The Impact of Contextual Reference Dependence on Purchase Decisions: An Experimental Study*

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Preliminary Version

Abstract

We test the implications of contextual reference dependence on consumers' purchase decisions in an experiment in which participants have to make a consumption choice between two sandwiches. In theoretical work, Karle and Peitz (2010a, 2010b) analyze how expectation–based reference points in the price and in the taste dimension affect the elasticity of demand when consumers observe prices across products from the outset—i.e., before forming their reference points—and product matches after the reference–point–formation stage but before purchase takes place. They derive the prediction that loss–averse consumers are more (resp. less) price–sensitive than standard consumers if price difference is sufficiently large (resp. small).

In this paper we make use of the fact that participants differ in the reported taste difference between sandwiches and the degree of loss aversion which we measure separately. We find that more loss–averse participants are more likely to switch to the cheaper sandwich if their reported taste difference is below a certain threshold.

Keywords: Loss Aversion, Reference-Dependent Utility, Behavioral Industrial Organization, Contextual Reference Points, Consumer Choice

JEL Classification: D83

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1 Introduction

There exists a large body of evidence in the marketing literature that consumer choice behavior is influenced by reference prices (see Mazumdar, Raj, and Sinha (2005) for an overview). Empirical findings with respect to the formation of reference prices, however, are less clear–cut. Some researchers such as Kalyanaram and Winer (1995) highlight the relevance of temporal reference prices which describes a weighted mean of past prices, while others such as Rajendran and Tellis (1994) emphasize the role of contextual reference prices which are based on the prices of the same product category at the moment of purchase. We follow this second line of research investigating contextual reference dependence. Our paper aims at testing predictions derived from an expectation–based micro founded model of contextual reference pricing. Using a one-shot consumption choice experiment with real products (sandwiches) allows us to isolate determinants of contextual reference dependence.[1]

In their theoretical work, Karle and Peitz (2010a,b) analyze how expectation–based reference points in the price and in the taste dimension affect the elasticity of demand when consumers observe price levels across products from the outset—i.e., before forming their reference points—and product tastes after the reference–point–formation stage but before purchase takes place.[2] As introduced by Karle and Peitz (2010a, b), loss–averse consumers in a symmetric setting rationally expect to choose a relatively cheap product with a higher probability ex post. This increases their realized losses if they end up buying a more expensive product ex post. Thus, loss aversion in the price dimension increases consumers' price sensitivity, while loss aversion in the taste dimension has the opposed effect. Depending on the size of the price difference, the former or the latter effect dominates. This means that more loss–averse consumers are more price–sensitive if price difference is sufficiently large (relative to taste differences).

In this paper we test this hypothesis making use of the fact that participants differ in the reported taste difference between sandwiches and the degree of loss aversion which we

[1]Our experiment is motivated by the postulated consumer behavior in Karle and Peitz (2010a) and Karle and Peitz (2010b), who presume that the actual price distribution is known from the beginning. In order to elicit participants' true product taste we depart from this assumption in the experiment: before participants have learnt and reported their tastes, we only announce price levels but not their allocation to sandwiches. Orthogonal to our motivation, market models as in Zhou (forthcoming) and Heidhues and Koszegi (2010) incorporate temporal reference pricing.

[2]See Heidhues and Koszegi (2008) which also apply the concept of expectation–based reference points introduced by Koszegi and Rabin (2006, 2007). They predict focal prices for an important market setting but postulate that prices are unobservable before consumers form reference points. In our experiment, however, price levels are observable at the reference–point–formation stage but their allocation to sandwiches is not.

measure separately in the experiment. We find evidence of expectation–based reference dependence. In particular, we find that more loss–averse participants are more likely to switch to the cheaper sandwich if their reported taste difference is below a certain threshold. Based on the theoretical choice model in Karle and Peitz we derive a logit estimator to test the significance of expectation–based reference dependence. Using an iterative method we account for the fact that participants' choices are affected by their expectations via their reference points. Applying this iterative logit estimator, we find a positive and significant effect of loss aversion in the price dimension.

Our paper complements other work that provides evidence of expectation–based reference dependence à la Koszegi and Rabin (2006). These works consist of exchange and valuation experiments (see Ericson and Fuster (2010)) and in experiments in which participants are compensated for exerting effort (see Abeler, Falk, Goette, and Huffman (2011)). Similarly, there is evidence that expectation–based reference dependence affects golf players' performance (see Pope and Schweitzer (2011)) and cab drivers' labor supply decision (see Crawford and Meng (2009)). As far as we are aware, we are the first to take a detailed look at expectation–based reference dependence in a controlled consumer choice setting.

2 Experiment

2.1 Design

In order to take account of the two dimensions of consumer loss aversion (price and taste), we use a two-dimensional compensation for participants: One sandwich for lunch and a monetary payment. Participants were invited for a "lunch experiment" with sandwiches. In the first part of the experiment participants had a choice between two sandwiches that differ in their horizontal characteristics. They were initially told that there will be a price difference of 1 Euro between the sandwiches which is not quality related (one sandwich will be sold at 4 Euro, the other one at 5 Euro and participants' budget will be 6 Euros) and that the prices will be revealed before making their sandwich choice. This was supposed to induce expectation-based loss aversion as in Karle and Peitz (2010a) and Karle and Peitz (2010b). Before sandwich prices were revealed participants were asked to taste both sandwiches and to rank their taste (5 categories from very bad to excellent). Then the price realization was announced and consumers made their sandwich choice. This first part of the experiment gave us information about participants' sandwich taste and about their choice behavior given the price difference of 1 Euro and the initial uncertainty about its realization.

In the second part of the experiment we independently measured participants' individual–specific degree of loss aversion by using monetary (loss) lotteries. Participants were endowed with a budget of 2 Euro and could win or loose up to 1 Euro given their lottery participation. We offered a menu of 18 lotteries of which one lottery was randomly drawn and paid out at the end. We simultaneously measured participants' risk aversion to better predict their loss aversion parameter. Loss aversion was subdivided in 4 categories from "loss loving or loss neutral" up to "strongly loss averse". Our hypothesis was that participants who showed a higher degree of loss aversion were more likely to choose the cheaper sandwich if the reported taste difference between the sandwiches was small (loss aversion in the price dimension dominates) and vice versa if the reported taste difference between the sandwiches was very large (loss aversion in the taste dimension dominates).

2.2 Implementation

The experiment was run at the experimental lab of the Department of Economics of the University of Mannheim in the Fall Term 2010 inviting students randomly of all semesters and of all faculties. We held 6 sessions of up to 24 participants. Two sessions were run in October (10/21 to 10/22) and another four sessions in December (11/30 to 12/03). This led to a total of 73 observations. But we had to rule out some observations because of inconsistent lottery choices in the second part of the experiment (8 obs.). Moreover, only the observations when participants liked the more expensive sandwich better are relevant for our analysis (35 obs.). Two types of sandwiches were offered, ham sandwiches (alternative 1) and sandwiches with camembert (alternative 2).[3]

3 Predictions

We consider the following timing:

Timing:

[3]Sandwiches were ordered from a local sandwich restaurant. In the announcement of the experiment it was announced that the experiment was not suitable for vegetarians. The sandwiches were warm and kept in thermos boxes. The sandwich price in the restaurant is 3.90 Euro.

1. Participant k learns her sandwich tastes $t_{1,k}$ and $t_{2,k}$ but still faces uncertainty with respect to sandwich prices: She is uncertain whether $\Delta p \equiv p_2 - p_1$ will be equal to 1 or -1.

2. Participant k forms a probabilistic reference point in the price dimension (buy at price p_1 or at p_2) and in the taste dimension (face a taste of $t_{1,k}$ or $t_{2,k}$)

3. She learns the price realization and makes her purchase decision, based on her utility that includes realized gains and losses relative to her reference–point distribution.

Since taste and price levels (but not price realizations) are observable at stage 2, participant k's reference point distribution in price and taste dimensions is determined by the "probability of choosing the cheaper product" conditional on k's characteristics.[4] We denote this probability by x_k:

$$\begin{aligned} x_k \equiv & Prob[y_k = 1|\Delta t_k, \lambda_k] \\ = & \frac{1}{2} Prob[y_k = 1|\Delta t_k, \lambda_k, \Delta p \geq 0] + \frac{1}{2} Prob[y_k = 1|\Delta t_k, \lambda_k, \Delta p < 0], \end{aligned} \tag{1}$$

where y_k describes k's sandwich choice ($y_k = 1$ refers to choosing the cheaper sandwich) and $\Delta t_k = t_{2,k} - t_{1,k}$ her taste difference in favor of sandwich 2. $\lambda_k \geq 1$ depicts k's utility weight on losses which measures her degree of loss aversion. The utility weight on gains is normalized to one. Thus, participant k is loss averse if $\lambda_k > 1$.

Suppose $i = 1$ is the cheaper sandwich ex post, say, the camembert sandwich. Now, consider only participant k in stage 3 who learnt that the camembert sandwich (sandwich 1) costs only 4 Euros but who like the ham sandwich (sandwich 2) better, that is, $\Delta p = 1$ and $\Delta t_k = t_{2,k} - t_{1,k} > 0$. A consumer's indirect utility of choosing the cheaper sandwich can be expressed as follows

$$\begin{aligned} u_1(p_1, p_2, t_{1,k}, t_{2,k}|x_k, \Delta p \geq 0) = & v + \beta t_{1,k} - \gamma p_1 + \delta Prob[p = p_2|x_k]\Delta p - \eta\lambda_k Prob[t = t_{2,k}|x_k]\Delta t_k \\ = & v + \beta t_{1,k} - \gamma p_1 + \delta(1 - x_k)\Delta p - \eta\lambda_k(1 - x_k)\Delta t_k \end{aligned} \tag{2}$$

with β, γ, δ and η being positive (marginal utility) parameters and v the reservation utility of receiving one sandwich. For $\delta, \eta > 0$ (and $\lambda_k > 1$), participant k experiences gain–loss utility in the price and the taste dimension. The larger is η relative to β the more matter gains and losses in the taste dimension. The larger is δ relative to γ the more matter gains

[4] See the definition of participants' personal equilibrium below.

and losses in the price dimension. As follows from equation (2), participant k faces a gain in the price dimension when buying the cheap sandwich (last but one term in second line) whose magnitude depends on the (marginal utility) parameter δ, the price difference Δp and the probability weight of facing the complementary event.[5] Participant k also experiences a loss in the taste dimension when buying the cheaper sandwich which she likes less ($t_{2,k} \geq t_{1,k}$; last term in second line). Her indirect utility if buying sandwich 2 equals

$$\begin{aligned} u_2(p_1, p_2, t_{1,k}, t_{2,k}|x_k, \Delta p \geq 0) =& v + \beta t_{2,k} - \gamma p_2 - \delta\lambda_k Prob[p = p_1|x_k]\Delta p + \eta Prob[t = t_{1,k}|x_k]\Delta t_k \\ =& v + \beta t_{2,k} - \gamma p_2 - \delta\lambda_k x_k \Delta p + \eta x_k \Delta t_k. \end{aligned} \quad (3)$$

In this case participant k faces a loss in the price dimension (last but one term in second line) since she has to pay 1 Euro more than for the other sandwich and a gain in the taste dimension (last term in second line) since she buys the sandwich she likes better. Taking into account that $\Delta p = 1$, we can derive the utility difference, $-\Delta u = u_1 - u_2$, conditional on x_k and $\Delta p \geq 0$:

$$\begin{aligned} -\Delta u_k|x_k, \Delta p \geq 0 =& (\gamma + \delta) \quad -(\beta + \eta)\Delta t_k + \quad \delta \quad (\lambda_k - 1)x_k \quad - \quad \eta \quad (\lambda_k - 1)(1 - x_k)\Delta t_k \\ =& \underbrace{\gamma_1}_{\oplus} \quad + \underbrace{\gamma_2}_{\ominus} \Delta t_k + \underbrace{\gamma_3}_{\oplus} (\lambda_k - 1)x_k \quad + \underbrace{\gamma_4}_{\ominus} (\lambda_k - 1)(1 - x_k)\Delta t_k \end{aligned} \quad (4)$$

This equation shows that a loss–averse participant k faces a net gain in the price dimension (last but one term in the second line) and a net loss in the taste dimension (last term in the second line) when deciding in favor of cheaper, less liked sandwich 1 ($-\Delta u > 0 \Leftrightarrow u_1 > u_2$). Without loss aversion ($\lambda_k = 1$ or $\gamma_3, \gamma_4 = 0$), she makes a standard sandwich choice.

To move towards a testable model, we introduce an error into participant k's behavior. Following standard discrete choice theory, the error is assumed to be additive, logistically distributed, and i.i.d. across consumers.[6] Then, in the case of $\Delta p \geq 0$ she chooses sandwich 1 with the probability that $-(\Delta u_k|x_k, \Delta p \geq 0)$ is positive—i.e., $Prob[y_k = 1|\Delta t_k, \lambda_k, \Delta p \geq 0] = Prob[\Delta u_k < 0|x_k, \Delta p \geq 0]$. In the case of $\Delta p < 0$, k's preferred sandwich (sandwich 2) is also the cheaper one. For simplification we assume that she will choose sandwich 2

[5]Cf. Koszegi and Rabin (2006) for an illustration.

[6]To identify their equilibrium believes (personal equilibrium) in our empirical analysis, we use that participants face choice uncertainty. If their choice was deterministic conditional on the price realization instead, we could not include their equilibrium believes in our empirical analysis. See Section 4 for further details.

for sure.[7] Thus, $Prob[y_k = 1|\Delta t_k, \lambda_k, \Delta p < 0] = 0$.

We now can describe participant k's personal equilibrium strategy x_k which completes the specification of her choice problem in (4): Given that $\Delta t_k > 0$, if $\Delta p \geq 0$, choose sandwich 1 with probability $Prob[\Delta u_k < 0|x_k, \Delta p \geq 0]$ and if $\Delta p < 0$ never choose sandwich 1. That is,

$$x_k = \frac{1}{2} Prob[\Delta u_k < 0|x_k, \Delta p \geq 0]. \tag{5}$$

The concept of personal equilibrium requires that k holds rational expectations about her choice in equilibrium and that her choice in equilibrium is optimal given her expectations.[8] Finally, we can derive our main hypothesis from equation (4).

Hypothesis: Participants who like the more expensive sandwich better ($\Delta t_k > 0$) and show a positive degree of loss aversion ($\lambda_k > 1$) are more likely to switch to the cheaper sandwich than otherwise identical participants with a lower degree of loss aversion (if the reported taste difference is sufficiently low).

The statement in the hypothesis focusses on the taste interval in which loss aversion in the price dimension dominates that in the taste dimension given the price difference of 1 Euro. For a sufficiently large taste difference, the effect of loss aversion could be reversed due to the dominance of loss aversion in the taste dimension.

4 Results

4.1 Degree of Loss Aversion

To measure participants' degree of loss aversion λ_k, we used their reported cutoff value in loss lottery series B (see the Appendix). We adjusted for risk aversion, which we found to be prevalent although monetary payoffs were rather small, by using participants' cutoff value in lottery series C. The cutoff values were defined respectively by the highest

[7] We did not find any inconsistent behavior with respect to sandwich choice in our sample. We therefore do not believe that participants held expectations different from zero about choosing a more expensive sandwich they like less. Nevertheless, we considered a specification in our empirical analysis in which we took noise into account for the case of $\Delta p < 0$. The results were almost identical to the simpler specification. Compare columns (5) and (6) to (3) and (4) in Table 2.

[8] Cf. Koszegi and Rabin (2006).

absolute value in a participant's choice interval. Her choice interval had to include all lower absolute values for her response to be consistent.[9] We applied the exponential utility representation proposed by Tversky and Kahneman (1992) to identify λ_k,[10]

$$u_k(x) = \begin{cases} x^{\beta}, & \text{if } x \geq 0; \\ -\lambda_k(-x)^{\beta} & \text{o/w}, \end{cases} \tag{6}$$

where $\lambda_k > 1$ represents loss aversion and $\beta \in (0, 1)$ risk aversion in gains and risk love in losses (and vice versa for $\beta > 1$). For lottery series B a natural candidate for a reference point is zero. We abstract from probability weighting, another integral part of prospect theory, in our setup as probabilities considered in the lottery series B and C are close to one half.

We find a share above 75% of participants being slightly risk averse or risk neutral and the remaining share being slightly risk loving (mean = 0.881, σ = 0.312). To not rely on outliers, we categorized the measured degree of loss aversion λ_k in four categories from "loss seeking or neutral" to "strongly loss averse" (cf. the bottom line in Table 1 about their frequency). We normalize loss neutrality to zero. So the categories show values from 0 to 3 and therefore measure $\lambda_k - 1$.[11]

4.2 Choice Behavior

About 80 percent of the participants liked the ham sandwich better (they were asked before learning the realized prices and thus their responses can be considered to be unbiased). In 6 out of 7 sessions, the ham sandwich was the more expensive sandwich (i.e., for ham $i = 2$). Due to the price disadvantage of 1 Euro, 31.71% of the participants that liked the more expensive sandwich better (36.26% for weakly better), actually switched to the cheaper sandwich. So the experimental setup (with respect to the taste of the provided sandwiches and the price difference of 1 Euro) induced a positive, intermediate amount of switching behavior/choice reversals which we could exploit for our empirical analysis.

We now turn to the main results: (i) Considering sandwich choice of participants who liked the more expensive sandwich better, we find a monotonous positive relationship

[9]Out of 151 total responses we found only 8 to be inconsistent which we deleted. This suggests that participants must have understood our instructions about the lottery setup fairly well. Their responses created cutoffs although they were not forced to report cutoff values directly.

[10]To be as robust as possible, we assumed the curvature for gains and losses to be identical.

[11]The mean of categorized measure of loss aversion is 1.63 which equals a λ of 2.63.

Table 1: Impact of Loss Aversion on Sandwich Choice

Δt_k	y_k	$(\lambda_k - 1)$:	0	1	2	3	Total
0	0	obs.		2	0	0	2
		freq.		50	0	0	28.57
0	1	obs.		2	1	2	5
		freq.		50	100	100	71.43
0	Total	obs.		4	1	2	7
		freq.		100	100	100	100
1	0	obs.	2	10	7	3	22
		freq.	66.67	66.67	53.85	42.86	57.89
1	1	obs.	1	5	6	4	16
		freq.	33.33	33.33	46.15	57.14	42.11
1	Total	obs.	3	15	13	7	38
		freq.	100	100	100	100	100
2	0	obs.	2	8	7	3	20
		freq.	100	88.89	87.5	75	86.96
2	1	obs.	0	1	1	1	3
		freq.	0	11.11	12.50	25.00	13.04
2	Total	obs.	2	9	8	4	23
		freq.	100	100	100	100	100
3	0	obs.		2	1	1	4
		freq.		66.67	100	100	80
3	1	obs.		1	0	0	1
		freq.		33.33	0	0	20
3	Total	obs.		3	1	1	5
		freq.		100	100	100	100
	Total	obs.	5	31	23	14	73

Table 1: $y_k = 1$ means that the cheaper sandwich was chosen. $\Delta t_k > 0$ means that the participant likes the more expensive sandwich better.

between loss aversion and the choice of the cheaper sandwich for each level of taste difference except for the category with the largest taste difference ($\Delta t_k = 3$), see Table 1. In that category the relationship is weaker and reversed. This supports our hypothesis that loss aversion in the price dimension makes participants more likely to switch to the cheaper sandwich. Furthermore, the results in Table 1 indicate that, for the maximum category of taste difference in our sample, the combination of intrinsic disutility and loss aversion in the taste dimension seem to dominate loss aversion in the price dimension.

(ii) Based on the theoretical choice model in Karle and Peitz we derived a logit estimator in Section 3 in order to test the significance of expectation–based reference dependence (cf. equation (4)). Due to multi-collinearity between the variables taste difference and net loss in the taste dimension (last term in (4)), we could not consider the impact of loss aversion in the taste dimension in our regression analysis. We therefore restricted the sample to taste differences for which loss aversion in the price dimension is dominant ($\Delta t_k \in [0, 2]$) as can be observed in Table 1. Table 2 illustrates the estimation

Table 2: Probability of Choosing the Cheap Sandwich: $Prob(y_k = 1|\Delta p \geq 0)$

	Logit: Naive Expectations		Logit: Rational Expectations		Logit: Rational Expectations⁺		Logit: No Expectations	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δt_k	-1.493***	-1.447***	-1.071**	-1.026*	-1.041*	-0.995*	-1.446***	-1.443***
	(0.004)	(0.005)	(0.048)	(0.066)	(0.058)	(0.078)	(0.004)	(0.005)
$(\lambda_k - 1)\hat{x}_k$	3.124*	3.311*	2.205*	2.257*	2.251*	2.305*		
	(0.091)	(0.082)	(0.079)	(0.077)	(0.083)	(0.081)		
Age		0.058		0.056		0.056		0.058
		(0.463)		(0.478)		(0.475)		(0.449)
Gender (M.)		0.429		0.422		0.420		0.409
		(0.468)		(0.476)		(0.478)		(0.474)
Meal Ex.		-0.132		-0.119		-0.119		-0.079
		(0.481)		(0.526)		(0.529)		(0.658)
Constant	0.178	-1.023	-0.073	-1.241	-0.141	-1.323	1.079*	-0.242
	(0.826)	(0.608)	(0.934)	(0.538)	(0.879)	(0.516)	(0.083)	(0.899)
N. Obs.	68	68	68	68	68	68	68	68
Pseudo R^2	0.1511	0.1683	0.1547	0.1702	0.1536	0.1691	0.1167	0.1315

Table 2: In the logit regressions with naive expectations, the sample mean is used to measure the ex ante probability of choosing the sandwich liked less (given the observed taste differences), i.e., $\hat{x}_k = \bar{y}_k/2$, while in the second and third specifications an individual–specific estimate is used (see main text). In the third specification the estimate puts a positive probability on choosing the more expensive sandwich participants like less. The fourth specification does not consider loss aversion. P-values are in parentheses. Significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

results. In the first two columns a naive estimate of the ex ante probability of choosing the sandwich which liked less, $\hat{x}_k$, is used: $\hat{x}_k$ is replaced by one half times the sample mean of the choice variable y_k. This means that, before observing the price realization, each participant expects to end up buying the product liked less with identical probability (which is equal to $\hat{x}_k = 0.181$ here).[12] In column (3) and (4), $\hat{x}_k$ is an estimate of participants' rational expectations about their switching probability given their characteristics, i.e., $\hat{x}_k = 1/2 \cdot \hat{Prob}[\Delta u_k < 0|x_k, \Delta p \geq 0]$. We estimated the switching probability iteratively and, in order to avoid endogeneity problems, used the sample mean (times one half)

[12]See Table 3 in the Appendix for a descriptive statistics of all regressor variables.

as an unconditional estimate for the lagged value of $\hat{x}_k$:

$$\hat{x}_{k,t+1} = \frac{1}{2}F\Big(\hat{\gamma}_{1,t} + \hat{\gamma}_{2,t}\Delta t_k + \hat{\gamma}_{3,t}(\lambda_k - 1)\frac{\bar{y}_k}{2}\Big), \tag{7}$$

where $F(\ )$ is the logistic cdf. Convergence of the iterative estimation was reached after a number of 25 to 28 iterations. The mean of $\hat{x}_{k,\infty}$ is equal to 0.170 (which is close to $\bar{y}_k/2$) and individual–specific $\hat{x}_{k,\infty}$'s vary between 0.049 and 0.378. In column (5) and (6), $\hat{x}_k$ is estimated in a similar procedure as the previous one but a positive probability is put on choosing the more expensive sandwich which is liked less, i.e., $\hat{x}_k = 1/2 \cdot \hat{Prob}[\Delta u_k < 0|x_k, \Delta p \geq 0] + 1/2 \cdot \hat{Prob}[\Delta u_k < 0|x_k, \Delta p < 0]$. In column (7) and (8) estimations which do not include measures of loss aversion are presented. The even column additionally include control variables as age, a gender dummy (male = 1) and a measure of the average expenditure for lunch per week.

As predicted in equation (4), in all regressions including measures of loss aversion we find a significantly negative effect of the reported taste difference ($\gamma_2 < 0$) and a significantly positive effect of the loss aversion in the price dimension ($\gamma_3 > 0$). The logit regressions with rational expectations in column (3) and (4) show the highest R squared (17.02% with controls) and the highest significance level for loss aversion in the price dimension (7.7% with controls). The logit regressions in column (7) and (8), which do exclude measures of loss aversion, show a notably lower R squared; for instance compare column (1) and (2). This indicates that measures of loss aversion notably add explanatory power to the estimation beyond those of standard preferences.

(i) and (ii) strongly support our hypothesis.

4.3 Discussion

- The coefficients of the constant in logit regressions have to be interpreted differently. This can explain why $\hat{\gamma}_1$ is found to be negative in several regressions in table 2.
- If participants had believed that the more tasty ham sandwich is more likely to the more expensive one, this should not have affected the significance of our estimates. For instance consider column (1) and (2) in Table 2. With naive expectations $\hat{x}_k$ is just a constant pre-multiplier of independent variable $(\lambda_k - 1)$.

TBE

5 Conclusion

Our experimental evidence suggests that information on the degree of loss aversion extracted from lotteries predicts behavior in consumption choice experiments. By presenting participants a one-shot consumption decision problem and by implementing a pre-consumption blind tasting, our experiment has successfully excluded the possibility that participants had formed reference point based on past purchases. Through tasting and the announcement of the price distribution, participants could form contextual reference points. Our results suggest that reference dependence matters for consumption decisions. TBE

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Appendix

A Tables

Table 3: Descriptive Statistics for $\Delta t_k \in [0, 2]$

Variable	Obs	Mean	Std. Dev.	Min	Max
y_k	68	0.353	0.481	0	1
Δt_k	68	1.235	0.626	0	2
$(\lambda_k - 1)$	68	1.632	0.879	0	3
Age	68	23.971	3.612	18	35
Gender (M.)	68	0.574	0.498	0	1
Meal Ex.	68	4.331	1.969	2	15
$\hat{x}_k$, Naive, col.(1)	68	0.181	0	0.181	0.181
$\hat{x}_k$, Rat. Exp., col. (3)	68	0.170	0.079	0.049	0.378
$\hat{x}_k$, Rat. Exp.$^+$, col. (5)	68	0.186	0.080	0.077	0.374

Table 3: Meal Ex. measures participants' reported average expenditure for lunch per week and Gender is a gender dummy which is equal to one for male. The three last rows measure the ex ante probability of switching to the sandwich liked less $\hat{x}_k$ used in the regressions in Table 2.

B Instructions

TBA