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Willingness-To-Pay for Food of the Own Region: Empirical Estimates from Hypothetical and Incentive Compatible Settings

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Abstract

The ongoing liberalisation of the European food market provides incentives to producers to seek for innovative strategies of product differentiation. One possibility to differentiate the own product from competing ones is its region-of-origin. In this paper, we investigate consumers' willingness-to-pay and underlying preferences for food of the own region. We consider fresh milk as an example. Underlying data stem from a hypothetical contingent valuation and from an incentive compatible experimental setting with real payoffs. We find that consumers perceive fresh milk from local farmers as a trustful, high quality product, and that consumers are interested in supporting local producers. Given that price premiums are small, both methods suggest a substantial demand for local products. However, compared to contingent-valuation estimates, the inclusion of real payoffs leads to a significant decrease in the willingness-to-pay stated. This decrease can mainly be assigned to "pretending altruists": free riding subjects who respond according to social norms as long as no costs are involved.

Keywords: consumer preferences for locally produced food products, experiments, altruism, externalities

JEL classification: C93, D62, D64, Q21

1 Introduction

Contingent valuation (CV) is a popular method especially for estimating perceived values of non-market goods. Nevertheless, many researches, like Diamond and Hausman (1994), heavily doubt the validity of the data derived. One major objection raised against CV is that it is hypothetical in both the payment for the good and its provision. As a consequence, "customers can have a tendency to de-emphasize price, since they do not actually have to pay the price" (Goett et al., 2000, p. 27). This hypothetical bias might cause people to overstate their true valuation of the good. A number of studies find substantial support for this hypothesis (cf., for example, Cummings et al., 1995, List and Gallet, 2001, Loomis et al., 1997, or Neill et al., 1994, for an overview). However, there is no indication of a "typical" bias compared to the "true" valuation derived from market or experimental data. On the contrary, biases found are rather volatile: as an example, –43 percent in Johannesson et al. (1998) and +2.600 percent in Neill et al. (1994).

This article presents the results of a field test of the willingness-to-pay (WTP) for local products based on a CV and an experimental setting. Our approach was *between*-subjects: Each respondent was assigned to one of the two settings only. The CV described a hypothetical situation in which a subject with a given monetary endowment was asked to state her additional WTP for a product of her own region compared to the same product from another region. To minimise biases, we employed a cheap-talk design: CV participants were told that hypothetical bias might lead people to misstate their true WTP, and we therefore asked them to act as if the situation was real. Previous work indicates that cheap talk is effective in reducing the WTP (Cummings and Taylor, 1999, or List, 2001) – at least for not-knowledgeable participants (Lusk, 2003). Participants in the experimental setting knew in advance that they would participate in a lottery with a 20 percent chance of winning after

having completed the questionnaire. The questionnaire design was exactly the same as in the hypothetical setting. The payoff consisted of the monetary endowment (minus a random selling price) and a quantity of a non-local good (local good) if individual WTP was less (larger or equal) the random selling price. This so-called Becker-de Groot Marschak (BDM) payoff mechanism is incentive compatible in the sense that a subject's (weakly) dominant strategy is the truthful revelation of her preferences.

In our surveys, subjects were asked to state their WTP for a product *from their own region* compared to the same product from another region. This *intra*-regional approach is different from *inter*-regional strategies investigated in most previous research, in which products of a specific region – in particular specialities of a region (like parmesan cheese) - are sold in *other regions* (cf., for example, van der Lans et al., 2001). A positive WTP for local provenance might be driven by altruistic and/or egoistic motives. For example, altruists might derive satisfaction from the reduction of transport-related air pollution which again contributes to preserving the environment, or from the preservation of local jobs. Impure altruists might derive satisfaction from the contribution itself, the "warm glow" of giving (Andreoni, 1990). A stronger confidence in the quality and safety of local products, and a preference for diversification might be pure egoistic motives.

One motivation for our research stems from concerns with validity checks of CVs in the past. These validity checks are typically based on rather small specialised samples (of students) and/or were conducted in the uncommon environment of a laboratory. Instead of this standard procedure, our field experiment is "artefactual" (Harrison and List, 2004): we approached the relevant population group, consumers, in their ordinary environment, in a supermarket. Thus, socio-demographic characteristics, which again might affect the individual demand behaviour, are less

concentrated. Moreover, previous studies frequently referred to commodities rather unfamiliar to the subjects, like a specific reduction of air pollution. In our setting, we varied only one characteristic – the point of origin – of a well-known everyday product. When compared to the experimental setting, we find that the hypothetical CV still leads to a significant but quantitatively small upward-shift of the WTP stated.

Another aim of our research is the identification of person groups whose responses are more prone to be hypothetically biased than others. In opinion polls, people typically tend to respond according to social norms. The reason is that such a "socially desirable" behaviour is at no costs and prevents the subjects from further displeasing enquiries. One might conjecture that responses of "confident" subjects, who feel sure about their behaviour and do not care (much) about the opinion of others, are less affected from this bias as compared to subjects who strongly care about the opinions of others. In our survey, subjects were asked to state the motives determining individual WTP for a local product. Therefore, we were able to distinguish between (a) "egoists" who opted for the local product mainly for reasons of improved product characteristics, and (b) "altruists" who stated that they chose the local product mainly to generate positive external effects. Following the reasoning outlined above, hypothetical bias should typically be more pronounced for (pretending) altruists when compared to "confident" subjects who claim to follow predominantly egoistic motives. Our data affirm this hypothesis. Thus, calibrating WTP responses in CV surveys according to such attitude-based data might be a useful step to generate more reliability in the data set.

The paper is structured as follows: Based on a basic consumer model, Section 2 explores the potential reasons that might drive WTP for products of the own region. Section 3 describes the data-collection process, the survey design and the BDM

payoff mechanism. Section 4 includes the empirical data and the statistical tests undertaken. Section 5 concludes.

2 A basic consumer model

We consider a consumer model similar to Cornes and Sandler (1984, 1994). In this model, spending on a private activity has characteristics of both, a private and a public good. Assume that a person receives an exogenous monetary transfer y. This transfer is at the person's free disposal and can be spent on either a numéraire good, a composite private consumption good, denoted x_1, or on changing one specific characteristic of another good, e.g.: The point of origin, of a given quantity of another product. More precisely, the subject is asked to state the maximum price premium $P \in [0, y]$, she would be willing to pay for substituting the quantity m^{nl} of a non-locally produced good, namely fresh milk, by the same quantity m^{l} of the same good coming from her own region. By choosing P, the subject simultaneously determines $p = P/m^{l}$, the average price premium of the locally produced good compared to the same non-locally produced good.

Substituting m^{nl} by m^{l} causes four effects which might affect the subject's utility level:

1. The available consumption quantity of the numéraire good reduces to $x_1 = y - P = y - pm^{l}$;
2. $x_2 = pm^{l} = P$ units of a private good, the "warm glow" of giving (Andreoni 1989, 1990) stemming from moral satisfaction from the contribution itself.
3. $x_3 = \Phi[m^{l}/(m^{l}+m^{nl})]$ units of a private good, superior qualitative characteristics (fresher, tastier, etc.) assigned to locally produced fresh milk relative to fresh milk stemming from other regions; Φ is a technical function which converts the share of the regionally produced goods in total consumption of the same product to x_3.

4. $x_4 = \Theta\, m^l$ units of an external effect, like an improvement of environmental quality from the reduction of transport emissions (pollutant emissions, noise etc.) or the preservation of local jobs. Θ is again a technical function which transforms the quantity m^l into an external effect.

We assume that all goods can be measured in monetary units and that consumers' preferences can be represented by a well-behaved utility function of the following type:

$$U(x_1, x_2, x_3, x_4) = U(y - pm^l, pm^l, \Phi\left[m^l \big/ (m^l + m^{nl})\right], \Theta m^l)$$

with $\partial U / \partial x_i \geq 0$ and $\partial^2 U / \partial x_i^2 \leq 0$ for *i = {1,2,3,4}*. In our surveys, we asked for our subjects' maximum WTP for substituting the quantity m^{nl} of non-locally produced milk by the quantity m^l coming from local producers. Given that this substitution was linked to a positive WTP, each subject then solved the equation

$$U(y,0,0,0) = U(y - p^* m^l, p^* m^l, \Phi\left[m^l \big/ (m^l + m^{nl})\right], \Theta m^l)$$

by determining p^*. Taking $m^l = p = 0$ as the starting point, differentiating this equation with respect to the choice variables p and m^l yields

$$-\partial U / \partial x_1 d\left[p^* m^l\right] = \partial U / \partial x_2 d\left[p^* m^l\right] + \partial U / \partial x_3 d\left[\Phi\left[m^l \big/ (m^l + m^{nl})\right]\right] + \partial U / \partial x_4 d\left[\Theta m^l\right]$$

The optimal price premium p^*, therefore, equates the utility loss from a reduction in the consumption of the numéraire good, $-\partial U / \partial x_1 d\left[p^* m^l\right]$, and the utility gains resulting from (a) "warm glow", $\partial U / \partial x_2 d\left[p^* m^l\right]$, (b) improved quality of the good, $\partial U / \partial x_3 d\left[\Phi\left[m^l \big/ (m^l + m^{nl})\right]\right]$, and (c) an external effect, $\partial U / \partial x_4 d\left[\Theta m^l\right]$. Whether

$\partial U / \partial x_i > 0$ or $\partial U / \partial x_i = 0$ does, of course, depend on the individual preferences of subject *j*. For example, $\partial U / \partial x_2 = \partial U / \partial x_4 = 0$ for "pure egoists", while $\partial U / \partial x_2 > 0$ *for* "warm glowers" and $\partial U / \partial x_4 > 0$ for subjects who opt for the local product for altruistic reasons. The empirical examination follows in Section 4, testing for the derivatives' significance and sign.

3 Survey and data

3.1 Data collection

The survey was conducted with adults in March-April 2004 in the German federal state Hesse. We collected a nearly equal share of CV and experimental data at each location. Furthermore, we assured that each respondent participated in only one of the two settings. People were approached in four supermarkets by a group of five interviewers. All interviewers got detailed instructions and definitions of the phrases to be used during the interviews. The questionnaire was fully computerized.

A problem that might equally affect the reliability of the CV and experimental data is sample-selection bias. I.e., the probability of participation might be affected by the information which is given during the recruitment process. For example, subjects who share a high interest in regional products or in the support of the environmental might be over represented if we asked people to participate in a survey on "food from the own region". In fact, while market research indicates significant WTP for green food, for example, only a small fraction of consumers finally opt for green products. To minimise such biases, we chose a rather broad description of the survey topic by asking the people to participate in an opinion poll "on the topic milk".

3.2 Survey design

In both the CV and the experimental setting, subjects were asked first to state some of their personal characteristics. Besides the typical economic and demographic characteristics, subjects' post codes were collected to distinguish between rural and urban citizens. We also asked each subject how much of her weekly consumption of milk (in the categories 0%, 12,5%, 25%, 50%, 75% and 100%) referred to ecologically produced milk (subsequently denoted "eco milk") and conventionally produced milk (subsequently denoted "conventional milk").[1]

Then, all the subjects were shown a computer screen where at the upper part of the screen a quantity of fresh milk *from non-Hessian farmers and dairies* was given. The quantity $m = \{2, 4, 6, 8 \text{ litres}\}$ varied proportionally with the subjects' household size $h = \{1, 2, 3, 4+ \text{ persons}\}$ and corresponds to the average weekly consumption of fresh milk in Germany. According to the individual consumption behaviour stated, this quantity was assigned to milk types $t = \{E, C\}$, eco milk (E) and conventional milk (C). Thus, m_E (m_C) is the respective consumption quantity of eco milk (conventional milk). In addition, each subject was endowed with a "free disposable budget" of $y = m \times 1$ *Euro/litre.*[2] Utilising this endowment, subjects were asked to state the maximal price mark up $P = \{P_E, P_C\}$ with $y \geq P_E + P_C$ they would be willing to pay if the respective quantities of milk came from local Hessian farmers and dairies. This price premium was collected in two blank fields in the lower part of the computer screen and caused a 1:1 reduction of the "remaining free disposable budget" $y_R = y - P_E - P_C$ which was also displayed.

[1] Information on the subjects' economic and demographic characteristics as well as their consumption behaviour can be provided by the authors upon request.

[2] This upper bound was chosen on the basis of an unbounded pre-test where in no case WTP exceeded 1 Euro per litre in order to reduce the costs of the experimental setting.

While the decision situation in the CV neither caused a real money transfer nor meant a real purchase, the BDM mechanism was implemented in the experimental setting determining real payoffs in terms of money ("remaining free disposable budget") and in terms of a milk quantity (eco milk or conventional milk of local or non local provenance).[3] Section 3.3 elaborates on the payoff mechanism in more detail.

In order to identify the motives behind individual WTP, we asked the subjects to rate several product attributes[4] of locally produced milk compared to milk from other regions (*freshness, clarity, retraceability, quality,* and *environment*), and whether they would like to subsidise local farmers on a 5-point likert scale *LS = {1 = full approval, …, 5 = full refusal)*. As regards to the product attributes, we additionally asked dichotomous questions *DQ = {1 = yes, 0 = no}* whether the respondent was willing to accept a price premium regarding an enhancement of the respective attribute. For example, we asked the subjects whether they thought that milk of the own region is "qualitatively better" compared to milk from other regions and – additionally – whether they would accept a price premium for such a "quality enhancement". We followed this sequential procedure since a subject might assign positive attributes to regional products but, nevertheless, might not accept a price mark up for these attributes since her consumer surplus of the attribute's enhancement is zero.

[3] See the Appendix for the translated exact wording.

[4] See Table A1 in the Appendix for details. The selection of the attributes is based on a 30 people pre-test where subjects were asked to state the product attributes they assigned to fresh milk of the own region.

3.3 Payoff mechanism

At the beginning of an interview, participants of the experimental setting were told that at the end of the survey they would participate in a lottery with a 20 percent chance of winning. Winners received a quantity of (non-)regional fresh milk and a monetary amount, both dependent upon the WTP stated. Like the participants of the CV, losers received a small compensation for their time and cognitive effort. The BDM mechanism used (Becker *et al.*, 1964) is incentive compatible in the sense that it is the (weakly) dominant strategy for each subject to truthfully reveal her preferences. Its functioning is as follows: Subjects submit WTP for a good. Afterwards, a random selling price is drawn from a distribution of possible prices with support on an interval from zero to the WTP maximally anticipated. In the experimental setting, for both milk types $t = \{E, C\}$, we therefore compared individual WTP, $P = \{P_E, P_C\}$, with the random selling price $P_S = \{P_{SE}, P_{SC}\}$. If the random selling price for the respective milk type was less (greater/equal) then individual WTP, then the subject received her weekly consumption of milk from the own region (from other regions), and her “remaining free disposable budget” (“free disposable budget”). The intuition of the BDM mechanism being incentive compatible is the following. If, on the one hand, the random selling price falls between the stated WTP and the true WTP, the individual has foregone a beneficial trade. Thus, subjects have no interest to understate WTP. If, on the other hand, the random selling price is greater than the true WTP but less than the stated WTP, the subject is required to buy the good at a price greater than her true WTP. Thus, for each subject it is the weakly dominant strategy to state her true WTP. The BDM mechanism was explained to the subjects before the decision situation was presented.

4 Empirical results

4.1 Sampling and data

The overall sample consists of 361 respondents. We collected this sample in March-April in the dairy-product section of supermarkets in three different Hessian cities, Hofgeismar (small rural town; about 14,500 inhabitants), Kassel (many public authorities; about 194,800 inhabitants), and Marburg (high fraction of students; about 74,500 inhabitants). Both settings were applied in each city. The number of observations for each location and setting is given in the first row of Table 1. It also states the distribution of personal characteristics of our respondents and – if available – of the total population in Hesse to give an idea of the sampling efficiency. The comparison reveals only one major bias: Compared to the overall Hessian population, there is a substantial higher fraction of females in the survey sample. This discrepancy results from the fact that in Germany daily groceries are mainly done by females.

Table 1: Breakdown of the Sample

		Subregion	A		B		C		Overall sample	Overall region [a]
			Exp	CV	Exp	CV	Exp	CV		
Variable		N =	52	103	53	52	50	51	361	6,092,000
Gender	Male		28.8	42.7	32.1	25.0	28.0	29.4	32.7	49.0
	Female		71.2	57.3	67.9	75.0	72.0	70.6	67.3	51.0
Age [b]	< 25 years		13.5	15.5	3.8	7.7	24.0	17.6	13.9	15.2
	25-45 years		38.5	38.8	41.5	67.3	48.0	47.1	45.7	33.3
	45-65 years		34.6	33.0	37.7	15.4	26.0	17.6	28.3	34.2
	65+ years		13.5	12.6	17.0	9.6	2.0	17.6	12.2	17.2
Education	No degree, primary school		23.1	28.2	7.5	11.5	8.0	9.8	16.6	---
	Secondary school		44.2	37.9	13.2	32.7	18.0	7.8	27.4	---
	German secondary school		26.9	21.4	32.1	25.0	48.0	52.9	32.4	---

	Technical school or university degree	5.8	12.6	47.2	30.8	26.0	29.4	23.5	---
Occupation	Unemployed or welfare recipient [c]	3.8	1.9	0.0	3.8	8.0	2.0	3.0	8.2
	Pupil, student, trainee	9.6	14.6	3.8	13.5	44.0	37.3	19.4	---
	Blue-collar worker	13.5	12.6	1.9	7.7	2.0	2.0	7.5	11.6
	White-collar worker or civil servant	42.3	35.9	35.8	42.3	30.0	27.5	35.7	27.9
	Self-employed	1.9	5.8	13.2	13.5	4.0	9.8	7.8	5.0
	Pensioner	17.3	18.4	26.4	9.6	8.0	15.7	16.3	---
	Houseman or -wife	11.5	10.7	18.9	9.6	4.0	5.9	10.2	---
% lifetime in region	< 25%	11.5	16.5	15.1	11.5	28.0	25.5	17.7	---
	25%-49%	17.3	10.7	17.0	15.4	18.0	17.6	15.2	---
	50%-74%	9.6	7.8	24.5	9.6	14.0	13.7	12.5	---
	75% and more	61.5	65.1	43.4	63.5	40.0	43.1	54.6	---
Household size	1 person	11.5	11.7	18.9	25.0	34.0	29.4	20.2	35.7
	2 persons	34.6	32.0	34.0	23.1	26.0	29.4	30.2	34.5
	3 persons	11.5	30.1	24.5	17.3	22.0	17.6	21.9	14.4
	≥ 4 persons	42.3	26.2	22.6	34.6	18.0	23.5	27.7	15.4
Children	0	57.7	64.1	58.5	46.2	86.0	76.5	64.5	67.5
	1	19.2	21.4	20.8	23.1	8.0	15.7	18.6	16.6
	2	17.3	7.8	13.2	26.9	4.0	7.8	12.2	12.0
	3 and more	5.8	6.8	7.5	3.8	2.0	0.0	4.7	3.9
Income [d]	<938 Euro	7.7	11.7	5.7	11.5	24.0	23.5	13.6	12.7
	938-2,344 Euro	53.8	57.3	35.8	46.2	56.0	43.1	49.9	57.8
	2,345 Euro and more	38.5	31.1	58.5	42.3	20.0	33.3	36.6	29.5

Table note. A denotes Hofgeismar, *B* denotes Kassel, and *C* denotes Marburg. *N* is the number of observations. All entries are percentages of the overall number of observations in the respective sample. For Hesse, percentages for the variables "household size", "children" and "income" are calculated to the base of the overall number of households.

[a]: Own calculations based on the Statistisches Landesamt Hessen, 2003 [State Office of Statistics of Hesse].

[b]: Other intervals for the overall Hessian population: < 15 years; 15-39 years; 40-64 years; 65 years and older.

[c]: Double counts possible for overall Hessian population.

[d]: Household net income per month. Other intervals for the overall Hessian population: < 920 Euro; 920-2,600 Euro; > 2,601 Euro.

For each household type separately, Table 2 summarises the weekly consumption of milk referred to eco milk and conventional milk. The data suggest that multi-person households have a (slightly) higher preference for eco milk compared to one-person households.

Table 2: Consumption of Eco Milk across Household Types

# HH members	N	Percentage of eco milk in total milk consumption					
		0%	12,50%	25%	50%	75%	100%
1	73	41	11	3	5	5	8
		(56.16)	(15.07)	(4.11)	(6.85)	(6.85)	(10.96)
2	109	51	16	6	13	4	19
		(46.79)	(14.68)	(5.50)	(11.93)	(3.67)	(17.43)
3	79	29	15	10	9	5	11
		(36.71)	(18.99)	(12.66)	(11.39)	(6.33)	(13.92)
4	100	48	14	5	5	2	26
		(48.00)	(14.00)	(5.00)	(5.00)	(2.00)	(26.00)

Table note. Numbers of observations in overall sample for each household type. Percentages in parentheses.

Descriptive statistics on our subjects' attitudes on locally produced milk compared to milk from other regions, and their readiness to accept a price premium for an enhancement of these attributes are summarised in Table 3. It also contains information on the subjects' preferences to subsidise local farmers. Regarding the assessment of the five pre-specified product attributes, the picture is ambiguous: a substantial fraction of our subjects trust in the specified point of production (*retraceability*), thinks that the point of production is easy to identify (*clarity*), and think that the consumption of milk from the own region means less pollution of the environment (*environment*). At the same time, they state to be willing to accept a price premium for an enhancement of these three attributes. There also seems to

exist a broad consensus among the interviewees of being willing to subsidise the local milk producers (*support*). On the other hand, people do not tend to believe that milk from the own region is fresher (*freshness*) or qualitatively better (*quality*) compared to milk from other regions. However, there is a significant fraction of interviewees who would accept a price premium for an enhancement of milk quality.

Table 3: Assessment of Product Attributes and Price Premium Acceptance

Variable	Likert scale categories					Price premium acceptance	
	1	2	3	4	5	yes	no
Freshness	45 (12.47)	42 (11.63)	112 (31.02)	31 (8.59)	131 (36.29)	196 (54.29)	165 (45.71)
Clarity	143 (39.61)	62 (17.17)	60 (16.62)	27 (7.48)	69 (19.11)	210 (58.17)	151 (41.83)
Retraceability	231 (63.99)	85 (23.55)	25 (6.93)	11 (3.05)	9 (2.49)	259 (71.75)	102 (28.25)
Quality	10 (2.77)	18 (4.99)	149 (41.27)	22 (6.09)	162 (44.88)	263 (72.85)	98 (27.15)
Environment	189 (52.35)	56 (15.51)	48 (13.30)	11 (3.05)	57 (15.79)	331 (91.69)	30 (8.31)
Support	193 (53.46)	54 (14.96)	47 (13.02)	18 (4.99)	49 (13.57)	---	---

Table note. Numbers of observations in overall sample. Percentages in parentheses. Likert scale categories range from *1 = full approval* to *5 = full refusal*.

4.2 Individual WTP

To compare WTP responses between the two settings, and to identify the underlying motives, the data of the overall sample of *N = 361* respondents was pooled over both milk types *t = {E, C}* resulting in 489 observations. Then we ran a regression of the form

$$dP = b_0 + b_1 m_E + b_2 m_C + b_3 d_{setting} + \sum_{i=\{4,\ldots,9\}} b_i d^i_{a/na} + b_{10} d_{urban} + e$$

where *dP* denotes WTP (in Euro cent) for regional provenance of the consumed weekly quantity of the respective milk type. As defined earlier, m_E and m_C are a household's consumption quantities of eco milk and conventional milk. These stimulus variables depend on the household's size and preferences stated in the first part of the questionnaire. The dummy variable $d_{setting} = \{1,0\}$ identifies differences in stated WTP between the two settings. The dummy is set equal to one (zero) in the experimental (CV) setting. Thus, a negative coefficient b_3 implies that, compared with the experimental setting, CV responses are biased upwards.

Individual motives that underlie WTP are considered by distinguishing between "approvers" and "non-approvers" for each considered product attribute. "Approvers" assign advantageous characteristics to regional fresh milk (likert-scale values of 1 or 2) and at the same time they reveal their willingness to accept a price premium for an enhancement of this product attribute. All other respondents are denoted "non-approvers". For each product attribute *i*, a dummy $d_{a/na}$ *= {1=approver, 0=non-approver}* is included in the regression. The *support* dummy is set equal to one if the subject is willing to support local farmers (likert-scale values 1 or 2) and zero else. d_{urban} *= {1=urban population, 0=rural population}* is an additional dummy variable and identifies the differences in WTP between urban and rural population. One might conjecture that, compared to the urban population, the rural population is stronger

attached to the local agricultural sector and this might shift WTP upwards. Finally, *e* is the disturbance term.

Table 4 contains the regression estimates. As can be taken from the last two rows, the regression fits the data satisfactorily well, despite the usual noise in cross-section survey data. The significantly positive regression intercept b_0 implies that overall WTP for regional provenance is positive. As indicated by $b_1 > b_2 > 0$, WTP is increasing in the consumption of the respective milk type and higher for eco milk compared to conventional milk. Moreover, since b_3 is significantly negative, this means that including the payoff mechanism in the experimental setting leads to a reduction in stated WTP. This indicates that responses in the CV are biased upwards. We postpone a more elaborate investigation to Section 4.3.

Regarding the motives that determine WTP, we find that (a) subjects who had a stronger confidence in local producers and at the same time willing to accept a price premium for guaranteed retraceability, and (b) subjects who assigned a higher product quality for milk of the own region and at the same time willing to accept a price premium for higher quality standards, in fact, report a higher WTP for milk of the own region ($b_6 > 0$, $b_7 > 0$). Altruistic motives also play a significant role: Subjects who stated that they were interested in supporting local dairies and farmers, report a significantly higher WTP ($b_8 > 0$).

Finally, there exists a significant difference in WTP between urban and rural population ($d_{urban} < 0$): the latter has a significantly higher WTP for milk from the own region. As outlined above, a possible interpretation is that the rural population is stronger attached to the local agricultural sector.

Table 4: Regression Estimates

Variable	Label	Coefficient	Estimate *(t stat.)*
---	intercept	b_0	15,129
			(1.488)
m_E	consumption of ecologically produced milk in litres	b_1	**12,807
			(6.204)
m_C	consumption of conventionally produced milk in litres	b_2	**12,346
			(7.605)
$d_{setting}$	dummy for setting	b_3	*-14,882
			(-1.914)
d_4	freshness	b_4	9,107
			(1.368)
d_5	clarity	b_5	2,787
			(0.504)
d_6	retraceability	b_6	**17,058
			(2.439)
d_7	quality	b_7	11,603
			(1.656)
d_8	environment	b_8	-0,659
			(-0.121)
d_9	support	b_9	**18,426
			(3.501)
d_{urban}	urban vs. rural population	b_{10}	**-22,834
			(-2.853)
	Adjusted R^2		0,182
	F		11,855

Table note. Endogenous variable: price premium in Euro cent. Pooled sample with 489 observations. Coefficients significant at 5% level are marked with two leading asterisks; coefficients significant at 10% level are marked with one leading asterisks; t statistics in parentheses.

Column three of Table 5 reports the average regional WTP *per litre*. We find that the average WTP for regional provenance is substantially higher (about 12 Euro cent per litre) for eco milk compared to conventional milk. A student t test for independent samples shows that the difference is significant at the 5% level for both settings.[5] Given that German consumers already pay an eco premium of about 30 Euro cent per litre on a consumer basic price for conventional milk of about 50 Euro cent per litre, this result is surprising. In column five, we also report average WTP per litre for four different household sizes $N = \{1, 2, 3, 4+ \text{ members}\}$. Asterisks indicate significant results of student t tests for independent samples, comparing WTP of any multiple person household to a single household. There only seems to be a slight decrease of WTP *per litre* (P/m^l) with increasing household size. This outcome gives interesting insights into the motives that determine WTP: If subjects solely derived "warm glow" from the contribution itself ($x_2 = pm^l = P$), then P (and not P/m^l) would be rather similar across household types. On the contrary, P goes up with the households' milk consumption (compare the regression coefficients b_1 and b_2). Thus, subjects seem to be more interested in egoistic (x_3) or altruistic effects (x_4) that are related to the level of individual consumption.

[5] The result also holds for the non parametric Mann-Whitney-U tests which does not presuppose equal distributions.

Table 5: WTP per Litre

Setting	Milk type	*Average dP/l across household types*	*N*	*dP/l*
			1	31.44
CV	eco	29.54	2	21.14
			3	51.48
			4	*14.44
			1	21.19
	conventional	**17.81	2	14.73
			3	17.78
			4	18.60
			1	37.62
Exp	eco	24.23	2	26.68
			3	**19.36
			4	**18.80
			1	14.86
	conventional	**12.35	2	10.95
			3	13.39
			4	10.97

Table note. dP/l is the average price premium in Euro cent per litre. *N* denotes the number of household members. Results of student t tests for independent samples. Coefficients significant at 5% level are marked with two leading asterisks; coefficients significant at 10% level are marked with one leading asterisks. Standard errors in italics.

4.3 Differences in hypothetical bias between egoists and altruists

A well-known phenomenon of opinion polls is that people tend to respond according to social norms, “socially desirable”, since it is at no costs. Therefore, these polls suffer from free riding. Moreover, to salve conscience the incentives for free riding and, thus, over-reporting WTP is probably more pronounced for (pretending) altruists compared to subjects who predominantly follow egoistic motives. We test this hypothesis by distinguishing an “egoistic” and an “altruistic” subset. The “egoistic” subset consists of those subjects who reported a positive WTP for regional provenance as a result of egoistic motives only. Thus, they did *not* want to support local producers financially or to reduce environmental pollution but at the same time revealed a preference for milk of the own region for reasons of enhanced product attributes. On the other hand, “altruists” reported (a) to be willing to financially support local producers and (b) were interested in reducing environmental pollution. For both subsets separately, we then conduct a student t test for independent samples comparing WTP per litre in the CV and in the experimental setting. The results are reported in Table 6. As reckoned above, compared to the experimental setting, WTP of (pretending) “altruists” is higher when it comes at no costs (like in the CV). However, this difference is significant for conventional milk only. Irrespective of the milk type, responses of “egoists” are statistically the same for both settings and are not affected by hypothetical bias. Thus, we can assign most of the WTP difference between the two settings to CV subjects who reported to behave altruistically.

Table 6: Hypothetical Bias for Altruists and Egoists

Subset	Milk type	Framework	*dP/l*	t statistic
Altruistic	eco	Exp	29.21	$^{+}$-0.869
		CV	36.66	
	conventional	Exp	15.87	***-2.709
		CV	23.97	
Egoistic	eco	Exp	22.67	$^{+}$0.089
		CV	22.00	
	conventional	Exp	21.73	$^{+}$0.414
		CV	19.33	

Table note. WTP/l is the average price premium per litre in Euro cent. Coefficients significant at 1% level are marked with three leading asterisks. Insignificant coefficients are marked with one leading positive sign.

4.4 Aggregate Demand

For both settings and both milk types, Table 7 reports aggregate demand reactions for different regional price mark ups. Aggregate demand is derived from horizontal aggregation of individual WTP reported by our subjects. Since our sample distributions do not perfectly coincide with the overall numbers in the region considered, data have been re-weighted by the personal variables which significantly determined individual WTP: *household size* and *rural vs. urban population*. The weighting factors are reported in Table A2 in the Appendix. Then, we estimated the following equation:

$$\ln A_{st} = a_{st} + b_{st} dP_{st} + e_{st}$$

where A_{st} is the percentage of regionally produced milk of type $t = \{E, C\}$ which, according to setting $s=\{CV, Exp\}$, can be sold at a price premium of dP_{st} Euro cent. Again, e is the disturbance term. This functional form possess the highest explanatory power and is consistent with a positive but decreasing marginal utility.

Altogether, the data suggest a high price elasticity of demand: Depending on the milk type and setting, a price premium of 1.0 (5.0) Euro cent reduces aggregate demand by 4.54% (20.75%) to 7.00% (29.88%). Moreover, demand reactions are more pronounced for conventional milk. Compared to the CV, the experimental setting predicts stronger demand reactions for conventional milk while predictions are about the same for eco milk.

Table 7: Price Sensitivity of Aggregate Demand

	Conventional		Eco	
	CV	Exp	CV	Exp
	*ln A= 4.462***	*ln A= 4.604****	*ln A= 4.594****	*ln A= 4.685****
	*-0.0469***dP*	*-0.0706***dP*	*-0.0535***dP*	*-0.0465***dP*
	adj. R^2=0.948	*adj. R^2=0.961*	*adj. R^2=0.934*	*adj. R^2=0.966*
	p(F)<0.01	*p(F)<0.01*	*p(F)<0.01*	*p(F)<0.01*
dp/l	*dA in %*	*dA in %*	*dA in %*	*dA in %*
1	4.58	7.00	5.21	4.54
2	8.95	13.34	10.15	8.88
3	13.13	19.25	14.83	13.02
4	17.11	24.75	19.27	16.97
5	20.90	29.88	23.47	20.75
8	29.65	41.23	33.05	29.44
10	37.44	50.74	41.43	37.19
20	60.86	75.68	65.70	60.54
30	75.51	88.00	79.91	75.22
40	84.68	94.08	88.23	84.43
50	90.42	97.08	93.11	90.22

Table note. dP/l is the price mark up in Euro cent per litre. *dA in %* is the relative decrease in demand compared to a situation with *dP/l=0*. Coefficients significant at 1% level are marked with three leading asterisks.

5 Conclusion

In this article, we have presented WTP estimates for fresh milk of the own region derived from a hypothetical CV setting and an incentive compatible experiment. Although CV subjects were rather familiar with the considered product and were told that hypothetical bias might lead them to misstate their true WTP, responses are still (slightly) biased upwards when compared to the experimental setting. The bias is quantitatively strongest for subjects who stated to follow altruistic reasons: WTP of (pretending) altruists was significantly lower when responses caused real financial consequences. If this outcome can be replicated in future research, the validity of contingent valuations could be enhanced by developing survey designs which allow for an identification of subjects who are more prone to be affected by hypothetical bias than others.

As far as our results can be generalised, the initial question whether consumers favour regionally produced fresh milk compared to non locally-fresh milk can be answered as follows: Yes, consumers assign positive attributes to milk of the own region but demand is rather price elastic. Precautious pricing is even more appropriate given the existence of further demand barriers, like lack of product availability, limited information, time restrictions or status quo bias, which might shift demand downwards. Regarding the motives that drive individual WTP, our results contradict “warm glow” which would have meant positive contributions which are invariant with the consumed quantity of regional fresh milk. On the opposite, we observe that WTP is mainly determined by pure altruistic (support of local farmers) and by egoistic motives (preference for trustful, retraceable high quality products).

Appendix

Instructions to the CV survey:

Dear Participant: Thank you very much for attending our survey. You will receive a small compensation for your efforts. First, we would like you to state some of your individual and household characteristics, and answer a couple of questions regarding your milk consumption and attitudes towards milk products. If you are finished with this, you will be given further instructions.

[…] Now the proper part of the survey begins. On the upper part of the computer screen a quantity of milk from non-Hessian farmers and dairies is given. This quantity is an average weekly consumption quantity of a household with a size corresponding to the one of your own household. According to your individual demand patterns that you gave us in the first part of the survey, this quantity is assigned to eco and conventional fresh milk. Moreover, a monetary amount is given which is at your free disposal.

On the lower part of the screen, you can see another offer with exactly the same milk quantities as displayed in the upper part of the screen. However, the offer comes from local Hessian farmers and dairies. Suppose, you were switching from the non-Hessian suppliers to Hessian suppliers. How much would you be willing to pay for exchanging the milk quantities of non-Hessian farmers and dairies by the same quantities coming from Hessian farmers and dairies. You can type in your willingness-to-pay for the respective quantities coming from Hesse in the lower part of the screen. Note that you cannot spend less than zero Euro and not more than your disposable budget. Imagine, that the monetary amount that you spend is transferred to the local producers, but that at the same time it leads to a 1:1 reduction of your own disposable budget. The resulting remaining disposable budget is also displayed in the lower part of the screen.

Before you enter your willingness-to-pay, I would like to stress that the decision situation is completely hypothetical. This means that your decision neither causes a real money transfer to local farmers and dairies, nor means a real purchase or any real financial consequences for you. Other surveys have shown that the description of such a hypothetical situation might lead people to misstate their true willingness-to-pay. Thus, please think about the decision situation as if it were real. Do you have any questions? […] Now, please type in your willingness-to-pay.

Instructions to the experimental survey: (changes compared to the CV are highlighted in italics)

Dear Participant: Thank you very much for attending our survey. […] First, we would like you to state some of your individual and household characteristics, and answer a couple of questions regarding your milk consumption and attitudes towards milk products. If you are finished with this, you will be given further instructions.

[…] Now the proper part of the survey begins. On the upper part of the computer screen a quantity of milk from non-Hessian farmers and dairies is given. This quantity is an average weekly consumption quantity of a household with a size corresponding to the one of your own household. According to your individual demand patterns that you gave us in the first part of the survey, this quantity is assigned to eco and conventional fresh milk. Moreover, a monetary amount is given which is at your free disposal.

On the lower part of the screen, you can see another offer with exactly the same milk quantities as displayed in the upper part of the screen. However, the offer comes from local Hessian farmers and dairies. Suppose, you were switching from the non-Hessian suppliers to Hessian suppliers. How much would you be willing to pay for exchanging the milk quantities of non-Hessian farmers and dairies by the same quantities coming from Hessian farmers and dairies. You can type in your willingness-to-pay for the respective quantities coming from Hesse in the lower part of the screen. Note that you cannot spend less than zero Euro and not more than your disposable budget.

Before you enter your willingness-to-pay, please notice that you can draw a lottery ticket after finishing the questionnaire. Four of five tickets are blanks. If you draw a blank you will receive a small compensation for your efforts. Else, I will compare your willingness-to-pay for the respective milk type of the own region

(conventional or eco) with a random number. It will appear in a separate box after you have typed in your willingness-to-pay. You can interpret this number as the selling price for milk from Hesse in the future. If the random selling price for the respective milk type is less then your own willingness-to-pay, then you will receive your household's weekly consumption of milk from Hessian farmers and dairies and your free disposable budget minus the random selling price. The random selling price will be transferred to the local milk producers. If the random selling price is greater than or equals your own willingness-to-pay, then you will receive your household's weekly consumption of milk from non-Hessian farmers and dairies and your complete free disposable budget. In this case, there is no financial transfer to the local milk producers.

Please note that the best strategy for you is stating your willingness-to-pay correctly. Let me explain this. What might happen if you understate your true willingness-to-pay? In this case, the random selling price might fall between your stated willingness-to-pay and your true willingness-to-pay such that you won't receive the milk from local producers although you would have received it at a price which is less your true willingness-to-pay. Thus, you have forgone a beneficial trade. What might happen if you overstate your true willingness-to-pay? In this case, the random selling price might be greater than your true willingness-to-pay but less than your stated willingness-to-pay such that you will receive the milk from local producers at a price which exceeds your true willingness-to-pay. Thus, you would have made a disadvantageous trade.

Do you have any questions? […] Now, please type in your willingness-to-pay.

Table A1: Product Attributes

Statement	Categories	Regarding fresh milk, I would be willing to accept a price premium …	Categories
Freshness: Fresh milk from the own region is fresher compared to milk from non-local producers.	*LS = {1 = full approval, …, 5 = full refusal)*	for more freshness	*0*: no *1*: yes
Clarity: It is easy for me to identify the point of origin on the milk's package.	*LS = {1 = full approval, …, 5 = full refusal)*	for an easier identification of its regional provenance	*0*: no *1*: yes
Retraceability: Regarding fresh milk, I have strong a confidence in the specified point of production.	*LS = {1 = full approval, …, 5 = full refusal)*	for guaranteed retraceability	*0*: no *1*: yes
Quality: Fresh milk from the own region has a higher quality compared to milk from non-local producers.	*LS = {1 = full approval, …, 5 = full refusal)*	for higher quality	*0*: no *1*: yes
Environment: Purchasing milk from the own region means less pollution of the environment.	*LS = {1 = full approval, …, 5 = full refusal)*	for a more ecologically production	*0*: no *1*: yes

Table A2: Weighting Factors

Number of household members	1	2	3	4+
		Hesse		
Overall Number	1,022,000	988,000	411,000	440,000
Townies	285,663	276,160	114,880	122,986
Rural population	736,337	711,840	296,120	317,014
		CV, conventional		
Overall Number	35	47	45	44
Townies	21	16	16	12
Rural population	14	31	29	32
Weighting factor_urban	13,603.020	17,259.997	7,180.019	10,248.851
Weighting factor_rural	52,595.470	22,962.582	10,211.024	9,906.681
		CV, ecological		
Overall Number	19	31	32	29
Townies	13	12	12	13
Rural population	6	19	20	16
Weighting factor_urban	21,974.110	23,013.329	9,573.359	9,460.478
Weighting factor_rural	122,722.762	37,465.266	14,805.985	19,813.362
		Experiment, conventional		
Overall Number	28	43	22	32
Townies	21	20	15	12
Rural population	7	23	7	20
Weighting factor_urban	13,603.020	13,807.997	7,658.687	10,248.851
Weighting factor_rural	105,190.939	30,949.568	42,302.814	15,850.689
		Experiment, ecological		
Overall Number	15	33	23	26
Townies	12	17	17	11
Rural population	3	16	6	15
Weighting factor_urban	23,805.286	16,244.703	6,757.665	11,180.565
Weighting factor_rural	245,445.524	44,490.003	49,353.283	21,134.253

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