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Differentiating the willingness to pay for public goods and social incentives based on the example of animal welfare

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1 Introduction

Theoretically, individuals' autonomous and independent purchase decisions lead to utility maximization. However, this should not be the case for public goods, where individual purchase decisions only have a marginal impact on the level of the public good. The willingness to pay for public goods should be zero, as free-riding is the dominant strategy. In this case, the intervention of a (public) entity is necessary to provide the public good and maximize the overall social welfare. Even though the effect of one individual is marginal, a larger strand of literature argues that coordination without any public intervention is nevertheless (at least in some cases) possible (see Warr 1982; Roberts 1984; Montgomery and Bean 1999; Ostrom 2000). They argue that social incentives (conscience, reputation, etc.) still lead to a positive willingness to pay for public goods. For example, some people compensate their flight emissions even if their individual compensation has almost no influence on climate change. However, they might silence their conscience by doing so or brag about their compensation in front of others (reputation).

Both considerations do not contradict each other as discussed in Gogoll and Schlieszus (2021b). While the "real" willingness to pay for the public good is zero without (public) intervention, individuals might have a positive willingness to pay caused by social incentives. In this paper, we aim to identify the two different kinds of willingness to pay. We introduce two scenarios to survey participants at the example of the public good animal welfare, i.e., the husbandry of chicken and male chick killing. In the first scenario, we focus on the willingness to pay without public intervention. The stated willingness to pay is caused by different preferences (e.g., for taste, health, and social incentives). By separating them we want to find the willingness to pay for social incentives. In the second scenario, we use a Quasi-Monarch setting (Gogoll and Schlieszus 2021b) to construct a referendum. In a regular referendum, individuals are given a standard (e.g., preventing male chick killing) and vote for or against this proposal. If the referendum is accepted, all individuals are forced to contribute to the provision of the public good. In this case, free-riding is not possible anymore. We use this property of a referendum to measure the willingness to pay for animal welfare and ask individuals up to which price they would

still approve (vote with "yes") the referendum. We use the stated willingness to pay and separate it from other preferences e.g., for free choice. Doing this we want to gather the willingness to pay for the public good animal welfare. In summary, we want to measure the willingness to pay in the individual and the referendum case and separate different components to get the willingness to pay for social incentives on the one hand and for the public good on the other hand.

Our paper is structured as follows. The first chapter gives a theoretical foundation of animal welfare as a public good. We focus on the setting and methods to gather stated willingness to pay in surveys. Afterwards, we present the results of our survey and separate the components of the stated willingness to pay in the individual and the referendum case. We analyze the components in both cases and identify the willingness to pay for social incentives and the public good. Finally, we discuss the results from a theoretical perspective.

2 Methodology

Animal welfare is receiving more and more attention in German politics and society in general. For instance, the German government prohibits killing male chicks in laying hen breeding from 2022 onwards (Bundesministerium für Ernährung und Landwirtschaft 2021). Instead, the gender has to be determined inside the egg, or male chicks must be raised.

Generally, one would consider the husbandry system to be the most relevant attribute with respect to the preference for animal welfare. But husbandry systems might also be correlated with other preferences. It is, for instance, stated that organic eggs taste better (Bray and Ankeny 2017; Güney and Giraldo 2020) and are more healthy (Pettersson et al. 2016; Bray and Ankeny 2017). Responses in our survey supported this view strongly. In contrast, the killing of male chicks is not related to other preferences that could potentially influence the willingness to pay for eggs. Thus, killing male chicks seems to be an appropriate instrument for measuring the willingness to pay for animal welfare. For our

survey, we differentiated the products by two attributes: the husbandry system and the killing of male chicks.

Animal welfare seems to be an excellent example to explain the difference between the two kinds of willingness to pay introduced above. In Germany, for instance, even though organic food is increasing in popularity, its market share is still relatively low. In 2020, organic fresh eggs had the highest organic share of food products in the basket of goods of German households with "only" 15,4 percent according to Bund Ökologische Lebensmittelwirtschaft (2021). However, some studies suggest that the majority of Germans would support increasing animal welfare levels if they were enforced on a public level (Bundesministerium für Ernährung und Landwirtschaft 2019; Sorg et al. 2021). This purchasing behavior can be explained by free-riding as there are around 45 million laying hens in Germany (Bundesanstalt für Landwirtschaft und Ernährung 2021). By buying organic eggs, the conditions of these hens, on average will not change significantly. The individual impact is marginal and one's utility should not increase by buying a product linked to better husbandry conditions. Hence, animal welfare can be defined as a public good.

This gap seems to be exactly what can be explained by the two types of willingness to pay we distinguish in our model (Gogoll and Schlieszus 2021b). The total willingness to pay in the case of the private provision will only be based on individual preferences such as social incentives or taste if reciprocity does not play a role. This way, a (small) share of the public good will be provided. In the case of public provision, the willingness to pay will additionally be based on the willingness to pay for increasing animal welfare. In our model (Gogoll and Schlieszus 2021b), we introduced an approach that enables us to measure this willingness to pay: the Quasi-Monarch. As a Quasi-Monarch, an individual can determine the level of contribution of every individual, including herself. Therefore, this individual has no incentive not to state her "real" willingness to pay because her impact is not marginal anymore. Following this model, we can determine the difference in the total willingness to pay for these two scenarios: One where every individual contributes on their own and one where the individual has the possibility of forcing everyone to participate in improving the level of the public good.

We implemented a referendum setting to compare these individual results to the Quasi-Monarch ones. Respondents were asked to imagine a scenario in which the state thinks about introducing a minimum standard concerning male chick killing or/and the husbandry system. Here, we ask for the maximum price for a carton of ten eggs, up to which respondents would still approve a referendum.

Multiple methods exist for measuring the willingness to pay. The availability of these depends on whether the willingness to pay for the respective public good can be measured directly and whether there is real data of market transactions available. To use real data to determine the willingness to pay for animal welfare, one would need to fluctuate market prices on an extensive level and in a controlled environment, which is often not feasible. Therefore, economic analysis uses stated willingness to pay approaches to indirectly determine the individual willingness to pay. The main two approaches are called choice experiments and contingent valuation.

Choice experiments are said to have multiple advantages over contingent valuation studies, making them popular in economic literature (Adamowicz et al. 1998; Hanley et al. 1998; Freeman et al. 2014). For instance, it is easier to include multiple different attributes into choice sets, which is why they have been highly used in market research (Louviere and Woodworth 1983; Adamowicz et al. 1998; Hanley et al. 1998). Using a choice experiment, we would be able to include preferences for, in our example, the amount of eggs, the husbandry level, or whether the killing of male chicks is permitted in only one study. This hypothetical multi-attribute setting is typically better suited to model real scenarios, leading to a smaller influence of biases.

However, there are also disadvantages of choice experiments compared to contingent valuation studies. Choice experiments are typically harder to process cognitively (Adamowicz et al. 1998; Perman et al. 2011). Respondents might only focus on some aspects of the question without considering all options, or they might focus on specific labels to make a choice easier. And while some biases might be weakened in choice experiments, multiple other biases – most notably the hypothetical bias – still have to be taken into account. In our pre-tests choice experiments led to inconsistent and misleading results (Gogoll and Schlieszus 2021a). For example, individuals agreed to a specific price

for a product in the referendum scenario but stated a lower willingness to pay in the same scenario in the next question. Furthermore, our results had such a large variance depending on the assumptions of calculating the individual willingness to pay that no implications could be drawn.

Therefore, we changed the approach in this paper. We decided to use a contingent valuation, where participants have to either state their willingness to pay directly (open-ended question) or have to confirm binarily whether they are willing to pay a specific amount for a given product. Contingent valuation suffers from multiple biases just as any survey method. The settings are, for instance, hypothetical in nature (hypothetical bias), focus on one specific aspect that participants might not have thought of beforehand (prominence bias), or suffer from biased strategic answers, if participants anticipate the survey design. A list of potential biases can be found in Perman et al. (2011) and Freeman et al. (2014).

In our survey, we implemented the contingent valuation setting by introducing sliders for all products in question. Participants were confronted with all product combinations (husbandry system and male chick killing) at once and had to state their maximum willingness to pay (in a range of 0 € to 10 €) while being able to see the difference between their stated willingness to pay for different properties respectively. We abstained from showing market prices for the various types of boxes of eggs in the question, to reduce the influence of the survey questions on the participants. We want to find out the willingness to pay, hence the maximum amount they are willing and able to pay for a box of ten eggs. The actual price on a competitive market would just reflect the production cost of the producers and should be independent of the individuals' willingness to pay. Using sliders also means that we turned the intuitive process of buying products into a rational thinking process. On the one hand, this avoids inconsistencies comparing the stated willingness to pay to the referendum scenario. On the other hand, this might lead to inconsistencies and an even further gap between stated and revealed willingness to pay.

We repeated this slider setting in the referendum scenario. Each individual had to set a price for all combinations of husbandry level and male chick killing. For this price, the participant would just approve the referendum. The combination of barn and male

chick killing was not presented as this represented (at the time of conducting the survey) the legal lower bound. To avoid social behavior – for example, thoughts of how other individuals would be affected by the stated price – we told respondents to only focus on themselves. The survey can be found in Annex A. Having acquired these two different kinds of willingness to pay, we aimed to compare the components of the individual willingness to pay without any referendums to the willingness to pay in the referendum case.

3 Data & Results

Our survey participants were non-economic students of the University of Bayreuth. The survey was implemented via Lighthouse Studio by Sawtooth Software. We evaluated 482 (53 of them incomplete) initial responses, of which we filtered out vegan students and those not buying eggs. These students were excluded because they do not have a trade-off between buying eggs and other products, i.e., their stated willingness to pay is unreliable. 352 responses remained.

3.1 Individual Willingness to Pay

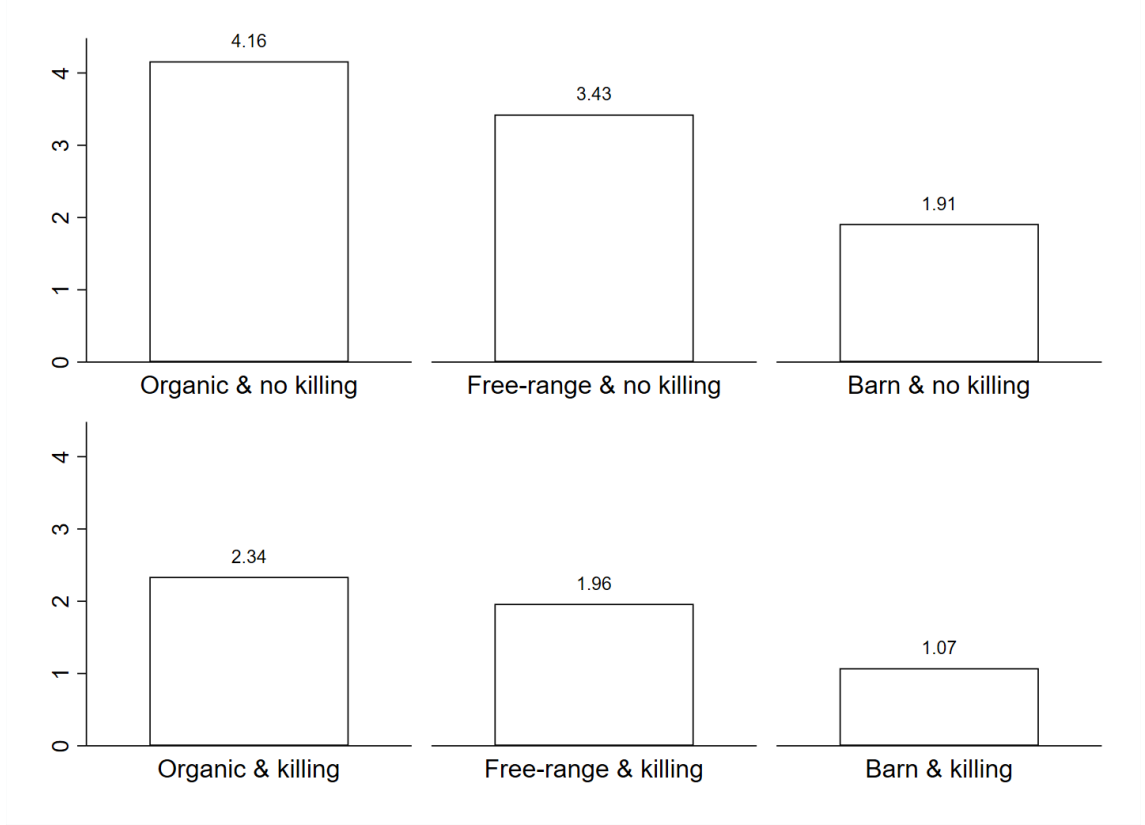We start by comparing and interpreting the individual willingness to pay without public intervention (figure 1).

Figure 1: Individual willingness to pay for a box of ten eggs in € (mean)

Note that the stated individual willingness to pay differs significantly from average prices in the supermarket.[1] For products with male chick killing (lower row), only the average price for free-range eggs (1.96 €) is above the supermarket price (1.69 €). For organic (2.34 € < 2.89 €) and barn eggs (1.07 € < 1.29 €), the supermarket price is higher than the average stated willingness to pay.[2] This is in line with the participants' consumption behavior: Most students usually buy free-range eggs (figure 2).

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[1] As reference we use prices for eggs gathered on 17th of June 2021 visiting an Aldi supermarket in Bayreuth.

[2] The observation holds for taking the median instead the mean. Medians: barn 0.85 €, free-range 2.00 €, organic 2.50 €.
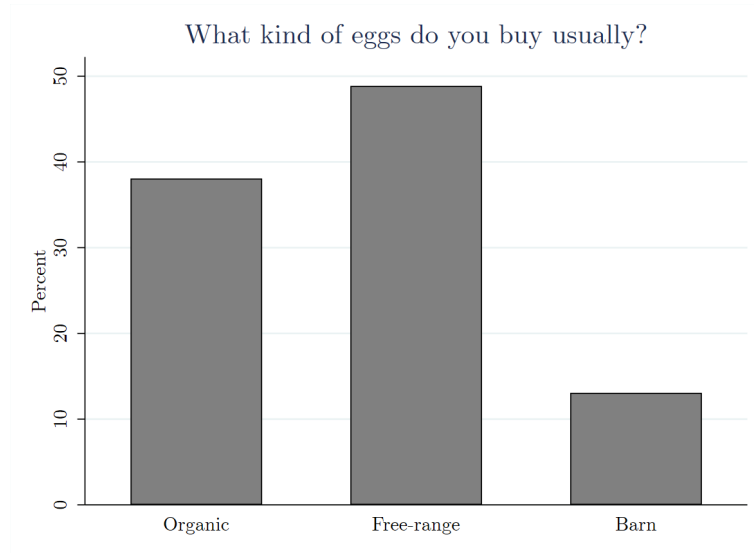
Figure 2: Usual choice of husbandry level at purchase

Compared to eggs with male chick killing, each willingness to pay without this property is on average higher than the respective supermarket price. At first glance, this seems to be a contradicting result. It suggests that consumers buy different packages of eggs simultaneously in one purchase as the willingness to pay is higher than the actual price in the supermarket. For sure, this is not the case. The willingness to pay states the maximum amount a person is willing and able to pay for a good. Following the economic theory, a willingness to pay can be calculated using a budget and a utility function. Both of these functions include at least two goods. Otherwise, the entire budget would be spent for one good as no opportunity cost exists. In our setting, survey participants are not directly confronted with their opportunity cost. Each individual might interpret opportunity cost differently depending on how the question is understood. On the one hand, the reference good can be a numéraire. In this case, the willingness to pay gives the maximum amount of money for a box of eggs if no other eggs are available. The trade-off is between eggs and all other goods. On the other hand, the reference goods can be other varieties of eggs. As eggs can be seen as substitutes, a consumer would only buy one product in each purchase situation with the best ratio between marginal utility and price. This implies that the prices of the other varieties of eggs are known or assumed implicitly. Thus, stating a willingness to pay depends on what other varieties of eggs are available at which prices.

As no reference prices were given in the survey, we interpret the willingness to pay for a box of eggs as if no alternative eggs were available. However, it is important to keep in mind that the results in the survey might include both interpretations of willingness to pay, which would lead to different conclusions.

Besides husbandry, we also asked participants if they usually buy eggs with male chick killing. In addition, we offered a third option where participants could state that they are unaware if they are buying eggs with or without male chick killing. We added this option as many pre-testers mentioned this property being unknown to them. Only one of the respondents answered that she is buying eggs with male chick killing, whereas about 40 percent responded that they do not buy eggs with chick killing. However, the majority (about 60 percent) did not know whether they buy eggs with or without chick killing.

The stated preference for killing male chicks seems to influence the individual willingness to pay (figure 1). Regressing the individual willingness to pay on male chick killing (while controlling for husbandry) shows an average decrease by $1.32 €$ for a box of ten eggs. This is the average amount individuals are willing to pay additionally for a box of ten eggs if produced without the killing of male chicks in our survey. Such an interpretation would assume that the willingness to pay for male chick killing is independent of the husbandry level. However, this is not the case as the difference between the willingness to pay for male chick killing varies significantly for the different types of husbandry: For organic eggs, the difference is -1.82 €, for free-range -1.46 €, and for barn -0.84 €. One possible reason is that some participants are unwilling to pay for products with low husbandry standards. Their willingness to pay for these products is zero. Let us assume that one individual is not buying eggs with a husbandry level barn. The resulting difference for eggs with male chick killing and without for barn would be zero. Thus, it is likely that the difference between products with and without male chick killing increases with the husbandry level.

The higher the husbandry standard, the more likely a willingness to pay above zero exists. Excluding participants that have a willingness to pay of zero from the regression leads to a lower willingness to pay for the prevention of male chick killing on average. How-

ever, the differences between the willingness to pay for male chick killing given different levels of husbandry decrease but do not disappear.

As explained before, the stated individual willingness to pay without public intervention includes a willingness to pay for social incentives. So far, we implicitly assumed that abstaining from male chick killing has the same effect on social incentives for all husbandry levels. Hence, this should result in the same willingness to pay for male chick killing. However, this might not be the case. Knowing that male chicks are not killed, but the remaining female chicks suffer under worse husbandry conditions might not, or only in a small amount, silence one's conscience. If we think of our conscience as a production function, the different goods needed to produce "conscience" are possibly not substitutes but complements or something in between substitutes and complements. And to make this even more complex: The form of the production function might even be different for every individual. This can explain why for higher husbandry levels, the willingness to pay for no killing of male chicks increases as its effect on social incentives is higher.

Similarly, we can interpret the changes between the different levels of husbandry (table 1).

	Organic - Free-Range	Free-Range - Barn
No Killing	0,73	1,52
Killing	0,38	0,89

Table 1: Differences of the willingness to pay between husbandry levels

Note that the amount people are willing to pay for better husbandry decreases with its level. On average, they are willing to pay around double as much for an improvement from barn to free-range than from free-range to organic. Diminishing returns on the utility seem to be a plausible reason. However, a lack of knowledge concerning the definition of "organic" might also drive the results. It is unclear if people know which living standards are provided to hens under organic husbandry. Furthermore, even the various organic certificates differ significantly in their husbandry standards.

The diminishing returns could be caused by three utility components: taste, health, and social incentives. Which of these factors is driving the results is not immediately

apparent. Most of the participants see a strong influence of animal welfare on taste and health, as figure 3 shows.
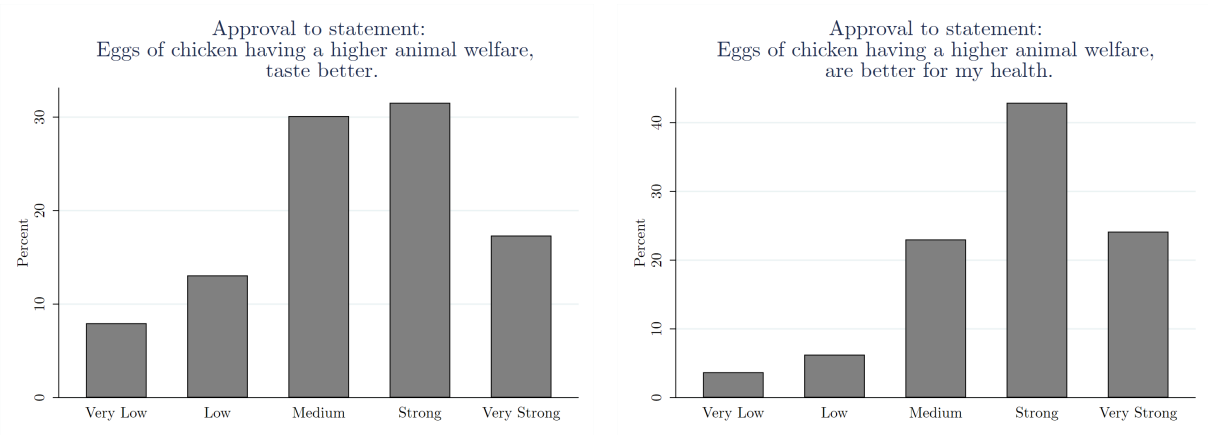

Figure 3: Factors influencing individual willingness to pay

We further asked participants to bring price, taste, health, and animal welfare into order regarding their influence on the decision to buy a product. Especially health and animal welfare are the most important criteria (figure 4). This is in line with the previous results.
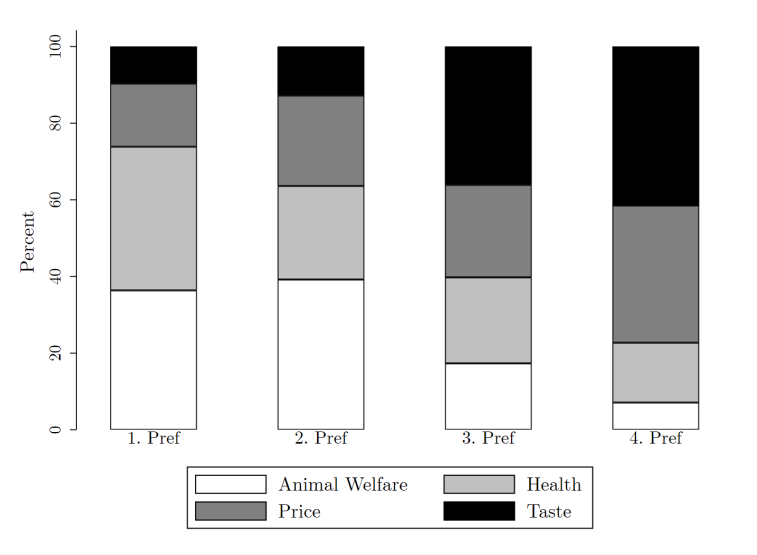

Figure 4: Preferences

3.2 Willingness to Pay with Public Intervention

In the second part of our survey, participants were asked about their willingness to pay in the referendum case (with public intervention).
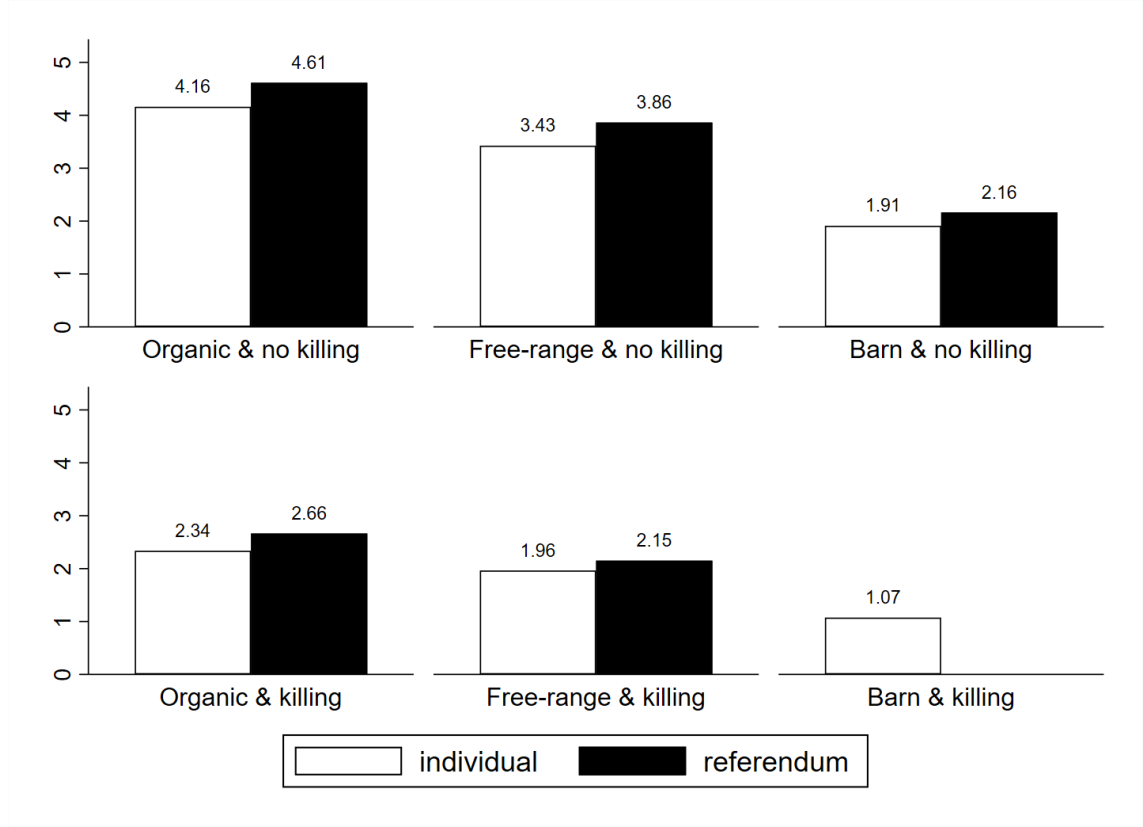

Figure 5: Comparison of the two kinds of willingness to pay for a box of ten eggs in € (mean)

As depicted in figure 5, there is a significant difference between the stated individual willingness to pay and the referendum case. The higher willingness to pay in the second case suggests that people are aware of the free-rider problem. We asked individuals in which case and why they would be willing to pay a higher price for eggs: In the individual case, in the case of the state setting a certain standard, or the same amount in both cases.
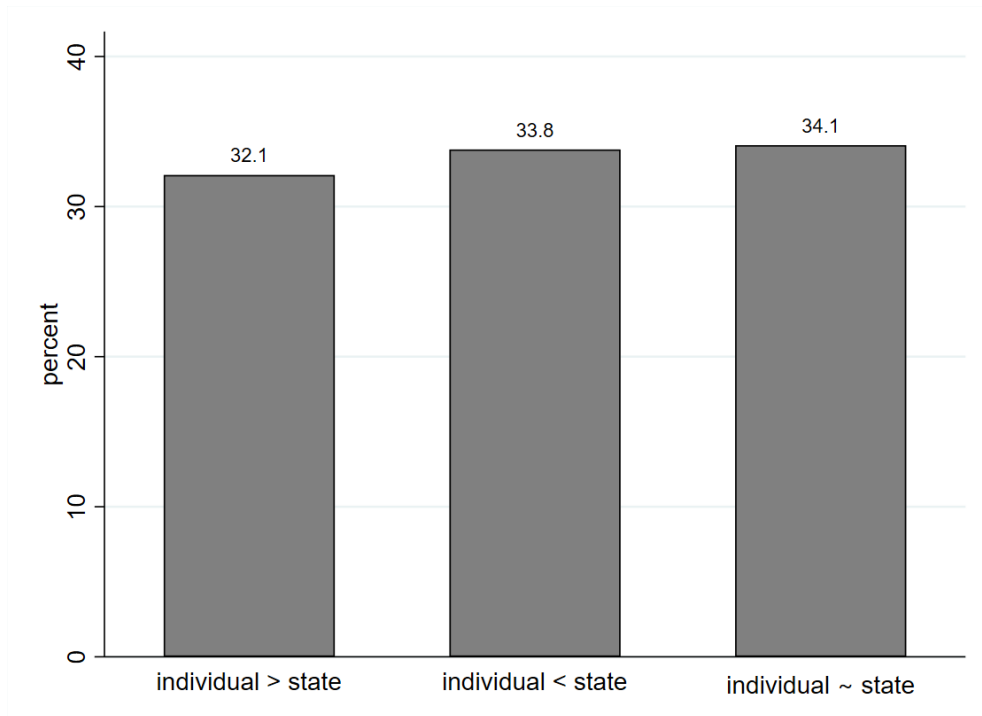
Figure 6: Individual choice vs. state standard

Figure 6 shows that the options are chosen almost equally. However, all groups have a similar willingness to pay for all products, i.e. the referendum willingness to pay is higher than the individual one. Individuals who prefer a public standard argue mainly that an individual choice leads to free riding. But also other reasons are stated: Some individuals argue that a public standard reduces transaction costs as they do not have to inform themselves anymore about the level of animal welfare. Others argue that forcing oneself to a certain standard is easier, a merit argument suggesting missing self-commitment. However, this argument is only valid if individuals see animal welfare as a private or small public good, not as a large public good. Missing self-commitment implies a mismatch of short-term and long-term utility maximization. Buying eggs with a lower husbandry standard provides a utility gain in the short term, whereas it diminishes utility in the long term. A utility decrease implies an impact on the welfare of hens, which is not given if the individual impact is marginal.

People that prefer an individual choice have various consistent arguments as well. They are mainly based on preferences for a free choice:

Firstly, individuals might experience uncertainties regarding their present and future income. Especially at the end of the month with decreasing budget, they still want to be able to buy eggs. This reasoning shows an interesting property of animal welfare. It can be defined as a luxury good as described by Baumol et al. (1979). Only when other preferences are satisfied to a certain degree the preference for this good turns into a willingness to pay. In other words, a change in income – not a change in preferences – drives the demand for the public good. With public intervention, people with lower income are also forced to accept a certain standard, even if they do not want a higher level of the public (luxury) good. The answers of this and another survey, we conducted with around 1000 participants (Gogoll and Schlieszus 2021a), indicate a strong positive correlation between willingness to pay for higher standards and the income of the households.

Secondly, students argued that – even if they could afford and want a certain standard – they do not want to force other individuals having lower incomes to provide this level of welfare. Regarding policy implications, it seems to be reasonable in case of introducing new standards regarding animal welfare to compensate lower incomes in order to establish a Pareto-superiority.

Thirdly, even if individuals are willing to pay for the provision of the public good today, they might disagree with a standard tomorrow. Individuals argue that they want to be free to choose the level of a specific good regularly, as is the case with private goods. Individuals can change their desired amount of a private good in the next period to maximize their utility. For public goods, this is hardly possible. If a standard is set, it is unlikely to change within the following years. For producers, this establishes reliability in expectations, which is necessary in the case of public goods. If a standard for animal welfare increases, the demand for certain kinds of eggs, e.g., with male chick killing, would become zero. This example shows that from an economic perspective, a flexible change of the level of the public good is hardly efficient. In turn, fixed standards can fail to achieve the household optimum if income or preferences change. This leads to a willingness to pay for being able to choose between all options or – the other way around – a willingness to pay against the implementation of a standard.

A last group of individuals is against a standard even though they are aware that the current standard is below their desired consumption amount of the public good. They argue that the decision regarding animal welfare is a personal decision. This argument is still valid while being aware of the free-rider problem. We can interpret it as a kind of constitutional preference: Even if introducing a standard for this public good would increase the individual's utility, introducing standards for other public goods might decrease their utility even more. To prevent the establishment of standards for other public goods, an individual can be willing to abstain from the desired standard regarding this public good.

We have seen that there are arguments for and against the establishment of standards, which are increasing and decreasing the stated willingness to pay for public intervention. Just interpreting the measured amount as "real" willingness to pay is too simple as other factors also play an important role. This is essential if our findings shall be translated into policy implications because various preferences must be considered. These preferences can be (partly) fulfilled with different political measures. By separating the components of the willingness to pay, policymakers can analyze these instruments more precisely and select the welfare maximizing ones.

3.3 Comparison of the Individual and Referendum Willingness to Pay

In the following chapter, we identify and compare the two kinds of willingness to pay, based on figure 5. Intuitively, one would interpret the difference between the stated individual and the stated referendum willingness as the willingness to pay for the public good animal welfare. However, this is not necessarily the case. Firstly, the individual willingness to pay depends on social incentives. Secondly, the referendum willingness to pay is biased by various other preferences (e.g., for free choice as explained above). These preferences influence the stated willingness to pay. Thus, let us first take a theoretical look at the components of the stated willingness to pay for each scenario.

In this paper, we differentiate between the following components:

1. Apart from other preferences, the pure willingness to pay for eggs (WTP_{eggs}) without any other properties is constant.

2. The willingness to pay for taste and health ($WTP_{taste\ \&\ health}$) might vary between but not within husbandry levels.

3. The willingness to pay for social incentives (WTP_{si}) exists in the individual case and can be separated into one for the husbandry level ($WTP_{si\ husbandry}$) and one for the prevention of male chick killing ($WTP_{si\ no\ kill}$). We assume that no willingness to pay for social incentives is involved in the referendum case.

4. The willingness to pay for animal welfare (WTP_{aw}) exists only in the referendum case and can be separated into one for the husbandry level ($WTP_{aw\ husbandry}$) and one for the prevention of male chick killing ($WTP_{aw\ no\ kill}$).

5. The willingness to pay can also depend on other preferences not covered in this list (WTP_{other}). For example, the willingness to pay for free choice should only be present in the referendum scenarios. However, it is unclear whether and how much this willingness to pay differs between the implemented standards. For now, we assume that these other preferences only exist in the referendum case and are constant therein.

Let us compare the individual willingness to pay (WTP_{ind}) and the willingness to pay in the referendum case (WTP_{ref}) with and without male chick killing. For simplification, we describe the stated willingness to pay for each scenario cumulatively:

$$WTP_{\text{ind;kill}} = WTP_{\text{eggs}} + WTP_{\text{taste \& health}} + WTP_{\text{si husbandry}} \tag{1}$$

$$WTP_{\text{ind;no kill}} = WTP_{\text{eggs}} + WTP_{\text{taste \& health}} + WTP_{\text{si husbandry}} +$$
$$WTP_{\text{si no kill}} \tag{2}$$

$$WTP_{\text{ref; kill}} = WTP_{\text{eggs}} + WTP_{\text{taste \& health}} + WTP_{\text{aw husbandry}}$$
$$+ WTP_{\text{other}} \tag{3}$$

$$WTP_{\text{ref; no kill}} = WTP_{\text{eggs}} + WTP_{\text{taste \& health}} + WTP_{\text{aw husbandry}} +$$
$$WTP_{\text{aw no kill}} + WTP_{\text{other}} \tag{4}$$

Calculating the total willingness to pay by adding the different components implies that the components are independent of each other. For example, the willingness to pay for preventing male chick killing would be independent of the one for the husbandry level. However, our data and results do not support this assumption. Social incentives but also animal welfare might partly be perceived as a complement. For instance, one's conscience is not silenced, knowing that no male chicks are killed while the laying hens must still endure bad husbandry conditions. For practical reasons, we will keep the additive character but calculate the willingness to pay separately for different husbandry levels and the property of chick killing.

We calculate the willingness to pay for the different components using the stated formula. For the willingness to pay for social incentives for preventing male chick killing, we can subtract the stated individual willingness to pay, including male chick killing (equation 1) from the stated individual one without male chick killing (equation 2). The difference should be the willingness to pay for social incentives to prevent male chick killing. For example, for free-range eggs we get:

$$WTP_{\text{si no kill}} = WTP_{\text{ind;no kill}} - WTP_{\text{ind;kill}} = 3,43\,€ - 1,96\,€ = 1,47\,€$$

Calculating the willingness to pay for animal welfare follows the same intuition. By subtracting the stated referendum willingness to pay for eggs with male chick killing (equation 3) from the stated referendum one without male chick killing (equation 4), we get in the free range case:

$$WTP_{\text{aw no kill}} = WTP_{\text{ref;no kill}} - WTP_{\text{ref;kill}} = 3,86\,€ - 2,15\,€ = 1,71\,€$$

Table 2 shows the results for all types of husbandry:

	Organic	Free-Range	Barn
WTP_{si}	1,82	1,47	0,84
WTP_{aw}	1,95	1,71	1,09

Table 2: Calculating the willingness to pay for preventing male chick killing

We calculate the willingness to pay for social incentives and animal welfare for different husbandry levels with the same approach. As stated above, the willingness to pay for the husbandry level varies with the property of male chick killing. Therefore, we have to calculate them separately. Another reason for separating the willingness to pay is the diminishing marginal utility of increasing standards. As social incentives for husbandry cannot be distinguished from preferences for taste and health, we can only calculate the aggregate. Table 3 shows the results.

	barn → free-range		free-range → organic	
	kill	no kill	kill	no kill
$WTP_{\text{social incentives}} + WTP_{\text{taste \& health}}$	0,89	1,52	0,38	0,73
$WTP_{\text{animal welfare}} + WTP_{\text{taste \& health}}$	1,08	1,7	0,51	0,75

Table 3: Calculating the willingness to pay for different types of husbandry

The calculation for the willingness to pay for animal welfare (equation 3 and 4) includes the component WTP_{other}. It reflects that the willingness to pay in the referendum case is biased by other preferences and restrictions, which increase (↑) or decrease (↓) the willingness to pay stated in the referendum scenario:

- merit preference ($\uparrow$): force oneself to consume a better husbandry standard,

- information restriction ($\uparrow$): transaction cost induced by comparing standards of the respective products,

- income restriction ($\downarrow$): possibility of buying eggs with low income in the present and future,

- social preference ($\downarrow$): everybody should be able to buy eggs,

- optimization restriction ($\downarrow$): a fixed level of animal welfare prevents flexible individual optimal budget allocation,

- constitutional preference ($\downarrow$): public intervention in one area might be followed by others in various areas.

The calculation above implies that the willingness to pay for the described components is equal for all referendum scenarios. However, in reality, this seems to be unlikely. For example, the willingness to pay for the prevention of male chick killing resulting from social preferences is probably higher having better husbandry conditions. Thus, other preferences bias the calculated willingness to pay for animal welfare.

Furthermore, all calculated results could also suffer from a prominence bias. This bias occurs when surveys focus on a topic that respondents usually do not focus upon in their decision-making. This leads to greater attention compared to a real shopping situation. As mentioned above, the majority (about 60 percent) did not know whether they buy eggs with or without chick killing. However, as most respondents understand that the survey is about animal welfare, they may overstate their respective willingness to pay.

Biases are, in general, very prominent in contingent valuation approaches. Some authors even argue that contingent valuation approaches are not feasible to measure the willingness to pay in general (Diamond and Hausman 1994 and Hausman 2012). Schläpfer and Hanley (2006) for instance, argue that the "real" willingness to pay in referendums in Switzerland is considerably lower than the one measured via contingent valuation beforehand. Thus, our survey's stated individual and referendum willingness to pay may be biased.

It is not our goal to precisely estimate the willingness to pay for animal welfare and social incentives. Instead, we aim to specify the functional form and the components of the willingness to pay in our two scenarios. Therefore, these biases are relevant and noteworthy, but more importantly we have to highlight some theoretical challenges in more detail in the following discussion.

4 Discussion

With the theoretical framework introduced in the last chapter, the components of the willingness to pay linked to public goods can be analyzed consistently. However, there are still some theoretical challenges and considerations primarily linked to interpreting the (public) good animal welfare, which are discussed in the following chapter.

Animal welfare as a good

For animal welfare to be part of an individual's utility function, it has to be seen as a good. In contrast to common goods, animal welfare cannot be bought directly but is rather linked to animal products such as milk, meat, or eggs. The production conditions of these goods determine the level of the good animal welfare. Thus, the good is a result of externalities. People consuming products from animals unintentionally affect the utility of other people. Buying products linked with high (low) animal welfare leads to a positive (negative) external effect. Several public goods show this property: Climate (change), for instance, is a result of externalities. Neither flying nor planting a tree is a direct purchase decision for or against the public good climate. However, each decision influences the public good. Thus, the property that the public good cannot be purchased directly (like a dike for coastal protection) is not a reason for not treating it as a (public) good that influences individuals' welfare.

In contrast to the public good climate, animal welfare can traditionally be characterized as a psychological external effect. In comparison to technological externalities, this implies that the induced cost of the external effect cannot be measured directly. The loss of utility for every individual has to be estimated by using each individuals' willingness

to pay. Even though the impact of a change in the level of the public good cannot be measured directly, it is still part of the utility function and thus should not be ignored. Instead, we see utility as a holistic concept where all aspects of human life impacting their welfare are covered. Other examples like social justice show intuitively that intangible goods are essential for individuals' utility. Thus, also goods that affect humans without a physical relation have to be analyzed by economists and policy makers potentially have to intervene. If the public sector decides to intervene and provide a public good, this intervention must be based on the (correct) willingness to pay for these goods. Otherwise, politicians can misuse such psychological externalities to set standards for increasing their own individual welfare. This is possible since the cost are not as inter-subjective measurable as for technological externalities. Only by measuring changes in the willingness to pay, this misuse can be prevented.

Animal welfare in theory, practice and survey

In economic literature, a public good is defined as a good that is non-rivalrous and non-excludable in consumption. Interpreting animal welfare as the overall (or average) welfare of animals, these characteristics are fulfilled. Nobody can be excluded from the utility of higher overall animal welfare, and the utility gained by one individual – for instance, due to better husbandry systems – does not decrease the utility of another person.

While animal welfare must be understood as a public good theoretically, this does not have to be the case in reality. Comparing the theoretical arguments to the already cited market data supports the definition of animal welfare as a public good though. On the one hand, "only" 15.4 percent of the fresh eggs that are purchased by German households are organically produced (Bund Ökologische Lebensmittelwirtschaft 2021). On the other hand, studies suggest that the majority of Germans would support increasing animal welfare levels if they were enforced on a public level (Bundesministerium für Ernährung und Landwirtschaft 2019; Sorg et al. 2021). One could explain this difference with the property non-excludability, which establishes the incentive to free-ride and not participate in the provision of the public good. The influence on the overall level of animal welfare is marginal, because the size of the public good is large. Small-sized public goods can be

provided – even without public intervention – using different mechanisms (Olson 1971). As there are around 45 million laying hens in Germany (Bundesanstalt für Landwirtschaft und Ernährung 2021), overall animal welfare can definitely be viewed as a large public good. For an individual, it is almost impossible to change animal welfare via financial sponsoring or claiming reciprocal behavior.

To control for this view, we asked individuals in our survey to what extent they agree with the following statement: "With my purchase of eggs, I personally influence chicken's well-being."
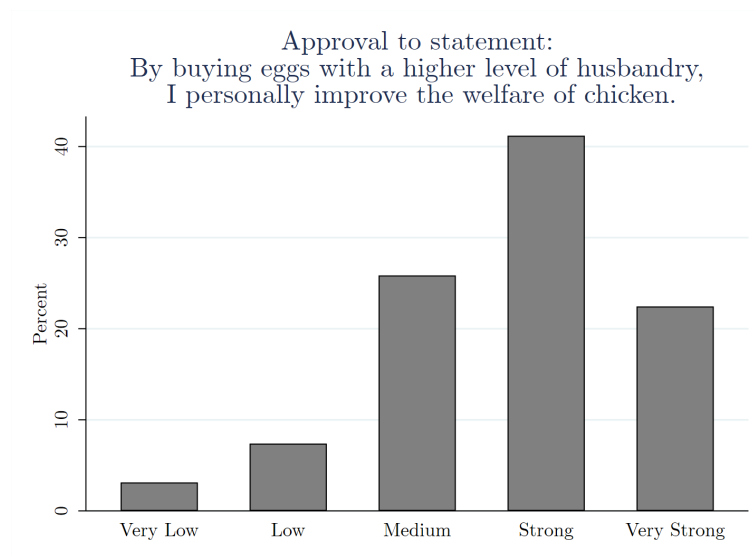

Figure 7: Well-being of chicken and personal choice

As figure 7 shows, about 60 percent of the participants state that with their purchase, they have a strong or even very strong influence on the well-being of chicken. This does not seem to be in line with the definition of a public good and contradicts the theory the market data introduced above. How can these responses be explained?

Firstly, the problem might stem from the composition of the participants of the survey. The survey participants are not a representative draw of the population. Therefore, a sample-selection bias might be present. This can be supported by the socio-demographic factors of the survey participants compared to the whole population (age, university environment, low tax payment).

Secondly, individuals might not understand animal welfare as a large public good. The aggregate of animal welfare consists of the welfare of single animals. Consumers might focus on the well-being of these single animals, which they support with their product choice. For an individual, it is more important not being responsible for one or some badly treated animals instead of being interested in improving the average or overall well-being of animals. In this case, the good "animal welfare" is a small public good, and each individual has a non-marginal impact. The individual purchase decision leads to an increase or decrease in a single animal's welfare.

Individuals might also change their behavior based on this view. As explained above, if their impact is not marginal anymore, they can change the level of the public good on an individual basis. They might then even try to compensate the "missing" willingness to pay of other individuals. By paying more for animal welfare they can achieve a higher level of animal welfare. Thus, the individual willingness to pay might be higher than in the referendum case. If a standard is enforced by law, for individuals it is not necessary to compensate for the behavior of others. Thus, they might decrease their willingness to pay in the referendum case.

Even if individuals understand animal welfare as a public good, many participants supposedly do not see a difference between paying individually or with public intervention. Some of our respondents do not see the benefit of a publicly forced provision of the public good. However, this is crucial for our calculation of the different kinds of willingness to pay. If people do not understand the rules of the game, we can fairly expect them to distinguish plausibly between the two scenarios. This is supported by a strand of literature suggesting that individuals have to understand the rules of the game before they are able to maximize their utility. In repeated public goods games, individuals may start with cooperation in the first iterations. But this cooperation breaks down after the players understand the rules of the game (see e.g. Andreoni 1995; Gale et al. 1995; Roth and Erev 1995; Palfrey and Prisbrey 1997; Cooper and Stockman 2002; Guillen et al. 2007; Feige et al. 2014). This would mean that many respondents may not have thought enough about animal welfare to understand it as a public good and the need for public provision through establishing public rules.

5 Conclusion and Implications

In this paper we aimed to identify and analyze the willingness to pay for social incentives and the public good animal welfare. Therefore, we implemented a contingent valuation survey. Individuals had to state their willingness to pay for a box of ten eggs with different husbandry levels and with and without the killing of male chicks. Individuals had to take this choice under two scenarios: In one scenario, they had to choose individually, in the other scenario, they had to state their willingness to pay in a referendum setting. In the latter setting, the chosen price was the upper bound for which they were just willing to approve the referendum and the implementation of the respective standard(s). Deducted from the model we established in Gogoll and Schlieszus (2021b), the willingness to pay in the first case should include individuals' social incentives. The willingness to pay in the second case should include their "real" willingness to pay for the public good.

The stated individual willingness to pay for one attribute varied across the products. For example, the willingness to pay for the prevention of male chick killing was higher for the husbandry level organic than for barn. This might indicate, that these properties are seen more as complements than substitutes. In contrast, the willingness to pay for switching from free-range to organic is lower than the willingness to pay from barn to free-range. Beside information asymmetries regarding the husbandry standards, a plausible explanation is also diminishing utility. However, the diminishing utility might be linked to the preferences of taste and health and not necessarily to social incentives.

The measurement of the willingness to pay in the referendum case showed, that beside a preference for animal welfare other preferences and restrictions influence the stated willingness to pay as well. Merit preferences and transaction cost due to screening of standards increase the willingness to pay whereas a desire of free choice due to income restriction, social preferences, optimization restriction and constitutional preferences diminish the stated willingness to pay.

The main purpose of our survey was not to gather a precise estimate of the willingness to pay for social incentives and animal welfare. Instead, we were aiming to give a consistent theoretical framework for differentiating the two kinds of willingness to pay

and other components. Thus, we split the different components and tried to give a way for calculation. As a result we should get – from a theoretical perspective – the "pure" willingness to pay for social incentives and the public good.

But there is more to measuring the willingness to pay consistently. It is required to decide whether public intervention is necessary or not. This also covers the question which standard to set. The optimal provision of the public good not only depends on the willingness to pay for social incentives and the public good but also on the production cost. For discrete standards like preventing male chick killing or organic husbandry, specific production costs exist. Due to social incentives, individuals are willing to pay for a certain standard without public intervention. Eggs of this standard will be bought even without public intervention if the willingness to pay is above production cost. Thus, some level of the public good will be provided already. The willingness to pay through social incentives is higher than the cost of the standard. For example, the individual willingness to pay might exceed the production cost to prevent male chick killing. Then, no public intervention is necessary. For a high husbandry standard like organic, the cost of production might exceed the willingness to pay for social incentives. Now, public intervention is needed if the willingness to pay for the public good is above production cost.

This is in line with other examples for public goods: In Germany, no law forces people to vote in elections, e.g., for the parliament. However, more than 50 percent of the German population votes regularly. In contrast, flying is not decreasing even though climate change is a well-known problem. This might be explained by ("production") cost for voting being perceived as low whereas ("production") cost of reducing flying is perceived as high. In the first example, the cost can be "covered" by social incentives. Even if an individual's influence is marginal, the cost might also be perceived as marginal. For the second example, this is not the case.

Following our model, the need for public intervention is given if, on the one hand, the cost of production exceeds the willingness to pay for social incentives and, on the other hand, it is below the willingness to pay for the public good.

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A   Annex

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Start

Liebe Teilnehmende,

im Rahmen einer unabhängigen, wissenschaftlichen Studie wollen wir in der folgenden Umfrage ermitteln, warum Sie wieviel für den Kauf von Eiern zahlen. Hierfür bitten wir um Ihre Unterstützung.
Die Dauer der Umfrage beträgt etwa **10 Minuten**. Alle Antworten werden selbstverständlich anonym gespeichert und sind nicht zurückzuverfolgen.

Wir bedanken uns für Ihre Teilnahme!

Niklas Gogoll & Felix Schlieszus
Wissenschaftliche Mitarbeiter der Universität Bayreuth

Für Rückfragen, Ideen oder Anmerkungen können Sie uns gerne unter felix.schlieszus@uni-bayreuth.de erreichen.

Weiter

Datenschutz

Einverständnis zur Verwendung Ihrer Daten und Mindestalter

Datenschutz_Allgemein_1

☐

Datenschutz_Allgemein_1

Ich erkläre mich damit einverstanden, dass im Rahmen dieser Studie Daten in anonymisierter Form erhoben und auf den Servern des Umfragenbetreibers Sawtooth Software aufgezeichnet werden. Die Einwilligung zur Erhebung und Verarbeitung der Daten ist unwiderruflich, da aufgrund der anonymisierten Form der Umfrage keine teilnehmerbezogene Löschung durchgeführt werden kann.

Datenschutz_Alter_1

☐

Datenschutz_Alter_1

Ich bestätige, dass ich mindestens 18 Jahre alt bin.

| Zurück | Weiter |

0% ▬▬ 100%

Essensgewohnheiten

Wie würden Sie Ihre Essgewohnheiten am ehesten beschreiben?

Wenn keine der Alternativen exakt zu Ihnen passt, wählen Sie die naheliegendste Alternative.

Essensgewohnheiten=1
○ Ich esse tierische Erzeugnisse (Käse etc.) und Fleischprodukte.

Essensgewohnheiten=2
○ Ich esse tierische Erzeugnisse, aber keine Fleischprodukte.

Essensgewohnheiten=3
○ Ich esse weder tierische Erzeugnisse noch Fleischprodukte.

Eierkauf

Wie viele Eier (nicht Packungen!) kaufen Sie durchschnittlich pro Woche?

[ ]

Zurück   Weiter

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Haltungsform

Für gewöhnlich kaufe ich Eier mit der Haltungsform…

Haltungsform=1
○ Bio

Haltungsform=2
○ Freilandhaltung

Haltungsform=3
○ Bodenhaltung

KT

Für gewöhnlich kaufe ich Eier, bei denen auf das Töten männlicher Küken verzichtet wird.
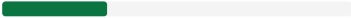
KT=1
○ Ja

KT=2
○ Nein

KT=3
○ Darauf achte ich beim Einkaufen nicht/ darauf habe ich bisher beim Einkaufen nicht geachtet.

| Zurück | Weiter |

0% ▬▬▬▬▬ 100%

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IZB

Im Folgenden möchten wir Ihre persönliche Zahlungsbereitschaft für Eier herausfunden, sprich wie viel sind Sie **maximal** bereit für eine bestimmte Packung Eier zu zahlen? Es gibt hier kein richtig oder falsch, besser oder schlechter.

Die nachfolgenden Eierpackungen (immer 10 Eier pro Packung, Größe L) unterscheiden sich hinsichtlich der Kriterien Haltungsform und dem Töten männlicher Küken.

Hinweis: Falls, Sie ein Produkt generell nicht kaufen würden, wählen Sie als Wert 0€ aus. Würden Sie mehr als 10€ für ein bestimmtes Produkt bezahlen, wählen Sie 10€ aus.

Bio-Eier & kein Kükentöten	IZB_r1_c1
Bio-Eier & Kükentöten	IZB_r2_c1
Eier aus Freilandhaltung & kein Kükentöten	IZB_r3_c1
Eier aus Freilandhaltung & Kükentöten	IZB_r4_c1
Eier aus Bodenhaltung & kein Kükentöten	IZB_r5_c1
Eier aus Bodenhaltung & Kükentöten	IZB_r6_c1

Zurück   Weiter

0%   100%

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IntroVB

Nehmen Sie an, dass der Staat das Tierwohl von Legehennen erhöhen will. Hierfür kann er Mindeststandards für Haltungsbedingungen und/oder zum Kükentöten für alle Hersteller verpflichtend einführen. Das heißt, es wäre dann nicht mehr möglich, Eier mit niedrigeren (schlechteren) Standards im Supermarkt zu kaufen.

Zurück   Weiter

0%   100%

VBZB

Der bisherige Mindeststandard entspricht dem der Bodenhaltung und das Töten männlicher Küken ist erlaubt. Bis zu welchem Preis für eine 10er Packung Eier würden Sie dem Vorschlag zur Erhöhung auf die folgenden Mindeststandards für alle Individuen noch zustimmen?
Es gibt hier kein richtig oder falsch, besser oder schlechter.

Die nachfolgenden Eierpackungen (immer 10 Eier pro Packung, Größe L) unterscheiden sich hinsichtlich der Kriterien Haltungsform und dem Töten männlicher Küken.

Hinweis: Falls, sie dem Vorschlag generell nicht zustimmen würden, wählen Sie als Wert 0€ aus. Würden Sie selbst einem Vorschlag zustimmen, der die Preise einer Packung auf mehr als 10€ erhöht, wählen Sie bitte den maximalen Wert (10€).

Machen Sie sich bei der Beantwortung bitte keine Gedanken darüber, ob sich andere Personen diesen Preis leisten können. Gehen Sie nur von Ihrer eigenen Situation aus!

Gehen Sie davon aus, dass es auch keinen Import von Eiern zu schlechteren Haltungsbedingungen aus dem Ausland geben wird.

	Value	
Bio-Eier & kein Kükentöten	VBZB_r1_c1	
Bio-Eier & Kükentöten	VBZB_r2_c1	
Eier aus Freilandhaltung & kein Kükentöten	VBZB_r3_c1	
Eier aus Freilandhaltung & Kükentöten	VBZB_r4_c1	
Eier aus Bodenhaltung & kein Kükentöten	VBZB_r5_c1	

Zurück   Weiter

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IvsZB

In welchem Fall sind Sie eher bereit einen höheren Preis für Eier zu zahlen?

IvsZB=1
○   wenn ich mir dies individuell aussuchen kann, sprich z.B. selbst entscheiden kann, ob ich Eier der Haltungsform Freiland kaufen möchte oder lieber Eier aus Bodenhaltung.

IvsZB=2
○   wenn der Staat einen bestimmten Standard einführt und sich alle Individuen an diesen halten müssen.

IvsZB=3
○   In beiden Fällen gleich viel

ZBWhy

Warum?
(Keine Pflichtantwort, aber Ihre Einschätzung ist äußerst relevant für unsere Forschung   )

[Zurück]   [Weiter]

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Praef

Sortieren Sie die folgenden Merkmale nach ihrer Wichtigkeit beim Kauf von **Eiern**. Verwenden Sie hierfür die Zahlen 1 (am wichtigsten) bis 4 (am unwichtigsten). Bitte verwenden Sie jede Zahl nur einmal.

Praef_1   [ ]   Tierwohl

Praef_4   [ ]   Geschmack

Praef_3   [ ]   Preis

Praef_2   [ ]   Eigene Gesundheit

[Zurück] [Weiter]

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TierwohlEier

Achten Sie beim Eierkauf auf das Tierwohl?

Überhaupt nicht	Eher nicht	Mittel	Eher schon	Sehr
TierwohlEier_r1=1	TierwohlEier_r1=2	TierwohlEier_r1=3	TierwohlEier_r1=4	TierwohlEier_r1=5
◯	◯	◯	◯	◯

Interdependenzen

Inwieweit stimmen Sie folgenden Aussagen zu:

	Sehr wenig	Wenig	Mittel	Stark	Sehr star
Eier von Hühnern, denen es besser geht, schmecken auch besser.	Interdependenzen_r1=1 ◯	Interdependenzen_r1=2 ◯	Interdependenzen_r1=3 ◯	Interdependenzen_r1=4 ◯	Interdependenze ◯
Eier von Hühnern, denen es besser geht, sind auch besser für die eigene Gesundheit.	Interdependenzen_r2=1 ◯	Interdependenzen_r2=2 ◯	Interdependenzen_r2=3 ◯	Interdependenzen_r2=4 ◯	Interdependenze ◯
Mit dem Kauf von Eiern mit besserer Haltungsform der Hühner, sorge ich persönlich dafür, dass es Hühnern besser geht.	Interdependenzen_r3=1 ◯	Interdependenzen_r3=2 ◯	Interdependenzen_r3=3 ◯	Interdependenzen_r3=4 ◯	Interdependenze ◯

Zurück   Weiter

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IntroSozio

Zu guter letzt sind für eine genaue Auswertung der Umfrage einige persönliche Daten für uns entscheidend. Diese werden natürlich anonym erfasst und sind nicht zurückverfolgbar.

Alter

Welcher Altersgruppe gehören Sie an?

[▼]

Geschlecht

Welchem Geschlecht fühlen Sie sich zugehörig?

Geschlecht=1
○ Weiblich

Geschlecht=2
○ Männlich

Geschlecht=3
○ Divers

Geschlecht=4
○ Keine Angabe

Bildungsstand

Welchen höchsten allgemeinbildenden Schulabschluss haben Sie?

[▼]

MNettoeinkommen

Wie hoch ist das monatliche Nettoeinkommen (also Einkommen nach Steuern) Ihres Haushalts?

[▼]

Studiengang

Welchen Studiengang studieren Sie?

[▼]

Haushaltsmitglied

Für wie viele Haushaltsmitglieder übernehmen Sie den Lebensmitteleinkauf?

[▼]

AlterHaushaltsmitglied

Wie viele der Haushaltsmitglieder sind Kinder unter 14 Jahren?

<div style="border:1px solid #ccc;">   ▼</div>

Zurück   Weiter

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Feedback

Haben Sie Anmerkungen, Feedback oder Fragen an und für uns? Wir freuen uns über jeden Kommentar.

Zurück   Weiter

0% 100%

Ende

Vielen Dank für Ihre Teilnahme an der Umfrage!

Mit Ihren Angaben versuchen wir zu messen, wie sich Ihre individuelle Zahlungsbereitschaft für das Tierwohl verändert, wenn nur Sie alleine oder zwanghaft alle zur Verbesserung des Tierwohls beitragen. Dafür haben wir uns für das Beispiel Eier entschieden. Eine bessere Haltungsform könnte man auch aus anderen Gründen (Geschmack, Gewissen, Gesundheit etc.) bevorzugen. Beim Kükentöten hingegen spielt ausschließlich das Tierwohl eine Rolle. Dies ermöglicht die Schätzung Ihrer Zahlungsbereitschaften in beiden Situationen.

Wenn Sie daran interessiert sind: Erste Ergebnisse der Umfrage werden zeitnah auf der Homepage des SoSci Panels unter Studienergebnisse veröffentlicht.

Mit freundlichen Grüßen

Niklas Gogoll & Felix Schlieszus

Für Rückfragen, Ideen oder Anmerkungen können Sie uns gerne unter niklas.gogoll@uni-bayreuth.de erreichen.

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