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Individuals’ valuation of a publicly provided private good evidence from a field study

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ABSTRACT
This paper assesses the Willingness to Pay (WTP) for a publicly provided bike sharing service whose costs are in large part covered by the municipality of Vienna, Austria. The following characteristics render it valuable for analyses: the possibility to free ride, a (perceived) positive externality of use, negligible income effects, perfect substitutability, and the credibility of valuation scenarios. We also address the disparity between Willingness to Accept (WTA) and WTP, and we find a mean WTP of EUR 1.2 for the bike sharing system and a disparity of 2:1 (WTA to WTP). Female participants as well as respondents who condition their valuation on those of others are willing to contribute more; and surprisingly those who actually use the bike sharing system as well as environmentally concerned respondents have a lower WTP. This Environmental Concern Paradox can be explained by an incorporation of positive externalities into individual valuation decisions.

1. Introduction

Various private goods and services are publicly provided by the government, e.g. to correct for market failures or for political reasons. In so doing these goods gain features of public goods, especially non-excludability and non-rivalry, which also makes them prone to free-riding (Samuelson 1954). They are available for everyone and common examples are health services or education. Yet, the ’true’ costs of providing these goods are easily underestimated, e.g. because people lose the market price as an indicator. That is, the public provision of these goods impedes their proper valuation. As this possibly induces a misallocation of resources from a welfare perspective, it is important to determine the optimal level of provision (for one of the first works on this issue see Atkinson and Stiglitz 1980).

Our investigation is based on a bike sharing system in Vienna, Austria: ‘City Bike’ which has been launched in 2003 by Gewista. The company was property of the City of Vienna until JCDecaux, a globally operating for-profit company, acquired the majority share in 2002 (Gewista 2017c). Still, the City of Vienna allocates public space for stations where City Bikes can be parked, bears 70% of the costs for installing new stations (about EUR 70,000 each) and 100% of all operating costs (ORF 2016). There are no legal or financial restrictions concerning who can use a City Bike; compared to systems in other cities (see Table 1) the low costs as well as the relatively high supply with regard to the city’s population are striking and underline the public character. As there are also other bike sharing services as well as normal bike rental services in the city – all of them privately...
we are confronted with a dual provision setting and the question of whether tax money is well spent gains even more importance. In addition, City Bikes can be defined as an ‘impure public good’ since using the private good ‘bikes’ also creates the environmental public good of, e.g. saving CO₂ emissions. Rational respondents should, therefore, incorporate both characteristics into their utility maximisation decision, and thus also into their valuations (Kotchen 2006).

Several direct and indirect methods have been developed to measure the value of – and hence the demand for – public goods, in particular in environmental economics (see Carson and Mitchell 1989; Green et al. 1998). Among the indirect approaches, which are based on revealed preferences, Hedonic Pricing is the most popular one; whereas the most widely used direct approaches are Choice Experiments (see Han, Kwak, and Yoo 2008) as well as the Contingent Valuation Method (CVM) which focus on stated preferences. Since CVM also allows to elicit non-use values it is particularly useful for examining public and publicly provided goods (see Perman et al. 2011). The valuations are based on the concepts of Compensating Variation (CV), i.e. returning the respondent’s utility to a level before the change of the good; and Equivalent Variation (EV), i.e. the change of wealth equivalent to a foregone utility change (Hicks 1957; Perman et al. 2011). Thus, use and non-use values can be elicited by using four different scenarios, based firstly on either an improvement or a deterioration and secondly on whether a respondent is to pay (WTP) or to receive (WTA) a certain amount of money (Bateman et al. 2002, 130).

There is also a well-known problem with CVM: in the absence of unusual income effects the elicitation scenarios should yield equivalent results (Willig 1976; Hanemann 1991; Shogren et al. 1994). However, e.g. Cummings, Brookshire, and Bishop (1986) review studies applying CVM to environmental goods and report WTA/WTP ratios between 3:1 to 10:1 (in USD); and Horowitz and McConnell (2002) show that WTA is significantly larger than WTP for almost all goods in question and that the ratio increases the more the good is considered public compared to private, again with ratios of about 10:1 compared to 3:1, respectively. Many scholars have attempted to explain this disparity: Tversky and Kahneman (1991) reason that the disutility of giving up a good is greater than the utility gained from obtaining it. This leads people to demand much more to give up an object than they would be willing to pay to acquire it. That is, we expect the respondents’ WTA to be higher than their WTP. Kotchen and Reiling (2000) on the other hand state that investigating public goods and in particular their non-use values necessitates the use of hypothetical questions based on hypothetical markets; this implies more difficult and thus distorted valuations by the respondents leading to the disparity (see also Plott and Zeiler 2005). Hanemann (1991), in addition to the income effect, proposes the substitution effect to explain the gap, where more perfect or at least more substitutes for the good in question lead to a lower gap between WTP and WTA.

In summary, when dealing with City Bikes, an example for publicly provided bike sharing systems, we have to deal with several characteristics that may (or may not) affect the respondents’ final valuation decision. First, free riding is possible and stating a positive valuation may change that in the future. Second, there is the positive externality of bike sharing as an impure public good – we are confronted with a dual provision setting and the question of whether tax money is well spent gains even more importance. In addition, City Bikes can be defined as an ‘impure public good’ since using the private good ‘bikes’ also creates the environmental public good of, e.g. saving CO₂ emissions. Rational respondents should, therefore, incorporate both characteristics into their utility maximisation decision, and thus also into their valuations (Kotchen 2006).

| Table 1. Comparison of bike sharing systems. |
|---------------------------------------------|
| ![Table 1. Comparison of bike sharing systems.](image) |
| **Cost for 1st hour** | **Subscription fee (yearly)** | **Bikes** | **Stations** | **Population** | **Bikes per 1000 inhabitants** | **Stations per 10,000 inhabitants** |
| Barcelona | 0.74 | 47 | 6,000 | 420 | 1607,104 | 3.73 | 2.61 |
| Melbourne | 1.29 | 39 | 600 | 50 | 4529,496 | 0.13 | 0.11 |
| New York City | 2.24 | 138 | 10,000 | 600 | 8537,673 | 1.17 | 0.7 |
| Paris | 1 | 29 | 23,600 | 1,800 | 2243,833 | 10.52 | 8.02 |
| Vienna | 0 | 1 (once) | 1,500 | 121 | 1840,226 | 0.82 | 0.66 |

Sources: Barcelona de Serveis Municipals (2017), Melbourne Bike Share (2017), Motivate International (2017), JCDecaux SA (2017), Gewista (2017a), and United Nations (2017).

Note: Values in EUR; Exchange Rates: EUR/USD 0.84; EUR/AUD 0.64.
good which rational respondents should include in their valuations. Third, income effects are negligible as the first 60 minutes of each trip are free and the subscription fee amounts to EUR 1 once; this fee even gets refunded as soon as any payments are required. Fourth, City Bikes are perfectly substitutable by other forms of mobility in Vienna. That is, walking or cheap and reliable public transport are an external constraint on valuations. And fifth, it is possible to design a credible WTA-scenario where respondents are assigned full property rights over a comparable good.

Since these valuations are often used as the basis of public interventions, understanding the determinants allows for a more ‘correct’ valuation (Coursey, Hovis, and Schulze 1987; Cooper, Poe, and Bateman 2004). This is important whenever policy makers want to infer whether the provision of otherwise private goods is justified. Hence, with the following analysis we want to understand what drives the valuation of a publicly provided bike sharing service by using different variables from competing theories (see Section 2), and we also use the opportunity to investigate the disparity between WTP and WTA. We find a mean WTP of EUR 1.2 and a disparity of 2:1 (WTA to WTP). Female participants as well as respondents who condition their valuation on those of others are willing to contribute more; and surprisingly those who used the bike in the last year prior to the survey as well as environmentally concerned respondents have a lower WTP. This ‘Environmental Concern Paradox’ can be explained by an incorporation of positive externalities into individual valuation decisions. We proceed as follows: Section 2 covers the questionnaire design, data collection, and the choice of explanatory variables. In Section 3 we present the valuation results and the analysis based on cross-sectional data on the respondents. In Section 4 we discuss the results and conclude.

2. Research design

Data collection took place from June to August 2016 and the questionnaire contains three parts, preceded by a description of the City Bike service as well as the current pricing mechanism (see Appendix 1). The valuation part contains questions on WTP for a 20% increase of the service (WTP+) as well as on WTP for a 20% decrease of the service (WTP−). The design of the questions was based on the purchase model developed by Kahneman and Ritov (1994), i.e. we asked the respondents to compare the status quo with an alternative in order to elicit their WTP. Alternatively, the authors also mention the contribution model, where respondents are asked to state their WTP for a (hypothetical) good via open-ended questions. The answers to the latter, however, more closely resemble attitudes – with higher WTP representing more favourable ones – which is why for valuation studies the purchase model is preferred (Kahneman and Ritov 1994). Since a rational human as a free rider should not contribute to the provision of a public good (Samuelson 1954), elicited valuations should remain close to 0. Regarding the payment vehicle, we ask for the acceptable price increase for the first hour of usage (in EUR/h), which represents revenue for the company operating the City Bike service. This is based on the system currently in place and avoids the problem of credibility of the city government introducing (or increasing) taxes. On the other hand, this creates the problem that respondents who never use City Bikes do not have to pay this additional fee. Hence, for the analyses we also split the sample according to whether respondents actually use the service (see Section 3.3). The elicitations were framed as a payment card system for WTP+ and WTP− with 9 questions ranging from EUR 0 to EUR 4 in steps of 50 cents. The WTA question is framed as the amount the respondents would demand, if they rent a private bike of City-Bike-quality to a customer. Conveniently, using City Bikes allows for a credible change of the public good ‘City Bike’ into a private good as we assume that the respondents are in general familiar with the good ‘bicycle’. This assignment of property rights as well as the according payment vehicle is credible and usually hard to come by with other public goods, like, e.g. for owning a river. Following Bateman et al. (2002), the respondents were also reminded that demanding too high prices for one hour of usage would lead to a lack of customers; this leads to more realistic valuations and remedies for the higher valuations elicited by an open-ended compared to, e.g. a dichotomous choice design. The scenario also states that
the rented bike is returned to the respondents, so that they should not worry about costs (e.g. time) to retrieve the bike again.

The second part is based on sociodemographic questions on age, gender, education, and income. Carlsson et al. (2012) as well as Li et al. (2009) report higher WTP for female respondents; and Berrigan and Irwin (2011) as well as Revollo-Fernández et al. (2015) report that women seem to be more cooperative which also translates to higher values for WTP. The effects on WTP have been found to be negative for age (Diaz-Rainey and Ashton 2011; Aldy, Kotchen, and Leiserowitz 2012) and positive for income (Carson, Flores, and Meade 2001; Li et al. 2009). However, due to the low costs of using City Bikes, the respondents’ budget constraints, e.g. for commuting, travelling, or leisure are not relevant for their WTP; i.e. the income effect is expected to be negligible (see Randall and Stoll 1980). This also holds for a possible disparity between WTP and WTA (see Hanemann 1991). Finally, Carlsson et al. (2012) report a positive relation between higher education and WTP.

The third part contains explanatory variables used to explore the determinants for the respondents’ valuations, viz. Environmental Concern, Conditional Cooperation, Trust, Risk Aversion, and the actual Usage of City Bikes. That attitudes may serve as predictors of behaviour can be traced back to social psychology, e.g. to the Theory of Planned Behaviour (Ajzen and Fishbein 1980; Ajzen 1991) or the Norm-Activation Model (Schwartz 1977). Moreover, experiments on conditional WTP for public goods (see Camerer 2003; Tingley and Tomz 2013) show that cooperation and prosocial behaviour, e.g. in public good games, are determined by factors that can either be internal to individuals, like, e.g. attitudes, fairness, or inequality aversion (see Falk and Fischbacher 2006), or external, such as norms and reputation (Simpson and Willer 2015). Additionally, these variables may also explain the expected disparity between individual WTA and WTP+. Based on their review, Horowitz and McConnell (2002) argue that this gap cannot be explained by faulty survey designs: there is, e.g. no difference between real and hypothetical questions, incentive compatible elicitation techniques lead to larger gaps, and improved market experience does not reduce the gap.

- **Environmental concern (EC):** Arrow et al. (1993), in a report for the National Oceanic and Atmospheric Administration (NOAA), recommend using attitudes towards the environment for explaining WTP. However, according to Cooper, Poe, and Bateman (2004) respondents may have problems stating their EC when asked directly; this is why we resort to the (revised) New Ecological Paradigm (NEP) Scale which measures in how far the respondents care for the environment and ‘endorse an ecological worldview’ (Dunlap et al. 2000). To keep the questionnaire short, we use a 10-item version coded on a 5-point Likert Scale (Dunlap et al. 2000; Hawcroft and Milfont 2010). Based on extant literature, we expect to find positive effects of EC on WTP and WTA (Kotchen and Reiling 2000; Cooper, Poe, and Bateman 2004; Longo, Markandya, and Petrucci 2008; Liebe, Preisendorfer, and Meyerhoff 2011).

- **Conditional cooperation (CC):** According to Ostrom (2000), cooperation in a group can be achieved, when there are members whose behaviour depends on (their beliefs about) other members’ actions, so called conditional co-operators. Liebe, Preisendorfer, and Meyerhoff (2011), Bateman et al. (2002, 400ff) as well as Ostrom (2000, 142ff) report a positive relation between CC and WTP. We elicit CC by asking the respondents how much they are willing to pay given an assumed average contribution of all other respondents (see Question 4 in Appendix 1). They are asked for nine contribution decisions, one for each assumed average contribution, with amounts ranging from 0 to EUR 4 in steps of 0.5.

- **Trust:** Thöni, Tyran, and Wengström (2012) show that Trust is a significant predictor for respondents to be conditional cooperators. Following their example, we use two attitude questions about trust based on World Values Survey Association (2012), and code them in a 5-point Likert Scale. This serves to investigate whether the beliefs about others’ cooperation (fairness) affects the respondents’ WTP as well as to check for the validity of CC.

- **Risk aversion:** The questions for WTP+ and WTP− are framed as risky projects with a possible 20% increase or decrease which could influence the respondents’ valuations. The questionnaire
contains a hypothetical lottery question with equal expected values which allows us to see the risk preferences given a certain reference point or endowment. According to Kahneman and Tversky (1979) individuals are risk averse in the domain of gains and risk seeking in the domain of losses. If the respondents’ risk preferences are consistent (see Isoni, Loomes, and Sugden 2011) then risk averse respondents should be more hesitant to contribute to a risky project, i.e. be hesitant to either support a possible increase (WTP+) or prevent a possible decrease (WTP−) of the City Bike service. Also, Hoehn and Randall (1987) argue that risk aversion and uncertainty about the (dis-)utility of a change in provision leads to a higher disparity as the WTP is downward biased and vice versa for WTA.

- **Usage**: Respondents who know and actually use the City Bike service should incorporate the use-value into their valuation decisions; non-users on the other hand can only state the existence or option value (see Carson, Flores, and Meade 2001; Bateman et al. 2002; Liebe, Preisendorfer, and Meyerhoff 2011). Moreover, Kotchen and Reiling (2000) find that knowledge about the public good significantly and positively influences WTP; and Coursey, Hovis, and Schulze (1987) argue that a possible gap between WTA and WTP may be due to a lack of market experience. We asked the respondents, how many times they had used a City Bike in the last 12 months, and we expect users to have a higher WTP than non-users. Also, users should show a smaller gap because they are familiar with the service, its quality, and the pricing mechanism. And as a misspecification or information bias in the question scenarios may distort valuations (see Halvorsen et al. 1998) as well as to guarantee a certain baseline of knowledge, we include a description of the City Bike service in each questionnaire.

To summarise, we expect positive effects on WTP for being female, having higher education, being concerned about the environment, being a conditional cooperator, as well as for actually using the City Bike service. The effects of age and being risk averse on WTP are hypothesised to be negative. Since the low costs of using the service should not interfere with the respondents’ budget constraints, the income effect should be negligible. The effect of trust on being a conditional cooperator is hypothesised to be positive. And we expect users to have lower values regarding the gap between WTP and WTA.

### 3. Results

Regarding the valuation results, we find a mean WTP+ of 1.2, and a mean WTA of 2.35; i.e. a disparity of 2:1. In addition, Appendix 2 contains descriptive information as well as a correlation matrix for all variables used in this analysis. The sequence of questions in the questionnaire has not been randomised for each individual respondent which means that we cannot exclude an order effect of, e.g. the prior elicitation of WTP+ on WTA. In this regard, however, the questions are ordered such that the important elicitation of WTP+ takes place close to the beginning and respondents have to answer sociodemographic questions or questions on explanatory variables in between the following valuations. In general, the result for WTP− serves as a valuable indicator for a possible order effect as it is elicited after WTA: the basically equal means of WTP+ and WTP− shown in Appendix 2, as well as the similar and close descriptive results in Table 2, suggest that the elicitation of WTA does not influence the results for WTP−. In addition, the results for WTP+ and WTP− are significantly and positively correlated \((r = 0.715)\), but not significantly different from each other, \(^9\) which is why the order effect should be negligible and we may also use the Ratio WTP+/WTA as a dependent variable. On the other hand, WTP+ and WTA are positively and significantly correlated, but also significantly different from each other. This indicates the existence of a gap; hence, we use the ratio between WTA and WTP+ as another dependent variable in the analysis. \(^10\)

The descriptive results in Section 3.1 give first insights into the data; we then test the various hypotheses by using WTP+ and the ratio WTP+/WTA (see Horowitz and McConnell 2002) as
dependent variables. As it is not possible to state negative values for WTP and WTA, both dependent variables are inherently censored from below at 0. We account for this by using the Tobit model, as the OLS estimators are inconsistent. We also split the sample into users and non-users and perform the same analyses again, e.g. because the payment vehicle for City Bikes only affects the former which may lead to distorted valuations.

### 3.1. Data preparation and descriptive statistics

Starting with a total sample of \( n = 147 \), we distinguish respondents stating a positive WTP+, those stating a WTP+ of 0, and protest-0 respondents (see Bateman et al. 2002; Cooper, Poe, and Bateman 2004). The latter use the questionnaire to express their political views or personal opinions and should be eliminated from the sample. Ten per cent of respondents stated a WTP+ of 0, compared to 15% for WTP−, and 11.4% for WTA. Respondents who stated a WTP of 0 were asked for possible reasons (see Question 3 in Appendix 1). We excluded seven respondents because they expressed skepticism or rejection of the valuation questions per se. The final sample consists of 140 participants: 65% of which are non-users, 66% females, and 63% have a university degree. Forty-one per cent of respondents stated a monthly income below EUR 1000. These numbers compare to those of the adult population of Vienna with 47% male, 26% with a university degree, and a median income of EUR 2250 (Statistik Austria 2017). City Bike users, on average, are willing to pay about EUR 0.3 less for a hypothetical positive change of the City Bike service (WTP+) than non-users. This refutes the hypothesis presented in Section 2, viz. that users should exhibit a higher WTP+. In addition, users also demand a slightly higher fee (WTA), resulting in a larger gap of 2.50 as opposed to 1.72 for non-users.

We recoded all even-numbered items of the revised 10-item NEP Scale such that high Likert Scale answers translate to a high level of environmental concern (recoded NEP or RNEP). The distributions of answers for each item as well as the item-total correlations are shown in Appendix 2. The former closely resemble the results reported by Dunlap et al. (2000), whereas the item-total correlations remain low (\(<0.3\) for 6 out of 10 items). Checking for reliability, we found a Cronbach’s Alpha of 0.579. Eliminating items RNEP.7, RNEP.9, and RNEP.12 improves the result to 0.609 which is closer to the suggested value of 0.7 (see Nunnally and Bernstein 1994) but needs to be taken into account for interpreting any results. An additional PCA also indicates the same elimination, yielding 3 components explaining 65% of total variance (see Appendix 2). The unrotated solution indicates that the NEP Scale is not unidimensional; this is, however, in line with Dunlap et al. (2000). That is, we retain seven items as a measure for EC by creating summated scales of the Likert Scale values of the seven recoded items; we do the same for Trust which consists of only 2 items (see Table 2). Also, as we do not see a lot of variation in the data (see Appendix 2), we convert Use into a binary variable with 1 for having used a City Bike at least once in the last 12 months.

#### Table 2. Descriptive statistics.

|                  | % of N | WTP+ | WTP− | WTA | WTA/WTP+ | EC   | Trust |
|------------------|--------|------|------|-----|----------|------|-------|
| Usage            |        |      |      |     |          |      |       |
| User             | 35     | 1.04 | 1.17 | 2.57| 2.50     | 25.86| 2.92  |
| Non-user         | 65     | 1.30 | 1.26 | 2.22| 1.72     | 25.54| 2.78  |
| Gender           |        |      |      |     |          |      |       |
| Male             | 34     | 0.97 | 0.96 | 2.20| 1.67     | 26.32| 2.86  |
| Female           | 66     | 1.33 | 1.37 | 2.42| 2.12     | 25.32| 2.81  |
| Age              |        |      |      |     |          |      |       |
| ≤26              | 48     | 1.29 | 1.25 | 2.18| 1.78     | 25.63| 2.58  |
| 27–35            | 39     | 1.11 | 1.19 | 2.74| 2.36     | 25.49| 3.11  |
| ≥36              | 13     | 1.19 | 1.28 | 1.85| 1.61     | 26.22| 2.91  |
| Education        |        |      |      |     |          |      |       |
| No degree        | 37     | 1.29 | 1.34 | 1.87| 1.49     | 25.50| 2.51  |
| Univ. degree     | 63     | 1.17 | 1.17 | 2.63| 2.28     | 25.75| 3.02  |
| Income           |        |      |      |     |          |      |       |
| 0–1000           | 41     | 1.24 | 1.18 | 1.92| 1.57     | 25.23| 2.54  |
| 1001–2000        | 29     | 1.26 | 1.14 | 2.22| 1.75     | 25.49| 3.00  |
| >2000            | 30     | 1.16 | 1.39 | 3.10| 2.78     | 26.39| 3.05  |

Note: Values for WTP+, WTP−, WTA, and WTA/WTP+ are in EUR; Income in EUR/Month.
As expected, Table 2 shows that women are more generous than men when it comes to WTP (EUR 0.36 more on average). If this generosity argument carried over to WTA, we would expect a lower WTA. However, females’ mean WTA is EUR 0.22 higher. Concerning Age, our sample ranging from 19 to 54 years covers two thirds of the adult population in Vienna (Statistik Austria 2017); for descriptive reasons, we categorise the respondents such that the higher tier, ≥36, represents one third, and the lower tier, ≤35, the other third. As younger respondents are overrepresented in our sample (87%), we split the lower tier again in half to gain additional insight. In the regression analyses, however, Age is included as a metric variable again. We find the WTP+ for the middle age group to be the lowest; and WTA to be the highest. Respondents younger than 26 are willing to contribute more to the City Bike service and they demand less from potential customers of their own bikes than middle-aged respondents. Finally, we find that 51% of respondents can be classified as risk averse, 19% as risk seeking, and 30% as risk neutral, as they preferred the certainty option, chose the risky outcome, or indicated indifference, respectively. And Figure 1 shows that 50% of the respondents can be classified as conditional cooperators, 7% of which always increase their contribution along with the average contribution of all other respondents, and 43% of which reach a certain limit. This is a similar result to Tingley and Tomz (2013). 9% of respondents are free riders and never contribute; and 19% are ‘unconditional co-operators’, i.e. they contribute as much as possible, even if others do less. The remaining 22% of respondents show inconsistent behaviour.

3.2. Full sample regressions

The results for WTP+ as the dependent variable are reported in Table 3. The Tobit estimation results closely resemble the OLS results as there are only 12 observations for a WTP of 0. For Model 5 we again split up the variables Trust and EC into their 2 and 7 items, respectively, and estimated various models including various combinations of items; the one with the highest explanatory power is
Table 3. Estimation results for WTP+.

|                | Model 1          | Model 2          | Model 3          | Model 4          | Model 5          |
|----------------|------------------|------------------|------------------|------------------|------------------|
| Constant       | 1.82*** (0.299)  | 1.61*** (0.307)  | 2.203*** (0.547) | 2.322*** (0.538) | 1.64*** (0.32)   |
| Age            | -0.019* (0.01)   | -0.016 (0.011)   | -0.013 (0.01)    | -0.017 (0.01)    | -0.016 (0.01)    |
| Gender         | -0.343*** (0.149)| -0.33*** (0.147) | -0.249* (0.144)  | -0.200 (0.142)   | -0.207 (0.135)   |
| Income         | 0.073 (0.171)    | -0.019 (0.169)   | 0.018 (0.165)    | -0.008 (0.161)   | 0.05 (0.157)     |
| Education      | -0.021 (0.148)   | -            | -            | -            | -0.027 (0.134)   |
| WTA            | -            | 0.066** (0.031)  | -            | -            | 0.066** (0.03)   |
| EC             | -            | -            | -0.026 (0.017)  | -0.024 (0.017)   | -                |
| Trust          | -            | -            | -0.045 (0.035)  | -0.038 (0.035)   | -                |
| CC             | -            | -            | 0.386*** (0.133)| 0.0400*** (0.131)| 0.432*** (0.129) |
| RA             | -            | -            | -0.045 (0.036)  | -0.031 (0.132)   | 0.01 (0.124)     |
| Use            | -            | -            | -            | -0.327** (0.137) | -0.279* (0.13)   |
| careful.da     | -            | -            | -            | -            | -0.21 (0.129)    |
| NEP6.a         | -            | -            | -            | -            | 0.28** (0.125)   |
| NEP8.da        | -            | -            | -            | -            | -0.346** (0.151) |
| $R^2$          | 0.063          | 0.097          | 0.161          | 0.196          | 0.26             |
| $N$            | 133            | 133            | 133            | 133            | 133              |

Note: Tobit; *p ≤ 0.1; **p ≤ 0.05; ***p ≤ 0.01; numbers in brackets are standard errors. N stands for the sample size; observations with missing values are not included for analysis.

$R^2$ is squared correlation of predicted vs. actual dependent variable.

The estimation results and in particular the signs of the coefficients indicate that our survey is theoretically valid. Confirming the hypothesis of Section 2, we find that females are willing to contribute more than males. However, this effect is weakened from −0.33 to −0.207 when introducing additional explanatory variables and gets insignificant as soon as Use is included. Respondents with a higher WTA also have a higher WTP, even though the effect is small. We also see that conditional cooperators have a higher WTP than respondents who do not (or not consistently) react to information about others’ WTP; the high value of the coefficients translates to about EUR 0.40 which corresponds to a third of the mean WTP of EUR 1.2. As its significance remains stable, the magnitude of the coefficient even increases when more explanatory variables are added. Also, as expected, the effect of Income is negligible – even with changing signs – and the coefficients for Age are negative.

On the other hand, the results for Use and EC contradict our hypotheses: First, users of City Bikes, who seemingly also include the use-value into their WTP, actually have a lower WTP+ than non-users. That is, actual knowledge of and experience with the City Bike service leads users to lower their valuation, whereas non-users seem to have higher expectations of the service. Second, we surprisingly find negative coefficients for EC which are not significant but remain negative throughout the models. For Model 5 we check all NEP items separately and we find the same results with NEP6.a and NEP8.da even being significant. According to Dunlap et al. (2000), agreeing to ‘The earth has plenty of natural resources, if we just learn how to develop them’ indicates low environmental concern, and vice versa for disagreeing with ‘The balance of nature is strong enough to cope with the impacts of modern industrial nations.’; the coefficients are expected to be negative and positive, respectively. However, the results show that respondents who are more concerned about the environment have a lower WTP+. There seems to be a feature of City Bikes – or of bike sharing in general – which induces a discrepancy between respondents’ expectations and their experiences, and which is also important for valuations. Separate analyses for users and non-users allow for additional insights (see Section 3.3).
Given the significant difference between WTA and WTP (see Section 3.1) with both a ratio of means and a mean ratio of 1.94, we also use the inverse, i.e. WTP+/WTA, as a dependent variable. This inversion remedies for heteroskedasticity and non-normality of the error term; however, the interpretation of coefficients is less intuitive: lower values and negative signs indicate larger disparities. 11.4% of respondents state a WTA of 0 which leads to a ratio divided by 0; hence, we exclude them from the analysis; the same holds for one outlier. This leaves 121 observations for analysis and the results are reported in Table 4. The variables are coded as stated above for the WTP+ estimation. In addition, cantrust.da is binary with 1 for disagreeing with ‘Most people can be trusted.’; and NEP9.a is binary with 1 for agreeing to ‘Despite our special abilities humans are still subject to the laws of nature.’

As expected, the effect of Income is small and insignificant (see Hanemann 1991). However, the (insignificant) negative coefficients of Use indicate that the user’s market experience and knowledge of the good in question leads to a larger disparity, which contradicts the hypothesis in Section 2. This is in line with our prior finding of negative coefficients for Use and WTP+ (see Table 3) as well as the insignificant but positive correlation for WTA and Use (see Appendix 2). The significant result for Education corresponds to respondents with higher education having a larger disparity, which is mainly due to the positive correlation with WTA (see Appendix 2). This, as well as the result for Trust, is unexpected and deserves a closer look in future surveys. We gain additional insight when analysing users and non-users separately below. The results for the separate NEP items contradict each other and the total effect of EC is thus negligible – again showing a potential multidimensionality of the NEP Scale.

### 3.3. Separate regressions for users and non-users

In this subsection we address the question whether the determinants for WTP+ or for the Ratio WTP+/WTA are different for users and non-users (see Tables 5 and 6). Regarding the former, the most important difference between the User Regression (UR) and Non-User Regression (NUR) is the coefficient of EC which is not significant in the Full Sample Regression (FSR, Table 3) and in NUR; but highly significant and negative in UR – with $n=48$ for users comparing to $n=85$ for non-users. The negative correlation for users and WTP+ reported in the FSR is driven by this result; i.e. for users EC is more important for WTP+ than for non-users. In another step we extend the FSR by interacting the binary variable for Use first with EC only (see Table 5) and second with all explanatory variables. The interaction effect of Use and EC turns out to be significantly negative in both

| Table 4. Estimation results for ratio WTP+/WTA. |
|-----------------------------------------------|
| Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
|---------|---------|---------|---------|---------|
| Constant | 0.90*** (0.233) | 0652** (0.261) | 0.964** (0.449) | 1.027** (0.449) | 1.215*** (0.277) |
| Age     | 0.000 (0.008) | 0.000 (0.008) | -0.001 (0.008) | -0.003 (0.008) | -0.003 (0.008) |
| Gender  | -0.203* (0.12) | -0.206* (0.118) | -0.198 (0.121) | -0.183 (0.121) | -0.171 (0.114) |
| Income  | -0.049 (0.13) | -0.066 (0.128) | -0.055 (0.128) | -0.052 (0.128) | -0.016 (0.123) |
| Education | -0.272** (0.119) | -0.336*** (0.121) | -0.332*** (0.121) | -0.322*** (0.120) | -0.370*** (0.114) |
| RA      | -        | -0.002 (0.108) | -0.021 (0.112) | 0.020 (0.111) | 0.001 (0.105) |
| Trust   | -        | 0.062** (0.030) | 0.060 (0.030) | 0.606** (0.03) | -        |
| CC      | -        | -        | 0.044 (0.108) | -0.032 (0.108) | -0.039 (0.106) |
| EC      | -        | -        | 0.011 (0.014) | -0.011 (0.014) | -        |
| Use     | -        | -        | -        | -0.138 (0.115) | -0.101 (0.112) |
| cantrust.da | -        | -        | -        | -        | -0.377** (0.106) |
| NEP8 da | -        | -        | -        | -        | -0.207* (0.122) |
| NEP9.a  | -        | -        | -        | -        | 0.267* (0.148) |
| R²**    | 0.078   | 0.11    | 0.117    | 0.128    | 0.197    |
| N       | 120     | 120     | 120      | 120      | 120      |

Notes: Tobit; * $p \leq 0.1$; ** $p \leq 0.05$; *** $p \leq 0.01$; numbers in brackets are standard errors. N stands for the sample size; observations with missing values are not included for analysis. Squared correlation of predicted vs. actual dependent variable.
cases, with coefficients of −0.058 (p=0.087) and −0.072 (p=0.043), respectively, indicating a structural difference between users and non-users. The lower valuation of users seems to result from their higher concern for the environment, whereas non-users do not take this into account; note, however, that the value for Cronbach’s Alpha of 0.609 suggests careful interpretation. We will again consider this Environmental Concern Paradox in Section 4.

Further, the correlation for CC is significantly positive with a coefficient double the size for users; so we expect an even higher coefficient in FSR with an equal amount of users and non-users. The significant results for WTA again seem to be driven by users; and the coefficient of Age with regard to WTP+ is always negative and insignificant for the full sample as well as for users only; whereas for non-users it is also negative but significant. Looking at the fully interacted model again and also checking models where only the respective variables are interacted with Use, we cannot report statistically significant differences between users and non-users regarding CC, WTA, or Age. However, as the sign and significance of CC is the same in UR, NUR and FSR, this was to be expected.

Three results for the disparity between WTP+ and WTA need to be mentioned (see Table 6): the coefficient for Education is consistently negative and highly significant for users, for non-users, and thus also for the full sample (Full Sample Gap Regression, FSG, Table 4; User Gap Regression, UG; Non-User Gap Regression, NUG). The coefficient for users is almost double the size than for non-users. However, since the former have a mean disparity of 0.59 and the latter have a mean disparity of 0.78, a difference between a respondent holding a university degree and a respondent who does not of, e.g. EUR 0.5 necessarily leads to a larger gap, if both are users compared to if both are non-users.

Table 5. Comparison of regression results for WTP+.

|                      | Users                  | Non-users              | Full sample             | Extended full sample |
|----------------------|------------------------|------------------------|-------------------------|----------------------|
| Constant             | 3.137*** (0.992)       | 1.841*** (0.648)       | 2.203*** (0.547)        | 1.772*** (0.62)      |
| Age                  | −0.004 (0.028)         | −0.020* (0.08)         | −0.013 (0.01)           | −0.016 (0.01)        |
| Gender               | −0.179 (0.240)         | −0.277 (0.188)         | −0.249* (0.144)         | −0.227 (0.142)       |
| Income               | −0.102 (0.284)         | 0.029 (0.192)          | 0.018 (0.165)           | −0.013 (0.16)        |
| WTA                  | 0.114*** (0.042)       | 0.031 (0.045)          | 0.057* (0.03)           | 0.068** (0.03)       |
| Trust                | −0.107* (0.062)        | −0.022 (0.043)         | −0.045 (0.035)          | −0.04 (0.035)        |
| RA                   | −0.109 (0.220)         | 0.099 (0.161)          | −0.045 (0.036)          | 0.041 (0.131)        |
| EC                   | −0.075*** (0.029)      | −0.003 (0.021)         | −0.026 (0.017)          | −0.004 (0.021)       |
| CC                   | 0.717*** (0.239)       | 0.378** (0.162)        | 0.386*** (0.133)        | 0.42*** (0.13)       |
| Use                  | −                      | −                      | −                       | −0.059* (0.034)      |
| Use*EC               | −                      | −                      | −                       | 1.17 (0.885)         |
| \( R^2 \) a          | 0.285                  | 0.169                  | 0.161                   | 0.213                |
| \( N \)              | 48                     | 85                     | 133                     | 133                  |

Note: Tobit; *p ≤ 0.1; **p ≤ 0.05; ***p ≤ 0.01; numbers in brackets are standard errors. \( N \) stands for the sample size.

\( R^2 \) a Squared correlation of predicted vs. actual dependent variable.

Table 6. Comparison of regression results for ratio WTP+/WTA.

|                      | Users                  | Non-users              | Full sample             | Extended full sample |
|----------------------|------------------------|------------------------|-------------------------|----------------------|
| Constant             | 1.254* (0.654)         | 0.900 (0.56)           | 0.964** (0.0449)        | 1.23*** (0.45)       |
| Age                  | 0.018 (0.019)          | −0.004 (0.009)         | −0.001 (0.008)          | −0.002 (0.008)       |
| Gender               | −0.152 (0.166)         | −0.204 (0.163)         | −0.198 (0.121)          | −0.138 (0.12)        |
| Income               | 0.216 (0.182)          | −0.195 (0.16)          | −0.055 (0.128)          | −0.054 (0.125)       |
| Education            | −0.552*** (0.186)      | −0.280* (0.147)        | −0.332** (0.121)        | −0.333*** (0.118)    |
| Trust                | −0.025 (0.043)         | 0.082** (0.038)        | 0.060* (0.030)          | 0.049* (0.03)        |
| RA                   | 0.024 (0.151)          | 0.078 (0.144)          | −0.021 (0.112)          | 0.008 (0.109)        |
| CC                   | 0.393** (0.158)        | −0.165 (0.137)         | −0.044 (0.108)          | −0.183 (0.127)       |
| EC                   | −0.034* (0.02)         | 0.006 (0.019)          | 0.011 (0.014)           | −0.013 (0.014)       |
| Use                  | −                      | −                      | −                       | −0.427* (0.175)      |
| Use*CC               | −                      | −                      | −                       | 0.502** (0.232)      |
| \( R^2 \) a          | 0.305                  | 0.158                  | 0.020                   | 0.117                |
| \( N \)              | 39                     | 81                     | 120                     | 120                  |

Note: Tobit; *p ≤ 0.1; **p ≤ 0.05; ***p ≤ 0.01; numbers in brackets are standard errors. \( N \) stands for the sample size.

\( R^2 \) a Squared correlation of predicted vs. actual dependent variable.
Concerning Trust, the coefficient in FSG is significant and positive, and as mentioned above: unexpectedly so. Splitting the sample shows that the effect is driven by non-users, with similar distributions for both groups. And lastly, the results for CC show that users who are conditional cooperators have a smaller gap than those who are free riders, with a relatively large coefficient of .393. However, this result does not carry over to the FSG. Again checking these results by individually including the interaction effects of Use with CC (see Table 4), Education, and Trust in the FSG, as well as by interacting Use with all explanatory variables, we find the coefficient for the interaction of Use and CC to be significantly positive with values of 0.50 ($p=0.031$) and 0.59 ($p=.015$), respectively; additionally, the coefficient for Use is significantly negative with $-0.43$ ($p=0.015$) indicating a structural difference between users and non-users both regarding the slope and intercept parameters. The reported difference regarding Trust cannot be confirmed using interaction effects; and since the sign and significance for Education is the same in UG, NUG, and FSG we find the interaction effect to remain insignificant as expected. In summary, actually using the City Bike service does seem to have a large impact on the respondents’ valuations.

4. Discussion and concluding remarks

As with all publicly provided goods, free riding is possible also with the City Bike service. Whereas this suggests a WTP of 0, we report a mean WTP+ of EUR 1.2, and a mean WTP+ for users of EUR 1.04. A short back-of-the-envelope calculation shows that one trip costs about EUR 0.5: in 2016 15 people were employed for the City Bike service with an assumed average yearly salary of EUR 30,000; yearly costs of 1500 bikes times EUR 600 (fee in case a user does not return a bike) including 20% of depreciation per year (assuming 5 years of use); minus ca. 100,000 new subscriptions of EUR 1 each as in 2015 (Gewista 2017b). This indicates high foregone revenues for the providers; even more so compared to privately run bike rental systems in Vienna starting at EUR 5 per hour (Vienna Tourist Board 2016). We also find a disparity of 2:1 between WTA and WTP, which, according to Hahne mann (1991) should not exist for goods for which income is irrelevant and which are perfectly substitutable as is the case with City Bikes in Vienna.

Many authors try to explain individuals’ WTP with the focus on one single theory. We show that alternative determinants of WTP, like, e.g. Environmental Concern, or personality captured by Conditional Cooperation, have higher explanatory power than variables derived from the theory of public goods or economic variables like Income. We can confirm the finding of, e.g. Carlsson et al. (2012) that female respondents have a higher WTP than male; and of Randall and Stoll (1980) or Hahnemann (1991) that income should not play a role for valuations as City Bikes are publicly provided, basically at a price of 0. On the other hand, regarding CC, we observe that it is strongly and positively linked to WTP – which is in line with Ostrom (2000) – with about 50% of participants being classified as conditional cooperators and only 9% as pure free riders. That is, there seems to be more to City Bikes, or in general to publicly provided bike sharing systems, in terms of possible hidden features whose effect dominates the one of ‘standard’ explanatory variables. For one, there is its character of an impure public good which is based on the additional environmental externality that results from use. And bike sharing seems to allude to altruistic feelings (indicated by CC), i.e. a positive externality on other fellow citizens. Both directions should be pursued in further analyses.

Another important result is that respondents who actually use the City Bike service have a lower WTP; note, however, that there may be an upward bias of non-users’ valuations due to the payment vehicle of City Bikes. In general, users get to know the quality of a good, which allows them to update their valuations. This is exactly why (also) eliciting non-use values is essential, as experience with a good may distort the actual valuation. Also, public decision makers can use a disparity between users’ and non-users’ valuations as an indicator for use experience and quality of the provided good, even though it may also be the case that non-users’ expectations are unrealistically high. The negative effect of use on WTP could be bad news for the providing company Gewista and in particular for the City of Vienna which introduced and supports this service, because users either are dissatisfied
with the quality of the bikes or service or with the public provision in general. Depending on whose valuations are deemed more important, users’ or non-users’, our result indicates a lower optimal supply of City Bikes if the former are the benchmark; and as the real valuation, unbiased by use experience, could be higher, a higher supply if the latter are chosen as the benchmark.

Combining the results of the separate regression for users and non-users with the significant negative coefficient of EC for the former, we are confronted with the Environmental Concern Paradox. The users’ ‘true’ valuation of the service could be the same as for non-users but is again distorted by a particular feature of City Bikes, viz. by their perceived positive externality. We propose two closely related interpretations of this effect which both deal with the idea that the actual use of certain goods leads to a positive externality: First, users may be driven by a certain ‘sense of entitlement’, i.e. the impression that people should actually get paid for doing something good – implicitly demanding some kind of subsidy, e.g. of the City of Vienna. An example for a positive effect is the reduced CO2 emissions when using City Bikes; even though this is an illusion compared to walking. If this holds true, users should also demand less for renting their private bike because those who rent their bikes again benefit the environment which also translates to a lower WTA. We can, however, not confirm this in our survey: users also have higher WTA valuations than non-users (yet insignificantly so). The second, more individualistic and also optimistic interpretation is that users focus only on the positive externality of the good. That is, they already discount their valuation by the perceived benefit when they themselves actually use the good. Our results support this second explanation (see Table 6) as EC does not play a role for non-users.

Moreover, if we translate this, e.g. to the valuation of electric cars vs. cars powered with fossil fuel, this implies buyers having lower valuations for the former – assuming all characteristics like, e.g. range or maximum velocity are the same. That is, after the early adopters and technology enthusiasts are taken out of market demand, the positive externality ceteris paribus leads to a lower WTP for an electric car compared to a fossil fuelled car. The same holds for renewable energy sources: again, after early adopters are satisfied and the technology matures, the WTP for a 100% renewable energy mix should be lower than for a mix which includes fossil fuels. The difference to City Bike is, however, that when riding a bike the positive externality is obvious and perceivable whereas consumers do not really see which generating unit actually provides electricity and whether this information is really true. In this regard, EC can serve as a proxy to measure the perceived externality and thus the downward pressure on the users’ valuations.

The features of City Bikes also allowed us to create credible scenarios both for WTP and for WTA and to get additional insight into the determinants of a possible disparity between them. This is important because it shows how to handle and interpret the elicited valuation once one of the four basic CVM question designs has been chosen (see Section 1). Not every scenario is appropriate for every good; hence, when the determinants for the gap are known, the valuation results can be inflated or deflated according to the characteristics of the underlying sample. Using City Bikes allowed for credibly asking 3 out of these 4 questions. Knowing for example that CC plays an important role in CVM surveys is helpful for creating the valuation questions: if the respondents are told how much others are willing to pay before answering, or if they have a certain type distribution over their fellow (cooperating) citizens, then the final valuation results must be adapted by a certain factor. We found, e.g. a correlation coefficient double the size for CC and WTP+ compared to CC and WTA. Furthermore, if surveys repeatedly show that there is, e.g. a disparity of 5:1 for a particular class of goods and a valuation study is based on WTA, then the valuation result needs to be deflated to 20% to get the according WTP result. The same holds for different characteristics of the respondents: having a larger share of respondents with a university degree or who are concerned about the environment again indicates that this de- or inflation should be adjusted accordingly.

We are aware that when dealing with stated preference elicitation techniques as compared to revealed preferences many biases are present and incentive compatibility is an even more important aim to strive for. However, we were confronted with severe constraints regarding the length of the questionnaire and the time it took the respondents to give the answers. The additional drop-off and
online surveys allowed us to reach a reasonable sample size. Moreover, the valuation scenario for WTP+ and WTP− – viz. paying for the first hour of use – may impose an upward bias because any answers given by non-users will only ever affect users, although the respondents should take into account that they may be using the good in the future. And lastly, we based our conclusions regarding EC and the Environmental Concern Paradox on a reduced 7-item version of the NEP Scale; in future survey the 15-item version should be used to validate our results. And finally, for accurately eliciting the ‘real’ citizens’ valuation for the City Bike service, the current sample can be updated to better depict the population structure of the Vienna.

Notes

1. An average ride lasts 22.5 minutes and in 95% of cases there are no further fees (Dechant 2013; Gewista 2016).
2. This is a lower result compared to a pilot study we conducted in 2015 (n = 364) where we found a gap of 4:1 using open-ended valuation questions.
3. Due to the length of the questionnaire an initial intercept survey at City Bike stations was followed by a drop-off survey in nearby buildings with the request to scan and send the results to a given E-mail address (response rate about 15%), as well as by an online SoSci Survey (Leiner 2014). Each part contributes about a third of the data.
4. The maximum WTP+ is EUR 3; and only 1 respondent stated a WTP− of EUR 4. Hence, the payment card does not seem to artificially constrain the WTP valuations. We found similar values in the pilot study in 2015 (n = 364) with open-ended valuation question, viz. a minimum WTP of EUR 0, a maximum of EUR 3, and a mean of EUR 0.79.
5. Since the pilot study did not include WTA, we have no indication of a range for the payment card. That is, the open-ended question is chosen to not artificially constrain the valuations.
6. Hanemann (1994, 29) argues that the gap may be due to ‘ordinary people [being] ill-trained for valuing the environment’.
7. We retain items 4, 6, 7, 8, 9, 10, 11, 12, 13, and 15; and we also want to express our gratitude to Prof. Florian G. Kaiser for providing the German translation of the NEP Scale.
8. Two sets of questionnaires were designed and handed out randomly to the respondents; the difference lies with Question 5 (see Appendix 1): we asked for a risky choice regarding a lottery for a possible gain or loss. However, we did not further pursue this distinction in the analysis as there were no significant differences between these two groups.
9. Paired-samples t-test, p = 0.69.
10. The WTA responses of 3 respondents were more than 3 SD out of range (i.e. >10; mean = 2.35; SD = 2.23) and as protest answers also truncated from the relevant analyses.
11. This result is sensitive to high WTA responses of, e.g. EUR 10 per hour particularly frequent with male respondents.
12. The outlier shows a ratio of 30, compared to a mean of 0.72 and a SD of 0.57.
13. The complete results are not presented here but available upon request.
14. The distribution of NEP values is, however, not significantly different between the two groups: Two-sample Kolmogorov Smirnov test, p = 0.769.
15. The complete results are not presented here but available upon request.
16. The pilot study in 2015 included questions on the satisfaction with the City Bike system, but closer analyses did not yield any significant results.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Willingness to Pay for Public Environmental Goods. *American Economic Review* 95 (3): 530–545.
Appendix 1. Questionnaire

City Bikes in Vienna

Founded in 2003, City Bike consists of about 1500 bikes and 120 stations in Vienna. In 2015 the bikes were used for more than 1 million trips. Subscribing costs 1 Euro once, the first hour of each trip is free and each additional hour costs from 1 up to 4 Euro. The service is provided by a privately owned company, Gewista GmbH.

(1) In the last 12 months I used a City Bike _____ times.

(2) Assume that the number of stations and bikes could be increased by 20% to more than 140 stations and 1800 bikes. To make this happen, everyone should pay a fee for the first hour. The quality of the bikes will remain the same. Consider that you could also spend the money on public transport or taxis. Please indicate (x) your preferences for all 9 options below:

| I would be willing to pay | Yes | No | I would be willing to pay | Yes | No | I would be willing to pay | Yes | No |
|---------------------------|-----|----|---------------------------|-----|----|---------------------------|-----|----|
| 0 Euro                    | ☐   | ☐  | 1,5 Euro                  | ☐   | ☐  | 3 Euro                    | ☐   | ☐  |
| 0,5 Euro                  | ☐   | ☐  | 2 Euro                    | ☐   | ☐  | 3,5 Euro                  | ☐   | ☐  |
| 1 Euro                    | ☐   | ☐  | 2,5 Euro                  | ☐   | ☐  | 4 Euro                    | ☐   | ☐  |

(3) If you are willing to pay only 0 Euro per ride, please indicate the reasons below:
☐ I am happy with City Bike as it is now. Changing it is not necessary.
☐ I am skeptical that increasing the fees would yield enough money.
☐ It is the city’s duty to offer City Bikes for free.
☐ Others should pay for it (e.g. companies via advertising).
☐ I think the money would not be used for City Bike but for other things.
☐ I cannot afford to pay for using City Bikes.
☐ I am opposed to any form of new fees.
☐ Other: ___________

(4) In the first row you can find the average payment (Euro for the first hour) of all the other users. Please fill in the maximum amount you would be willing to pay depending on what the others do:

| Average fee of all other users: | 0 | 0,5 | 1 | 1,5 | 2 | 2,5 | 3 | 3,5 | 4 |
|---------------------------------|---|-----|---|-----|---|-----|---|-----|---|
| Maximum fee you would be willing to pay: |     |     |     |     |     |     |     |     |     |

(5) In the table below you can find two policy options. Please indicate which one you prefer.

| Option A | Option B |
|----------|----------|
| With certainty (100%) the service will be increased by 10%. | With 50% the service will be increased by 20%, and with 50% remains the same. |

☐ Option A ☐ Option B ☐ I am indifferent

Alternative question for risk aversion:
(5) In the table below you can find two policy options. Please indicate which one you prefer.

| Option A | Option B |
|----------|----------|
| With certainty (100%) the service will be decreased by 10%. | With 50% the service will be decreased by 20%, and with 50% remains the same. |

☐ Option A ☐ Option B ☐ I am indifferent

(6) Please suppose that you have a bike of City-Bike-quality. Since you currently do not need it, you can rent it to someone to make some money. How much would you demand for one hour of rent (including returning the bike to you)? Keep in mind that you may not find any customers when you set the price too high. _____ Euro

(7) Gender: male ☐ female ☐

(8) Age: ______

(9) Assume that there are plans to reduce the number of stations and bikes by 20% to less than 100 stations and 1200 bikes. To prevent this, everyone should pay a fee for the first hour. The quality of the bikes will remain the same. Consider that you could also spend the money on public transport or taxis. Please indicate (x) your preferences for all 9 options below:

| I would be willing to pay | Yes | No | I would be willing to pay | Yes | No | I would be willing to pay | Yes | No |
|---------------------------|-----|----|---------------------------|-----|----|---------------------------|-----|----|
| 0 Euro                    | ☐   | ☐  | 1,5 Euro                  | ☐   | ☐  | 3 Euro                    | ☐   | ☐  |
| 0,5 Euro                  | ☐   | ☐  | 2 Euro                    | ☐   | ☐  | 3,5 Euro                  | ☐   | ☐  |
| 1 Euro                    | ☐   | ☐  | 2,5 Euro                  | ☐   | ☐  | 4 Euro                    | ☐   | ☐  |
10. For each of the statements below, please indicate whether you strongly disagree, mildly disagree, are unsure, mildly agree or strongly agree with it.

| Statement                                                                 | Strongly disagree | Disagree | Unsure | Agree | Strongly agree |
|---------------------------------------------------------------------------|-------------------|----------|--------|-------|----------------|
| Human creativity will ensure that we do NOT make the earth unlivable.     | □                 | □        | □      | □     | □              |
| The earth has plenty of natural resources if we just learn to develop them.| □                 | □        | □      | □     | □              |
| Plants and animals have as much right as humans to exist.                 | □                 | □        | □      | □     | □              |
| The balance of nature is strong enough to cope with the impacts of modern industrial nations. | □                 | □        | □      | □     | □              |
| Despite our special abilities humans are still subject to the laws of nature. | □                 | □        | □      | □     | □              |
| The so-called 'ecological crisis' facing humankind has been exaggerated.  | □                 | □        | □      | □     | □              |
| The earth is like a spaceship with very limited room and resources.       | □                 | □        | □      | □     | □              |
| Humans were meant to rule over the rest of nature.                       | □                 | □        | □      | □     | □              |
| The balance of nature is very delicate and easily upset.                 | □                 | □        | □      | □     | □              |
| If things continue on their present course, we will soon experience a major ecological catastrophe. | □                 | □        | □      | □     | □              |
| Most people can be trusted.                                              | □                 | □        | □      | □     | □              |
| You cannot be too careful when dealing with other people.                | □                 | □        | □      | □     | □              |

(10) Highest degree: ________________ (e.g. apprenticeship, college degree)
(11) Gross monthly income: ______ Euro OR

| Income Range | 0–1.000 | 1.001–2.000 | 2.001–3.000 | 3.001–4.000 | 4.001–5.000 | >5.000 |
|--------------|---------|-------------|-------------|-------------|-------------|--------|
|□             | □       | □           | □           | □           | □           | □      |
Appendix 2. Additional information on the variables

Table A1. Descriptive information, all variables.

| Non-metric variables | Metric variables |
|----------------------|------------------|
| Value                | Frequency (Freq) | Percentage (%) | N | Min  | Max  | Mean | SD  |
| Gender               |                  |                |   |      |      |      |     |
| male                 | 47               | 33.6           | 140 | 19   | 54   | 28.47| 7.168|
| female               | 93               | 66.4           | 140 | 0    | 14   | 1.211| .7588|
| Income               |                  |                |   |      |      |      |     |
| 0–1000               | 57               | 40.7           | 138 | 0    | 4.0  | 1.228| .8757|
| 1000–2000            | 41               | 29.3           | 135 | 0    | 10   | 2.349| 2.23 |
| >2000                | 41               | 29.3           | 140 | 16   | 35   | 25.60| 3.958|
| Education            |                  |                |   |      |      |      |     |
| University degree    | 88               | 62.9           | 140 | 2    | 9    | 5.66 | 1.877|
| No degree            | 52               | 37.1           | 139 | 0    | 100  | 3.53 | 11.67|
| CC                   |                  |                |   |      |      |      |     |
| Cooperating          | 73               | 52.1           |     |      |      |      |     |
| Not cooperating      | 67               | 47.9           |     |      |      |      |     |
| RA                   |                  |                |   |      |      |      |     |
| Risk averse          | 72               | 51.4           |     |      |      |      |     |
| Not risk averse      | 68               | 48.6           |     |      |      |      |     |

Table A2. Reliability and validity test results for the NEP scale.

| NEP item | Response frequencies | Item-total Corr. 7 items | PCA loading matrix
|----------|----------------------|--------------------------|-----------------|
|          | 1  2  3  4  5 N/A  |                          | Comp 1 | Comp 2 | Comp 3 |
| 4        | 7 34 46 33 15 5   | 0.248                    | 0.348  | 0.662  | 0.456  |
| 6        | 29 38 25 12 4    | 0.319                    | 0.478  | 0.643  | –      |
| 7        | 4 6 11 77 –      | –                        | –      | –      | –      |
| 8        | 1 9 23 57 50 –   | 0.397                    | 0.649  | –      | –0.268 |
| 9        | 2 6 13 54 65 –   | –                        | –      | –      | –      |
| 10       | 0 7 19 66 48 –   | 0.398                    | 0.667  | –      | –0.494 |
| 11       | 10 13 63 39 –    | 0.288                    | 0.496  | –0.298 | 0.681  |
| 12       | 2 7 19 49 63 –   | –                        | –      | –      | –      |
| 13       | 1 10 70 44 –     | 0.280                    | 0.545  | –0.555 | –      |
| 15       | 0 6 24 66 44 –   | 0.429                    | 0.698  | –0.177 | –      |

Note: n=140; 1 = strongly disagree, 2 = disagree, 3 = unsure, 4 = agree, 5 = strongly agree; KMO Measure of Sampling Adequacy: 0.62; Bartlett’s test of sphericity highly significant.

*Loadings < 0.15 are not shown.
Table A3. Matrix of correlations and associations.

| Variables | User | Age | Income | Gender | Education | RA | CC | Trust | EC | WTP+ | WTP− | WTA |
|-----------|------|-----|--------|--------|-----------|----|----|-------|----|------|-------|-----|
| User      | 1    |     |        |        |           |    |    |       |    |      |       |     |
| Age       | −0.178 | 1  |        |        |           |    |    |       |    |      |       |     |
| Income    | −0.081 | 0.450** | 1  |        |           |    |    |       |    |      |       |     |
| Gender    | 0.113 | 0.034 | −0.031 | 1  |           |    |    |       |    |      |       |     |
| Education | 0.068 | 0.171** | 0.286** | 0.014 | 1  |    |    |       |    |      |       |     |
| RA        | −0.036 | 0.136 | 0.092 | 0.086 | 0.052 | 1  |    |       |    |      |       |     |
| CC        | 0.043 | −0.101 | −0.010 | −0.136 | 0.033 | −0.016 | 1  |       |    |      |       |     |
| Trust     | 0.070 | 0.158** | 0.233** | 0.025 | 0.262** | −0.079 | 0.008 | 1  |    |      |       |     |
| EC        | 0.048 | 0.039 | 0.132 | 0.130 | 0.019 | 0.235** | 0.080 | −0.054 | 1  |      |       |     |
| WTP+      | −0.165* | −0.137 | −0.040 | −0.228** | −0.079 | −0.032 | 0.267** | −0.121 | −0.109 | 1  |      |       |     |
| WTP−      | −0.052 | −0.113 | 0.089 | −0.223** | −0.097 | −0.049 | 0.284** | −0.024 | 0.037 | 0.715** | 1  |     |
| WTA       | 0.076 | −0.020 | 0.215 | −0.044 | 0.165* | 0.070 | 0.119* | −0.058 | 0.093 | 0.198** | 0.078 | 1   |

Note: *p ≤ 0.05, **p ≤ 0.01. Printed coefficients are based on Pearson correlations; significances were determined by using the appropriate tests according to the different scale levels. Income is coded as EUR per month: 1 = ‘0 – 1000’; 2 = ‘1001 – 2000’; 3 = ‘> 2000’.

*p ≤ 0.05.

**p ≤ 0.01.