RUHR
ECONOMIC PAPERS

Manuel Frondel
Viola Helmers
Stephan Sommer

Fostering the Acceptance of Congestion Charges: Experimental Evidence for Europe

RUHR UNIVERSITÄT BOCHUM RUB rwi

#1148

Imprint

Ruhr Economic Papers

Published by

RWI – Leibniz-Institut für Wirtschaftsforschung
Hohenzollernstr. 1-3, 45128 Essen, Germany

Ruhr-Universität Bochum (RUB), Department of Economics
Universitätsstr. 150, 44801 Bochum, Germany

Technische Universität Dortmund, Department of Economic and Social Sciences
Vogelpothsweg 87, 44227 Dortmund, Germany

Universität Duisburg-Essen, Department of Economics
Universitätsstr. 12, 45117 Essen, Germany

Editors

Editorial Office

Ruhr Economic Papers #1148

Responsible Editor: Manuel Frondel

ISSN 1864-4872 (online) – ISBN 978-3-96973-331-8

Ruhr Economic Papers #1148

Manuel Frondel, Viola Helmers, and Stephan Sommer

Fostering the Acceptance of Congestion Charges: Experimental Evidence for Europe

Bibliografische Informationen der Deutschen Nationalbibliothek

The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available on the Internet at **http://dnb.dnb.de**

RWI is funded by the Federal Government and the federal state of North Rhine-Westphalia.

https://dx.doi.org/10.4419/96973331
ISSN 1864-4872 (online)
ISBN 978-3-96973-331-8

Manuel Frondel, Viola Helmers, and Stephan Sommer*

Fostering the Acceptance of Congestion Charges: Experimental Evidence for Europe

Abstract

Although there is ample empirical evidence that congestion charges can effectively reduce traffic congestion and its detrimental effects, this instrument has only been implemented in a handful European cities. On the basis of a randomized information experiment that was embedded in a survey across seven European countries, this paper empirically investigates whether information on their (i) effectiveness and (ii) a-posteriori acceptance may increase the public support for congestion charges. Relative to the control group, the results indicate that, on average, this information can raise acceptance by 9.3% and 7.1%, respectively. Moreover, while there is substantial heterogeneity in the acceptance across countries, attributing a concrete price level to the charge uniformly raises acceptance at low charge levels, but lowers it at high levels. Based on these results, we conclude that information campaigns on congestion charges and their benefits for commuters and city-dwellers are essential for fostering public support for this rarely employed transport policy instrument.

JEL-Codes: R48, C25

Keywords: Acceptability; congestion charge; public support; road pricing

March 2025

** Manuel Frondel, RWI, RUB; Viola Helmers, RWI, Ruhr Graduate School in Economics; Stephan Sommer, RWI, Bochum University of Applied Science.*

– We thank participants of the 2023 conference of the Verein für Socialpolitik and the 2023 IAREP-SABE conference for their comments. We gratefully acknowledge financial support by the Federal Ministry for Education and Research (BMBF) within Kopernikus project Ariadne 2 (grant 03SFK5C0-2) and the German Research Foundation (DFG) within TRR 391: Spatio-temporal Statistics for the Transition of Energy and Transport (grant 520388526), Project C03: Monitoring of Germany's Mobility Transition: Data and Methods. The experiment was preregistered under the AEA RCT Registry (AEARCTR-0010644; https://www.socialscienceregistry.org/trials/10644).

– All correspondence to: Manuel Frondel, RWI, Hohenzollernstraße 1–3, 45128 Essen, Germany, e-mail: manuel.frondel@rwi-essen.de

1 Introduction

There is ample empirical evidence that congestion charges, that is, fees for the entrance into a city by car via a road with scarce capacity, can effectively reduce traffic congestion and its detrimental effects, such as air and noise pollution (Leape, 2006; Börjesson et al., 2012; Börjesson and Kristoffersson, 2015; Croci, 2016; Green et al., 2016; Li and Hensher, 2012). Reducing congestion also lowers the risk of accidents and the extent of various health problems (Zheng et al., 2010; Wilhelm et al., 2012; Nie et al., 2007). Because of such advantages, congestion charges have long been promoted by transport planners and economists alike (Cramton et al., 2018, 2019) for big cities, as their benefits are widely considered to outweigh implementation and operation costs, not least due to the revenues that can be raised with such charges (Decorla-Souza and Kane, 1992; Leape, 2006; Eliasson et al., 2009; Anas and Lindsey, 2011; Wang et al., 2013), whereas smaller cities are likely to have too little congestion for congestion charges to be beneficial to society. Nonetheless, in Europe, congestion charges have been introduced only in a handful of cities so far, such as London, Stockholm, Gothenburg, and Milan, mainly due to the challenge of making it publicly and politically acceptable (Jones, 2003; Schuitema et al., 2010; Fürst and Dieplinger, 2014).

Börjesson and Kristoffersson (2015), for instance, highlight the example of Gothenburg, where despite of a negative referendum, the introduction of a congestion pricing scheme was supported by all political parties, once its introduction had been linked to grants for national transport investments. In addition to political acceptance, public acceptance likewise seems to be a key issue with this policy instrument. For instance, in New York City, plans for a congestion charge were scrapped because of the low public support, and similar policies were rejected through referenda by the inhabitants of Birmingham, Edinburgh, and Manchester (Baranzini et al., 2021). Common concerns that people voice about congestion charges refer to equity (Kristoffersson et al., 2017), effectiveness (Li et al., 2019), the use of the revenues (Grisolía et al., 2015; Jaensirisak et al., 2005), the complexity of the design, as well as privacy (Gu et al., 2018). Moreover, the received literature suggests that people tend to incorrectly anticipate the effects of a congestion charge by overestimating potentially negative impacts, but underestimating the positive effects (Baranzini and Carattini, 2017).

Adding to this body of research, we embedded a randomized information experiment within a large-scale international survey to investigate the effect of two types of information on the acceptance of a congestion charge in seven European countries: Information on (i) the effectiveness of congestion charges and on (ii) how the acceptance increased after the implementation of a congestion charge in cities such as Stockholm and Gothenburg, a type of information that has not been subject of scientific scrutiny so far. A particular appeal of our study lies in the large sample of 15,822 individuals originating from seven European countries: France, Germany, Greece, Italy, Poland, Spain, and the United Kingdom.

Each of the 15,822 participants was randomly assigned to either of three intervention groups and, upon receiving either of two information treatments or no further information, was asked to accept the hypothetical introduction of a congestion charge. The first group was provided with information about the positive effects that congestion charges had on traffic-related problems in cities where they were introduced, citing several scientific articles (e. g. Green et al., 2016, Börjesson et al., 2012, Börjesson and Kristoffersson, 2015). The second group received information about how these charges rose in popularity after they were implemented (Börjesson et al., 2012; Börjesson and Kristoffersson, 2015), while the third group served as the control group and did not obtain any additional information. Thereafter, we randomly attributed either of three concrete charge levels to each participant: €2, €5, or €10 for Germany and France, for instance. We asked whether participants are willing to pay a fee of this level for driving into a city, hypothesizing that with a concrete charge level, a congestion charge will be assessed differently by participants than the hypothetical introduction of a congestion charge of an undefined level.

The empirical results indicate that both types of information may improve the acceptance of a congestion charge, with the information on its effectiveness having a somewhat stronger effect across countries than the information on the increased a-posteriori acceptance in cities where a charge was introduced: On average, participants who received the information on the efficacy of congestion charges are 9.3% more likely to approve or strongly approve of a charge than subjects of the control group, while individuals who received the information on the increased a-posteriori acceptance are 7.1% more likely to accept a congestion charge of an undefined level. Moreover, presenting a concrete amount for the charge raises its acceptance at the low charge level of 2 euros, while the acceptance is substantially lower at the high charge level of 10 euros: Presenting the high charge level to the participants reduces the likelihood of being willing to pay the congestion charge by 22.6% relative to the low charge level. We also find that previous knowledge about the nature of the congestion charge can favor acceptance significantly, such as in Germany.

The following section provides a literature review on the acceptance of congestion charges and their beneficial effects. Section 3 describes the experimental design and the data base. Section 4 presents the empirical methodology, followed by the presentation of the empirical results and our robustness checks. The last section summarizes and concludes.

2 Literature on the Acceptance of Congestion Charging

Although still rarely implemented in cities, the proposition to put a price on road traffic to internalize the negative external effects is already some 70 years old (Walters, 1961; Reynolds, 1963; Vickrey, 1963). In 1975, Singapore was the first city in the world that introduced a congestion charge. As a result, the traffic volume within the tolled zone decreased by about 45% (Khan, 2001). It took almost another three decades, until London was the first European metropolis that implemented a congestion charge in 2003. The charge was estimated to have decreased traffic by about 30%, increased travel speed within the city, and reduced the number of car accidents (Leape, 2006).

A few other European cities followed London, with similar positive effects. In Stockholm, for instance, where a congestion charge was implemented in 2007 after a trial period in 2006, the charging scheme led to a decrease in traffic volume by about 20% and in kilometers driven inside the tolled area by around 15% (Eliasson et al., 2009; Börjesson et al., 2016; Croci, 2016). The charging scheme was also ascribed positive impacts on human health by improving air quality: Simeonova et al. (2018) find that the prevalence of asthma among young children decreased already during the seven-month trial run, and diminished further once the charging scheme became permanent in Stockholm. In Milan, where the congestion charging scheme was paused in 2012 for eight weeks due to a legal dispute, strong opposite effects were observed due to the eight-week break: Gibson and Carnovale (2015) recorded an increase in traffic of up to 20%, as well as a rise of carbon monoxide and small airborne particulate matter concentrations by 6% and 17%, respectively. Gehlert et al. (2011) report that in a field trial in Copenhagen, most households reduced the traveled distance as a response to congestion pricing.

Despite the convincing evidence on the beneficial effects of congestion charges, plans of implementing this measure have been abandoned in numerous cities, most notably due to a lack of both political and public support. Such a lack of support has been cited frequently as the main hurdle to a widespread implementation (Gu et al., 2018; Altshuler, 2010; Schuitema et al., 2010). Regarding political support, King et al. (2007) argue that congestion pricing is politically feasible if it creates more winners, e.g. people who use public transit, than losers, e.g. drivers whose time saved is worth less than the tolls they pay. Without any redistribution, losers may outnumber winners. Hence, to increase political acceptability, it is crucial to produce winners, e. g. by using congestion charge revenues wisely.

With respect to public support, there is a variety of factors explaining the resistance against the introduction of congestion charges that are usually revealed via citizen surveys (see Li and Hensher, 2012, for an early review). For example, using data on the Stockholm referendum, Hårsman and Quigley (2010) find that voters in favor of implementing the pricing scheme are predisposed by more general political preferences. For the case of Edinburgh, Gaunt et al. (2007) show that knowledge of congestion pricing has a significant effect on its acceptability. Analyzing the congestion pricing in Stockholm, Eliasson (2014) and Hårsman and Quigley (2010) identify that car ownership is a major determinant of public support: People who do not own a car are much more supportive of congestion pricing.

Conducting surveys in Helsinki, Lyon, and Stockholm, Börjesson et al. (2015) show that environmental concern is the strongest predictor for supporting congestion pricing. Perceived effectiveness in terms of reduced air pollution plays a major role as well, which is confirmed by numerous studies (Schuitema et al., 2010; Ádám Török, 2015; Jaensirisak et al., 2005; Fürst and Dieplinger, 2014). Using Stockholm as a research venue, Eliasson and Jonsson (2011) identify the beliefs about the charges' effectiveness, as well as general environmental attitudes, as the most important factors to predict support for congestion pricing.

Beyond individual characteristics, institutional characteristics might play a role as well. Grisolía et al. (2015), for instance, document that the support for congestion pricing in Las Palmas might increase if the revenues raised by the charge are used for urban parks or an improvement of the bus system – rather than building a rapid transit system. Comparing the experiences of Stockholm and Gothenburg, Hysing and Isaksson (2015) suggest that the local political and geographical context matters when designing and implementing a pricing scheme. Notably, the positive referendum in Stockholm and the negative referendum in Gothenburg could be rooted in the schemes' complexity, as Stockholm's scheme was easier to understand. Moreover, in Stockholm, the goals of introducing congestion pricing were more clearly communicated than in Gothenburg. Also, Baranzini et al. (2021) highlight the importance of design features for a successful implementation of congestion pricing. Using the case of Geneva, these authors note that earmarking revenues for public transport particularly fosters support.

Finally, the literature suggests that supporting congestion prices is determined by familiarity with such systems. Using a survey in Belgrade, Milenković et al. (2019) show that residents who felt informed about congestion pricing are more likely to support it. Based on two studies from Gothenburg, Hess and Börjesson (2019) suggest that public support for congestion pricing tends to increase over time, presumably due to gradually accepting congestion pricing as the status quo.

Given the extensive empirical evidence, the hypothesis underlying our experimental analysis is that supplying information, for example on the benefits of congestion charges, will affect people's acceptance of a charge, not least due to two reasons. First, a lack of information about a scheme's effectiveness makes people unsure about its effects and makes them more likely to reject it (Shatanawi et al., 2020; Gu et al., 2018; Odeck and Kjerkreit, 2010). Providing empirical evidence on their efficacy may therefore increase acceptance. Second, the existence of a status quo bias has been proposed as a reason for why people may reject a congestion charge prior to its implementation, but feel more positively about the charge after its implementation (Börjesson et al., 2016). A prominent example is Stockholm, where less than 40% of the citizens stated that they would "probably" or "most likely" vote yes to a permanent congestion charge prior to its implementation, but more than 50% stated so after the trial run (Börjesson et al., 2012).

3 Data and Experimental Design

Our study is part of Kopernikus Project Ariadne, funded by the Federal Ministry of Education and Research to support Germany's energy transition on a scientific basis. For our analysis, we draw on survey data collected by two market research institutes: First, the data for Germany was collected by forsa, which entertains a representative household panel including over 100,000 members, from which 6,613 individuals were drawn for the survey. Given that 8,373 individuals were contacted by forsa, the response rate amounts to about 79%. 6,210 individuals finished the survey.

Second, for the surveys for the six other countries, we collaborated with the market research institute Bilendi, which drew samples of some 1,500 individuals per country. Altogether, we received 15,822 completed questionnaires, 6,613 from Germany and

9,209 from the remaining six countries. Bilendi did not provide any information about how many participants had to be sampled to reach a sample size of 6,613, but the response rate was definitely not as high as 100%.

All surveys were conducted online. The field phase started on November 21, 2022 and ended on December 23, 2022. Participants were sampled by Bilendi to be representative for each country in three characteristics: age, education, and gender. In contrast, the German sample is representative for two characteristics: regional distribution across federal states and household size. Yet, with respect to gender, age, and university education, the German sample is not representative. For this reason, we have estimated all model specifications without employing the German data, but found no systematic difference in the treatment effect estimates (see Table B2 in the appendix).

We gathered a large suite of socio-economic and demographic characteristics, environmental preferences, as well as psychological and political attitudes, the means of which are reported in Table 1. In addition, we inquired about mobility-related issues, including each participant's access to mobility options, such as the number of cars and bikes, public transport ticket ownership, and distance to the closest public transport stop. We also elicited information on participants' mobility behavior, such as their dominant mode used for commuting, their commuting distance and time, how many kilometers they travelled by car in the last year, how often they drive into a city, which city that is, as well as their opinions about cars and public transport, and whether there are reasons that would make them use their car less.

Prior to the experiment, participants answered numerous questions about congestion charges. For instance, we asked them whether they had ever heard of congestion charges and if they knew of cities that introduced congestion charges. There are substantial differences with respect to the knowledge about congestion charges across

Table 1: Summary Statistics: Means across Countries

	UK	France	Italy	Poland	Spain	Greece	Germany
Female (0/1)	0.50	0.49	0.51	0.51	0.51	0.48	0.39
Age	43.3	44.7	45.4	43.3	44.5	44.5	59.1
University education (0/1)	0.40	0.15	0.31	0.19	0.36	0.28	0.59
Low income (0/1)	0.24	0.29	0.22	0.33	0.31	0.24	0.30
Medium income (0/1)	0.39	0.37	0.44	0.28	0.35	0.42	0.31
High income (0/1)	0.37	0.34	0.34	0.39	0.34	0.34	0.39
Lives in a city (0/1)	0.29	0.50	0.43	0.32	0.60	0.53	0.31
Distance to public transport: < 10 min (0/1)	0.60	0.52	0.54	0.48	0.66	0.63	0.69
Frequency public transport: < 10 min (0/1)	0.18	0.20	0.14	0.19	0.26	0.19	0.16
Owns a car (0/1)	0.96	0.97	0.98	0.94	0.98	0.98	0.89
Commutes by car (0/1)	0.52	0.61	0.61	0.49	0.49	0.50	0.49
Owns ticket for public transport (0/1)	0.25	0.21	0.22	0.35	0.44	0.35	0.24
Believes in man-made climate change (0/1)	0.40	0.48	0.52	0.35	0.54	0.43	0.49
Prior knowledge about congestion charges (0/1)	0.80	0.38	0.15	0.21	0.36	0.34	0.61
General view on traffic problems (1/4)	2.92	2.92	3.18	2.95	3.11	3.42	2.95
Personal view on traffic problems (1/4)	2.71	2.81	2.97	2.78	3.04	3.38	2.31
# observations	1,531	1,548	1,532	1,530	1,537	1,531	6,613

Note: Participants rated traffic problems on a 4 Point Likert scale from ”Not at all serious” to ”Very serious”. Net household income, reported by choosing one of thirteen country-specific income intervals, was split into three terciles, denoted by ”Low income”, ”Medium income”, and ”High income”.

Table 2: Results on Survey Question Q2: ”Have you ever heard of the concept of a congestion charge before?”

	UK	France	Italy	Poland	Spain	Greece	Germany	Total
Yes	76.9%	36.8%	13.8%	18.8%	34.5%	32.9%	62.7%	46.7%
No	19.4 %	60.8%	79.4%	72.1%	62.1%	63.5%	36.2%	50.0%
Don’t know	3.7%	2.4%	6.8%	9.1%	3.4%	3.6%	1.2%	3.3%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

countries (Table 2): While this instrument is hardly known in Italy and Poland, it is quite well-known in the UK and Germany.[1]

Then, we explained how congestion charges work, how and why they are implemented and we asked which effect participants would expect from a congestion charge on traffic and related external effects. Not least, we asked about the severity of six traffic-related problems, both for the society in general and for the respondents themselves, with responses measured on a 4-Point Likert scale ranging from "1 - Not at all serious/Does not bother me at all" to "4 - Very serious/Bothers me a lot". Aver-

[1]One reason for the differences in answering this question could be owed to survey-specific language. To keep the survey comparable across all countries, we used the respective translation for congestion charge in each survey. Yet, it is possible that such schemes are called differently across countries. For instance, the congestion pricing scheme in Italian’s Milan is called Area C.

aged across the six problems, we define two related variables: ”Societal view on traffic problems” and ”Personal view on traffic problems – see Table 1.

For the experiment – see Appendix A for the exact wording –, we randomly split the sample into three groups. One group served as the control group, as these subjects did not receive any additional information on congestion charges, while a second group was provided with information about the positive effects that congestion charges had on traffic-related problems in cities where they were introduced, citing articles such as Green et al. (2016); Börjesson et al. (2012) and Börjesson and Kristoffersson (2015). We refer to this group by ”effectiveness information” and to the treatment by ”effectiveness information treatment”. A third group, referred to by ”public opinion information” group, received information about how these charges rose in popularity after they were implemented (Börjesson et al., 2012; Börjesson and Kristoffersson, 2015), the treatment we call the ”public opinion information” treatment. Table B1 of the appendix shows that the randomization was successful in that the covariates do not differ systematically across groups.

The participants then answered two questions about their acceptance of congestion charges. First, after randomization into groups and the provision of the information treatments, we requested the participants to state their approval of a congestion charge on a 5-Point Likert scale, ranging from ” Disapprove strongly” to ”Approve strongly”. We recoded the answers to this question as a binary variable, where the options ”Approve” and ”Strongly approve” are coded as 1, indicating general approval, whereas the other response options are coded as zero.

Second, irrespective of the intervention group, each participant was assigned one of three daily congestion charge levels and was asked whether he or she would be willing to pay the randomly assigned charge for the entrance into a city by car. For Germany and France, for instance, the hypothetical charge levels were chosen to amount to 2, 5, and 10 euros. For the other countries, the levels were adjusted according to their nominal per-capita expenditure and presented in national currencies, such as Sloty for Poland – see Table 3 for the individual levels by country. These charge levels were chosen to represent the range of existing charges, with Milan's Area C Scheme costing between 3 and 7.5 euros, and Oslo city toll prices ranging from about 1 to about 12.8 euros, for example (Area C Milano, 2024; Fjellinjen, 2024). In what follows, the three charge levels are denoted as "Low", "Medium", and "High".

Table 3: Amounts of Congestion Charges that are Randomly Allocated to Respondents

Charge Level	UK	France	Italy	Poland	Spain	Greece	Germany
Low	£2.0	2.0 €	1.5 €	3.0 Zloty	1.5 €	1.0 €	2.0 €
Medium	£5.0	5.0 €	4.0 €	8.0 Zloty	3.0 €	2.5 €	5.0 €
High	£10.0	10.0 €	8.0 €	16.0 Zloty	6.0 €	5.0 €	10.0 €

4 Methodology

To investigate the effect of the information treatments on the support for congestion pricing, we estimate two models that solely differ in the inclusion of congestion charge levels and respective interaction terms:

$$y_{1i} = \beta_0 + \boldsymbol{\beta}'_x \boldsymbol{x}_i + \boldsymbol{\beta}'_T \boldsymbol{T}_i + \boldsymbol{\beta}'_c\, \boldsymbol{country}_i + \boldsymbol{\beta}'_{ct} \boldsymbol{T}_i \times \boldsymbol{country}_i + \epsilon_i, \quad (1)$$

$$y_{2i} = \gamma_0 + \boldsymbol{\gamma}'_x \boldsymbol{x}_i + \boldsymbol{\gamma}'_T \boldsymbol{T}_i + \boldsymbol{\gamma}'_c\, \boldsymbol{country}_i + \boldsymbol{\gamma}'_{ct} \boldsymbol{T}_i \times \boldsymbol{country}_i + \boldsymbol{\gamma}'_p \boldsymbol{p}_i + \boldsymbol{\gamma}'_{pt} \boldsymbol{T}_i \times \boldsymbol{p}_i + \nu_i, \quad (2)$$

where y_{1i} is a binary variable denoting individual i's acceptance of a congestion charge in general, while y_{2i} is a binary variable indicating whether respondent i would pay the congestion charge at either of three randomly assigned charge level categories: a low, medium, or high charge level. $\boldsymbol{p}$ designates the respective vector capturing these categories. Note that to simplify the interpretation of the results, we dichotomized the dependent variable y_{1i}, which was originally measured on a five-point Likert scale. To check the robustness of our results, we employed this information in (Ordered) Probit estimations, finding virtually identical results in terms of marginal effects – see Table B3 in the appendix for the Probit results.

$\boldsymbol{T}$ is a vector that captures the randomly assigned treatment groups and $\boldsymbol{x}$ designates a vector of socio-economic characteristics, attitudes and other control variables.

$\boldsymbol{country}$ is a vector that indicates each respondent's country of residence, with the United Kingdom being chosen as the base category. $\boldsymbol{T} \times \boldsymbol{country}$ and $\boldsymbol{T} \times \boldsymbol{p}$ are interaction terms and ϵ and ν are idiosyncratic error terms. The average treatment effects, in Equations (1) and (2) reflected by the vectors $\boldsymbol{\beta}_T$ and $\boldsymbol{\gamma}_T$, can be consistently estimated using standard discrete-choice methods, as the information treatments were randomly assigned.

In models with binary dependent variables, non-linear estimators, such as Probit or Logit, are the standard estimation method. However, it has been shown that linear probability models (LPM) perform just as well in estimating partial effects in those models (Wooldridge, 2001, p. 455), and even more so when most covariates are of discrete nature (Wooldridge, 2001, p. 456). Results from an LPM are also much more straighforward to interpret than those from Logit or Probit estimations, which first need to be converted into marginal effects. For these reasons, in what follows, we primarily present the LPM estimation results.

Throughout, we estimate two model specifications: In the basic model specification, we only include treatment variables, country indicators, and interaction terms, whereas in the specifications that we call the full model, we add socioeconomic characteristics, as well as variables on individual mobility behavior and opinions.

5 Empirical Results

Table 4 shows the proportions of participants who "Approve" or "Strongly approve" of the congestion charge across countries, with acceptance rates in the control group ranging from 18.4% to 34.0%. With the exception of Poland, the approval rates of a hypothetical introduction of a congestion charge are about 3 to 9 percentage points higher in the treatment groups than in the control group.

Most pronounced is the increase in the acceptance rates for Germany and the UK, where the average rates in the control group are at 34.0% and range between about 41% and 44% in the treatment groups. Hence, both information treatments tend to have

Table 4: Acceptance Rates for a Congestion Charge across Intervention Groups and Countries when No Concrete Charge Level is Presented to the Participants

	UK	France	Italy	Poland	Spain	Greece	Germany
Control group	34.0%	18.4%	22.3%	29.7%	24.4%	27.2%	34.0%
Effectiveness information	43.3%	27.0%	29.1%	25.6%	33.3%	33.1%	44.0%
Public opinion information	41.2%	27.5%	25.4%	28.5%	29.3%	31.2%	42.7%
Total	39.5%	24.3%	25.6%	28.0%	29.0%	30.5%	40.3%

had positive effects on the acceptance of a congestion charge in general, a conclusion that is also valid when concrete levels of charges are presented to the participants – see Table 5.

When subjects face a concrete charge level, for some countries, such as France, Italy, Spain, and the UK, the acceptance rate is lower across intervention groups than when no charge level is presented. For the UK, for instance, the acceptance rate amounts to 28.6% in the control group (Table 5), rather than 34.0% without a concrete charge level (Table 4), and 35.8% and 38.9% in the treatment groups, rather than 43.3% and 41.2%, respectively.

Yet, the effect of presenting concrete charge levels is not negative for all countries. On the contrary: For Germany, as well as for Greece and Poland, the acceptance rates are higher when concrete charge levels are presented. One reason for this result might be that for these countries the respondents are surprised that the charge levels are lower than expected, in turn raising the acceptance rates. This explanation is corroborated by the fact that at the lowest charge level, approval rates are substantially higher than on average, while approval is much smaller at the high charge level (Table 6).

Taken together, the descriptive results indicate that the information treatments were effective in that approval rates significantly increase upon providing information on the advantages of congestion charges and on the a-posteriori increase of acceptance in cities where congestion charges were already prevalent for a long time, such as Stockholm and Gothenburg.

The acceptance rates reported in Table 4 can be perfectly reproduced by the Linear Probability Model (LPM) estimation results for Basic Model 1 (left panel of Ta-

Table 5: Acceptance Rates of Congestion Charges across Intervention Groups and Countries when a Concrete Charge Level is Presented to the Participants

	UK	France	Italy	Poland	Spain	Greece	Germany
Control group	28.6%	12.1%	16.6%	31.9%	17.7%	30.9%	41.9%
Effectiveness information	35.8%	13.3%	17.8%	36.4%	22.1%	39.4%	47.2%
Public opinion information	38.9%	17.2%	17.9%	33.9%	22.6%	32.1%	47.4%
Total	34.4%	14.2%	17.4%	34.0%	20.8%	34.1%	45.5%

Table 6: Acceptance Rates of Congestion Charges Across Concrete Charge Levels and Countries

Level	UK	France	Italy	Poland	Spain	Greece	Germany
Low	46.5%	21.8%	24.4%	42.5%	28.4%	43.7%	62.3%
Medium	33.0%	11.6%	16.2%	33.0%	21.5%	30.4%	44.6%
High	23.7%	9.5%	11.9%	27.0%	12.8%	28.3%	30.1%
Total	34.4%	14.2%	17.4%	34.0%	20.8%	34.1%	45.5%

ble 7): For the UK, for example, the difference between the effectiveness treatment and the control group of 9.3% precisely mimics the coefficient estimate corresponding to the indicator of the effectiveness treatment. In line with the acceptance rates reported in Table 4, the LPM estimates indicate again that the information treatments were quite effective: Both the effectiveness information treatment – informing participants about the effectiveness of charges in other cities – and the "public opinion" information treatment – informing participants about how the acceptance for congestion charges increased after implementation – increase the likelihood of accepting a congestion charge in a statistically significant way, at the 1% and 5% significance levels, respectively.

The lack of statistically significant coefficient estimates for the interaction terms of treatment and country indicators allows the conclusion that the effects of the information treatments did not vary in a statistically significant way across countries – with Poland being the exception in a twofold way: As can already be seen from the acceptance rates reported in Table 4, for Poland, the effect of the effectiveness treatment is not only negative, rather than positive, but this negative effect is also significant in statistical terms. As the Polish sample does not differ systematically from the samples of the five other European countries with respect to the characteristics presented

Table 7: Linear Probability Estimations Results on the binary Acceptance of a Congestion Charge based on Equation (1)

	Basic model 1		Basic model 2		Full model	
	Coeff.	Std. E.	Coeff.	Std. E.	Coeff.	Std. E.
Effectiveness Information	0.093**	(0.031)	0.113**	(0.036)	0.114**	(0.035)
Public opinion information	0.071*	(0.030)	0.063	(0.037)	0.056	(0.035)
France	-0.156**	(0.031)	-0.148**	(0.036)	-0.114**	(0.035)
Italy	-0.118**	(0.030)	-0.112**	(0.036)	-0.086*	(0.036)
Poland	-0.043	(0.030)	-0.044	(0.036)	0.007	(0.036)
Spain	-0.097**	(0.030)	-0.110**	(0.035)	-0.122**	(0.034)
Greece	-0.069*	(0.030)	-0.074*	(0.035)	-0.076*	(0.034)
Germany	-0.000	(0.024)	-0.005	(0.028)	-0.024	(0.028)
Effectiveness Information × France	-0.007	(0.043)	-0.021	(0.051)	-0.018	(0.049)
Effectiveness Information × Italy	-0.025	(0.043)	-0.058	(0.052)	-0.055	(0.050)
Effectiveness Information × Poland	-0.134**	(0.043)	-0.133**	(0.051)	-0.140**	(0.049)
Effectiveness Information × Spain	-0.003	(0.043)	-0.018	(0.050)	-0.014	(0.048)
Effectiveness Information × Greece	-0.034	(0.043)	-0.046	(0.049)	-0.046	(0.047)
Effectiveness Information × Germany	0.007	(0.034)	-0.008	(0.040)	-0.004	(0.038)
Public opinion information × France	0.019	(0.043)	0.029	(0.051)	0.040	(0.049)
Public opinion information × Italy	-0.040	(0.043)	-0.046	(0.052)	-0.034	(0.050)
Public opinion information × Poland	-0.083	(0.043)	-0.085	(0.052)	-0.082	(0.050)
Public opinion information × Spain	-0.022	(0.043)	0.005	(0.049)	0.002	(0.048)
Public opinion information × Greece	-0.031	(0.043)	-0.021	(0.049)	-0.007	(0.047)
Public opinion information × Germany	0.015	(0.034)	0.025	(0.040)	0.037	(0.038)
Female	–	–	–	–	-0.013	(0.009)
Age	–	–	–	–	-0.000	(0.000)
University education	–	–	–	–	0.054**	(0.009)
Medium income	–	–	–	–	0.031**	(0.011)
High income	–	–	–	–	0.024*	(0.011)
Lives in a city	–	–	–	–	-0.003	(0.010)
Distance to nearest stop < 10 min	–	–	–	–	0.008	(0.009)
Owns a car	–	–	–	–	-0.170**	(0.018)
Commutes by car	–	–	–	–	-0.075**	(0.009)
Owns public transport ticket	–	–	–	–	0.073**	(0.010)
Frequent public transport (<10 min)	–	–	–	–	0.038**	(0.012)
Believes in man-made climate change	–	–	–	–	0.143**	(0.009)
Prior knowledge congestion charges	–	–	–	–	0.066**	(0.009)
Societal view on traffic problems	–	–	–	–	0.051**	(0.010)
Personal view on traffic problems	–	–	–	–	0.007	(0.008)
Constant	0.340**	(0.022)	0.354**	(0.026)	0.216**	(0.042)
# Observations	14,892		11,867		11,867	
Adjusted R-Squared	0.02		0.02		0.10	
AIC	19678.89		15956.31		15049.73	

Note: ** and * indicate statistical significance at the 1% and 5% level, respectively.

in Table 1, the exceptional effect for Poland may reflect a general skepticism towards climate and climate-related policies, as noted for example by Żuk and Szulecki (2020). According to these authors, Poland is widely perceived as a laggard in European climate policy, seeking to safeguard domestic coal as a major energy source and opposing ambitious decarbonization goals.

To learn more about the correlations of congestion charge acceptance with socio-demographic characteristics and attitudes, we add a variety of covariates, the coefficient estimates of which are reported in the right panel of Table 7. It bears noting that the full model is estimated on the basis of much fewer observations than (Basic Model 1) due to item-non-response with respect to the questions that build the basis for the covariates. When estimating the basic model with only those observations that are used for the full model (see Basic Model 2 in Table 7), the treatment effect estimates are very close to the estimates of the full model. Yet, the estimates of the treatment effects that are to be preferred are those that originate from Basic Model 1, as these estimates result from the successfully randomized experiment, whereas the subsample employed from the two other estimations is likely to be not perfectly randomized.

There are numerous covariates that correlate with the acceptance of a congestion charge. Unsurprisingly, participants who own at least one car are less likely to approve of a congestion charge. Likewise, support is lower if respondents use the car to commute. In contrast, respondents who own a ticket for public transport are more likely to accept the policy, as well as those with access to frequent public transport. In line with the literature, see e. g, Jaensirisak et al. (2005), respondents who deem the traffic problems listed in the survey as a rather significant issue for society were also more likely to approve of the charge . This is in accord with findings from the received literature: Beyond mere self-interest, general attitudes matter for the support of congestion charges (Nilsson et al., 2016; Börjesson et al., 2016; Eliasson, 2014, 2016).

Other factors that are favorable for the acceptance of a congestion charge are a high education in the form of a university degree, a medium or a high household income, and prior knowledge about this instrument. Not least, as becomes clear from the negative coefficient estimates of the country indicators, relative to the reference country UK, the acceptance of a congestion charge is much lower in all other countries, except for Germany.

Table 8: Linear Probability Estimations Results on the binary Acceptance of a Congestion Charge based on Equation (2), that is, when a Concrete Charge Level is Presented

	Basic model 1		Basic model 2		Full model	
	Coeff.	Std. E.	Coeff.	Std. E.	Coeff.	Std. E.
Effectiveness Information	0.074*	(0.030)	0.103**	(0.036)	0.103**	(0.035)
Public opinion information	0.100**	(0.030)	0.104**	(0.036)	0.101**	(0.035)
Medium level of charge	-0.140**	(0.030)	-0.159**	(0.037)	-0.153**	(0.036)
High level of charge	-0.226**	(0.030)	-0.257**	(0.035)	-0.241**	(0.034)
France	-0.212**	(0.038)	-0.198**	(0.045)	-0.143**	(0.044)
Italy	-0.170**	(0.039)	-0.156**	(0.047)	-0.083	(0.045)
Poland	-0.005	(0.040)	-0.035	(0.047)	0.043	(0.045)
Spain	-0.154**	(0.038)	-0.167**	(0.044)	-0.141**	(0.043)
Greece	-0.004	(0.038)	-0.018	(0.044)	0.028	(0.043)
Germany	0.179**	(0.030)	0.153**	(0.035)	0.147**	(0.034)
Female	–	–	–	–	-0.013	(0.009)
Age	–	–	–	–	-0.000	(0.000)
University education	–	–	–	–	0.044**	(0.009)
Medium income	–	–	–	–	0.031**	(0.011)
High income	–	–	–	–	0.038**	(0.011)
Lives in a city	–	–	–	–	-0.023*	(0.010)
Distance to nearest stop < 10 min	–	–	–	–	-0.011	(0.009)
Frequent public transport (<10 min)	–	–	–	–	0.043**	(0.012)
Owns a car	–	–	–	–	-0.141**	(0.019)
Commutes by car	–	–	–	–	-0.078**	(0.009)
Owns public transport ticket		–	–	–	0.087**	(0.010)
Believes in man-made climate change	–	–	–	–	0.130**	(0.008)
Prior knowledge congestion charges	–	–	–	–	0.112**	(0.009)
Societal view on traffic problems	–	–	–	–	0.050**	(0.010)
Personal view on traffic problems	–	–	–	–	-0.020*	(0.008)
Constant	0.408**	(0.027)	0.442**	(0.032)	0.328**	(0.046)
Interaction terms included:						
T* × *country	Yes		Yes		Yes	
p* × *country	Yes		Yes		Yes	
# Observations	14,020		11,225		11,225	
Adjusted R-Squared	0.11		0.10		0.17	
AIC	17274.60		14294.63		13376.68	

Note: ** and * indicate statistical significance at the 1% and 5% level respectively.

When participants face a randomly given charge level, the information treatments again turn out to be effective (Table 8), but differ in magnitude from those reported in Table 7. More importantly, there is substantial heterogeneity in the acceptance rates across charge levels: Not surprisingly, acceptance rates are clearly lower for high charges, by 22.6%, than for low charge levels.[2]

[2]Note that all models reported in Table 8 include interaction terms of treatment and country indicators, as well as interaction terms of charge levels and country indicators. For exhibition purposes, the

Continuing the exploratory analysis, interaction terms of the treatment indicators and the charge levels are employed as additional explanatory variables, but none of the related coefficient estimates are statistically significant (see Table B4 in the appendix), suggesting that the treatment effects do not vary with the level of the congestion charge.

To explore the effect of previous knowledge about congestion charges on acceptance, we added interaction terms between the pre-knowledge variable and the country indicators. While without such interaction terms prior knowledge exhibits a uniformly positive correlation with approval, Table B5 shows a more varied picture. In the model with charges level, for example, only the coefficient estimates of the interaction terms for Italy, Poland, and Greece are statistically significant. It bears noting that these are the three countries in which the proportion of participants indicating previous congestion charge knowledge is the lowest (Table 2), suggesting that in countries where knowledge about congestion charges is generally lower, there may be a substantial difference in the acceptance of congestion charges.[3]

Finally, we present some robustness checks the results of which are reported in the appendix. Two of these checks are based on two questions that we asked the participants about location. First, before the block of questions about congestion charges, we asked them to specify the city to which they regularly drive. 98.5% of the respondents specified a city. Estimating our model specifications with this sub-sample did not alter the results in qualitative terms (see Table B6).

Second, after the block of questions about congestion charges, we asked participants to specify the city which they had thought of while answering these questions. Re-estimating the model specifications on the basis of the subsample of 39.5% of the sample who specified a city, increases the size of the treatment effect in the specification without charge levels, and decreases it in the specification with charge levels

estimates on these interaction terms are not reported, but they are quite similar to those presented in Table B4 in the appendix.

[3]Note that those 13.8% of participants from Italy, for example, who stated that they knew about congestion charges only represents 200 individuals, which is why we should take these results with caution.

(Table B7). However, these results should be taken with caution, not least because randomization gets lost when the sample size is drastically reduced, as in this case.

Lastly, Tables B8 and B9 report the estimation results for respondents who either live in urban or rural environments, respectively. For people from rural areas, the treatment effects hardly change compared to those reported for the entire sample, while for inhabitants of urban areas, the effects should be taken with caution, given that treatment randomization gets lost for this relatively small subsample.

6 Summary and Conclusion

Particularly in large cities, as well as on motorways with scarce capacity, traffic congestion is an everyday nuisance that has multiple negative external effects, for instance on air quality, but also for the quality of life in general. As a potential remedy for crowded cities, both economists and transport planners recommend introducing a congestion charge, a mandatory fee for entering the city by car.

This recommendation is corroborated by ample empirical evidence that congestion charges can help to significantly reduce traffic load, in particular during peak hours, by attaching a price to the negative external effects, thereby setting an incentive for car drivers to reevaluate their commuting behavior and timing. However, as can be learned from cities such as Stockholm and Gothenburg, where congestion charges were implemented more than a decade ago, but all the more from cities where the introduction of congestion charges was contemplated but abandoned, such as New York and Edinburgh, whether this policy measure actually enters into force heavily relies on both political and public support.

Building on previous research on support factors for congestion charges, this article has empirically investigated whether two information treatments may help to increase the support for congestion charges: (i) Information on the effectiveness of this instrument in diminishing air pollution, congestion, and the number of accidents and (ii) information on the increase in the a-posteriori acceptance rates in cities where a charge is in place. These information treatments were the elements of a randomized information experiment that was embedded in an international survey among more than 15,000 individuals originating from seven European countries: France, Germany, Greece, Italy, Poland, Spain, and the UK.

Among the key results of our empirical analysis of this unique data base is that without any further information on this policy instrument, only a minority of between about 18% and 34% of the survey respondents approved or strongly approved of a congestion charge, depending upon the country of origin. The lowest acceptance rates are to be observed for France and Italy, the highest rates are found for Germany and the UK. The substantial heterogeneity in acceptance rates across countries correlates with the subjects' prior knowledge about congestion charges: 76.9% of the participants from the UK and 62.7% of those from Germany had some prior knowledge about congestion charges, whereas these shares are much lower in the other countries. In particular, only 13.8% of the participants from Italy had some prior knowledge about congestion charges.

Providing evidence on the effectiveness of congestion charges substantially raised approval rates, by 9.3% on average, and by 7.4% once either of three levels for the hypothetical charge was presented to the survey participants. Likewise, information on how the acceptance of the charge had increased in Gothenburg and Stockholm after its implementation led to an increase in approval rates, by 7.1% on average, and by 10.0% once a concrete charge level was presented. Approval rates substantially diminish with the level of the charge, though: Relative to the lowest charge level of 2 euros per day, at charges of 5 and 10 euros, average approval rates decrease by 14.0% and 22.6%, respectively.

Based on these results, our policy advice is straightforward: Prior to the implementation of any congestion charge, information campaigns are vital to foster public support. To be effective, such campaigns should exploit the large body of scientific work, which demonstrates that congestion charges can substantially reduce air pollution, travel times, and accidents. Moreover, policymakers should not get tired of repeatedly communicating these substantial advantages to their constituents to push the support for their congestion charge proposals. Emphasizing that public opinion has changed in other places after the implementation of a congestion charge could additionally foster support.

Appendix

A Wording of the Experiment

Q1 - Seriousness of traffic problems: In the following, you see a list of transport-related problems.

a) Please indicate how serious you perceive these problems to be for society in general.

	Not at all serious	Slightly serious	Serious	Very serious	Don't know/ no response
Traffic congestion	◯	◯	◯	◯	◯
Lack of parking spaces	◯	◯	◯	◯	◯
Inadequate public transport (frequency, reliability, etc.)	◯	◯	◯	◯	◯
Traffic-related air pollution	◯	◯	◯	◯	◯
Traffic noise	◯	◯	◯	◯	◯
Dangerous road conditions	◯	◯	◯	◯	◯

b) Please indicate now how much these problems bother you personally.

	Does not bother me at all	Bothers me a little bit	Bothers me a somewhat	Bothers me a lot	Don't know/ no response
Traffic congestion	◯	◯	◯	◯	◯
Lack of parking spaces	◯	◯	◯	◯	◯
Inadequate public transport (frequency, reliability, etc.)	◯	◯	◯	◯	◯
Traffic-related air pollution	◯	◯	◯	◯	◯
Traffic noise	◯	◯	◯	◯	◯
Dangerous road conditions	◯	◯	◯	◯	◯

To solve traffic problems in cities, the media and policymakers are currently discussing the idea of introducing more "congestion charges". If these were introduced, every car driver would have to pay a fee to drive into a city.

Q2 - Pre-knowledge: Have you ever heard of the concept of a "congestion charge" before?

- Yes
- No
- Don't know/no response

The purpose of a congestion charge is to reduce the negative consequences of car traffic, such as harmful emissions, noise and traffic jams. By paying the charge, car drivers cover some of the costs incurred as a result of these negative impacts. Congestion charges have already been introduced in London, Gothenburg, Stockholm and many other European cities. These systems could be introduced in a similar form in cities near you, especially in places, where there are frequent traffic jams – if cities near you do not already have them.

One way of recording the cars that enter the city is to use an automatic number plate recognition system. The congestion charge is a flat daily rate, meaning that you do not pay any extra if you drive into the city more than once on the same day. It is applied during the hours in which traffic is at its heaviest in the city, such as between 7:00 am and 7:00 pm.

T1 - Text for "Effectiveness Treatment" group: The introduction of a congestion charge has had a demonstrable positive impact in the previously mentioned cities. Here are a few examples:

- The volume of traffic in the city centre decreased in the long term by 18% in Stockholm and by 12% in Gothenburg ((Börjesson et al., 2012), (Börjesson and Kristoffersson, 2015)).
- Congestion has improved significantly in Gothenburg, with journey times on the main traffic routes decreasing by a third ((Börjesson and Kristoffersson, 2015)).
- In London, the overall number of accidents has decreased by 35% since the congestion charge was introduced ((Green et al., 2016))."

T2 - Text for "Public Opinion Treatment" group: Gothenburg and Stockholm have already had congestion charges for years. Before they were introduced, surveys of the local population revealed that the schemes had little support, with only 30 to 40% of respondents finding them a good idea. However, after the charges were introduced, acceptance of them grew noticeably, with over 50% of respondents in both cities in favour of them ((Börjesson et al., 2012), (Börjesson and Kristoffersson, 2015)).

Q3 - Acceptance of Congestion Charge: What is your general opinion on congestion charges? Please indicate the extent to which you personally approve or disapprove of congestion charges.

- Strongly disapprove
- Disapprove
- Neither approve nor disapprove
- Approve
- Strongly approve
- Don’t know/no response

Q4 - Acceptance of paying for congestion charge of a particular amount: Would you approve of a congestion charge that would cost you [amount in local currency] a day to drive your car into a city?

- Yes
- No
- Don't know/no response

B Tables

Table B1: Balance Table: Means across Treatment Groups

	Control group	Effectiveness information	Public opinion information	P-values
Age	50.4	50.3	50.4	0.96
Female (0/1)	45.6%	45.6%	45.0%	0.73
University education (0/1)	40.5%	40.9%	41.0%	0.87
Low income (0/1)	28.2%	28.9%	28.2%	0.67
Medium income (0/1)	34.1%	34.5%	35.8%	0.16
High income (0/1)	37.6%	36.6%	35.9%	0.18
Lives in a city (0/1)	38.9%	38.8%	38.9%	0.99
Distance to public transport: < 10 min (0/1)	61.8%	62.4%	63.1%	0.39
Frequency public transport: < 10 min (0/1)	17.6%	18.0%	17.9%	0.84
Owns a car (0/1)	93.2%	94.2%	93.1%	0.041*
Commutes by car (0/1)	52.0%	52.3%	53.0%	0.58
Owns ticket for public transport (0/1)	27.5%	28.0%	27.1%	0.59
Believes in man-made climate change (0/1)	47.1%	47.2%	47.2%	0.99
Prior knowledge about congestion charges (0/1)	49.1%	48.5%	47.4%	0.24
General view on traffic problems (mean) (1/4)	3.04	3.02	3.03	0.14
Personal view on traffic problems (mean) (1/4)	2.69	2.67	2.69	0.51
# observations	5185	5209	5219	

Note: To examine differences across groups, we have employed Pearson's chi-squared test for binary variables and the Kruskal-Wallis test for continuous variables, the p-values of which are reported in the last column.

Table B2: Linear Probability Estimations Results on the Acceptance of a Congestion Charge based on Equation (1) and (2) when Germany is Excluded

	No Charge Levels		Charge Levels	
	Coeff.	Std. E.	Coeff.	Std. E.
Effectiveness Information	0.093**	(0.030)	0.074**	(0.028)
Public opinion information	0.071*	(0.029)	0.100**	(0.029)
Medium level of charge	–	–	-0.140**	(0.029)
High level of charge	–	–	-0.226**	(0.028)
France	-0.156**	(0.030)	-0.212**	(0.036)
Italy	-0.118**	(0.029)	-0.170**	(0.037)
Poland	-0.043	(0.029)	-0.005	(0.037)
Spain	-0.097**	(0.029)	-0.154**	(0.036)
Greece	-0.069*	(0.029)	-0.004	(0.036)
Constant	0.340**	(0.021)	0.408**	(0.026)
Interaction terms included:				
T $\times$ ***country***	Yes		Yes	
p $\times$ ***country***	Yes		Yes	
# Observations	8,601		8,118	
Adjusted R-Squared	0.01		0.06	
AIC	10790.95		9078.98	

Note: ** and * indicate statistical significance at the 1% and 5% significance level, respectively. The dependent variable is binary: acceptance of congestion charge.

Table B3: Linear Probability Estimation Results on the Acceptance of Congestion Charges based on Equation (1) and the Marginal Effects derived from Probit Estimations

	LPM		Probit			
	Basic model		Basic model		Full model	
	Coeff.	Std. E.	Coeff.	Std. E.	Coeff.	Std. E.
Effectiveness Information	0.076**	(0.009)	0.076**	(0.009)	0.087**	(0.010)
Public opinion information	0.062**	(0.009)	0.062**	(0.009)	0.064**	(0.010)
France	-0.152**	(0.018)	-0.152**	(0.017)	-0.108**	(0.021)
Italy	-0.139**	(0.018)	-0.139**	(0.017)	-0.116**	(0.021)
Poland	-0.115**	(0.018)	-0.115**	(0.018)	-0.066**	(0.022)
Spain	-0.105**	(0.017)	-0.105**	(0.018)	-0.123**	(0.020)
Greece	-0.091**	(0.017)	-0.090**	(0.018)	-0.091**	(0.021)
Germany	0.007	(0.014)	0.007	(0.014)	-0.013	(0.018)
Female					-0.013	(0.009)
Age					-0.000	(0.000)
University education					0.053**	(0.009)
Medium income					0.030**	(0.011)
High income					0.023*	(0.011)
Lives in a city					-0.003	(0.010)
Distance to nearest stop < 10 min					0.008	(0.009)
Frequent public transport (<10 min)					0.037**	(0.012)
Owns a car					-0.154**	(0.018)
Commutes by car					-0.073**	(0.009)
Owns public transport ticket					0.071**	(0.010)
Believes in man-made climate change					0.138**	(0.008)
Prior knowledge congestion charges					0.065**	(0.009)
Societal view on traffic problems					0.051**	(0.010)
Personal view on traffic problems					0.007	(0.008)
Constant	0.349**	(0.014)	–	–	–	–
# Observations	14,892		14,892		11,867	
AIC	19677.55		18760.05		14332.73	

Note: ** and * indicate statistical significance at the 1% and 5% level respectively. The dependent variable is binary: acceptance of congestion charge when no charge level is presented.

Table B4: Linear Probability Model Estimations Results on the Acceptance of a Congestion Charge based on Equation (2), when Interaction Terms of Treatment indicators and Charge Levels are included

	Basic model		Basic model		Full model	
	Coeff.	Std. E.	Coeff.	Std. E.	Coeff.	Std. E.
Effectiveness Information	0.080*	(0.033)	0.117**	(0.039)	0.111**	(0.037)
Public opinion information	0.112**	(0.033)	0.112**	(0.039)	0.108**	(0.038)
Medium level of charge	-0.128**	(0.033)	-0.146**	(0.040)	-0.144**	(0.039)
High level of charge	-0.220**	(0.033)	-0.247**	(0.038)	-0.233**	(0.037)
Effectiveness Information × Medium level of charge	-0.020	(0.023)	-0.032	(0.026)	-0.025	(0.025)
Effectiveness Information × High level of charge	-0.002	(0.023)	-0.013	(0.026)	-0.005	(0.025)
Public opinion information × Medium level of charge	-0.019	(0.023)	-0.010	(0.026)	-0.003	(0.025)
Public opinion information × High level of charge	-0.019	(0.023)	-0.018	(0.026)	-0.020	(0.025)
France	-0.213**	(0.038)	-0.198**	(0.045)	-0.143**	(0.044)
Italy	-0.171**	(0.039)	-0.157**	(0.047)	-0.084	(0.045)
Poland	-0.006	(0.040)	-0.037	(0.047)	0.042	(0.045)
Spain	-0.155**	(0.038)	-0.167**	(0.044)	-0.142**	(0.043)
Greece	-0.004	(0.038)	-0.019	(0.044)	0.028	(0.043)
Germany	0.179**	(0.030)	0.152**	(0.035)	0.147**	(0.035)
Female					-0.013	(0.009)
Age					-0.000	(0.000)
University education					0.044**	(0.009)
Medium income					0.031**	(0.011)
High income					0.038**	(0.011)
Lives in a city					-0.023*	(0.010)
Distance to nearest stop < 10 min					-0.011	(0.009)
Frequent public transport (<10 min)					0.043**	(0.012)
Owns a car					-0.141**	(0.019)
Commutes by car					-0.078**	(0.009)
Owns public transport ticket					0.087**	(0.010)
Believes in man-made climate change					0.130**	(0.008)
Prior knowledge congestion charges					0.112**	(0.009)
Societal view on traffic problems					0.051**	(0.010)
Personal view on traffic problems					-0.020*	(0.008)
Constant	0.402**	(0.028)	0.435**	(0.033)	0.321**	(0.047)
Interaction terms included:						
T × ***country***	Yes		Yes		Yes	
p × ***country***	Yes		Yes		Yes	
# Observations	14,020		11,225		11,225	
Adjusted R-Squared	0.11		0.10		0.17	
AIC	17280.89		14300.41		13381.88	

Note: ** and * indicate statistical significance at the 1% and 5% level respectively. The dependent variable is binary: acceptance of congestion charge when charge levels were presented.

Table B5: Linear Probability Model Estimation Results on the binary Acceptance of a Congestion Charge when Interaction Terms on Prior knowledge about congestion charge and Country Indicators are Included

	No Charge Levels		Charge Levels	
	Coeff.	Std. E.	Coeff.	Std. E.
Effectiveness Information	0.099**	(0.031)	0.067*	(0.030)
Public opinion information	0.073*	(0.031)	0.092**	(0.030)
Medium level of charge	–	–	-0.139**	(0.030)
High level of charge	–	–	-0.220**	(0.030)
France	-0.235**	(0.042)	-0.175**	(0.048)
Italy	-0.202**	(0.041)	-0.134**	(0.047)
Poland	-0.148**	(0.041)	-0.007	(0.048)
Spain	-0.176**	(0.041)	-0.107*	(0.047)
Greece	-0.164**	(0.041)	0.005	(0.047)
Germany	-0.139**	(0.036)	0.157**	(0.041)
Prior knowledge congestion charges=1	-0.078*	(0.032)	0.087**	(0.031)
France × Prior knowledge congestion charges=1	0.110**	(0.041)	-0.010	(0.040)
Italy × Prior knowledge congestion charges=1	0.219**	(0.047)	0.143**	(0.046)
Poland × Prior knowledge congestion charges=1	0.245**	(0.044)	0.177**	(0.044)
Spain × Prior knowledge congestion charges=1	0.118**	(0.041)	-0.026	(0.040)
Greece × Prior knowledge congestion charges=1	0.170**	(0.041)	0.088*	(0.040)
Germany × Prior knowledge congestion charges=1	0.193**	(0.034)	0.050	(0.034)
Constant	0.403**	(0.034)	0.342**	(0.038)
Interaction terms included:				
$T \times country$	Yes		Yes	
$p \times country$	Yes		Yes	
# Observations	14,536		13,739	
Adjusted R-Squared	0.03		0.13	
AIC	19077.43		16687.86	

Note: ** and * indicate statistical significance at the 1% and 5% level, respectively.

Table B6: Linear Probability Model Estimation Results on the binary Acceptance of a Congestion Charge for Only Those Participants who Specified a City they Drive to

	No Charge Levels		Charge Levels	
	Coeff.	Std. E.	Coeff.	Std. E.
Effectiveness Information	0.115**	(0.035)	0.100**	(0.035)
Public opinion information	0.057	(0.035)	0.099**	(0.035)
Medium level of charge	–	–	-0.152**	(0.036)
High level of charge	–	–	-0.241**	(0.034)
France	-0.112**	(0.035)	-0.145**	(0.044)
Italy	-0.084*	(0.036)	-0.083	(0.045)
Poland	0.008	(0.036)	0.040	(0.045)
Spain	-0.120**	(0.034)	-0.141**	(0.043)
Greece	-0.074*	(0.034)	0.028	(0.043)
Germany	-0.022	(0.028)	0.150**	(0.035)
Female	-0.017	(0.009)	-0.015	(0.009)
Age	-0.000	(0.000)	-0.000	(0.000)
University education	0.056**	(0.009)	0.043**	(0.009)
Medium income	0.030**	(0.011)	0.029**	(0.011)
High income	0.023*	(0.011)	0.037**	(0.011)
Lives in a city	-0.004	(0.010)	-0.020*	(0.010)
Distance to nearest stop < 10 min	0.006	(0.009)	-0.012	(0.009)
Frequent public transport (<10 min)	0.040**	(0.012)	0.043**	(0.012)
Owns a car	-0.177**	(0.019)	-0.145**	(0.019)
Commutes by car	-0.073**	(0.009)	-0.076**	(0.009)
Owns public transport ticket	0.074**	(0.010)	0.088**	(0.010)
Believes in man-made climate change	0.141**	(0.009)	0.127**	(0.009)
Prior knowledge congestion charges	0.067**	(0.009)	0.114**	(0.009)
Societal view on traffic problems	0.050**	(0.010)	0.046**	(0.010)
Personal view on traffic problems	0.009	(0.009)	-0.017	(0.008)
Constant	0.226**	(0.043)	0.336**	(0.046)
Interaction terms included:				
$T \times country$	Yes		Yes	
$p \times country$	Yes		Yes	
# Observations	11,537		10,918	
Adjusted R-Squared	0.10		0.17	
AIC	14620.72		12965.77	

Note: ** and * indicate statistical significance at the 1% and 5% level, respectively.

Table B7: Linear Probability Model Estimation Results on the binary Acceptance of a Congestion Charge for Those Participants who Specified a City they Thought of while Answering the Questions

	No Charge Levels		Charge Levels	
	Coeff.	Std. E.	Coeff.	Std. E.
Effectiveness Information	0.173**	(0.055)	0.092	(0.054)
Public opinion information	0.058	(0.056)	0.061	(0.055)
Medium level of charge	–	–	-0.129*	(0.054)
High level of charge	–	–	-0.287**	(0.054)
France	-0.009	(0.061)	-0.109	(0.072)
Italy	-0.028	(0.057)	-0.055	(0.072)
Poland	0.056	(0.059)	0.064	(0.074)
Spain	-0.050	(0.051)	-0.159*	(0.064)
Greece	-0.007	(0.052)	-0.040	(0.064)
Germany	0.037	(0.043)	0.139**	(0.053)
Female	-0.008	(0.013)	-0.025	(0.013)
Age	0.000	(0.000)	-0.000	(0.000)
University education	0.049**	(0.014)	0.033*	(0.014)
Medium income	0.026	(0.017)	0.011	(0.017)
High income	0.019	(0.017)	0.034*	(0.017)
Lives in a city	-0.031*	(0.015)	-0.053**	(0.015)
Distance to nearest stop < 10 min	0.014	(0.014)	0.020	(0.014)
Frequent public transport (<10 min)	0.037*	(0.018)	0.056**	(0.017)
Owns a car	-0.191**	(0.028)	-0.158**	(0.028)
Commutes by car	-0.117**	(0.014)	-0.107**	(0.014)
Owns public transport ticket	0.078**	(0.015)	0.072**	(0.015)
Believes in man-made climate change	0.143**	(0.013)	0.125**	(0.013)
Prior knowledge congestion charges	0.069**	(0.014)	0.114**	(0.014)
Societal view on traffic problems	0.042**	(0.016)	0.061**	(0.016)
Personal view on traffic problems	0.018	(0.013)	0.001	(0.013)
Constant	0.202**	(0.068)	0.296**	(0.073)
Interaction terms included:				
$T \times country$	Yes		Yes	
$p \times country$	Yes		Yes	
# Observations	5,317		5,064	
Adjusted R-Squared	0.10		0.17	
AIC	7013.65		6283.59	

Note: ** and * indicate statistical significance at the 1% and 5% level, respectively.

Table B8: Linear Probability Model Estimation Results on the binary Acceptance of a Congestion Charge for Participants who Live in an Urban Area

	No Charge Levels		Charge Levels	
	Coeff.	Std. E.	Coeff.	Std. E.
Effectiveness Information	0.098	(0.063)	0.175**	(0.061)
Public opinion information	0.031	(0.064)	0.153*	(0.062)
Medium level of charge	–	–	-0.182**	(0.064)
High level of charge	–	–	-0.180**	(0.062)
France	-0.174**	(0.057)	-0.180*	(0.072)
Italy	-0.183**	(0.059)	-0.158*	(0.076)
Poland	-0.044	(0.064)	0.040	(0.084)
Spain	-0.237**	(0.054)	-0.165*	(0.070)
Greece	-0.135*	(0.055)	0.027	(0.071)
Germany	-0.118*	(0.050)	0.038	(0.064)
Female	-0.007	(0.014)	-0.022	(0.014)
Age	-0.000	(0.000)	-0.000	(0.000)
University education	0.058**	(0.015)	0.053**	(0.014)
Medium income	0.033	(0.017)	0.032	(0.017)
High income	0.038*	(0.018)	0.049**	(0.018)
Distance to nearest stop < 10 min	-0.027	(0.016)	-0.021	(0.016)
Frequent public transport (<10 min)	0.059**	(0.015)	0.053**	(0.014)
Owns a car	-0.212**	(0.024)	-0.196**	(0.024)
Commutes by car	-0.083**	(0.015)	-0.072**	(0.015)
Owns public transport ticket	0.078**	(0.015)	0.096**	(0.014)
Believes in man-made climate change	0.106**	(0.014)	0.109**	(0.013)
Prior knowledge congestion charges	0.057**	(0.015)	0.114**	(0.015)
Societal view on traffic problems	0.050**	(0.016)	0.015	(0.016)
Personal view on traffic problems	0.020	(0.014)	-0.007	(0.014)
Constant	0.351**	(0.068)	0.478**	(0.077)
Interaction terms included:				
$\boldsymbol{T} \times \boldsymbol{country}$	Yes		Yes	
$\boldsymbol{p} \times \boldsymbol{country}$	Yes		Yes	
# Observations	4,736		4,455	
Adjusted R-Squared	0.11		0.17	
AIC	6113.37		5333.59	

Note: ** and * indicate statistical significance at the 1% and 5% level, respectively.

Table B9: Linear Probability Model Estimation Results on the binary Acceptance of a Congestion Charge for Participants who Live in a Rural Area

	No Charge Levels		Charge Levels	
	Coeff.	Std. E.	Coeff.	Std. E.
Effectiveness Information	0.121**	(0.042)	0.071	(0.042)
Public opinion information	0.071	(0.042)	0.083*	(0.042)
Medium level of charge	–	–	-0.151**	(0.043)
High level of charge	–	–	-0.280**	(0.041)
France	-0.089	(0.046)	-0.123*	(0.057)
Italy	-0.028	(0.045)	-0.033	(0.058)
Poland	0.041	(0.043)	0.050	(0.054)
Spain	-0.036	(0.046)	-0.143*	(0.058)
Greece	-0.066	(0.045)	0.012	(0.056)
Germany	0.020	(0.034)	0.194**	(0.041)
Female	-0.011	(0.011)	-0.003	(0.011)
Age	-0.000	(0.000)	-0.000	(0.000)
University education	0.049**	(0.012)	0.035**	(0.012)
Medium income	0.029*	(0.014)	0.028*	(0.014)
High income	0.013	(0.014)	0.025	(0.014)
Distance to nearest stop < 10 min	0.028*	(0.011)	0.000	(0.011)
Frequent public transport (<10 min)	-0.002	(0.023)	0.028	(0.023)
Owns a car	-0.127**	(0.029)	-0.091**	(0.030)
Commutes by car	-0.072**	(0.012)	-0.083**	(0.012)
Owns public transport ticket	0.068**	(0.014)	0.079**	(0.014)
Believes in man-made climate change	0.167**	(0.011)	0.144**	(0.011)
Prior knowledge congestion charges	0.075**	(0.012)	0.115**	(0.012)
Societal view on traffic problems	0.051**	(0.012)	0.072**	(0.012)
Personal view on traffic problems	-0.001	(0.011)	-0.027**	(0.010)
Constant	0.120*	(0.056)	0.207**	(0.060)
Interaction terms included:				
$T \times country$	Yes		Yes	
$p \times country$	Yes		Yes	
# Observations	7,131		6,770	
Adjusted R-Squared	0.09		0.18	
AIC	8929.55		8027.22	

Note: ** and * indicate statistical significance at the 1% and 5% level, respectively.

Table B10: LPM results, equation (1) and equation (2), include all "Don't know/no response" as dummies

	No Charge Levels		Charge Levels	
	Coeff.	Std. E.	Coeff.	Std. E.
Effectiveness Information	0.088**	(0.030)	0.074**	(0.028)
Public opinion information	0.075*	(0.030)	0.086**	(0.028)
Medium level of charge			-0.120**	(0.028)
High level of charge			-0.203**	(0.028)
France	-0.116**	(0.030)	-0.125**	(0.036)
Italy	-0.069*	(0.030)	-0.061	(0.037)
Poland	0.002	(0.030)	0.019	(0.037)
Spain	-0.106**	(0.030)	-0.120**	(0.036)
Greece	-0.055	(0.030)	0.044	(0.036)
Germany	0.002	(0.024)	0.193**	(0.029)
Male	0.011	(0.008)	0.019**	(0.007)
Non-binary	0.073	(0.088)	0.031	(0.084)
Age	-0.000	(0.000)	-0.001*	(0.000)
University education	0.051**	(0.008)	0.039**	(0.008)
Medium income	0.034**	(0.010)	0.036**	(0.010)
High income	0.043**	(0.010)	0.052**	(0.010)
Income: Don't know/no answer	-0.041*	(0.018)	-0.030	(0.017)
Lives in a city	0.003	(0.009)	-0.022**	(0.008)
City: Don't know/no answer	0.127	(0.100)	0.005	(0.095)
Distance to nearest stop < 10 min	0.009	(0.009)	-0.010	(0.008)
Distance ...: Don't know/no answer	0.023	(0.013)	0.016	(0.013)
Every 10 minutes or more frequently	0.036**	(0.011)	0.038**	(0.011)
Every 10...: Don't know/no answer	-0.047**	(0.016)	-0.044**	(0.015)
Owns a car	-0.159**	(0.016)	-0.088**	(0.015)
Owns a car: Don't know/no answer	-0.128**	(0.021)	-0.052**	(0.020)
Commutes by car	-0.067**	(0.008)	-0.062**	(0.008)
Commutes by car: Don't know/no answer	-0.128	(0.072)	-0.065	(0.069)
Owns a ticket for public transport	0.076**	(0.009)	0.081**	(0.009)
Owns a ticket...: Don't know/no answer	-0.041	(0.037)	-0.088*	(0.036)
Climate change man-made	0.132**	(0.008)	0.101**	(0.007)
Climate change...: Don't know/no answer	-0.075**	(0.015)	-0.102**	(0.015)
Has heard of congestion charge	0.072**	(0.008)	0.109**	(0.008)
Has heard of...: Don't know/no answer	-0.003	(0.025)	-0.054*	(0.024)
Traffic problems serious (general)	0.045**	(0.009)	0.035**	(0.008)
Traffic ...(general): Don't know/no response	-0.016	(0.017)	-0.037*	(0.016)
Traffic problems bother me (personal)	0.016	(0.009)	-0.004	(0.009)
Traffic... (personal): Don't know/no response	-0.025	(0.017)	-0.033*	(0.017)
Constant	0.309**	(0.031)	0.306**	(0.034)
Interaction terms included:				
$T \times$ ***country***	Yes		Yes	
$p \times$ ***country***	Yes		Yes	
# Observations	14,765		14,760	
Adjusted R-Squared	0.11		0.16	
AIC	18064.22		16688.32	

Note: ** and * indicate statistical significance at the 1% and 5% level respectively. Dependent variable is binary acceptance of congestion charge, after prices were specified

References

Altshuler, A. (2010). Equity, pricing, and surface transportation politics. *Urban Affairs Review*, 46:155–179.

Anas, A. and Lindsey, R. (2011). Reducing urban road transportation externalities: Road pricing in theory and in practice. *Review of Environmental Economics and Policy*, 5:66–88.

Area C Milano (2024). Area C Milano. `https://www.areacmilano.it/en`. Last accessed: 2024-12-11.

Baranzini, A. and Carattini, S. (2017). Effectiveness, earmarking and labeling: Testing the acceptability of carbon taxes with survey data. *Environmental Economics and Policy Studies*, 19:197–227.

Baranzini, A., Carattini, S., and Tesauro, L. (2021). Designing effective and acceptable road pricing schemes: Evidence from the Geneva congestion charge. *Environmental and Resource Economics*, 79:417–482.

Börjesson, M., Hamilton, C. J., Näsman, P., and Papaix, C. (2015). Factors driving public support for road congestion reduction policies: Congestion charging, free public transport and more roads in Stockholm, Helsinki and Lyon. *Transportation Research Part A: Policy and Practice*, 78:452–462.

Börjesson, M. and Kristoffersson, I. (2015). The Gothenburg congestion charge. Effects, design and politics. *Transportation Research Part A: Policy and Practice*, 75:134–146.

Börjesson, M., Eliasson, J., and Hamilton, C. (2016). Why experience changes attitudes to congestion pricing: The case of Gothenburg. *Transportation Research Part A: Policy and Practice*, 85:1–16.

Börjesson, M., Eliasson, J., Hugosson, M. B., and Brundell-Freij, K. (2012). The Stockholm congestion charges - 5 years on. Effects, acceptability and lessons learnt. *Transport Policy*, 20:1–12.

Cramton, P., Geddes, R. R., and Ockenfels, A. (2018). Set road charges in real time to ease traffic. *Nature*, 560:23–25.

Cramton, P., Geddes, R. R., and Ockenfels, A. (2019). Using technology to eliminate traffic congestion . *Journal of Institutional and Theoretical Economics*, 175:126–129.

Croci, E. (2016). Urban Road Pricing: A comparative study on the experiences of London, Stockholm and Milan. *Transportation Research Procedia*, 14:253–262.

Decorla-Souza, P. and Kane, A. R. (1992). Peak period tolls: Precepts and prospects. *Transportation*, 19:293–311.

Eliasson, J. (2014). The role of attitude structures, direct experience and reframing for the success of congestion pricing. *Transportation Research Part A: Policy and Practice*, 67:81–95.

Eliasson, J. (2016). Is congestion pricing fair? Consumer and citizen perspectives on equity effects. *Transport Policy*, 52:1–15.

Eliasson, J., Hultkrantz, L., Nerhagen, L., and Rosqvist, L. S. (2009). The Stockholm congestion - charging trial 2006: Overview of effects. *Transportation Research Part A: Policy and Practice*, 43:240–250.

Eliasson, J. and Jonsson, L. (2011). The unexpected "yes": Explanatory factors behind the positive attitudes to congestion charges in Stockholm. *Transport Policy*, 18(4):636–647.

Fjellinjen (2024). Tariffs and toll stations. `https://www.fjellinjen.no/en/tariffs-and-toll-stations`. Last accessed: 2024-12-11.

Fürst, E. W. M. and Dieplinger, M. (2014). The acceptability of road pricing in Vienna: The preference patterns of car drivers. *Transportation*, 41:765–784.

Gaunt, M., Rye, T., and Allen, S. (2007). Public acceptability of road user charging: The case of Edinburgh and the 2005 referendum. *Transport Reviews*, 27(1):85–102.

Gehlert, T., Kramer, C., Nielsen, O. A., and Schlag, B. (2011). Socioeconomic differences in public acceptability and car use adaptation towards urban road pricing. *Transport Policy*, 18(5):685–694.

Gibson, M. and Carnovale, M. (2015). The effects of road pricing on driver behavior and air pollution. *Journal of Urban Economics*, 89:62–73.

Green, C. P., Heywood, J. S., and Navarro, M. (2016). Traffic accidents and the London congestion charge. *Journal of Public Economics*, 133:11–22.

Grisolía, J. M., López, F., and de Dios Ortúzar, J. (2015). Increasing the acceptability of a congestion charging scheme. *Transport Policy*, 39:37–47.

Gu, Z., Liu, Z., Cheng, Q., and Saberi, M. (2018). Congestion pricing practices and public acceptance: A review of evidence. *Case Studies on Transport Policy*, 6:94–101.

Hårsman, B. and Quigley, J. M. (2010). Political and public acceptability of congestion pricing: Ideology and self-interest. *Journal of Policy Analysis and Management*, 29(4):854–874.

Hess, S. and Börjesson, M. (2019). Understanding attitudes towards congestion pricing: a latent variable investigation with data from four cities. *Transportation Letters*, 11(2):63–77.

Hysing, E. and Isaksson, K. (2015). Building acceptance for congestion charges – the Swedish experiences compared. *Journal of Transport Geography*, 49:52–60.

Jaensirisak, S., Wardman, M., and May, A. (2005). Explaining variations in public acceptability of road pricing schemes. *Journal of Transport Economics and Policy*, 39:127–153.

Jones, P. (2003). Acceptability of road user charging: Meeting the challenge. *In J. Schade and B. Schlag, Acceptability of transport pricing strategies: MC-ICAM conference on acceptability of transport pricing strategies (pp. 27-62).*, Elsevier Netherlands.

Khan, A. M. (2001). Reducing traffic density: The experience of Hong Kong and Singapore. *Journal of Urban Technology*, 8:69–87.

King, D., Manville, M., and Shoup, D. (2007). The political calculus of congestion pricing. *Transport Policy*, 14(2):111–123.

Kristoffersson, I., Engelson, L., and Börjesson, M. (2017). Efficiency vs equity: Conflicting objectives of congestion charges. *Transport Policy*, 60:99–107.

Leape, J. (2006). The London Congestion Charge. *Journal of Economic Perspectives*, 20:157–176.

Li, X., Shaw, J. W., Liu, D., and Yuan, Y. (2019). Acceptability of Beijing congestion charging from a business perspective. *Transportation*, 46:753–776.

Li, Z. and Hensher, D. A. (2012). Congestion charging and car use: A review of stated preference and opinion studies and market monitoring evidence. *Transport Policy*, 20:47–61.

Milenković, M., Glavić, D., and Maričić, M. (2019). Determining factors affecting congestion pricing acceptability. *Transport Policy*, 82:58–74.

Nie, J., Beyea, J., Bonner, M. R., Han, D., Vena, J. E., Rogerson, P., Vito, D., Muti, P., Trevisan, M., Edge, S. B., and Freudenheim, J. L. (2007). Exposure to traffic emissions throughout life and risk of breast cancer: the Western New York Exposures and Breast Cancer (WEB) study. *Cancer Causes and Control*, 18:947–955.

Nilsson, A., Schuitema, G., Bergstad, C. J., Martinsson, J., and Thorson, M. (2016). The road to acceptance: Attitude change before and after the implementation of a congestion tax. *Journal of Environmental Psychology*, 46:1–9.

Odeck, J. and Kjerkreit, A. (2010). Evidence on users' attitudes towards road user charges - A cross-sectional survey of six Norwegian toll schemes. *Transport Policy*, 17:349–358.

Reynolds, D. J. (1963). Congestion. *The Journal of Industrial Economics*, 11:132.

Schuitema, G., Steg, L., and Rothengatter, J. (2010). The acceptability, personal outcome expectations, and expected effects of transport pricing policies. *Journal of Environmental Psychology*, 30:587–593.

Shatanawi, M., Abdelkhalek, F., and Mészáros, F. (2020). Urban congestion charging acceptability: An international comparative study. *Sustainability*, 12:5044.

Simeonova, E., Currie, J., Nilsson, P., and Walker, R. (2018). Congestion Pricing, Air Pollution and Children's Health. *Journal of Human Resources*, 56:971–996.

Vickrey, W. (1963). Pricing in urban and suburban transport. *American Economic Review*, 53:452–465.

Walters, A. A. (1961). The theory and measurement of private and social cost of highway congestion. *Econometrica*, 29:676.

Wang, S., Meng, Q., and Liu, Z. (2013). Fundamental properties of volume – Capacity ratio of a private toll road in general networks. *Transportation Research Part B: Methodological*, 47:77–86.

Wilhelm, M., Ghosh, J. K., Su, J., Cockburn, M., Jerrett, M., and Ritz, B. (2012). Traffic-related air toxics and term low birth weight in Los Angeles County, California. *Environmental Health Perspectives*, 120:132–138.

Wooldridge, J. M. (2001). *Econometric Analysis of Cross Section and Panel Data*. The MIT Press.

Zheng, Z., Ahn, S., and Monsere, C. M. (2010). Impact of traffic oscillations on freeway crash occurrences. *Accident Analysis and Prevention*, 42:626–636.

Ádám Török (2015). Comparative analysis between the theories of road transport safety and emission. *Transport*, 32:192–197.

Żuk, P. and Szulecki, K. (2020). Unpacking the right-populist threat to climate action: Poland's pro-governmental media on energy transition and climate change. *Energy Research and Social Science*, 66.