UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

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Why the Attitude?

An analysis of attitudes towards the congestion charge in Gothenburg prior to implementation

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ABSTRACT

In 2013, congestion charge was implemented in Gothenburg after a decision taken by the local politicians. The public reactions have been many and loud, which have fostered the on-going discussion of a public referendum. This highlights the importance of public acceptability when implementing a policy that aims at dealing with negative externalities, such as congestion and pollution. By using ex-ante data from a survey sent to car owners in the region, this thesis aims at analysing if expected effects of the scheme and the self-image of being environmentally concerned are more determining for attitudes than socio-economic factors, as suggested by studies in other cities. The results indicate that attitudes are impacted the most by expectations about the effects of the scheme, the complexity of the scheme, whether it is considered unfair, if the respondent drives a car and to some extent, the stated environmental interest. This implies that the most important policy implication in order for policy-makers to achieve acceptance, is to provide the public with information that emphasises the positive effects of the charge.

Supervisor: Jessica Coria

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Ida Muz

TABLE OF CONTENTS

TABLES

TEXT BOXES

GRAPHS

APPENDICES

PART 1. INTRODUCTION

1.1. INTRODUCTION

In January of 2013, a congestion charge was introduced in Gothenburg following a decision taken by the local politicians two years earlier. The reactions from the public have been many and loud, not least in the leading local papers. Despite the earlier consensus across the political spectrum to implement the charge, the local papers recently announced that the second largest local political party, the Moderates, will vote for a public referendum in the town council in May 2013 (GP14/5 2013). If enough parties decide to vote for a referendum, the future existence of the congestion charge will be determined by the people of Gothenburg. This highlights that although the charge might be perfectly motivated from an efficiency point of view, it is not enough for a successful implementation. Without having the public on board, implementations are more likely to fail, which was demonstrated in Edinburgh in 2005 when a proposed scheme was outvoted in a referendum (Gaunt et al. 2007). Despite this, the congestion charge in most other cities, e.g. several Norwegian cities and Stockholm, all faced opposition before implementation, but have seen an increase in acceptance levels *ex-post* (Treitvik 2003; Eliasson & Jonsson 2011). There is an extensive amount of studies with the objective to disentangle the determinants of attitudes towards congestion pricing in order to find the right ingredients for an accepted implementation. Factors such as environmental concern and perceived effects of the charge have been found to be more important for attitudes than socio-economic factors (see e.g. Eliasson & Jonsson 2011 or Jaensirisak et al. 2005). This implies that plenty can be done by the policy makers in order to reduce opposition, both *ex-ante* and *ex-post*.

The research focus of this thesis is to analyse attitudes towards the congestion charging scheme in Gothenburg *prior* to implementation. The hypothesis to be tested is if factors based on individual perception, such as environmental attitudes and expected effects of the scheme, are stronger determinants of attitudes towards the congestion charge in Gothenburg than socio-economic factors, such as income, education and gender. The findings can help policy makers to emphasise certain information, or target certain groups, when communicating with the public in order to reach a higher acceptance of the implementation. In a larger setting, this information can help to reduce hurdles to implementation of economic policies aimed at dealing with negative externalities from traffic, such as congestion and pollution. This should

create stronger incentives for policy-makers to use congestion pricing when motivated from an efficiency point of view.

The methodological framework involves analysing results from an attitudinal survey carried out in Gothenburg just prior to implementation by departments at the University of Gothenburg and Chalmers Technical University. The dependent variable is an attitudinal question that asks the respondents if they consider the decision to implement the congestion charge to be a good decision. The respondents answered on a 7-graded Likert scale where 1 is *"Very Bad"* and 7 is *"Very Good"*. A deeper descriptive analysis is carried out, as well as a regression analysis, in which both an Ordinary Least Square (OLS) and an Ordered Probit (OP) is estimated. These two analyses are intended to complement each other; the former to give indications of the relationship without putting any restrictions of the direction of causality and the latter to estimate the relationship when controlling for other variables. One issue with statement-based data is dealing with independent variables that measure different aspects of the same underlying variable, which might cause problems of high correlation. This problem is addressed by using a factor analysis that linearly transforms correlated variables into factor components that capture most of the variance from the original data but are uncorrelated with each other. These components are then used in the regressions.

The results indicate that the sample is overall negative towards the congestion charge, but there are some indications of factors that determine to what extent the respondents are negative. Socio-economic factors do not impact the attitude to any larger degree, in line with results from studies in other cities. Car drivers are much more negative than individuals travelling by other means of transport; this is also found in most of the previous studies. Besides this, expected effects of the scheme, the complexity of the scheme and if the charge is considered to be unfair increases the probability that an individual is negative to the charge. To some extent, environmental attitudes are found to impact attitudes towards the implementation positively. This implies that in order for policy makers to increase public acceptance for the implemented scheme, they should focus on communicating positive effects of the scheme (i.e. less congestion and less pollution) to the public.

1.1.1. Limitations and restrictions

The sample consists of car owners in the Gothenburg region, which makes the analysis limited to analysing the attitudes of people with access to cars. Nevertheless, this does not necessarily imply that all respondents are everyday car drivers. Also, it is these people that

will be affected most by the charge, which implies that their attitudes towards it also are of much interest. But it should be noted that they are expected to be more negative than the average inhabitant, implying that results from a full survey of all people living in the region would most likely be less negative. Furthermore, only *ex-ante* attitudes are available for analysis due to the timing of implementation and the writing of this thesis. Earlier findings suggest that attitudes often change after implementation, which implies that an ex-post survey might have a higher share of positive attitudes.

The rest of the thesis is organised as follows; an introduction to the situation in Gothenburg and the implementation of congestion charge can be found in the second part. Following this, in part three, I present theories and empirical findings from earlier research in other cities. The fourth part describes the data and explains the empirical strategy used in the analysis. In the fifth part, the reader finds the results, followed by the conclusions in the sixth and final part.

PART 2. THE IMPLEMENTATION IN GOTHENBURG

2.1. GOTHENBURG PRIOR TO THE CONGESTION CHARGE

Gothenburg is the second largest city in Sweden, located at the west coast. In 2012, the number of inhabitants of the municipality was estimated to almost 530,000 people (Statistics Sweden [1]). By looking at the number of daytime inhabitants[1] over the six years period 2004 to 2011, it has increased from around 280,200 to 308,000 (Trafikkontoret 2010:4;Statistics Sweden [2] & [4]). Out of these, around 106,400 people commuted into the city from other municipalities in 2011. At the same time, around 48,000 of the inhabitants of Gothenburg commuted out of the municipality on a daily basis, thus indicating a net inflow of around 58,000 people to the city from other municipalities. The sharp increase in population during the last 50 years has most likely contributed to the estimated increase of 400% in number of car journeys within the city (Statistics Sweden [1]; Trafikkontoret 2012:7). During the same time span, the capacity of the public transportation has only increased with 50%. Västtrafik is the main provider of public transportations within the region with the operation of the transports procured by several entrepreneurs[2]. The company is owned by "Västra Götalandsregionen", a merger of counties and county administrations in western Sweden. According to a customer satisfaction survey conducted by the trade organisation "Swedish

[1] This is measured as the number of people gainfully employed in the area including those that commute into the area for work.
[2] The public transportation system includes trains, buses, trams and boats (Västtrafik's webpage [1])

Public Transport Association", around 52% of the commuters were satisfied with Västtrafik in 2012, a rather low share according to Västtrafik (Västtrafik's webpage [2]).

The development of car traffic is estimated to have decreased with around half a percentage between 2011 and 2012, the main explanation being a downwards turning economy (Trafikkontoret 2012:14p). The decrease has been larger within the central parts due to construction- and roadwork while the traffic across the municipality boarder has increased slightly. In 2012, the city of Gothenburg estimated that around 44% of the population use a car as primary mode of daily transportation, a share that has remained more or less constant over the last years (Trafikkontoret 2012:8). Around 26% of the population state that they primarily use public transportation whiles around 6% go by bike and 25% walk to work or school (Ibid.). Mainly people that go by foot or public transportation tend to switch to bikes during the summer season whiles car travellers appear to use their cars independent of the time of the year.

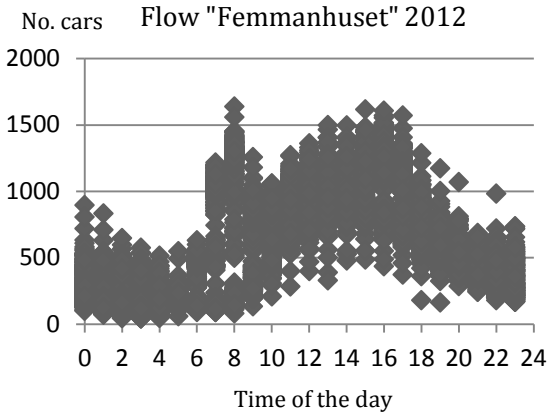
Traffic flow is measured daily at a couple of places in the city. Looking at the data for the years 2010 and 2012 for two of the places in the central city ("Femmanhuset" and "Ullevigatan") it is evident that traffic levels sharply increases around 6am and peaks around 8am every morning at both of these places. The traffic then drops but still remains fairly high until it peaks again in the evening around 5pm-6pm. By looking at the NO_2-emissions at "Femmanhuset" in 2010, it can be seen that morning peak hour (8am) infers the highest levels of emissions. The same pattern can be seen when looking at the emission levels for the years 2010-2012 for NO_2 and CO_2. For PM10, there is one peak in the morning and one in the afternoon.

The hourly environmental standards[3] adopted by the Swedish Parliament for NO_2 is 90 ug/ms, which can be exceeded a maximum of 175 times during one year. Levels above 200 ug/ms is not allowed during one hour more than 18 hours a year as a maximum (Förordning (2001:527) om miljökvalitetsnormer för utomhusluft, §4:1).The level of NO_2 exceeded this threshold in 2012 at a few places in the city[4] (City of Gothenburg, Luftkvalitetsrapport 2012). It is concluded that keeping NO_2 -levels below these thresholds is difficult, especially in the central parts of the city where the traffic is dense. In May 2011, Sweden was sentenced a fine by the European Court for exceeding the threshold of emissions of particles (PM_{10}) set by the

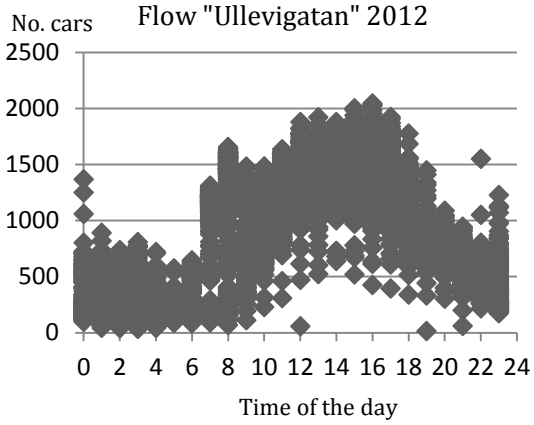
[3] In Swedish "Miljökvalitetsnormer"
[4] Mainly the threshold for hourly and daily values were exceeded.

European Union. In five Swedish urban areas the thresholds had been exceeded during the previous years, of which Gothenburg exceeded the daily limits in 2005 and 2006 (SEPA's webpage).

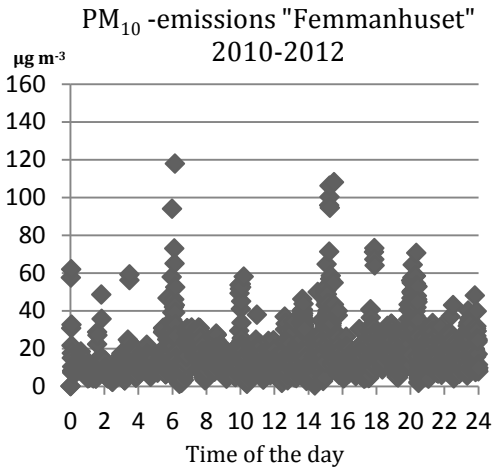
Graph 1. Traffic Flow "Femmanhuset"



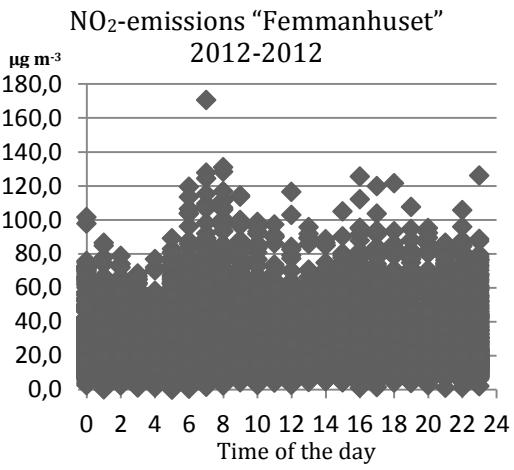
Graph 2. Traffic flow "Ullevigatan"



Graph 3. PM_{10}-emissions "Femmanhuset"



Graph 4. NO_2-emissions "Femmanhuset"



The data for the diagrams comes from the City of Gothenburg's database

For particles ($PM_{2.5}$ and PM_{10}) and ground-level ozone, the national standards have been reached in the years following 2006 in Gothenburg. Despite this, it continues to be one of the most troublesome air quality standards to reach, together with the standards for NO_2 (City of Gothenburg, Luftkvalitetsrapport 2012). Both of these emissions mainly results from traffic, which implies that decreasing traffic levels is the only way of dealing with these issues today.

2.1.1. The heavily criticised decision of implementation

In January of 2010, the city council of Gothenburg made the decision to implement a congestion charge that resulted in a request that was sent to the Ministry of Finance, written

together with the Swedish Transport Administration (henceforth referred to as STAD[5]) (Government proposition 2009/10:189, p.10). After a proposition from the government in May 2012, the Swedish Parliament voted in favour of introducing a congestion charge in Gothenburg from the year 2013 (the Parliament's webpage [1]). In the proposition it is stated that the primary aim of the implementation is to reduce congestion. The design of the scheme is to a large extent based on the congestion charging scheme introduced in Stockholm in 2006/2007. The work group in charge of the investigation presented two different sizes of the cordon area, of which the smaller was preferred in the final proposition. It was argued that the smaller size of the area reduces congestion the most, as well as provides the strongest incentives for a car driver to switch to alternative transport modes (Ibid.)

In Gothenburg there have been many and loud protests against the congestion charge, not least in the leading local papers. In April 2011 the town council voted against a referendum of the congestion charging scheme after a petition was handed to the municipality of which 23,000 residents had signed (Vägvalet's webpage). The petition demanded that a referendum was to be held regarding the implementation of the congestion charge. "Vägvalet"[6], a political party with the main aim to abolish the congestion charge, also handed in a non-governmental bill to the city council at the same time (Ibid.). This party was founded in 2010 as a response to the City council's proposal to implement the congestion charge and won five out of 81 seats in the city council in the election in September 2010 (City of Gothenburg's webpage [1]). Until recently, there has been more or less consensus across the political spectrum to implement the congestion charge with only two parties taking a stand against it, the nationalistic party "the Swedish Democrats"[7] (Swedish Democrats' webpage) and "Vägvalet". In May 2013, a vote in the town council resulted in that enough politicians voted in favour of a public referendum. This means that a referendum will take place, although the details about when and how the results will be taken into consideration are yet to be determined (City of Gothenburg's webpage [2]).

2.2. THE IMPLEMENTATION OF CONGESTION CHARGE

The 1st of January 2013, the congestion charge was implemented in Gothenburg, requiring all four-wheeled vehicles to pay a fee for entering or exiting the city central on weekdays between 6am and 18.29pm (Swedish Transport Agency's webpage [1]). The fee is

[5] The author's own abbreviation.
[6] Translates to "the choice of road" (the author's own translation)
[7] In Swedish, "Sverigedemokraterna" (the translation to English is done by the author)

differentiated based on the traffic flow, which implies that the level is depended upon what time of the day that the passage is made. During peak hours[8], vehicles passing a toll station is charged 18 SEK, while the charge is 13 SEK at the shoulders of the peak hours[9], and 8 SEK the first and the last half hours of the charging period as well as in-between the shoulders of the peak hours during the day (Swedish Transport Agency's webpage [2]). There is a maximum daily amount that a vehicle can be charged, with a cap of 60 SEK per day and vehicle. Moreover, a vehicle will be charged only once if it passes more than one toll station within one hour. If there are different levels of the charge within that hour, the vehicle will be charged for the passage made with the highest level of the fee. The Swedish Transport Agency (henceforth referred to as STAG[10]) sends invoices to car owners at the end of every month for all passages made the previous month (STAG's webpage [1]). The registration and identification of vehicles is done with an Optical Character Recognition (OCR) system that photographs the license plate of the car (from the front and back) and then identifies the car directly in the camera while the car passes in regular speed (STAG's webpage [3]). It is not possible to pay the charge upon passage or beforehand, all payment is done in retrospect. Neither is it possible to charge vehicles that are registered abroad[11], only Swedish registered cars can be charged. Because of the earlier implementation in Stockholm, legal framework as well as technology was already in place. Due to geographical conditions and the infrastructure of Gothenburg, it requires 36 toll stations to encircle the city central (STAG's webpage [2]).

The implementation of the congestion charge is a part of the West Swedish package[12], a larger infrastructure investment in the Gothenburg region. The West Swedish package includes investments in public transportation such as extending platforms for commuter trains, expanding parking facilities for cars and bicycles outside of the city, new bus lines as well as new bus lanes into and within the city (Västra Götalandsregionen 2012). There is also an eight kilometre long railway tunnel under construction with underground stations at three places in the central parts of the city. This railway tunnel, called the West Link[13], will connect to commuter trains outside of the central parts of the city, thereby making it possible to smoothly travel into the city central without having to switch transportation mode at the congested central station (STAD's webpage [1]). Something that is not possible for train commuters today. Furthermore, a new tunnel underneath the river and an exchange of the

[8] 7am-7.59am and 3.30pm-4.59pm
[9] 6.30am-6.59am, 8am-8.29, 3pm-3.29pm and 5pm-5.29pm
[10] The author's own abbreviation.
[11] Possible ways of charging foreign vehicles are currently under discussion.
[12] In Swedish this is called "Västsvenska paketet".
[13] In Swedish "Västlänken"

oldest of the two bridges over the river[14] is also parts of the package. There are several other investments planned and currently under implementation, such as better traffic information and new pedestrian and bicycle lanes (STAD's webpage [2]). The cost of the project is estimated to 34 billion SEK, half of which is financed by the Swedish government and the rest by local and regional funding. The revenues from the congestion charge is intended to finance the West Link and constitutes an essential share of the regional and local funding for this massive traffic investment (Västra Götalandsregionen 2012). Before implementation of the congestion charge, several improvements has been done on the tram-lines as well as for the buses, one being expansions and changes that resulted in a 5.6% higher capacity within the tram traffic (Trafikverket 2012:10).

2.2.1. A study of knowledge about the West Swedish package

In March 2011, May 2011 and in May 2012, three survey studies were carried out in Western Sweden by the STAD (2012) in order to find out how much knowledge people living in this region have about the West Swedish package. The final survey was done in connection to an information campaign and the results from the different periods were compared. The results showed that around 65% of the respondents had a positive attitude towards the West Swedish package as a whole; this share remains constant between the sampling periods (STAD 2012). The respondents were most positive to the investments in public transportation, with an average of 4.1 on a five-graded scale. The congestion charge received the lowest score in all of the sampling periods, an average of 2.5 on the five-graded a scale in the last round. In these surveys, around 75% the sample believed that the package would affect them positively, while the share is 50% in the neighbouring municipalities. Around 60% of the sample in the last survey was negative or rather negative towards the congestion charge. Inhabitants of the Gothenburg region were slightly more negative than respondents living outside of the region (45%). Of the ones that are positive towards the West Swedish package, the larger share stated that this was because of the investments in public transportation, better accessibility and/or better connections across the river (Ibid.). Furthermore, these studies showed that the public's perception of available information had increased slightly in the last round compared to the two previous survey occasions, and this improvement in accessible information mainly regarded the congestion charge. However, almost 33% of the sample still considered the information regarding the congestion charge as being *"Inadequate"* in the last round, while 45% considered it to be "*Good*" or "*Very good*". A large share of the sample was still

[14] "Götaälvbron", the eastern bridge.

interested in receiving more information about the package, particularly about the congestion charge (Ibid.). This suggests that the information provided to the public prior to implementation was rather poor.

2.2.2. Early effects of the congestion charge

The 23rd of January 2013, the first report of effects on traffic in Gothenburg after the implementation of congestion charge was published, i.e. three weeks after implementation. It estimated that there had been a 20% reduction of vehicles passing a toll station compared to January previous year[15] (West Swedish package, report January 2013). In the end of April, the second report was released for March. The decrease in traffic flow compared to same month previous years was estimated to 15% during charging hours, and a 13% reduction in the daily number of cars entering and exiting the cordon-area (West Swedish package, report April 2013). These estimations suggest that the effects of the scheme are in line with ex-ante forecasts that predicted a 15-20 decrease of traffic flow during charging hours. The flows on the arterial roads have been reduced by 6% compared to March previous year and the estimated decrease of traffic in the city streets are 15%.

The effects of the charge are also measured in terms of congestion and travel time. The effect of congestion is measured as the difference between travel time during morning peak hours and "free flow", e.g. during the night when there is no congestion (Ibid.). This is reported as the percentage change of the prolonged travel time compared to "free flow". The uncertainty of travel time is measured as the difference between the 85th percentile and the 15th percentile of the median travel time, which implies that a smaller difference is a sign of a smaller variation.

Overall congestion, travel time and the uncertainty of travel time has decreased on all arterial roads into Gothenburg (Ibid.). For the highways, the travel time and congestion has decreased slightly or remained the same as previous year, with one exception, "Lundbyleden" on which the congestion has increased due to extensive road works. The explanation to the smaller effects on the highways is explained to be due to the fact that congestion on the highways was not very severe before implementation (West Swedish package, report January 2013).

In order to measure the effect on public transportation, the difference between travel time and scheduled time was estimated during peak hours on weekdays. This estimation indicated no

[15] In this estimation macro effects (e.g. changes in the economic growth rate and changes in employment) has been controlled for.

major changes in the difference between travel time and scheduled time on five of the major express-bus lines compared to last year, except for one on which there has been an increase[16] (West Swedish package, report April 2013.).

The available estimates indicate that the overall effects of the scheme on traffic have been positive so far. The report of emission levels, taking into account the weather conditions, for this period has not yet been released. Considering that most of the emissions that are problematic in Gothenburg results from traffic, it is likely that there has been a measurable decrease in pollution as well. The question is if this will be enough to achieve public acceptance for the congestion charge. The next section is intended to help mapping out the findings from earlier studies of public acceptability and congestion charge from earlier implementations.

PART 3. ATTITUDES TOWARDS ROAD PRICING

3.1. WHAT DETERMINES ATTITUDES? GENERAL FINDINGS

The first congestion scheme introduced was in Singapore already in 1975. Since then Bergen, Oslo, Trondheim, London, Milan and Stockholm have implemented congestion charge aiming at either reduce congestion, improve the environment or simply because of raising revenues. In table 1 below, a short description of the implemented (or nearly implemented) congestion charging schemes is presented. In most of these places, there has been a strong opposition to the charge (e.g. in Edinburgh the implementation was stopped in a public referendum), that has proven to increase after implementation (e.g., in Norway, London and Stockholm). Nevertheless, today most of these schemes are accepted by the public. For example, in Stockholm it has even been referred to as a success (see e.g., Börjesson et al. 2012).

Analysing attitudes towards road pricing is a relatively new field of research, which means that most theories are based on empirical findings. There has been little evidence that socio-economic factors impact attitude towards congestion charge[17]. I have divided the findings from earlier studies into three subgroups below; *Principals of implementation*, intended to explain what strategies of implementation that earlier research have found increase acceptance towards road pricing and congestion charging; *Psychological factors*, derived from psychological theories of acceptance and reactance; and *"Familiarity", "Objective" and*

[16] From "Lilla Varholmen" (outside of the cordon area) to "Järnvågen" (inside of the cordon area).
[17] For instance, Jaensirisak et al (2005) found that younger people are more positive towards road charge than elder, when conducting a Stated Preference study in London and Leeds, and Eliasson and Jonsson (2011) found in their simplest model that men were more negative to the congestion charge in Stockholm.

"Subjective" effects, other factors that have been found to affect individuals' attitudes towards road charge.

3.1.1. Principles of implementation that can reduce negative attitudes

The PRIMA-project was carried out in 1999-2000 in eight cities in Europe that either had implemented, planned to implement or failed to implement some form of road pricing (Hårsman, et al. 2000). The aim was to analyse reasons why individuals accept or do not accept road-pricing, and the report from the project presents ten principles that potentially increase acceptance. Six of these are mentioned below as "Jones' six principles". In addition the remaining four principles should be taken into account when launching a road-pricing scheme in order to increase public support (Hårsman et al. 2000:47pp). *The first implementation is important* and has been shown to impact the acceptance level and should thus be carefully designed, with one example being to start off with a low initial tax level and then gradually increase it. *Charging only new roads can be a relatively easy way to introduce road-pricing* since people often more strongly oppose implementing charge for something that has been free of charge. *Communication with the public, marketing strategy and transparency are essential parts of implementation* and will affect the acceptance levels. It is important, not only to sell the idea to the public, but also to provide sufficient information and have transparent decision making processes. This is also highlighted by Börjesson et al. (2012:9) and Eliasson and Jonsson (2011), that suggest that one contributing factor to the success in Stockholm is that the charging was branded as an "Environmental tax". "Branding" is argued to be important due to the perceived system effects of the charge and implies that it is not enough to focus on the scarce road space in order to gain acceptability. The reason for the successful branding in Stockholm is explained by the fact that individuals perceive themselves as being environmentally concerned (Ibid.). This self-image of being environmentally concerned is found to be more important for determining attitudes than the individual's actual behaviour (sorting garbage etc.).

Moreover, there is an extensive amount of articles that find that lack of information often makes individuals negative towards an implementation (see e.g., Hensher & Li 2013, Odeck & Kjerkrit 2010, Gaunt et al. 2007). Providing sufficient information to the public can be one crucial factor for gaining acceptance for road pricing (see also Santos & Fraser 2006). Gaunt et al. (2007) points to the fact that there were strong objections towards a double-cordon scheme in Edinburgh already from start, and this had not been considered when proposing the final design of the scheme before referendum, which increased opposition.

Table 1. Implementations of congestion pricing in other cities

	SINGAPORE	NORWAY			ENGLAND		SWEDEN	ITALY
	Singapore	Bergen	Oslo	Trondheim	London	Edinburgh	Stockholm	Milan
Year	1975/1995/1998	1986	1990	1991/1998	2003	No (2005)	2006 (trial)/ 2007	2008/2012(trial)
Type of Scheme	Area road pricing	Cordon Pricing Scheme	Cordon pricing scheme	Six zone cordon scheme	Area licence scheme	Double cordon scheme	Area cordon scheme	Area cordon scheme
Primary Aim	Reduce congestion	Finance traffic investments	Finance traffic investments	Finance traffic investments	Reduce congestion (environment)	Reduce congestion	Improve the urban environment and reduce congestion	No info
Technical system (today)	Pre-paid smartcards. Electronic Road Pricing, in-vehicle units.	Manual toll booths and non-stop lanes (video shooting).	Electronic tolling system	Six zone cordon scheme, gradually introduced.	Pre-payment. Automatic number plate recognition (ANPR) system, for enforcement.	Pre-payment. Registered and identified upon passage.	Payment is done in retrospect. Optical Character Recognition (OCR) system (video shooting) for enforcement.	A new system under trial. Much simpler than previous. Cover larger area.
Rates	Inbound traffic is charged, rates differentiated based on vehicle, location and time of the day ("Shoulder-Price-method")	Seasonal passes, allows unlimited amount of passages	Seasonal passes, allows unlimited amount of passages	Differentiated based on time of the day as well as on vehicle weight	Daily charge for unlimited amount of passages during charging hours. Rate has gradually increased.	Inbound traffic charged for passing one of the cordons, once a day for unlimited amount of passages.	Charging all traffic in or out of the city, Every passage is charged (but only 1/hour). Maximum daily amount limit. Differentiated based on time.	Fixed daily charge. Alternative fuel vehicles exempted, certain "dirty fuel" vehicles are banned.
Revenue allocation	No info	Transport investments	Transport investments	Transport investments	Investments in Public transportation	Transport investments	Intended for investments in public transportation. Used for road investment	No info
Effects	1 year after implementation 15% decrease in no. of cars entering the area	Hampered traffic to some extent	No clear results	Shifting the time of passage, hampered annual growth of traffic	After 1 year: 31% decrease in congestion, 30% decrease in no. of cars entering.	Not implemented	18% decrease in no. of cars entering/exiting the city	14% decrease in traffic (23% during morning peak hours)
Referendum	No	No	No	No	No	Yes	Yes (after trial)	Yes (2012)
Attitudes ex-ante	No info	Majority against	Majority against	Majority against	Against	Against	Majority against	In favour for new scheme (2012)
Attitudes ex-post	No info	Decreased opposition	Decreased opposition	Majority in favour	Supported	Not implemented	Majority in favour	Not available

Sources: Singapore: Goh (2002) and Olszewski & Xie (2005) & Santos (2007). Norway: Treitvik (2003) & Langemyhr (1996). London: TfL (2004:7), Leape (2006:159), Santos & Shaffer (2004) & TfL's webpage. Edinburgh: Laird et al. (2007). Stockholm: Eliasson & Jonsson (2011), Eliasson (2009), Gov. Report (2007), Börjesson et al.(2012) & Papathanasopoulou and Antoniou (2011)

This implies that communication with the public is an important element in the policy-maker's quest for public acceptance. This does not necessarily imply that a final decision should be based on referendum. Santos & Fraser (2006:300) argues that this is a bad idea since there are so few voters that are well-informed, comparing the outcome in London, with no referendum, and in Edinburgh, where a majority voted against implementation. A dialogue with the public is highlighted by the authors as one of the most important lessons from London. Eliasson and Jonsson (2011) conclude that communicating the environmental effects of the scheme in Stockholm is one reason for increased acceptance levels during the course of the trial period. The final principle offered by Hårsman et al. (2000:76) is that *acceptance needs to be monitored and follow-ups are essential* since acceptance takes time and is a continuous process.

Regarding Jones (1995)'s six principles, the first principle states that *the objective of the scheme should meet the public concern* (Jones 1995:175). This highlights the importance of the introduced road-pricing scheme taking care of what the public considers to be the major problem with the traffic situation. This is likely to differ between cities and can, for instance, be congestion, environmental issues or traffic accidents. This also implies that a system should not be implemented unless it is truly motivated (also argued by Eliasson & Jonsson 2011.646). Jaensirisak et al. (2005) find in their stated preference study in London and Leeds that the design of the charge is found to affect acceptability and that features such as only charging limited areas and charging only during peak hours did increase acceptability among the respondents. This implies that a well-designed scheme that focuses on the main issues will be more likely to be accepted. Treitvik (2003) builds on an argument by Larsen and Østmoe (2001) when he concludes that the obvious effects of the scheme is one major reason for gaining acceptance in the Norwegian cities. Gaunt et al. (2007) find that the inhabitants of Edinburgh did not believe that the system would actually deal with the problems of congestion and this is one major reason to the negative attitudes. Jaensirisak et al (2005) find similar results in their study; people that perceive the congestion and pollution to be serious and the current situation to be unacceptable are to a larger extent in favour of the congestion charge. This is also related to Jones' (1995:175) second principle that states that *it should be demonstrated that there are no alternative solutions in order to reach the objective* (reduce congestion, pollution or accidents etc.). Road-pricing is an unpopular measure since it forces people to pay for a good that was earlier free of charge. Because of this it is, as Jones' call it, "a policy of last resort" (Ibid.). This implies that if the objective of the scheme is to reduce

congestion or pollution, the effects of the scheme should be emphasised before and after. The third of Jones' principles states that *revenues should be hypothecated and alternative allocations should be provided* (Jones 1995:176). If the public know how the revenues will be spent and consider this to be a good allocation, e.g. in public transportation, resistant often decreases. The reason is that individuals might psychologically feel better about the system if they experience that they derive benefits from what they have contributed to finance through the charge. However, Börjesson et al. (2012:9) find that revenue allocation was less decisive for attitudes in Stockholm since they first were intended to finance public transportation but were later re-allocated to finance a large bypass, which did not impact acceptance levels.

Keep the scheme as simple as possible is the fourth of Jones' principles (1995:176). If individuals understand the system and can calculate the costs inferred on them, resistance to the system will decrease. It has also been shown that people trust simpler systems more than they trust advanced systems since they believe (often wrongfully) that the risk of errors is smaller. This further motivates a simpler system in order to reduce resistance. Hensher and Li (2013) and Gaunt et al. (2007) found that a too complicated system was one of the major reasons to why the public voted against implementation in Edinburgh in 2005.

The fifth of Jones's principles is to *carefully consider technological issues* (1995). After the earliest implementations, there was resistance to road-pricing because people have felt that their privacy was being invaded by monitoring. However, these objections are likely to diminish as technology improves and new solutions become available (Jones 1995:178), which suggest that this principle is most likely not an issue today[18]. The sixth and final principle states that *issue of equity needs to be addressed* (Jones 1995:177). This can be addressed in different ways, examples given by Jones is to differentiate the fee based on engine size and/or to give out a number of free permits every month that can be traded. Furthermore, it could be worth pointing out to the public that although low incomers will be affected most by the charge, investments in public transportation will potentially be beneficiary for this group. According to the PRIMA-project, the authors (Hårsman et al. 2000:75) find that the package of implementing road-pricing schemes should include investments in public transportation. Mainly because acceptance is related to the availability of alternative transport modes but also because this can be seen as a compensation for people whose welfare will decrease because of the implementation. Since the value of time tends to

[18] With the technology today, only the license is photographed and the vehicle is registered automatically and the invoices are sent to the car owner.

be correlated with income, allocation of revenues to improvements in public transportation might address equity issues (Hårsman et al. 2000:53). The transportation system in Stockholm was considered well-functioning already before implementation, and was found to impact the shift to acceptance in Stockholm, according to Börjesson et al. (2012:11).

3.1.2. Psychological factors

Cognitive dissonance theory was first outlined by Festinger (1957). The theory suggests that in a situation where an individual is faced with an unavoidable behaviour (e.g. forced to pay congestion charge against her will), the individual will change her attitude in order to eliminate any discrepancy between behaviour and attitude that causes discomfort (Schade & Baum 2007:43). This implies that the more likely an implementation is, the more positive should attitudes become. Börjesson et al. (2012:8) summarise this theory in three words as "[…] accept(ing) the unavoidable". They find cognitive dissonance to be a possible explanation to why individuals become more positive to congestion charge after the trial in Stockholm. This has been argued by many earlier studies to be one of the main reasons for seeing a decrease in opposition after implementation (see e.g. Hensher & Li 2013 and Eliasson & Jonsson 2011)

Schade and Baum (2007:43) also distinguish a behaviour called *Reactance*, derived from Brehm (1966) and Reactance theory. This is a state of arousal that individuals can reach when they experience that their freedom of behaviour is threatened. Thus, when a decision of implementation is made without letting the public take part in the decision making (i.e. there is no referendum or public hearing), then people might experience reactance. This makes an individual even more negative towards the implementation than she would have been if she had been outvoted by a majority in a referendum.

3.1.3. "Familiarity", "Objective" and "Subjective" effects

Familiarity has been argued to increase acceptability of road pricing, with several possible explanations to this phenomenon offered in previous studies. It has been found that if the charge imply net benefits on the individual (and this was not expected ex-ante), then attitudes turn in favour of the charge, once people have experienced these effects (see e.g., Börjesson et al. 2005; Jones 2003; Schade & Baum 2007; Hensher & Li 2013). This can be caused by either benefits being larger than anticipated or that the costs turn out to be smaller than expected prior to implementation. Börjesson et al. (2005:8) categorise these two effects as "objective effects" of the charge. This finding also helps to explain why people usually are

more negative prior to implementation, since uncertainty of the effects tend to make individuals more negative (Hensher and Li 2013). De Borger & Proost (2012) find that the major explanation to why car drivers are against congestion tolling *ex-ante* but becomes positive *ex-post* is due to the car drivers' idiosyncratic uncertainty about their willingness-to-pay for driving, and also due to uncertainty about whether politicians will use the revenues in an appropriate way.

Another explanation offered by Börjesson et al. (2005:8) is that with familiarity comes a better understanding or acceptance of pricing a good that was earlier free of charge. People will start thinking of road space in terms of a scarce good that needs to be priced, which will foster acceptance. This last explanation, together with cognitive dissonance are argued by Börjesson et al. (2005:8) to be "subjective effects" and related to the attitudes of the individuals. Previous empirical studies have shown that perceived effects of congestion charge will impact the attitude of the individual (see e.g. Hensher and Li 2013, Verhof 1998, Harrington et al. 2000 or Thorpe et al. 2000). This implies that if the individual experience positive effects of a scheme, they will become more positive to the scheme as a whole. However, Riensta et al. (1999) argue that causality could be reversed; people are justifying their attitudes by having low or high expectations. Eliasson and Jonsson (2011:640) build on this argument when they suggest that the causality runs in both directions. Thus, an individual with positive attitudes towards the charge will be more prone to believe that the effects have been beneficial (so-called perceived system effects) than a less positive individual, thus creating a feedback-loop where attitude and perception affect and enhance each other.

The earlier findings presented can give some guidance to what can be expected to be found in Gothenburg. It also makes it possible to analyse the findings in Gothenburg in a more general setting. In the following part, the data underlying the analysis and the empirical strategy are presented.

PART 4. EMPIRICAL STRATEGY & THE DATA

4.1. DESCRIPTIVE STATISTICS

4.1.1. The survey

The data used in the analysis is based on a survey conducted in cooperation between different institutions at University of Gothenburg and Chalmers Technical University. It was sent out in November 2012 to 3,499 car owners registered at the Swedish Transport Agency[19], living within the Gothenburg region. In the beginning of December 2012 a reminder was sent out to all non-respondents, which was followed by an additional reminder one week later. The final response rate was 46.4% out of which 31 were discarded for not living within the Gothenburg region, implying that the sample consists of 1,593 observations. This also implies that the dataset from this survey is cross-sectional. For a version of the survey in Swedish, please see Appendix A.

4.1.2. The data

In table 2 below are the statistics for the socio-economic and travel related variables of the sample. The sample has a larger share of men than women, almost 65% are men. The mean age of the respondent is 54 with a minimum of 20 and the oldest respondents being 95 years old. The sample is well-educated with almost half having finished post-secondary schooling of minimum 3 years. An average household consists of 2.5 persons, out of these 1.96 are on average adults. The larger share of the sample are gainfully employed while the rest is retired, studying or on parental- or sick leave. Almost a third of the sample lives in one of the districts that either have the whole or parts of the district within the cordon area. Around 70% of the sample live within Gothenburg Municipality whiles the rest live in neighbouring municipalities[20]. Not very surprisingly, most of the respondents can use a car whenever needed and almost 75% of the sample state that the car is their primary mode of transportation. Only 12% use public transportations primarily, whiles the rest walk, go by bike, moped or motorcycle. Of the ones driving, there is a large share that passes a toll station at the time of the survey, which indicates that this share will be directly affected by the cost of the charge.

[19] Swedish law requires all vehicles used to be registered.
[20] The municipalities represented in the sample are Ale, Alingsås, Härryda, Kungsbacka, Kungälv, Lerum, Mölndal, Partille, Stenungnsund and Öckerö. For a table of the distribution over districts, please see Appendix B.

Table 2. Descriptive statistics, socio-economic and travel related variables

Name	Values	Mean	(Std.dev)	Median	Description
Sex	1;0	0.65	(0.48)	1	1 if man, 0 if woman
Age	20;95	54	(14.6)	54	The respondent's age
High education	1;0	0.4	(0.48)	0	1 if finished 3 or more yrs of post-secondary education, 0 otherwise
No. Adults	1;5	1.95	(0.7)	2	No. of individuals>18 yrs in household
No. Children	0;3	0.17	(0.47)	0	No. of children (<18 yrs) in the household
Household size	1;6	2.49	(1.18)	2	No. of people in the household
Job	0;1	0.64	(0.48)	1	1 if gainfully employed, 0 otherwise
Cordon area	0;1	0.29	(0.45)	0	1 if living in districts *Centrum*, *Majorna-Linné*, *Lundby* or *Norra Hisingen*, 0 otherwise
Car availability	1,5	1.2	(0.54)	1	If the respondent can use a car whenever she wants, 1=Always; 5=Never
Car	0;1	0.76	(0.43)	1	1 if having car as primary mode of transportation, 0 otherwise
Public	0;1	0.13	(0.33)	0	1 if primarily going by public transportation, 0 otherwise
Bike	0;1	0.06	(0.23)	0	1 if having bike as primary mode of transportation, 0 otherwise
Foot	0;1	0.04	(0.21)	0	1 if going by foot to/from work/school, 0 otherwise
Moped/MC	0;1	0.004	(0.06)	0	1 if having moped or MC as primary mode of transportation, 0 otherwise
Pass tollstation	0;1	0.65	(0.48)	1	1 if passing a toll station to/from work/school
Passtoll and car	0;1	0.37	(0.48)	0	1 if passing a toll station & drives car, 0 otherwise
Income	1,500;1,200,000	81,121	(143,848)	50,000	Monthly gross household income
Income1	0;1	0.25	(0.43)	0	1 if having an monthly gross household income less than 32,500 SEK (1st quartile)
Income2	0;1	0.17	(0.38)	0	1 if having an monthly gross household income in the range 32,500-49,000 SEK (2nd quartile)
Income3	0;1	0.31	(0.44)	0	1 if having an monthly gross household income in the range 50,000- 69,000 SEK (3rd quartile)
Income4	0;1	0.26	(0.44)	0	1 if having an monthly gross household income in the range 70,000- 1,200,000 SEK (4th quartile)

The monthly gross household income has a quite large spread, ranging from 1,500 SEK[21] to 1,200, 000 SEK, with a large share of the sample having a gross household monthly income larger than 70,000 SEK[22]. For a graph of the distribution of income in the different groups, please see Appendix B. Below in table 3 are the statistics for the variables based on perception[23].

[21] There are five respondents that have answered that there income lies in the range 22-95 SEK. It is possible that these respondents thought the number should be in terms of 1000s of SEK since an income of this small amount appears a bit odd as a gross income (it is less than one hour of minimum wage). Due to this, these responses are discarded.

[22] This can be compared to the average gross income (per person) in Sweden in 2011 was 34,800 SEK with a median of 30,500 SEK. A person working in a cash register had an average gross income of 22,900 SEK, a primary school teacher 26,400 SEK and a CEO 81,400 SEK (Statistics Sweden [3]).

[23] All of these are based on statements, in which the respondent can answer on a scale from 1 to 7, where 1 is "Do not agree at all" and 7 is "Agree completely". The only variable with a different scale is the variable *Switch*, where 1 is "Very Low" and 7 is "Very high".

Table 3. Descriptive Statistics for variables based on perception

Name	Values	Mean	(Std. dev)	Median	Description
Revenue PT	1;7	4.83	(2.21)	6	If Public transportation is a good allocation of revenues, 1=Do not agree at all; 7=Agree completely
Revenue Roads	1;7	5.66	(1.76)	6	If building and maintaining roads is a good allocation of revenues, 1=Do not agree at all; 7=Agree completely
Revenue Low tax fuel	1;7	3.53	(2.47)	3	If lowering taxes on fuel is a good allocation of revenues, 1=Do not agree at all; 7=Agree completely
Revenue Health & School	1;7	3.60	(2.56)	3	If health care and education is a good allocation of revenues, 1=Do not agree at all; 7=Agree completely
Revenue Low other taxes	1;7	2.81	(2.31)	1	If lowering other taxes is a good allocation of revenues, 1=Do not agree at all; 7=Agree completely
Revenue	0;1	0.59	(0.49)	1	1 if rated public transportation as being a good allocation (5-7) of revenues, 0 otherwise
Switch	1;7	3.1	(2.3)	2	How the respondent consider her possibilities to switch from car to public transportation, 1=Very Low;7=Very High
Switch (grouped)	1;3	1.68	(0.90)	1	The variables above divided into three groups, 1=Low (1,2,3), 3= neutral(4) and 3=High (5,6,7)
S1. Reduce congestion	1;7	3.23	(1.88)	3	If the respondent believe that congestion will be reduced within the cordon area after implementation, 1=Do not agree at all; 7=agree completely
S2. Complicated	1;7	3.33	(1.98)	3	If the respondent believe that it will be complicated paying the congestion charge, 1=Do not agree at all; 7=Agree completely
S3. Better traffic	1;7	2.93	(1.74)	3	If the respondent believe that the charge will improve the traffic situation in Gothenburg, 1=Do not agree at all; 7=Agree completely
S4. Less noise & pollution	1;7	3.07	(1.74)	3	If the respondent believe that the charge will reduce noise and pollution, 1=Do not agree at all; 7=Agree completely
S5. Unfair	1;7	5.4	(2.05)	6	If the respondent believe that the charge are unfair, 1=Do not agree at all; 7=Agree completely
S6. Easier get around	1;7	2.43	(1.72)	2	If the respondent believe that it will be easier to get around after implementation, 1=Do not agree at all; 7=Agree completely
S7. Worse economic situation	1;7	4.70	(2.34)	5	If the respondent think that the charge will worsen her economic situation, 1=Do not agree at all; 7=Agree completely
S8. Reduced life quality	1;7	4.17	(2.32)	4	If the respondent think that the charge will decrease her quality of life, 1=Do not agree at all; 7=Agree completely
PT Trust	1;7	2.37	(1.56)	2	If the respondent trust that the public transportation always comes on time, 1=Do not agree at all; 7=Agree completely
PT Smooth	1;7	2.87	(1.87)	2	If the respondent consider public transportation to be a smooth way of travelling, 1=Do not agree at all; 7=Agree completely
PT Comfortable	1;7	3.05	(1.84)	3	If the respondent consider it to be comfortable to go by public transportation, 1=Do not agree at all; 7=Agree completely
Reduce	1;7	4.54	(2.02)	5	If the respondent think that car traffic has to be reduced due to climate and environmental reasons, 1=Do not agree at all; 7=Agree completely
Reduce (grouped)	1;3	2.27	(0.89)	3	The variables above divided into three groups, 1=Not agree (1,2,3), 3= neutral(4) and 3=Agree (5,6,7)
Environmental interested	1;7	4.96	(1.48)	5	If the respondent is interested in environmental issues, 1=Do not agree at all, 7=Agree completely
Env interested (grouped)	1;3	2.52	(0.74)	3	The variables above divided into three groups, 1=Not agree (1,2,3), 3= neutral(4) and 3=Agree (5,6,7)

For the variables measuring appropriateness of allocation of revenues, it can be seen that the allocation that has the highest median and mean is to allocate the revenues towards roads. Allocating revenues towards public transportation has an average slightly below its median

value of 5. This implies that the respondents in general found the revenue allocation to be appropriate. It can also be seen that most respondents that primarily drive cars do not find it easy to switch to public transportation, indicating that they consider themselves to have a high transaction cost of switching transport mode. As can be seen in the table, the general expectations of effects are quite low, all variables have both the mean and median value at the left of neutral for all statements phrased positively[24] and to the right at the statements phrased negatively. Furthermore, the attitude to the public transportation system is on average quite negative, all three statements have both the median and mean values at the lower end of the scale (left of neutral). However, it is evident that the larger part of the sample consider themselves being environmentally friendly, the larger share stating a five or higher on the 7-graded scale. The majority of the sample also thinks that traffic has to be reduced due to climate and environmental reasons (mean and median around 4.5-5).

4.1.3. Representative of the sample

One concern with the sample is the fact that no stratification method was used when distributing the survey. In order to investigate if the sample is representative for the population, sample statistics are compared to population statistics of the different city districts as well as the neighbouring municipalities from which there are respondents represented in the sample.

The comparison of reported statistics with the sample suggests that the sample has a larger share of highly educated people than the average citizens in respective district. Income levels also appear to be a bit higher in the sample than the average levels reported, although it should be noted that the measure of income is quite crude[25]. Furthermore, for the city districts it appears as the sample is distributed fairly equal to the distribution of the population[26], which suggests that there is no need for post-stratification of the sample based on district. For more details, please see Appendix B.

4.2. EMPIRICAL MODEL

The analysis of the data consists of two parts. The first part is a deeper descriptive analysis of the data intended to explore the relationship between the variables without inferring too much about the direction of the causality. The second part is a regression analysis intended to explore the relationships found in the observational analysis when controlling for all other

[24] The highest is "*Agree completely*"
[25] For the sample it is household income divided by the number of stated contributors to the household budget.
[26] The districts *Angered*, is slightly underrepresented and *Norra Hisingen* is slightly overrepresented.

variables. In order to clarify how the regression analysis is carried out, I describe the econometric model below.

4.2.1. The Ordered Probit Model

Economic theory suggests that people make choices and ratings based on some underlying utility function (developed by McFadden (1974)). Unfortunately, we cannot observe the utility of the individuals, only the choices that the individual makes. However, by assuming that the individual is rational, it is argued that the underlying preferences will determine the behaviour, implying that an individual that is asked to rate an implementation will make the rating based on her underlying preferences (Greene & Hensher 2010:2 & 106). Preferences are assumed to be continuous, whiles observed ratings will be censored versions, and based on certain individual-specific thresholds (μ_{ik}). The difference between the levels (1 to 2 or 2 to 4) is not the same on the utility scale, implying that there is a strictly nonlinear transformation that is captured by the thresholds and that can be measured through ordered choice modelling (Ibid.).

The ordered probit regression takes into account the natural ordering of the levels of the dependent variable, i.e. the range from "*Very bad"* (1) to "*Very Good"*(7). This method is suitable due to the nature of the data. However, there is a lack of observations for the highest levels of the dependent variable, which could result in too little variation in the observations for these levels. To analyse the effect that this could have on the estimates, I also estimate an OLS model[27] that treats the variables as continuous. Hence, it does not take into account that the relationship between the variables might not be linear (the distance between 1 and 2 might not be equal to the distance between 4 and 5). Moreover, due to lack of observations for the sixth and seventh level, these will be merged into one group. This implies that the ordered response, y can take on the values {1, 2, 3, 4, 5, 6}. This will be derived through the latent variable model (Greene & Hensher 2010:99p):

$$y^* = \beta x_i' + \varepsilon_i \,, \quad i=1,\ldots n \qquad [1]$$

where x_i is a vector of all explanatory variables and ε_i is a normally distributed error term. n are the number of observations in the sample. The observations will fall into six different intervals depending on the following cut-off points.

$\mu_1 < \mu_2 < \mu_3 < \mu_4 < \mu_5$

[27] For more details about OLS estimations, please see e,g, Hill et al. (2008) *"Principles of Econometrics"*

The latent variable remains unobserved; instead what is observed are the choices made (y) (Wooldridge 2002:505):

$$y = 1 \quad if\ \mu_1 > y^* \qquad [2]$$
$$y = i \quad if\ \mu_{i-1} < y^* < \mu_i, \qquad \text{i=2, 3, 4, 5}$$
$$y = 6 \quad if\ \mu_5 < y^*$$

In order to make it easier to interpret the results, the marginal effects will be estimated for each level of the dependent outcome. If multiplying the marginal effects by one hundred, this gives the percentage point change in the probability of ending up in the particular level given a marginal change in the independent variable (Bookwater & Dalenberg 2010).

4.2.2 Empirical Model

Earlier studies and theories can give indications of what can be expected to impact attitudes in Gothenburg. The variable of most interest in this paper is the inhabitants of the city's *Attitude* towards the decision to implement congestion charge in Gothenburg. It is likely that there will be a negative majority in the sample; this has been found in practically all cities before implementation. Nevertheless, the analysis can still give indications of what factors make an individual more or less negative.

Socioeconomic variables

Results from earlier studies imply that socio-economic characteristics, such as income, education and gender, are less decisive for attitudes, implying that this is most likely also the case in Gothenburg. In a few cases, it has been found to impact the attitude to some degree (albeit not very strongly). This indicates that socio-economic characteristics in some cases can have a small impact on attitudes. *Education* can impact the individual, since a highly educated person is more likely aware of the problem with congestion and pollution problems than a less educated person. Having a higher household *Income* is likely to make a person less negative, since the cost of the charge constitutes a smaller share of the household budget in a wealthy household than in a household with lower income. Being *gainfully employed* can make a person more dependent on the car, but also have a higher value of time, which indicates that the effect can go in either direction. *Number of household members* can impact the attitude to the congestion charge, since the larger the household, the smaller share of the budget for each member. On the other hand, if larger family consists of more adults, a larger share of the household can provide for themselves. This implies that a multiple-child household have a tighter budget due to more mouths to feed. But they can also have a higher value of time, thus

being either more negative or positive to the charge. Also, a household with children might be more concern with the environment that their children grow up in, which implies that households with children could be more positive towards the charge. Furthermore, the *Place of residence* is likely to impact the benefits for an individual. Living inside the cordon area implies that an individual experience more of the benefits (clean air, reduced traffic etc.). This indicates that people living within the cordon area in Gothenburg could be slightly more positive than people living outside of the area.

Factors related to travel habits

Using the *Car* as the primary mode of transportation has been found to impact opinion negatively. In Gothenburg, it is thus likely to find that car drivers are more negative than the average resident since this has been found in most of the ex-post studies. An individual that passes *a toll* every day to work or school at the time of the survey, will in the future either have to pay the charge or switch mode of transport. This individual will be more negative than a person that is not affected directly by the cost of the charge. For the ones using other transport modes, passing the cordon could impact attitudes either positively (less congestion) or negatively (more crowded on the trams and buses) or not at all. Controlling for interaction effects between passing a toll and having a car will be done in the estimations.

Factors based on perception

As been found in previous studies, *perceived effects* impacts attitudes. There have been discussions about in which direction the causality goes. Thus, there might be respondents having negative expectations because they are negative to the charge, and vice versa. However, earlier research suggests that people become more positive after implementation due to the benefits being larger than expected. This implies that it is more likely that the direction of causality goes from expected effects to attitudes or possibly, that it runs in both directions. Furthermore, it is argued that a *too complicated system* will decrease acceptance. Individuals that think that the system will be complicated and hard to understand will be more likely to be negative than individuals that do not. It has also been found that if individuals believe that the charge is unfair, they will be more likely to be negative towards the charge. In some sense, it can be argued that those that cannot afford to drive their car after implementation will be compensated since the revenues are invested in public transportation (the West Link). Nevertheless, there it is still possible that motorist does not consider the

charge to be fair. Indicating that due to equity issues, motorists are more negative and commuters are more positive.

As suggested by previous studies, an environmentally interested person is more likely of being positive towards the charge. One could acknowledge the risk that individuals state to be more environmentally concerned than they are in reality in order to feel better about themselves (i.e., receive a "warm glow") or simply because they think they are "better persons" than they are. However, Eliasson and Jonsson (2011) find that it is the self-image of being environmentally concerned that impacts attitudes. A person that believes that *traffic has to be reduced* due to environmental and climate reasons is expected to be more positive to the charge than a person who does not.

Furthermore, the attitude towards the *public transportation system* is important since it is the closest substitute for a driver that does not want to pay the congestion charge. Although revenues from the scheme are allocate to public transportation in Gothenburg, the low share of customer satisfaction for Västtrafik (Västtrafik's webpage [2]) is likely to increase negative attitudes. Another related factor is that a person that finds it easier to *switch* between public transportation and driving a car will also have a more positive attitude towards the charge since the cost of changing transport is considered small. Furthermore, earlier research shows that *revenues allocation* matters for acceptance levels. The choice of allocation in Gothenburg could be argued to deal with equity effects but it does not compensate the ones paying for the charge (the motorists). This indicates that the share of the drivers that will switch to public transportation after implementation might find this a suitable allocation and those that will continue driving might not, whiles those that commute will most likely be positive to the allocation. This indicates that revenue allocation might have a small impact on the attitudes in this sample, increasing the negative attitudes for the motorists and decreasing it for the commuters (and the soon-to-be commuters).

4.2.3. Hypothesis to be tested

Based on earlier findings and the situation in Gothenburg, the following hypothesis will be tested in this thesis. "*Attitudes towards the congestion charge in Gothenburg are likely to be influenced more by attitudinal factors, such as expected effects and environmental concern than by socio-economic factors.*" Before testing this hypothesis, a presentation of the data underlying the analysis is presented below.

4.2.4. Data issues

There are several statements included in the survey, on which the respondent is asked to state to what degree they agree on a 7-graded Likert scale (1=*"Do not agree at all"* and 7=*"Agree completely"*). Some of these statements are likely to be highly correlated and are all measuring the same latent variable, one being expected effects of the congestion charging scheme and the other being attitudes towards the public transportation system. This problem is addressed by conducting two separate factor analyses. The idea behind a factor analysis is to capture the underlying structure of the variables by exploring correlations, and create new factors that captures as much information as possible but remains uncorrelated with each other[28] (Hair Jr. et al. 2010:94pp). These factors can then be used in the regressions as indexes.

There are two factors created from the factor analysis of the statements regarding expected effects and one factor created for the statements measuring attitudes to the public transportation system. The factor *Expected effects Positive* is loaded with the statements S1, S3, S4 & S6 (see text box1, below), and thus implies that this factor captures the information from variables that are positively phrased (positive expectations of effects as the scale increases from 1 to 7) whiles *Expected effects Negative* is loaded with the variables S7 and S8, that are negatively phrased (negative expectations of effects as the scale increases from 1 to 7)[29]. For the measure of attitudes the three variables measuring comfort, convenience and trust of the public transportation system are included in the factor called *Public Transportation*. For more details about the factor analysis, please see Appendix C, where the procedure is reported stepwise.

Another issue is based on the argument put forward by Eliasson & Jonson (2009). They argue that causality between perceived effects and attitudes towards the charge runs in both directions. If this is the case, including expectations about effects in the regression, could create endogeneity in the data. This goes for all variables related to attitude and motivates interpreting the results with caution. A model estimated without the perceived effects can be

[28] Due to the structure of the variables (being categorical rather than continuous) a Polychoric matrix of correlation is used instead of Pearson correlation, which is the default option in Stata . See e.g. Holgado-Tello et al. (2010) or Sariset al. (1998) for a discussion of correlation matrices in factor analyses for cardinal variables.

[29] The observant reader might have noted that the statements S2 and S5 are not included in the factor analysis. This is due to these variables not loading highly to any variables (limit set at 0.5). When testing with Cronbach's alpha the scale reliability coefficient decreases when adding one or both of these variables to the analysis. This is a test of which variables belong together in a factor (and a general rule of thumb is that it should not be smaller than 0.7) (Hair et. al 2010:125).

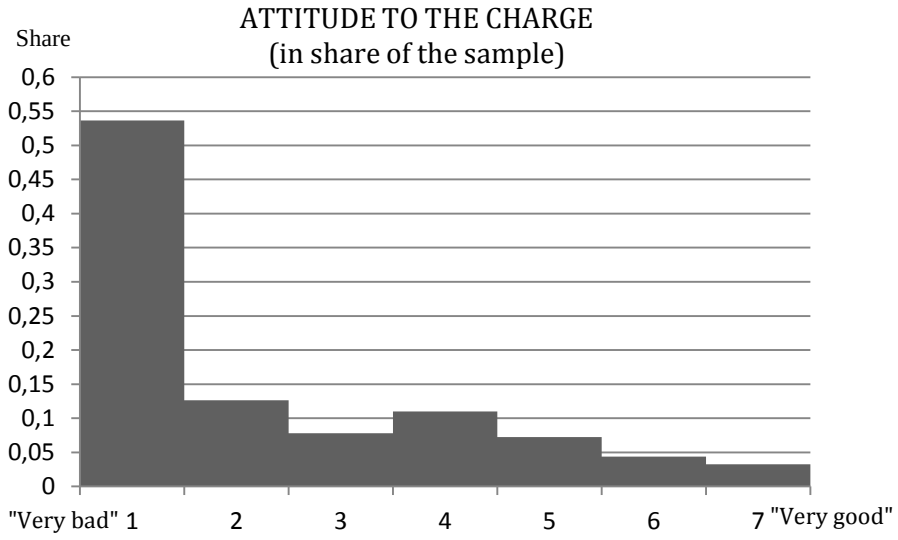
found in Appendix D. However, the results can still give some indications of the relationship between the variables, which motivates doing the regressions but interpreting the results as indications rather than absolute values. Furthermore, there will be a deeper descriptive analysis of the variables related to attitudes and perception of the respondents in the following part, intended to further clarify the relationship between attitudes towards the charge and the attitudinal variables.

PART 5. RESULTS

In the first section, an examination of the distribution of attitudes is presented, followed by the deeper descriptive analysis of the distribution of variables based on perception of the charge divided on the distribution of attitudes. This is intended to disentangle the relationship between these variables without emphasising the direction of causality, while the regression analysis is intended to explore the relationship based on the assumption that the causality runs from the independent variables to the dependent. Also, this allows me to analyse the relationships when controlling for all other factors. Together, these two analyses are intended to give a better understanding of the determinants of attitude.

5.1. DEEPER DESCRIPTIVE ANALYSIS[30]

Graph 5. Distribution of attitudes to the charge



n=1577.The question posed was "Do you consider the decision to implement the congestion charging scheme to be a good or a bad political decision?" the respondents were asked to answer on a seven-graded scale ranging from 1=Very bad to 7=Very good

[30]It should be noted that cross-sectional data (including variables such as income and education) often has the problem of endogeneity due to the error term being correlated with unobserved heterogeneity. However, it has been found in earlier studies of attitudes to road charge that socio-economic variables are not determining attitudes to congestion charge to any larger extent. Therefore it is unlikely that there are unobserved heterogeneity that are not included in the model (like ability, intelligence etc.), that effects both the attitude to the charge as well as the socio-economic characteristics.

5.1.1. Distribution of attitudes

The variable of main interest is a question that asks the respondents if they believe the decision to implement the congestion charge is a good or a bad political decision[31]. The respondents are asked to rank their opinion on a seven-graded Likert scale that ranges from 1 being "*Very bad*" to 7 being "*Very good*". As suspected, there is a large share of the sample (54%) that is negative towards the decision of implementing the congestion charge; they state that they consider the implementation to be a very bad political decision[32]. The distribution of answers can be seen above in graph 5. Clearly, it is right-skewed with the majority of the sample found on the left side of the mean (2.31), and the median respondent choosing a 1. The reasons for such a large share of negative respondents can partly be due to the timing of the survey, and partly be due to the fact that the majority of the sample is everyday car drivers.

In table 4 below, the distribution of responses is presented for the whole sample compared to the different sub-groups based on socio-economic characteristics. It can be seen that there is no major difference between genders; women appear to have a bit more tendency to vote for the middle alternative although the average responses are quite similar for both genders[33].

Table 4. Distribution of responses for sub-samples

Sub-samples	*"Very bad"*						*"Very good"*
	1	**2**	**3**	**4**	**5**	**6**	**7**
Whole sample	**53.7%**	**12.6%**	**7.8%**	**11.0%**	**7.3%**	**4.4%**	**3.2%**
Men	55.6%	11.1%	7.3%	10.1%	7.3%	4.9%	3.6%
Women	50.6%	15.1%	8.8%	12.7%	7.2%	3.5%	2%
Younger (<54yrs)	53.2%	13.7	8.1%	10.0%	7.2%	4.7%	3.1%
Older (=/>54yrs)	53.6%	11.8%	7.8%	12.1%	7.4%	4.0%	3.3%
Children	54.5%	12.9%	8.4%	10.4%	4.5%	5.9%	3.5%
No children	54.9%	12.3%	8.0%	10.8%	7.0%	4.1%	3.0%
Car	62.2%	13.1%	7.25%	8.7%	5.1%	1.5%	2.1%
Public Transportation	29.6%	11.8%	9.5%	16.0%	15.4%	11.2%	6.5%
Highly educated	43.6%	13%	8.25%	12.2%	10.2%	7.8%	4.0%
Not highly educated	60.2%	11.6%	7.5%	10.2%	5.3%	2.3%	2.3%
Within cordon	55.4%	12.9%	7.6%	10.0%	5.8%	4.7%	3.6%
GBG municipality	55.3%	12.3%	7.6%	10.2%	7.3%	4.6%	2.7%
Other municipalities	49.6%	13.5%	8.5%	13.0%	7.2%	3.8%	4.5%

n=994 for Men; n=543 for Women; n=740 for Younger & Older; n=202 for Children; n=1,401 for No children; n=993 for Car; n=169 for Public transportation; n=606 for Highly educated; n=928 for Non highly educated; n=449 for Within cordon; n=1,099 for GBG municipality; n=446 for Other municipality

[31] There is a risk that some respondents are answering this statement, thinking more of the political process than on the policy instrument *per se*.
[32] A one on the scale
[33] The sample has a larger share of men.

Neither does it appear as age impacts the attitude, dividing the sample in two groups[34] the distribution of responses are quite similar for the younger and the older group. The distribution of responses based on education level show that people that are highly educated[35] have a higher share of responses that are positive (5 or higher) and a lower share that is negative (3 or less) compared to respondents that are not highly educated. The largest difference between subsamples can be seen for the ones primarily driving and the ones primarily travelling with public transportation. The results show that car drivers are much more negative, which is in line with earlier research.

Below, I will investigate how the distribution of attitudes differs across the responses to the variables that are based on statements, i.e. the variables based on perception. This is intended to help clarify the relationship between the attitudes and these variables.

5.1.2. Expected Effects

There are eight statements in the survey, they are found below in text box 1. Of these, four are related to the effects on traffic and the environment after implementation (S1, S3, S4 and S6). One statement is related to the respondents' expectations of the complexity of the scheme (S2) and another statement is whether they believe the charge to be unfair (S5). The final two statements are related to the impacts the charge may infer on the respondents' life quality and economic situation (S7 and S8). The respondents are asked to state to what extent they agree with the statement on a scale ranging from 1 being, "*Do not agree at all*", to 7 being, "*Agree completely*".[36]

Text Box 1. Statements in the survey[37]

1. The implementation of the congestion charge will lead to less congestion within the cordon area (**S1**)
2. It will be complicated to pay the congestion charge (**S2**)
3. The congestion charge will improve the traffic situation within Gothenburg (**S3**)
4. Noise and pollution will be reduced after implementation of the congestion charge (**S4**)
5. The congestion charge is unfair (**S5**)
6. It will become easier for me to get around when the congestion charge has been introduced (**S6**)
7. The congestion charge will make my economic situation worse (**S7**)
8. The congestion charge will affect my life quality negatively (**S8**)

By looking at the statistics for the rating of the statements of expected effect, it is evident that the sample overall have rather negative expectations of the effects of the congestion charge. The majority of the sample does not believe that it will reduce congestion to any larger extent,

[34] Where one group are the ones below mean and median age (54) and the other are the ones of 54 years or more.
[35] Finished 3 or more years of post-secondary schooling.
[36] The distribution of responses can be found in Appendix D.
[37] All translations from Swedish to English are done by the author.

nor do they believe that noise and pollution will decrease, that the traffic situation will improve or that it will become easier to get around after implementation. Although, the larger share of the sample do not believe that it will be complicated paying the charge, the majority think that the charge is unfair[38]. The majority of the sample also believes that their economic situation will be worsened after implementation, whiles a third of the respondents think that their life-quality will be worsened, and a fourth of the sample do not agree at all, hence are positive. A little less than a tenth of the sample answered negatively in all of the statements above[39], indicating that they might have answered as a protested against the charge, while there was around 1% of the respondents answered all the statements positively. However, it could be the case that these respondents are the ones justifying their attitudes by having low (or high) expectations.

In order to see if there are any clear relationships between the attitude towards the political decision of implementing the congestion charge and the expectations of the effects of the scheme, a cross table with these two variables is presented below. This can facilitate to differentiate between the respondents that gave a low opinion because they believe they will be worse off after implementation and the respondents that are negative although they will be better off. This could either be a sign of protests against the decision rather than the policy instrument *per se,* or simply because they see the benefits but expects the costs to be higher. The share of the respondents that rated the congestion charge low (1-3) are referred to as *negative*, the ones giving it a 4, *neutral* and the ones rating it high (5-7) are referred to as *positive* and are specified below for each of the eight statements. The responses are divided into groups depending on whether they gave the statement a *low rating* (1-3) a *neutral rating* (4) or a *high rating* (5-7). The share (%) is based on the opinion of the congestion charge, e.g. the respondents that gave the first statement a low rating and also were negative towards the congestion charge constitutes a 69% share of the sample that were negative towards the charge[40].

By eyeballing table 5 below, it is evident that there are four of these statements (S1, S3, S4 and S6) that have a large share of the negative respondents (more than 65%) answered negatively. This implies that respondents that are negative do not believe that congestion, noise and pollution will decrease, neither that the traffic situation will improve nor that it will be easier to get around. Interestingly, around 18% of the negative share actually believes that

[38] Almost half of the sample rated this statement a 7, thus agreeing completely.
[39] I.e., S1<=3 & S2>=5 & S3<=3 & S4<=3 & S5>05 & S6<=3 & S7>=5 & S8>=5
[40] More details for each of the statements can be found in Appendix D.

congestion will decrease within the cordon area. Thus, this share of the sample appears to be negative for other reasons than for having low expectations of the effects. Around half of the ones being negative towards the charge did not believe that it would be complicated paying the tax, hence, the expectations of a complicated systems was not the reason for being negative for this group.

Table 5. Distribution of statements based on the attitude to the congestion charge. Expressed in percent (%) of the share of positive, negative or neutral respondents.

STATEMENTS		ATTITUDE TO CHARGE		
		Negative (1-3)	*Neutral (4)*	*Positive (5-7)*
S1	*Not less congestion (1-3)*	68.9%	26.4%	17.0%
	Neutral (4)	12.8%	33.5%	12.1%
	Less congestion (5-7)	18.3%	40.1%	71.0%
S2	*Not complicated (1-3)*	52.8%	60.1%	80.2%
	Neutral (4)	15.7%	25.6%	7.7%
	Complicated (5-7)	31.4%	14.3%	12.2%
S3	*Not better traffic (1-3)*	77.5%	30.2%	16.0%
	Neutral (4)	12.3%	35.5%	17.3%
	Better traffic (5-7)	10.2%	34.3%	66.7%
S4	*Not less P&N (1-3)*	72.9%	27.4%	19.1%
	Neutral (4)	14.7%	36.3%	17.8%
	Less P&N (5-7)	12.4%	36.3%	63.1%
S5	*Not unfair (1-3)*	14.1%	15.8%	48.2%
	Neutral (4)	5.6%	26.7%	18.9%
	Unfair (5-7)	80.3%	57.6%	32.9%
S6	*Not easier (1-3)*	82.9%	45.2%	37.8%
	Neutral (4)	9.2%	38.6%	27.5%
	Easier around (5-7)	7.8%	16.3%	34.7%
S7	*Not worse (1-3)*	24.3%	41.7%	63.2%
	Neutral (4)	9.4%	22.0%	13.5%
	Worse econ. (5-7)	66.4%	36.3%	23.3%
S8	*Not worse (1-3)*	29.6%	51.2%	83.4%
	Neutral (4)	13.6%	32.7%	10.8%
	Worse quality (5-7)	56.8%	16.1%	5.8%

n=1518 for S1, n=1514 for S2 & S6, n=1523 for S3 n=1516 for S4, n=1519 for S5,n=1524 for S7& S8

A rather large share of the negative respondents believes that their economic situation and life quality will be worse after implementation, implying that many believe that they will be personally affected by the charge, which might have increased opposition. Most of the negative respondents state that the charge are unfair, while around 15% do not appear to be negative because of this, stating that it will not be unfair. Interestingly, there are only 1% of the negative respondents that believe that traffic will improve after implementation, and an

even smaller share that believes that it will be easier to get around. Thus, almost all of the ones being negative towards the charge believe this, indicating that there is a strong relationship between these variables and the negative attitude to the charge. As noted earlier, the share of the respondents being positive is fairly low, implying that it is difficult to draw conclusions from their statements, although it is evident that this group have overall more positive expectations of the effects of the charge.

6.1.3. Revenue disbursement

The respondents are also asked to rank the appropriateness of allocation of revenues from the congestion charging scheme to five different allocations. The first is to finance public transportations, the second to finance building and maintenance of roads, the third to lower taxes on gasoline and diesel, the fourth to finance health care and education and the fifth to lower taxes for citizens.

Table 6. Revenue allocation and attitude to the congestion charge in percentage (%) of stated opinion (positive, neutral or negative)

REVENUE ALLOCATION		**ATTITUDE TO CHARGE**		
		Negative (1-3)	*Neutral (4)*	*Positive (5-7)*
Public transportation	*Not a good allocation (1-3)*	32.6%	8.8%	10.4%
	Neutral (4)	11.9%	10.6%	3.5%
	Good allocation (5-7)	55.6%	80.6%	86%
Roads	*Not a good allocation (1-3)*	10.7%	11.2%	18.3%
	Neutral (4)	8.9%	10.6%	12.2%
	Good allocation (5-7)	80.4%	78.2%	69.6%
Lower tax on fuel	*Not a good allocation (1-3)*	43.3%	65.3%	76.5%
	Neutral (4)	10.7%	10.6%	3.5%
	Good allocation (5-7)	46.0%	24.1%	20.0%
Health care & Education	*Not a good allocation (1-3)*	49.8%	38.8%	54.4%
	Neutral (4)	6.3%	9.4%	8.3%
	Good allocation (5-7)	43.9%	38.8%	37.4%
Lower other taxes	*Not a good allocation (1-3)*	59.9%	70.6%	76.5%
	Neutral (4)	8.9%	9.4%	5.2%
	Good allocation (5-7)	31.2%	20.0%	18.3%

n=1545 for all.

The respondents are asked to rate the appropriateness of these five allocations on a scale from 1 being "*Should not be the allocation of the tax*" to 7 being "*Should be the allocation of the tax*".[41] Below are the responses grouped as before, the ones rating the opinion charge low (1-3) are *negative,* the ones rating it the middle alternative (4) are *neutral* and the ones rating it

[41] The interested reader can find all tables for each level of the revenue disbursement in Appendix D.

high (5-7) are grouped as *positive*. For the revenue allocation the same principle as above is used, implying that rating the allocation low (1-3) means *not a good allocation*, the middle alternative (4) *neutral* and rating it high (5-7) means that the respondent believe it to be *a good allocation*. The distribution can be seen in table 6 above, and suggest that most respondents find the allocation of revenues to the public transportation system to be a fairly good allocation, a majority giving this a high rate. However, the allocation with the highest share of high ratings is to building and maintaining roads, almost 80% of the sample stated a high rate for this allocation. For the negative share of the sample, this is the allocation which most find appropriate. This can be expected since there is a high share of respondents that are motorists, and are likely to consider that "what they pay for" should be used to create benefits for them. A third of all negative respondents believe that allocating the revenues to the public transportation system is to be a bad allocation. However, since the choice of allocation has been a known fact for long, it could be the case that some respondents become more negative of the choice of allocation as a way of justifying the negative attitude. Overall, this indicates that revenue allocation might be less of a determinant for the negative attitude.

6.2.3. Other variables based on perception

Besides the variables of expected effects and revenue allocation, there are a couple of other variables based on the individual's perception. These variables are divided into three groups by the same principle used above, and can be seen below, in table 7, distributed across the negative, neutral and positive shares of the sample. As already mentioned, there is a large share of the sample considering themselves to be environmentally friendly. Although the positive share is rather small, it can still be seen that the negative respondents consider themselves to be uninterested in environmental issues to a larger extent than the positive respondents. This indicates that environmental interest might have an effect (albeit small) on the attitudes towards the charge, but not as large impact as found in earlier studies. For the statement of the possibility for respondents to switch between driving and public transportation, the distribution indicates that those that find it harder are generally more negative although the distribution for the positive share is quite even between finding it easy and finding it hard.

For the statement that traffic must be reduced due to climate and environmental reasons, a large share of the respondents agree to this statement independently of attitude to the charge. However, there is a small tendency for those being positive to the charge to be more prone to consider that traffic must be reduced. This indicates that those that are concerned with the

climate and environmental effects of their daily travels are also, in general, more positive towards the charge.

Table 7. Variables based on perception and attitude to the congestion charge in percentage (%) of the share being negative, neutral or positive towards the congestion charge.

STATEMENTS		**ATTITUDE TO THE CHARGE**		
		Negative (1-3)	*Neutral (4)*	*Positive (5-7)*
Environmental interest	*Not interested (1-3)*	16.8%	9.5%	6.5%
	Neutral (4)	21.9%	18.5%	7.8%
	Interested (5-7)	61.3%	72.0%	85.7%
Traffic must Reduce (Climate & Environment)	*Must not (1-3)*	34.3%	17.0%	13.3%
	Neutral (4)	15.6%	13.9%	9.8%
	Must (5-7)	50.0%	69.1%	76.9%
Switch	*Hard (1-3)*	65.7%	57.1%	43.3%
	Neutral (4)	8.4%	7.1%	8.7%
	Easy (5-7)	25.9%	35.7%	48.0%
Trust (Public Transportation)	*No trust (1-3)*	82.4%	67.7%	59.9%
	Neutral (4)	8.4%	20.4%	17.1%
	Trust (5-7)	9.2%	12.0%	23.0%
Travel Smoothly (Public Transportation)	*Not smoothly (1-3)*	73.3%	52.1%	36.5%
	Neutral (4)	10.7%	17.4%	18.0%
	Smoothly (5-7)	16.0%	30.5%	45.5%
Travel Comfortably (Public Transportation)	*Not comfortable (1-3)*	70.6%	48.8%	34.5%
	Neutral (4)	12.2%	13.1%	18.4%
	Comfortable. (5-7)	17.2%	38.1%	47.1%

No. of observations, Env.interest-Opinion=1530, Switch-Opinion=1146, Reduce-opinion=151, 7Attitude car-opinion=1525 , Trust-Opinion=1511, Smooth-Opinion=1506 & Comf-Opinion=1512

For the three statements regarding the attitude towards the public transportation system, the results indicate that the larger share of the sample have quite a negative attitude towards the system (as was found by the satisfaction analysis carried out for Västtrafik), but those that are negative towards the charge appear to be negative to a larger extent than those that are positive or neutral to the charge. This indicates that there exist a relationship (albeit weak) between the negative attitude to the public transportation system and the negative attitudes towards the charge. In order to detect statistically significant relationships and to find what impacts attitudes the most (when controlling for all other variables), a regression analysis is

carried out below. Due to the issues stated earlier[42], the results below are intended to give *indications* of the impact on the attitude to the charge.

5.2. RESULTS FROM THE REGRESSION ANALYSIS

In table 8 below are both the results from the OLS regression and the Ordered Probit (OP) regression. The results are quite robust between the models; all variables that are significant in the OP are also significant in the OLS[43], except for the variable *reduce* that is only significant in the OP. All directions of effects are the same for both models, except for *income group 2* (although, this variable is insignificant).

Table 8. Regression results, OLS and Ordered Probit (OP)

OPINION[1.)]	**OLS**	(SE)	**OP**	(SE)
Man	**0.134**	(0.102)	**0.028**	(0.110)
Age	**-0.006**	(0.004)	**-0.007**	(0.005)
High Education	**0.139**	(0.106)	**0.148**	(0.115)
No. Adults	**0.048**	(0.077)	**0.045**	(0.086)
No. Children	**0.207****	(0.099)	**0.204****	(0.093)
Job	**0.099**	(0.141)	**0.032**	(0.172)
Within cordon	**-0.061**	(0.102)	**-0.045**	(0.113)
Car	**-0.856*****	(0.305)	**-0.745*****	(0.278)
Other transport mode	**-0.300**	(0.250)	**-0.324**	(0.237)
Passtoll	**-0.315**	(0.292)	**-0.255**	(0.273)
Income group 2	**0.037**	(0.155)	**-0.015**	(0.174)
Incomer group 3	**0.055**	(0.142)	**0.107**	(0.158)
Income group 4	**0.023**	(0.158)	**0.105**	(0.177)
*Passtoll*car*	**0.322**	(0.313)	**0.199**	(0.296)
Revenue PT	**0.071**	(0.110)	**0.105**	(0.122)
Switch	**0.102***	(0.059)	**0.096***	(0.056)
Attitude PT	**0.010**	(0.050)	**0.051**	(0.048)
Complicated	**-0.058****	(0.025)	**-0.115*****	(0.031)
Unfair	**-0.227*****	(0.035)	**-0.211*****	(0.032)
Reduce	**0.043**	(0.058)	**0.146****	(0.065)
Exp. negative effects	**-0.245*****	(0.031)	**-0.256*****	(0.032)
Exp. positive effects	**0.488*****	(0.041)	**0.471*****	(0.043)
Environmental Interest	**0.118****	(0.065)	**0.128***	(0.074)
_cons	**2.960*****	(0.585)		
cut1 (cons)			**-0.483**	(0.584)
cut2 (cons)			**0.087**	(0.583)
cut3 (cons)			**0.571**	(0.586)
cut4 (cons)			**1.258**	(0.593)
cut5 (cons)			**2.162**	(0.600)
No. of observations	**642**		**642**	
R2	**0.5950**			
Log pseudolikelihood			**-666.781**	
Pseudo R2			**0.2991**	

***Significant at 1% level **Significant at 5% level & *Significant at 10% level

1.) 1-7 for OLS, 1-6 for OP (group 6 & 7 are merged into one group).

[42]The risk of having a simultaneous relationship between the variables.

[43] Not taking the level of significance into account

When the models are estimated without the perceived effects (see Appendix D), there are some socio-economic variables that are significant that loses significance once the attitudinal variables are included[44]. However, looking at the magnitudes in the OLS-regression, there are indications that the variable controlling for driving a car might be over-estimated (-1.46), which suggests that this variable could capture the effects of the variables based on perception[45]. This motivates using the full model for further analysis.

The models in table 8, confirms the hypothesis, socio-economic variables are not significant to any larger extent. However, number of children is significant, indicating that people with more children are more positive to the congestion charge. This is a bit unexpected since the statistical analysis revealed that there was little difference between the groups that had children and the group that did not. However, when controlling for other effects, it appears as if number of children has an impact on attitudes[46]. As far as I know, this has not been found in any earlier studies. For the transport related variables, driving a car is highly significant and negative in both regressions, indicating that car drivers are more negative towards the charge compared to an individual that mainly travels with public transportation, in line with findings in previous studies. This variable has the largest explanatory power in the OLS and also in the ME for the OP-regression, as can be seen below in table 9. Moreover, the variables *Switch, Complicated, Unfair, Expected positive effects*, *Expected negative effects*, *Reduce* and *Environmental interest* are more or less significant in both models. Out of these, the variables *Unfair, Expected positive effects* and *Expected negative effects* are highly significant in both regressions.

Individuals that believe that the effects of the scheme will be positive are more likely to be positive than individuals that do not, whiles individuals that stated that they will be personally affected negatively (*Expected negative effects*) are more likely to be negative than an individuals that do not.[47] Having the opinion that the congestion charging scheme is *unfair* increases the probability of being negative to the charge. There are also indications that respondents that believe that the system is complicated will also be more negative to the congestion charge, as suggested by earlier research. *Environmental interest* is significant (albeit at a 10% level), implying that individuals that are environmentally interested are more

[44] High education and car are significant in both, and living inside the cordon area in the OP.
[45] Also, a log-likelihood test between the restricted and the full model (OP) suggest the latter is a better fit.
[46] It should be noted that it might be the case that this variable is capturing an effect that is not controlled for, or simply that when controlling for other variables, families with children are more positive to congestion pricing.
[47] When running the regressions for the subgroup that only contains car drivers, the only variables that are significant are the Positve and Negative expected effects.

positive to the charge. This is in line with results from earlier studies, although the effect on the sample in Gothenburg does not appear to be as strong as found in other cities. The variable *reduce* is significant in the OP and indicate that those that believe that traffic has to be reduced due to climate and environmental reasons are on average more positive to the charge. The size of the variable is quite small in the OLS as well as when looking at the Marginal effects (ME) from the OP-regression, in table 9 below. This indicates that this variable has a small impact on the attitude towards the charge.

Table 9. Marginal Effects from the Ordered Probit

	ME(1)	**ME(2)**	**ME(3)**	**ME(4)**	**ME(5)**	**ME(6)**
Man	**-0.011**	0.002	0.003	0.004	0.002	**0.000**
Age	**0.003**	-0.000	-0.001	-0.001	-0.001	**-0.000**
High Education	**-0.059**	0.008	0.016	0.022	0.012	**0.002**
No. Adults	**-0.018**	0.002	0.005	0.007	0.004	**0.001**
No. Children	**-0.082****	0.011**	0.022**	0.030**	0.016**	**0.003***
Job	**-0.013**	0.002	0.004	0.005	0.003	**0.000**
Within cordon	**0.018**	-0.003	-0.005	-0.007	-0.004	**-0.001**
Car	**0.283*****	-0.008	-0.065***	-0.113***	-0.080**	**-0.018**
Other transport mode	**0.128**	-0.025	-0.036	-0.043*	-0.021*	**-0.003***
Pass toll	**0.101**	-0.011	-0.027	-0.038	-0.022	**-0.004**
Income 2	**0.006**	-0.001	-0.002	-0.002	-0.001	**-0.000**
Income 3	**-0.043**	0.005	0.012	0.016	0.009	**0.002**
Income 4	**-0.042**	0.005	0.012	0.016	0.009	**0.002**
*Pass toll*car*	**-0.079**	0.011	0.022	0.029	0.016	**0.003**
Revenue PT	**-0.042**	0.006	0.012	0.015	0.008	**0.001**
Switch	**-0.038***	0.005	0.011	0.014*	0.008*	**0.001**
Attitude PT	**-0.020**	0.003	0.006	0.007	0.004	**0.001**
Complicated	**0.046*****	-0.006***	-0.013***	-0.017***	-0.009***	**-0.002*****
Unfair	**0.084*****	-0.011***	-0.023***	-0.030***	-0.017***	**-0.003*****
Reduce	**-0.058****	0.008**	0.016**	0.021**	0.012**	**0.002***
Exp. negative effects	**0.102*****	-0.014***	-0.028***	-0.037***	-0.020***	**-0.003*****
Exp. positive effects	**-0.188*****	0.025***	0.052***	0.068***	0.038***	**0.006*****
Environmental Interest	**-0.051***	0.004	0.014*	0.018*	0.010*	**0.002**

***Significant at 1% level **Significant at 5% level & *Significant at 10% level

There are four variables of which the ME's are highly significant for all levels, *complicated, unfair, expected positive effects* and *expected negative effects.* These variables are thus affecting the probability of choosing all levels either positively or negatively. The results suggest that primarily going by *car* and the *expected effects* of the scheme (both positive and negative) have the largest effects on the probability of rating the charge a one, with *car* impacting the most. Furthermore, *child*, *reduce*, *complicated*, *unfair*, and *Environmental*

Interest are also significant for this level. Having more children decreases the probability of rating the scheme a 1, as well as considering that traffic needs to be *reduced* due to climate and environmental reasons. Having *positive expectations of effects* as well as stating to be environmentally interested, decreases the probability of rating the congestion charge a one whiles the relationship is the opposite for *expected negative effects*. Finding the scheme to be *unfair* increases the probability of rating it a 1 as well as believing it to be *complicated*.

The probability of rating the scheme a six or seven is mostly affected by the *expected positive effects* of the scheme, albeit all magnitudes are quite small for this level, most likely because there is not that much variation within this level (due to lack of observations). *Car* is not significant for the highest level, indicating that it is either more determinant for the negative ones or simply due to the lack of observations. Instead, mainly travelling by *other transportations mode* makes a respondent less likely to rate the scheme a six or seven, compared to travelling with public transportation[48].

Overall, the results from both analyses provide support for the hypothesis tested. Although, there are some limitations to the conclusions that can be drawn, the results still provides a lot of indications of why the majority of the sample are found to be negative to the charge, and can also give some clues to what the policy-makers should focus on in order to reach acceptance for the implementation.

PART 6. CONCLUSIONS & POLICY IMPLICATIONS

The results from the analyses are in line with earlier results; socio-economic characteristics are in general not found to impact attitudes when controlling for factors based on perception. The only significant variable is the number of children in a family, indicating that having an additional child increases the probability of being positive to the charge. The value of time might be higher for a family with children, which implies that paying a charge for travelling quicker is valued more for this group[49]. Another possible explanation is that individuals with children are more concerned with the environment that their children will grow up in, implying that less traffic and less pollution are more important for this group. As found in most previous studies, respondents that are primarily car drivers are more negative than individuals using public transportation. This result is robust over the different specifications and appears to be one of the major determinants of attitudes for the sample. Car drivers are

[48] However, the magnitude is quite small and the variable is only significant at a 10% level.
[49] The sample consists of families with 0, 1 or 2 children, indicating that the significance is most likely driven by the change from having no children to having any.

the ones that will be most affected by the cost of the scheme since they will have to pay for something that was free before. Gaunt et al. (2007) found that car drivers tend to focus more on the costs and less on the benefits of the system, and De Borger & Proost (2012) find it to be due to the drivers' idiosyncratic uncertainty about their willingness-to-pay for driving. This implies that drivers could become positive, or at least less negative, *ex-post* when they are forced to make the decision if it is worth the cost to continue driving or not.

The expectations about the effect of the charge are in general found to be quite low, and few believe that congestion will decrease after implementation. This indicates that people do not believe that the system will be able to handle the main problem it is intended to solve. Expected effects are found to be one of the major determinants of attitudes in Gothenburg, providing evidence for the first of Jones' (1995) principles. This is also related to the concept of familiarity and "objective" effects. It appears as the residents of Gothenburg are uncertain about the effects of the charge, and/or believe that a net cost will be inferred on them, which is likely to have increased the negative attitudes. Moreover, there has been little focus from the policy-makers side on the "congestion solving" or dealing with the pollution problems of NO_2-emissions and PM_{10}, but rather on the financing of the West Link. This might have resulted in that the public consider the congestion charge more as a means to an end rather than an end in itself[50]. Furthermore, no "branding" has been done of the charge in Gothenburg, which is likely to have increased the uncertainty of the effects of the scheme, since people might not think of the charge as improving the environment or improving the traffic situation, but rather as "just another tax" to be levied upon them. This can also be an indication of having provided the public with too little information, which has been suggested by earlier studies to increase opposition. This is supported by the fact that the first reports of the traffic situation after implementation suggest that congestion has decreased and there has been an increase in traffic flow, something that the larger part of the sample did not expect. If the public has not been provided with sufficient information about the effects of the scheme *ex-ante*, which was suggested by the results from City of Gothenburg's study, this is likely to have had a negative impact on the expectations of the effects, which in turn might have increased opposition.

[50] However, it should be reminded that the schemes implemented in Norway were implemented with the primary aim to raise revenues, and these schemes are more or less accepted today (see Treitvik 2003).

When it comes to revenue allocation, it appears as if it had little impact on the attitude to the charge for the respondents in Gothenburg[51]. This goes against the sixth of Jones' (1995) principles that imply that the investment in public transportation decreases opposition. From the statistics, it can be shown that most respondents considered that the investment in public transportation is a reasonable allocation, but that most of the negative respondents believed that the revenues should be allocated to building and maintaining roads. This suggests that the motorist might consider the charge to be unfair due to the choice of allocation; 80% of the negative share of the sample stated that they considered the charge to be unfair. This variable is highly significant in all of the regression and if found to increase the probability of being negative, an indication that the public does not consider equity issues to have been addressed. Although, it is likely that the motorists are considering that the charge is unfair due to the fact that they have to pay for investments in public transportation (that they might not use themselves). However, the charge is included in a package that, not only include investments in public transportation, but also road investments, which has been found to increase acceptance in previous studies. This implies that if the investment in the West Link is not the reason for rating the charge unfair, the reasons remain unclear. One possible explanation is that it could be a sign of "reactance", that the respondents (and especially the motorists) find the decision-making process to be unfair, rather than the charge in itself, due to the fact that they have not been allowed to participate in the process.

Although, the majority of the negative share of the sample did not believe that the congestion charging scheme would be complicated, the share of the negative respondents is considerably less than for the positive share, and the variable is significant in all of the regressions. The marginal effects from the Ordered Probit-regression reveal that the effect was larger for the probability of being negative (level 1) than for the probability of being positive (level 6)[52]. This indicates that looking at the sample as a whole, the fourth of Jones' (1995) principles of designing a simple scheme has been addressed. But the respondents that stated it to be complicated appear to be more negative than those that did not, in line with the principle and previous research.

It is likely that with time, the people of Gothenburg will become more positive to the congestion charge. The reason in shift could be that they find that the effects to be better than expected, or/and that the car drivers were prepared to pay more than they believed *ex-ante*

[51] It should be noted that it could be the case that the revenue allocation is more important for positive individuals, but that the variation was too little in this group in order to reveal such tendencies.
[52] Which, most likely is due to the difference in observation levels

and/or simply because of cognitive dissonance; accepting it because it is a fact. Nevertheless, in order to foster acceptance, policy-makers should focus on spreading information about the positive effects of the scheme (i.e. less congestion and decrease in pollution levels) and continuously update the public of these effects as a way of reaching acceptance. It will be left to future research to tell if the negative attitudes in Gothenburg will change *ex-post*. If the result from the referendum will determine the existence of the charge, there is a risk that Gothenburg will follow Edinburgh as the second city that failed to permanently implement the charge. However, it might be the case that the public's experience of the charge has made the scheme accepted, and that the strategy of postponing the question of a referendum is a tactic from the politicians in order to achieve acceptance in Gothenburg in the same way as in Stockholm. However, due to insufficient provision of information and the fact that there has been no "branding", as well as the low trust in the public transportation system, the likelihood of success is smaller in Gothenburg than it was in Stockholm.

In a larger perspective, the results from this study imply that it is possible to reduce hurdles in implementation of economic policies, such as congestion pricing. If addressing the different principles of implementation (Jones 1995) and using the findings from this study and previous studies, the policy-makers can do a great deal to increase acceptance. This should create stronger incentives for policy-makers to implement efficient policies aimed at reducing negative externalities from traffic in the future.

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APPENDIX A.

CHALMERS | GÖTEBORGS UNIVERSITET

ENKÄT OM INFÖRANDET AV TRÄNGSELSKATT I GÖTEBORG

Först några frågor om dig själv

1. Är du man eller kvinna?

1 ☐ Man 2 ☐ Kvinna

2. Hur gammal är du? ☐☐ år

3. Hur många personer ingår i ditt hushåll?
Ange antal personer i varje åldersintervall. ***Räkna även med dig själv.***

☐ st 0-6 år ☐ st 7-12 år ☐ st 13-17 år ☐ st 18-64 år ☐ st 65-74 år ☐ st 75- år

4. I vilken typ av bostad bor du?

1 ☐ Flerfamiljshus, hyresrätt 2 ☐ Flerfamiljshus, bostadsrätt 3 ☐ Radhus/villa/enfamiljshus

5. Var bor du? *Kryssa för ett alternativ*

Stadsdel i Göteborgs kommun

01 ☐ Centrum
02 ☐ Majorna-Linné
03 ☐ Lundby
04 ☐ Norra Hisingen
05 ☐ Västra Hisingen
06 ☐ Askim-Frölunda-Högsbo
07 ☐ Västra Göteborg
08 ☐ Angered
09 ☐ Örgryte-Härlanda
10 ☐ Östra Göteborg

Annan kommun

11 ☐ Ale
12 ☐ Alingsås
13 ☐ Härryda
14 ☐ Kungsbacka
15 ☐ Kungälv
16 ☐ Lerum
17 ☐ Mölndal
18 ☐ Partille
19 ☐ Stenungsund
20 ☐ Öckerö
21 ☐ Annan ort

6. Har du körkort för bil?

1 ☐ Ja 2 ☐ Nej

7. Har du tillgång till tjänstebil?

1 ☐ Ja 2 ☐ Nej

8. Kan du i allmänhet använda dig av bil när du behöver?

1 ☐ Ja, alltid 2 ☐ Ja, för det mesta 3 ☐ Ja, ibland 4 ☐ Nej, sällan 5 ☐ Nej, aldrig

9. Har du något kort du kan använda för resor med kollektivtrafiken? *Kryssa ett eller flera alternativ*

1 ☐ Nej 2 ☐ Ja, periodkort (även skol- och seniorkort) 3 ☐ Ja, annat

10. Vilken är din högsta utbildning? *Kryssa för ett alternativ*

01 ☐ Folkskola, grundskola eller motsvarande
02 ☐ Gymnasial utbildning högst 2-årig
03 ☐ Gymnasial utbildning 3 år
11 ☐ Eftergymnasial utbildning kortare än 3 år
12 ☐ Eftergymnasial utbildning 3 år eller längre

11. Vilken är din huvudsakliga sysselsättning? *Kryssa för ett alternativ*

01 ☐ Förvärvsarbetar
02 ☐ Studerar
03 ☐ Sjukskriven
13 ☐ Föräldraledig
11 ☐ Arbetssökande
12 ☐ Pensionär
13 ☐ Annat

12. Ungefär hur stor är ditt hushålls totala månadsinkomst före skatt?

☐ kr/mån. ☐ Vet ej/vill ej svara

13. Hur många i personer i hushållet bidrar till den gemensamma månadsinkomsten? *Bortse från eventuella barn- och studiebidrag.*

☐ personer.

14. Vart åker du normalt när du åker till arbete eller skola? *Kryssa för ett alternativ.*

Stadsdel i Göteborgs kommun

01 ☐ Centrum
02 ☐ Majorna-Linné
03 ☐ Lundby
04 ☐ Norra Hisingen
05 ☐ Västra Hisingen
06 ☐ Askim-Frölunda-Högsbo
07 ☐ Västra Göteborg
08 ☐ Angered
09 ☐ Örgryte-Härlanda
10 ☐ Östra Göteborg

Annan kommun

11 ☐ Ale
12 ☐ Alingsås
13 ☐ Härryda
14 ☐ Kungsbacka
15 ☐ Kungälv
16 ☐ Lerum
17 ☐ Mölndal
18 ☐ Partille
19 ☐ Stenungsund
20 ☐ Öckerö
21 ☐ Annan, nämligen:

Några frågor om ditt resande

15. Vilket är det huvudsakliga färdsättet för din resa till arbete/studier vid den här tiden på året? *Med huvudsakligt färdsätt menar vi det färdsätt du använde för längsta delen av din resa*

- ☐ Kollektivtrafik
- ☐ Cykel/elcykel
- ☐ Bil
- ☐ Moped/MC
- ☐ Till fots
- ☐ Annat färdsätt

16. Ungefär vilken tid brukar du normalt sett lämna hemmet för att åka till din arbets-/studieplats och vilken tid är du framme? *Fyll i tiderna så att om du lämnar hemmet kl halv åtta på morgonen skriver du 0730.*

Lämnar hemmet: ☐☐☐☐ *Ankommer till arbete/studieplats:* ☐☐☐☐

17. Ungefär vilken tid brukar du normalt sett lämna din arbets-/studieplats och vilken tid är du hemma?

Lämnar arbete/studieplats: ☐☐☐☐ *Kommer hem:* ☐☐☐☐

18. Hur ofta åker du normalt kollektivtrafik till din arbets-/studieplats vid den här tiden på året?
Ange endast ett färdsätt per dag du åker till din arbets-/studieplats

- ☐ 7 dagar/vecka
- ☐ 6 dagar/vecka
- ☐ 5 dagar/vecka
- ☐ 4 dagar/vecka
- ☐ 3 dagar/vecka
- ☐ 2 dagar/vecka
- ☐ 1 dag/vecka
- ☐ Mer sällan
- ☐ Aldrig

19. Hur ofta åker du normalt cykel/elcykel till din arbets-/studieplats vid den här tiden på året?
Ange endast ett färdsätt per dag du åker till din arbets-/studieplats

- ☐ 7 dagar/vecka
- ☐ 6 dagar/vecka
- ☐ 5 dagar/vecka
- ☐ 4 dagar/vecka
- ☐ 3 dagar/vecka
- ☐ 2 dagar/vecka
- ☐ 1 dag/vecka
- ☐ Mer sällan
- ☐ Aldrig

20. Hur ofta åker du normalt bil till din arbets-/studieplats vid den här tiden på året?
Ange endast ett färdsätt per dag du åker till din arbets-/studieplats

- ☐ 7 dagar/vecka
- ☐ 6 dagar/vecka
- ☐ 5 dagar/vecka
- ☐ 4 dagar/vecka
- ☐ 3 dagar/vecka
- ☐ 2 dagar/vecka
- ☐ 1 dag/vecka
- ☐ Mer sällan
- ☐ Aldrig

21. Hur ofta åker du normalt moped/MC till din arbets-/studieplats vid den här tiden på året?
Ange endast ett färdsätt per dag du åker till din arbets-/studieplats

☐ 7 dagar/vecka ☐ 4 dagar/vecka ☐ 1 dag/vecka
☐ 6 dagar/vecka ☐ 3 dagar/vecka ☐ Mer sällan
☐ 5 dagar/vecka ☐ 2 dagar/vecka ☐ Aldrig

22. Hur ofta tar du dig normalt till fots till din arbets-/studieplats vid den här tiden på året?
Ange endast ett färdsätt per dag du åker till din arbets-/studieplats

☐ 7 dagar/vecka ☐ 4 dagar/vecka ☐ 1 dag/vecka
☐ 6 dagar/vecka ☐ 3 dagar/vecka ☐ Mer sällan
☐ 5 dagar/vecka ☐ 2 dagar/vecka ☐ Aldrig

23. Hur ofta passar du på att göra andra ärenden i samband med dina resor till/från arbetet? *Exempelvis hämta på dagis, skola, handla mat o.s.v.*

Aldrig ☐ ☐ ☐ ☐ ☐ ☐ ☐ Varje dag

24. Om du ibland tar bilen till arbete/studier, vilka möjligheter har du att byta färdmedel?

	Mycket små möjligheter						Mycket goda möjligheter
	1	2	3	4	5	6	7
Från bil till kollektivtrafik	☐	☐	☐	☐	☐	☐	☐
Från bil till cykel	☐	☐	☐	☐	☐	☐	☐

25. Passerar du i dagsläget en betalstation (trängselskattegräns) på vägen till arbete/studier?

1 ☐ Ja 2 ☐ Nej 3 ☐ Vet ej

Frågor om ditt arbete/dina studier

26. Hur många dagar per vecka arbetar du normalt?

☐ 7 dagar/vecka ☐ 4 dagar/vecka ☐ 1 dag/vecka
☐ 6 dagar/vecka ☐ 3 dagar/vecka ☐ Mer sällan
☐ 5 dagar/vecka ☐ 2 dagar/vecka ☐ Aldrig

27. Om du arbetar/studerar, hur många timmar per vecka arbetar eller studerar du vanligtvis?

☐☐ timmar per vecka

28. Har du möjlighet att själv bestämma hur dags du ska vara på din arbets-/studieplats?

1 ☐ Ja, alltid 2 ☐ Ja, för det mesta 3 ☐ Ja, ibland 4 ☐ Nej, sällan 5 ☐ Nej, aldrig

29. Har du möjlighet att (helt eller delvis) arbeta/studera på distans från hemmet?

1 ☐ Ja 2 ☐ Nej

30. Om ja, hur många dagar per vecka brukar du vanligtvis arbeta/studera på distans?

Antal ☐ dagar:

Frågor om miljö och välbefinnande

31. Hur intresserad är du i allmänhet av miljöfrågor?

	1	2	3	4	5	6	7	
Inte alls intresserad	☐	☐	☐	☐	☐	☐	☐	Mycket intresserad

32. Hur nöjd är du på det hela taget med det liv du lever?

	1	2	3	4	5	6	7	
Inte alls nöjd	☐	☐	☐	☐	☐	☐	☐	Mycket nöjd

33. Hur känner du dig i allmänhet?

	1	2	3	4	5	6	7	
Nedstämd	☐	☐	☐	☐	☐	☐	☐	På gott humör

34. Om du tänker efter hur din tid fördelas mellan bl.a. förvärvsarbete, hemarbete, restid, sömn, måltider, motion, umgänge med familj/vänner och annan fritid. Hur nöjd är du då med fördelningen av din tid under en vanlig vecka?

	1	2	3	4	5	6	7	
Inte alls nöjd	☐	☐	☐	☐	☐	☐	☐	Mycket nöjd

35. Om du tänker på ditt liv i stort, upplever du obehag för att du har svårt att hinna med allt som behöver göras?

	1	2	3	4	5	6	7	
Liten utsträckning	☐	☐	☐	☐	☐	☐	☐	Stor utsträckning

Frågor om din nuvarande resesituation

36. Tänk på ditt vardagliga resande under den <u>senaste månaden</u> som helhet (t.ex. resor du gjort till affärer, till fritidsaktiviteter, till restauranger, till arbete/skola och alla andra resor som du vanligtvis gör). Vilken är din sammantagna upplevelse av dessa resor?

	-3	-2	-1	0	1	2	3	
Mycket stressad	☐	☐	☐	☐	☐	☐	☐	Mycket avslappnad
Mycket uttråkad	☐	☐	☐	☐	☐	☐	☐	Mycket entusiastisk
Mina resor fungerade mycket dåligt	☐	☐	☐	☐	☐	☐	☐	Mina resor fungerade mycket bra
Mycket trött	☐	☐	☐	☐	☐	☐	☐	Mycket pigg
Mycket låg standard	☐	☐	☐	☐	☐	☐	☐	Mycket hög standard
Mycket orolig	☐	☐	☐	☐	☐	☐	☐	Mycket lugn
Mina resor var de sämsta tänkbara	☐	☐	☐	☐	☐	☐	☐	Mina resor var de bästa tänkbara
Mycket jäktad	☐	☐	☐	☐	☐	☐	☐	Mycket avspänd
Mycket utled	☐	☐	☐	☐	☐	☐	☐	Mycket begeistrad

37. Hur nöjd är du som helhet med ditt vardagliga resande under den senaste månaden?

Mycket missnöjd	☐	☐	☐	☐	☐	☐	☐	Mycket nöjd

38. Nedan återfinns några påståenden om olika färdmedel, ange om du håller med eller inte.

	Håller inte alls med						Håller helt med
	1	2	3	4	5	6	7
Bilen ger människor frihet.	☐	☐	☐	☐	☐	☐	☐
På sikt måste bilismen minska av miljö- och klimatskäl.	☐	☐	☐	☐	☐	☐	☐
Man kan lita på att kollektivtrafiken alltid kommer i tid.	☐	☐	☐	☐	☐	☐	☐
Kollektivtrafiken är oftast ett smidigt sätt för mig att färdas.	☐	☐	☐	☐	☐	☐	☐
Det är bekvämt att åka kollektivt.	☐	☐	☐	☐	☐	☐	☐

39. Händer det att du samåker med bil till arbete/studier?

1 ☐ Ja, samåker med person/er som inte bor i det egna hushållet
2 ☐ Ja, men samåker enbart med person/er som bor i det egna hushållet
3 ☐ Nej

Frågor om din inställning till trängselskatten i Göteborg

40. Tycker du att trängselskatten är ett bra eller dåligt politiskt beslut?

	1	2	3	4	5	6	7	
Mycket dåligt	☐	☐	☐	☐	☐	☐	☐	Mycket bra

41. Nedan återfinns några olika påståenden om vilka effekter trängselskatten kan komma att få. Vi vill att du svarar genom att ange om du håller med om nedan påståenden.

	Håller inte alls med 1	2	3	4	5	6	Håller helt med 7
Trängselskatten kommer att leda till minskad trängsel innanför betalstationerna.	☐	☐	☐	☐	☐	☐	☐
Det kommer att vara krångligt att betala trängselskatt.	☐	☐	☐	☐	☐	☐	☐
Trängselskatten kommer att förbättra trafiksituationen i Göteborg.	☐	☐	☐	☐	☐	☐	☐
Buller och luftföroreningar kommer att minska när trängselskatten införs.	☐	☐	☐	☐	☐	☐	☐
Trängselskatten är orättvis.	☐	☐	☐	☐	☐	☐	☐
Det kommer att bli enklare för mig att ta mig fram när trängselskatten är införd.	☐	☐	☐	☐	☐	☐	☐
Trängselskatten kommer att leda till att jag får det sämre ekonomiskt.	☐	☐	☐	☐	☐	☐	☐
Trängselskatten kommer att påverka min livskvalitet negativt.	☐	☐	☐	☐	☐	☐	☐

42. Intäkterna från en trängselskatt kan användas till olika ändamål. Vi undrar nu vilka av nedanstående alternativ du främst tycker att pengarna borde användas till:

	Bör skatten ej användas till						Bör skatten användas till
	1	2	3	4	5	6	7
Finansiera satsningar på kollektivtrafiken	☐	☐	☐	☐	☐	☐	☐
Bygga och underhålla vägar	☐	☐	☐	☐	☐	☐	☐
Sänka skatten på bensin och diesel	☐	☐	☐	☐	☐	☐	☐
Finansiera vård och skola	☐	☐	☐	☐	☐	☐	☐
Sänka skatter för medborgarna	☐	☐	☐	☐	☐	☐	☐

43. Är det viktigt för dig vad skatteintäkterna används till? Givet att intäkterna används på det sätt du angett ovan, skulle det då påverka din inställning till om trängselskatten är ett bra eller dåligt politiskt beslut?

	1	2	3	4	5	6	7	
Mycket negativ	☐	☐	☐	☐	☐	☐	☐	Mycket positiv

Vänd blad →

Frågor till dig som har tillgång till bil

44. Om du i dagsläget använder bil som ditt huvudsakliga färdsätt, skulle det vara praktiskt möjligt för dig att börja använda andra transportalternativ som kollektivtrafik eller cykel för dina dagliga resor?

	1	2	3	4	5	6	7	
Nej, inte alls	☐	☐	☐	☐	☐	☐	☐	Ja, utan problem

45. Tror du att du kommer resa mindre (i kilometer räknat) med bil efter införandet av trängselskatten?

	1	2	3	4	5	6	7	
Ja, jag kommer att resa mycket mindre	☐	☐	☐	☐	☐	☐	☐	Nej, jag kommer resa mycket mer

46. Tror du att dina vanliga bilresor kommer ta kortare tid på grund av mindre bilköer efter införandet av trängselskatten?

☐ Ja, mycket kortare tid
☐ Ja, något kortare tid
☐ Nej, lika lång tid

47. Om det finns alternativa färdvägar som är längre men där du slipper betala trängselskatt – skulle du då välja dessa?

	1	2	3	4	5	6	7	
Nej, aldrig	☐	☐	☐	☐	☐	☐	☐	Ja, alltid

48. Tror du att andra kommer att välja dessa avgiftsfria men längre alternativ?

	1	2	3	4	5	6	7	
Nej, aldrig	☐	☐	☐	☐	☐	☐	☐	Ja, alltid

49. Föreställ dig att trängselskatten är införd. Ange den summa som motsvarar det maximala belopp som du kan tänka dig att betala <u>per dag i trängselskatt</u> för att fortfarande ta bilen till och från jobbet. Försök ställa kostnaden i relation till vad du nu använder motsvarande belopp till och vad du eventuellt skulle behöva avstå ifrån. Tänk också på att det även kostar att använda kollektiva färdmedel. Den maximala trängselskatten för en dag är 60 kronor.

Jag kan maximalt tänka mig att betala ☐☐☐☐ kr/dag i trängselskatt

APPENDIX B.

Table B1. The distribution of districts that the respondents live in or work in

District	Live in	Work in
Centrum (1)	7.39%	18.90%
Majorna-Linné (1)	6.03%	2.83%
Lundby (1)	5.91%	3.57%
Norra Hisingen (1)	8.87%	3.88%
Västra Hisingen (1)	8.37%	9.85%
Askim-Frölunda-Högsbo (1)	10.22%	4.37%
Västra Göteborg (1)	5.36%	3.20%
Angered (1)	3.76%	1.66%
Örgryte-Härlanda (1)	8.19%	2.40%
Östra Göteborg (1)	4.99%	3.51%
Ale (2)	1.42%	0.74%
Alingsås (2)	6.71%	2.96%
Härryda (2)	0.55%	1.23%
Kungsbacka (2)	0.25%	1.11%
Kungälv (2)	3.26%	2.03%
Lerum (2)	4.50%	1.35%
Mölndal (2)	5.85%	5.85%
Partille (2)	2.46%	1.35%
Stenungsund (2)	1.91%	0.86%
Öckerö (2)	0.74%	0.49%
Other district (2)	2.09%	7.08%
Total	98.8%	79%

n=1604 for live in. n= 1283 for destination Note. (1) means that the district lies within Gothenburg municipality while (2) means that the district is an own municipality.

Graph B1. Income Groups

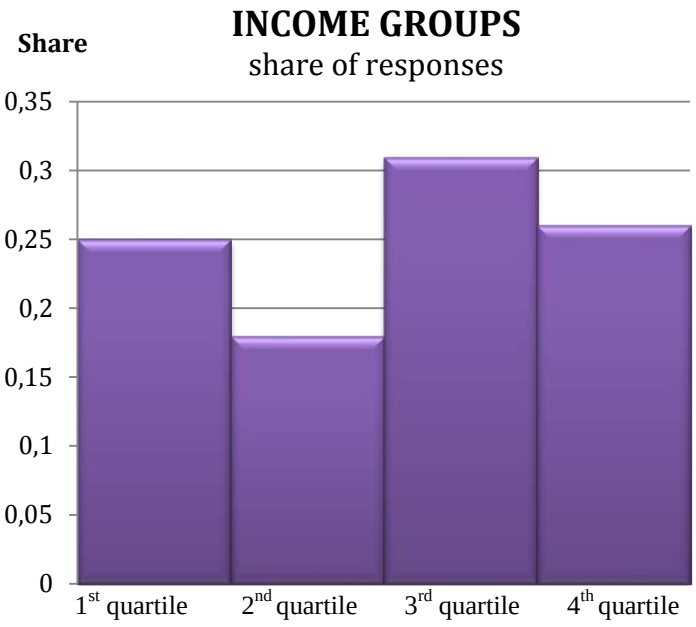

Table B2. Statistics for the different municipalities represented in the sample

MUNICIPALITY	**Flat** *statistics* (2011)	**Flat** *sample*	**Monthly income** *statistics* (2011)	**Monthly income**[1] *sample*	**Highly educated**[2] *statistics* (2011)	**Highly educated**[3] *sample*
Gothenburg	80.1%	49.8%	20,208	46,400	32.3%	32.3%
Ale	37.5%	26%	20,408	26,100	16.4%	30.4%
Alingsås	43.9%	31.2%	20,067	34,200	22.5%	23.9%
Härryda	25.1%	0%	23,858	21,300	29.3%	33.3%
Kungsbacka	24%	0%	24,267	38,500	26.6%	75%
Kungälv	39.2%	21%	21,967	26,800	21.2%	30.2%
Lerum	20.9%	3%	22,933	48,400	26.1%	45.2%
Mölndal	53.1%	44%	22,742	46,300	32%	46.3%
Partille	52.3%	10%	22,600	57,800	28.8%	32.5%
Stenungsund	33.1%	8%	22,250	45,600	21.2%	41.9%
Öckerö	10.3%	3%	22,067	70,271	20.1%	16.7%

Source: STATISTICS SWEDEN. 1. This is the household income divide by the number of contributors to the household budget. 2. & 3. Highly educated means that the person has at least finished 3 years of post-secondary schooling, sample consists of population in the ages 25-64 years

Table B3. City districts, statistics and sample averages

CITY DISTRICT	**Pop.** *Statistic*[1] (2011)	**Pop.** *Sample*	**Families with ≥1 car** *statistics* (2010)	**Flat** *statistics* (2011)	**Flat** *sample*	**Monthly income** *statistcs* (2010)	**Monthly income**[2] *sample*	**Highly educated**[3] *statistics* (2011)	**Highly educated**[3] *sample*
Angered	9.3%	5.4%	37.6%	79.6%	44%	15,600	31,600	13.8%	26.2%
Östra Göteborg	8.7%	7.2%	29.2%	88.3%	41%	15,800	35,000	19.8%	38.3%
Örgryte-Härlanda	10.8%	11.9%	36.6%	87.5%	62%	24,900	51,600	41.3%	49.6%
Centrum	11.2%	10.7%	27.5%	99.9%	89%	24,600	64,700	46.7%	49%
Majorna-Linné	11.9%	8.73%	29.3%	98.0%	89%	23,500	38,000	44.4%	59%
Askim-Frölunda-Högsbo	10.6%	14.8%	45.5%	74.5%	35%	26,100	43,400	34.5%	44.6%
Västra Göteborg	9.9%	7.8%	57.4%	39.9%	18%	29,200	40,300	34.6%	35.6%
Västra Hisingen	9.8%	12.1%	48.5%	64.5%	33%	23,400	40,900	22.4%	34.6%
Lundby	8.4%	8.56%	36.1%	85.8%	50%	22,500	39,500	30.4%	33.3%
Norra Hisingen	9.1%	12.8%	53.1%	69.1%	37.5%	23,100	61,700	19.6%	30.6%
Non specified	0.3%	-	11.6%	-	-	-	-	8.0%	-
TOTAL/AVERAGE	**100%**	**100%**	**38.4%**	**81.5%**	**49.8%**	**23,000**	**44,670**	**32.3%**	**40.1%**

Source: Gothenburg Municipality online database (Statistik Göteborg), 1.Measured as the total number of inhabitants in the district divided by the total number of inhabitants in all of the districts included. 2. This is the household income divided by the number of contributors to the household budget. 3. Measured as the share with 3 or more years of post-secondary schooling

Table B4. Transportation mode Gothenburg

TRANSPORTATION MODE *Gothenburg area*	**2011 & 2012**
Car	44%
Public transportation	26%
Bicycle	6%
By foot	25%

Source: Trafikkontoret Göteborgs stad

APPENDIX C.

FACTOR ANALYSIS STATEMENTS (S1, S3, S4, S6, S7 & S8)

Table C1. Correlation matrix between statements S1-S8

	s1	s2	s3	s4	s5	s6	s7	s8
s1	1.0000							
s2	-0.1806	1.0000						
s3	0.7416	-0.1998	1.0000					
s4	0.7029	-0.2094	0.8078	1.0000				
s5	-0.1976	0.2694	-0.2829	-0.2434	1.0000			
s6	0.4861	-0.1625	0.5649	0.5188	-0.2089	1.0000		
s7	-0.2736	0.2258	-0.3296	-0.2734	0.3543	-0.2051	1.0000	
s8	-0.3282	0.3150	-0.4240	-0.3658	0.3808	-0.3139	0.7102	1.0000

Table C2. Step 1, factor analysis for S1, S3, S4, S6, S7 & S8

Factor analysis/correlation			Number of obs = 1596	
Method: principal factors			Retained factors = 2	
Rotation: (unrotated)			Number of params = 11	
Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	3.42350	2.57243	0.8624	0.8624
Factor2	0.85106	0.86292	0.2144	1.0768
Factor3	-0.01186	0.04295	-0.0030	1.0738
Factor4	-0.05481	0.03175	-0.0138	1.0600
Factor5	-0.08657	0.06493	-0.0218	1.0382
Factor6	-0.15150	.	-0.0382	1.0000

LR test: independent vs. saturated: chi2(15) = 6733.95 Prob>chi2 = 0.0000

Table C3. Factor loadings (pattern matrix) and unique variances, Statements S1,S3, S4,S6, S7 & S8

Variable	Factor1	Factor2	Uniqueness
s1	0.7909	0.2582	0.3078
s3	0.8991	0.2243	0.1414
s4	0.8420	0.2729	0.2165
s6	0.6665	0.1387	0.5365
s7	-0.6070	0.5897	0.2839
s8	-0.6841	0.5410	0.2393

Table C4. Step 3, factor analysis, S1, S3, S4, S6, S7 & S8

Factor analysis/correlation Number of obs = 1596

Method: principal factors Retained factors = 2

Rotation: orthogonal varimax (Kaiser on) Number of params = 11

Factor	Variance	Difference	Proportion	Cumulative
Factor1	2.69534	1.11612	0.6790	0.6790
Factor2	1.57922	.	0.3978	1.0768

LR test: independent vs. saturated: chi2(15) = 6733.95 Prob>chi2 = 0.0000

Table C5. Rotated factor loadings (pattern matrix) and unique variances, S1, S3, S4, S6, S7 & S8

Variable	Factor1	Factor2	Uniqueness
s1	0.8070		0.3078
s3	0.8806		0.1414
s4	0.8581		0.2165
s6	0.6381		0.5365
s7		0.8222	0.2839
s8		0.8221	0.2393

Table C6. Factor rotation matrix (S1, S3, S4, S6, S7 & S8)

	Factor1	Factor2
Factor1	0.8467	'-0.5320
Factor2	0.5320	0.8467

Table C7. Scoring coefficients (method = regression; based on varimax rotated factors)

Variable	Factor1	Factor2
s1	0.21443	0.05629
s3	0.48476	0.04584
s4	0.31795	0.08985
s6	0.09578	0.00340
s7	0.12984	0.46257
s8	0.10309	0.53465

Table C8. Alpha test (S1, S3, S4, S6, S7 & S8)

Test scale = mean(unstandardized items)	
Reversed items: s7 s8	
Average interitem covariance:	1.750831
Number of items in the scale:	6
Scale reliability coefficient:	0.8302

FACTOR ANALYSIS ATTITUDE TO PUBLIC TRANSPORTATION

Table C9. Correlation matrix for attitude to the public transportation system variables

	Trust in PT	Travel smoothly	Travel comfortably
Trust in PT	1.0000		
Travel smoothly	0.4634	1.0000	
Travel comfortably	0.4679	0.7161	1.0000

Table C10. Step 1, factor analysis, attitudes to the public transportation system

Factor analysis/correlation	Number of obs =		1596	
Method: principal factors	Retained factors =		1	
Rotation: (unrotated)	Number of params =		3	
Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	1.78404	1.85205	1.1434	1.1434
Factor2	-0.06801	0.08779	-0.0436	1.0999
Factor3	-0.15580	.	-0.0999	1.0000

LR test: independent vs. saturated: chi2(3) = 2072.77 Prob>chi2 = 0.0000

Table C11. Factor loadings (pattern matrix) and unique variances

Variable	Factor1	Uniqueness
Travel comfortably	0.8433	0.2888
Travel smoothly	0.8324	0.3072
Trust in PT	0.6165	0.6200

Table C12. Step 3, factor analysis

Factor analysis/correlation		Number of obs = 1596		
Method: principal factors		Retained factors = 1		
Rotation: orthogonal varimax (Kaiser on)		Number of params = 3		
Factor	Variance	Difference	Proportion	Cumulative
Factor1	1.78404	.	1.1434	1.1434

LR test: independent vs. saturated: chi2(3) = 2072.78 Prob>chi2 = 0.0000

Table C13. Rotated factor loadings (pattern matrix) and variances

Variable	Factor1	Uniqueness
Travel comfortably	0.8433	0.2888
Travel smoothly	0.8324	0.3072
Trust in PT	0.6165	0.6200

(blanks represent abs(loading)<.5)

Table C14. Factor rotation matrix

	Factor1
Factor1	1.0000

Table C15. Scoring coefficients (method = regression; based on varimax rotated factors)

Variable	Factor1
Travel comfortably	0.44118
Travel smoothly	0.40687
Trust in PT	0.16119

Table C16. Alpha test (Travel comfortably, Travel smoothly & Trust in PT)

Test scale = mean(unstandardized items)	
Average interitem covariance:	1.716634
Number of items in the scale:	3
Scale reliability coefficient:	0.7881

APPENDIX D.

Table D1. The distribution of responses to the statements, measured in percentage (%) of the sample

ALTERNATIVES / **STATEMENTS**	**1** *"Do not agree at all"*	**2**	**3**	**4**	**5**	**6**	**7** *"Agree completely"*
S1. Less congestion	24.1%	17.9%	13.0%	14.2%	14.8%	6.8%	5.9%
S2. Complicated	20.9%	21.4%	13.2%	15.2%	7.9%	7.0%	11.0%
S3. Better traffic	28.6%	18.7%	14.2%	15.0%	11.9%	5.0%	4.2%
S4. Less noise & poll.	24.1%	18.6%	15.4%	16.8%	12.1%	5.9%	3.7%
S5. Unfair	9.2%	4.7%	4.7%	9.6%	7.8%	12.6%	48.3%
S6. Easier get around	43.8%	16.9%	8.7%	14.5%	5.4%	3.3%	3.6%
S7. Worse economic	16.9%	8.1%	5.8%	11.0%	7.5%	10.7%	37.1%
S8. Worse lifequality	20.8%	10.0%	7.8%	15.0%	8.4%	7.6%	27.6%

n=1596

Table D2. Apporpritaness of different revenue allocations

ALTERNATIVES / REVENUE ALLOCATION	1 *"Should not be the allocation"*	2	3	4	5	6	7 *"Should be the allocation"*
Public Transportation	15.2%	5.6%	7.0%	10.9%	11.2%	15.1%	35.0%
Roads	5.9%	2.6%	3.6%	9.8%	11.0%	19.4%	47.6%
Lower taxes on fuel	38.0%	9.3%	6.0%	10.0%	6.3%	6.4%	24.1%
Health and Education	39.4%	8.6%	4.9%	7.3%	5.4%	7.8%	26.7%
Lower taxes	51.0%	11.1%	4.7%	8.8%	4.1%	3.9%	16.4%

Table D10. OLS and Ordered Probit (OP) w/o variables based on perception

	OLS	(SE)	**OP**	(SE)
Man	**0.125**	(0.139)	**0.046**	(0.094)
Age	**-0.002**	(0.006)	**-0.001**	(0.004)
High Education	**0.482*** **	(0.143)	**0.335*** **	(0.097)
No. Adults	**0.111**	(0.101)	**0.071**	(0.071)
No. Children	**0.178**	(0.135)	**0.106**	(0.085)
Job	**0.207**	(0.195)	**0.128**	(0.144)
Within cordon	**-0.306** **	(0.147)	**-0.194***	(0.103)
Car	**-1.485*** **	(0.439)	**-0.833*** **	(0.252)
Other transport mode	**-0.297**	(0.367)	**-0.197**	(0.209)
Passtoll	**-0.337**	(0.412)	**-0.129**	(0.234)
Income 2	**0.181**	(0.229)	**0.115**	(0.164)
Income 3	**0.206**	(0.195)	**0.164**	(0.142)
Income 4	**0.162**	(0.214)	**0.117**	(0.154)
*Passtoll*car*	**-0.029**	(0.438)	**-0.161**	(0.253)
_cons	**3.141*** **	(0.618)		
cut1 (cons)			**-0.343**	(0.403)
cut2 (cons)			**0.006**	(0.403)
cut3 (cons)			**0.296**	(0.403)
cut4 (cons)			**0.694**	(0.405)
cut5 (cons)			**1.186** **	(0.410)
No. of observations	640		640	
R2	0.1443			
Log pseudolikelihood			-900.667	
Pseudo R2			0.0505	