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How has travel behaviour changed since the implementation of the congestion tax in Gothenburg?

- A survey study based on individuals living in Gråbo and Särö

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Abstract

Emissions from car traffic are known to have a negative impact on the climate and on human health. To reduce these emissions and their impacts, a congestion tax was implemented in Gothenburg on the first of January 2013. The tax will be charged on individuals who travel to and from Gothenburg. We have conducted a survey study on individuals living in two areas located about 25 kilometres from Gothenburg to investigate how their travel behaviour has been affected by the implementation of the congestion tax. The survey consisted of questions about travel behaviour by car and public transport, possible car substitutes, attitudes toward the congestion tax and socio-economic factors. Our results show that on average 22 percent of the individuals in Gråbo compared to 16 percent in Särö have decreased their travel by car. There is a corresponding increase in travel by public transport of 13 percent in Gråbo and 5 percent in Särö. We have found three other types of substitutes: adaption of day and time of travel, travel to another destination or cancelling the travel. However, we did not find any significant substitution to other means of transportation than public transport. Individuals with a higher income are less affected by the congestion tax than individuals with a lower income. Also, the factors reason of travel, attitude toward the tax and whether an individual has got children or not have a significant impact on travel behaviour changes after the implementation of the tax.

Abstrakt

Utsläpp från biltrafik är känt för att ha en negativ inverkan på klimatet och människors hälsa. För att minska utsläppen och dess påverkan infördes den första januari 2013 en trängselskatt i Göteborg. Skatten belastar dem som reser till och från Göteborg med bil. Vi har genomfört en enkätundersökning på individer som bor ungefär 25 kilometer från Göteborg, för att undersöka hur deras resebeteende har påverkats av trängselskatten. Undersökningen bestod av frågor gällande resmönster med bil och kollektivtrafik, möjliga substitut till bil, attityd mot trängselskatten och socioekonomiska faktorer. Våra resultat visar att i genomsnitt har 22 procent i Gråbo, till skillnad mot 16 procent i Särö, minskat sitt bilåkande. Motsvarande ökning i resande med kollektivtrafik är 13 procent i Gråbo och 5 procent i Särö. Vi har även hittat tre andra substitut: anpassning av tid och dag för att resan, resa till en annan destination eller att ställa in resan. Dock hittade vi inga andra signifikanta transportsubstitut än kollektivtrafik. Individer med en högre inkomst påverkas mindre av trängselskatten jämfört med dem som har en lägre inkomst. Även faktorer som anledning för resa, attityd mot trängselskatten och om en individ har barn har en signifikant påverkan på förändrat resebeteende efter trängselskattens införande.

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Anna Gräsberg and Sandra Göransson

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1. Introduction

During the recent years it has become more evident that the climate is changing. Extreme weather causing flooding or drought is becoming more common and intense. Many scientists argue that humans are causing this change through activities that increase the amount of greenhouse gases (GHG), such as carbon dioxide (CO_2), in the atmosphere. One source of these emissions is traffic, since road vehicles emit greenhouse gases when transforming fossil fuels into energy. However, traffic does not only imply a problem to the climate, but also to the human health, by emissions of for example Nitrogen dioxide (NO_2) and small particles (PM). (Sveriges klimatberedning, 2008)

Two of Sweden's 16 national environmental quality objectives, Reduced Climate Impact and Clean Air, concern these problems. The Reduced Climate Impact objective includes goals on the level of greenhouse gases in the atmosphere, whereas the Clean Air objective includes goals on the level of gases and particles harmful to humans (Naturvårdsverket, 2012). To achieve these objectives, incentives such as economic instruments can be implemented. The aim of economic instruments is to internalise external costs, such as costs from emissions. An example of such an incentive is a congestion tax. A congestion tax leads to a higher cost of travel by car to a specific area, and therefore the expected outcome will be decreased traffic and an increased demand for substitutes such as public transport (Kolstad, 2011).

In January 2013, a congestion tax was implemented in Gothenburg. The reason for the implementation was, among others, to decrease the negative environmental impacts from traffic emissions. Two other reasons were to decrease the congestion from vehicles in the urban areas to give more space for public transport and bicycles, and to contribute to the financing of costly, but important, infrastructural investments. (Göteborgs Stad, 2012)

One month after the implementation of the tax, traffic on seven commuter routes into Gothenburg had decreased by between four and 13 percent (Trafikverket, 2013a). According to Trafikkontoret Göteborgs Stad (2011a), 38 percent of all commuters to Gothenburg use these specific routes. The question is what these four to 13 percent of the commuters do instead. Do they for example travel by public transport or do they work from home; and are individuals affected differently? A tax like this is for example commonly known to affect low income individuals more than high income.

The main objective of this thesis is therefore to find out whether individuals' travel behaviour has changed since the implementation of the congestion tax, and if these changes differ depending on income level. We aim to answer the following questions:

1. How much has travel by car decreased?
2. How much has travel by public transport increased?
3. What has travel by car been substituted with?
4. What factors contribute to decreased travel by car?

To answer these questions we will perform a survey study on individuals living in two areas located within the commuter routes mentioned in the section above. The areas, Gråbo and Särö, are both located about 25 kilometres from Gothenburg, and are connected by a certain bus route (BLÅ-linjen). The two areas are of analytical interest since Särö, compared to Gråbo, is considered a high-class area and therefore assumed to have a larger share of high income individuals. We therefore assume that individuals living in Gråbo would have changed their travel behaviour by car more than individuals in Särö.

2. Background

Congestion taxes have been shown to have a decreasing effect on road traffic and emissions. However, as previous studies show (Small, 1983; Arnott et al., 1994, Eliasson et al., 2006; Transek, 2006; Trafikkontoret Stockholms Stad, 2009), there is a risk of negative distributional effects of the tax, since it could be more beneficial for high-income individuals than for low income.

2.1 The congestion tax and its effects

With a decrease in road traffic the air quality will improve. Gothenburg has had difficulties achieving the objectives within the national environmental quality objective for Clean Air, especially targeting the level for nitrogen dioxide (NO_2). In Gothenburg road traffic is the second largest source of NO_2 emissions, after the shipping industry. According to the environmental quality objective, no more than 26 thousand inhabitants should be exposed to a yearly average amount of NO_2 above 20 µg/m3 (one-millionth of a gram per cubic meter air) at their residence. Without the congestion tax approximately 68 thousand of the inhabitants in Gothenburg are exposed to a higher level than that. Calculations performed before the congestion tax was implemented show that NO_2 is estimated to decrease by one to two percent in the outer areas of Gothenburg and by three to five percent in the central parts of Gothenburg. Consequently, 13 thousand less inhabitants will be exposed to the higher levels of NO_2. (Trafikverket, 2013c)

The congestion tax in Gothenburg was implemented on the first of January 2013. There are 36 control points (tolls) where cars passing between 06.00 and 18.30 need to pay a tax. Depending on traffic peaks, the tax is either 8, 13 or 18 SEK, however, there is a maximum tax level of 60 SEK per day. No tax is charged on weekends, holidays and days before holidays or in July. (Transportstyrelsen, 2012)

In cities like Stockholm and London, where a congestion tax system has also been implemented, there has been an effect of decreased road traffic. In Stockholm, where the congestion tax was implemented in January 2006, the traffic decreased by 22 percent five months after the implementation (Stockholms Stad, 2006). Likewise in London, where the tax was implemented in 2003, the traffic decreased by 34 percent (Leape, 2006). One month after the implementation of the congestion tax in Gothenburg, a 17 percent decrease in road

traffic was observed, compared to the same time the previous year. The decrease amounts to about 104 thousand vehicles (Trafikverket, 2013b).

The effect of a congestion tax is that some travellers by car will choose another mean of transportation, change the destination of travel, adapt the time and day they travel or will not travel at all anymore (Trafikverket, 2013b). Hence, there might be a higher demand for substitutes such public transport. The public transport company Västtrafik in Gothenburg was aware of this and therefore increased the public transports already in December 2012. One month after the implementation of the tax in Gothenburg, a ten percent increase in sales of monthly commuter cards for public transport was registered. However, since commuters do not need to register every travel they do with public transport there are no exact numbers of how many individuals there are on every bus or tram. Västtrafik has attempted to estimate how crowded the busses are from certain areas outside of Gothenburg travelling to Gothenburg. The first study was conducted in December 2012, four studies were made in January 2013 and the latest one in March 2013. In Gråbo, there was an increase in travellers by bus both in January and in March compared to December, however, in Särö there was an increase in January but not in March. In March, the level of travellers by bus in Särö was almost back to the same level as before the tax was implemented (Trafikverket, 2013b).

2.2 Literature review

There are several studies that describe the effects of congestion pricing systems (mainly referred to as congestion tax or charge systems in the literature). The studies explain how different individuals are likely to be affected and behave after the implementation of such a system, based on socio-economic factors such as income. Some of the older studies mentioned (Richardson, 1974; Small, 1983; Evans, 1992; Arnott et al., 1994) are more focused on theoretical and empirical frameworks for welfare effects, whereas more recent studies (Eliasson et al., 2006; Transek, 2006; Trafikkontoret Stockholms Stad, 2009) evaluate the actual distributional and behavioural impacts of the congestion tax.

Some of the older studies presented here (Richardson, 1974; Small, 1983; Evans, 1992; Arnott et al., 1994) argue that congestion pricing systems will be regressive, decreasing the welfare of low income individuals more than the welfare of high income individuals. This is due to the fact that high income individuals have a higher value of time and therefore more

often feel that the time gained from less congestion is worth the charge. In addition to that, individuals with a lower income usually have a smaller possibility to affect their work hours, and therefore will not be able to adapt their travel to when the tax is lower (Arnott et al. 1994). However, as Small (1983) argues, if the revenues from the charge are allocated in a way that benefits the "losers" of a congestion charging scheme, then the possible effect could benefit all income groups. In that case, the tax would instead be progressive.

From a travel behaviour survey conducted in Stockholm after the implementation of the congestion tax, Trafikkontoret Stockholms Stad (2009) stated that 50 percent of the reduced travel by car had been substituted by public transport. However, the other 50 percent could not clearly be interpreted. No car sharing or time adjustments could be found, and there was also no increase in travel by bike. Therefore, expectations were that some travellers have cancelled their travel or that they plan their travel more thoroughly.

Transek (2006) studied the socio-economic effects from the implementation of the congestion tax in Stockholm. The data used was collected from two travel habit surveys conducted on Stockholm inhabitants a certain day during the autumn 2004 and spring 2006. The results show that high income households with children, whose main reason of travel is work, travel the most. The implementation of the congestion tax in Stockholm has led to a decrease in travel by car for all household types. Paid workers with and without children decreased their travel by car by 9 and 18 percent respectively. Students and pensioners, however, decreased their travel by car by 66 and 25 percent respectively.

Eliasson et al. (2006) conducted a case study on the most probable distributional outcomes from the congestion tax system in Stockholm. The data used was collected from travel surveys between 1994 and 2000. They found that those who initially travel the most to the city centre will be the most affected by a congestion tax. Hence, in contrast to the other studies, they state that high income individuals will be more affected by the charge and decrease their travel more than low income individuals since they are the ones that travel the most. They finally conclude that the Stockholm congestion tax is likely to be progressive rather than regressive since the revenues will be used to, for example, improve the public transport.

Since most of the studies show that a congestion tax will affect low income individuals more than high income individuals, we will test this in our study. As these studies mention that those who travel the most to the city centre are likely to decrease their travel by car the most, we also test if individuals with work as the main reason of travel will decrease their travel by car more than those who travel for pleasure or other reasons. Finally we test if individuals with children will decrease their travel by car less than those who do not have children.

3. Theory

The congestion tax in Gothenburg is a type of environmental tax, aiming to approach the problem of so-called negative externalities that arise as a cost to society from travel by car. How individuals tend to behave after the implementation of a tax is explained by various theories, mainly based on income and utility.

3.1 Negative externalities

Negative externalities occur when the consumption or production of a certain good impose a social cost to society that is higher than the private cost of the good. The difference between the social cost and the private cost therefore results in a negative externality (Kolstad, 2011). Travel by car generates negative externalities such as congestion, air pollution and noise. The driver who does not compensate for these externalities will therefore not pay the true costs of driving by car. Due to this, the individual who travels by car will decrease the welfare of society. By implementing a congestion tax, the costs of some of these negative externalities will be included. The general implication of the tax is therefore that a higher private cost will decrease the use of the good and hence decrease the cost for society.

3.2 Rational decision model

There are various theories explaining the behaviour in making decisions. The rational decision model states that individuals know their preferences and allocates their income based on market prices to get the highest utility given their budget constraint (Wilkinson, 2008). When imposing a congestion tax, the price for travel by car will increase, meaning that the individual will have to pay more to get the same level of utility as before. Hence, the rational behaviour could then be to decrease the amount of travel by car, since that part of the income instead could be used for consumption of other goods.

3.3 Value of time

Some authors (see for example de Donnea, 1972) emphasize that individuals also take the value of time, which is the opportunity cost of time, into account when making a decision. In this theory, an individual's utility is maximised under both a budget constraint and a time constraint. The choice of whether to travel or not, where to travel and mean of transportation is therefore decided after taking both the budget and time values into account. An individual

chooses to travel by car and pay the congestion tax only if the value of time is at least as high as the additional tax cost. However, if the tax cost is higher than the value of time and if there are substitutes available at a lower price, the individual will choose the substitute. The value of time depends on, for example, income and travel purpose. A higher income individual has a higher value of time, and travel to work has a higher value of time than travel for leisure activities.

3.4 Status quo bias

Studies have shown that individuals do not always act according to the rational decision models, and therefore behavioural theories try to explain these seemingly irrational actions. Individuals may not have the power to assimilate information from which they can work out rational, optimal decisions. A theory that explains this behaviour is the so-called status quo bias (see for example Samuelson and Zeckhauser, 1988). This theory describes how individuals often choose to hold on to their current behaviour, even though another alternative might give them a higher utility according to the rational decision theory. The behaviour is explained by the fact that individuals tend to weigh potential losses of changing their current behaviour more than the potential gains from other alternatives. Status quo bias could explain why individuals decide to continue to travel by car, even though the rational behaviour would be to change their behaviour due to the higher cost of a congestion tax.

3.5 Income and substitution effects

Theories that could explain possible outcomes of the congestion tax are the income and substitution effects. The income effect describes how much the consumption of a certain good decreases when the disposable income decreases. When a tax is implemented on car travel, the disposable income decreases since the same amount of the good cannot be used at the same price as before. The income effect affects lower income individuals more since they are more vulnerable to increased price levels (Perloff, 2004). For a normal good, such as travel by car, the substitution effect works in the same direction as the income effect. Consequently, as the disposable income decreases due to the tax, an individual will use more of another type of good that has a lower price (Perloff, 2004). Trafikkontoret Stockholms Stad (2009) describes four types of substitution effects. Firstly, an individual can choose to do the same type of travel in a way that reduces the costs, by choosing another mean of transportation such as public transport. Secondly, an individual can choose to adapt the time

of travel to when the tax is lower. Further on, the function of the travel can be substituted, meaning that an individual will work from home or shop for groceries elsewhere instead. Finally, an individual can choose to cancel the travel. In this study we will thereby perform a survey study to investigate which of these substitution effects seems to occur in the case of the congestion tax in Gothenburg.

4. Methodology

It is important to have a strategy on how to collect and analyse the data when performing a study. In the following section, we will motivate our choice of method for data collection, describe our course of action and the econometrical approach.

4.1 Method for data collection

When performing a survey study and collecting data, there are two important criterions: to target the right individual and to achieve a high response rate. In addition to that, it is preferable to get up-to-date information and receive responses quickly. Since phone interviews fulfil these criteria, we chose it as our method for collecting data.

Other common methods for data collection are email-, postal- and web surveys and face-to-face interviews. Email- and postal surveys are good methods for targeting the right individual; they are, however, time consuming due to the possibly long response time. The response rate is often low and in most cases it is needed to send out reminders to improve it. Furthermore, not everyone has an email or uses it frequently, which means that individuals with an email could be different compared to those without an email. Consequently, there could be a selection bias when conducting an email-survey. A web survey is a low-cost alternative for collecting data, however, the method preclude drawing conclusions from a sample of a population, since there is no targeting of a certain individual. Face-to-face interviews is a good method to target the right individual, but is also time consuming and could make respondents uncomfortable to answer sensitive questions, such as about income. (Statistiska Centralbyrån, 2008)

4.1.1 Survey design

Our survey consists of 13 questions aiming to capture how travel behaviour by car and public transport has changed since the implementation of the congestion tax. It also aims to find possible additional substitutes, attitudes toward the congestion tax and socio-economic factors, which we assume contribute to changed travel behaviour.

The survey begins with a question if the respondent has travelled to Gothenburg by car anytime during the last twelve months. This way we divide the respondents into car travellers and non-car travellers. The respondents who are car travellers will be asked for their main

reason of travel by car to Gothenburg. From their answers, we can divide the car travellers into different groups for main reason of travel, such as work or pleasure. We assume that an individual whose main reason of travel is work will be more affected by the tax, since they travel more frequently to Gothenburg.

The survey continues by letting the car travellers specify how many times per week they travel by car to Gothenburg today and how many days they travelled by car before the congestion tax was implemented. This way we will find how much the travel by car has decreased (or increased). Both car travellers and non-car travellers then get the question how many times per week they travel with public transport today and how many times they travelled before the congestion tax was implemented. From their answers, we want to capture a possible substitution effect from car to public transport. For those who decreased their travel by car we are also interested in if they substitute travel by car with other means of transportation, beside public transport. Therefore, the next question is about other substitutes, for example, what other means of transport they use, if they use car-pooling or commuter parking or if they choose to stay at home instead.

For those who increase their number of travels by car after the congestion tax, we are interested in knowing the reason. Those who have not changed their number of travels by car, we ask if they have been affected in any manner, such as adapting their time and day of travel. For all other respondents who have either increased or decreased their number of travels or do not travel by car at all, we ask if they have been affected in any other way. This captures adaption of time and day of travel and also result in other interesting comments the respondents might have. Furthermore, the respondents are asked to state their attitude toward the congestion tax, positive, negative or neutral. Their attitude is of interest since it is assumed to have an effect on changed travel behaviour by car. We assume that individuals who would benefit from the tax will have a positive attitude, whereas individuals who would not benefit from the tax will have a negative attitude.

The last part of the survey captures socio-economic factors that could contribute to changed travel behaviour. It starts with a question about the respondents' occupation so as to later on categorize them into different occupation groups. For example we assume that workers travel more by car, whereas students and pensioners travel more by public transport. However, students and pensioners are assumed to have a lower income and might therefore be more

affected by the tax, if they travel by car. The occupational question is followed by a question on income level. The respondents are presented to four different income intervals (below 15 thousand SEK gross income per month, between 15 and 25, between 25 and 35 and above 35 SEK per month), where they specify which one is most consistent with their income level. This way we can divide the respondents into different income groups, which is relevant since we assume that income is an explanatory factor for travel behaviour.

We continue the survey by asking for age, number of individuals living in the household and how many individuals in the household are children under the age of 18. We also note the gender of the respondent. We assume that younger individuals (students) and older individuals (pensioners) are more affected by the tax and that individuals with children will decrease their number of trips less than those without children. We also assume that women might be more affected by the tax than men, since this is a common assumption. The study ends by asking the respondents if they have any other comments, which could for example regard the study or attitude toward the tax.

4.1.2 Data collection

The survey was conducted on individuals living in the two areas Gråbo and Särö, each located about 25 kilometres from Gothenburg. Särö is, compared to Gråbo, considered a high-class area and is therefore assumed to have a larger share of high income individuals. In 2010, there were 3 165 inhabitants in Särö and 4 195 in Gråbo (Statistiska Centralbyrån 2013b). In Gråbo and Särö 52 percent respectively 50 percent are women (Statistiska Centralbyrån, 2012).

To create a representative sample of the population in the two areas we used random sampling. Random sampling means that each individual in the population has the same probability of being included in the sample. To get a random sample of individuals in Gråbo and Särö, we started by identifying all streets in both areas (Svenska Gator, 2013). We randomly selected the streets, by putting them in Excel and using a number generator to randomly assign each street a unique number between one and the total amount of streets. The randomization was made for each area separately. To find individuals who live on each street, we used a web-based phone directory (Eniro, 2013). We decided to include three individuals from each street, until we got a sample of 180 individuals in each area. Our strategy was to choose the first, the middle and the last individual displayed on the web-based

telephone directory. If there was an even number with two individuals in the middle, we included the first of the two in the order. If there were solely three or less individuals on a street we included all of them.

The survey was conducted through phone interviews in April 2013, (approximately three months after the congestion tax was implemented) on weekdays between 17.00 and 21.00. Because of the restricted time, we decided to call the same individual only three times if there was no answer. If the individual still had not answered after the third time, we categorized them as no-answer. Out of the random sample of 360 individuals, we collected 100 responses from each area.

When contacting individuals we were meticulous in interviewing the one individual of the household we had chosen to be included in our sample. We began by introducing ourselves and briefed them about the study and continued with our survey questions if the individual accepted to participate. Simultaneously we entered their questions in a document.

Out of the sample of 360 individuals 200 accepted to participate, which meant a response rate of 56 percent. The non-response rate consisted of 10 percent who chose not to participate in the study, 24 percent who did not answer their phone and 10 percent where the phone number specified did not work. We do not expect there to be a difference between the individuals who did answer the phone and those who did not.

4.2 Method for data analysis

We will use an econometric approach to analyse the data. The causal effects of interest are: what factors affect the probability of individuals decreasing their travel by car and what factors affect how much individuals choose to decrease their travel by car. We will perform a model analysis using the binary probit method and the OLS method. The analysis will be made using the statistical software STATA.

4.2.1 The binary probit method

To find out what factors affect the probability that an individual decreases his or her travel by car, we will use the binary probit method. This method indicates the probability of an outcome where only two outcomes are possible (see further explanation of this model in

Woolridge, 2009). In our model, the only two possible outcomes are to decrease the travel by car or not to decrease the travel by car. The factors we think have an effect on the probability are area of living (Gråbo compared to Särö), gender (woman compared to man), age, having children (having children compared to not having children), income (having an income above 35 thousand SEK per month compared to having less than that), main reason of travel (work compared to other) and attitude (negative compared to positive or neutral). Our binary probit model can therefore be expressed as follows:

$$\Pr\ Decreasecar = 1\ Area, Gender, Age, Child, Inc4, Worktra, Negative\ =$$
$$\Phi(\propto + \beta_1 * \text{Area} + \beta_2 * \text{Gender} + \beta_3 * \text{Age} + \beta_4 * Child + \beta_5 * Inc4 + \beta_6 * Worktra + \beta_7 * Negative)$$

In this model, the dependent variable (Decreasecar) is the dummy variable for travel by car. If an individual has decreased the travel by car, the value is 1, and if not the value is 0. Pr means probability, and the parenthesis following it describes the independent variables' (Area, Gender, Age, Child, Inc4, Worktra and Negative) effect on the dependent binary variable (Decreasecar). Φ denotes the standard normal cumulative distribution function and $\propto$ the intercept. The coefficients $\beta_1, \beta_2 \ldots \beta_k$ indicate the sign of the effect of the independent variables on the probability that the dependent variable equals one. Hence, a negative sign of a certain coefficient would indicate that the variable has a negative effect on the probability that an individual will decrease his or her travel by car.

4.2.2 The OLS method

When examining what factors might affect how much an individual decreases his or her travel by car, we will use the OLS (Ordinary Least Squares) method. The OLS method enables an estimation of the unknown parameters in a linear regression model by minimizing the sum of the squared vertical distances between the observed responses from the sample and the responses predicted by the linear approximation. The aim is to find an approximation of the independent variables on the dependent variable (see further explanation of this model in Woolridge, 2009). Our OLS regression model can be expressed as follows:

$$\text{Differencecar} = \propto + \beta_1 * \text{Area} + \beta_2 * \text{Gender} + \beta_3 * \text{Age} + \beta_4 * Child + \beta_5 * Inc4 + \beta_6 * Worktra + \beta_7 * Negative + \varepsilon_i$$

In our model, the dependent variable (Differececar) is a continuous variable reflecting how much the travel by car has decreased or increased for an individual after the implementation of the congestion tax. The independent variables (Area, Gender, Age, Child, Inc4, Worktra and Negative) are variables that might affect the decrease in travel by car. The coefficients $\beta_1, \beta_2 \dots \beta_k$ each measure the effect of the independent variables on the dependent variable, holding all other variables constant. Hence, a negative sign of a certain coefficient would indicate that the independent variable has a negative effect on the dependent variable. Lastly, $\propto$ is the intercept and ε_i the error term, which measures the difference between the actual observations and their predictions.

4.3 Main drawbacks of the methodology

Since we will have a fairly small sample of 200 individuals, it might be difficult to draw any significant conclusions about the population. Our sampling might also have some drawbacks. It is only based on an online telephone directory, which only represents individuals that want to put their number there, leading to the fact that the true selection probabilities are not consistent with the sample. This is called a selection bias. If we assume, however, that the individuals who decide to put their contact information online are not significantly different from individuals who do not, this would not be considered a bias.

In both models of the econometrical approach, a potential problem is the so-called omitted variables bias. Such a bias occurs when an independent, explanatory variable is omitted from the analysis. The omission of one explanatory variable will give a distorted impression of the other variables (see Woolridge, 2009). In our case, it could for example be distance to bus stop or whether an individual pays the congestion tax by him or herself.

5. Results and analysis

In the following section we will present and analyse the results of our survey study. The sample characteristics in Gråbo and Särö will be followed by the found changes in travel behaviour and end with the results from the binary probit and OLS regression analysis.

5.1 Descriptive statistics

Table 1 below summarizes some differences in sample characteristics between Gråbo and Särö. The only characteristic with a significant difference between Gråbo and Särö is age. The average age of the sample in Gråbo is 47 years, whereas in Särö it is 54 years. However, since we do not have any data on the actual average age in these areas, we cannot tell if there is a difference in age or not in the population. The sample share of females is a bit higher in Gråbo than in Särö, 60 percent compared to 55 percent. Both in Gråbo and Särö 36 percent of the respondents have children under the age of 18. Between the samples there is an even distribution of workers (employed to some kind of work). There is, however, a greater share of pensioners and a lower share of others (students or unemployed) in Särö.

Table 1. Description of differences in sample characteristics between Gråbo and Särö (standard error in parenthesis)

Variable	Definition	Gråbo	Särö	P-value[#]
Age	Average age of respondents	47 years (0.026)	54 years (0.048)	0.005***
Gender	Share of female respondents	60% (0.049)	55% (0.050)	0.477
Child	Share of respondents with children under 18	36% (0.948)	36% (0.048)	1
Worker	Share of respondents with an employment	72% (0.046)	69% (0.046)	0.759
Pensioner	Share of respondents who are pensioners	17% (0.038)	26% (0.044)	0.123
Other	Share of respondents who are students or unemployed	11% (0.032)	5% (0.022)	0.119
Number of observations	-	100	100	-

[#]Hypothesis H_0: No significant differences between the two areas. Test: t-test.
*Significant at 10% level; **significant at 5% level; ***significant at 1% level

The income distributions in both areas are presented in Figure 1 and Figure 2 below. As can be seen, a higher proportion of the respondents in Särö have an income above 35 thousand SEK per month (24 percent compared to 7 percent). Both in Särö and Gråbo, the most common income level is between 25 thousand and 35 thousand SEK per month. However, there are twice as many respondents with an income between 15 thousand and 25 thousand in Gråbo than in Särö.

Figure 1. Income distribution Gråbo

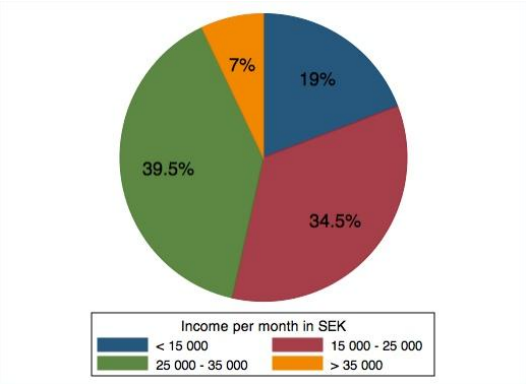

Figure 2. Income distribution Särö

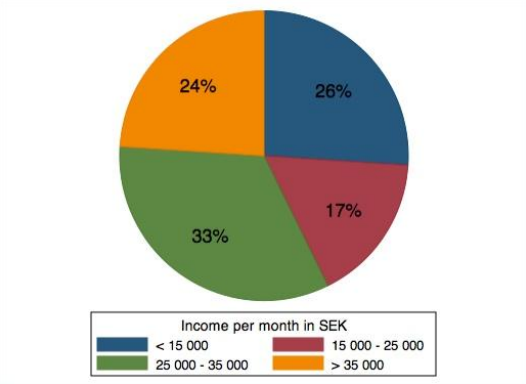

Table 2 below summarizes the results from a test to find income differences between Gråbo and Särö. As can be interpreted from the table, there is a significant difference between the areas in the highest income level (above 35 thousand SEK) and in the lower income level (between 15 and 25 thousand SEK).

Table 2. Description of differences in income distribution between Gråbo and Särö (standard error in parenthesis)

Variable	Income in SEK	Gråbo	Särö	P-value[#]
Inc1	< 15 000	19% (0.039)	26% (0.044)	0.308
Inc2	15 000 – 25 000	34.5% (0.048)	17% (0.037)	0.003***
Inc3	25 000 – 35 000	39.5% (0.049)	33% (0.047)	0.3033
Inc4	> 35 000	7% (0.026)	24% (0.042)	0.001***
Number of observations	-	100	100	-

[#]Hypothesis H_0: No significant differences between the areas. Test: t-test.
*Significant at 10% level; **significant at 5% level; ***significant at 1% level

5.2 Travel behaviour changes and adaptations

In Table 3 we have summarized how individuals in Gråbo and Särö have changed their travel by car. The total share of individuals who have decreased their travel by car differs between 22 percent in Gråbo and 16 percent in Särö. On average, individuals in Gråbo decreased their travel by car with 0.3 days per week and in Särö 0.5 days per week. The change in travel by car varies between an increase of 0.5 days per week and a decrease of 5 days per week in Gråbo, and between zero and a decrease of 4.75 days per week in Särö. However, the increase in Gråbo only represents one individual who could no longer travel by bus to Gothenburg since the public transport had been cancelled after the congestion tax was implemented.

Table 3. Effect of congestion tax on travel behaviour by car

Variable	Share of respondents who decreased their travel by car	Average days less travelled per week	Minimum days decreased per week	Maximum days decreased per week	Number of observations
Total	19%	0.4	+0.5	5	200
Gråbo	22%	0.3	+0.5	5	100
Särö	16%	0.5	0	4.75	100

In Table 4 we present how individuals have changed their travel behaviour by public transport. The individuals substituting travel by car with public transport constitutes of 13 percent of the individuals who decreased their travel by car in Gråbo, and of 5 percent of the individuals in Särö. Some individuals increased their travel by public transport with five days per week. One individual in Särö had decreased his or her travel by public transport to Gothenburg, which depends on no interest in travelling to Gothenburg anymore. Also one individual in Gråbo decreased his or her travel by public transport since the bus had been cancelled after the implementation of the congestion tax.

Table 4. Effect of congestion tax on travel behaviour by public transport

Variable	Share of respondents who increased their travel by public transport	Average days more travelled per week	Minimum days increased	Maximum days increased	Number of observations
Total	9%	0.25	-0.25	5	200
Gråbo	13%	0.31	-0.5	5	100
Särö	5%	0.19	-0.25	5	100

Table 5 below compares the travel and attitude characteristics between Gråbo and Särö. The main reason of travel in Gråbo and Särö is either work (42 percent in Gråbo and 44 percent in Särö) or pleasure (35 percent in Gråbo and 44 percent in Särö), where pleasure includes travel for shopping and cinema visits. In Gråbo, 21 percent compared to 9 percent in Särö travel to Gothenburg for other reasons such as studies or hospital visits. There is a significant difference between the areas for other as the main reason of travel.

Table 5. Differences in travel behaviour and attitude characteristics between Gråbo and Särö (standard error in parenthesis)

Variable	Definition	Gråbo	Särö	P-value[#]
Worktra	Share of respondents whose main reason of travel is work	42% (0.05)	44% (0.05)	0.777
Pleasuretra	Share of respondents whose main reason of travel is pleasure	35% (0.05)	44% (0.05)	0.195
Otherstudtra	Share of respondents whose main reason of travel is studies or other	21% (0.041)	9% (0.03)	0.017**
Dummycar	Share of respondents who decreased their travel by car	22% (0.04)	16% (0.04)	0.282
Dummypubl	Share of respondents who increased their travel by public transport	13% (0.02)	5% (0.03)	0.048**
Timeadapt	Share of respondents who have adapted their time of travel by car	31% (0.046)	23% (0.042)	0.205
Otheralt	Share of respondents who travel to other areas by car instead	9% (0.026)	7% (0.029)	0.604
Dummystayhome	Share of respondents who substitute travel by car to stay home	19% (0.022)	25% (0.024)	0.758
Attitude	Share of respondents with a negative attitude toward the congestion tax	58% (0.05)	51% (0.05)	0.32
Number of observations	-	100	100	-

Hypothesis H_0: No significant differences between the two areas. Test: t-test.
*Significant at 10% level; **significant at 5% level; ***significant at 1% level

The results do not show any significant differences in the level of decreased travel by car between the two areas, however, there is a significant difference in the increased level of travel by public transport. In Gråbo, 13 percent compared to 5 percent in Särö travel more by public transport after the implementation of the congestion tax.

After the implementation of the congestion tax, 31 percent of the respondents in Gråbo and 23 percent in Särö decided to adapt their time of travel into Gothenburg by travelling when the tax is lower or on weekends and holidays when there is no tax at all. Also 9 percent of respondents in Gråbo compared to 7 percent in Särö stated that they choose to travel somewhere else than to Gothenburg for the same type of travel. Another adaptation made by 19 percent of the respondents in Gråbo and 25 percent in Särö was to substitute at least one travel by car to Gothenburg by staying home instead. We only found a few individuals who substituted travel by car with other means of transport than public transport. In Gråbo one individual stated that he or she decided to walk instead of taking the car, whereas four individuals in Särö decided to go by bike instead. However, none of these behavioural differences are significant.

The majority of the individuals in both Särö and Gråbo have a negative attitude toward the congestion tax. About 10 percent of all respondents stated that they would not call this tax a congestion tax, since some of the tolls are located outside of the city centre resulting in that individuals only passing by Gothenburg still have to pay, and also since there is a tax when leaving the city centre. Further on, some of the respondents wished for a referendum in which they, who live outside of Gothenburg, should also be included. Some also stated that all passing cars should pay, that there should be no exemption from the congestion tax, hence that also foreign-registered cars should have to pay.

Finally, however, some respondents who were positive after the implementation stated either that they would be willing to pay the tax since their travel time by car has decreased significantly, or that the travel time by public transport has decreased. Important to mention though is that some of those travelling by car, who were very positive about the tax, used company cars, meaning that they do not pay the tax themselves.

5.3 Regression analysis

This section consists of the results from the binary probit and OLS regressions.

5.3.1 Binary probit regression

The binary probit regression describes what variables might affect the probability that an individual will decrease his or her travel by car after the implementation of the congestion tax. Hence, the dependent variable (Decreasecar) is a dummy variable for travel by car. Table 6 on the following page shows the marginal effect of the probability of decreasing travel by car for different variables.

We expect that the probability of decreasing the travel by car is higher if you live in Gråbo compared to Särö, if you are a female compared to male, if your main reason of travel is work compared to other and if your attitude toward the congestion tax is negative compared to positive or neutral. We also think that high income individuals (with an income above 35 thousand SEK per month) and individuals with children will have a lower probability of decreasing their travel by car than their counterparts. Lastly, we think that younger individuals (students) and older individuals (pensioners) will have a higher probability of decreasing their travel by car.

Table 6. Results from binary probit regression models

Dependent variable: Decreasecar			
Variable	**Description**	**Model 1** Marginal effect (Standard error)	**Model 2** Marginal effect (Standard error)
Area	Respondents who live in Gråbo	-	0.014 (0.055)
Gender	Respondents who are females	0.021 (0.056)	0.042 (0.055)
Age	Age of respondents	-0.002 (0.002)	-0.001 (0.002)
Child	Respondents with children under 18	-0.087 (0.058)	-0.088* (0.057)
Inc4	Respondents with an income above 35 000 SEK per month	-0.132** (0.059)	-0.137* (0.054)
Worktra	Respondents whose main reason of travel is work	-	0.073 (0.062)
Negative	Respondents with a negative attitude toward the congestion tax	-	0.156*** (0.052)
Log likelihood	-	-93.959	-88.516
Number of observations	-	200	200

Hypothesis H_0: Independent variables do not have a significant effect on the dependent variable. Test: z-test.
*Significant at 10% level; **significant at 5% level; ***significant at 1% level

Because we have a fairly small sample, we chose to include only one out of four variables for income level and one out of four variables for main reason of travel. This way, these variables are the reference points.

In Model 1 we chose to include only socio economic factors such as gender, age, having children and income. The model indicates that individuals with an income above 35 thousand SEK per month have about 13 percentage points lower probability of decreasing their travel by car than those with an income below that.

Model 2 is a developed version of Model 1. We included the variables for area of living, main reason of travel and attitude toward the congestion tax. In Model 2 we once again find that individuals with a high income have about 13 percentage points lower probability of decreasing their travel by car. Model 2 also indicates that individuals with children have about 9 percentage points lower probability of decreasing their travel by car than individuals without children. Finally, individuals with a negative (compared to positive and neutral) attitude toward the congestion tax have about 15 percentage points higher probability of decreasing their travel by car, as indicated by Model 2.

Since we find Model 2 to be a better description of reality than Model 1, we will draw our conclusions based on Model 2. Our results from the binary probit regression are according to our expectations and in line with previous studies. As Transek (2006) state, households with children decrease their travel by car less than those with children. Also, the fact that higher income leads to a lower probability of decreasing travel by car can be explained by previous studies, for example by Arnott et al. (1994). Model 2 indicates that individuals with a negative attitude toward the tax have a higher probability of decreasing their travel by car. We assume that individuals have a negative attitude toward the tax either because they are or will be negatively affected by the tax or since it is a matter of principle. Since we asked the attitude question only after the tax was implemented, we cannot be sure of the causal relationship between attitude and decreased travel by car. Since it is significant we do think that it does explain travel behaviour, and removing it from any of the models does not greatly affect the coefficients of other variables. However, we will not investigate the attitude variable any further in this thesis.

5.3.2 OLS regression

To find out what variables might have an effect on how much an individual chooses to decrease his or her travel by car we used the OLS regression method. The dependent variable (Differencecar) in the OLS regression is therefore the change in number of days travelled by car per week after the implementation of the congestion tax. In Table 7 on the following page we have summarized the results.

As in the binary probit regression models, we only included one of the dummy variables for income and main reason of travel in the OLS-regression models. We expect that individuals who live in Gråbo, females, individuals whose main reason of travel is work and those with a

negative attitude toward the congestion tax will decrease their travel by car more than their counterparts. Individuals with an income above 35 thousand SEK per month and those with children we expect to decrease their number of trips less than their counterparts. Finally, we expect that younger (students) and older (pensioners) individuals will decrease their number of travels by car more.

Table 7. Results from OLS regression models

Dependent variable: Differencecar			
Variable	**Description**	**Model 1** Coefficient (Standard error)	**Model 2** Coefficient (Standard error)
Area	Respondents who live in Gråbo	-	-0.050 (0.148)
Gender	Respondents who are females	-0.225 (0.152)	-0.219 (0.151)
Age	Age of respondents	0.006 (0.005)	0.006 (0.005)
Child	Respondents with children under 18	0.059 (0.166)	0.042 (0.165)
Inc4	Respondents with an income above 35 000 SEK per month	0.475** (0.215)	0.438** (0.219)
Worktra	Respondents whose main reason of travel is work	-0.489*** (0.163)	-0.442*** (0.163)
Negative	Respondents with a negative attitude toward the congestion tax	-	-0.308** (0.143)
R^2	-	0.074	0.097
Adjusted R^2	-	0.050	0.064
Number of observations	-	200	200

Hypothesis H_0: Independent variables do not have a significant effect on the dependent variable. Test: t-test.
*Significant at 10% level; **significant at 5% level; ***significant at 1% level

In Model 1 we included variables for socio economic factors and work as the main reason of travel. The model indicates that an individual with an income above 35 thousand SEK per month would on average decrease their travel by car about two days less per month than

those with an income below 35 thousand. The individuals whose main reason of travel is work would, according to the model, decrease their travel by car with two days per month more than those whose main reason of travel is pleasure or other.

Since we wanted to include variables for area of living and also the attitude toward the congestion tax we constructed Model 2. In Model 2, income level and work as main reason of travel still have about the same significant effect on decreased number of days travelled as in Model 1. Additionally, individuals who have a negative attitude toward the congestion tax will, on average, travel 1.2 days less per month than those with a positive or neutral attitude.

For further analyses we will use Model 2, since we find it more realistic than Model 1. Our results are according to the expectations and in line with previous studies. As mentioned before, for example Arnott et al. (1994) conclude that high income individuals are less affected by a congestion tax than low income individuals. Also, as Eliasson et al. (2006) states, individuals who travel the most into the city centre have more travels that are affected by the tax and will therefore decrease a higher amount of travels. Hence, individuals with work as the main reason of travel are expected to decrease their number of travels more. The indication that individuals with a negative attitude toward the tax decrease their number of travels by car more than those with a neutral or positive attitude could be since those who have a negative attitude are the ones that are most negatively affected by the tax or that the tax is against their principles. As mentioned in the section 5.3.1, we do not know the causal relationship between attitude and travel behaviour by car, but it does have a significant effect. Still, we will not investigate this variable any further in this thesis.

6. Discussion and conclusion

The purpose of this thesis was to find out how individuals' travel behaviour has changed since the implementation of the congestion tax in Gothenburg. We expected that individuals with a higher income level would be less likely to change their travel behaviour. To test this hypothesis we compared individuals living in the two areas Gråbo and Särö, where we assumed that a greater share of individuals in Gråbo have a lower income than those living in Särö. The overall results show that income level does have an effect on travel behaviour, however, we did not find any significant behavioural differences between the two areas.

Our results show that 22 percent of the individuals in Gråbo compared to 16 percent in Särö have decreased their travel by car to Gothenburg since the implementation of the congestion tax. On average, individuals in Gråbo travel one day less per month, whereas individuals in Särö travel two days less per month. There is, however, no significant difference in the decrease between the two areas.

We found that 13 percent in Gråbo and 5 percent in Särö have substituted travel by car with travel by public transport. On average, individuals in Gråbo travel one day more per month by public transport, whereas individuals in Särö travel one day every two months more. Besides substituting travel by car with public transport, 19 percent of the individuals in Gråbo and 25 percent in Särö chose to substitute at least one day of travel by car with staying home. Also, 31 percent in Gråbo and 23 percent in Särö stated that they adapt the time or day of travel by car to Gothenburg to when taxes are lower or when there is no tax (for example on weekends). 19 percent in Gråbo and 6 percent in Särö travel to another destination for the same type of travel. We did not find that a significant share of individuals choose to substitute travel by car with other means of transportation than public transport. Out of the whole sample of 200 individuals only four state that they have substituted travel by car with biking and only one individual decided to walk instead. This could, however, be explained by the fact that both areas are located in a distance of approximately 25 kilometres from Gothenburg, which would make other means of transport, such as bikes, ineffective.

Our results show that factors such as having children, income level and attitude toward the congestion tax have a significant effect on the probability of changing the travel behaviour by car after the implementation of the congestion tax. Individuals with children under the age of

18 are less likely to decrease their travel by car compared to those without children. Individuals with an income above 35 thousand SEK per month are also less likely to decrease their travel by car, compared to individuals with an income below that. Those with a negative attitude toward the congestion tax are on the other hand more probable to decrease their travel by car than those who have a positive or neutral attitude.

Furthermore, factors such as income, main reason of travel and attitude are shown to have a significant effect on the level of decreased travel by car after the implementation of the congestion tax. An individual with an income above 35 thousand SEK per month would on average travel two days per month more than an individual with an income below than that. We find that individuals whose main reason of travel to Gothenburg is work, on average travel two times less per month than to those whose main reason of travel is pleasure or other. Individuals with a negative attitude toward the congestion tax decrease their travel by car with on average one day more per month compared to those with a positive or neutral attitude.

All the results are consistent with previous studies and the theoretical framework. As indicated by Transek (2006) and Eliasson et al. (2006), individuals who travel the most will also decrease their travel by car more than others. Therefore, individuals whose main reason of travel is work decrease their number of travel by car more than those who travel for other reasons. Transek (2006) also found that households with children on average decreased their travel by car less than those who did not have children. Our results show that individuals with children have a lower probability of decreasing their travel by car than those without children. As most studies mentioned have found (Richardson, 1974; Small, 1983; Evans, 1992; Arnott et al., 1994; Transek, 2006), high income individuals are less affected by the congestion tax and decrease their number of travels by car less than those with a lower income. This is also in accordance with the value of time theory, which states that high income individuals have a higher value of time and therefore are less likely to decrease their number of travels. However, there could be a status quo bias, meaning that individuals do not want to change their present mean of transportation, since they value the loss higher than the potential gain from a change. Therefore, it is difficult to say anything about the long-term effects from the tax. It is apparent that there is a substitution effect since many of the respondents stated that they substitute their travel by car with other means of transportation or to another behaviour such as time adaption or cancellation of a certain travel.

A congestion tax is a useful economic instrument for reducing traffic and thereby emissions of greenhouse gases. It enables a way to contribute to achieving the national environmental objectives Clean Air and Reduced Climate Impact. However, it is important that the tax will not affect individuals differently. Therefore it is important to further investigate the distributional effects of the congestion tax in Gothenburg, especially for individuals living outside of the city, who might have difficulties to travel by public transport because of the location. Because Särö and Gråbo are located a bit further away from Gothenburg, we did not find that many individuals substituted their travel by car by other means of transport than public transport. Therefore, for further studies, it would be interesting to find out how individuals living closer to the city centre have changed their travel behaviour, for example substituting travel by car with travel by bike. Also, since we found that attitude has a significant effect on travel behaviour, it could be interesting for further investigations. By learning about individuals' underlying factors of attitude toward the tax, it could provide policy makers with a greater insight on how to make the tax more accepted.

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Appendix

Appendix 1. Survey layout in Swedish

Hej! Mitt namn är Anna/Sandra. Jag ringer från Göteborgs universitet, där jag just nu skriver min kandidatuppsats om trängselskatten i Göteborg. Jag skulle vilja ställa några korta frågor till dig angående trängselskatten. Det kommer ta ungefär 4 minuter och dina svar kommer vara anonyma, skulle det gå bra?

Kön:

1. Har du under det senaste året rest med bil till Göteborg?

(Om nej, gå till fråga 5)

2. Vilken är den främsta anledningen till att du reser till Göteborg?
3. Under en normal vecka, hur många resor gör du då med bil till Göteborg?
4. Hur många resor gjorde du med bil innan trängselskattens införande?
5. Under en normal vecka, hur många resor gör du då med kollektivtrafik till Göteborg?
6. Hur många resor gjorde du med kollektivtrafik innan trängselskattens införande?

    OM FÄRRE: Vilka andra kommunikationsmedel använder du för de resor som du inte gör med bil eller kollektivtrafik idag?

    OM FÄRRE: Hur ofta under en normal vecka väljer du att stanna hemma istället för att resa till Göteborg med bil på grund av trängselskatten?

    OM FLER: Vad är anledningen till att du gör fler resor med bil idag?

7. Har trängselskatten påverkat dig på något (annat) sätt?
8. Har du en positiv, negativ eller neutral inställning till trängselskatten?
9. Vad är din huvudsakliga sysselsättning?
10. Är din månatliga bruttoinkomst ungefär

    Under 15 000 SEK

    Mellan 15 000 och 25 000 SEK

    Mellan 25 000 och 35 000 SEK

    Över 35 000 SEK

11. Hur gammal är du?
12. Hur många personer bor i ditt hushåll?
13. Hur många av dessa är barn under 18?

Det var de frågor jag hade, tack så mycket för din medverkan! Har du någon övrig fundering eller kommentar?

Appendix 2. Survey layout in English

Hi! My name is Anna/Sandra. I am calling from the University of Gothenburg, where I am at the moment writing my bachelor thesis regarding the congestion tax in Gothenburg. I would like to ask you a couple of questions regarding the congestion tax. It will approximately take 4 minutes and your answers will be anonymous, would that be ok?

Gender:

1. During the past year, have you travelled by car to Gothenburg?

(If no, go to question 5)

2. Which is your main reason for travel to Gothenburg?

3. During a normal week, how many times do you travel by car to Gothenburg?

4. During a normal week before the congestion tax was implemented, how many times did you travel by car to Gothenburg?

5. During a normal week, how many times do you travel by public transport to Gothenburg?

6. During a normal week before the congestion tax was implemented, how many days did you travel by public transport to Gothenburg?

IF LESS: What other means of transport do you use for those travels, which you do not do by car and public transport today?

IF MORE: During a normal week, how many times do you chose to stay at home instead of travelling to Gothenburg by public transport

IF MORE: What is the reason travelling more to Gothenburg today?

7. Has the congestion tax affected you in any (other) way?

8. Do you have positive, negative or neutral attitude toward the congestion tax?

9. What is your main occupation?

10. Is your monthly gross income approximately

Below 15 000 SEK

Between 15 000 and 25 000 SEK

Between 25 000 and 35 000 SEK

Above 35 000 SEK

11. How old are you?

12. How many individuals live in your household?

13. How of those are children under the age of 18?

That was the questions I had, thank you for participating! Do you have any further questions or comments?

Appendix 3. Variable list

Table 8. Variable list

Variable	Definition
Age	Number describes age of individual
Area	Dummy variable for respondents living in Gråbo or Särö, 1=Gråbo, 0=Särö
Child	Dummy variable for individuals with children, 1=Yes, 0=No
Differencecar	Dummy variable for individuals who decreased their travel by car, 1=Yes, 0=No
Dummypubl	Dummy variable for individuals who increased their travel by public transport, 1=Yes, 0=No
Dummystayhome	Dummy variable for individuals who o to stay home one or more times a week instead of travelling by car to Gothenburg, 1=Yes, 0=No
Gender	Dummy variable for gender, 1=Woman, 0=Man
Inc1	Dummy variable for individuals with an income below 15000, 1=Yes, 0=No
Inc2	Dummy variable for individuals with an income between 15000 and 25000, 1=Yes, 0=No
Inc3	Dummy variable for individuals with an income between 25000 and 35000, 1=Yes, 0=No
Inc4	Dummy variable for individuals with an income above 35000, 1=Yes, 0=No
Negative	Dummy variable for individuals with a negative attitude toward congestion tax, 1=Negative, 0=Positive or neutral
Otheralt	Dummy variable for individuals who choose to travel elsewhere instead of travelling to Gothenburg, 1=Yes, 0=No
Otherstudtra	Dummy variable for individuals whose main reason of travel by car to Gothenburg is studies or other, 1=Studies or other, 0=Pleasure or work
Pensioner	Dummy variable for employment, 1=Pensioner, 0=Worker, student or other
Pleasuretra	Dummy variable for individuals whose main reason of travel by car to Gothenburg is pleasure, 1=Pleasure, 0=Work, studies or other

Positive	Dummy variable for individuals with a positive attitude toward congestion tax, 1=Positive, 0=Negative or neutral
Timeadapt	Dummy variable for individuals who have adapted their time of travel by car to Gothenburg, 1=Yes, 0=No
Worktra	Dummy variable for individuals whose main reason of travel by car to Gothenburg is work, 1=Work, 0=Pleasure, studies or other
Worker	Dummy variable for employment, 1=worker, 0=Pensioner, student or other