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Changes in travel habits in Stockholm County

Effects of the Stockholm Trial

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Brief résumé

The effects of the Stockholm Trial on journeys[1] by the residents of the county have been studied by means of postal questionnaire surveys. The study was divided into two panels[2] with 77,000 and 7,500 individuals respectively in the age range 12-84 years. Because of the delayed start of the trial the study *before* respectively *during the trial* could not be carried out at the same time of year. As travel varies between different seasons, seasonal variations — apart from rises in petrol prices over the period — are taken into account in the assessment of the effects resulting from the Stockholm Trial.

County residents' *car journeys* across the congestion charging zone (charging zone) have clearly decreased by approximately 20% as a result of the congestion charging trial. The reduction has occurred primarily in 24-hour weekday periods and, expressed as a percentage, it is approximately the same during the charging period as in the period free of charge.

The greatest reduction *expressed as a percentage* applies to car journeys between areas of the county south and north of the congestion charging zone, which has more than halved.

Most car journeys across the charging zone are journeys to or from work/school. It is these car journeys which have decreased most as a result of the trial. Almost all car journeys to or from work/school with a destination or starting point within the inner city which have been reduced, are now instead made on public transport. The smaller number of work/school journeys which previously ran between the northern and southern part of the county through the inner city have been transferred to the Essingeleden bypass.

Car journeys across the charging zone for other reasons than work/school have not transferred to public transport, but have been adjusted by means of altered destination/starting-point for the journey, change of route, or have simply not happened.

The increase in public transport journeys to or from the inner city are journeys to or from work/school. Almost the entire increase has occurred during the charging period. People travelling for other reasons have reduced the number of their public transport journeys.

Those with access to a clean vehicle in March 2006 have altered their car journeys across the charging zone as much as other people, whilst the owners of company cars have scarcely reduced their car journeys across the charging zone during the trial. It is clear that the reduction in car journeys across the charging zone has not implied an increase in tele-working. Nor has car-sharing increased. Nor is there anything which points to the fact that people to any great extent have re-scheduled their journeys to other times of day in order to avoid the charging periods.

1 A journey is a movement by a person from one place to another for a reason. Each movement is counted – irrespective of whether it was made on foot, by bicycle or public transport.

2 A panel is a group studied on repeated occasions

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Foreword

On June 2, 2003 Stockholm City Council decided to propose a congestion charge — the Stockholm Trial. On June 16, 2004 the Swedish Parliament, the *Riksdag*, adopted the Congestion Charge Law (SFS 2004:629). The law makes it possible to charge a congestion tax in Stockholm up to July 31, 2006. On April 28, 2005 the government decided that the congestion charging trial period should begin on January 3, 2006. The main operators in the Stockholm Trial are the City of Stockholm, the National Road Administration, *Vägverket*, and Stockholm Transport, *SL*. The trial is financed by the State.

The Stockholm Trial consists of three parts: extended public transport, congestion tax and more park-and-ride sites in the city and the county. The objectives of the trial are:

- The number of vehicles in the congestion charging zone during the peak periods of the morning and afternoon should be reduced by 10 to 15%.
- Traffic flows should improve on the most heavily congested roads in Stockholm.
- Emissions of carbon dioxide, nitrogen oxides and particles in inner city air should be reduced.
- People residing or staying in the inner city should experience an improvement in the urban environment.

The Congestion Charging Secretariat is the City of Stockholm's project office. Its task is to plan, coordinate, report on and evaluate the trial. In order to provide an answer to the question to what extent the objectives have been reached, and in order to be able to study the effects of the Stockholm Trial, the Congestion Charging Secretariat has, together with the National Road Administration, the Stockholm County Council Regional Planning and Traffic Office, Stockholm Transport, different research institutions (Lund Institute of Technology, the Royal Institute of Technology) and some of the city's administrations (the Traffic Office, the Office of Research and Statistics and the Congestion Charging Secretariat), and independent consultancy firms (Transek, Trivector, etc.) designed a comprehensive program of evaluation. The measurements, analyses and reports have been prepared by public authorities and administrations as well as consultancies specialising in the different sub-areas included in the programme of evaluation. All of the evaluation reports of being published successively on the trial's homepage, www.stockholmsforsoket.se

The project manager for the program of evaluation was initially Joanna Dickinson (Master of Science in Engineering). She was succeeded by Dr Muriel Beser Hugosson and Ann Sjöberg (Licentiate of Technology). Apart from the project managers, Dr Camilla Byström, Annika Lindgren, Oscar Alarik, Litti le Clercq, David Drazdil, Malin Säker and Ann Ponton Klevstedt have also worked on the evaluations.

This report has examined how the Stockholm Trial affected the travel habits of the population of Stockholm County. Project managers at Trivector Traffic were Annika Nilsson and Lena Smidfelt Rosqvist; other contributors have been Karin Neergaard, Andreas Allström, Linnea Viklund, Liselott Söderström and Lovisa Bengtsson.

Stockholm and Lund, August 2006
Trivector Traffic AB

Summary

Introduction

In order to examine the way in which journeys[1] on the part of the residents of Stockholm County have been affected by the Stockholm Trial a comprehensive study of travel habits (RVU) has been made in Stockholm County. The study was carried out both *before* the trial and *during* the trial.

Traffic censuses and other studies in the evaluation have already shown that car use has decreased. The study of travel habits provides an opportunity of acquiring information about the *manner* in which the population have adjusted their travel. Do they change the timing of the journeys? Do they make fewer journeys? Do they choose other destinations for their journeys?

For the sake of readability, however, the concept "journeys *within and to/from* Stockholm County" will be abbreviated to "journeys *within the county*". All journeys shown are, unless otherwise stated, those made by residents of Stockholm County.

The RVU has been supplemented by a non-response study to discover how well those who responded to the RVU actually represent the population of the county. The non-response studies show that there are differences in travel habits between the non-response group and the responding group, but that this does not affect the conclusions concerning *changes* in travel habits.

Seasonal variations have hampered the evaluation

The evaluation of the RVU has been made more difficult by the fact that the study before the trial was made during the autumn, in September/October, and the study during the trial was made in March. the study had initially been planned to take place in September/October 2004 and in October 2005 respectively, but this could not be done, as the start of the Congestion Charging Trial period was delayed until January 2006.

The normal seasonal variations mean that fewer journeys are made in March than in September/October. This seasonal variation should not be confused with the fact that the largest number of car journeys across the charging zone is made in the late spring, in May and June, which is shown in the evaluation report on car traffic.[2]

The number of journeys varies depending on the reason that for the journey and also between different means of transport. for example, cycle journeys are considerably more sensitive to the season and the weather than car journeys, and leisure-time journeys are considerably more sensitive than journeys to and from work/school. We know this because in Sweden a recurrent travel habit survey – the RES – is conducted, which has been used to distinguish the effects of different seasons in the travel habit studies from September/October 2004 compared with March 2006.

[1] By 'journey' here we mean a movement carried out by a person from one place to another for a particular reason. Each movement is counted — whether it occurs on foot, by bicycle, by car or by public transport.

[2] Stockholms stad (2006) – Utvärdering av Stockholmsförsökets effekter på biltrafiken

Where it is possible, we have added comments on the effects of seasonal variation on the differences between the travel habits studies. There are reliable figures for seasonal variation for travel in the county as a whole, and for the number of vehicles crossing the inner city zone. As regards seasonal variations the data for travel by different groups or in different directions, the data is often uncertain, and it also varies a great deal. This means, for example, that it is not possible to isolate the effects of the Stockholm Trial on travel by specific groups.

Results and conclusions

Car journeys by county residents across the charging zone have declined, and journeys by public transport have increased

The congestion charging trial has meant that residents of Stockholm County have reduced the number of their car journeys across the charging zone by approximately 20%. The reduction has probably been reinforced by the rise in petrol prices. Those car journeys which expressed as a percentage have decreased most are journeys between the northern and southern halves of the county across the inner city. The reduced number of car journeys by county residents across the charging zone over a 24-hour weekday period represent a good 80,000 *vehicle passages* across the zone.

Journeys by public transport across the zone have, as a result of the Stockholm Trial, increased by approx. 5%. Converted into passengers crossing the zone on public transport, this increase corresponds to approx. 30,000. Journeys to and from work/school have increased more than this, and journeys for other reasons show a decrease.

Journeys on foot or by bicycle across the charging zone have probably not – or very little – been affected by the trial during those periods to which the travel habit study applies. Journeys on foot and by bicycle show very large seasonal variations, which also to a great extent vary with the weather. The evaluation of journeys on foot and by bicycle did not show any reliable change caused by the trial.

Table 1.1 Number of journeys passing the charging zone at least once during a 24-hour weekday period by various means of transport.

Number of journeys with different means of transport passing the charging zone at least once during a 24-hour weekday period.						
	On foot	By bicycle	Car	Public transport	Others	Total
RVU 2004	20,000	40,000	377,000	70,000	40,000	1,184,000
RVU 2006	22,000	9,000	284,000	727,000	26,000	1,068,000
Percentage change	(+8 %)	-78 %	-25 %	(+3 %)	-33 %	-10 %
Statistically significant difference	No	-31,000	-93,000	No	-14,000	-116,000
Seasonal variation in county according to RES	*8 %*	*-41 %*	*-14 %*	*-2 %*	*-47 %*	*-10 %*
Seasonal variation across charging zone			*-5 %*	*-2 %*		*-5 %*

Where have the car journeys gone?

Journeys to and from work/school represent approximately half of the reduction in car journeys across the charging zone. Most of the missing car journeys to and from work/school across the charging zone have, as a result of the Stockholm Trial, been transferred to public transport. The exception is the relatively few work journeys between the northern and southern parts of the county by car which previously went through the inner city, and which now use the Essingeleden bypass.

There is nothing — either in this study or in the others which are included in the evaluation of the Stockholm Trial — to indicate that tele-working has increased as a result of the trial. Nor do people car share more. Both the travel habit study and manual traffic monitoring show that the number of persons per passenger car has remained constant at 1.26-1.27 persons. Nor is there anything to indicate that to any measurable extent people have shifted their journeys to other times of day in order to avoid the charging periods.

Coordination of several reasons for travel into composite journeys has possibly increased somewhat (roughly the same amount for all means of transport and groups), but the differences are very small. Coordination implies, for example, you do your shopping on your way home from work instead of first going home and then going out to shop. In this way you make three journeys instead of four.

Car journeys for purposes such as shopping/service and leisure show other patterns of adjustment rather than change of means of transport. These car journeys have instead altered their destination/starting-point for the journey changed their route or have simply not been made.

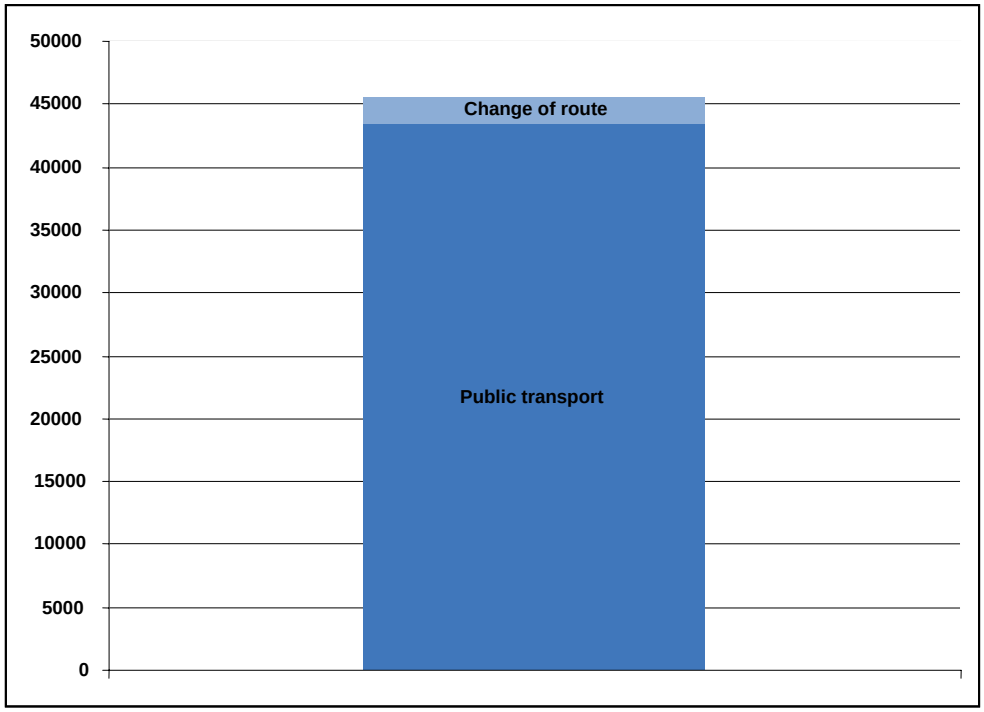

Figure 1.1 Journeys across the charging zone to and from work/school which are no longer made by car during the 24-hour weekday period.

Table 1.2 Number of car journeys passing the charging zone at least once in a 24-hour weekday period for different reasons.

Number of car journeys for different reasons passing the charging zone at least once in a 24-hour weekday period							
	Work/ school	Business trip	Shopping/ service	Leisure time	To home	Others	Total
RVU 2004	100,000	51,000	44,000	43,000	110,000	29,000	377,000
RVU 2006	77,000	36,000	31,000	33,000	86,000	21,000	284,000
Percentage change	-23 %	-30 %	-28 %	-24 %	-22 %	-28 %	-25 %
Statistically significant difference	-23,000	-1, 000	-13,000	-10,000	-24,000	-8,000	-93,000
Estimated seasonal variation	*-8 %*						*-5 %*

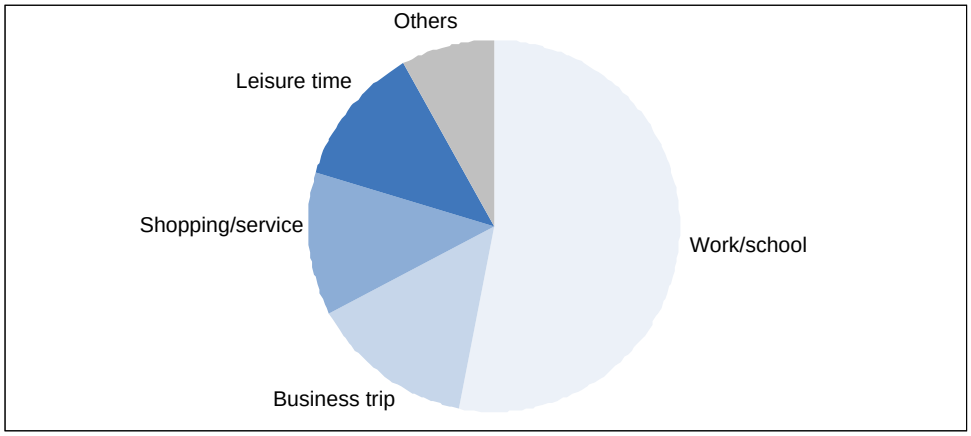

Figure 1.2 Number of car journeys passing the charging zone for different reasons at least once in a 24-hour weekday period, RVU 2004.

Table 1.3 Number of public transport journeys passing the charging zone for different reasons at least once in a 24-hour weekday period.

Number of public transport journeys for different purposes passing the charging zone at least once in a 24-hour weekday period.							
	Work/ school	Business trip	Shopping/ service	Leisure time	To home	Others	Total
RVU 2004	251,000	25,000	64,000	83,000	266,000	18,000	707,000
RVU 2006	271,000	22,000	59,000	77,000	279,00	19,000	727,000
Percentage change	+8 %	(-12 %)	(-8 %)	(-6 %)	(+5 %)	(+5 %)	(+3 %)
Statistically significant difference	+20,000	No	No	No	No	No	No
Seasonal variation							*-2 %*

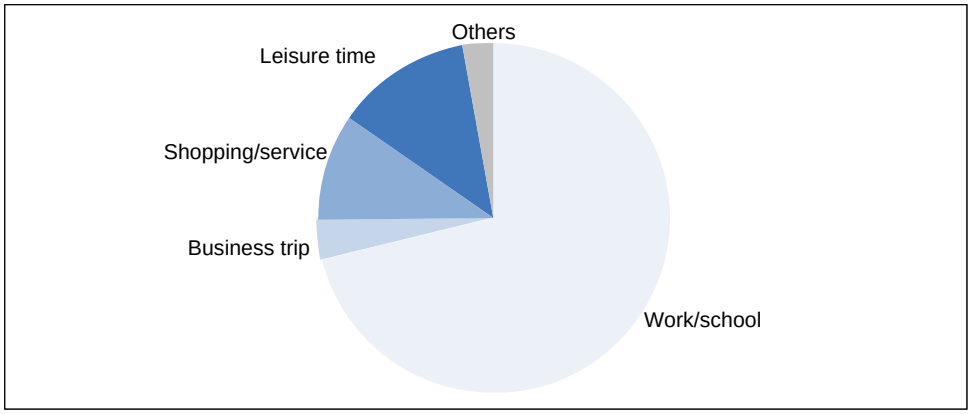

Figure 1.3 Number of public transport journeys for different reasons passing the charging zone at least once during a 24-hour weekday period, RVU 2004.

Groups who have reduced their car journeys across the charging zone

It is not possible to determine how the changes measured between the monitoring periods for different groups have been influenced by the Stockholm Trial. This is because the effect of the seasons varies considerably between different groups, choices of route and means of transport. (What is more there is no reliable data for travel across the charging zone divided into different reasons for travel.) Those differences that are shown include seasonal variations, which it cannot be assumed will look the same for the different groups. Even if one cannot distinguish the effects of the trial from other causes, it is interesting to study who has changed their behaviour the most.

All geographical and socio-economic groups reduced their *car journeys across the charging zone* between September/October 2004 and March 2006, irrespective of whether one is looking at charging periods or periods free of charge. We cannot know how much of the effect on the individual groups has been caused by the trial. The reduction varies in different groups. Job-seekers, students and pensioners are those who have reduced the number of their car journeys most between the periods. Even *during the charging period* all groups have reduced their *car journeys* across the charging zone in March 2006 compared with September/October 2004.

Those who, seen as a percentage, have reduced their car journeys across the charging zone most during the charging period between monitoring occasions are students, job-seekers and adults with older children. But these groups seldom travel across the charging zone. As regards differences between people with different consumption levels, it is people with an average consumption level who have most reduced the number of their car journeys across the charging zone during the charging period. Whilst it is high income earners who make most journeys. Compared with women, men make twice as many journeys across the zone during the charging period. On the other hand men and women have to approximately the same extent reduced their car journeys across the zone during the charging period in March 2006 compared with September/October 2004.

Men living within the zone are responsible for the largest number of car journeys per person across the charging zone both in 2004 and 2006 (despite a major reduction).

Adults with children, particularly those who live within the zone, are also responsible for many car journeys per person across the charging zone.

Table 1.4 Number of car journeys across the charging zone during the charging period per person (excluding the Lidingö exemption), weekdays, September/October 2004 compared with March 2006. Reduced number of car journeys across the whole group.

	Car journeys 2004	Car journeys 2006	Percentage change	Statistically significant difference	Reduction in no. of car journeys in group
3 areas					
Within the zone	0.27	0.20	-26%	-0.072	-17,500
North of the zone	0.16	0.12	- 21%	-0.033	-21,500
South of the zone	0.16	0.11	-29%	-0.045	-30,000
6 areas					
Northern outer suburb	0.14	0.12	(-8%)	No	(-4,000)
Northern inner suburb	0.17	0.11	-31%	-0.052	-13,500
Inner city	0.27	0.20	-26%	-0.071	-17,500
Lidingö	0.33	0.22	(-33%)	No	(-4,000)
Southern inner suburb	0.17	0.12	-30%	-0.052	-16,000
Southern outer suburb	0.14	0.10	-27%	-0.039	-14,000
Gender					
Male	0.24	0.17	-27%	-0.064	-48,000
Female	0.12	0.09	-22%	-0.026	-21,000
Composition of household					
Single adult without children	0.12	0.09	-30%	-0.037	12,000
Two or more adults without children	0.18	0.13	-26%	-0.047	-31 000
Single adult with teenage children*	0.12*	0.14*	(+13%)*	No*	(400)
Two or more adults with teenage children	0.19	0.11	-44%	-0.084	-12,500
Single adult with children *	0.15*	0.12*	(-23%)*	No*	(-1,400)
Two or more adults with children	0.22	0.18	(-16%)	No	(-13,000)
Occupation					
Student (20 years old-)	0.07	0.02	-64%	-0.042	4,000
Pensioner	0.09	0.06	-32%	-0.029	-8,500
Job-seeker*	0.10*	0.06*	(-43%)*	No*	(2,200)
Employed with children(<12 years of age)	0.27	0.22	-21%	-0.059	-17,000
Employed with children (13-17 years of age)	0.31	0.22	(-29%)	No	(-8,500)
Employed without children	0.22	0.17	-23%	-0.050	-28,000
Country of birth					
Born in Sweden	0.18	0.14	-25%	-0.045	-56,500
Born abroad	0.14	0.10	-28%	-0.040	-12,500
Consumption level					
Low	0.10	0.08	-18%	-0.017	-5 500
Medium-low	0.12	0.09	-27%	-0.034	-10 000
Medium	0.21	0.13	-40%	-0.085	-26 500
Medium-high	0.20	0.16	-19%	-0.039	-15 000
High	0.29	0.23	-21%	-0.061	-13 500

The effects of the congestion charge can scarcely be felt in the total travel within the county

Those car journeys across the charging zone which have disappeared as a result of the Stockholm Trial comprise a very small proportion of the total number of journeys (including all means of transport) which the county residents make — on a weekday approximately 2%. Of the car journeys in the county, the reduction in car journeys across the charging zone comprises a good 4% — this, too, is a very small proportion.

The total number of journeys in the county in a 24-hour weekday period has declined rather more between monitoring periods than they normally do between these seasons. The reduction — assuming normal seasonal variation — is approx. 3% and corresponds to approximately twice as many journeys as the reduction in the number of journeys across the charging zone. It is therefore on the basis of these results very uncertain whether the total number of kilometres travelled in the county has changed.

Table 1.5 Number of car journeys in different directions.

Total number of car journeys in different directions in a 24-hour weekday period				
Direction	RVU 2004	RVU 2006	Percentage change	Statistically significant difference
North, to/from the zone	161,000	133,000	-17 %	-28,000
South, to/from the zone	147,000	117,000	-21 %	-30,000
Between North and South	166,000	112,000	-33 %	-54,000
-of which via Essingeleden	104,000	83,000	-20 %	-21,000
-of which not via Essingeleden	62,000	29,000	-53 %	-3, 000
Within the zone	79,000	62,000	-22 %	-17,000
Outside the zone	1,591,000	1,385,000	-13 %	-206,000
Outside the county to the zone	7,000	5,000	(-24 %)	No
Total	2,15,000	1,814,000	-16 %	-337,000
Seasonal variation RES			*-14 %*	

Table 1.6 Total number of journeys of county residents in the county by different means of transport in a 24-hour weekday period.

Number of journeys per 24-hour weekday period by different means of transport						
	On foot	By bicycle	Car	Public transport	Other	Total
RVU 2004	745.000	295,000	2,151,000	1,376,000	97,000	4,664,000
RVU 2006	689,000	45,000	1,814,000	1,413,000	64,000	4,025,000
Percentage change	-8 %	-85 %	-16 %	+3 %	-34 %	-14 %
Statistically significant difference	-56,000	-250,000	-337,000	+37,000	- 33,000	-639,000
Seasonal variation RES	*8 %*	*-41 %*	*-14 %*	*-2 %*	*-47 %*	*-10 %*

1. Introduction

1.1 Background and aim

As part of an evaluation of the Stockholm Trial a comprehensive study of travel habits has been carried out in Stockholm County. The aim of the study has been to investigate in what ways the journeys[5] made by the residents of Stockholm County have been affected by the Stockholm Trial. Has the number of journeys, the choice of means of transport or the timings of journeys been affected? Moreover, can we with the help of background information about the population discover whether the adjustment differs between different geographical and socio-economic groups? The study was carried out both *before* the conduct of the trial and *during* the period in which time it took place. The current report describes the methods and results of the study.

Anticipated effects

When the congestion charging trial period began in Stockholm, it was anticipated that travel in the county would change. The greatest changes were anticipated for journeys — primarily car journeys — across the charging zone itself, as these journeys are directly affected by the congestion tax. Journeys further away from the charging zone were, in a corresponding way, expected to be affected to a lesser extent. As, before the trial, only 7% of journeys on weekdays in the county were made by car across the intended charging zone, no major changes in travel habits in the county as a whole were anticipated.

The expectation was that county residents would be influenced to varying degrees, and adjust in different ways, depending on different geographical and socio-economic prerequisites. similarly it was assumed that adjustment would be influenced by how closely the reasons for journeys were linked to time and place.

1.2 Method

The traffic habits study, RVU, has been carried out on three main occasions — September/October 2004 and 2005 and March 2006. The study has been conducted as a postal questionnaire survey sent to two main panels[6] in the population in the age range 12-84 registered in Stockholm County in 2004 and 2005 respectively. The original size of the panels was 77,000 individuals (county panel) and 7500 individuals

5 By journey we mean a movement made by a person from one place to another for a particular purpose. Each movement is counted – whether it be on foot, by bicycle, by car or public transport.

6 A panel is a group that on repeated occasions is studied in order to ascertain how, for example, their travel habits have changed.

(commuter panel) respectively. When the survey was repeated during the Stockholm Trial in 2006 the same individuals were approached who had responded to the questionnaire in September/October 2004 and 2005 respectively and who had not moved out of the county. In total a good 24,000 responded plus 2,221 individuals in the survey both before and during the trial. The survey included, on the one hand, background questions about the individual and the household, on the other a travel diary with questions on all journeys made on a monitoring day. The first and largest panel addressed itself to all the Stockholm County residents. The second and smaller panel, the commuter panel, focused on individuals resident outside the area of the congestion tax and working within the charging zone.

In order to be able to relate the two main panels to each other there is also a control panel. This is a group from the county panel who were asked to describe their travel habits in September/October 2005. They have also described their journeys three times.

The RVU has also been supplemented with non-response studies. These show that there are differences in travel habits between the non-response group and the responding group, but that these do not affect the conclusions in this report.

In the assessment of how the Stockholm Trial has changed county residents travel habits other factors have been taken into account which can have affected travelling. As the congestion charging trial was conducted later than planned, the pre-trial study was carried out in September/October, while the study during the trial was carried out in March. Apart from the fact that travel normally differs between autumn and spring, September/October 2004 had fine weather whilst March 2006 was unusually cold during the period of the study. Between these two monitoring occasions the price of petrol was, what is more, raised, which, irrespective of other circumstances affects car travel. All of this has been taken into account in the evaluation of the effects of the Stockholm Trial on travel habits.

Methods and monitoring data are presented in more detail in Chapter 4.

2. Results

Those results presented proceed from differences between the travel habits stated by Stockholm County residents in September/October 2004 compared with those travel habits stated by the same population in March 2006. It is these values and differences that are presented in the tables in this chapter. Where possible reference values are also shown e.g. for such differences between autumn and spring as can be regarded as seasonal variations. In the description of the results these are put in relation to different values in order to determine what differences are the result of the Stockholm Trial.

The journeys included in the study are journeys to/from and within the county made by Stockholm county residents. All the days of the week are included in the study. Where it was not possible to determine statistically significant differences between travel in September/October 2004 and during the period of the congestion charging trial in March 2006, no results are presented. Those interested in more detailed data on travel in Stockholm County are referred to the Trivector report 2005:25 *Resvanor i Stockholms län 2004* ("Travel habits in Stockholm County 2004").

The RVU is based on people accounting for the journeys they have made on a particular day. For the evaluation of the Stockholm Trial the number of passages across the charging zone to which these journeys correspond has also been calculated. The reader's attention should be drawn to when the figures refer to *journeys*, and when they refer to *passages*. Normally the figures in the table refer to the number of *journeys*. In the RVU journeys are classified according to the reason for the journey and there is a category which applies to journeys "to home". In certain sections pie charts are given in which these "to home" to journeys are divided into different categories according to the reason for the journey.

All the tables show measured differences between two monitoring occasions, September/October 2004 and March 2006 respectively.

The results chapter is divided into four sections. In the first journeys across the charging zone are presented, then distribution effects on different social groups. In the third section data is presented for total travel in the county, and in the fourth section data is presented for travel in the county divided into different directions.

2.1 Differences in travel across the charging zone

Car journeys across the charging zone

Car journeys are responsible for the *largest proportion* of the reduction in the number of journeys across the charging zone. During a 24-hour weekday period residents' car journeys across the charging zone fell by an order of 20% because of the Stockholm Trial. Possibly the effect is slightly exaggerated by an increase in petrol price. The reduction between monitoring occasions is even greater if one includes seasonal variation, see Table 2.1. The reduction caused by the trial can be compared with the measurements car traffic[7] which shows that the total traffic across the charging zone in a 24-hour weekday period had decreased by 22% between the spring of 2005 and the spring of 2006. The RVU, ignoring the seasonal variation shows a somewhat lower percentage reduction than does the monitoring. One explanation for this difference is that the RVU only covers those private journeys made across the charging zone, unlike the monitoring which includes all traffic passing the charging zone.

Some of the reduced number of car journeys are those that usually drive straight through the inner city and therefore make more than one passage of the charging zone. The reduction in the number of car journeys corresponds to approximately 2,80,000 *car passages* across the charging zone. The estimate is based on a normal occupancy of 1.27 persons per car.

Table 2.1 Number of car journeys passing the charging zone at least once during a 24-hour weekday period. Base = main means of transport for journey across charging zone.: $N_{weekday}$= 12 179 (RVU 2006), $N_{weekday}$ = 13 718 (RVU 2004) and $N_{weekend}$= 3 077 (RVU 2006) and $N_{weekend}$ = 3 229 (RVU 2004) respectively.

Total number of car journeys passing charging zone at least once			
	24-hour weekday period during the charging period	24-hour weekday period during charge-free period	24-hour weekday period
RVU 2004	304,000	73,000	377,000
RVU 2006	228,000	56,000	284,000
Percentage change	-25 %	-24 %	- 25 %
Statistically significant difference	-76,000	-17,000	- 93,000
Traffic monitoring across charging zone reduction 2005 to 2006			*- 22 %*
Seasonal variation according to traffic monitoring across charging zone			*- 5 %*

Car journeys across the charging zone divided into reason for journey

The number of car journeys county residents make across the charging zone during a 24-hour weekday period has fallen by approx. 20% because of the Stockholm Trial. The greatest reduction in absolute figures is in journeys to and from work/school, whilst the greatest percentage reduction was partly found among and other journeys (other journeys include, for example, fetching and dropping off individuals and groups). Different reasons for journeys show great differences in seasonal variations.

[7] Stockholms stad (2006) – Utvärdering av Stockholmsförsökets effekter på biltrafiken

This means that it is not possible to state with certainty precisely how the Stockholm Trial has affected different reasons for journeys — work/school journeys excepted (see the section on Where have the car journeys gone?) Note that seasonal reductions in autumn and spring in RES referred to the study months of September/October compared with March. Car traffic across the charging zone is at its maximum during the latter part of the spring, in May-June which is described in the car traffic report[8].

The results are similar if one merely studies the journeys during the charging period — which means that there been no shift of journeys from the charging period to the charge-free period on weekdays.

Table 2.2 Number of car journeys for different reasons passing the charging zone at least once during a 24-hour weekday period. Base = main reason for car journeys across charging zone during a 24-hour weekday period: N=3 648 (RVU 2006) and N=4 902 (RVU 2004) respectively.

Number of car journeys for different reasons passing charging zone at least once during a 24-hour weekday period							
	Work/ school	Business trip	Shopping// service	Leisure time	To home	Others	Total
RVRVU 2004	100,000	5, 000	44,000	4,000	110,000	29,000	37,000
RVRVU 2006	77,000	36,000	31,000	33,000	86,000	21,000	284,000
Percentage change	-23 %	-30 %	-28 %	-24 %	-22 %	-28 %	-25 %
Statistically significant difference	-23,000	-15,000	-1,000	-1,000	-2,000	-8,000	-93,000
Seasonal variation in the county according to RES	*-7 %*						*-5 %*

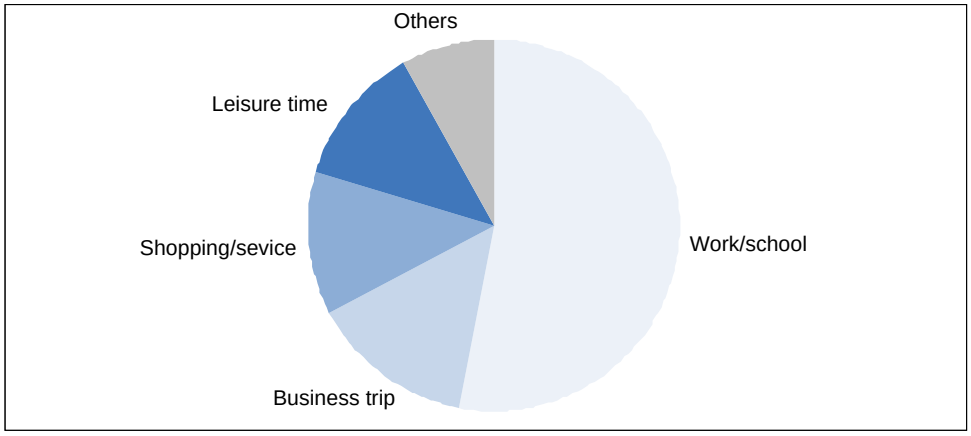

Figure 2.1. Number of car journeys for different reasons passing charging zone at least once during a 24-hour weekday period,, RVU 2004.

What has happened to the car journeys on the Essingeleden bypass?

In order to be able to assess how the residents have changed their car use across the inner city and along the Essingeleden bypass respectively, those journeys which those

[8] Stockholms stad (2006) – Utvärdering av Stockholmsförsökets effekter på biltrafiken

who commute to work have made between the two halves of the county have been studied. The reduction between measurements of such car journeys going via the Essingeleden bypass (-11 percent) are less than the seasonal variation for car journeys in the county as a whole (-14 percent), see Table 2.3. The difference is not significant, and should be treated with caution, but, if one assumes that this is correct, it means that these commuters have as a result of the Stockholm Trial increased their car journeys on the Essingeleden bypass somewhat. If instead one studies the car journeys made by these commuters to work between North and South passing through the inner city, one can say that these have fallen dramatically and considerably more than the seasonal variation, see Table 2.4.

These car journeys differ from other journeys as regards transfer between 24-hour weekday periods and weekend periods, see Tables 2.5 and 2.6. The reduction for the Essingeleden bypass is considerably greater at weekends than in 24-hour weekday periods, whilst for car journeys through the inner city indications are that there is rather a small increase at weekends, whilst 24-hour weekday periods shows a large fall. This chimes well with what one might believe about the transfer of journeys. The resistance to choosing to drive through the inner city on weekdays is great, and then the Essingeleden bypass is also relatively heavily congested. At weekends the congestion on the road network is not as great, and flexibility in the choice of route is greater.

Table 2.3 Number of car journeys for different reasons in a N-S direction via the Essingeleden bypass during a 24-hour weekday period made by people commuting between N and S.

Number of car journeys made by "commuters" in the direction N-S via the Essingeleden bypass for different purposes during a 24-hour weekday period							
	Work/ school	Business trip	Shopping / service	Leisure time	To home	Other	Total
RVRVU 2004	6,400	2 ,400	500	1 ,700	6 ,800	600	18 ,400
RVRVU 2006	6 ,800	1 ,500	700	800	5 ,500	1 ,100	16, 400
Percentage change	(+5 %)	(-36 %)	(+55 %)	-52 %	(-19 %)	(+66 %)	(-11 %)
Statistically significant difference	No	No	No	No	No	No	No
Seasonal variation in the county according to RES							*-14 %*

Table 2.4 Number of car journeys in an N-S. direction not taking the Essingeleden bypass for different reasons in a 24-hour weekday period, made by people commuting between N and S.

Number of car journeys made for different reasons by "commuters in that direction En-S. who have not taken the Essingeleden bypass 24-hour weekday period							
	Work/ school	Business trip	Shopping/ service	Leisure time	To home	Other	Total
RVU 2004	3,200	900	2,000	800	2,900	1,200	11,000
RVU 2006	2,000	500	400	600	1,600	400	5,500
Percentage change	(-39 %)	(-40 %)	-80 %	(-25 %)	-46 %	-66 %	-50 %
Statistically significant difference	No	No	-1,600	No	-1,300	-800	-5, 500
Seasonal variation in the county according to RES							*-14 %*

Table 2.5 Number of car journeys in a N-S. direction in a weekday 24-hour period.

Number of car journeys in the direction N-S in a weekday 24-hour period			
	Via Essingeleden bypass	Through the inner city	Total
RVRVU 2004	18,000	11,000	29,000
RVRVU 2006	16,000	5,000	22,000
Percentage change	(-11 %)	-50 %	-26 %
Statistically significant difference	No	-6,000	-8,000

Table 2.6 Number of car journeys in the direction N-S during a week 24-hour period.

Number of car journeys in the direction N-S during a week 24-hour period			
	Via Essingeleden bypass	Through the inner city	Total
RVRVU 2004	15,000	12,000	27,000
RVRVU 2006	12,000	12,000	24,000
Percentage change	(-20 %)	(+3 %)	(-10 %)
Statistically significant difference	No	No	No

Public transport journeys across the charging zone

The number of public transport journeys across the charging zone during an entire 24-hour weekday period has increased by 3% between the two measuring occasions; the increase is, however, not significant at the 95% level, see Table 2.7. If one takes into account seasonal variations the Stockholm Trial may have meant an increase in the order of 5%. It is journeys to work and school which in principle are responsible for the entire increase in public transport travel. The results are similar if one only studies journeys during the charging period.

Table 2.7 Number of public transport journeys for different reasons passing across the charging zone at least once in a 24-hour weekday period. Base = main reason for public transport journeys across charging zone in a 24-hour period: N=7741(RVU 2006) and N=7 552 (RVU 2004) respectively. .

Number of public transport journeys for different reasons passing the charging zone at least once during a 24-hour weekday period.							
	Work/ school	Business trip	Shopping/ service	Leisure time	To home	Other	Total
RVU 2004	251,000	25,000	64,000	83,000	266,000	18,000	707,000
RVU 2006	271,000	22,000	59,000	77,000	279,000	19,000	727,000
Percentage change	+8 %	(-12 %)	(-8 %)	(-6 %)	(+5 %)	(+5 %)	(+3 %)
Statistically significant difference	+20 000	No	No	No	No	No	No
Seasonal variation							*-2 %*

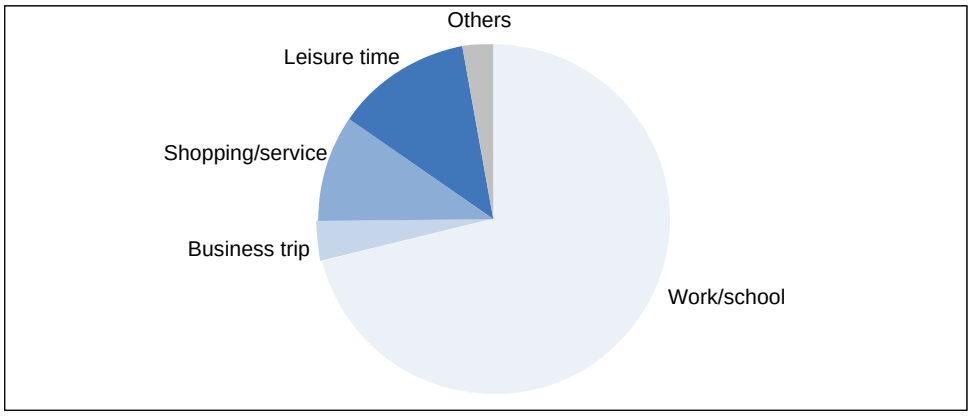

Figure 2.2 Number of journeys on public transport for different reasons passing the charging zone at least once during a 24-hour weekday period, RVU 2004.

It can also be ascertained that more than four fifths of the public transport journeys occurred during the charging period, and generally speaking the whole increase in public transport travel occurred during the charging period.

Travel across the charging zone - all means of transport

The *total* number of journeys including all means of transport *across the charging zone during the charging period* had in March 2006 decreased by 95,000 journeys compared with September/October 2004, which corresponds to a reduction of 10%. Taken across an entire 24-hour weekday period journeys across the charging zone had fallen by 116,000 journeys, which means that travel outside the charging period had also decreased, see Table 2.8.

The reduction in the total number of journeys across the charging zone on weekdays is approximately twice as large as the estimated seasonal variation between the two monitoring occasions, see Table 2.8. This indicates that county residents in total are travelling to the inner city rather less than during the trial.

Table 2.8 Total number of journeys passing the charging zone at least once (all means of transport). Base= number of journeys across charging zone per person: $N_{weekday}$ = 16 476 (RVU 2006), $N_{weekday}$ = 16 139 (RVU 2004) and $N_{weekend}$= 6 561 (RVU 2006) and $N_{weekend}$ = 6 383 (RVU 2004) respectively.

Total number of journeys passing charging zone at least once			
	Weekday 24-hour period during charging period	Weekday 24-hour period during charge-free period	Weekday 24-hour period
RVU 2004	984,000	200,000	1,184,000
RVU 2006	889,000	179,000	1,068,000
Percentage change	-10 %	-11 %	-10 %
Statistically significant difference	-95,000	-21,000	-116,000
Seasonal variations according to traffic monitoring across charging zone			*-5 %*

Just about a quarter of the journeys across the charging zone on weekdays are car journeys. Despite this, car journeys are responsible for a good three quarters of the reduction in the number of journeys across the charging zone, see Table 2.9. During the weekend car journeys are responsible for a considerably larger proportion of the journeys across the charging zone, approx. 45%.

Cycle journeys have declined a great deal between the monitoring occasions in September/October 2004 March 2006, see Table 2.9. The reduction across the charging zone is rather larger than for cycle journeys in the county. The reduction across the charging zone is also greater than the normal seasonal variation for the county, according to RES. But if one also takes into account the fact that winter road conditions obtained during the monitoring period in 2006, unlike the monitoring period in 2004 when there was no snow on the ground, then the reduction in cycling seems likely to be an effect of weather and not of the Stockholm Trial.

Table 2.9 Total number of journeys with different means of transport passing charging zone at least once during a weekday 24-hour period (main means of transport for the journey) Base= main means of transport journeys across charging zone on weekdays: N=12 179 (RVU 2006), N=13 718 (RVU 2004)

Number of journeys with different means of transport passing charging zone at least once during a weekday 24-hour period						
	On foot	Bicycle	Car	Public transport	Other	Total
RVU 2004	20,000	40,000	377,000	707,000	40,000	1,184,000
RVU 2006	22,000	9,000	284,000	727,000	2,000	1,068,000
Percentage change	(+8 %)	-78 %	-25 %	(+3 %)	-33 %	-10 %
Statistically significant difference	No	-31,000	-9,000	No	-14,000	-116,000
Seasonal variation in the county according to RES.	*8 %*	*-41 %*	*-14 %*	*-2 %*	*-47 %*	*-10 %*
Seasonal variation according to traffic monitoring across charging zone			*-5 %*			*-5 %*

There are small differences in the distribution of means of transport between journeys made during the charging period and outside the charging period respectively. The change between 2004 at 2006 is generally speaking as big irrespective of what part of the day is being studied, see the section “Travel across the charging zone divided into week and day”

Journeys across the charging zone divided into reasons for journey

The reduction in the total number of journeys across the charging zone is divided into different reasons for the journey according to Table 2.10. Business trips have presumably not been affected by the Stockholm Trial. The change one can see in the monitoring results is the result of something else. The reduction in leisure time journeys is in line with seasonal variation according to RES for the county as a whole. The number of journeys to and from work/school seems rather to have increased somewhat during the course of the trial. This must be the result of the business cycle rather than the Stockholm Trial. One can however establish that the trial scarcely reduced the total number of work/school journeys.

Journeys for shopping/service have on the other hand decreased more than the seasonal variation shown by RES for the county as a whole, see Table 2.10. It is also probably not merely the seasonal variation which has caused journeys for shopping/service across the charging zone to a decrease between September/October 2004 and March 2006, but this can be one effect of the Stockholm Trial. Those values compared between the RVU and RES were not measured in exactly the same way, which is why no precise effects have been estimated or should be estimated.

Table 2.10 Number of journeys for different reasons passing the charging zone at least once in a weekday 24-hour period Base= main reason for journeys across charging zone in 24-hour weekday period: N=12 336 (RVU 2006) and N=13 862 (RVU 2004) respectively.

Number of journeys with different reasons passing charging zone at least once in a weekday 24-hour period							
	Work/ school	Business trip	Shopping/ service	Leisure time	To home	Other	Total
RVU 2004	381,000	84,000	117,000	138 000	411,000	53,000	1,184,000
RVU 2006	361,000	64,000	98,000	117,000	385,000	43,000	1,068,000
Percentage change	-5 %	-23 %	-17 %	-15 %	-7 %	-19 %	-10 %
Statistically significant difference	-20,000	-20,000	-19,000	-2,000	-2, 000	-10,000	-116,000
Seasonal variation for county according to RES	*-7 %*	*-16 %*	*-9 %*	*-17 %*	-	*7 %*	*-10 %*

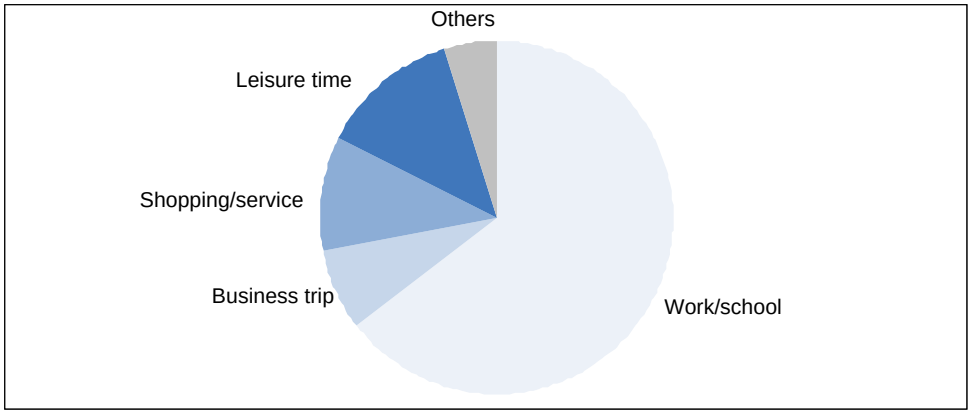

Figure 2.3. Number of journeys for different reasons passing the charging zone at least once in a 24-hour weekday period, RVU 2004.

As to the rest, it can be said that the number of work journeys during the charge-free period has increased by 6,000 journeys, see Table 2.11, and generally speaking the entire decrease in the number of journeys for shopping and service has taken place in the charging period.

Table 2.11 Number of journeys for different reasons passing the charging zone in a 24-hour weekday period during the charging period. Base= main reason for journeys across charging zone at least once in the charging period: N=10 094 (RVU 2006) and N=11 415 (RVU 2004) respectively .

Number of journeys for different reasons passing the charging zone at least once during the charging period							
	Work/ school	Business trip	Shopping/service	Leisure time	To home	Other	Total
RVU 2004	343,000	79,000	110,000	112,000	294,000	46,000	984,000
RVU 2006	317,000	62,000	92,000	98,000	281,000	39,000	889,000
Percentage change	-8 %	-22 %	-16 %	- 13 %	(-4 %)	- 16 %	-10 %
Statistically significant difference	-26,000	-17,000	-18,000	-14,000	No	-7,000	-95,000

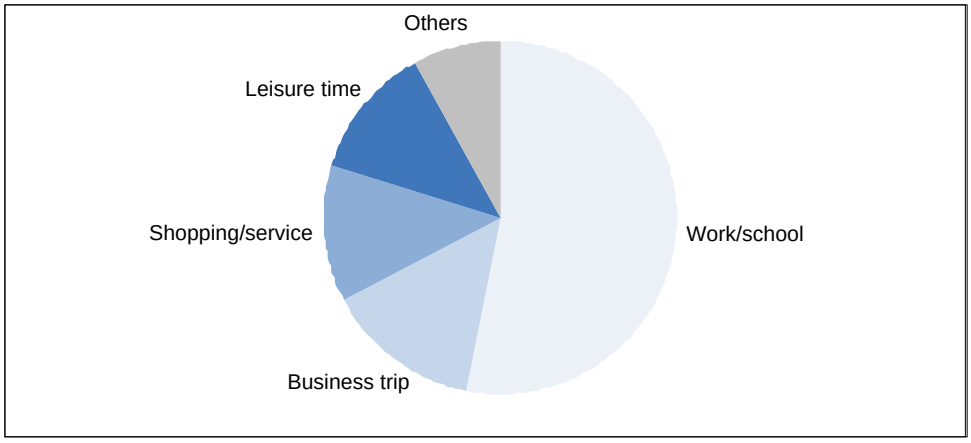

Figure 2.4. Number of journeys for different reasons passing the charging zone at least once in a 24-hour period in the charging period, RVU 2004.

Journeys across the charging zone per person and day

Most of the residents of the county do not travel to Stockholm's inner city on an ordinary weekday or at the weekends, see Table 2.12. The proportion of individuals who have not made any journey across the charging zone has increased significantly during a 24-hour weekday period but not during a 24-hour weekend.

Table 2.12 Proportion of the population who have not made any journey across the charging zone. Base= number of journeys across the charging zone per person: $N_{weekday}$= 16 476 (RVU 2006), $N_{weekday}$ = 16 139 (RVU 2004) and $N_{weekend}$= 6 561 (RVU 2006) and $N_{weekend}$ = 6 383 (RVU 2004) respectively.

Proportion of the population who have not made any journey across the charging zone				
	24-hour weekday period during charging period	24-hour weekday period during charge-free period	24-hour weekday period	24-hour weekend period
RVU 2004	65.1 %	88.8 %	63.9 %	76.2 %
RVU 2006	67.8 %	89.5 %	66.4 %	77.4 %
Percentage change	+4 %	+0.8 %	+4 %	(+2 %)
Statistically significant difference	+2.7 %-points	+0.7 %-points	+2.5 %-points	No

During the charging period the average number of journeys across the charging zone has decreased by 0.06 journeys per person, see Table 2.13. Even during the charge-free period on weekdays is a small reduction in the number of journeys across the zone has occurred

Table 2.13 Average number of journeys across the charging zone per person. Base= number of journeys per person: $N_{weekday}$= 16 476 (RVU 2006), $N_{weekday}$ = 16 139 (RVU 2004) and $N_{weekend}$= 6 561 (RVU 2006) and $N_{weekend}$ = 6 383 (RVU 2004) respectively.

Average number of journeys across the charging zone per person			
	24-hour weekday period during charging period	24-hour weekday period during charge-free period	24-hour weekday period
RVU 2004	0.63	0.13	0.76
RVU 2006	0.57	0.11	0.68
Percentage change	-10 %	-11 %	-10 %
Statistically significant difference	-0.06	-0.02	-0.08
Season variation across the zone			*-5 %*

Changes in length of journey and length of car journey

The average length of journey of those journeys — taking all means of transport together – which crossed the charging zone in a 24-hour weekday period were the same during March 2006 as during September/October 2004. The average length of journey for journeys across the zone undertaken in a 24-hour weekend period – taking all means of transport together — was however rather shorter, see Table 2.14. For car journeys across the zone the average journey length has become shorter during the charge-free period whilst there is no noticeable difference during the charging period, see Table 2.14. A comparison of *all* of the journeys in the county did not show any seasonal variation in average journey length either for journeys with all means of transport or for car journeys, see Table 2.32. It

should be mentioned that the number of observations in RES was small and that it was not possible to make a comparison only for car journeys across the zone.

Table 2.14 Average length of journey (all means of transport) for journeys passing the charging zone at least once. Base= all journeys across the zone with relevant journey length: $N_{weekday}$= 11 146 (RVU 2006). $N_{weekday}$= 11 990 (RVU 2004). $N_{weekend}$= 2680 (RVU 2006) and $N_{weekend}$ = 2 531 (RVU 2004) respectively .

Average journey length for all journeys passing the charging zone at least once				
	24-hour weekday period during charging period	24-hour weekday period during charge-free period	24-hour weekday period	24-hour weekend period
RVU 2004	18.0 km	18.5 km	18.1 km	19.9 km
RVU 2006	17.9 km	18.8 km	18.0 km	18.6 km
Percentage change	(-0.6 %)	(2 %)	(-0.6 %)	-7 %
Statistically significant difference	No	No	No	-1.3 km

A large proportion of the journeys across the charging zone are work trips, which in most cases have fixed starting points and destinations, which of course gives unchanged lengths of journey. Weekend journeys have a higher proportion of free journeys and here one has greater freedom/readiness to choose destinations nearer to home, for example the shop that is nearer.

Table 2.15 Average length of car journeys passing the charging zone. Base= all car journeys across the zone with relevant journey length: $N_{weekday}$= 3 356 (RVU 2006), $N_{weekday}$= 4 207 (RVU 2004), $N_{weekend}$= 1 474 (RVU 2006) and $N_{weekend}$ = 1 386 (RVU 2004) respectively.

Average journey length of car journeys passing the charging zone at least once				
	24-hour weekday period during charging period	24-hour weekday period during charge-free period	24-hour weekday period	24-hour weekend period
RVU 2004	20,5 km	21,9 km	20,7 km	23,0 km
RVU 2006	19,7 km	19,2 km	19,5 km	21,1 km
Percentage change	(-4 %)	-12 %	- 6 %	-8 %
Statistically significant difference	No	- 2,7 km	-1,2 km	-1,9 km

Journeys across the charging zone divided into week and day

Division of journeys across weekdays and weekends

The decrease in car journeys across the charging zone is approximately twice as large on a weekday as at the weekend, see Table 2.16. For journeys across the zone by public transport the percentage increase is as large on the weekday as at the weekends.

Table 2.16 Number of journeys by car and by public transport passing the charging zone at least once in a 24-hour period, broken down into weekdays and weekends. $N_{weekday}$=36 009 (RVU 2004), $N_{weekday}$=32 792 (RVU 2006), $N_{weekend}$=10 509 (RVU2004), $N_{weekend}$=9 151 (RVU 2006)

Journeys passing the charging zone at least once in a 24-hour period broken down into weekdays and weekends				
	Car journeys Weekday	Car journeys Weekend	Public transport journeys Weekday	Public transport journeys Weekend
RVU 2004	377,000	373,000	707,000	291,000
RVU 2006	284,000	32,000	727,000	299,000
Percentage change	-25 %	-13 %	+3 %	+3 %
Statistically significant difference	-93,000	-48,000	+20,000	+8,000

Car journeys during respective charging intervals

A breakdown of journeys according to starting times can give some indication of how the different charging levels have affected travel. Notice that it is the starting times for the journeys that have been studied, not the point in time when they passed the charging zone.

The distribution of starting times for car journeys between the different charging intervals was the same during the congestion charging trial period in March 2006 as it was in September/October 2004. The number of car journeys across the zone has dropped during all of the charging intervals, and the greatest reduction has occurred during the lowest charge interval, see Table 2.17. In the commuter panel (see Appendix 2) it is the car journeys in the 10 kronor and 15 kronor intervals that have decreased. In the 20 kronor interval in the mornings between 0730 and 0829 one can actually see an increase in the number of car journeys across the zone, see Appendix 2.

Table 2.17 Number of car journeys across the charging zone at least once, with starting times during each charging interval. Base= weekday journeys by car across the zone during the charging period: N=2 882 (RVU 2006) and N= 3 996 (RVU 2004) respectively.

Number of car journeys passing the charging zone at least once with a starting time in each charging interval			
	Fee 10 kronor	Fee 15 kronor	Fee 20 kronor
RVU 2004	156,000	54,000	94,000
RVU 2006	113,000	43,000	7,000
Percentage change	-28 %	-19 %	-24 %
Statistically significant difference	-43,000	-11,000	-22,000

In a more detailed study of starting times for those car journeys starting within the zone and crossing the charging zone in a 24-hour weekday period it is clear that the greatest increase in the number of journeys is to be found between 0900 and 1529, see Figure 2.5. This period has fewer journeys strictly fixed in time and space.

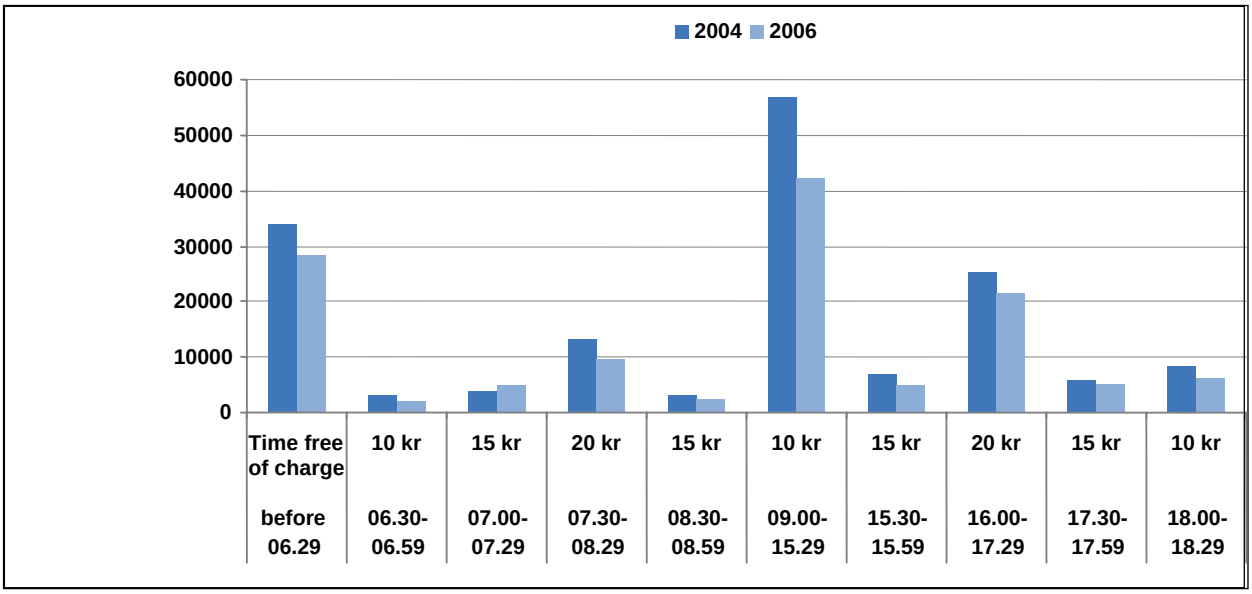

Figure 2.5 Number of car journeys across the charging zone starting within the zone in different charging intervals. Base= weekday journeys by car across the zone starting within the zone: N = 1 627 (RVU 2006) and N = 2 062 (RVU 2004) respectively.

The results of the RVU have been compared with car traffic measurements[9] broken down into morning and afternoon traffic. Traffic measurements show a greater reduction in car traffic across the charging zone during the morning, whilst the RVU shows a greater reduction in the afternoon, see Table 2.18. it should however be noted that the traffic measurements compare all traffic from the spring of 2006 with the spring of 2005, whilst the RVU only compares car traffic for residents of the county in March 2006 with September/October 2004. What is more, the traffic measurements are based on the number of vehicle *passages*, whilst the RVU is based on the number of car *journeys*.

Table 2.18 Reduction in the number of car journeys passing the charging zone at least once during the charging period in the morning and afternoon rush respectively.

Reduction in the number of car journeys passing the charging zone at least once			
	Morning (0730-1529)	Afternoon (1600-1800)	Entire charging period (0630-1829)
Traffic monitoring	-16 %	-24 %	-22 %
RVU	-24 %	-22 %	-25 %

Public transport journeys during respective charging intervals

The breakdown of starting times of public transport journeys between the different charging intervals is the same during March 2006 as during September/October 2004. The majority of the public transport journeys fall in the time interval when the maximum charge is made for passing the charging zone by car. Note however that it is the starting time for the journeys, which has been studied, not the point in time when they passed charging zone.

[9] Stockholms stad, Utvärdering av Stockholmsförsökets effekter på biltrafiken, Rapport juni 2006.

The total number of journeys under respective charging intervals

The number of journeys across the charging zone had fallen in all charging intervals during March 2006 compared with September/October 2004. The greatest percentage reduction had occurred in the interval with the lowest charge, see Table 2.19. Note that the breakdown of journeys into respective charge intervals has been made on the basis of the starting time for the journeys, not the point in time when they passed the charging zone.

Table 2.19 Total number of journeys (all means of transport) passing the charging zone at least once during the charging period, broken divided into charging intervals. Base= number of journeys per person during the charging period: $N_{weekday}$= 16 476 (RVU 2006), $N_{weekday}$ = 16 139 (RVU 2004) and $N_{weekend}$= 6 561 (RVU 2006) and $N_{weekend}$ = 6 383 (RVU 2004) respectively .

Total number of journeys passing the charging zone at least once during the charging period divided into charging intervals			
	Fee 10 kronor	Fee 15 kronor	Fee 20 kronor
RVU 2004	420,000	197,000	367,000
RVU 2006	37,000	18,000	3,000
Percentage change	-12 %	-7 %	-9 %
Statistically significant difference	-48,000	-15,000	-32,000

Where have the car journeys gone?

On the basis of the results presented here can we discover where the reduced car journeys across the charging zone have gone? Yes — for most journeys we can say precisely what has happened. This applies to journeys to and from work/school — journeys fixed in time and space and therefore easier to trace. Journeys to and from work/school represent more than half of the journeys by car across the charging zone, see Figure 2.6. In the case of journeys for other reasons we know what adjustments have been made, but not exactly the extent to which the adjustments break down.

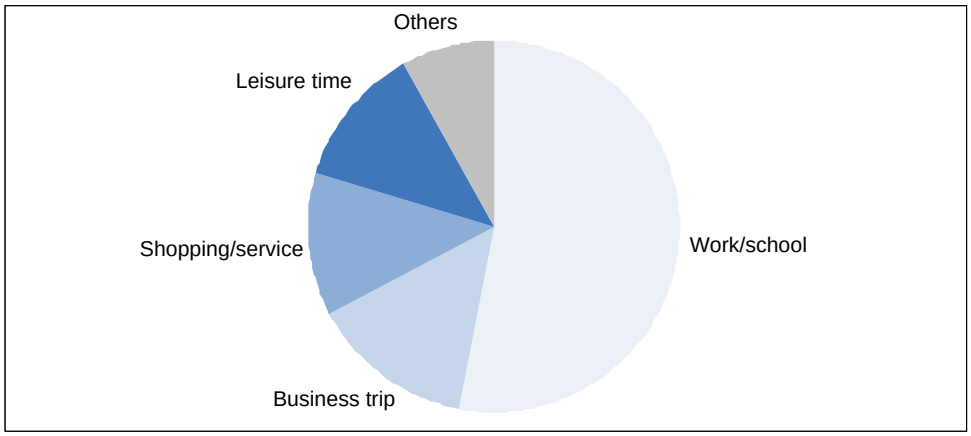

Figure 2.6. Number of journeys for different reasons passing the charging zone in a 24-hour weekday period in the charging period, RVU 2004.

There is nothing — either in this study or in those others that form part of the evaluation of the Stockholm Trial — to indicate that tele-working might have increased as a result of the trial. Nor do people car-share more. Both the RVU and manual traffic monitoring showed that the number of individuals per private car remains constant at 1.26 to 1.27 persons. Nor is there anything to indicate that to any

great extent people have shifted their journeys to other times of day in order to avoid the charging periods. Coordination of several reasons for travel into composite journeys has possibly increased somewhat (approximately as much for all means of transport and groups), but the differences are very small. You do your shopping on the way home from work instead of first going home and then going out to shop. In this way you make three journeys in a day in stead of four.

Work and school journeys

Journeys to and from work/school across the charging zone have decreased by 46,000, see Table 2.2 and Figure 2.7. The increase in public transport journeys to/from work/school across the charging zone caused by the Stockholm Trial is approximately 43,000 if one takes into account the seasonal reduction in public transport, see Table 2.7. This means that these work/school journeys across the charging zone during the trial have been transferred to public transport. The remaining 3,000 cannot be found in the transferred worked journeys via the Essingeleden bypass, see Figure 2.7.

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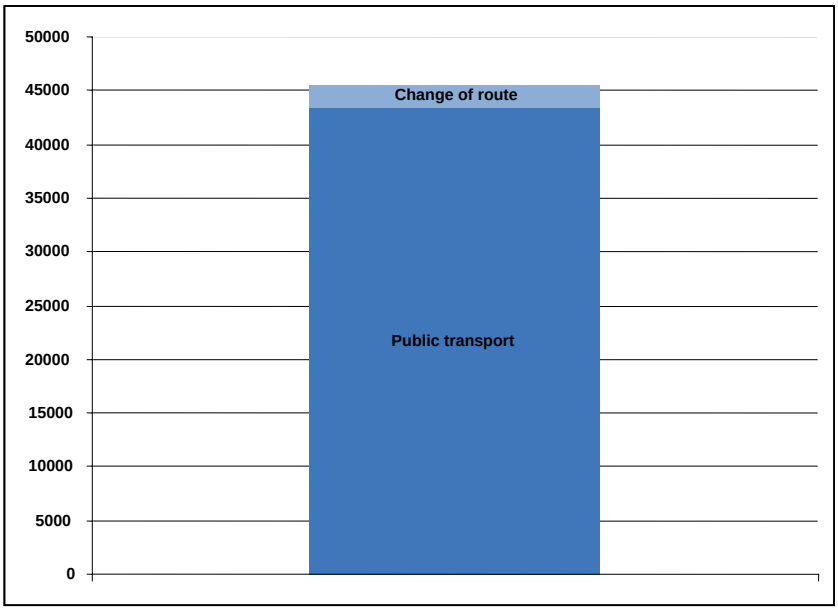

Figure 2.7 Journeys across the charging zone to and from work/school no longer made by car during a 24-hour weekday period.

Other reasons for journeys

In the case of the journeys whose purpose is not work or school, both the number of car journeys and public transport journeys have decreased, see Table 2.2 and Table 2.7, on the assumption of normal seasonal variation. This means car journeys across the charging zone for shopping/service and leisure have had patterns of adjustment other than change of means of transport. The adjustment strategies mean that people have changed the destination/starting-point for their journey, co-ordinated the journeys to a greater extent or quite simply not made the journey.

Clean vehicles and company cars

No difference in behaviour can be shown for those people who have access to clean vehicles and those who do not. Both groups have in the RVU reduced the number of their car journeys across the charging zone to the same extent, see Table 2.20.

Table 2.20 Number of car journeys passing the charging zone at least once in a 24-hour weekday period. Base= number of journeys per person who have stated their possession of different vehicle types: $N_{clean\ car}$= 2 241 (RVU 2006), $N_{clean\ car}$ = 2 910 (RVU 2004) and $N_{company\ car}$= 2 337 (RVU 2006) and $N_{company\ car}$ = 3 102 (RVU 2004) respectively.

Number of car journeys passing the charging zone at least once in a 24-hour weekday period				
	Clean car 2006	NOT clean car 2006	Company car both 2004 and 2006	NOT company car 2004 and 2006
RVU 2004	16,000	299,000	56,000	259,000
RVU 2006	11,000	224,000	54,000	181,000
Percentage change	-27%	-25%	-4%	-30%

For the group with company cars things look completely different, however. This group has a virtually unchanged number of car journeys across the charging zone during the trial. The group with company cars both during 2004 and 2006 has reduced its car travel across the charging zone by only 4% on a weekday compared with a reduction of 30% for the group which did not have access to a company car in either of those years.

The results are somewhat surprising, but one should be aware that a larger proportion of clean vehicles are also company cars. This would also explain these values.

2.2 Distribution effects

The aim of measuring distribution effects is to find an answer to how different groups have been affected by the Stockholm Trial. Those groups that have been compared with respect to their journeys have been divided into geographical areas, gender, country of birth, occupation, composition of household and consumption level[10]. In this report we have concentrated on showing the differences for the different groups between 2004 and 2006. There are, on the other hand, also differences within the groups (e.g. between men and women) for both 2004 and 2006.

The changes shown are based on changes between these studies in September/October 2004 and March 2006 respectively. They are, therefore, influenced by other factors than merely the Stockholm Trial, e.g. rises in petrol prices, seasonal and meteorological variations. The influence of the seasons varies considerably between different groups, directions and means of transport. The seasonal variation cannot, therefore, be assumed to be similar for the different groups. The differences shown in the tables in this chapter also take into account an unknown factor, which is a result of causes other than the Stockholm Trial. Even if we cannot

[10] The total household income taking into account the number of dependents in the household.

distinguish the effects of the Stockholm Trial, it is interesting to study who has changed their behaviour most.

Changes in the total number of journeys in the county

The average person made, as has been shown earlier, an average of 2.6 journeys per weekday in March 2006; this is a reduction of 14% from September/October 2004. This reduction is approximately the same for all groups, see Appendix 4. Car journeys have also decreased between September/October 2004 and March 2006, but the size of the change varies little between different groups. People resident within the zone and adults with teenage children are among those who have reduced the number of their car journeys most (18% and 19% reductions respectively compared with an average 16%). Most of those who have reduced the number of their car journeys have also increased the number of their journeys on public transport. This difference is clearer if one looks at all of the journeys in the county than if one merely compares journeys across the charging zone during the charging period.

Journeys across the charging zone in total and those by car and public transport

As has been shown earlier, the average person made, on average 0.7 journeys across the charging zone per 24-hour weekday period during March 2006; this is a reduction of 10% from September/October 2004. The reduction across the zone is therefore smaller than the total reduction in the county. Those who have reduced the number of their journeys (taking all means of transport together) across the zone most are job seekers and single parents with children, see Appendix 4. If one only looks at car journeys, then job-seekers, students and pensioners have reduced the number of their journeys most. Residents of southern outer suburbs have increased their use of public transport across the zone most. They have replaced 0.06 journeys on average per person and weekday with public transport.

Changes in car journeys across the charging zone during the charging period

All groups have reduced their car journeys across the charging zone during the charging period in March 2006 compared with September/October 2004; most of the differences are also significant, see Table 2.21. Residents north of the zone have changed their journeys least. Residents within the zone and south of the zone have changed their journeys more than the average resident of the county. Students, job-seekers and pensioners have, as a percentage, reduced the number of their journeys most (between 32% and 64% reduction, compared with an average 25%). If one looks at municipalities and city districts, then residents in Tyresö and in West Stockholm have reduced the number of their journeys most (a reduction of 71% and 41% respectively), see Appendix 4.

The number of journeys has decreased for all purposes; only for business trips can one see a significant reduction, and those for the group of adults with teenage children. As regards differences between people with different consumption levels, it is people with a consumption level around average who have reduced the number of their car journeys across the congestion zone during the congestion charging period most. There are also significant differences **within** all groups (e.g. between men and women) for both 2004 and 2006.

Table 2.21 Number of car journeys passing the charging zone during the charging period per person (excluding the Lidingö exemption) weekday 24-hour period, September/October 2004 compared with March 2006. The value in brackets shows that the change is not significant. * means that the number of responses is small (<300 responses). A reduced number of car journeys applies to the whole group.

	Car journeys 2004	Car journeys 2006	Percentage change	Statistically significant difference	Reduced no. of car journeys in total in group
3 areas					
Within the zone	0.27	0.20	-26%	-0.072	-17, 500
North of the zone	0.16	0.12	- 21%	-0.033	-21,500
South of the zone	0.16	0.11	-29%	-0.045	-30,000
6 areas					
Northern outer suburb	0.14	0.12	(-8%)	No	(-4,000)
Northern inner suburb	0.17	0.11	-31%	-0.052	-13,500
Inner city	0.27	0.20	-26%	-0.071	-17,500
Lidingö	0.33	0.22	(-33%)	No	(-4,000)
Southern inner suburb	0.17	0.12	-30%	-0.052	-16,000
Southern outer suburb	0.14	0.10	-27%	-0.039	-14,000
Gender					
Male	0.24	0.17	-27%	-0.064	-48,000
Female	0.12	0.09	-22%	-0.026	-21,000
Composition of household					
Single adult with no children	0.12	0.09	-30%	-0.037	12 000
Two or more adults with no children	0.18	0.13	-26%	-0.047	-31,000
Single adult with teenage children*	0.12*	0.14*	(+13%)*	No*	(400)
Two or more adults with teenage children	0.19	0.11	-44%	-0.084	-12,500
Single adult with children*	0.15*	0.12*	(-23%)*	No*	(-1,400)
Two or more adults with children	0.22	0.18	(-16%)	No	(-13,000)
Occupation					
Student (20 years of age)	0.07	0.02	-64%	-0.042	4,000
Pensioner	0.09	0.06	-32%	-0.029	-8,500
Job-seeker*	0.10*	0.06*	(-43%)*	No*	(2,200)
Employed person with children (< 12 years of age)	0.27	0.22	-21%	-0.059	-17,000
Employed person with teenage children (13-17 years of age)	0.31	0.22	(-29%)	No	(-8,500)
Employed person with no children	0.22	0.17	-23%	-0.050	-2, 000
Country of birth					
Born in Sweden	0.18	0.14	-25%	-0.045	-56 500

	Car journeys 2004	Car journeys 2006	Percentage change	Statistically significant difference	Reduced no. of car journeys in total in group
Born outside Sweden	0.14	0.10	-28%	-0.040	-12 500
Consumption level					
Low	0.10	0.08	-18%	-0.017	-5,500
Medium-low	0.12	0.09	-27%	-0.034	-10,000
Average	0.21	0.13	-40%	-0.085	-26,500
Average-high	0.20	0.16	-19%	-0.039	-15,000
High	0.29	0.23	-21%	-0.061	-13,500

Appendix 4 also shows a breakdown by social groups within the zone, north of the zone and south of the zone. Some conclusions that may be drawn from Table 2.21 and from the appendix are:

Both men and women have reduced the number of their car journeys across the zone during the charging period. There are, however, differences between the genders as regards whether people live within, north of, or south of the zone, see Appendix 4. Men who live within the zone represent most of the car journeys across the zone during the charging period in both 2004 and 2006, (even though they also represent the greatest reduction). Within the zone and north of the zone men represent the greatest reduction in car journeys across the zone during the charging period (significant), whilst south of the zone women represent the greatest reduction at the same time as they made rather few journeys.

Employed people with children, and adults with children, generally represent the greatest number of car journeys across the zone during the charging period both in 2004 and 2006. This applies particularly to those who live within the zone, see Appendix 4. People with high consumption levels, particularly those who live within the zone, are also among those who made most car journeys across the zone during the charging period, both in 2004 and 2006.

The smallest number of car journeys across the zone during the charging period is made by students, followed by single adults without children living south of the zone.

Students are the group who have reduced their car journeys across the zone during the charging period most between 2004 and 2006; this applies particularly to those who live north of the zone. Adults with teenage children, particularly those who live north of the zone, and individuals with medium-low consumption levels also show a large percentage reduction.

Proportion of people who have travelled by car across the zone during the charging period

The proportion of people who have travelled by car across the charging zone during the charging period has fallen for most groups, see Table 2.22. There is no group in which the proportion has increased. The greatest change is to be found in the northern

inner suburbs. For women change has been less than for the average person. The proportion of women who have travelled by car across the zone during the charging period was low even in 2004. Otherwise there is nothing to indicate that those who travelled little before have changed least or vice versa.

Table 2.22 Proportion of people who have travelled by car across the charging zone during the charging period (excluding the Lidingö exemption), weekday 24-hour period, September/October 2004 compared with March 2006. A value in brackets indicates that the change is not significant. The number of responses in each sample: 198 -15,138 . * means that the sample is small (<300 responses).

	Proportion of individuals 2004	Proportion of individuals 2006	Percentage change	Statistically significant difference
3 areas				
Within the zone	16%	12%	-22%	-3.4%-points
North of the zone	9%	7%	-20%	-1.9%-points
South of the zone	9%	6%	-29%	-2.7%-points
6 areas				
Northern outer suburb	8%	7%	(-4%)	No
Northern inner suburb	10%	6%	-35%	-3.4%-points
Inner city	16%	12%	-22%	-3.4%-points
Lidingö	18%	12%	(-32%)	No
Southern inner suburb	10%	7%	-31%	-3.2%-points
Southern outer suburb	8%	6%	-27%	-2.2%-points
Gender				
Male	13%	10%	-27%	-3.6%-points
Female	7%	6%	-19%	-1.4%-points
Composition of household				
Single adult with no children	7%	5%	-26%	-1.9%-points
Two or more adults with no children	11%	8%	-24%	-2.6%-points
Single adult with teenage children*	6%*	7%*	(+14%)*	No*
Two or more adults with teenage children	10%	6%	-33%	-3.2%-points
Single adult with children*	11%*	6%*	(-40%)*	No*
Two or more adults with children	12%	10%	-19%	-2.3%-points
Occupation				
Student (20 year of age)	4%	2%	(-49%)	No
Pensioner	6%	4%	-27%	-1.6%-points
Job-seeker*	6%*	4%*	(-34%)*	No*
Employed person with children (< 12 years of age)	16%	11%	-27%	-4.3%-points
Employed person with teenage children (13-17 years of age)	15%	13%	(-15%)	No
Employed person with no children	13%	10%	-22%	-2.8%-points

	Proportion of individuals 2004	Proportion of individuals 2006	Percentage change	Statistically significant difference
Country of birth				
Born in Sweden	11%	8%	-24%	-2.6%-points
Born outside Sweden	8%	6%	-25%	-2.0%-points
	Proportion of individuals 2004	Proportion of individuals 2006	Percentage change	Statistically significant difference
Consumption level				
Low	6%	4%	-28%	-1.7%-points
Medium-low	7%	5%	-21%	-1.4%-points
Average	12%	8%	-35%	-4.2%-points
Average-high	12%	9%	-20%	-2.3%-points
High	17%	13%	-20%	-3.3%-points

Change in public transport journeys across the charging zone during the charging period

The number of public transport journeys across the charging zone during the charging period has neither increased nor decreased significantly. This is somewhat surprising when one considers that Stockholm Transport's report shows that the number of travellers on public transport has increased by 6% between the autumn of 2004 and the spring of 2006. Only the group Adults with children shows a significant difference in the number of public transport journeys (at the 95% level). This difference shows an increase, see Table 2.23. The groups Within the zone, Northern outer suburb, Southern outer suburb, Employed with and without children have also increased their public transport travel, but the difference is only significant at the 90% significance level.

Table 2.23 Number of public transport journeys across the charging zone during the charging period per person, 24-hour weekday period, September/October 2004 compared with March 2006. A value in brackets indicates that the change is not significant. The number of responses in each sample: 198 -15,138 . * means that the sample is small (<300 responses).

	Public transport journeys 2004	Public transport journeys 2006	Percentage change	Statistically significant difference
3 areas				
Within the zone	0.31	0.35	(+12%)	No
North of the zone	0.33	0.33	(+1%)	No
South of the zone	0.39	0.40	(+3%)	No
6 areas				
Northern outer suburb	0.23	0.24	(+8%)	No
Northern inner suburb	0.45	0.43	(-4%)	No
Inner city	0.31	0.35	(+12%)	No
Lidingö	0.41	0.46	(+11%)	No

	Public transport journeys 2004	Public transport journeys 2006	Percentage change	Statistically significant difference
Southern inner suburb	0.55	0.54	(-3%)	No
Southern outer suburb	0.26	0.29	(+14%)	No
Gender				
Male	0.29	0.32	(+10%)	No
Female	0.41	0.41	(-1%)	No
Composition of household				
Single adult with no children	0.42	0.42	(0%)	No
Two or more adults with no children	0.34	0.35	(+2%)	No
Single adult with teenage children*	0.39*	0.41*	(+5%)*	No*
Two or more adults with teenage children	0.35	0.35	(-2%)	No
Single adult with children*	0.46*	0.37*	(-20%)*	No*
Two or more adults with children	0.31	0.36	+15%	+0.046
Occupation				
Student (20 years of age)	0.77	0.74	(-4%)	No
Pensioner	0.17	0.18	(+5%)	No
Job-seeker*	0.28*	0.22*	(-24%)*	No*
Employed person with children (< 12 years of age)	0.37	0.42	(+12%)	No
Employed person with teenage children (13-17 years of age)	0.33	0.35	(+7%)	No
Employed person with no children	0.41	0.44	(+6%)	No
Country of birth				
Born in Sweden	0.35	0.37	(+6%)	No
Born outside Sweden	0.35	0.33	(-5%)	No
Consumption level				
Low	0.32	0.29	(-10%)	No
Medium-low	0.31	0.34	(+11%)	No
Average	0.34	0.36	(+7%)	No
Average-high	0.41	0.41	(0%)	No
High	0.39	0.44	(+11%)	No

Proportion of people who have travelled on public transport across the charging zone during the charging period

The proportion of people who have travelled on public transport across the zone during the charging period has on average increased. This accords well with the information that the proportion who have a Stockholm Transport travel card has increased. For most groups there is no significant difference between 2004 and 2006. The group in which the proportion of people travelling on public transport has

increased is among others those who live in the Southern outer suburbs, men and adults with children, see Table 2.24. For men there is, however, no statistically significant data showing that the number of public transport journeys has increased, see Table 2.2.3.

Table 2.24 Proportion of individuals making public transport journeys across the charging zone during the charging period, 24-hour weekday period, September/October 2004 compared with March 2006. A value in brackets indicates that the change is not significant. The number of responses in each sample: 198 -15 ,138 . * means that the sample is small (<300 responses).

	Proportion of individuals 2004	Proportion of individuals 2006	Percentage change	Statistically significant difference
3 areas				
Within the zone	20%	21%	(+7%)	No
North of the zone	19%	20%	(+1%)	No
South of the zone	24%	25%	(+6%)	No
6 areas				
Northern outer suburb	13%	15%	(+12%)	No
Northern inner suburb	27%	26%	(-6%)	No
Inner city	20%	21%	(+7%)	No
Lidingö	24%	27%	(+10%)	No
Southern inner suburb	33%	32%	(-2%)	No
Southern outer suburb	15%	19%	+20%	+3,1%-points
Gender				
Male	18%	20%	+10%	+1,7%-points
Female	24%	24%	(+0%)	No
Composition of household				
Single adult with no children	26%	26%	(0%)	No
Two or more adults with no children	21%	21%	(+2%)	No
Single adult with teenage children*	22%*	22%*	(0%)*	No*
Two or more adults with teenage children	21%	21%	(+1%)	No
Single adult with children*	24%*	22%*	(-10%)*	No*
Two or more adults with children	19%	21%	+14%	+2,5%-points
Occupation				
Student (20 years of age)	42%	41%	(-2%)	No
Pensioner	11%	11%	(+2%)	No
Job-seeker*	18%*	13%*	(-25%)*	No*
Employed person with children (< 12 years of age)	21%	24%	+14%	+3,0%-points
Employed person with teenage children (13-17 years of age)	19%	22%	(+15%)	No

	Proportion of individuals 2004	Proportion of individuals 2006	Percentage change	Statistically significant difference
Employed person with no children	26%	27%	+7%	+1,7%-points
Country of birth				
Born in Sweden	21%	22%	(+5%)	No
Born outside Sweden	21%	21%	(+1%)	No
Consumption level				
Low	19%	18%	(-7%)	No
Medium-low	19%	20%	(+6%)	No
Average	20%	22%	+12%	+2%-points
Average-high	24%	25%	(+3%)	No
High	25%	26%	(+5%)	No

2.3 Differences in travel in the county as a whole

Change in total travel

Number of journeys irrespective of means of transport

In the RVU measurements the number of journeys in the county[11] – taking all means of transport together – in a 24-hour weekday period has fallen by 14%, see Table 2.25. This should however be compared taking into account a fairly substantial seasonal variation in Stockholm County between the specific periods measured during September/October 2004 and March 2006 respectively. If in RES[12] the comparison is made between September/October and March, then March has 11% fewer journeys in total in the county. In the comparison of RVU 2006 (March) with RVU 2004 (September/October), the reduction is therefore greater (14%) than the seasonal variation. If one assumes that the seasonal variation from the analysis by RES also holds good between 2004 and 2006, then this would mean that we have a reduction in the total number of journeys — taking into account all means of transport — of approx. 3% between September/October 2004 in March 2006, which does not depend on seasonal variation. This reduction might result from other factors apart from the Stockholm Trial, e.g. petrol prices and the business cycle.

The values given above apply to weekdays. On days over the weekend the RVU measurements show that the number of journeys in the county — taking all means of transport together — have fallen by 16%, see Table 2.25. This reduction is therefore somewhat larger than the reduction on weekdays. If one compares days at the weekend in RES then March has 7% *more* journeys in total in the county than

[11] For the sake of readability journeys *within and to/from Stockholm County* is abbreviated to journeys *within the county*. Journeys apply to residents of Stockholm County in the age range 12 to 84.

[12] Analyses based on partial journeys on the monitoring day in Stockholm County and data from the years 1995-2001. Applies to residents of Stockholm County in the age range 12-84.

September/October, but one should be aware that the basis for days over the weekend in RES is relatively unreliable. RES therefore shows a reverse seasonal effect compared with the RVU than the one that was to be found on weekdays. It should be borne in mind that there was unusually cold weather in March 2006 when the RVU in 2006 was carried out. This may have meant that travel at weekends was inhibited. Travel at weekends consists in large part of leisure-time travel (48%)[13] and if the weather does not tempt one into leisure-time activities, it is possible these will be cancelled. There was also a more marked difference in the proportion who travelled on the monitoring days in the RVU than there was in RES when the different measuring period are compared. As the seasonal variation is unreliable for the weekends, and as the Stockholm Trial does not directly affect weekend travel, these values are included only where they are relevant for the evaluation of the effects of the Stockholm Trial.

Table 2.25 Total number of journeys to/from and within county made by county residents in a 24-hour weekday period and a 24-hour weekend period. Base= journeys per person: $N_{weekday}$= 17 286 (RVU 2006) and $N_{weekday}$ = 17 297 (RVU 2004) respectively. $N_{weekend}$= 6 716 (RVU 2006) and $N_{weekend}$ = 6 705 (RVU 2004) respectively.

Total number of journeys in the county — all means of transport				
	24-hour weekday period	24-hour weekend period	*Seasonal variation RES*	
			24-hour weekday period	24-hour weekend period
RVU 2004	4 664 000	3 406 000	*Sept/Oct*	
RVU 2006	4 025 000	2 875 000	*March*	
Percentage change	-14 %	-16 %	*-10 %*	*+5%*
Statistically significant difference	-639 000	-531 000		

Number of journeys per person and day

The number of journeys in the county divided into the average number of journeys per person naturally follows the same pattern of reduction as the total number of journeys. With the aid of an analysis of how each person in the entire panel travelled in September/October 2004 compared with March 2006, it transpired that 31% made as many journeys, 41% made fewer journeys and 28% made more journeys.

Coordination of several reasons for travel into composite journeys has possibly increased somewhat (approximately as much for all means of transport and groups), but the differences are very small. Coordination implies, for example, but you do your shopping on your way home from work instead of first going home and then going out to shop. In this way you make three journeys instead of four. It is also possible to do more on one and the same journey, for example, doing more shopping in one shopping trip and in this way reducing the need for so many shopping trips. But this is not something that one can read from or analyse in the RVU.

[13] Trivector report 2005:25 “Resvanor I Stockholms län 2004”

Table 2.26 Proportion of persons who have travelled, and average number of journeys per person and per mobile person in a 24-hour weekday period or weekend 24-hour period. Base= journeys per person: $N_{weekday}$= 17 286 (RVU 2006) and $N_{weekday}$ = 17 297 (RVU 2004) respectively. $N_{weekend}$= 6 716 (RVU 2006) and $N_{weekend}$ = 6 705 (RVU 2004) respectively.

	Proportion of individuals travelling		Number of journeys per mobile person		Number of journeys per person	
	24-hour weekday period	24-hour weekend period	24-hour weekday period	24-hour weekend period	24-hour weekday period	24-hour weekend period
RVU 2004	84 %	69 %	3.5	3.2	3.0	2.2
RVU 2006	81 %	64 %	3.2	2.9	2.6	1.8
Percentage change	-4 %	-8 %	-10 %	-8 %	-14 %	-16 %
Statistically significant difference	-3.4 %-points	-5.6 % -points	-0.36	-0.24	-0.41	-0.34
Seasonal variation RES . March cf. with Sept-Oct	*-1.8 %*	*-3.0%*				

Change in the number of journeys according to reason for journey

For work and school journeys and business trips the reduction between 2004 2006 was completely in line with the corresponding seasonal variation from RES, The number of shopping trips has fallen by 20%, approximately twice as much as the seasonal variation in RES. There is also a great reduction in leisure-time journeys. Journeys for shopping/service and leisure-time journeys are more sensitive to change than work-related journeys. The reduction is presumably a combination of the Stockholm Trial and rising petrol prices. Note that here it is a question of the number of journeys not the length of the journey.

The reduction in the number of journeys is somewhat greater during the weekend, which is not strange when one considers that the proportion of free journeys then is higher. Leisure-time journeys and journeys for shopping/service have shown the highest percentage reductions during the weekend. A comparison of the seasonal variation according to RES shows that normally during weekends in March rather more shopping and service journeys are made than in September/October, and approximately as many leisure-time journeys. This was not the case in the RVU, which may be because of the unusually cold weather and the rise in petrol prices.

The number of journeys to work and school also decreased over the weekend. Both September/October 2004 and March 2006 show the same proportion, 4%, stating that they worked from home. Less travel to work/school is therefore compensated for by an increase in tele-working. The fact that the journeys to work/school have decreased most during the weekend indicates that it is rather a question of a general decrease in journeys to work, than a decrease because of the congestion charging trial.

Table 2.27 Number of journeys for different reasons in a 24-hour weekday period. Base= weekday journeys with stated reason: N=43 642 (RVU 2006) and N=50 757 (RVU 2004) respectively.

Number of journeys in a 24-hour weekday period with stated reason							
	Work /school	Business trip	Shopping/ service	Leisure time	To home	Other	Total
RVU 2004	1,099,000	246,000	729,000	573,000	1,663,000	354,000	4,664,000
RVU 2006	1,020,000	198,000	579,000	446,000	1,486,000	296,000	4,025,000
Percentage change	-7 %	-19 %	-20 %	-22 %	-11 %	-17 %	-14 %
Statistically significant difference	- 79,000	-48,000	150,000	-127,000	-177,000	-58,000	-639,000
Seasonal variation RES	*-7 %*	*-16 %*	*-9 %*	*-17 %*	-	*7 %*	*-10 %*

Change in the number of journeys according to means of transport

Even if the total number of journeys – taking all means of transport together — has presumably been influenced very little by the trial, it is interesting to study whether the distribution by different means of transport has changed.

The trial has presumably not affected the total number of car journeys in the county. The total reduction in the number of car journeys made in a 24-hour weekday period by county residents shows, according to an analysis by RES a seasonal reduction of 14% between March and September/October. This is approximately the same reduction as the total reduction in the number of car journeys in the RVU between September/October 2004 and March 2006, see Table 2.28.

Those car journeys across the charging zone that have disappeared as a result of the Stockholm Trial comprise a very small proportion of the total number of journeys (including all means of transport) made by county residents — on a weekday approx. 2%. Of the total number of car journeys in the county, the reduction in car journeys across the charging zone comprises about 4%.

Table 2.28 Car journeys to/from and within the county made by county residents in a weekday 24-hour period and weekend 24-hour period. Base= journeys with main means of transport: $N_{weekday}$=42 697 (RVU 2006) and $N_{weekday}$=50 026 (RVU 2004) respectively, $N_{weekend}$=11 823 (RVU 2006) $N_{weekend}$=13 889 (RVU 2004) respectively .

Total number of car journeys to/from and within the county		
	24-hour weekday period	24-hour weekend period
RVU 2004	2,151,000	2,016,000
RVU 2006	1,814,000	1,693,000
Percentage change	-16 %	-16 %
Statistically significant difference	-337,000	-323,000
Seasonal variation RES	*-14 %*	*-11%*

For a 24-hour weekend period the reduction is according to the RVU greater than the corresponding seasonal variation according to RES, 14% and 11% respectively.

Journeys on foot or by bicycle across the charging zone have presumably been affected not at all — or very little — by the trial during those periods to which the RVU applies. Journeys on foot and by bicycle show considerable seasonal variations which to a great extent also change with the weather. The reduction in cycling in RVU in March 2006 compared with September/October 2004 is even greater than the normal seasonal variation which can be discerned from Stockholm County in RES, see Table 2.29. But if one also takes into account the very cold weather with wintry road surfaces during the monitoring weeks in March 2006, this difference is with all certainty an effect of the weather. More detailed measurements and results are be found in a separate evaluation of cycling in the county [14].

The number of public transport journeys has increased somewhat presumably partly as a result of the trial. The weather conditions which reduced the number of cycle journeys have presumably also played a part in the increase that one can see here. The seasonal variation in RES indicates that public transport travel in the county is normally somewhat lower in March compared with September/October, see Table 2.29. The same tendency seems to appear in Stockholm Transport's measurements. A fairly small increase shown by RVU between September/October 2004 in March 2006 is in this way presumably rather understated seen as an effect of the Stockholm Trial. Stockholm Transport gives an increase in travellers of 6% during the first four months of 2006 compared with the corresponding period in 2005. Taking into account the seasonal variation for public transport journeys, RVU and Stockholm Transport's measurements show relatively similar results in this respect. For the commuter panel the increase in the number of public transport journeys was larger. The commuters therefore increased public transport travel by 5%, compared with 3% for the population of the county as a whole.

Table 2.29 Number of journeys by different means of transport per 24-hour weekday period (main means of transport for the journey)[15]. Base= journeys by stated means of transport, weekdays:: N=42 697 (RVU 2006) and N=50 026 (RVU 2004) respectively.

Number of journeys per 24-hour weekday period with each means of transport						
	On foot	Bicycle	Car	Public transport	Other	Total
RVU 2004	745,000	295,000	2,151,000	1,376,000	97,000	4,664,000
RVU 2006	689,000	45,000	1,81,000	1,413,000	64,000	4,025,000
Percentage change	-8 %	-85 %	-16 %	+3 %	-34 %	-14 %
Statistically significant difference	-56,000	-25,000	-337,000	+37,000	- 33,000	-639,000
Seasonal variation RES	*8 %*	*-41 %*	*-14 %*	*-2 %*	*-47 %*	*-10 %*

On days over the weekend the number of car journeys in the county has decreased about as much as on weekdays. A comparison with RES shows that the number of car journeys on days over the weekend is normally 11% lower in March than in September/October. As mentioned above, the measured number of journeys at weekends in RVU has been disturbed by the unusually cold weather. Even if car

[14] Trivector Traffic (2006C) – On foot- and cykeltrafiken i Stockholms län - effekter av Stockholmsförsöket, Trivector Rapport 2006:50

[15] The data has been calculated on the basis of the distribution by means of transport and average number of journeys per person.

journeys are not as weather-sensitive as other means of transport, inclement weather can have contributed to a reduction in activities requiring car journeys at weekends. This means that it is difficult — with any certainty — to give an opinion about whether the Stockholm Trial led to car journeys being made at the weekend instead of during the charging period.

Number of car journeys per person

The change to fewer car journeys in March 2006 compared to September/October 2004 means that the average number of car journeys per person and day fell from 1.4 to 1.2 during a 24-hour weekday period, see Table 2.30. This is however, as stated above, approximately, of the same order of magnitude as the seasonal variation between September/October and March in the county (according to RES) and it is therefore difficult to discern the effects of the Stockholm Trial.

Table 2.30 Number of car journeys per person. Base= journeys with main means of transport: $N_{weekday}$=42 697 (RVU 2006) and $N_{weekday}$=50 026 (RVU 2004) respectively, $N_{weekend}$=11 823 (RVU 2006) and $N_{weekend}$=13 889 (RVU 2004) respectively .

Number of car journeys per person		
	24-hour weekday period	24-hour weekend period
A RVU 2004	1.4	1.3
RVU 2006	1.2	1.1
Percentage change	- 16 %	- 16 %
Statistically significant difference	-0.21	-0.21
Seasonal variation RES	*-14 %*	*-11 %*

Change in length of journey

Journey length per journey

The average length of journey per journey both in total and for car traffic was somewhat longer during March 2006 compared with September/October 2004, see Table 2.31. For car traffic it is primarily the very longest journeys which have become longer during March 2006. Comparison with RES shows a good correspondence in the average journey length for both journeys with all means of transport and the car journeys. The data in RES is on the other hand too small to acquire values for the normal seasonal variation between March and September/October, see Table 2.32.

Table 2.31 Average length of journey per journey in a 24-hour weekday period. Base= journeys with journey length: $N_{weekday}$=35 750 (RVU 2006) and $N_{weekday}$ =38 654 (RVU 2004) respectively .

Average length of journey per journey		
	All journeys	Car journeys
RVU 2004	11.3 km	13.6 km
RVU 2006	12.0 km	14.1 km
Percentage change	+ 7 %	+3 %
Statistically significant difference	+0.7 km	+0.5 km

Table 2.32 Average length of journey per journey in a 24-hour weekday period from RES. Base= journey with lengths of journey and means of transport – car, public transport, on foot or by bicycle: $N_{weekday}$= 1191 (March) and $N_{weekday}$ = 2632 (Sept/Oct) respectively.

Average length of journey per journey from RES		
	All journeys	Car journeys
September/October	11.5 km	16.1 km
March	10.8 km	15.7 km
Percentage change	(-6 %)	(-2.4 %)
Statistically significant difference	No	No

Journey length per person and day

As a result of people now making fewer journeys the total average journey length per person and 24-hour period during the trial decreased compared with September/October 2004, see Table 2.33. The fact that the average journey length per journey has increased somewhat has, therefore, not compensated for the reduction in the number of journeys.

Table 2.33 Journey length per person and day. Base= journeys with journey length: $N_{weekday}$=35 750 (RVU 2006) and $N_{weekday}$ =38 654 (RVU 2004) respectively. $N_{weekend}$=9 510 (RVU 2006) and $N_{weekend}$ =9 668 (RVU 2004) respectively.

Journey length per person and day		
	All journeys	Car journeys
RVU 2004	33.5 km	18.6 km
RVU 2006	30.8 km	16.2 km
Percentage change	- 8 %	-13 %
Statistically significant difference	- 2.7 km	-2.4 km

Change in transport mileage

For weekdays the average journey length was somewhat longer in March 2006 than in September/October 2004, but because of the reduced number of journeys the total journey length — the transport mileage — in the county nevertheless decreased. Transport mileage for journeys in the county over a 24-hour weekday period had declined by 4.2 million person kilometres in March 2006 compared with September/October 2004. The corresponding reduction for transport mileage by passenger car was 3.7 million person kilometres per weekday, see table 2.34.

Table 2.34 Transport mileage for journeys to/from and within the county[16]. Base= journeys with a length of journey: $N_{weekday}$=35 750 (RVU 2006) $N_{weekday}$ =38 654 (RVU 2004) and respectively

Transport mileage for journeys in the county over a 24-hour weekday period		
	All means of transport	Car journeys
RVU 2004	52,574,000 person km	29,168,000 person km
RVU 2006	48,375,000 person km	25,433,000 person km
Percentage change	-8 %	-13 %
Statistically significant difference	-4,199,000 person km	-3,735,000 person km
Seasonal variation RES	*-15 %*	*- 17 %*

It is not improbable that the Stockholm Trial has led to an increase in transport mileage. It has, however, not been possible to discern what the differences in transport mileage shown by RVU result from. These reductions are smaller than the seasonal reductions according to RES. It should however be stressed that the data in RES is relatively small and the exact levels of seasonal variations for this reason are very unreliable. The results indicate that transport mileage, both in total and by car, has increased between September/October 2004 and March 2006 if one assumes normal seasonal variations for the county. The Swedish Road and Traffic Research Institute, VTI, has estimated the reduction in traffic mileage in the county caused by the Stockholm Trial at 2.8% per 24-hour weekday period between the spring of 2005 and the spring of 2006.

On the basis of the proportion who state in the RVU that they travel as driver and passenger respectively it can be said that there is no significant difference between the two studies as regards car-sharing. This result agrees with manual traffic counts in the county where the figure for car-sharing remains at 1.26-1.27 persons per passenger car.

Change in the distribution of journeys across the week and the weekend

The distribution of car journeys between weekday and weekend

Between September/October 2004 and March 2006 no change has occurred in the distribution of the number of car journeys between the weekend and weekday, as the number of car journeys decreased just as much on both weekdays and days at the weekend. But as shown in Table 2.28 this decrease did not tally with the seasonal variation from RES. We believe that the number of car journeys in March 2006 would have been greater if the weather had not been unusually cold. The results, however, show no redistribution of car journeys from weekdays to weekends as a result of the Stockholm Trial.

Distribution of car journeys by starting time

During March 2006 there was a somewhat higher proportion of the total number of car journeys in the county that started during the time when the congestion tax was

[16] The estimates are based on the average number of journeys to/from and within the county per person multiplied by the average journey length (and the proportion of car journeys for car transport mileage) and 1,570,847, i.e. the number of residents in the county in 2004 in the ages 12-84 years of age.

levied. It should however be noted that the total number of car journeys was considerably fewer in March 2006, which is why the total number of car journeys starting during a time when the tax was levied was approx. 250,000 fewer per 24-hour weekday period during March 2004 than September/October 2004, see Table 2.35. This may possibly be an indication of the fact that car journeys not directly affected by the congestion tax have exploited so called "freed up" space.

Table 2.35 Number and proportion of car journeys starting during the charging period and in the charging interval with the highest charge respectively, 24-hour weekday period. Base=starting time per car journey: $N_{weekday}$= 18 187 (RVU 2006) and $N_{weekday}$ = 21 665 (RVU 2004) respectively.

	Car journeys starting during the charging period		Car journeys starting during the interval with the highest charge	
	Number	Proportion of	Number	Proportion of
RVU 2004	1,734,000	80.6 %	568,000	26.4 %
RVU 2006	1,483,000	81.8 %	500,000	27.6 %
Percentage change	-14 %	+1 %	-12 %	+4 %
Statistically significant difference	-251,000	+1.2 %-points	-68,000	+1.1 %-points

Distribution of public transport journeys across the week and the day

On weekdays the number of journeys by public transport has increased by 3%, whilst the number of journeys by public transport was during the 24-hour period the same in March 2006 and September/October 2004.

The public transport journeys are distributed on weekdays equally across the day as previously. The starting times for residents' public transport journeys are distributed between the charging period and other times of day during the trial in the same way as in September/October 2004. 14% of the journeys start in the charge-free period and 32% in the period with the highest charge. For commuters the entire increase in the number of public transport journeys has occurred during the charging period. More than half of the increase has occurred in the period of the highest charge, see Appendix 2.

2.4 Differences in travel in different directions

Change in the total travel

The total travel – including all means of transport – has decreased in all six directions studied in March 2006 compared with September/October 2004, see table 2.36[17].

[17] The estimates are based on the average number of journeys to/from and within the county per person multiplied by 1,570,847, i.e. the number of inhabitants of the county in 2004 with ages 12-84. The number of journeys has subsequently been distributed among directions on the basis of travel directions obtained from the RVU.

Table 2.36 Number of journeys on weekdays in different directions, total (all means of transport). Base= weekday journeys, all means of transport: N=41 479 (RVU 2006) and N=48 298 (RVU 2004) respectively.

Total number of journeys in different directions during a 24-hour weekday period				
Direction	RVU 2004	RVU 2006	Percentage change	Statistically significant change
N, to/from the zone	486,000	448,000	-8 %	-38,000
S, to/from the zone	513,000	475,000	-8 %	-38,000
N-S	273 000	21, 000	-21 %	-58,000
Within the zone	668,000	558,000	-16 %	-110,000
Outside the zone	2,708,000	2,315,000	-14 %	-393,000
Outside the county to the zone	16,000	14,000	(-13 %)	No
Total	4,664,000	4,025,000	-14 %	-639,000

Change in number of journeys by reason for journey

There are major differences in how the number of journeys for different purposes have changed in the six main directions studied between September/October 2004 and March 2006, see Table 2.37[18]. For all journeys in the entire county the total reduction for different reasons is largely the same as for the seasonal variation between September/October and March according to RES, see Chapter 2.3. It should be noted however that the percentage reduction in shopping trips, leisure time trips and business trips is at least as large in the direction outside the charging zone as the directions affected by the charge.

Table 2.37 Number of journeys for different reasons in different directions. The main reason for the journey. Base= weekday journeys with stated direction and purpose: N=42 367 (RVU 2006) and N=48 941 (RVU 2004) respectively.

Direction	Work/school	Business trip	Shopping/ service	Leisure time	Journey home	Other
N, to/from the zone						
RVU 2004	151,000	36,000	46,000	57,000	174,000	22,000
RVU 2006	147,000	26,000	42,000	50,000	164,000	19,000
Percentage change	(-2 %)	-26 %	(-10 %)	-13 %	(-6 %)	(-12 %)
Statistically significant difference	No	-10,000	No	-7 000	No	No
S, to/from the zone						
RVU 2004	161,000	32,000	56,000	56,000	187,000	21,000
RVU 2006	155,000	27,000	44,000	51,000	182,000	16,000
Percentage change	(-4 %)	-16 %	-20 %	(-10 %)	(-3 %)	-26 %
Statistically significant difference	No	-5,000	-12,000	No	No	-5,000
N-S						
RVU 2004	93,000	26,000	20,000	28,000	94,000	12,000

[18] The table does not show the direction “outside the county” as these journeys are so few.

RVU 2006	78,000	17,000	14,000	18,000	79,000	9,000
Percentage change	-16 %	-35 %	-27 %	-35 %	-16 %	-28 %
Statistically significant difference	-15 000	-9 000	-6 000	-10 000	-15 000	-3 000
Within the zone						
RVU 2004	145,000	42,000	163,000	97,000	189,000	32,000
RVU 2006	128,000	39,000	122,000	77,000	165,000	27,000
Percentage change	-12 %	(-7 %)	-25 %	-21 %	-12 %	-18 %
Statistically significant difference	-17,000	No	-41,000	-20,000	-24,000	-5,000
Outside the zone						
RVU 2004	546,000	106,000	443,000	331,000	1,015,000	267,000
RVU 2006	510,000	85,000	356,000	246,000	893,000	225,000
Percentage change	-6 %	-20 %	-20 %	-26 %	-12 %	-15 %
Statistically significant difference	-36,000	-21,000	-87,000	-85,000	-122,000	-42,000

Change in number of journeys by means of transport

Of the total decrease in the number of journeys in the county a good half are car journeys, see table 2.38. The greatest percentage, 33%, is represented by car journeys between north and south, and particularly through the inner city. For the car journeys in the direction “North-South” the journeys went via the Essingeleden bypass to a greater extent in March 2006 (74 percent) than in September/October 2004 (63 percent), something that presumably results from the fact that the Essingeleden bypass is exempted from the congestion charging trial. The greatest percentage in the reduction of car journeys for the commuter panel is in the direction between the southern part of the county and the zone, see Appendix 2.

Bicycle journeys have decreased in all directions but as stated earlier this results from normal seasonal variation, weather and road conditions.

The differences in the number of public transport journeys in the county as a whole are small and show significant increases only if all the directions are put together. In the commuter panel (see Appendix 2) the increase in the number of public transport journeys occurred mostly within the charging zone. In table 2.38 travel in the direction “outside the county” is not shown, as these journeys are so few that the account would be misleading.

Table 2.38 Change in the number of journeys per 24-hour weekday period in different directions. Main means of transport for journey. Base= weekday journeys with stated direction and means of transport: N=41 479 (RVU 2006) and N=48 298 (RVU 2004) respectively.

Direction	On foot	Bicycle	Car	Public transport	Other
N, to/from the zone					
RVU 2004	9,000	19000	161,000	283,000	14,000
RVU 2006	9,000	5,000	133,000	294,000	7,000
Percentage change	(+4 %)	-76 %	-17 %	(+4 %)	-47 %
Statistically significant difference	No	-14,000	-28,000	No	-7,000
S, to/from the zone					
RVU 2004	9,000	18,000	147,000	327,000	12,000
RVU 2006	11,000	3,000	117,000	333,000	11,000
Percentage change	(+28 %)	-82 %	-21 %	(+2 %)	(-15 %)
Statistically significant difference	No	-15,000	-30,000	No	No
N-S					
RVU 2004	3,000	3,000	166,000	93,000	8,000
RVU 2006	,,000	1,000	112,000	96,000	4,000
Percentage change	(-33 %)	-77 %	-33 %	(+4 %)	-55 %
Statistically significant difference	No	-2,000	-54,000	No	-4,000
Within the zone					
RVU 2004	285,000	69,000	79,000	225,000	10,000
RVU 2006	250,000	11,000	62,000	226,000	9,000
Percentage change	-12 %	-84 %	-22 %	(+1 %)	(-8 %)
Statistically significant difference	-35,000	-58,000	-17,000	No	No
Outside the zone					
RVU 2004	439,000	186,000	1 591,000	445,000	47,000
RVU 2006	417,000	25,000	1 385,000	461,000	27,000
Percentage change	-5 %	-87 %	-13 %	+4 %	-41 %
Statistically significant difference	-22,000	-161,000	-206,000	+16,000	-20,000
Seasonal variation RES	*8 %*	*-44 %*	*-16 %*	*-1 %*	*-52 %*

Change in the number of car journeys in different directions

For most directions travel by car had decreased in March 2006 compared with September/October 2004, see Table 2.39. In total the reduction is 16%, and, as discussed in Chapter 2.3, a seasonal effect between the measurement occasions in September/October and March. But, as is shown in Chapter 2.1, car journeys decreased across the charging zone more than the seasonal variation, at the same time as traffic monitoring supports the idea that the reduction is a result of the Stockholm Trial. If the car journeys across the zone actually *fell* as a result of the tax (Chapter

2.1) but the total number of car journeys in the county is the same this then means that the car journeys not passing the charging zone have *increased.* It is possible that this has been influenced because of the reduction in congestion on routes not directly affected by the congestion tax.

The lowest percentage decrease between September/October 2004 and March 2006 applies to journeys outside the zone, which are consequently not directly affected by the congestion tax, see Table 2.39. The reduction between September/October 2004 and March 2006 for car journeys not affected by the congestion tax is 13%. As the total seasonal variation of these journeys is a reduction of 14%, this means that the Stockholm Trial may possibly have increased the number of car journeys not affected by the congestion charging zone.

For none of the six directions studied is there any significant difference between March 2006 and September/October 2004 as regards the extent of car-sharing.

Table 2.39 Number of car journeys on weekdays in different directions. Base= weekdays, car journeys in stated direction: N=18,016 (RVU 2006) and N=21 604 (RVU 2004) respectively .

Total number of car journeys in different directions in a 24-hour weekday period				
Direction	RVU 2004	RVU 2006	Percentage change	Statistically significant change
N, to/from the zone	161,000	133,000	-17 %	-28,000
S, to/from the zone	147,000	117,000	-21 %	-30,000
N-S	166,000	112,000	-33 %	-54,000
-of which on the Essingeleden bypass	104,000	83,000	-20 %	-21,000
-of which not on the Essingeleden bypass	62,000	29,000	-53 %	-33,000
Within the zone	79,000	62,000	-22 %	-17,000
Outside the zone	1 591,000	1,385,000	-13 %	-206,000
Outside the county to the zone	7,000	5,000	(-24 %)	No
Total	2 151,000	1,814,000	-16 %	-337,000
Seasonal variation RES			*-14 %*	

Change in length of journey

Average length of journey — for all means of transport taken together – for the directions “South to/from the zone” and “Outside the zone” increased in March 2006 compared with September/October 2004, see table 2.40. For other directions there are no significant differences in the average length of journey. Journeys outside the county to the zone are not included in the table, as these journeys are so few that no conclusions can be drawn.

Table 2.40 Average length of journey per journey (all means of transport) in different directions on weekdays. Base= journey length for weekday journeys: N=35 750 (RVU 2006) and N=38 654 (RVU 2004) respectively.

Average length of journey per journey on weekdays in different directions				
Direction	Journey length 2004	Journey length 2006	Percentage change	Statistically significant change
N. to/from the zone	16.5 km	16.4 km	(-0.6 %)	No
S to/from the zone	15.3 km	16.0 km	+4 %	+0.7 km
N-S	31.5 km	31.3 km	(-0.6 %)	No
Within the zone	2.8 km	2.8 km	(+0.5%)	No
Outside the zone	9.3 km	10.6 km	+14 %	+1.3 km

If one simply looks at the car journeys, it is only the direction "Outside the zone" which shows an increase in average length of journey per car journey, see Table 2.41. Nor if one breaks down the car journeys "North to South" into those car journeys taking the Essingeleden bypass and those car journeys not taking the bypass does one obtain any significant differences as regards the average length of car journey. The car journeys between North and South have therefore not become longer even if a greater proportion of motorists now choose to travel via the Essingeleden bypass.

For car traffic it is primarily the very longest journeys which have become longer in March 2006. One might note that the journey length and car journey length increased by 40% and 12% respectively outside the zone.

Table 2.41 Average journey length of car journeys in different directions on weekdays. Base= journey length car journeys on weekdays: N=15 344 (RVU 2006) and N=16 766 (RVU 2004) respectively.

Average journey length of car journeys on weekdays in different directions				
Direction	Journey length 2004	Journey length 2006	Percentage change	Statistically significant change
N. to/from the zone	17.4 km	17.7 km	(+2%)	No
S to/from the zone	17.1 km	17.2 km	(+0.4 %)	No
N-S	33.6 km	33.0 km	(-2 %)	No
Within the zone	3.9 km	3.7 km	(-4 %)	No
Outside the zone	10.9 km	12.2 km	+12 %	+1.3 km

Change in the distribution of journeys across the week and the day

The distribution of car journeys between weekday and weekend

The proportion of car journeys occurring during the weekend has increased in two directions: "South to/from the zone" and "North-South". The proportion of journeys during the weekend has on the other hand decreased outside the zone, see Table 2.42. The results for the directions: "South to/from the zone" and "North-South" in Table 2.42 may be an indication that car journeys have been retimed from the charging period to the weekend, but this not something we can state with certainty.

Table 2.42 Change in the proportion of car journeys of all car journeys occurring during the weekend (N). Base= day of journey: N=56256 (RVU 2006) and N=65341 (RVU 2004) respectively.

Proportion of car journeys occurring during the weekend in different directions				
Direction	Proportion of car journeys weekend 2004	Proportion of car journeys weekend 2006	Percentage change	Statistically significant change
N to/from the zone	27 %	27 %	(-1 %)	No
S to/from the zone	26 %	32 %	+21 %	+6 %
N-S	23 %	28 %	+19 %	+5 %
Within the zone	26 %	25 %	(-6 %)	No
Outside the zone	27 %	26 %	-4 %	-1 %

Distribution of car journeys by starting time

Only in two directions are there significant differences as regards the distribution of car journey starting times across the day. The one direction is "Journeys outside the zone", which are not affected by the congestion charging trial. In the direction outside the zone there is (unlike other directions) a clear increase in journeys occurring during the charging period. This may be perhaps be a result of the fact that journeys not directly affected by the charges can benefit from the reduction in congestion (exploit the freed-up space) and therefore increase.

The other journey direction with significant differences in starting times is "North-South" for those journeys not taking the Essingeleden bypass. The greatest proportion of journeys on weekdays in the direction North to South start during the 10 kronor charging period, see Table 2.43. The change in the number of journeys is also greatest during this charging period; the number of journeys at this time had fallen by 17,000 on a weekday in March 2006 compared with September/October 2004.

Table 2.43 Number and proportion of car journeys in the direction north to south not taking the Essingeleden bypass, with different starting times in a 24-hour weekday period. Base= starting time per car journey on a weekday in the direction north to south not taking the Essingeleden bypass. $N_{weekday}$= 375 (RVU 2006) and $N_{weekday}$ = 720 (RVU 2004) respectively.

Starting times in the direction "N-S"	Starting time with no charge		Starting time with charge 10 kronor		Starting time with charge 15 kronor		Starting time with charge 20 kronor	
	Proportion of journeys	Number of journeys	Proportion of journeys	Number of journeys	Proportion of journeys	No. of journeys	Proportion of journeys	Number of journeys
RVU 2004	21 %	13,000	42 %	26,000	12 %	8,000	25 %	15,000
RVU 2006	29 %	8,500	32 %	9,000	15 %	4 500	24 %	7,000
Percentage change	+38 %	-36 %	-23 %	-64 %	(+21 %)	-44 %	(-3 %)	-55 %
Statistically significant difference	+8 %	-4,500	-10 %	-17,000	No	-3 ,500	No	-8,000

Distribution of public transport journeys by starting times

Only in the travel direction North to South are there any statistically significant differences as regards the distribution of public transport journeys across the day. The

statistically significant differences only apply to the proportion travelling during the charging periods 10 kronor and 15 kronor, see Table 2.44.

Table 2.44 Number and proportion of public transport journeys in the direction N-S with different starting times in a 24-hour weekday period. Base= starting times per in the direction north to south: $N_{weekday}$= 858 (RVU 2006) and $N_{weekday}$ = 836 (RVU 2004) respectively.

Starting times in the direction "N-S"	Starting time with no charge		Starting time with charge 10 kronor		Starting time with charge 15 kronor	
	Proportion of journeys	Number journeys	Proportion of journeys	Number journeys	Proportion of journeys	Number of journeys
RVU 2004	14 %	13,000	30 %	28,000	22 %	21,000
RVU 2006	17 %	16,000	35 %	33,000	18 %	18,000
Percentage change	(+ 19 %)	+ 24 %	+ 14 %	+ 19 %	- 18 %	(- 15 %)
Statistically significant difference	No	+ 3,000	+ 4 %	+ 5,000	- 4 %	No

When from the total travel and the proportion of public transport journeys one estimates the number of public transport journeys during different charging periods in the direction "North to South" there are only significant differences in the time periods with the 10 kronor charge and the charge-free period. During both of these time periods the number of public transport journeys increased 19% and 24% respectively during the congestion charging trial compared with September/October 2004.

For other directions 13-16 % of journeys occur during the charge-free period and 28-34% of journeys during the highest charge period.

3. Conclusions

Car journeys have decreased across the charging zone

The congestion charging trial has meant that the residents of Stockholm County have reduced their car journeys across the charging zone by approx. 20%. The reduction has possibly been amplified by the rise in petrol prices. The greatest percentage reduction in car journeys can be found in the direction between the northern and southern halves of the county for those travelling across the inner city.

The number of journeys — taking into account all means of transport — across the charging zone made by the residents in a 24-hour weekday period has decreased between September/October 2004 and March 2006 by a total of 116,000 journeys, of which 93,000 are car journeys. The figures include seasonal variations, but to a great extent this is also an effect of the Stockholm Trial, amplified by the rising petrol prices. The trial can also have had a redistributing effect on car journeys which has meant that other car journeys in the county have increased somewhat.

What is more, one can say that the reduction in car journeys across the charging zone has not implied any more tele-working. Nor has car-sharing increased. There is nothing to indicate that to any great extent people have retimed their journeys to other times of day in order to avoid the charging periods.

The reduced number of business trips by car across the charging zone with a destination or starting point in the inner-city have to a great extent become public transport journeys. Business trips through the inner-city have been moved across to the Essingeleden bypass. Journeys for other purposes distribute their adjustments among a change in the starting point/destination, change of route or absence of a journey, with the help of the coordination of several purposes for a journey.

The total number of journeys and distance covered in the county has decreased somewhat

If one assumes the seasonal variation from the analyses carried out by RES to be reliable also for the comparison between 2004 in 2006, this would imply that we have a reduction in the total number of journeys in the county — taking into account all means of transport — of approximately 3% between September/October 2004 and March 2006 which does not result from seasonal variation. The reduction is approximately the same for the total distance covered, the traffic mileage, in the county. This reduction can, apart from the Stockholm Trial, be a result of several factors, for example petrol price and the business cycle. The effect as such is a major one.

The number of car journeys across the charging zone which has decreased as a result of the Stockholm Trial is a very small proportion of the total number of journeys (all means of transport) that the residents make in the county — on a weekday about 2%.

Of the car journeys in the county the decrease in car journeys across the charging zone comprises a good 4% — this to a very small proportion. It may be worth mentioning the fact that the exemption from congestion tax for clean vehicles has had no effect on the reduction in traffic. Those who had access to a clean car in March 2006 have changed their behaviour just as much as those who did not have access to a clean car. The group who had access to a company car have however reduced their car journeys across the charging zone to a considerably smaller extent than the group who did not have access to a company car, which presumably has to do with the fact that they, to a lesser extent, paid for their journeys themselves.

In conclusion one can summarise the effects of the Stockholm Trial on the travel by county residents:

- a reduction in the number of car journeys across the charging zone
- the reduced number of business trips by car across the charging zone has presumably in large part become public transport journeys
- a possible increase in the number of car journeys not affected by the congestion tax
- an overall reduction in the number of journeys in the county (all of the lost car journeys have not been replaced by other journeys)

Distribution effects

It the is not possible to discern how the changes measured between measurement occasions in the RVU for different groups have been affected by the Stockholm Trial alone, as the seasonal influence varies strongly between different groups, directions and means of transport. (Besides, there are no reliable figures for travel across the charging zone divided into different reasons for journey.) Those differences shown take into account seasonal variations, which therefore cannot be assumed to be similar for the different groups. Even if one cannot distinguish the effects of the trial from other causes, it is interesting to study who has changed their behaviour most.

All geographical and socio-economic groups have reduced their *car journeys* across the charging zone between September/October 2004 and March 2006, irrespective of the charging period. The reduction is, however, different in size for different groups. Job-seekers, students and pensioners are those who have reduced the number of a car journeys most. *During the charging period* too all groups have reduced their *car journeys* in March 2006 compared with September/October 2004 across the charging zone.

Those who percentage-wise have reduced their car journeys across the charging zone during the charging period most are students, job-seekers and adults with teenage children. As regards differences between people with different consumption levels, it is people with a consumption level around average who have most reduced the number of their car journeys across the charging zone during the charging period. Men and women have on the other hand to an equally high degree reduced their car journeys across the zone during the charging period in March 2006 compared with September/October 2004.

Men who live within the charging zone are responsible for most of the car journeys per person across the charging zone during the charging period in both 2004 and 2006 (despite a major reduction). The same applies to adults with children, particularly those who live within the charging zone.

4. Method and realisation

In order to be able to say whether the Stockholm Trial has affected the travel habits on the part of the residents of Stockholm County, several travel habit studies have been conducted. In this report primarily two travel habit studies have been compared: one before the start of the trial (September/October 2004) and one during the trial (March 2006). Both studies have been conducted as postal questionnaire surveys.

4.1 Questionnaire survey

The questionnaire surveys have been designed so that those who responded in September/October 2004 were approached in March 2006 according to a so-called panel design.

A consultative group with representatives from the Swedish Institute for Transport and Communications Analysis, Stockholm County Council, Stockholm Real Estate, Streets and Traffic Department, the regional planning and traffic office in Stockholm County, Stockholm Transport and the Royal Institute of Technology have participated in discussions on sampling, methods and production of the questionnaire. The Office of Research and Statistics has been responsible for sampling, dispatch and collation of the questionnaires.[19]

Population and sample

The sample for the first RVU (September/October 2004) was a stratified sample of 77,000 people out of the total 1,570,847 residents in Stockholm County in the age range 12-84.

In order to be able to express oneself statistically on the differences between different parts of the county, Stockholm County was divided into 8 geographical areas. The boundaries of the areas are shown in table 4.1 and Figure 4.1. The sample was commissioned from the National Swedish Tax Board and was retrieved from the national population registration in week 36 September 2004. The sample in the areas was collated with the help of the data about the municipality and parish which are the geographical codes to which the Tax Board have access. The sample was applied in equal numbers in all 8 areas.

[19] USK (2004) – Resvaneundersökning 2004 - genomförande, granskning, kodning samt bortfallsanalys, Utrednings- and Statistikkontoret, Stockholms stad

Table 4.1 Division into 8 sample areas and the delimitation of these

Area		Delimitation
1	Northern outer suburb	Municipalities: Norrtälje, Sigtuna, Vallentuna, Upplands-Bro, Upplands Väsby, Österåker, Täby, Sollentuna, Järfälla, Ekerö, Vaxholm
2	Northern inner suburb	Municipalities: Danderyd, Sundbyberg, Solna. Församlingar i Stockholm: Bromma, Västerled, Vällingby, Spånga, Hässelby, Kista
3	N Stockholm Inner city	Parishes: Domkyrko, Johannes, Adolf Fredrik, Gustav Vasa, Matteus, Engelbrekt, Hedvig Eleonora, Oscar, Kungsholm, Sankt Göran, Essinge,
4	S Stockholm Inner city	Parishes: Maria, Högalid, Katarina, Sofia
5	Lidingö	Lidingö
6	SW inner suburb	Parishes: Hägersten, Brännkyrka, Vantör, Enskede, Skarpnäck, Farsta, Skärholmen
7	SE inner suburb	Nacka municipality
8	Southern outer suburb	Municipalities: Nykvarn, Södertälje, Salem, Botkyrka, Huddinge, Haninge, Nynäshamn, Tyresö, Värmdö

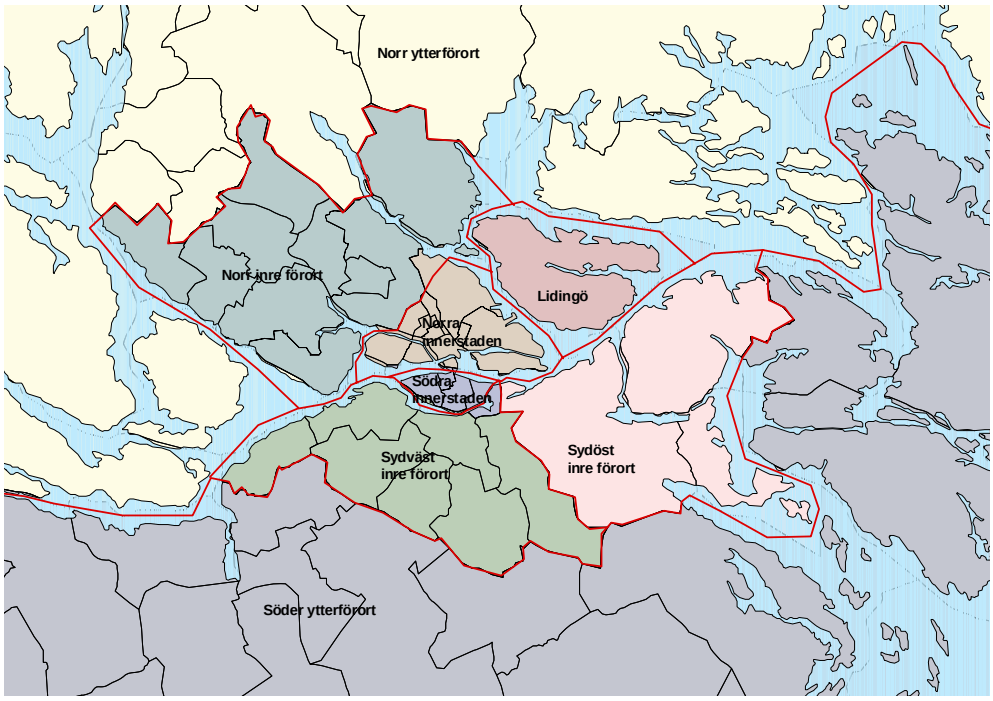

Figure 4.1 Map of the study area with division into 8 sample areas

The sample for the second questionnaire survey, during the ongoing Stockholm Trial in March 2006, was those people who had responded to the first survey, 36,049 persons.

Content of questions

The questionnaire contained on the one hand some background questions about the individual and the household, on the other a travel diary with questions about all journeys made on a specific monitoring day. The questionnaire was devised by Trivector Traffic in collaboration with the joint consultation group. The questionnaire in March 2006 was supplemented with a few more questions, but the questions were

otherwise identical in order to avoid the responses being influenced by different phrasing of the questions.

Realisation

The Institute for Transport and Communications has together with the Swedish Institute of Public Opinion Research been responsible for sampling, dispatch and collation of the questionnaires. The Institute of Transport and Communications has also collaborated with the Institute of Public Opinion Research in coding all of the questionnaires.

Each respondent answered questions about travel on a specific monitoring day. The monitoring period for the first questionnaire (September/October 2004) ran from Monday September 20 to Sunday October 3. The sample was therefore distributed randomly over these 14 monitoring days and the questionnaire was sent out successively. The respondent received the questionnaire one to three days before the monitoring day. The monitoring period for the second survey (during the ongoing trial in March 2006) ran from Monday, March 6 to Sunday, March 19.

Reminder cards were sent out within a week, and within two weeks those who had received the reminder card and still not responded received a new questionnaire with a new motoring day. The new monitoring day fell on the same weekday as in the main circulation. The monitoring period for the reminder in the survey in September/October 2004 ran from Monday, October 11 to Sunday, October 24, 2004. The corresponding reminder period for this survey during the ongoing Stockholm Trial ran from Monday, March 22 to Sunday, April 2, 2006. In March 2006 no reminder cards were circulated.

The number of responses per day was largely evenly distributed across the weekdays in both 2004 and 2006.[20]

The Institute of Public Opinion Research has been responsible for registering the arrival date of the questionnaires, status (answered or unanswered questionnaire) and checking and sorting the questionnaires. Checking and sorting implied that the questionnaires were sorted into different groups depending on the usability of the responses. In this way one could use the responses from certain questions even if not all the responses were usable.

The travel diaries were divided to groups by the Institute of Public Opinion, approved and not approved. An approved travel diary contained the starting and arrival times of the movement in a logical time sequence, one entry per movement, one means of transport to per metre transport column and starting and destination locations stated with street, number and city district/municipality. The last movement on a monitoring day should have a logical final destination. The travel diaries that were not approved were checked and complemented manually in so far as it is possible e.g. putting addresses to places. A relatively large number of travel diaries supplemented completely however and therefore lack starting and end time, a detailed address etc. These travel diaries have been used for certain analyses such as calculation of the

[20] USK (2006 – Resvaneundersökningarna 2004-2006 - genomförande, granskning, kodning samt bortfallsanalys, Utrednings- and Statistikkontoret, Stockholms stad

number of journeys. On the other hand, they have been excluded from detailed analyses of e.g. travel times, which require properly completed travel diaries.

Response frequency

From the gross sample in the first RVU of 77,000 people, 36,049 people responded to the questionnaire. The gross non-response, i.e. people who for different reasons did not receive the questionnaire, was 2,422 people (3%) This means that the response frequency calculated on the net sample was 48%, see Table 4.2. The response frequency in the eight different areas was 46% at its minimum and 51% at its maximum.

Of the 36,049 people responding to the first survey, some had moved out of the county by March 2006 and some others had died. In this way, 35,110 received a new questionnaire during the ongoing trial in March 2006, and 24,002 responded to this.

Table 4.2 Results of questionnaire survey

	Gross sample (questionnaires circulated)	Gross non-response	Net sample	Responses received	% response
RVU Sept/Oct 2004	77,000	2,422	74,578	36,081	48.4 %
RVU March 2006	35,110	435	34,675	24,002	69.2 %

Gross non-response

The reasons for the sample for the survey in September/October 2004 and 1.2% in March 2006 are evident from Table 4.3.

Table 4.3 Cause of gross non-response

Reason for non-response	RVU Sept/Oct 2004			RVU March 2006		
	Number	Proportion of (%)	Proportion of total (%)	Number	Proportion of (%)	Proportion of total (%)
Excluded from gross sample before circulation	165	6.8	0.2	939*		
Wrong address/unknown at address	1,268	56.2	1.6	126	29.0	0.4
Ill/hearing-impaired/visually impaired/has handicap	442	19.6	0.6	125	29.0	0.4
On holiday/away during the period	203	9.0	0.3	57	13.1	0.2
Abroad/at sea	136	6.0	0.2	62	14.3	0.2
Moved abroad	95	4.2	0.1	14	3.2	0.0
Does not speak Swedish	66	2.9	0.1	5	1.1	0.0
Deceased	29	1.2	0.0	12	2.8	0.0
Outside target group	13	1.0	0.0	34	7.8	0.1
Military service	5	0.2	0.0	0	0	0
Total	2,422	100	3.1	435	100	1.2

*excluded before circulation are not included in percentage calculations.

The gross non-response in the survey in September/October 2004 was greatest in the sample area “Northern inner suburb” which consists of the municipalities of Danderyd, Solna, Sundbyberg and West Stockholm. In the survey in March 2006 the

gross non-response was greatest in the sample area "Southern inner-city", which consists of the parishes of Maria, Högalid, Katarina and Sofia.

Net non-response

Of the net sample of 74,578 people in the survey in September/October 2004, 36,612 people or 49.1% had not responded, see Table 4.4. From the table it is clear that of the net sample of 35,110 people in March 2006, 10,176 people or 29.4% did not respond. Telephone interviews were conducted with a sub-sample from these groups.

Table 4.4 Cause of net non-response

Reason for non-response	RVU Sept/Oct 2004		RVU March 2006	
	Number	Proportion of (%)	Number	Proportion of (%)
Responses received	36,081	48.4	24,002	69.2
Responses received after 9/11 (included in data file)	230	0.3	-	-
Arrived too late	-	-	122	0.4
Did not wish to participate/refusal on principle	1,358	1.8	263	0.8
No cause	261	0.4	91	0.3
Lack of time	28	0.0	1	0.0
Duplicates	5	0.0	-	-
Not approved	3	0.0	20	0.1
No contact	36,612	49.1	10,176	29.4
Total	74,578	100	34,675	100

4.2 Non-response studies

A total of five non-response studies have been made to supplement the RVU in Stockholm County. They are shown in their entirety in a separate report[21]. Non-response studies are made to complement different panels, on the one hand the panel described in Chapter 2 studying the population of the entire county, on the other the panel described in Appendix 2 focusing on commuters working in the inner-city and with their home outside the inner-city. In this chapter we call these *the county panel* and *the commuter panel* respectively. We assume however that they possess certain general characteristics which do not correspond in the RVU, irrespective of panel, and made use of all the studies to provide a co-ordinated assessment of how the final result in the RVU is influenced by the fact that not the entire population has been studied

Aims and limitations

The aim of one non-response study is to find out whether the individuals who have not responded to the travel diary in the RVU (the non-response group) in any way differ from those who have done so (the responding group). If the non-response group is large and the difference between the non-response group and the responding group

[21] Trivector Traffic (2006) – Resvanor i Stockholms län - bortfallsundersökningar, Trivector Rapport 2006:21

is marked, then the final result can be misleading. The responding group and the non-response group can differ in varying ways. They can have different backgrounds as regards, for example, car ownership or have different travel patterns.

Non-response studies are aimed at providing a co-ordinated assessment of how the final result in the RVU is influenced by the fact that not the entire population has been studied. The aim has not been to provide a basis for weighting the responding group as against the non-response group in analyses of the RVU.

The five non-response studies have been made with slightly different methods and focus on individuals who have dropped out at different stages. The most common methodology used has been, after the conclusion of a questionnaire round, to select on the one hand a sample of individuals who have responded, on the other a sample of those who have not done so. Then their telephone numbers have been sought and a number of new questions asked in a telephone interview with the aim discovering who they are and how they travel. The aim has been to get hold of almost everyone in a smaller sample. See the methods used in table 4.5.

Table 4.5. Focus and method of non-response studies. RVU 2004-2006 is the traffic habits study which examines the population of the whole county. RVU 2005-2006 is the traffic habits study which examines commuters with places of work in the inner city and homes outside the inner city.

Supplements	Studies	Method
RVU 2004-2006	Non-response group 2004	Comprehensive telephone interview with large sample from the non-response group, December 2004 2007 responses, 22% response frequency; no telephone number found for 39% Weighted responses compared with those from the RVU September/October 2004.
RVU 2004-2006	Final non-response group = Non-response 2004 + 2006	Brief telephone interview to small sample from non-response group and responding group, May 2006 73 responses in responding group and 80 responses in non-response group, response frequency was 73% of the responding group and 40% of the non-response group; no telephone number found for 7% of the responding group and 27% of the non-responding group only weighted responses were compared
RVU 2005-2006	Non-response group 2005	Brief telephone interview to small sample from the non-response group and responding group, February 2006 49 responses in the responding group and 75 responses in the non-response group; response frequency 80% in the responding group and 59% in the non-response group; no telephone number was found for 14% of the responding group and 23% of the non-response group. Both the weighted and un-weighted responses were compared, in-commuters and others were compared separately; comparison was also made with the RVU 2005 for the group of in-commuters.
RVU 2005-2006	Non-response group 2005	An extra circulation to the sample from the non-response group in connection with the circulation in March 2006 149 responses, of which 82 were commuters, 67 others, 15% response frequency Weighted responses were compared with those from the RVU in March 2006; commuters and others were compared separately

RVU 2005-2006	Non-response group 2006	Brief telephone interview to a small sample from the non-response group and the responding group, May 2006 44 responses in the responding group and 57 in the non-response group; responding frequency was 94% in the responding group and 73% in the non-response group; no telephone number was found for 4% from the responding group in 9% in the non-response group Both weighted and un-weighted responses were compared; only commuters were analysed

Results and conclusions

The non-response studies have not pointed in one clear direction to the two groups differing in any significant way. This too can be seen as a result of the differences between the groups being not particularly large. One can therefore draw the conclusion that travel by the responding group reflects travel by the population at large.

There are, however, some differences between the responding group and non-response group which should be borne in mind.

The responding group tends to be more mobile than the non-response group.

For the *county panel* the study in December 2004 showed that the responding group made more journeys (which however may be the result of a difference in method) and had a higher access to a car and a Stockholm Transport travel card than the non-response group. An analysis of the RVU showed that those who responded in 2004 but not in 2006 made fewer journeys per person and day in September/October 2004 than those who responded to both questionnaires.

For the *commuter panel* the study in February 2006 indicated that the in-commuter responding group had a greater tendency to respond to the questionnaire if they had travelled on the monitoring day and in this way considered that they had something to contribute to the study. The study in March 2006 showed that the responding group made more journeys and the non-response group had greater access to a car and a Stockholm Transport travel card than the non-response group. The study in May 2006 showed that those who responded in 2005 but not in 2006 travelled to the same extent on the monitoring day as those who responded to both questionnaires.

It should be stressed here that the non-response studies did not succeed in reaching the entire non-response group in the sample, and therefore cannot give an exhaustive picture of non-response. Other studies[22] have shown that those people who do not respond to RVU consist on the one hand of people with low mobility who for this reason not interested in participating, on the other hand people who are very active and mobile, and therefore do not consider they have time to participate. This result can therefore be an indication that we have succeeded in contacting those in the non-response group with low mobility to a greater extent than those who are very mobile.

The non-response group is more motorised than the response group.

[22] For example; Kuhnimhof, T., Chlond, B. – Rules of Non-response and Selectivity: Analysing the Drop-out in the Multi-stage Recruitment Process for the German Mobility Panel, Institute of Transport Studies, University of Karlsruhe.

The *county panel*'s non-response group chose to travel by car to a greater extent than the response group when they did travel. This was the case both in the non-response study carried out before the congestion trial period and the non-response study carried out during the trial. This is therefore a general pattern for the non-response group.

In the *commuter panel*, too, the non-response group travelled more often by car. This applied only to the group who were not commuters. For the commuter panel all of the non-response studies were made during the congestion charging trial period. We do not therefore know how the non-response group travelled before the trial period. But in the non-response study the responding group and the non-response group stated that they had changed their car journeys to the same extent since 2005. Which is why we can draw the conclusion that the non-response group in general is more motorised, but has changed its car journeys to the same extent as the responding group.

This means that the number of car journeys in the county panel is underestimated somewhat for each monitoring period, but that the estimation of the change between the periods is correct.

The commuter panel's response group travelled on public transport more than its non-response group.

This applied both to commuters and the others. For the commuter panel all of the non-response studies were carried out during the congestion charging trial period. But in the non-response study the responding group and be non-response group stated that they had changed their public transport travel to the same extent since 2005. Which is why one can draw the conclusion that the non-response group generally speaking travel on public transport less, but has changed its public transport travel to the same extent as the responding group. This indicates the number of journeys by public transport in the commuter group is overestimated in the respective monitoring period, but that the estimation of the change between the periods is correct.

The responding group has a somewhat more positive attitude to the congestion charging trial than the non-response group. This was particularly clear in the *commuter panel*'s non-response study in May 2006, which compared those responding to both questionnaires with those who only responded to the first questionnaire. In the *county panel*'s non-response study in May 2006 the groups were more comparable. The study compared those who responded to both questionnaires with those who did not respond at all. This indicates therefore that those who are positively inclined to the trial are more motivated to continue to participate in the RVU. We assess it as improbable, however, that attitude to the congestion tax influences how people respond but merely whether they respond.

In brief, we draw the conclusion that the changes in the travel by the responding group accurately reflect the alterations in travel by the population as a whole. The effects of the congestion tax will therefore be properly assessed by the RVU. On the other hand the number of car journeys is underestimated and the number of journeys by public transport overestimated somewhat during the respective monitoring periods. At the same time, it should be stressed that the differences between the responding group and the non-response group are small and influence the results to a very minor extent overall.

4.3 Weighting of responses received

The sample for the RVU in October 2004 was made from 8 different areas. The number of questionnaires circulated to each area was the same, though there are different numbers of residents in the 8 areas. Against this background an adjustment has to be made of the responses received so that certain areas are weighted more heavily whilst others are weighted less, otherwise the responding group will not correspond to the population of the county.

The response group has been weighted against the composition for the county as regards the parameters of gender, age, background and geographical area.

The weighting has been carried out against the population of Stockholm County in September/October 2004 when the sample was taken. In the same way the weighing parameters are based on data on the respondent in September/October 2004. Each respondent has the same weight in both surveys. Sensitivity analyses have been conducted for what this signifies when one considers that some respondents (a good 5%) have moved to another geographical area between the surveys. The analysis shows that this does not affect the results when you compare travel habits in September/October 2004 with March 2006.

The weighting has been conducted in such a way that the proportions of the different parameters have been compared between the responding groups and the population of the county, first within each respective geographical area; currently a weighting parameter has been calculated and after that adjusted according to the number of inhabitants in each area in relation to the county. An example follows below:

The proportion of people born abroad with Swedish citizenship living in area 1 is 10.5%. In the responding group the same proportion was 8.3%. This means that this group is underrepresented and needs to be weighted upwards. The proportion of the population is divided by the portion of the responding group for each parameter. After that these quotients are multiplied (background, age and gender). In this way a matrix is obtained with weighting factors for each area, age group, background and gender, in total 160 weighting parameters. Parameters >1 mean that this group has been weighted more heavily and vice versa. After this each area is adjusted according to the proportion of the county as a whole.

4.4 Description of the weighted responding group

Gender and age

The weighted responding group consisted of 52% women and 48% men both in the survey in September/October 2004 and during the congestion charging trial in March 2006.

As the study during the ongoing congestion charging trial was carried out in 2004 this meant that those individuals who had responded to the questionnaires had become 18 months older by the time of the second study. This means that the number in the age-group 12-18 has fallen by 9% and the age-group 25-39 has fallen by 5%. At the same

time the number in the age-group 40-64 has increased by 4%, in the number in the age-group 65+ has increased by 20%, see Figure 4.2.

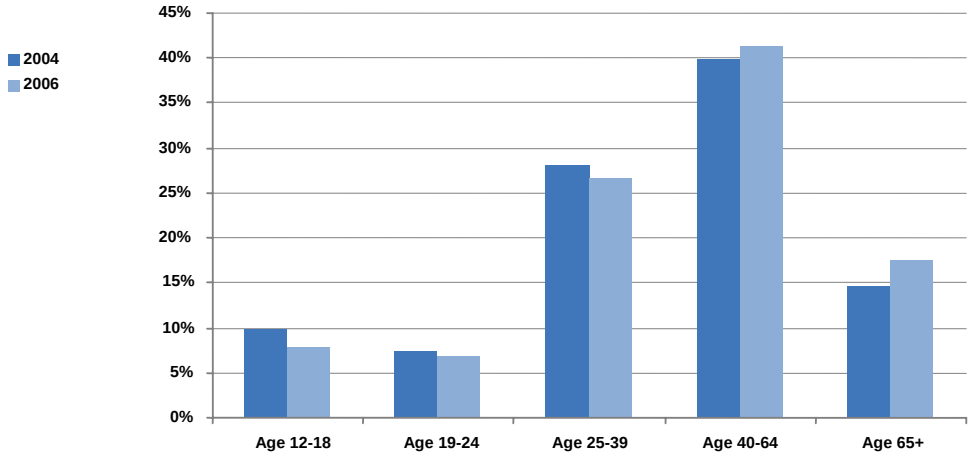

Figure 4.2. Age distribution. N=24,002 (both RVU 2004 and RVU 2006)

Origin

In both travel habits studies in September/October 2004 and March 2006 90% of people in the study are Swedish citizens, of whom 79% were born in Sweden. In both studies 8% are foreign citizens born abroad, and 1% of foreign citizens born in Sweden.

Composition of households

The proportion of households with single adults and the proportion of households with two or more adults with teenage children increased somewhat, whilst two or more adults with children has decreased somewhat between September/October 2004 and March 2006, Table 4.6.

Table 4.6 Composition of households. Base=all individuals: N=23 738 (RVU 2006) and N=23 749 (RVU 2004) respectively.

	RVU 2004	RVU 2006	Percentage change	Statistically significant difference
Single adult	20 %	21 %	+3,7 %	+0,74 %-points
Two or more adults with no children	42 %	41 %	-0,6 %	No
Single adult with teenage children	1,6 %	1,4 %	-15 %	-0,24 %-points
Two or more adults with teenage children	9,3 %	10 %	+12 %	+1,1 %-points
Single adult with children	2,6 %	2,4 %	-8,7 %	No
Two or more adults with children	25 %	24 %	-4,4 %	-1,1 %-points

Type of dwelling

Both in September/October 2004 and during the ongoing congestion charging trial in March 2006 the greatest proportion owned their own house, either a detached house,

a terraced house or an owner-occupied apartment, see Table 4.7. In March 2006 a greater proportion were living in owner-occupied apartments in apartment blocks than during September/October 2004. The proportion living in apartment blocks as tenants had decreased to a corresponding extent.

Table 4.7 Type of dwelling. Base: all individuals. N=23 866 (RVU 2006) and N= 23 848 RVU 2004)

	RVU 2004	RVU 2006	Percentage change	Statistically significant difference
Apartment block (tenant)	30 %	29 %	.2 %	-1.6 %-points
Apartment block (owner-occupier)	25 %	26 %	+6.4 %	+.6 %-points
Terraced house/detached house/self-contained house (tenant)	4.2 %	3.9 %	-6.5 %	No
Terraced house/detached house/self-contained house	41 %	41 %	+0,3 %	No

Residential area

Although a good 5% of the population in the group studied has moved to a different sample area between September/October 2004 and March 2006 an equally large proportion lives in the six respectively three areas of the county that have been demarcated for analyses of distribution effects according to Chapter 2.3), see Table 4.8.

Table 4.8 Proportion of the population divided into 6 3 areas in the county respectively. Base: all individuals. N=24,002 (RVU 2006 and RVU 2004).

Population distributed among 6 areas		Population distributed among 3 areas	
Northern outer suburb	23 %	North of the zone	42 %
Northern inner suburb	17 %		
Inner city	15 %	Within the zone	15 %
Lidingö	2,2 %		
Southern inner suburb	20 %	South of the zone	43 %
Southern outer suburb	23 %		

Occupation

Both in September/October 2004 and March 2006 the largest proportion of the population in the studies was employed, see table 4.9. In March 2006 however there was a somewhat smaller proportion studying, and also the proportion of job-seekers had reduced to some extent. Instead the proportion of pensioners had increased, which can be explained by the fact that the group studied was 18 months older in the second study.

Table 4.9 Distribution by occupation. Base: all individuals. N=23 913 (RVU 2006) and N= 23 856 RVU 2004)

	RVU 2004	RVU 2006	Percentage change	Statistically significant difference
Employed	60 %	59 %	-1.5 %	-0.9 %-points
Studying	14 %	14 %	-1.1 %	No
On sick list	1.8 %	1.5 %	-12.6 %	No
On parental leave	2.3 %	2.4 %	+6.3 %	No
Job-seeker	3.1 %	2.6 %	-15 %	-0.5 %-points
Pensioner	18 %	20 %	+11 %	+1.9 %-points
Other	0.9 %	0.6 %	-36 %	-0.3 %-points

In the breakdown into the six occupational groups (students (>=20 years of age), pensioners, job-seekers, employed with children, employed with teenage children and employed with no children) used in the studies of distribution effects (see Chapter 2.2), it is clear that in March 2006 the proportion of pensioners in the total population had increased by 2% points and that the number of job-seekers had decreased by 0.5% point, see Table 4.10.

Table 4.10 Distribution by occupation. Base: all individuals. N=23 913 (RVU 2006) and N= 23 856 RVU 2004)

	RVU 2004	RVU 2006	Percentage change	Statistically significant difference
Student (>20 years of age)	5.9 %	5.7 %	-3.8 %	No
Pensioner	17.6 %	19.5 %	+ 11 %	+1.9 %-points
Job-seeker	3.1 %	2.6 %	-15 %	-0.5 %-points
Employed with children	18.2 %	18.3 %	+.0.4 %	No
Employed with teenage children	5.9 %	5.8 %	-2.0 %	No
Employed person with no children	35.8 %	35.0 %	-2.2 %	No

In March 2006 compared with September/October 2004 1% fewer of the employed people worked on the monitoring day; 64% compared with 65.5%. Of the employed persons the proportion was the same however, 4% in September/October 2004 and March 2006, working at home on the monitoring day.

Household income

During September/October 2004 68% of households had a monthly income of greater than 25,000 kronor. During the ongoing congestion charging trial this proportion had increased somewhat to 70%. During March 2006 the proportion of households with a monthly income of more than 70,000 kronor had increased by 20%, see table 4.11.

Table 4.11 Distribution by income group, monthly income. Base: all individuals. N=23 240 (RVU 2006) and N= 23 222 RVU 2004)

	RVU 2004	RVU 2006	Percentage change	Statistically significant difference
0 – 7,500 kronor	2.5 %	2.3 %	-8.4 %	No
7,501 – 10,000 kronor	3.0 %	3.2 %	+7.7 %	No
10,001 – 15,000 kronor	6.7 %	6.8 %	+0.6 %	No
15,001 – 25,000 kronor	19 %	18 %	-6.8 %	-1.3 %-points
25,001 – 40,000 kronor	25 %	25 %	-3.5 %	-0.9 %-points
40,001 – 55,000 kronor	22 %	21 %	-2.4 %	No-points
55,001 – 70,000 kronor	12 %	13 %	+6.1 %	+.0.7 %-points
More than 70,001 kronor	9.3 %	11 %	+20 %	+ 1.9 %-points

Driving licence, access to a car and parking place at home

76% of the individuals in the responding groups both in September/October 2004 and March 2006 had a driving licence. In both RVUs 81 per cent stated that they or someone else in the household had access to a car. 91% of those who held a driving licence and had access to a car in the household state that they had access to a car on the monitoring day.

In both RVUs 91% had a driving licence in the household, and 82% of the households with a driving licence also had access to a car.

In March 2006 a slightly larger proportion, 79%, of those households that had access to a car also had access to their own parking place than in September/October 2004 when 76% stated that they had their own parking space.

Of those employed, 13% in March 2006 stated that they themselves or someone else in the household had access to a car owned or leased by their employer. This was percentage-wise more than in September/October 2004. If we look not only at those employed but at the whole population then in March 2006 barely 8% stated that they themselves or someone else in the household had access to a car owned or leased by their employer.

In March 2006 2.5% of the households owned or had access to a clean car. In September/October 2004 the study did not ask this question.

Access to a public transport travel pass

During the ongoing congestion charging trial in March 2006 almost 8% more people always had access to a card valid for journeys on Stockholm Transport compared with the autumn of 2004, see table 4.12.

Table 4.12 Proportion with Stockholm Transport travel card. Base: all individuals. N=23 669 (RVU 2006) and N= 23 693 RVU 2004)

	RVU 2004	RVU 2006	Percentage change	Statistically significant difference
Yes. always	35 %	38 %	+7.9 %	+2.8 %-points
Yes. sometimes	20 %	19 %	-4.7 %	-0.9 %-points
No. never	45 %	43 %	-4.2 %	-1.9 %-points

At the same time in March 2006 a greater proportion of those stating that they always or sometimes have access to a Stockholm Transport card had stated that on the monitoring day they had a card for use on ST, 77% in March 2006 compared with 72% in September/October 2004.

Benefits at/through the workplace

The proportion of employed persons who state that they have a parking place at/through their work has decreased somewhat during the ongoing congestion charging trial in March 2006 compared with September/October 2004, see Table 4.13. What is more, the proportion stating that they have free parking has decreased, and instead the proportion stating that they have expensive or cheap parking has increased.

Table 4.13 Proportion of employed persons stating that they have access to different benefits at/through their place of work. Base: all employed persons. N=14,084 (RVU 2006) and N= 14 358 RVU 2004)

	RVU 2004	RVU 2006	Percentage change	Statistically significant difference
Parking	74 %	72 %	-2,1 %	-1,5 %-points
Free parking	58 %	52 %	-11 %	-6.4 %-points
Cheap parking	24 %	26 %	+7.4 %	+1.8 %-points
Expensive parking	26 %	29 %	+9.5 %	+2.5 %-points
Company car	13 %	14 %	+4.6 %	No
Pass for travel on Stockholm Transport	8.5 %	8.5 %	-0.6 %	No
Other benefits relating to a car or public transport	8.0 %	7.7 %	-3.3 %	No

Reasons for not travelling

The proportion of individuals in the study stating that they did not make any journey on the monitoring day was higher in March 2006 compared with September/October 2004, see table 4.14

Table 4.14 Proportion of those who have not made any journey in either a 24-hour weekday or weekend period respectively. Base: all individuals. $N_{weekday}$= 17.023 (RVU 2006) and $N_{weekday}$ = 17 167 (RVU 2004) respectively. $N_{weekend}$= 6 602 (RVU 2006) and $N_{weekend}$ = 6 660 (RVU 2004) respectively.

	RVU 2004	RVU 2006	Percentage change	Statistically significant difference
24-hour weekday period	16 %	19 %	+22 %	+3.4 %-points
24-hour weekend period	31 %	36 %	+18 %	+5.6 %-points

The most common cause of not having travelled is that they had no reason to travel, see table 4.15.

Table 4.15 Reasons for not travelling . Base: all individuals. N= 24,002 (RVU 2006 and RVU 2004)

	RVU 2004	RVU 2006	Percentage change	Statistically significant difference
No reason to travel	11 %	15 %	+40 %	+4.4 %-points
Illness	2.5 %	3.2 %	+27 %	+0.7 %-points
Sick child	0.3 %	0.6 %	+110 %	+0.3 %-points
Other reason	7.7 %	4.4 %	-43 %	-3.4 %-points
Total:	21 %	23 %	+9.5 %	+2.0 %-points

4.5 Processing and analysis

Comparison between travel habits in 2004 and 2006

Included in the analysis are responses from people who replied to the questionnaires both in September/October 2004 and March 2006. This means that the results for September/October 2004 given in this report may differ a little from those given in the previous report[23].

Other samples for analysis were tested to see whether they affected the result. Primarily the importance of the fact that the people who had responded to the questionnaires on both occasions had become 18 months older was tested. This was done by taking away the youngest people in the study in 2004 and the oldest in the study in 2006, so that the groups would be comparable as regards age, approx. 14-84 years. This sensitivity analysis showed that the results were reliable, but that the variation in the responses had decreased, which is to be expected when the group has a narrower age range.

Statistical analysis

The material has mostly been analysed in the statistics programme SPSS. The calculation of the weighting parameters, certain analyses and diagrams have been made in Microsoft Excel. If not stated otherwise statistical significance is at the 95% level.

[23] Trivector Traffic (2005) - Resvanor i Stockholms län 2004, Trivector Rapport 2005:25

Events which may affect the evaluation

When we compare the results between the studies, we have taken into account different events which have occurred during the monitoring periods or between the periods that may be thought to affect travel in September/October 2004 and March 2006.[24]

Weather

During the RVU in 2006 the average daily temperature was considerably lower than during the years 1990 to 2005. Amounts of precipitation were somewhat less than during the period 1991 to 2005. The colder average temperature means that the number of journeys, particularly on foot or by bicycle, should be lower than normal during this period. During the RVU in 2004 and the RVU in 2005 there were no significant deviations from previous years.

Season

The weather also differed greatly between the monitoring periods as a result of normal seasonal variation, with considerably warmer weather during the RVU 2004 than during the RVU 2006. In the RVU 2004 the average temperature dropped from approx. 12° at the beginning of the monitoring period to 8° at the end of the monitoring period, apart from a cold period around 4° from October 9-14 . In the RVU 2006 the temperature rose from approximately -10° at the beginning of the monitoring period to 5° at the end of the period. The daytime weather nevertheless had an insignificant effect on the average number of journeys per person in the two RVUs, see Table 4.16.[25]

Table 4.16 The response group's monitoring days in 2006 and 2004 respectively. Number of respondents for the most common combinations of monitoring days. The average number of journeys per person for 2004 and 2006 respectively.

Monitoring day			Number of journeys per person		
2004	2006	Number of responses	2004	2006	Difference 2004-2006
Monday 20 Sept	Monday 6 March	1179	2.9	2.5	-0.4
Tuesday 21 Sept	Tuesday 7 March	1152	2.9	2.6	-0.3
Wednesday 22 Sept	Wednesday 8 March	1154	3.0	2.6	-0.4
Thursday 23 Sept	Thursday 9 March	1228	3.0	2.7	-0.3
Friday 24 Sept	Friday 10 March	1235	3.1	2.7	-0.4
Saturday 25 Sept	Saturday 11 March	1250	2.4	2.2	-0.2
Sunday 26 Sept	Sunday 12 March	1156	2.1	1.7	-0.4
Monday 27 Sept	Monday 13 March	1176	3.0	2.6	-0.4
Tuesday 28 Sept	Tuesday 14 March	1189	3.0	2.7	-0.3
Wednesday 29 Sept	Wednesday 15 March	1321	3.2	2.6	-0.6
Thursday 30 Sept	Thursday 16 March	1209	3.1	2.8	-0.3
Friday 1 Oct	Friday 17 March	1247	3.2	2.7	-0.5

[24] Trivector Traffic (2006B) – Händelser som kan påverka utvärderingen av Stockholmsförsöket - Slutrapport, Trivector Rapport 2006:47

[25] As individuals were allocated monitoring days in the same order in RVU 2004 and RVU 2006 (and therefore, for example, had to describe their travel on the warmest day in September 2004 and the coldest day in March 2006) it was feared that the seasonal effect would be amplified. The most common combinations of monitoring days comprise 70% of the responses.

Saturday 2 Oct	Saturday 18 March	1158	2.3	2.0	-0.3
Sunday 3 Oct	Sunday 19 March	1165	2.1	1.7	-0.4
Total		16819			

Despite this, the season has great significance. This is dealt with by producing reference values from the national travel habits survey RES for the population of the county in the age range 12-84 for March and September-October respectively. The seasonal variation according to RES is taken into account when we draw conclusions about the differences in travel between 2004 and 2006.

Disturbances in road traffic

There were approximately the same number of road traffic disturbances (including road-works, traffic accidents, traffic queues, etc) during RVU if one discounts the disturbances on the Södra Länken bypass which did not occur in RVU 2004. If road-works alone are studied, these were very frequent in September 2004 compared with 2000-2003; the reverse is true for October 2004. During RVU 2006 there were unusually few road-works, approx. 25% fewer than during the same period in the years 2000-2005. The differences in the road-works mean that travel times by car become longer in September 2004 and shorter during RVU 2006; the differences should however be marginal. The disturbances are assessed as having been insufficiently major to have affected the number of car journeys.

Disturbances in public transport

During RVU 2006 there were relatively major disturbances in traffic on the tube and commuter trains, which was not the case during RVU 2004. The disturbances may mean that travel times for public transport are longer than normal in the RVU 2006 compared with 2004. The disturbances are however judged to be insufficiently major to have affected the number of journeys by public transport.

Changes in the infrastructure

On Sunday, October 24, 2004 the Södra Länken bypass was opened to car traffic, therefore the last monitoring day in RVU 2004. The opening of Södra Länken has had a major effect on car traffic and contributed to a net increase in car traffic to and from the Nacka area by almost 15%. Choice of means of transport and possibly also travel times can have changed between RVU 2004 and RVU 2006. Particularly important changes are to be expected to journeys to and from the Nacka area. This is taken into account when we draw conclusions about travel to and from the Nacka area as regards choice of means of transport and number of car journeys.

The price of petrol

The price of petrol rose by 13% between October 2004 and March 2006. The high a price of petrol was assessed as reducing car travel by approximately 4%[26], as regards traffic mileage by car. This is taken into account when we draw conclusions about changes in traffic mileage by car between 2004 and 2006. There is no clear connection with *the reduction in the number* of car journeys. Which is why car traffic monitoring is used, in order to assess the significance of the petrol price on, for example, car journeys across the charging zone.

[26] Calculated on the basis of the price elasticity of 0.3, i.e. if the petrol price goes up 10%, then the demand of a petrol is reduced by 3%

Other economic factors

Employment has grown continuously from RVU 2004 to RVU 2006. The total amount of salaries in the City of Stockholm and the county have grown by approx. 6% between the fourth quarter of 2004 and the fourth quarter 2005. The number of commercial overnight stays has increased by approx. 4% in the first quarter of 2000 votes compared with the first quarter 2006. The increase from the fourth quarter 2004 to the fourth quarter 2005 was 6-7%. The improvement in the market should lead to an increase in travel, particularly by car. We take into account the significance of this by studying how the responding group has changed between RVU 2004 and 2006 (see Chapter 4.4), and how different social groups have been affected (see Chapter 2.2).

Geocoding

Coding is done at street address level and is translated into NYKO areas. NYKO areas are Statistics Sweden's key code areas (Sw. *nyckelkod*) for the sub-areas of a municipality. NYKO exists in divisions of varying fineness, from the 1-figure level (the largest area, which is equal to the municipality) down to the 10 figure level (city district level as in this case). The addresses come from Statistics Sweden's geographical database, which is based on National Tax Board data. Stockholm Office of Research and Statistics has then created 10 figure area codes and has inserted the names of city districts in the city of Stockholm into the file. The file comprises in total 49,071 address intervals for all of the 26 municipalities in the county.

Distance coding

Transek has developed distance matrices. These have been calculated with the help of the network analysis system Emme/2. The net describes the road network as it appeared in 2005, i.e. with the Södra länken bypass. The Emme areas are coarser than NYKO, which means that several NYKO areas are usually contained within a single Emme area. This means that the distance of a journey starting and ending within the same Emme area will be 0; standard distances have therefore been coded for those short distances within the same city district.

The standard distances have been calculated by manually determining distances for a random selection of those journeys given a distance of 0, divided according to means of transport. This has been done by manually measuring with the aid of maps the relevant Emme areas. Then a value was taken (between mean and median) for these journeys. Account was taken of the median because the mean value is sometimes affected by some extreme values. In general the distances were similar, as the Emme area's size limits the length of the journeys.

After being supplemented by the standard distance for short journeys for the RVU in September/October 2004 a total of 48,322 (74%) of the travel diaries' 65,341 journeys have been able to be determined as to distance. For the RVU during the ongoing trial in March 2006 a total of 45,260 (80%) of the travel diaries' 56,256 journeys have been able to be determined as to distance.

Estimate of consumption level

Consumption level is a measure showing how much a person has to spend. As a basis for ascertaining the level, household income is used, the number of people in the

household and the composition of the household. All the data do not increase proportionately with the number of people in the household but depend e.g. on age and whether people live together or not. We have used those measures ("consumption points") that the National Board of Health and Welfare recommend in calculating welfare allowances:

- single 1,16
- living with partner 1,92
- additional adult,0,96 (children of 18-19 living at home are calculated as additional adults)
- children up to 3,0,56
- children 4-10,0,66
- children 11-17,0,76

As the respondents' replies about household income are stated in intervals, this of course means that the value of the consumption level usually falls in a lower or higher interval than they would have done if we had had the exact figure as a basis. Here we have based our calculations on the higher figure in each interval, as we have assessed the risk of mistakes as less then, e.g. to avoid a single person being moved a whole interval downwards.

The consumption level has been divided into five intervals: Low, Medium-low, Average, Average-high and High. The division has been done so that all groups are approximately the same size. This means that people with high consumption levels are among the one fifth with most money to spend.

4.6 Reporting the results

Those results given in the report, if not stated otherwise, refer to the entire population of Stockholm County who were between 12 and 84 years of age at the time of the study. In the description of the responding groups the weighted responding group is referred to. If not otherwise stated, the differences given are statistically significant at the 95% level.

In the heading for each table and diagram we state what Base the analysis is based on, e.g. "Base=all journeys, all days" or "Base=only weekdays, car journeys" etc.

In Appendix 1 definitions are given of some expressions used in the report.

5. List of references

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Trivector Traffic (2006C) – On foot- and cykeltrafiken i Stockholms län - effekter av Stockholmsförsöket, Trivector Rapport 2006:50

USK (2004) – Resvaneundersökning 2004 - genomförande, granskning, kodning samt bortfallsanalys, Utrednings- and Statistikkontoret, Stockholms stad

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Utvärdering av Stockholmsförsökets effekter på biltrafiken, Rapport Juni 2006, Stockholms Stad

Appendix 1 – List of definitions

Table 1 List of definitions

Term	Explanation
24-hour weekday period or 24-hour weekend period respectively	24-hour weekday period corresponding to pay an average 24-hour weekday period (Mon-Fri) during the monitoring period.
Base	Data that the result is based on (in tables diagrams).
Charging interval	Time interval for congestion charge of 10, 15 and 20 kronor respectively.
Charging period	Weekdays (excluding the day before a red day) between 0630 and 1830.
Charging zone	Section demarcating the zone where the charging tax is levied.
Commuter	In this report a person who (daily) travels between his home and a place of work, where his home is situated outside the charging zone and his place of work within the charging zone. Compare the definition for commuters.
Congestion charging trial period	Period with congestion tax, January 3 – July 31, 2006.
Congestion charging zone	The geographical area covered by the congestion charging trial.
Congestion tax	A tax levied on vehicles passing the charging zone during the charging period.
Consumption level	The total household income, taking into account the burden of support in the household.
Direction of journey	Combination of starting point and destination point.
Household	People living at the same address.
Household income	The total income for the entire household (per month, before tax). N.B. that the respondents' answers are provided in intervals.
Income per consumption unit	The total income from the entire household (per month, before tax) divided by the number of consumption units in the household. The consumption unit is a weighting system which takes into account the composition of the household, see also section 4.5 (calculating consumption levels).
In-commuter	Person who (daily) travels between their home and their place of work, where their home is situated outside the charging zone and their place of work within the charging zone, and all of this since September/October 2004.
Journey across the charging zone	Journey in, out or across the charging zone.
Journey per mobile person	Number of journeys per person made in one journey..
Journey per person	Number of journeys for all persons (incl. those who have not made any journey).
Journey/movement	A journey/movement ends with a task at a destination which differs from the starting point of the journey. If one has first dropped off the children at the nursery and then gone to work this is two journeys, one to the nursery and one to work. Journeys/movements carried out in professional traffic (e.g. if the person drives a taxi) are not included. Walks/Runs and not included either. This is clear from the instructions accompanying the questionnaire.
Journeys in the county	Journeys that have been made within, into or out of the whole of Stockholm County.

Main means of transport	Main means of transport for each journey. In a journey where one has walked to the bus, travelled by bus and then walked from the bus, the bus is, for example, the main means of transport.
Means of transport	Means of transport/conveyance with the help of which a journey/move occurs
Monitoring day	The day the respondent has to describe his travel. A monitoring day runs from 0400 on the morning of the monitoring day to 0359 the next day.
Population	People registered in Stockholm County between 12 and 84 years of age.
Respondents	Those people who have answered the questionnaire and whose answer constitutes a basis for adjustment up to the whole population.
RVU2004	The travel habit study carried out in September/October 2004 and based on a sample of the whole county population. 77,000 people in the sample.
RVU2005	The travel habit study carried out in September/October 2005 and designed to evaluate the effect on public transport measures. 10,000 people in the sample, of whom 7,500 commuters.
RVU2006	Two parallel travel habit studies carried out at the same time during March 2006. Two panels.
Statistically significant	Significant at the 95% level.
Transport mileage	The total distance for the whole population. Measured in person kilometres. (Can be compared with traffic mileage, vehicle kilometres, which is the distance vehicles have moved in total).

Appendix 2 – Altered travel habits among commuters – a separate panel with commuters in the panel

Background

In October 2005 a travel habit study (RVU) was carried out among 10,000 inhabitants of Stockholm County. Three quarters of those asked were commuters, i.e. they were resident outside the charging zone and worked within the charging zone. In March 2006 a further travel habit study was conducted among those who had responded in October 2005. These 2221 commuters who responded to the travel habits study in both October 2005 and March 2006 comprise one panel, and who they are and how their travel has changed during the trial congestion charging trial is described in this appendix.

There were several reasons for conducting a travel habit study with a further panel in addition to the county panel. Perhaps the most important was that in this way one could isolate the effects of the public transport initiative without the congestion tax. The results of this study are presented in a report[25] in which in-commuters are studied. The in-commuters in the RVU in October 2005 are compared with a corresponding group from the RVU in 2004. The group of in-commuters is a more homogeneous group than the group we call commuters as the sample is based on their own data about where they work. This smaller sample was necessary as in the study mentioned it is not a panel that is being studied. This group of in-commuters should not therefore be confused with the commuter panel described below.

A further reason for carrying out an RVU in October 2005 was to be able to follow whether there were certain trends in travelling over time. As the congestion charging trial was delayed by several months, a longer time than planned would pass between the RVUs of the county panel. By conducting a further RVU between the two main studies there was a greater possibility of discerning trends in travelling. Comparisons between the RVUs in October 2004, October 2005 and March 2006 are shown in a special section and it is there the more narrowly defined in-commuters (who are not a panel) who are compared with each other.

The reason for this RVU has been to study a group in the population which can be regarded as particularly affected by the Stockholm Trial as they commute to work into the charging zone. It is therefore to a great extent these people that the public transport initiative is aimed at. The same individuals have been studied both before the congestion charging trial and during the period with extended public transport

[25] Trivector Traffic (2005B) – Inpendlares resvanor i Stockholms län 2005 - utvärdering av den utökade kollektivtrafiken inom Stockholmsförsöket, Trivector Rapport 2006:12

(October 2005) and when the whole Stockholm Trial was under way with both extended public transport and congestion tax.

Description of responding group

The county commuters number 183,000 and comprise 11.7% of the population of Stockholm County between 12 and 84 years of age.

Generally speaking there has not been any great change in the responding group studied between the two survey periods. Approx. 4% state that they have changed address since October 2005.

The responses have been weighted with regard to age, gender and background so that the group corresponds to the total population of the county.

Table 1. Composition of households. Base= all commuters: N= 2191 (RVU 2006) and N= 2196 (RVU 2005) respectively.

Composition of households	RVU 2006	RVU 2005	Statistically significant difference
Single adult	18.4	18.8	No
Two or more adults with no children	38.4	38.7	No
Single adult with teenage children	0.8	0.7	No
Two or more adults with teenage children	8.1	8.1	No
Single adult with children	2.5	2.8	No
Two or more adults with children	31.8	30.8	No

Table 2. Types of dwelling. Base: all commuters. N= 2202 (RVU 2006) and N= 2201 RVU 2005)

Type of dwelling	RVU 2006	RVU 2005	Statistically significant difference
Apartment block (tenant))	22.8	22.8	No
Apartment block (owner-occupier)	26.4	26.4	No
Terraced house/detached house/self-contained house	3.3	3.0	No
Terraced house/detached house/self-contained house (owner-occupier)	47.5	47.7	No

The fact that only 80% of the respondents are employed is because those defined as commuters are those who were registered as employed in 2003. Their occupation can have changed between the selection of the sample and the circulation of the questionnaire.

Table 3. Distribution by employment. Base: all commuters. N= 2197 (RVU 2006) and N=2197 RVU 2005)

Occupation	RVU 2006	RVU 2005	Statistically significant difference
Employed	82.8	84.0	No
Studying	2.9	2.8	No
On sick list	1.7	1.5	No
On parental leave	4.4	4.1	No
Job-seeker	1.9	1.7	No
Pensioner	4.9	4.1	No
Other	1.4	1.7	No

There are no differences in income among respondents between October 2005 and March 2006.

Table 4. Distribution by income group. Base: all commuters. N= 2172 (RVU 2006) and N= 2171(RVU 2005)

Household income	RVU 2006	RVU 2005	Statistically significant difference
0 – 7,500 kronor	0.7	0.4	No
7,501 – 10,000 kronor	1.0	0.8	No
10,001 – 15,000 kronor	2.3	3.3	No
15,001 – 25,000 kronor	13.9	13.9	No
25,001 – 40,000 kronor	21.6	23.0	No
40,001 – 55,000 kronor	24.4	25.1	No
55,001 – 70,000 kronor	20.2	18.6	No
More than 70,001 kronor	15.9	14.8	No

Access to a car, possession of a driving license and Stockholm Transport travel card

87% of the commuters had access to a car at some time on the monitoring day in the RVU 2005. In March 2006 there is a significant reduction to 84%.

There is a significantly greater proportion with a seasonal, monthly or termly card during the monitoring period in 2006 compared with 2005 and it is the monthly card that has increased most. Those who previously used a carnet of tickets for their journeys on Stockholm Transport seem now to have changed to some form of card. The number who have pre-purchased a pass is the same for both monitoring periods.

Table 5. Type of card for public transport travel. N=all commuters with pre-purchased tickets on Stockholm Transport. N=1889 (RVU 2006) and N=1909 (RVU 2005)

Type of pre-paid Stockholm transport card	Monthly card/30-day card	Seasonal card/annual card	Termly card	Carnet
RVU 2005	57.5 %	14.8 %	0.4 %	27.3 %
RVU 2006	62.4 %	14.5 %	0.9 %	22.2 %
Percentage change	4.9 %-points	0.3 %-points	0.5 %-points	-5.1 %-points
Statistically significant difference	Yes	No	Yes	Yes

A good half, 57%, of the groups responding state they have a transponder.

Differences in travel across the charging zone

Change in number of journeys across the charging zone

Journeys across the charging zone comprise half of the commuters' journeys in a 24-hour weekday period.

The number of journeys by all means of transport together across the charging zone has decreased by 8% or 20,000 in March 2006 compared with October 2005, see Table 6. The reduction across the zone is therefore greater than the reduction in the county in total (6.5%), which should be a direct effect of the congestion charging trial. This means that commuters have reduced the average number of their journeys across the charging zone during the charging period from 1.21 to 1.13 journeys per person and day. The difference is however not statistically significant.

There is a great difference between the commuters and the population of the county as regards the number of journeys across the charging zone. The commuters make almost twice as many journeys per person across the charging zone on weekdays, which is not particularly surprising, as they work within the congestion charging zone.

Table 6. Total number of journeys across the charging zone. Base= journeys across the charging zone: $N_{weekday}$, charge= 1549 (RVU 2006), $N_{weekday}$, charge = 1647 (RVU 2005). $N_{weekday}$, no charge = 278 (RVU 2006) and $N_{weekday}$, no charge = 304 (RVU 2005) respectively and $N_{weekend}$= 427 (RVU 2006) and $N_{weekend}$ = 442 (RVU 2005) respectively.

Number of journeys across the charging zone	24-hour weekday period during charging period	24-hour weekday period during charge-free period	24-hour weekday period	24-hour weekend period
RVU 2005	222,000	43,100	265,100	104,600
RVU 2006	206,600	38,000	244,600	100,600
Percentage change	(-7 %)	(-12 %)	- 8 %	(-4 %)
Statistically significant difference	No	No	-20,500	No

Car journeys across the charging zone comprise a little more than 30% of all commuters' car journeys in the county. Car journeys across the charging zone have decreased between October 2005 and March 2006. It is primarily car journeys during

the charging period that have fallen, by 12,000 or 23%, see Table 7. This means a reduction by 0.07 car journeys per person and day for commuters, which can be placed in relation to the total reduction in travel across the charging zone during the charging period which has fallen by approx. 0.08 journeys per person. During the charge-free period and at weekends no great change has occurred.

Compared with the population as a whole commuters make more car journeys per person across the charging zone. As they make so many journeys in total across the charging zone the proportion of their journeys by car across the charging zone is however lower than for the population as a whole.

Table 7. Total number of car journeys across the charging zone per 24-hour weekday period: $N_{weekday}$, charge= 300 (RVU 2006), $N_{weekday}$, charge = 386 (RVU 2005). $N_{weekday}$, no charge = 84 (RVU 2006) and $N_{weekday}$, no charge = 93 (RVU 2005) respectively and $N_{weekend}$= 171 (RVU 2006) and Nweekend = 186 (RVU 2005) respectively.

Number Car journeys cross the charging zone	24-hour weekday period during charging period	24-hour weekday period during charge-free period	24-hour weekday period	24-hour weekend period
RVU 2005	52,900	12,900	65,800	43,300
RVU 2006	40,900	11,300	52,200	40,900
Percentage change	-23 %	(-13 %)	- 21 %	-5 %
Statistically significant difference	-12,000	No	-13 600	No

Change in journeys by means of transport

Car traffic is primarily responsible for the reduction in travel across the charging zone; almost 14,000 of the approx. 21,000 fewer journeys are a reduction in car journeys. Public transport journeys have increased somewhat but the increase is not significant. Cycling has also decreased substantially, but this is a normal seasonal variation.

Table 8. Number of journeys across the charging zone with different means of transport, 24-hour weekday period. N=1806 (RVU 2006), N= 1935 (RVU 2005)

Number of journeys across the charging zone by respective means of transport in a 24-hour weekday period	On foot	Bicycle	Car	Public transport	Other	Total
RVU 2005	2,200	13,300	65,800	179,000	4,800	265,100
RVU 2006	2,800	1,100	52,200	184,300	4,200	244,600
Percentage change	(29 %)	- 92 %	- 21 %	(3 %)	(- 13 %)	- 8 %
Statistically significant difference	No	-12,200	-13,600	No	No	-20,500

Change in reasons for journey

The number of leisure time journeys across the charging zone has decreased by 26% for commuters. For other purposes the difference is not significant. Car journeys represent the greatest part of this reduction, see Table 9 and 10. Compared with the

population in the county as a whole commuters primarily make journeys to work and school when they travel across the charging zone.

Table 9. Number of journeys across the charging zone for respective reasons in a 24-hour weekday period. Base= weekdays journeys across the charging zone with stated purpose: N= 1805 (RVU 2006) and N= 1923 (RVU 2005) respectively.

All journeys across the charging zone, different reasons, weekday	Work/school	Business trip	Shopping/ service	Leisure time	To home	Other
RVU 2005	113,400	9,500	12,400	15,200	95,000	19,600
RVU 2006	106,300	8,100	10,000	11,300	92,500	16,400
Percentage change	(- 6 %)	(- 14 %)	(- 20 %)	-26 %	(-3 %)	(- 17 %)
Statistically significant difference	No	No	No	- 3,900	No	No

Table 10. Number Car journeys with respective reasons passing the charging zone in a 24-hour weekday period. Base= weekday journeys by car across the charging zone with stated purpose: N= 379 (RVU 2006) and N= 471 (RVU 2005) respectively.

Car journeys across the charging zone, different reasons for journey, weekday	Work/school	Business trip	Shopping/ service	Leisure time	To home	Other
RVU 2005	24,300	4,300	5,300	6,200	19,100	6,600
RVU 2006	20,200	3,600	3,900	3,300	15,00	5,500
Percentage change	(-17 %)	(-15 %)	(-26 %)	-48 %	(-18 %)	(-16 %)
Statistically significant difference	No	No	No	-2,900	No	No

If we only look at those journeys made across the charging zone during the charging period, then there is only a significant reduction for the combination of car journey to work/school. These journeys across the charging zone by car have decreased by 21% during the charging period, see Table 11.

Table 11. Number of journeys across the charging zone with respective reasons in a 24-hour weekday period during the charging period (main means of transport for the journey). Base= weekday journeys during the charging period across the charging zone with stated purpose: N= 1528 (RVU 2006) and N= 1619 (RVU 2005) respectively.

All journeys across the charging zone during charging period, different reasons for journey	*Work/school*	*Business trip*	*Shopping/ service*	*Leisure time*	*To home*	*Other*
RVU 2005	103,700	8,500	11,600	10,800	68,800	18,600
RVU 2006	94,900	7,00	9,200	9,700	70,700	14,300
Percentage change	(- 9 %)	(-7 %)	(-21 %)	(- 10 %)	(3 %)	(-23 %)
Statistically significant difference	No	No	No	No	No	No

Table 12. Number of car journeys across the charging zone with respective reasons in a 24-hour weekday period during the charging period (main means of transport for the journey). Base= weekday journeys during the charging period across the charging zone with stated purpose: N= 297 (RVU 2006) and N= 377 (RVU 2005) respectively.

Car journeys across the charging zone during the charging period, different reasons for journey	Work/school	Business trip	Shopping/ service	Leisure time	To home	Other
RVU 2005	21,600	4 ,200	4 ,900	3 ,900	12,600	5,700
RVU 2006	17,100	3 ,500	3 ,100	2,300	10,100	4,800
Percentage change	- 21 %	(- 15 %)	(- 37 %)	(- 40 %)	(- 20 %)	(- 17 %)
Statistically significant difference	- 4,500	No	No	No	No	No

For journeys by public transport there were no significant differences in the number of reasons for the journey, either in the total 24-hour weekday period or during the charging period.

Change in the distribution of car journeys across the 24-hour period

There has been a major reduction in car journeys across the charging zone during those periods when the congestion tax is set at 10 kronor and 15 kronor. On the other hand there has not been any reduction during the periods when the tax is 20 kronor. Compared with the car journeys made by commuters in the county in total it is primarily car journeys across the charging zone that have decreased during the 20 kronor period. There are no significant differences between the different charging periods for journeys by public transport.

Table 13. Total number of car journeys across the charging zone during the charging period. Base= Car journeys across the charging zone during the charging period: $N_{weekday,\ charge}$= 300 (RVU 2006), $N_{weekday,\ charge}$ = 386 (RVU 2005).

Number of car journeys across the charging zone for each charging period	10 kronor	15 kronor	20 kronor
RVU 2005	22,900	13,700	16,300
RVU 2006	15,600	9 400	15,900
Percentage change	-32 %	-32 %	(-2 %)
Statistically significant difference	- 7,300	-4,300	No

As Figure 1 below shows, there is an increase in the number of car journeys between 0730 and 0829. During the 20-kronor period in the afternoon from 1600 to 1729 there is however a significant reduction. Notice that the figure shows the starting time for the journey and not when the zone was crossed.

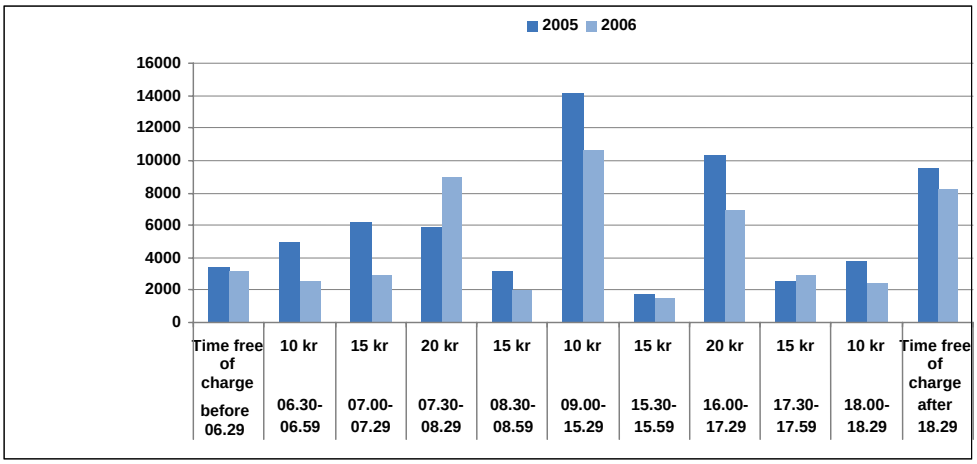

Figure 1. Number of car journeys across the charging zone during the different charging periods Base=Number of car journeys across the charging zone with stated starting time, N=479 (RVU 2006) and N=384 (RVU 2005).

There are no significant differences for journeys by public transport between the different charging intervals.

Total commuter journeys in the county

Change in the number of journeys

The number of journeys by all means of transport taken together per day for commuters in the county had decreased by 7% in March 2006, see Table 14. Over the weekend the reduction is even greater, 8%. Car journeys have decreased even more — 12% on weekdays and 10% at weekends. This is the result of factors such as weather and season, which are described in greater detail in Chapter 2.3

The reduction for commuters is somewhat smaller than for the population of the county as a whole. This is presumably because commuters have a somewhat reduced opportunity compared with other groups to influence the number of journeys they make, as they are employed. Nor can they directly be compared with all employed persons, as they commute to work into the charging zone.

Table 14. Total number of journeys and car journeys respectively for commuters in the county in a 24-hour weekday and weekend period respectively. Base= journeys per person on a weekday and weekend respectively: $N_{weekday}$= 1361 (RVU 2006) and $N_{weekday}$ = 1361 (RVU 2005) respectively. $N_{weekend}$= 860 (RVU 2006) and $N_{weekend}$ = 860 (RVU 2005) respectively.

Number of journeys to/from and within the county	Total for commuters in the county		Car journeys for commuters in the county	
	24-hour weekday period	24-hour weekend period	24-hour weekday period	24-hour weekend period
RVU 2005	519,200	432,200	189,800	267,900
RVU 2006	485,300	396,900	166,200	242,300
Percentage change	- 7 %	- 8 %	-12 %	-10 %
Statistically significant difference	-33,900	-35,300	-23,600	-25,600

The number of journeys per person for commuters has fallen from 2.9 to 2.7 per 24-hour weekday period in March 2006, see Table 15. At the weekend the reduction is even greater, 0.3 journeys. The reason for the reduction is that the proportion stating that they travelled on the monitoring day has dropped. Those travelling (mobile persons) do not make fewer journeys per person.

The reduction on weekdays is somewhat less than for the population of the county as a whole.

Table 15. Proportion of people travelling and average number of journeys per person. Base= journeys per person on a weekday and weekend respectively $N_{weekday}$= 1361(RVU 2006) and $N_{weekday}$ = 1361 (RVU 2005) respectively. $N_{weekend}$= 860 (RVU 2006) and $N_{weekend}$ = 860 (RVU 2005) respectively.

Proportion of people travelling and number of journeys per person and 24-hour period	Proportion of people travelling		Average number of journeys per mobile person		Average number of journeys per person	
	24-hour weekday period	24-hour weekend period	24-hour weekday period	24-hour weekend period	24-hour weekday period	24-hour weekend period
RVU 2005	91.2 %	76.1 %	3.2 journeys	3.0 journeys	2.9 journeys	2.3 journeys
RVU 2006	86.7 %	69.6 %	3.2 journeys	2.9 journeys	2.7 journeys	2.0 journeys
Percentage change	- 5 %	- 9 %	(0 %)	(- 4 %)	- 5 %	- 12 %
Statistically significant difference	- 4.5 %-points	- 6.5 % - points	No	No	-.0.2 journeys	-.0.3 journeys

The number of car journeys per person fell from 1.04 to 0.91 per person and weekday, see Table 16. It is therefore not merely the car journeys that have decreased during the congestion charging trial but also other types of journey. Commuters have reduced their car travel somewhat less than the county population as a whole.

Table 16. Average number of car journeys per person in a 24-hour weekday and weekend period respectively. Base= journeys per person on a weekday and weekend respectively: $N_{weekday}$= 1361(RVU 2006) and $N_{weekday}$ = 1361 (RVU 2005) respectively. $N_{weekend}$= 860 (RVU 2006) and $N_{weekend}$ = 860 (RVU 2005 respectively). Base= main means of transport on weekdays and weekends respectively: $N_{weekday}$= 3624 (RVU 2006 and $N_{weekday}$ = 3784 (RVU 2005) respectively. $N_{weekend}$= 1632 (RVU 2006) and Nw_{eekend} = 1837 (RVU 2005) respectively.

Average number of car journeys per person	24-hour weekday period	24-hour weekend period
RVU 2005	1.04	1.46
RVU 2006	0.91	1.32
Percentage change	-12 %	(-10 %)
Statistically significant difference	- .0.13 journeys	No

The number of journeys by public transport for commuters was 1.25 per weekday in October 2005 and 1.32 in March 2006. During the weekend journeys by public transport per person are considerably lower. The increase in the number of journeys by public transport is not significant. On the other hand it is interesting to note that no reduction has occurred as it has for car journeys. This indicates that the congestion charging trial is an important explanation for the reduction in the number of journeys and car journeys. The reduction in travel can therefore not be said to be a general trend but applies primarily to certain means of transport, see Table 17.

Table 17. Average number of public transport journeys per person in a 24-hour weekday period and weekend period respectively. Base= journeys with main means of transport. Average: $N_{weekday}$= 3624 (RVU 2006) and $N_{weekday}$ = 3784 (RVU 2005) respectively. $N_{weekend}$= 1632 (RVU 2006) and $N_{weekend}$ = 1837 respectively.

Average no. of journeys by public transport per person	24-hour weekday period	24-hour weekend period
RVU 2005	1.25	0.46
RVU 2006	1.32	0.50
Percentage change	(5 %)	(7 %)
Statistically significant difference	No	No

Change in length of journey

There are no significant differences in journey length per journey – either by car or in total – in March 2006 compared with October 2005.

With information on the average number of journeys per person and the average length of journey, the average length of journey per person can be calculated. The average length of journey for in-commuters in the county fell from 36.6 km to 33.9 km on weekdays in March 2006, see Table 18. The fact that the average length of journey fell was a result of journeys getting shorter and the number of journeys per person decreasing.

Table 18. Total average journey length per person in a 24-hour weekday period and weekend period respectively. Base= journeys with journey length: $N_{weekday}$= 3143 (RVU 2006) and $N_{weekday}$ = 3287(RVU 200) respectively. $N_{weekend}$= 1310 (RVU 2006) and $N_{weekend}$ = 1420 (RVU 2005) respectively.

Total average journey length per person*	All journeys	
	24-hour weekday period	24-hour weekend period
RVU 2005	36.6 km	26.5 km
RVU 2006	33.9 km	22.6 km
Percentage change	- 8 %	-15 %
Statistically significant difference	- 2.7 km	- 3.9 km

Change in transport mileage

Transport mileage, i.e. the total length of journeys for all the journeys made by commuters in Stockholm County, has been calculated on the basis of journey length per person. The number of kilometres travelled decreased by 510,000 km per weekday for commuters. The reduction in car journeys was responsible for 270,000 of these, see Table 19.

Table 19. Transport mileage for commuters in the county in a 24-hour weekday period and weekend period respectively.. Base= journeys with length of journey: $N_{weekday}$= 3143 (RVU 2006) and $N_{weekday}$ = 3287(RVU 200) respectively. $N_{weekend}$= 1310 (RVU 2006) and $N_{weekend}$ = 1420 (RVU 2005) respectively.

Transport mileage for journeys to/from and within county	Total for in-commuters in county		Car journeys for in-commuters in county		Public transport journeys for in-commuters in county	
	24-hour weekday period	24-hour weekend period	24-hour weekday period	24-hour weekend period	24-hour weekday period	24-hour weekend period
RVU 2005	6,710,000 person kms	4,840,000 person kms	2,410,000 person kms	3,580,000 person kms	3,560,000 person kms	980,000 person kms
RVU 2006	6,200,000 person kms	4,140,000 person kms	2,140,000 person kms	3,120,000 person kms	3,550,000 person kms	1,030,000 person kms
Percentage change	- 8 %	-15 %	-11 %	-13 %	(,0 %)	(+ 5 %)
Statistically significant difference	- 510,000 person km	- 700,000 person km	-270,000 person km	- 460,000 person km	No	No

Change in journeys by means of transport

The number of car journeys has decreased by approx. 24,000 for commuters in March 2006. The number of cycle journeys has fallen as much, which did large part is presumably the result of weather and road conditions in March 2006. The number of journeys by public transport for commuters increased by 12,000, see table 20. Compared with journeys for the whole population of the county, commuters seem to have increased their public transport travel more than average. For this reason the reduction in the total number of journeys is not as great for commuters as for the population as a whole.

Table 20. Number of journeys with different means of transport in a 24-hour weekday period (main means of transport for the journey). Base= journeys per person on weekdays: N= 1361 (RVU 2006) and N= 1361 (RVU 2005) respectively. Base= main means of transport for the journey on weekdays: N= 3624 (RVU 2006) and N= 3784 (RVU 2005) respectively.

Number of journeys with different means of transport, weekday	On foot	Bicycle	Car	Public transport	Other	Total
RVU 2005	61,700	28,700	189,800	229,200	9,800	519,200
RVU 2006	65,500	,800	166,200	241,500	,300	48,300
Percentage change	(+ 6 %)	-83 %	-12 %	+ 5 %	(-25 %)	- 7 %
Statistically significant difference	No	-23,900	-23,600	+12,300	No	-33,900

Change in journey by reason for journey

All types of journey have decreased apart from journeys to work/school, see table 21. The reduction is however only significant for business trips and shopping/service journeys. On the other hand the proportion of journeys to work/school and business trips have increased. The fact that the journeys to work/school had not decreased at the same time as other types of journeys can be explained in that journeys to work and school are journeys that are difficult to reduce by starting to work from home or the like. Nor has this happened. All those in the group – commuters – also work for a living.

Table 21. Number of journeys for different reasons, weekdays. Base=weekday journeys with reason: N=3623 (RVU 2006) and N=3807 (RVU 2005) respectively.

Number of journeys by reason for journey on weekdays	Work/ school	Business trip	Shopping/ service	Leisure time	Other	To home	Total
RVU 2005	150 700	28 900	56 600	43 800	69,000	170 200	519 200
RVU 2006	151 100	22 100	46 400	39 300	64,000	162 400	485 300
Percentage change	(0 %)	-23 %	-18 %	(- 10 %)	(- 7 %)	(- 5 %)	- 7 %
Statistically significant difference	No	-6800	-10 200	No	No	No	-33 900

Change in distribution of car journeys across the day

The proportion of car journeys in the county per weekday starting during the charging period has increased somewhat during the congestion charging trial, from 77% to 81%. There was however no significant reduction in the number of car journeys during the charging period, see Table 22.

Table 22. Number of car journeys with different starting times in a 24-hour weekday period. Base= journeys per person on weekdays: N= 1361 (RVU 2006) and N= 1361 (RVU 2005) respectively. Base=starting time per car journey: $N_{weekday}$= 1241 (RVU 2006) and $N_{weekday}$ = 1417 (RVU 2005) respectively.

Number and proportion of car journeys in different charging intervals	**Car journeys during the charging period**		**Car journeys in period with highest charge**	
	Number of journeys	Proportion of journeys	Number of journeys	Proportion of journeys
RVU 2005	146,800	77 %	50,900	27 %
RVU 2006	135,000	81 %	47,500	29 %
Percentage change	(- 8 %)	+ 5,0 %	(- 7 %)	+ 7 %
Statistically significant difference	No	+ 4 %-points	No	No

The fact that the number of journeys by public transport on weekdays has increased has already been reported. The analysis shows that the increase has occurred entirely during the charging period. During the charging period the number of journeys by public transport for commuters increased by 15,000, of which 8,000 during the high charge period (i.e. 0730-0829 and 1600-1729). This also means that the number of journeys by public transport has decreased somewhat outside the charging period on weekdays; the reduction is however not significant. For the population in the county there are no differences in the number of journeys by public transport during the charging period, but then commuters have increased the total number of journeys by public transport more than the population in the county as a whole.

Table 23. Number journeys on public transport with different starting times in a 24-hour weekday period. Base=starting time per public transport journey: $N_{weekday}$= 1828 (RVU 2006) and $N_{weekday}$ = 1694 (RVU 2005) respectively.

Number and proportion of journeys by public transport in different charging periods	Public transport journeys in the charging period		Public transport journeys in the period with the highest charge	
	Number of journeys	Proportion of journeys	Number of journeys	Proportion of journeys
RVU 2005	195,600	85 %	83,600	36 %
RVU 2006	210,500	87 %	91,800	38 %
Percentage change	+ 8 %	(+2 %)	+ 10 %	(+4 %)
Statistically significant difference	14,900	No	8,000	No

Variations in different directions

Journeys between the zone and outside the county are not shown as they are based on too few observations.

Change in number of journeys

The number of car journeys between the south of the county and the charging zone dropped by approx. 8,000.

Table 24. Number of journeys on weekdays in different directions: (N). Base= weekday journeys, all means of transport: N=3591 (RVU 2006) and N=3762 (RVU 2005 respectively).

Journeys in different directions, weekdays	Number 2005 (RVU 2005)	Number 2006 (RVU 2006)	Percentage change	Statistically significant difference
N, to/from the zone	118,100	112,800	(- 4%)	No
S to/from the zone	135,900	122,000	- 10 %	- 13,900
N-S	14,600	16,900	(+ 16 %)	No
Within the zone	71,300	74,900	(+ 5 %)	No
Outside the zone	179,300	158,700	-12 %	- 20,600
Total	519,200	485,300	- 7 %	- 33,900

Those travelling by car between the northern and southern parts of the county can choose either to go through the congestion charging zone or pass by the zone on the Essingeleden bypass and do not then need to pay. The proportion who choose to take the bypass have increased from 53% to 79% between October 2005 and March 2006 There were however few respondents.

Table 25. Number of car journeys in different directions for commuters (N). Base= weekday journeys, car journeys: N= 1223 (RVU 2006) and N= 1348 (RVU 2005) respectively.

Car journeys in different directions,commuters	Number 2005 (RVU 2005)	Number 2006 (RVU 2006)	Percentage change	Statistically significant difference
N, to/from the zone	31,600	26,700	(-15 %)	No
S to/from the zone	31,200	23,700	-24 %	- 7,500
N-S	6,500	8,900	(+38 %)	No
Within the zone	10,700	10,900	(-)	No
Outside the zone	109,800	96,000	-13%	- 13,800
Total	189,800	166,200	-13 %	- 23,600

Change in journeys by means of transport

The number of car journeys between the southern part of the county and the congestion charging stone has decreased by 24% or 7500. Outside the zone, car journeys decreased by 13%, or almost 14,000. This corresponds to more than half of the total reduction in car journeys of almost 24,000.

Within the zone the number of journeys by public transport has increased by 8,000 or a good 30%. The total increase in journeys by public transport is 12,000, which means that within the zone it represents more than half of the increase. Car journeys only show a significant reduction between the southern part of the county and the zone and outside the zone.

Table 26. Change in number of journeys (N). Main means of transport for journey. Base= weekday journeys with stated directions and means of transport: N= 3519 (RVU 2006) and N= 3685 (RVU 2004 respectively).

* Statistically significant art the 90 % level

Journeys with different means of transport in different directions, weekday	On foot	Bicycle	Car	Public transport	Other
N, to/from the zone					
RVU 2005	700	4,700	31,600	79,300	1,900
RVU 2006	1,000	0	26,700	83,400	1,800
Percentage change	(+ 40 %)	-	-15%	(5 %)	(- 7 %)
Statistically significant difference	No	-4,700	4,900*	No	No
S to/from the zone					
RVU 2005	1,500	8,500	31,200	92,700	1,900
RVU 2006	1,800	1,100	23,700	93,500	2,000
Percentage change	(+ 15 %)	-87 %	-24 %	(+1 %)	(+5 %)
Statistically significant difference	No	-7,400	-7,500	No	No
N-S					
RVU 2005	-	100	6,500	7,000	1,000

RVU 2006	-	-	8,900	7,400	400
Percentage change	-	-	+ 38 %	(+ 5 %)	(- 57 %)
Statistically significant difference	No	No	2400**	No	No
Within the zone					
RVU 2005	28,400	6,200	10,700	24,600	1,400
RVU 2006	28,400	1,500	10,900	32,600	1,500
Percentage change	-	-76 %	(+ 1 %)	+ 32 %	(+ 9 %)
Statistically significant difference	No	-4,700	No	8,000	No
Outside the zone					
RVU 2005	31,100	9,200	109,800	25,600	3,600
RVU 2006	34,300	2,200	96,000	24,600	1,600
Percentage change	(+ 10 %)	-76 %	-13 %	(- 4 %)	- 55%
Statistically significant difference	No	- 7000	-13 800	No	-2,000

Conclusions

Commuting journeys in the county as a whole

Commuting journeys in the county have decreased between October 2005 and March 2006. The reduction is somewhat larger during the weekend than on weekdays. It is the proportion of people who have travelled on the monitoring day that has decreased. Those who have travelled have made just as many journeys during October 2005 as during March 2006.

It is above all car journeys that have decreased in number. Of these 34,000 fewer journeys commuters as a group made in any 24-hour weekday period, car journeys comprise 70%, or 24,000. This implies a reduction in the number of car journeys by 12%, from 190,000 car journeys in October 2005 to 166,000 car journeys in March 2006.

At the same time as commuting car journeys have declined substantially, journeys on public transport have increased. Commuters comprise 5% or 12,000 more journeys by public transport in March 2006 compared with October 2005.

Commuting journeys across the charging zone

A good 60% of the reduction in the number of journeys has occurred across the charging zone despite the fact that only half of the commuters' journeys pass through the zone. Of the reduction, car journeys represent 70% here too. Of 21,000 (8%) fewer journeys across the charging zone per 24-hour period car journeys represent 14,000. It is during the charging period that car journeys have decreased most, 25%.

Across the charging zone journeys by public transport have increased from 179,000 to 184,000, but the increase is not significant.

It is primarily leisure-time journeys across the charging zone that have declined. For car journeys the number of leisure-time journeys has fallen by almost a half on weekdays.

Commuters' journeys in different directions

The greatest reduction in the number of car journeys has occurred between the southern part of the county and the charging zone. A reduction in car journeys has also occurred from the northern part of the county to the charging zone. The reduction from the south of the county to the zone is 24%, and from the north to the zone 15%. The greatest increase in the number of journeys by public transport has occurred within the charging zone, where commuters make 8,000 or 32% more journeys by public transport.

Where have the commuting journeys gone?

The greatest reduction in car journeys has occurred in the directions to/from the charging zone. In these directions there has been no corresponding increase in journeys by public transport or journeys by other means of transport. Outside the charging zone journeys by car have fallen substantially, and here too are not accompanied by any increase in journeys by other means of transport. It seems therefore that these are journeys that are no longer being made. The greatest and only significant increase in journeys by public transport can be seen within the congestion charging zone.

One explanation for the reduction in car journeys to and from the congestion charging zone could therefore be that these have in part been replaced by journeys on public transport within the charging zone. The reduction in the number of car journeys across the zone in the morning is less than during the rest of the day. This is probably because these are primarily journeys to work, which are not as flexible as other journeys. We are also seeing that car journeys to work/school across the charging zone percentage-wise have not fallen as much as other journeys. Those car journeys one simply does not make any longer would therefore be other types of journeys, when previously one took the car to/from the congestion charging zone in order to run an errand but now instead run the errand on public transport within the zone. Another partial explanation for the increase in journeys by public transport within the zone would be that cycle journeys have fallen drastically, presumably because of seasonal variations.

Method and monitoring data

The method for gathering and analysing data is largely the same for the RVU for the county population as a whole as for the RVU focusing on commuters. In this section therefore differences between the two RVUs are described, and for other descriptions of method see Chapter 4. The first RVU was carried out in October 2005 and directed primarily at commuters; 75% of the sample of 10,000 people were commuters. The response frequency in the first RVU was 49%. The monitoring period from this study was Monday, October 3 to Sunday, October 30. 3,732 of those people who responded to the question there in October 2005 received a new questionnaire in March 2006. The monitoring period from March 2006 was the same as for the big RVU. i.e.

Monday, March 6 to Sunday, March 19. The monitoring period for the reminder was also the same. The response frequency for the RVU in March 2006 was 75%.

Stockholm Office of Research and Statistics (USK) and Statistics Sweden (SCB) have been responsible for sample, circulation, collation and coding of the questionnaires. The responses have been weighted as to gender, age and background so that the group would correspond to the total population of commuters in the county.

Events which might affect the evaluation

A number of events have occurred which might affect the evaluation of the Stockholm Trial. These are events which may have caused lasting effects on the pattern of travel or one-off events which may have affected the monitoring on a particular day:

During the monitoring weeks in October 2005 there were primarily two events which may have affected travel:

- Stockholm Transport strike 6/10 – This day was excluded from the analyses
- The collision of the pontoon crane Lodbrok with the Essingeleden bypass 14/10. This of course severely limited access on the bypass. Car journeys on the bypass are so few in this study that it has little effect on the results.

The petrol price was largely the same during October 2005 and spring 2006, which is why it does not affect the result. The opening of the Södra länken bypass in September/October 2004 has not affected the results as both the studies were made after it opened. For events affecting monitoring in March 2006, see Chapter 4.5.

Comparison between the panels, Statistics Sweden (SCB) and the Swedish Institute of Public Opinion Research (SIFO)

The traffic habit study conducted by Statistics Sweden in October 2005 and March 2006 was a sample targeted on in-commuters in the county, i.e. those people who live outside the congestion charging zone and work within the zone. The Swedish Institute of Public Opinion Research (SIFO) traffic habit study carried out in September/October 2004 and March 2006 looks at travel by the entire population of Stockholm County. In order to be able to compare the results and see how well the methods agree, a group of individuals, called “in-commuters”, have been studied[26]. The commuters were resident outside the congestion charging zone but worked inside the zone — and had what is more themselves stated that they worked within the charging zone at the time of the study. This group should therefore not be confused with those shown in other sections in this Appendix.

The comparison between the two studies shows a relatively good agreement between the Institute in 2006 and Statistics Sweden in 2006. There is no significant difference between the average number of journeys in the two studies in March 2006. On the other hand there is a significant difference in the number of journeys between the Institute study in 2004 and the Statistics Sweden study in 2005.

[26] See also Trivector Rapport 2006:12, Inpendlares resvanor i Stockholms län 2005 – utvärdering av den utökade kollektivtrafiken inom Stockholmsfösöket.

The difference between the years in the Institute study are significant but not the difference between the years in the Statistics Sweden study. There is a longer gap in time in the Institute study between monitoring occasions, which may cause the differences between the years to become greater. The Institute study in 2004 shows a higher level of travel than in any of the other RVUs.

Table 27. Average number of journeys per person for in-commuters in Institute of Public Opinion Research and Statistics Sweden studies on the various monitoring occasions, N individuals SIFO 2004=2116 N SIFO 2006=1929, N SCB 2005=1485, N SCB 2006=1448

Average number of journeys per person for commuters*	SIFO	SCB	Significant difference between SIFO and SCB
Sept/Oct 2004 /Oct 2005	3.2	3.0	0.2
March 2006	2.7	2.9	No
Statistically significant difference	0.5	No	

*Live outside the zone and state they work in the zone. Part of Stratum 1 on sample selection
SIFO = Institute of Public Opinion Research
SCB = Statistics Sweden

If one looks at how great a proportion of the respondents travelled on the monitoring day, it looks a little different. There is no difference between the different studies but on the other hand between the different years. The fact that in the Institute of Public Opinion Research study in September/October 2004 there are so many journeys on average per person compared with Statistics Sweden, shows that there are no more people travelling in September/October 2004. On the other hand people have made more journeys.

Table 28. Proportion of in-commuters who have travelled in Institute of Public Opinion Research and Statistics Sweden's studies respectively on the different monitoring occasions, N individuals SIFO 2004=2116 N SIFO 2006=1929, N SCB 2005=1485, N SCB 2006=1448

Proportion of in-commuters who made a move on the monitoring day	SIFO	SCB	Significant difference between SIFO and SCB
RVU 2004/RVU2005	94.7 %	96.0 %	No
RVU 2006	91.0 %	91.4 %	No
Statistically significant difference	3.7 %-points	4.6 %-points	

* Live outside the zone and state they work in the zone. Part of Stratum 1 on sample selection
SIFO = Institute of Public Opinion Research
SCB = Statistics Sweden

The total difference in the number of journeys between the two studies during monitoring in March 2006 was 5.5% more journeys in the Statistics Sweden study. The greatest difference was in the number of car journeys. The greatest lack of agreement is for car journeys with a difference of 12% or almost 17,000 journeys.

Table 29. Number of journeys with different means of transport, SIFO and SCB 2004-2005-2006

Number of journeys with different means of transport	On foot	Bicycle	Car	Public transport	Other	Total
SIFO 2004	65,300	24,700	204,000	273,800	15,900	583,700
SCB 2005	65,300	27,700	184,100	266,900	10,200	554,300
SIFO 2006	59,500	5,700	139,400	289,300	7,400	501,300
SCB 2006	66,500	1,700	156,200	295,300	9,200	529,000
Difference SIFO-SCB 2006	7,100	- 4,000	16,800	6,000	(1 800)	27,700
Percentage difference SIFO-SCB 2006	-12 %	70 %	-12 %	-2 %	(-25 %)	- 6 %

SIFO = Institute of Public Opinion Research
SCB = Statistics Sweden

Appendix 3 – Travel in the control group

The control group consists of 578 people who have described their travel habits in September/October 2004, October 2005 and March 2006.

Weekday travel by the control group has also decreased between September/October 2004 and March 2006. Of the total difference of 17% the greatest change (of 10%) was between September/October 2004 and October 2005. Between these periods there was a petrol price rise of 10%, which may explain some of the decrease. Other changes are results not of season or weather, as the monitoring periods were comparable. The difference between October 2005 in March 2006 can be explained by differences in season.

The petrol price was comparable between these periods. That travel has declined is the result both of a greater proportion not travelling and a smaller number of journeys per mobile person. The number in the control group with a monitoring day at the weekend was too small to be able to say anything about the changes there, Tables 1 and 2.

Table 1 Proportion who have not travelled and number of journeys per person. N = 578 (all journeys), N = 426 (24-hour weekday period), N = 152 (24-hour weekend period)

Total for county population	Proportion of respondents who have not made any journey			Number of journeys per person		
	24-hour weekday period	24-hour weekend period	All journeys	24-hour weekday period	24-hour weekend period	All journeys
RVU 2004	14.8 %	29.6 %	20.1 %	2.90	2.12	2.70
RVU 2005	19.5 %	34.2 %	23.4 %	2.61	1.82	2.40
RVU 2006	22.8 %	36.8 %	26.5 %	2.41	1.99	2.30
Statistically significant difference between.04 and.05*	No	No	No	-0.29	No	-0.3
Statistically significant difference between.05 and.06*	No	No	No	No	No	No
Statistically significant difference between.04 and.06*	+8.0 %	No	+6.4 %	-0.49	No	-0.4

Table 2 Number of journeys per mobile person. N = 462 (all journeys 2004). N = 355 (24-hour weekday period 2004). N = 107 (24-hour weekend period 2004) N = 443 (all journeys 2005). N = 343 (24-hour weekday period 2005). N = 100 (24-hour weekend period 2005) N = 425 (all journeys 2006). N = 329 (24-hour weekday period 2006). N = 96 (24-hour weekend period 2006)

Number of journeys per mobile person	Total for county population		
	24-hour weekday period	24-hour weekend period	Total
RVU 2004	3.48	3.01	3.37
RVU 2005	3.24	2.78	3.14
RVU 2006	3.12	3.15	3.12
Significant difference between.04 and.05*	No	No	-0.23
Significant difference between.05 and.06*	No	No	No
Significant difference between.04 and.06*	-0.36	No	-0.25

Appendix 4 – Distribution effects

In this appendix there are tables supplementing those presented in section 2.2.

Change in the total number of journeys, car journeys and journeys by public transport

Table 1. Percentage change in the total number of journeys, car journeys and journeys by public transport in the county per person, weekday, September/October 2004 compared with March 2006. Value in brackets shows that the change is not significant.

	All journeys			All car journeys			All public transport journeys		
	2004	2006	%.change	2004	2006	%.change	2004	2006	% change
3 areas									
Within the zone	3.1	2.7	-15%	0.8	0.6	-19%	1.3	1.4	+10%
North of the zone	3.0	2.6	-14%	1.8	1.7	-10%	0.9	1.0	+9%
South of the zone	2.9	2.5	-13%	1.6	1.5	-11%	1.1	1.2	+7%
6 areas									
Northern outer suburb	3.0	2.6	-13%	2.1	2.0	(-7%)	0.7	0.8	(+7%)
Northern inner suburb	3.0	2.5	-16%	1.5	1.2	-18%	1.2	1.2	(+7%)
Inner city	3.1	2.7	-15%	0.8	0.6	-19%	1.3	1.4	+10%
Lidingö	3.1	2.7	-15%	1.9	1.7	(-12%)	0.9	1.1	(+14%)
Southern inner suburb	2.9	2.5	-13%	1.3	1.2	(-13%)	1.3	1.4	(+6%)
Southern outer suburb	2.9	2.5	-12%	1.9	1.7	-10%	0.9	1.0	+13%
Gender									
Male	3.0	2.5	-15%	1.9	1.6	-14%	0.8	1.0	+14%
Female	3.0	2.6	-12%	1.3	1.2	-8%	1.2	1.3	(+5%)

Occupation

	All journeys			All car journeys			All public transport journeys		
Composition of household									
Single adult with no children	2.7	2.3	-14%	1.1	0.9	-15%	1.3	1.4	+5%
Two or more adults with no children	2.7	2.3	-14%	1.6	1.4	-11%	1.0	1.0	(+6%)
Single adult with teenage children	3.0	2.5	-17%	1.2	1.3	(+7%)	1.3	1.3	(-3%)
Two or more adults with teenage children	3.2	2.8	-13%	1.6	1.3	-18%	1.2	1.3	(+1%)
Single adult with children	3.5	3.2	(-8%)	1.5	1.6	(+1%)	1.2	1.3	(+7%)
Two or more adults with children	3.5	3.0	-14%	2.0	1.9	-8%	0.8	1.0	+20%
Student (20 years of age)	3.3	2.8	-16%	0.7	0.7	(-12%)	1.9	1.9	(+2%)
Pensioner	2.0	1.7	-15%	1.5	1.3	-16%	0.8	0.9	(+10%)
Job-seeker	2.6	1.9	-28%	1.6	1.2	(-24%)	1.1	1.1	(-2%)
Employed person with children (< 12 years of age)	3.7	3.2	-13%	2.3	2.0	-12%	0.8	0.9	+21%
Employed with teenage children (13-17)	3.3	2.9	-10%	2.2	2.0	(-10%)	0.8	0.9	(+7%)
Employed person with no children	3.0	2.7	-12%	1.5	1.3	-13%	1.1	1.2	+8%
Country of birth									
Born in Sweden	3.1	2.6	-14%	1.6	1.4	-12%	1.0	1.1	+9%
Born outside Sweden	2.6	2.3	-11%	1.3	1.2	(-7%)	1.1	1.2	(+7%)
Consumption level									
Low	2.8	2.4	-14%	1.4	1.2	-9%	1.2	1.3	+13%
Medium-low	2.9	2.5	-12%	1.5	1.4	(-7%)	1.1	1.1	(+2%)
Average	3.1	2.6	-17%	1.8	1.6	-15%	0.9	1.0	+16%
Average-high	3.2	2.8	-13%	1.6	1.5	-10%	1.0	1.1	(+7%)
High	3.1	2.7	-13%	1.7	1.4	-15%	1.0	1.1	+12%

Number of journeys across the zone in total, by car and public transport

Table 2. Total number of journeys across the charging zone (irrespective of time of day), by car and public transport per person and weekday, September/October 2004 compared with March 2006. Value in brackets shows that the change is not significant. * means that the sample is small.

	All journeys across the zone			Car journeys across the zone			Public transport journeys across the zone		
	2004	2006	% change	2004	2006	% change	2004	2006	% change
3 areas									
Within the zone	0.86	0.76	-11%	0.34	0.26	-24%	0.37	0.40	(+8%)
North of the zone	0.71	0.64	-11%	0.20	0.16	-20%	0.38	0.39	(+1%)
South of the zone	0.82	0.74	-11%	0.20	0.14	-28%	0.46	0.49	(+5%)
6 areas									
Northern outer suburb	0.52	0.51	(-2%)	0.17	0.15	(-9%)	0.26	0.29	(+11%)
Northern inner suburb	0.92	0.77	-16%	0.21	0.15	-29%	0.54	0.51	(-5%)
Inner city	0.86	0.76	-11%	0.34	0.26	-24%	0.37	0.40	(+8%)
Lidingö	1.10	0.95	(-14%)	0.47	0.34	(-27%)	0.47	0.51	(+9%)
Southern inner suburb	1.10	0.97	-12%	0.22	0.16	-25%	0.67	0.65	(-3%)
Southern outer suburb	0.59	0.55	(-7%)	0.18	0.12	-32%	0.29	0.35	+21%
Gender									
Male	0.85	0.73	-13%	0.29	0.22	-26%	0.35	0.38	(+9%)
Female	0.73	0.67	-7%	0.15	0.12	-22%	0.47	0.48	(+1%)
Composition of household									
Single adult with no children	0.81	0.73	-10%	0.16	0.12	-27%	0.51	0.50	(-1%)
Two or more adults with no children	0.77	0.69	-11%	0.23	0.17	-24%	0.41	0.42	(+3%)
Single adult with teenage children*	0.75	0.71	(-6%)	0.16	0.18	(+12%)	0.44	0.45	(+4%)
Two or more adults with teenage children	0.79	0.64	-19%	0.24	0.14	-43%	0.41	0.41	(-1%)
Single adult with children*	0.85	0.66	-22%	0.18	0.15	(-17%)	0.51	0.42	(-19%)
Two or more adults with children	0.79	0.74	-6%	0.26	0.22	-17%	0.35	0.41	+15%
Occupation									
Student (20 years of age)	1.15	1.02	-12%	0.10	0.04	-55%	0.88	0.85	(-3%)
Pensioner	0.35	0.33	(-7%)	0.10	0.07	-29%	0.19	0.20	(+7%)
Job-seeker*	0.53	0.41	-23%	0.12	0.08	(-38%)	0.32	0.29	(-8%)
Employed person with children (< 12 years of age)	0.98	0.87	-12%	0.33	0.26	-23%	0.42	0.48	(+13%)
Employed person with teenage children (13-17 years of age)	0.95	0.83	-13%	0.38	0.27	(-28%)	0.38	0.42	(+10%)
Employed person with no children	0.97	0.90	-7%	0.28	0.22	-20%	0.51	0.54	+7%

	All journeys across the zone			Car journeys across the zone			Public transport journeys across the zone		
	2004	2006	% change	2004	2006	% change	2004	2006	% change
Country of birth									
Born in Sweden	0.80	0.72	-10%	0.23	0.18	-24%	0.42	0.44	(+6%)
Born outside Sweden	0.71	0.61	-14%	0.17	0.12	-27%	0.41	0.39	(-3%)
Consumption level									
Low	0.61	0.52	-15%	0.12	0.10	-23%	0.38	0.35	(-7%)
Medium-low	0.65	0.59	-9%	0.15	0.12	-24%	0.37	0.40	(+6%)
Average	0.80	0.70	-13%	0.26	0.17	-34%	0.39	0.43	(+9%)
Average-high	0.92	0.81	-12%	0.25	0.20	-20%	0.49	0.49	(0%)
High	1.02	0.95	-7%	0.36	0.28	-23%	0.46	0.52	+12%

Change in car journeys across the charging zone during the charging period by municipality

It is only possible to distinguish significant differences in the number of car journeys across the charging zone during the charging period for four municipalities/city districts: Tyresö, Stockholm inner city, West Stockholm and South Stockholm. In these four, car journeys have decreased across the charging zone during the charging period, see Table 3.

Table 3. Number of car journeys across the charging zone during the charging period per person (excluding Lidingö exemption), weekdays, September/October 2004 compared with March 2006. Values in brackets indicate that the change is not significant. * means that the sample was very small (<100 responses)[27].

	Car journeys 2004	Car journeys 2006	Percentage change	Significant difference (number of journeys)
Municipalities				
Upplands Väsby	0.10	0.12	(24%)	No
Vallentuna	0.10	0.10	(6%)	No
Österåker	0.20	0.17	(-17%)	No
Värmdö	0.22	0.17	-22%	No
Järfälla	0.11	0.10	(-13%)	No
Ekerö*	0.27*	0.22*	(-18%)*	No*
Huddinge	0.15	0.16	(10%)	No
Botkyrka	0.11	0.10	(-14%)	No
Salem*	0.10*	0.04*	(-58%)*	No*
Haninge	0.19	0.10	(-48%)	No
Tyresö	0.21	0.06	-71%	-0.153
Upplands-Bro*	0.11*	0.04*	(-65%)*	No*

[27] Several Municipalities have a small sample, less than 300 responses.

	Car journeys 2004	Car journeys 2006	Percentage change	Significant difference (number of journeys)
Nykvarn*	0.06*	0.02*	(-73%)*	No*
Täby	0.20	0.18	(-14%)	No
Danderyd	0.29	0.28	(-2%)	No
Sollentuna	0.16	0.16	(2%)	No
Södertälje	0.07	0.05	(-21%)	No
Nacka	0.27	0.19	(-32%)	No
Sundbyberg	0.13	0.10	(-26%)	No
Solna	0.16	0.10	(-38%)	No
Lidingö	0.33	0.22	(-31%)	No
Vaxholm*	0.07*	0.03*	(-56%)*	No*
Norrtälje	0.07	0.07	(4%)	No
Sigtuna	0.04	0.06	(55%)	No
Nynäshamn	0.14	0.09	(-34%)	No
Stockholm Inner city	0.27	0.20	-26%	-0.072
S Stockholm	0.15	0.10	-29%	-0.045
W Stockholm	0.15	0.09	-41%	-0.063

Proportion of individuals who have travelled by car across the zone during the charging period by municipality

The proportion of people who have travelled by car across the charging zone during the charging period has decreased for the whole county, but there is a significant decrease only for the four municipalities mentioned earlier. i.e. Tyresö, Stockholm inner city, West Stockholm and South Stockholm.

Table 4. Proportion of individuals who have travelled by car across the charging zone during the charging period (excluding Lidingö exemption), weekdays, September/October 2004 compared with March 2006. Values in brackets indicate that the change is not significant.

	Proportion of individuals 2004	Proportion of individuals 2006	Percentage change	Significant difference (%-points)
Municipalities				
Upplands Väsby	5%	6%	(14%)	No
Vallentuna	8%	7%	(-12%)	No
Österåker	9%	10%	(7%)	No
Värmdö	11%	8%	(-21%)	No
Järfälla	6%	5%	(-9%)	No
Ekerö	14%	12%	(-12%)	No
Huddinge	8%	8%	(3%)	No

	Proportion of individuals 2004	Proportion of individuals 2006	Percentage change	Significant difference (%-points)
Botkyrka	7%	6%	(-16%)	No
Salem	7%	2%	(-71%)	No
Haninge	11%	8%	(-27%)	No
Tyresö	14%	5%	-66%	-8.3%-points
Upplands-Bro	7%	3%	(-52%)	No
Nykvarn	4%	3%	(-18%)	No
Täby	12%	10%0	(-18%)	No
Danderyd	17%	14%	(-20%)	No
Sollentuna	10%	9%	(-3%)	No
Södertälje	4%	2%	(-43%)	No
Nacka	15%	10%	(-31%)	No
Sundbyberg	9%	6%	(-30%)	No
Solna	10%	6%	(-40%)	No
Lidingö	18%	12%	(-32%)	No
Vaxholm	4%	3%	(-28%)	No
Norrtälje	4%	5%	(8%)	No
Sigtuna	2%	6%	(183%)	No
Nynäshamn	8%	6%	(-27%)	No
Stockholm Inner city	16%	12%	-22%	-3.4%-points
S Stockholm	9%	6%	-32%	-3.0%-points
W Stockholm	9%	5%	-39%	-3.4%-points

Change in journeys by public transport across the charging zone during the charging period by municipality

Only one municipality, Tyresö, shows a significant difference between 2006 and 2004, see Table 5.

Table 5. Number of public transport journeys across the charging zone during the charging period per person, weekdays, September/October 2004 compared with March 2006. Values in brackets indicate that the change is not significant.

	Public transport journeys 2004	Public Transport journeys 2006	Percentage change	Significant difference (number of journeys)
Municipalities				
Upplands Väsby	0.24	0.27	(12%)	No
Vallentuna	0.28	0.21	(-25%)	No
Österåker	0.13	0.17	(32%)	No
Värmdö	0.30	0.37	(26%)	No

	Public transport journeys 2004	Public Transport journeys 2006	Percentage change	Significant difference (number of journeys)
Järfälla	0.32	0.32	(1%)	No
Ekerö	0.23	0.19	(-17%)	No
Huddinge	0.34	0.37	(6%)	No
Botkyrka	0.24	0.23	(-4%)	No
Salem	0.31	0.42	(34%)	No
Haninge	0.26	0.31	(18%)	No
Tyresö	0.36	0.54	+52%	+0.184
Upplands-Bro	0.20	0.17	(-12%)	No
Nykvarn	0.06	0.09	(39%)	No
Täby	0.33	0.36	(10%)	No
Danderyd	0.37	0.38	(3%)	No
Sollentuna	0.22	0.30	(39%)	No
Södertälje	0.15	0.11	(-27%)	No
Nacka	0.46	0.45	(-2%)	No
Sundbyberg	0.43	0.49	(13%)	No
Solna	0.51	0.52	(1%)	No
Lidingö	0.41	0.46	(11%)	No
Vaxholm	0.44	0.28	(-36%)	No
Norrtälje	0.05	0.10	(100%)	No
Sigtuna	0.16	0.14	(-17%)	No
Nynäshamn	0.13	0.21	(56%)	No
Stockholm Inner city	0.31	0.35	(12%)	No
South Stockholm	0.58	0.56	(-3%)	No
West Stockholm	0.45	0.40	(-10%)	No

Proportion of individuals who have travelled by public transport across the charging zone during the charging period by municipality

The proportion of people who have travelled by public transport across the charging zone during the charging period 2006 is approximately the same as in 2004. There are no significant differences at the municipality/city district level, but only if one looks at the county as a whole, see Table 6.

Table 6. Proportion of individuals who have travelled by public transport across the charging zone during the charging period, weekdays, September/October 2004 compared with March 2006. Values in brackets indicate that the change is not significant.

	Proportion of individuals 2004	Proportion of individuals 2006	Percentage change	Significant difference (%-points)
Average value (whole county)	21%	22%	-5%	+1%
Municipalities				
Upplands Väsby	14%	14%	(+2%)	No
Vallentuna	17%	11%	(-33%)	No
Österåker	8%	11%	(+31%)	No
Värmdö	18%	24%	(+36%)	No
Järfälla	17%	19%	(+12%)	No
Ekerö	13%	12%	(-5%)	No
Huddinge	20%	23%	(+10%)	No
Botkyrka	15%	14%	(-4%)	No
Salem	18%	26%	(+43%)	No
Haninge	16%	21%	(+33%)	No
Tyresö	23%	32%	(+39%)	No
Upplands-Bro	12%	12%	(-5%)	No
Nykvarn	3%	5%	(+63%)	No
Täby	19%	22%	(+16%)	No
Danderyd	20%	22%	(+10%)	No
Sollentuna	13%	18%	(+42%)	No
Södertälje	8%	8%	(-8%)	No
Nacka	28%	27%	(-3%)	No
Sundbyberg	25%	27%	(+8%)	No
Solna	32%	30%	(-5%)	No
Lidingö	24%	27%	(+10%)	No
Vaxholm	23%	19%	(-17%)	No
Norrtälje	4%	6%	(+60%)	No
Sigtuna	11%	10%	(-7%)	No
Nynäshamn	8%	14%	(+72%)	No
Stockholm Inner city	20%	21%	(+7%)	No
South Stockholm	34%	34%	(-2%)	No
West Stockholm	27%	24%	(-10%)	No

Car journeys across the zone during the charging period divided by social groups and the three areas

Table 7. Car journeys across the zone during the charging period divided by social group and the three areas, weekdays, September/October 2004 compared with March 2006. Values in brackets indicate that the change is not significant. * means that the sample was very small (<200 responses).

	Within the zone				North of the zone				South of the zone			
	2004	2006	+-%	Sign?	2004	2006	+-%	Sign?	2004	2006	+-%	Sign ?
Gender												
Male	0.38	0.26	-32%	Yes	0.21	0.16	-23%	Yes	0.22	0.16	-27%	Yes
Female	0.17	0.15	(-15%)	No	0.12	0.10	(-17%)	No	0.10	0.07	-31%	Yes
Composition of household												
Single adult with no children	0.19	0.13	-34%	Yes	0.10	0.09	(-10%)	No	0.11	0.06	-41%	Yes
Two or more adults with no children	0.32	0.23	-30%	Yes	0.15	0.12	-18%	Yes	0.16	0.12	-28%	Yes
Single adult with teenage children*	0.28	0.07	(-76%)	No	0.12	0.11	(-6%)	No	0.10	0.18	(+89%)	No
Two or more adults with teenage children	0.23	0.16	(-30%)	No	0.22	0.11	-49%	Yes	0.16	0.10	-39%	Yes
Single adult with children*	0.21	0.19	(-10%)	No	0.16	0.11	(-31%)	No	0.13	0.12	(-8%)	No
Two or more adults with children	0.35	0.32	(-9%)	No	0.21	0.18	(-13%)	No	0.20	0.16	-3%	Yes
Occupation												
Student (20 years of age)	0.09	0.07	(-23%)	No	0.06	0.01	-90%	Yes	0.05	0.03	(-48%	No
Pensioner	0.22	0.11	-52%	Yes	0.06	0.06	(-2%)	No	0.08	0.05	-39%	Yes
Job-seeker*	0.18	0.13	(-30%)	No	0.10	0.06	(-41%)	No	0.08	0.04	(-49%)	No
Employed person with children (< 12 years of age)	0.44	0.36	(-18%)	No	0.26	0.21	(-19%)	No	0.26	0.19	-27%	Yes
Employed person with teenage child (13 years of age)	0.37	0.27	(-27%)	No	0.35	0.22	-37%	Yes	0.26	0.21	(-19%)	No
Country of birth												
Born in Sweden	0.28	0.21	-25%	Yes	0.16	0.13	-17%	Yes	0.17	0.12	-32%	Yes
Born outside Sweden	0.23	0.15	(-34%)	No	0.16	0.10	-38%	Yes	0.11	0.10	(-11%)	No
Consumption level												
Low	0.12	0.13	(+8%)	No	0.10	0.08	(-22%)	No	0.09	0.08	(-19%)	No
Medium-low	0.24	0.11	-55%	Yes	0.10	0.09	(-5%)	No	0.11	0.08	-30%	Yes
Average	0.31	0.18	-43%	Yes	0.21	0.12	-42%	Yes	0.20	0.13	-35%	Yes
Average-high	0.28	0.22	(-22%)	No	0.18	0.17	(-9%)	No	0.19	0.14	-27%	Yes
High	0.35	0.28	(-20%)	No	0.25	0.21	(-14%)	No	0.29	0.21	-28%	Yes