TØI report 1527/2016

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Institute of Transport Economics
Norwegian Centre for Transport Research

Policies for sustainable commuting

TØI-rapport
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Sammendrag:

Denne rapporten presenterer resultater fra en «stated preferanse» studie som ble gjennomført blant pendlere til seks sentrale områder i Oslo og Akershus, med høy tetthet av arbeidssteder . Studien undersøker et stort utvalg av stedsspesifikke tiltak som kan endre arbeidsreiser med bil til disse områdene til mer miljøvennlige reisevaner.

Summary:

This report presents the results of a stated preference study that was conducted among commuters to six key areas in Oslo and Akershus, with high density of work locations. The study examine a large range of location specific policy measures that could change commuting to these areas to more environmentally friendly travel behaviour.

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Preface

This report presents the results of a Stated Preference (SP) study that was conducted among commuters to six key areas in Oslo and Akershus, with high density of work locations. The study examines a large range of location specific policy measures that could change commuting to these areas to more environmentally friendly travel behaviour. The study is a part of the project "Towards more sustainable commuting in Oslo and Akershus – a study of six key areas". The project has been financed by The Regional Research Council for Oslo and Akershus, Akershus County, Ruter AS and The Norwegian Railway.

Jørgen Aahuag, Mark Van Walwyk at MiPro and Paul Koster at Free University of Amsterdam have helped with programming of the SP study and Kåre Skollerud has helped with the design of the SP questionnaire. Farideh Ramjerdi has had the overall responsibility for the design, analysis and writing of the report. The study has benefited from expert advice from David Banister at Oxford University. Trude Rømming has been responsible for putting the report in its final form.

Oslo, March 2017
Institute of Transport Economics

Gunnar Lindberg
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Parkeringstiltak rettet mot bensin og dieselbiler er effektivt i alle sonene og bidrar til å få reisende til å erstatte bilreiser med kollektivtransportreiser, sykling eller hjemmekontor, er hovedfunnet i en «stated preference» undersøkelse som ble utført blant personer med arbeidssted i utvalgte soner i Oslo og Akershus. For at tiltakene skal være effektive er det imidlertid en forutsetning at det er en reel mulighet til å velge andre transportmidler. Forbedring i kollektivtilbudet, kan være effektivt i perifere områder, men tilgang på kollektivtransport ved bosted er en gjennomgående utfordring i disse områdene. Å gi bedre parkeringstilgjengelighet for elbil enn for andre biler, både med hensyn til kostnad og avstand, er et egnet tiltak i de perifere områdene, mens det er mindre egnet i sentrale områder som i Sentrum og på Blindern. Overgang til gange og sykkel er vanskelig å få til ved stor avstand mellom bosted og arbeidssted.

Denne rapporten presenterer resultatene fra en «stated preferanse» studie som ble gjennomført blant pendlere til seks områder i Oslo og Akershus med høy tetthet av arbeidsplasser. I rapporten presenterer vurderinger av et stort utvalg av stedsspesifikke tiltak som kan endre pendlernes reisevaner til disse områdene i en miljøvennlig retning. Rapporten er en del av prosjektet "Reisevaneendring i Oslo og Akershus, en analyse av seks trafikk knutepunkter".

De studerte tiltakene har som mål å få arbeidsreisende til å bytte til mer miljøvennlige transportmidler. Studien er finansiert av Regionalt forskingsfond hovedstaden, Akershus fylkeskommune, Ruter AS, Jernbaneverket, Oslo kommune, bymiljøetaten og Statens vegvesen region øst.

De utvalgte områdene i Oslo og Akershus er:

1. Alna – Nedre Linderud – Nedre Kalbakken
2. Blindern
3. Nydalen
4. Sentrum
5. Fornebu
6. Ahus - Nordbyhagen

Tiltakene som inngår i studien er:

- Parkeringskostnader og avstand mellom parkering og arbeidsplass
- Kollektivtransporttiltak som; frekvens, antall bytter, avstand til/fra holdeplass, ledig sitteplass (om bord)
- Sykkelveg og tilgang på garderobe og dusj på arbeidsplass, trygg sykkelparkering ved arbeidsplass, samt økonomiske insentiver for å sykle til jobb
- Økonomiske insentiver for å gå til jobb
- Insentiver til å bytte til elbil som primær- eller sekundærbil i husholdningen.

I studien studerte vi også:

- Hvordan parkeringskostnader og avstand til parkeringsplass påvirker bruken av hjemmekontor
- Avveiningsforholdet mellom hjemmekontor og ulike egenskaper ved kollektivtransportsystemet

Studien er basert på bruk av "Stated Preference" (SP) (hypotetiske valg-eksperimenter) metodikk. SP-metodikken går ut på å presentere respondenter for valg mellom hypotetiske alternativer som har forskjellige egenskaper. Respondenten velger det alternativet som passer han/henne best. Egenskapene i et SP-eksperiment knyttes til et (eller flere) "policy tiltak". Dataene fra SP-eksperimentet analyseres ved hjelp av "discrete choice theory". Dette er en økonometrisk metode som brukes for å predikere valg mellom et begrenset antall alternativer. Verdien av de ulike egenskapene utledes gjennom mål på enten betalingsvilje, WTP ("willingness-to-pay"), eller "willingness-to-accept" ("WTA"). WTP og WTA er mål på den økonomiske verdien av en bestemt endring, utledet fra bytteforholdet mellom to situasjoner, og sier noe om hvor mye den enkelte enten må betale (WTP) eller må kompenseres (WTA) for å oppnå samme nytte som før endringen inntraff.

Anbefalingene om stedsspesifikke tiltak blir gitt på grunnlag av både deskriptiv analyse av de innsamlede dataene, og verdiene for WTP og WTA sett opp mot de aktuelle stedene.

Hovedfunnene fra disse analysene er at tiltak rette mot parkering (parkeringskostnader og begrensing av parkeringsmuligheter) for bensin- og dieselbiler er effektivt i alle sonene. Dette bidrar til å få reisende til å skifte fra bil til kollektivtransport, sykling eller hjemmekontor. Imidlertid er det en forutsetning at det finnes tilgang til alternative reisemåter (som kollektivtransport eller sykkel) eller elbil, for at tiltakene skal være effektive. Parkeringstiltak som differensierer mellom bensin-/dieselbiler og elbiler, kan få bilister til å skifte til både kollektivtransport og elbil. Vi anbefaler en slik tilnærming for de perifere områdene. I sentrumsområdene anbefaler vi ikke å differensiere mellom bensin-/dieselbiler og elbiler. Dette er med bakgrunn i elbilens stadig økende popularitet og svært god tilgang til kollektivtransport i sentrumsområdene.

I alle de perifere områdene vil forbedringer i kollektivtilbudet få bilister til å skifte til kollektivtransport. Tilgang til kollektivtransport fra hjemmet er imidlertid et gjennomgående problem, som kan i noen grad kan avbøtes med tiltak som innfartsparkering.

Bedre infrastruktur for syklister, som sykkelveger, trygg sykkelparkering og tilgang til garderobe på arbeidsplassen, kan få reisende med bil og kollektivtransport til å velge å sykle. Stor avstand mellom hjem og arbeidsplass kan være til hinder for å sykle (eller gå) til jobb. Her er det betydelig variasjon mellom områdene. Følgelig varierer det hvor effektive tiltakene for å fremme sykling er. De økonomiske insentivene for å sykle eller gå til jobb er også avhengig av avstand mellom hjem og arbeidsplass.

Ansatte i de ulike områdene har, i ulik grad, anledning til å jobbe hjemmefra. Dette følger i stor grad hvilke yrker som er vanligst i området. Reisende med høy utdannelse har som regel høy inntekt og bedre anledning til å jobbe hjemmefra. Økninger i parkeringskostander og avstand til parkering vil få personer i denne kategorien til å jobbe mer hjemmefra. Tilsvarende, men i mindre grad, vil personer som reiser med kollektivtransport jobbe mer hjemmefra dersom kollektivtilbudet svekkes.

Tabellene SI-IV, oppsummerer anbefalte tiltak for de utvalgte områdene i Oslo og Akershus. I disse tabellene er de mest effektive tiltakene merket "XXX" (og uthevet i blått), mens "X" står for de minst effektive tiltakene.

Tabell S.I, viser stedsspesifikke tiltak rettet direkte mot arbeidsreisende som kjører bil. Parkeringstiltak er sterkt anbefalt for alle områdene. Dette vil får bilister til å bytte til andre reisemidler, spesielt å ta kollektivtransport og, når avstandene tillater det, sykle eller gå. Det gir også de som har anledning til det insentiv til å jobbe mer hjemmefra (se tabell S.IV). Et slikt tiltak bør imidlertid ses sammen med utvikling av et bedre kollektivtilbud. Dette gjelder spesielt på Alna og Fornebu (se tabell S.II), samt utbedring av infrastruktur for syklende (spesielt for Ahus (se tabell S.III)).

Parkeringstiltak som skiller mellom bensin-/dieselbiler og elbiler får bilister til å foretrekke elbil på arbeidsreiser. En slik tilnærming kan anbefales for de mer perifere områdene, men vi anbefaler ikke å differensiere mellom bensin-/dieselbiler og elbiler i sentrumsområdene, som Sentrum og Blindern, fordi elbilen også krever plass og elbilens stadig økende popularitet og svært god tilgang til kollektivtransport i sentrumsområdene, gjør at dette fremstår som et mindre gunstig tiltak.

Tabell S.I. *Stedsspesifikke tiltak rettet mot arbeidsreisende med bil*

	Rettet mot bilister		Tiltak som fremmer bruk av elbil	
Område	Parkerings-kostnad	Avstand til parkering	Differensiert parkeringskost.	Differensiert avstand til parkering
Alna	XX	XX	XXX	XXX
Blindern	XXX	XXX	X	X
Nydalen	XXX	XXX	XXX	XXX
Sentrum	XXX	XXX	X	X
Fornebu	XX	XX	XXX	XXX
Ahus	XXX	XXX	XXX	XXX

Tabell S.II viser anbefalinger for stedsspesifikke tiltak rettet mot kollektivtransport. Felles for alle områdene er vektlegging av "tilgang til sitteplass" på kollektivtransport. Arbeidsreiser skjer i hovedsak i rushtidene når trengselen på kollektivtransport er størst. Ledig sitteplass, om bord på de kollektive transportmidlene, verdsettes omtrent likt i de ulike områdene.

Tabell S.II. *Stedsspesifikke tiltak rettet mot kollektivtilbudet*

Område	Avstand til holdeplass	Bytter	Avgangsfrekvens	Sitteplass
Alna	XXX	XXX	XXX	XX
Blindern	X	X	X	XXX
Nydalen	XX	XX	XX	XX
Sentrum	X	X	X	XXX
Fornebu	XXX	XXX	XXX	XX
Ahus	XX	XXX	XXX	XX

Sentrumsområdene, Blindern og Sentrum, har god kollektiv tilgjengelighet i dag. Dette er i mindre grad tilfelle i de mer perifere områdene. Disse vil derfor ha større nytte av et bedre

kollektivtilbud. Dårlig tilgang til kollektivtilbud ved hjemstedet vil være til hinder for enkelte, med mindre en bedring i kollektivtilbudet til arbeidsstedene kombineres med tilbud av typen «innfartsparkering». Spesielt gjelder dette for arbeidsreiser til Alna og Fornebu.

Tabell S.III viser anbefalinger for stedsspesifikke tiltak for å få flere til å sykle eller gå til jobb. De økonomiske insentivene for å sykle eller gå til arbeid forventes å fungere best på Blindern, grunnet kort avstand mellom hjem og arbeidsplass samt arbeidstakernes profil. Bedre infrastruktur for syklende, altså sykkelveger, trygg sykkelparkering og tilgang til dusj/garderobe på arbeidsplassen vil også være mest effektivt på Blindern, etterfulgt av Ahus og Nydalen. Profilen på de som bruker bil til Sentrum og de lange avstandene mellom hjem og arbeidsplass for arbeidsreisende til de andre utvalgte områdene, gjør sykkeltiltak mindre effektive her.

Tabell S.III. *Stedsspesifikke tiltak for syklende og gående*

	Tiltak for å fremme sykling				Gå
Område	Sykkelveg	Trygg sykkelparkering	Dusj/ garderobe	Økonomisk insentiv	Økonomisk insentiv
Alna	X	X	X	X	X
Blindern	XXX	XXX	XX	XX	XX
Nydalen	XX	XX	XX	X	X
Sentrum	X	X	X	X	X
Fornebu	XX	XX	XX	X	X
Ahus	XX	XX	XX	X	X

Tabell S.IV. Arbeidsreisende til Alna, Ahus og Sentrum har yrkestyper og profiler som i liten grad gir anledning til å jobbe hjemmefra. Parkeringstiltak kan derimot bidra til mer bruk av hjemmekontor for arbeidsreisende til Blindern, Fornebu og Nydalen.

Tabell S.IV. *Stedsspesifikke tiltak for å fremme bruk av hjemmekontor*

Område	Parkeringskostnad	Avstand til parkering
Alna	X	X
Blindern	XXX	XXX
Nydalen	XXX	XXX
Sentrum	XX	XX
Fornebu	XXX	XXX
Ahus	X	X

Oppsummert peker studien i retning av at tiltak rettet mot parkering (som økt parkeringsavgift og økt avstand til parkeringsplasser) vil fungere som et tiltak som reduserer biltrafikken uavhengig av område. Å gi bedre parkeringstilgjengelighet for elbil enn for andre biler, både med hensyn til kostnad og avstand, er et egnet tiltak i de perifere områdene, mens det er mindre egnet i sentrale områder som i Sentrum og på Blindern. Tiltak rettet mot sykkel eller gange virker å være mest egnet på Blindern. Mens tiltak rettet mot økt bruk av hjemmekontor er minst egnet for de som arbeider på Ahus eller Alna. Dette henger særlig sammen med hvilke typer arbeid som finnes på stedene.

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Summary

Policies for sustainable commuting

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Authors: Farideh Ramjerdi, Kåre H. Skollerud, Jørgen Aarhaug
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This report presents the results of a stated preference study that was conducted among commuters to six key areas in Oslo and Akershus, with high density of work locations. The study examines a large range of location specific policy measures that could change commuting to these areas to more environmentally friendly travel behaviour. A major finding of the study is that parking policies aimed at gasoline and diesel vehicles is effective to get commuters with car to switch to public transit, walking, cycling or telecommuting, For the measures to be effective, it is essential that there is a real opportunity to choose other means of transport. Improvement in public transport, can be effective in peripheral areas, but access to public transport at home location is a consistent challenge for commuters to these areas. Differentiated parking policies that favour electric cars promotes commuting with electric cars, a policy that is recommended for the peripheral areas, but not for central areas such as Sentrum and Blindern. A long distance between home and workplace does not makes walking or cycling an attractive alternative to car.

This study is a part of the project "Travel behaviour change in Oslo and Akershus, a study of six key areas". The study focuses on one of the objectives of the project and examines area specific policy measures for diverting commuters to more environmentally modes of transport to each of some selected areas. The study has been financed by the Regional Research Council for Oslo and Akershus, Akershus county, Ruter AS, The Norwegian Railway Administration, Municipality of Oslo and the National Road Administration.

The selected areas in Oslo and Akershus are:

1. Alna – Nedre Linderud – Nedre Kalbakken
2. Blindern
3. Nydalen
4. Sentrum
5. Fornebu
6. Ahus

The selected area specific policy measures in this study are limited to:

- Parking cost and parking distance at work;
- Measures to improve public transport services (frequency, transfers, distance to/from station, seat availability);
- Cycle path, changing facilities and secure cycle parking at work, monetary incentives to cycle to work;
- Monetary incentive to walk to work;
- Trade-offs between teleworking and parking cost and parking distance;
- Trade-offs between teleworking and attributes of public transport services, and;
- Incentives to switch to electric car as a main car and as a second car in a household.

Stated Preference (SP) technique is used in this study. SP technique relies on choice among hypothetical alternatives described by different attributes. A respondent chooses the

alternative that best suits her/him. Attributes in a SP experiment relates to a "policy" (or policies). The SP data collected is analysed using discrete choice theory, an econometric approach for predicting choices between a set of alternatives. The valuation of the attributes can be derived by either willingness to pay (WTP) or willingness to accept (WTA). WTP and WTA are economic values, derived from trade-off between two situations, of a specific change in the amount that a person needs to pay (WTP), or to be paid (WTA), to be as well of as the person would have been without the change.

Recommendations for area specific policy measures are based on both descriptive analysis of the collected data and the derived WTP or WTA measures from the estimation of the econometric models.

Parking policies (parking cost and parking restrictions) levied on gasoline/diesel cars are effective policies in all zones to divert commuters with car to public transport, cycling or teleworking. However, this policy is effective with the presence of alternative modes of travel (e.g. public transport and cycle) or the use of electric car for commuting. Differential parking policies levied on gasoline/diesel and electric cars can divert car use to both public transport as well as the use of electric car for commuting to work. While we recommend this approach for the peripheral areas, we do not recommend to differentiate between gasoline/diesel car and electric car in the central areas, given the present electric car take-off and the very good public transport accessibility in the central areas.

Improvements in public transport services to increase the accessibility to public transport services at all the peripheral areas will divert car use to public transport. However, accessibility to public transport at home is an obstacle, that can be addressed by provision of park and ride or similar services.

Provision of cycling infrastructure (cycle path, secure parking and changing facilities at work can) divert commuting by car and public transport to cycling. A long distance between home and work location is a hindrance to cycling (or walking) that differs between selected areas and consequently with differences in the extent of success of the policies for promotion of cycling. The extents of the monetary incentives to cycle or walk to work will also depend of home to work distance.

The possibilities of teleworking vary between selected areas depending on the prevailing work characteristics. The commuters with high level of education (skilled workers) generally enjoy higher income and most have more possibilities to work at distance. With increase in parking cost and parking distance, this segment of commuters increase their frequency of teleworking. Similarly, commuter with public transport increase their frequency of teleworking with a decrease in public transport services, but to a lesser extent.

The following tables summarises the policy recommendations for the selected areas Oslo and Akershus. "XXX" (and marked in blue) in these tables stands for the most effective policy measure, while "X" stand for the least effective policy measure.

Table I shows the area specific policy measures directly levied on commuters with car. Parking policies are strongly recommended for all the selected areas. This policy will divert commuters with car to other modes of travel, particularly with public transport and when travel distance allows to cycling and walking. It also provides incentive for the commuters that their work characteristics allow teleworking to do so (see Table IV). However, this policy should be accompanied with improvements in public transport services to the

periphery areas, especially for Alna and Fornebu (see Table II) and provision of cycling infrastructures, especially for Ahus (see Table III).

Table I. *Area specific policies directed at car commuters*

	Aimed at car commuters		Policies to Promote Electric Car	
Work Location	Parking Cost	Parking Distance	Differential Parking Cost	Differential Parking Distance
Alna	XX	XX	XXX	XXX
Blindern	XXX	XXX	X	X
Nydalen	XXX	XXX	XXX	XXX
Sentrum	XXX	XXX	X	X
Fornebu	XX	XX	XXX	XXX
Ahus	XXX	XXX	XXX	XXX

As mentioned earlier, differential parking policies levied on gasoline/diesel cars and electric car can divert commuters with gasoline/diesel car to electric car for commuting. While we recommend this approach for the peripheral areas, we do not recommend to differentiate between gasoline/diesel car and electric car in the central areas, such as Sentrum and Blindern, given the present electric car take-off and the very good public transport accessibility in the central areas.

Table II shows the recommendations for public transport area specific policies. One aspect of the public transport services that is shared almost equally among the selected areas is "seat availability". Commuters to work travel during rush hours when public transport is most congested, and they almost value seat availability equally.

While centrally located areas, i.e., Blindern and Sentrum, have good accessibility with public transport, the peripheral areas benefit from improvements in public transport services. However, as it was pointed out earlier, adequate accessibility to public transport at home location is a hindrance for some commuters, especially for commuters to Alna and Fornebu, unless this policy is complemented by park and ride or similar services.

Table II. *Area specific policies directed at public transport*

Work Location	Distance to Station	Transfer	Frequency	Seat
Alna	XXX	XXX	XXX	XX
Blindern	X	X	X	XXX
Nydalen	XX	XX	XX	XX
Sentrum	X	X	X	XXX
Fornebu	XXX	XXX	XXX	XX
Ahus	XX	XXX	XXX	XX

Table III shows the area specific policies to promote cycling and walking. The monetary incentives to walk or cycle to work is most effective for Blindern due to the short home-work distance as well as the profile of part of these commuters.

Table III. *Area specific policies to promote cycling and walking*

Work Location	Policies to Promote Cycling				Walk
	Cycle Lane	Secure Parking	Changing Facility	Monetary Incentive	Monetary Incentive
Alna	X	X	X	X	X
Blindern	XXX	XXX	XX	XX	XX
Nydalen	XX	XX	XX	X	X
Sentrum	X	X	X	X	X
Fornebu	XX	XX	XX	X	X
Ahus	XX	XX	XX	X	X

Provision of cycling infrastructures, i.e. cycle lane, secure parking and changing/shower facilities at work, is also most effective to divert car commuters to cycling at Blindern followed by Ahus and Nydalen. The profile of car commuters to Sentrum and the long home-work distance of commuters to other selected areas makes cycling policies less effective.

Table IV shows the area specific policies to promote teleworking. The work characteristics and the profiles of commuters to Alna, Ahus and Sentrum do not allow extensive telecommuting. Parking policies can promote telecommuting to Blindern, Fornebu and Nydalen.

Table IV. *Area specific policies to promote teleworking*

Work Location	Parking Cost	Parking Distance
Alna	X	X
Blindern	XXX	XXX
Nydalen	XXX	XXX
Sentrum	XX	XX
Fornebu	XXX	XXX
Ahus	X	X

In summary, a major finding of the study is that parking policies aimed at gasoline and diesel vehicles is effective to get commuters with car to switch to public transit, walking, cycling or telecommuting, For the measures to be effective, it is essential that there is a real opportunity to choose other means of transport. Improvement in public transport, can be effective in peripheral areas, but access to public transport at home location is a consistent challenge for commuters to these areas. Differentiated parking policies that favour electric cars promotes commuting with electric cars, a policy that is recommended for the peripheral areas, but not for central areas such as Sentrum and Blindern. A long distance between home and workplace does not makes walking or cycling an attractive alternative to car.

1 Introduction

This study is a part of the project "Travel behaviour change in Oslo and Akershus" (Reisevaneendring i Oslo og Akershus). The study focuses on one of the objectives of the project and examines area specific policy measures for diverting commuters to more environmentally modes of transport to each of some selected areas. The selected areas in Oslo and Akershus are:

1.Alna – Nedre Linderud – Nedre Kalbanken
2. Blindern
3. Nydalen
4. Sentrum
5. Fornebu
6. Ahus (Nordbyhagen)

The study was designed to benefit from the most recent theoretical developments in the research area econometrics. The main data was collected in the spring of 2015. Stated Preference (SP) technique is used for collecting data on preferences related to the choice of alternatives with different characteristics.

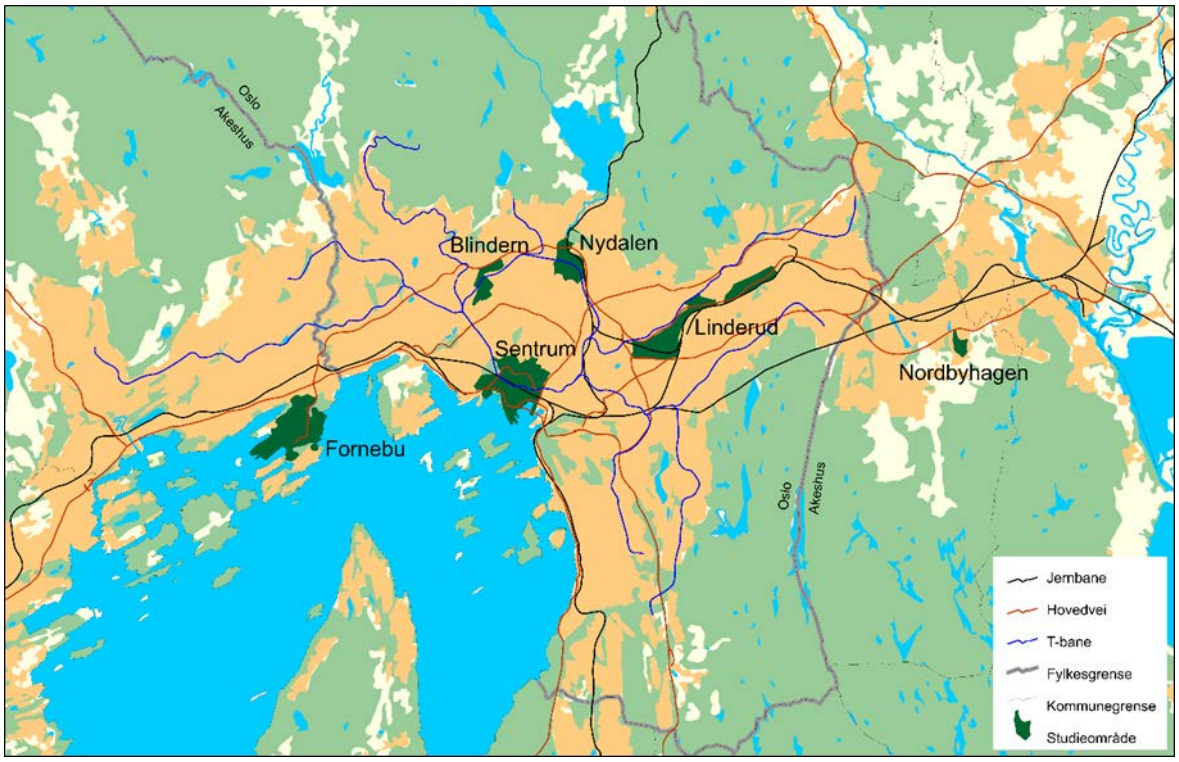

Figure 1. *Selected areas*

1.1 Selected policy measures

A range of policy measures were selected for evaluation using SP technique. These policies aim to motivate commuters to choose a more environmentally sustainable mode following Figure 2.

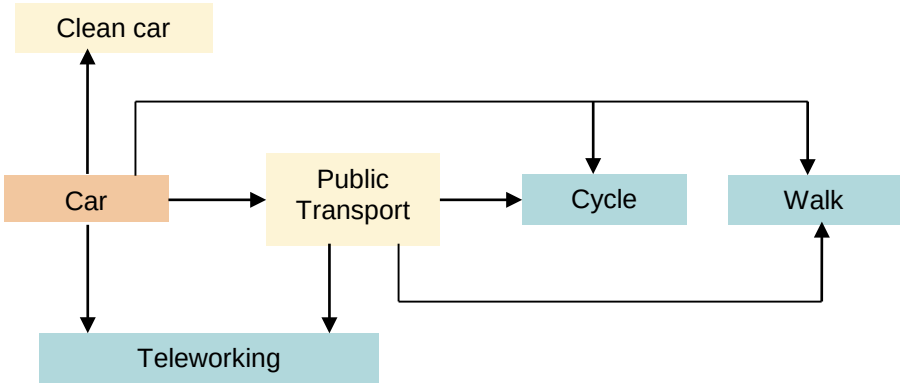

Figure 2. *Schematic presentation of policy impacts*

The policy measures, that will be translated to attributes in the SP study, are as follow:

Car Use: Travel time with car; Car variable cost (fuel and toll cost); Parking cost and Parking distance at work.

Public Transport: In vehicle time; Public transport fee; Public transport frequency; Number of transfers; Walking distance to/from station; Seating place availability.

Cycling: Cycle time; Availability of cycle path; Changing facilities & shower and at work; Secure cycle parking at work; Monetary incentive to cycle to work.

Walking: Walk time; Monetary incentive to walk to work

Teleworking for those who commute with car: Attributes of travel with car (travel time, running cost, parking cost & distance) and Number of days teleworking.

Teleworking for those who commute with public transport: Attributes of public transport services (public transport fee, in vehicle travel time, number of transfers, frequency of services, walking distance to and from station) and Number of days teleworking.

Promotion of clean cars (electric vehicles): As the main or as the second household car: Purchase price; Variable cost; Battery range; Refuelling time; Depreciation relative to conventional cars.

At Fornebu: In addition to these policy measures, two additional "policies" were evaluated at Fornebu. These were a new T-bane line and a new Ferry line.

1.2 Structure of the report

The next section will cover the theoretical underpinnings and methods for the estimation of values of interest in the study. The design of the experiments in this study is presented in Chapter 3. Chapter 4 focuses on descriptive analysis of the data. Chapter 5 presents factor analysis of the collected data and Chapter 6 estimation results. Chapter 7 presents recommendations for area specific policy measures.

2 Theoretical underpinnings and estimation techniques

The value of an attribute (a policy measure) can be measured by data on the trade-offs between the attribute and another attribute, like in a bartering transaction. The monetary value of an attribute (a policy measure) is measured by data on trade-offs between the attribute and money (cost/price of an attribute).

Observations on choices among alternative combinations of attributes and information about the relative weighting of attributes can be used to derive the value of an attribute. Observations on choices are either associated with revealed preference (RP) or stated preference (SP). A problem of RP data is the relative absence of attribute variance (Hensher et al., 2005). This is partly explained by market structure. Train, (2003) states that 'If data from these markets are used in a choice model, the coefficients of the invariant attributes would be found to be insignificant'. Bateman et al., (2002) on the same subject state that an attribute that takes on the same value for all alternatives cannot help explain why individuals reside at the point of the distribution that they do. Collinearity of the attributes is another major problem in RP data. The attribute values of alternatives often move in the same direction. And RP data does not provide information on the non-chosen alternatives. An advantage of SP technique relates to the examination of demand for a new alternative, such as a new T-Bane or Ferry connection. A further advantage of SP techniques relates to the cost of data collection, since it is possible to collect more than one observation per respondent. Most valuation studies are based on SP data.

Stated Preference (SP) technique is used for this study. SP technique relies on choice among hypothetical alternatives described by different attributes. A respondent chooses the alternative that best suits her/him. Attributes in a SP experiment relates to a "policy" (or policies). However, the descriptions of alternatives should be plausible, i.e., the attributes should relate to the attributes of different alternatives (e.g., modes) that are available to each respondent. The number of SP experiment should be limited 3 to 4 (see for example Louviere et al, 2000).

The study uses a **"**Reference" for the design of the experiments. To increase realism in SP studies, it is now increasingly common to include a reference alternative in surveys and to pivot the attributes of the hypothetical options around those for the reference alternative. This is often done by assigning the respondents reported attributes of the reference alternative to one of the alternatives in the choice set and generating the attributes of the other alternatives by pivoting on the revealed information.

Dominant choices (a choice situation where one alternative is better than the other alternative with respect to all the attributes) are not included in the study. The respondents are likely to react negatively to a dominant choice, i.e., they might assume it is an error or might undermine the seriousness of the experiments.

In the design of the experiments we have avoided complexity as much as possible. Complexity of the design is associated with choice inconsistency. Increase in the number of choice set in an experiment, number of rankings, levels of the attributes and correlational structure of information in the choice set has been associated with complexity of choice. Deshazo and Fermo (2002), by examining the variance of the error component in the utility function of a heteroskedastic Multinominal Logit (MNL) model, suggest the increasing the number of attributes in the choice set contributes most to the complexity in the set among the contributing factors.

The SP data collected is analysed using discrete choice theory. Discrete choice theory is an econometric approach for predicting choices between a finite number of alternatives. The approach relies on the assumption that individuals are always choosing the alternative with the highest utility. The utility for each alternative has a deterministic component (parameters to be estimated) and noise. The deterministic component is made up from alternative specific attributes and individual characteristics. A model with a high explanatory power has a large deterministic component relative to the noise (Train, 2003: Hensher *et al.* 2005). This above statement can be expressed as follows:

A decision-maker n faces J alternatives. The utility of alternative *j* for the decision maker n can be specified by a function that relates the attributes of the alternative j for decision maker n labelled as $x_{nj} \ \forall_j$, and some attributes of the decision-maker, labelled s_n. The function is often called "indirect utility", denoted by

$$V_{nj} = V(x_{nj}, s_n) \ \forall_j.$$

V depends on parameters that are unknown to the researcher and therefore estimated statistically. Since there are aspects of utility that the researcher does not or cannot observe, V_{nj} *is not equal to* U_{nj}. Utility is decomposed as:

$$U_{nj} = V_{nj} + \varepsilon_{nj},$$

where ε_{nj} captures the factors that affect utility but are not included in V_{nj}. The family of these types of models are consistent with random utility maximization (RUM). With the assumption that each ε_{nj} is independently, identically distributed extreme value, the logit model is obtained.

When alternatives are expressed by transport modes, defined by their attributes, including monetary cost and travel time of a trip, one can derive the willingness to pay (WTP) for travel time saving from the results of the estimations of the parameters for time and cost of a mode. One can derive the (monetary) valuation of other attributes of a mode by either WTP or willingness to accept (WTA) measures. The derivations of WTP and WTA is not limited to a mode choice context. WTP and WTA are measures of economic values, derived from trade-off between two situations, of a specific change in the amount that a person needs to pay (WTP), or to be paid (WTA), to be as well of as would have been without the change.

One restriction in the context of SP data, with multiple responses from the respondents, is that the observations are not independent, i.e., there is correlation across the alternatives in each choice set. Another important restriction is the inability to allow for heterogeneity in preferences. The rapid development in simulation techniques since the mid 90's has led to the use of econometric models that are not as restrictive as logit model. The state of practice is now based on the less restrictive models (Train, 2003). The most general model

is the so-called mixed logit model that also allows for the parameters to assume a distribution and hence it allows the estimation of a distribution for monetary value (McFadden and Train, 2000). Note that the distribution can be explained by both observed and un-observed heterogeneity.

Mixed logit approach does not identify the contributing observed or latent variables to heterogeneity. An alternative approach is latent class discrete choice approach. A latent class model captures heterogeneity of preferences by latent segmentation relying on observed or latent variables. Factor analysis is an approach that is used for a preliminary identification of the latent segments. Analysis of the collected data in the SP study relies on both simple logit approach as well as latent class discrete choice approach (see Walker and Ben-Akiva, 2002).

Pythonbiogeme (Bierlaire, 2016) was used for model estimations. The software Stata 14.2 was used for factor analysis

3 The design of the study

A pilot study was conducted in 2014 that led to some changes in the survey design, mainly in reducing the length of the questionnaire. The main study was carried out in 2015. Furthermore, based on the selected policy measures, the number of choice experiments (CE) in the SP study was limited to 3 with an additional choice experiment for the commuters to Fornebu, focusing on a new T-bane line and a new Ferry service.

The number of choice sets in each CE is limited to six. A choice set presents alternatives, described by attributes of the alternatives, that a respondent should choose among. The data collected on the choices and the descriptions of the alternatives are used for the estimation of valuation of the different attributes. A randomized fractional factorial design is used in this study. Dominant choice sets were excluded. These CEs are:

CE1: In this choice experiment a respondent have a choice between "Car", "Public Transport", "Cycle" and "Walk" (the choice set) for their commuting to work. All respondents at the six locations get this CE, based on the modes that is available to them. As an example, if a respondent does not own a car, mode car is not among the choice set. Another example related to the commuting distance that has consequence for cycling or walking to work. However, public transport is always an available mode. The modes are described by their attributes. Travel time by all modes are pivoted around the reported travel times by each respondent. Travel cost by car is based on reported commuting distance by each respondent and travel cost for car is pivoted around the calculated travel cost. If a respondent had reported that public transport is not an available mode, the attributes of the alternative public transport was based on travel distance to work. Figure 3 show an example of this CE.

	Car	Public Transport	Bike	Walk
Parking cost	150 NOK/day		Secure parking	
Parking distance	500 meters			
Travel cost for car (toll included)	40 NOK			
(In vehicle) Time (Min)	13	23	21	40
Public transport cost		412 NOK/month		
Seat availability		All the way		
Frequency		Every 10 Min		
Walk time to/from station		15 Min		
No. of transfers		1		
Cycle path			25% of the way	
Economic incentive			50 NOK/day	75 NOK/day
Mark your choice	○	○	○	○

Figure 3. *A presentation of a choice set in CE1*

CE1a: This CE is only designed for commuters to Fornebu. The choice set in this experiment is "Car", "Existing Public Transport", "A new T-bane line" and "A new ferry line". Travel times by all modes are pivoted around the reported travel times and by each respondent. Travel time by the new T-bane and the new ferry line were based on travel time with public transport. Travel cost by car is based on reported commuting distance by each respondent and travel cost for car is pivoted around the calculated travel cost. Figure 4 shows an example of this CE.

	Car	Today's Public Transport	New Ferry line	New T-bane
Parking cost	150 NOK/day			
Parking distance	700 meters			
Car travel cost (toll included)	45 NOK			
In vehicle time (minutes)	12	34	22	15
Ticket cost, one way		30	52	35
Frequency		Every 15 Min	Every 30 Min	Every 10 Min
No. of transfers		0	2	1
Mark your choice	○	○	○	○

Figure 4. *A presentation of a choice set in CE1a*

CE2a: Only the respondents who commute to work by public transport get this CE. The choice set in this study is two alternatives of "Public Transport attributes and number of teleworking at home". The respondents who are not allowed to work at distance do not get this CE. Travel time by public transport is pivoted around the reported time by each respondent. Figure 5 shows an example of this CE.

	Alternative 1	Alternative 2
Car cost + Toll (one way)	70	50
Parking cost, NOK/day	100	20
Parking distance, meter	500	1500
Teleworking	2 days/week	3 days/week
Mark your Choice	○	○

Figure 5. *A presentation of a choice set in CE2a*

CE2b: Only the respondents who commute to work by car get this CE. The choice set in this study is two alternatives of "Car attributes and number of days teleworking". The respondents who are not allowed to work at distance do not get this CE. Travel cost by car is based on reported commuting distance by each respondent and travel cost for car is pivoted around the calculated travel cost. Figure 6 shows an example of this CE.

	Alternative 1	Alternative 2
Ticket cost, one way, NOK	50	25
In vehicle time, min	10	15
Frequency	Every 10 min	Every 20 Min
No. of Transfers	0	1
Teleworking	2 days/week	3 days/week
Mark your choice	○	○

Figure 6. A presentation of a choice set in CE2b

CE3a: Respondents who did not have a car in their households and half of the respondents who had only one car in their household get a CE with a choice set of a conventional car and electric car as the main car in household. Respondents were asked to report the car type they use for commuting to work. For those who had reported a car type, the purchase price of the conventional and electric car was pivoted around their reported car type. "A small car" was used for those without car.

CE3b: Respondents who have more than one car in their households and the other half of the respondents who have only one car in their household get a CE with a choice set of a conventional car and electric car as the second car. The base value for conventional car and electric car for each respondent was based on the reported car used for commuting. The purchase prices of conventional and electric car are pivoted around this value for each respondent. Figure 7 show and example of CE3a and CE3b.

	Electric car	Gasoline/Diesel car
Purchase price, NOK	300 000	200 000
Variable car cost, NOK/km	0,5	3,5
Range, km	100 km	500 km
Refuelling time	8 hr	5 min
Depreciation relative to a conventional car	0.9	
Mark your Choice	○	○

Figure 7. A presentation of a choice set in CE3a and CE3b

3.1 Structure of the questionnaire

The first part of the questionnaire focuses on respondents work category and work arrangement, home & work locations, accessibility to public transport (distance to stations at home & work, frequency, no. of transfers), accessibility to car (parking cost & distance at work, car type), estimated travel time for different mode, frequencies of commuting by different modes (Car, PT, Cycle, Walk), respondent perceptions, attitudes, habits related to different modes, and information related to teleworking. The second part of the questionnaire deals with the choice experiments. The last part focuses on socio-economic data (e.g. household structure, education, income). Appendix I presents the questionnaire used in this study. Figure 8 shows the structure of the questionnaire.

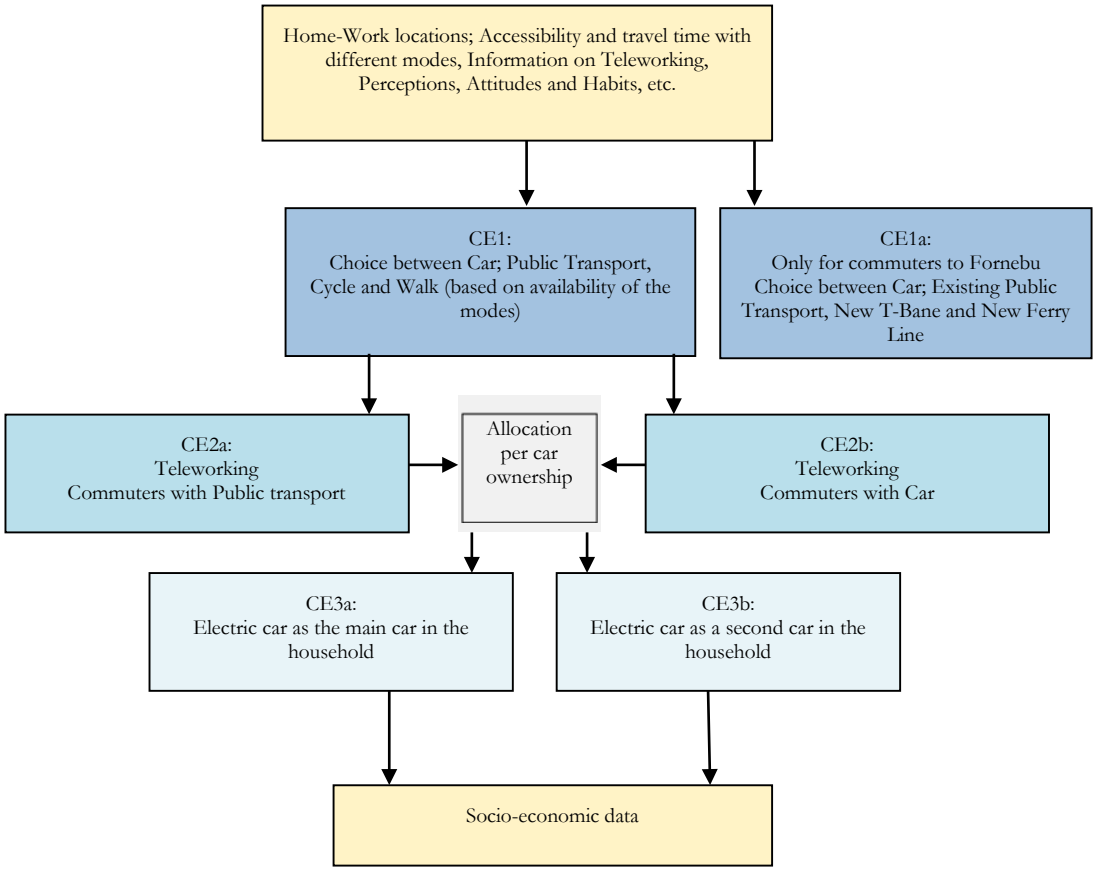

Figure 8. *The structure of the questionnaire*

Self-administered internet survey method has been used in the study. A choice based approach was adopted for recruitment at the six selected work locations. The commuters by car and by public transport were recruited at each of these locations. Invitation cards were distributed at the selected areas stating the objective of the study, and requesting email address' for distributing the questionnaire.

About 50% of respondents were intercepted at PT stations and the other 50% at parking locations. About 80% of the respondents were employed at the intercepted locations, the others were visiting these locations from other areas in Oslo. Table 1 shows the number of respondents who commute to the selected areas

Table 1. *Number of respondents at selected areas*

Work location	Respondents
1 ALNA –NEDRE LINDERUD – NEDRE KALBAKKEN	258
2 BLINDERN	271
3 NYDALEN	253
4 SENTRUM	272
5 FORNEBU	332
6 AHUS	289

4 Descriptive analysis of the data

This chapter focuses on the differences between commuters to the selected areas by comparing their socio-economic characteristics, the distance between their home location to work, their reported travel time to work by car and public transport and distance to public transport stations at home and at work and their frequency of mode choice for commuting to work and frequency of teleworking. These descriptive analysis is summarised in Table 2-6. Some figures on these tables are highlighted to emphasise the area with the lowest/highest value.

Table 2. Age, gender, Income & Cars in households, for selected area

Work Location	Age	Gender (Male)	Income (1000NOK)	No. of Cars in Household
Alna	43.98	.66	597	1.26
Blindern	44.07	.60	550	1.08
Nydalen	44.71	.59	653	1.30
Sentrum	45.66	.67	697	1.36
Fornebu	47.29	.70	735	1.35
Ahus	43.56	.28	545	1.43

Table 3. Description of transport services for commuters to selected areas

Work location	Home-Work Distance, km	Travel Time: Home to Work, minute		Distance to Public Transport, meter	
		Car	Public Transport	At Home	At Work
Alna	20.30	32.68	52.53	648	522
Blindern	13.32	35.67	41.39	575	339
Nydalen	18.32	33.20	46.58	609	291
Sentrum	17.23	40.18	39.42	579	369
Fornebu	21.99	39.07	49.24	557	174
Ahus	16.08	23.92	56.16	521	162

Table 4. Commuters' frequency of mode choice to selected areas

Work Location	Frequency of mode choice per month			
	Car	Public Transport	Bike	Walk
Alna	12.42	4.84	1.39	2.38
Blindern	8.61	7.72	3.26	2.75
Nydalen	11.42	6.30	1.62	1.94
Sentrum	9.90	7.82	1.33	2.29
Fornebu	9.52	8.33	1.64	.92

A-Hus	13.45	3.49	1.53	1.46

Table 5. Level of education of commuters to the selected areas

Work Place	Education, percentage of the respondents				
	basic	12 Years	13 Years	16 Years	16+ Years
Alna	0.03	0.19	0.11	0.37	0.29
Blindern	0.01	0.04	0.06	0.25	0.63
Nydalen	0.02	0.07	0.09	0.37	0.45
Sentrum	0.01	0.07	0.09	0.35	0.47
Fornebu	0.01	0.05	0.06	0.36	0.52
Ahus	0.01	0.07	0.07	0.41	0.45

Table 6. Frequency of teleworking (TW) and facilities for TW at home

Work Location	Frequency of teleworking per week		Facilities for teleworking at home	
	Allowed	Practiced	Internet connection	Home office
Alna	1.58	1.02	0.85	0.64
Blindern	2.15	1.35	0.92	0.69
Nydalen	1.70	1.11	0.85	0.74
Sentrum	1.52	0.90	0.83	0.72
Fornebu	1.80	1.34	0.95	0.78
Ahus	0.44	0.21	0.27	0.39

Assuming the recruited respondents are representative commuters by car and by public transport to these areas, the examination of Tables 2-6 points to differences in policy packages that could be effective in these locations. Some of the differences are highlighted bellow:

Commuters to work at Alna: They do not have good access to public transport either at home or at work. Their commuting distance to work is among the longest. They report a long travel time with public transport than with car. Car ownership is less than the average among this group. They also report a quite a high frequency of car use and a low frequency of public transport use. They report the lowest frequency of cycling to work, however, they walk to work more frequently compared to other selected zones. The level of education among this group is lower than commuters to other locations, however their income is slightly lower than average. The number of days they can work at distance or their practice is less than the average.

Commuters to work at Blindern: They are highly educated. Their reported income is relatively low, but the number cars in their households is the lowest among the selected groups. They report a relatively short distance from home to work. The difference between travel time with car and public transport is not as high among the selected group. This group of commuters rely more on public transport, walking and cycling than other groups. Meanwhile the number of days they can work at distance or their practice is more than other groups.

Commuters to work at Nydalen: Their level of education is about the average. Their reported income is higher than the average of the selected groups, so is the number cars in their households. Home to work distance among this group is about the average. The

difference between travel time with car and public transport is higher than the average among this group. While they have better access to public transport at work, the distance to public transport at home is longer than the average. This group's use of car for commuting is about the average. The commuters to Nydalen practice teleworking more than the average and they can telework more than the average.

Commuters to work at Sentrum: They have a higher income than the average and higher number cars in their households. Their distance to work is about the average. This group is the only group that reports a similar travel time to work with car and public transport. They do not enjoy the best access to public transport at home or at work, however they preference for mode of travel to work is like commuters to Blindern. The only difference between these two groups is that commuters to Blindern rely more on cycling than commuters to Sentrum. The level of education among the commuters to Sentrum is about the average. This group can work at distance and practice teleworking less than the average.

Commuters to work at Fornebu: They have the highest income among commuters to other selected areas and higher number cars in their households than the average. Their distance to work is longer than other commuters. Compared with other groups, the commuters to Fornebu report a long travel time with car as well as with public transport. They report a relatively good access to public transport at work, however, their access to public transport at home is not as good. The difference between their mode of travel to work with car and public transport is not large. They walk much less than commuters to other selected areas. Commuters to Fornebu have the highest level of education. The number of days they can work at distance is more than the average, however, their practice is the most among the commuters to the selected locations.

Commuters to work at Ahus: Most respondents at Ahus are female. The reason is the location of medical facilities at Ahus, with majority of female workers. They income is lower than average, however the reported number cars in their households is the highest. Their distance to work is the shortest among commuters to the selected areas. They have a good access to public transport at work compared to their access to public transport at home. They report the shorted travel time to work with car and the longest travel time with public transport. They report the highest frequency of car use and the lowest frequency of public transport for commuting to work among commuters to the selected regions. The level of education among the commuters to Ahus is lower than average. Meanwhile the number of days they can work at distance is the lowest so is their practice among the commuters to the selected locations.

5 Factor analysis of the collected data

This section focuses on examination of the collected data using factor analysis. Factor analysis refers to different statistical analysis with an objective to represent a set of observed variables in terms of a smaller number of hypothetical variables (see M.S. Lewis-Beck, 1994). Exploratory factor analysis is used in the work presented here, implying we seek a minimum number of hypothetical factors (variables) that account for observed covariation among observed variables.

We rely on the collected (observed data) socio-economic data as well as psychometric data (data on attitudes, habits, etc.) to explore the underlying "factors" that explain travellers' preference for:

a. Mode of travel work
b. Telework (home)
c. Electric vehicle

5.1 Mode of travel to work

Scree-Test is used to select the number of factors that should be derived from the data. The following figure shows the result of a Scree-Test for mode choice. We have used four factors in this analysis.

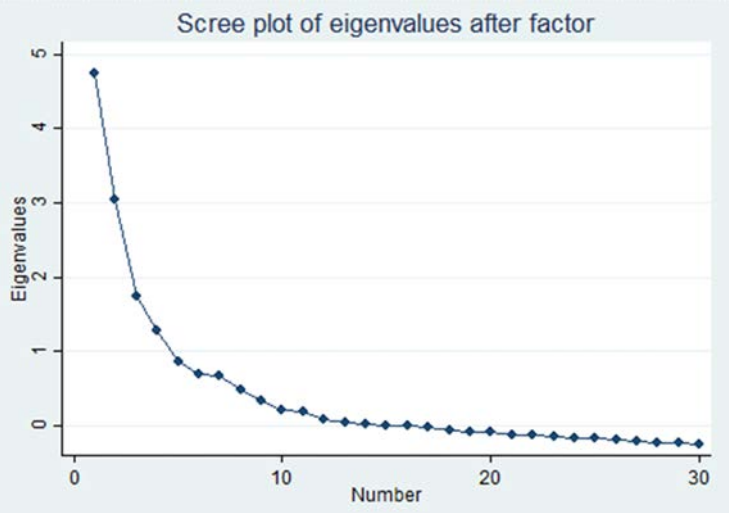

Figure 9. Scree-Test for mode choice

Table 7 shows the result of the factor analysis, using 4 factors. Different colours on this table mark the variables that relate to the factors. An examination of this table suggests:

1. The commuters with preferences for car use are a heterogeneous group. Those who are not satisfied with public transport services (under Factor 1) and those who like car (Factor 3).
2. The commutes who have preference for cycling (Factor 2)
3. The commuters who have preferences for public transport (Factor 4)

While income is an observed variable in Factor 3 (those who like car), neither education nor gender have turned significant as an explanatory variable in this analysis.

Table 7. *Factor analysis: Identification of factors for mode choice to work*

Variable	Factor1	Factor2	Factor3	Factor4	Uniqueness
Car is fast			0.4852		0.7176
Car is flexible			0.5317		0.6746
Caris safe			0.4510		0.7736
Bad public transport (PT) service	0.7524				0.4038
Car is less expensive				-0.5273	0.6663
I like car			0.4644		0.7660
PT is good for environmnet		0.3318		0.2934	0.7932
Cycle is good for environment		0.9545			0.0861
PT is fast	-0.4221		-0.3182	0.3157	0.6210
PT is good	-0.7675			0.2226	0.3569
PT is less expensive				0.6310	0.5436
PT use is my habit	-0.2390		-0.2449		0.8472
I like PT			-0.3868	0.3419	0.6925
PT is safe		0.2189		0.4105	0.7566
Cycle is good excercise		0.7628			0.4149
Cycle is fast	-0.2608		-0.3428	-0.2047	0.7426
I like cycling		0.4014	-0.2491		0.7682
I cycle because of bad PT	0.6493				0.5668
Cycling is flexible		0.3728	-0.3229		0.7392
Home-Work distance	0.3857			0.3082	0.7328
Frequency of car use for commuting	0.3565		0.6169		0.4583
Frequency of car use in work			0.3190		0.8887
Number of cars in household	0.3283		0.4674		0.6714
PT travel time to work	0.6874		0.2496	0.2763	0.3784
Access to PT at home location	0.3226				0.8570
No. of PT transfers	0.5204				0.6952
Have PT card	-0.2652		-0.4241	0.2664	0.6672
Hilly cycling path		-0.2269			0.9370
Income			0.2992		0.8877
Education					0.9626
Gender					0.9676

5.2 Telework

Scree-Test is used to select the number of factors that should be extracted from the data. The following figure shows the result of a Scree-Test for teleworking. While the Scree-Test points to four factors, we show the results for only 3 factors here.

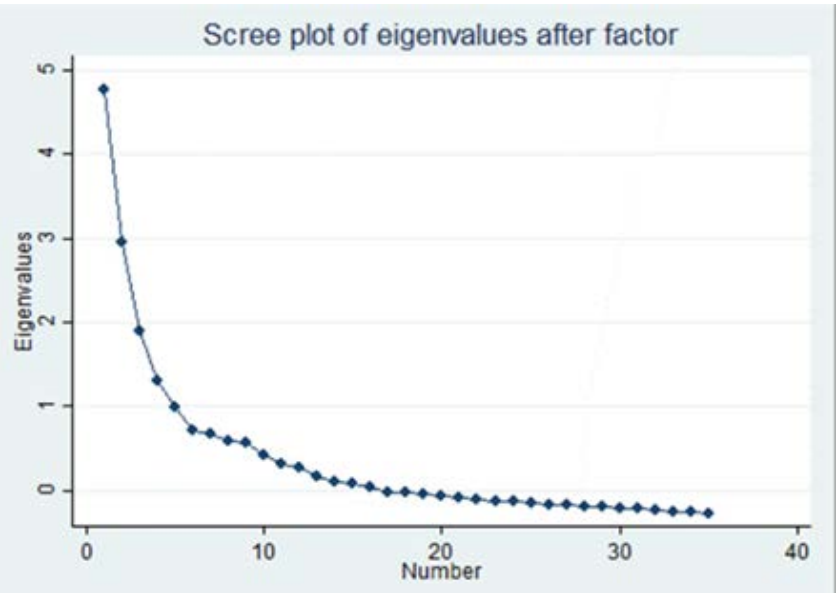

Figure 10. *Scree-Test for teleworking*

Table 8 shows the result of the factor analysis for only 3 factors. Different colours on this table mark the variables that relate to the 3 factor. The results show that one group (Factor 2) is positive towards teleworking and 2 groups rely on car for commuting, however, with somewhat different negative attitudes towards public transport (Factor 1 and Factor 3). A result that emerges from this analysis is that attitude towards environment is not an important factor for teleworking.

The variables that contribute to Factor 2 are the number of days that a commuter are allowed to telework as well as their practice of teleworking. Income and education are contributing variables. Male respondents tend to have a more positive attitude towards teleworking. Also, note that distance from home to work is not an important contributing variable.

Table 8. *Factor analysis: Identification of factors for teleworking*

Variable	Factor1	Factor2	Factor3	Uniqueness
Car is fast	0.4836			0.7629
Car is flexible	0.4349			0.7880
Caris safe	0.3794			0.8421
I commute with car due to bad PT service	0.2754		0.6494	0.4948
Car is less expensive	0.4170			0.8157
I like car	0.3641			0.8567
PT is good for environmnet				0.9567
PT is fast	-0.5013		-0.3194	0.6460
PT is good	-0.2932		-0.6492	0.4773
PT is less expensive	-0.4691			0.7667
PT use is my habit	-0.3621			0.8418
I like PT	-0.4911			0.7467
PT is safe	-0.2186			0.9156
Internet is important for distance working (DW)		0.7456		0.4414
Home office is important for DW		0.5861		0.6542
TW is efficient		0.3888	0.2437	0.7871
TW is good, it results is less trips		0.3034	0.4865	0.6491
TW allows performing other tasks at home		0.4402		0.7640
TW is difficut if no home office		-0.2933		0.8970
TW is difficult, no contact with work				0.9753
TW, days Practiced		0.4728		0.7756
TW Days Allowed		0.3974		0.8237
Have internet connection at home		0.6788		0.5347
Have home office		0.5435		0.6851
Home-Work distance			0.4629	0.7726
Frequency of car use per month	0.7470		0.2102	0.3977
Frequency of PT use per month	-0.7077			0.4800
Frequency of car related to work per month	0.3209			0.8819
Number of cars	0.4918		0.2437	0.6817
PT travel tome			0.7401	0.4128
Acces to public transport at home			0.3225	0.8804
No. Of transfers			0.5442	0.6954
PT card	-0.6324			0.5880
Income	0.2723	0.4124		0.7554
Education		0.2201		0.9396
Gender		0.2578		0.9190

5.3 Electric car

The following Figure shows the result of a Scree-Test for electric car. The Scree-Test points to 3 factors.

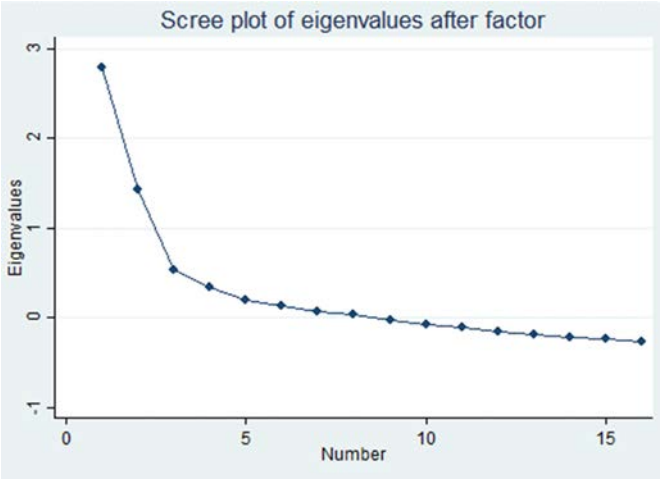

Figure 11. *Scree-Test for electric car*

Table 9 shows the result of the factor analysis. Different colours on this table mark the variables that relate to the factors. Two of the three identified classes rely on car for commuting to work, however, their profiles are different. One group (Factor 1) prefers car based on the perception that car is a better mode of transport than public transport. The second group (Factor 2) prefers car based on the perception that public transport services is not adequate. The third group (Factor 3) has a higher frequency of car use for commuting to work and for accompanying children to school. This group has higher income, higher level of education and are older male respondent. Note that variables income, education, age and gender do not affect the first two groups (Factor 1 and Factor 2).

***Table 9**. Factor analysis: Identification of factors for the choice of El car*

Variable	Factor1	Factor2	Factor3	Uniqueness
Car is fast	0.5571			0.6716
Car is flexible	0.5406			0.6951
Caris safe	0.4779			0.7686
I commute with car due to bad PT service		0.7024		0.4633
Car is less expensive	0.3156			0.8802
I like car	0.5078			0.7204
Car use is my habit	0.2734			0.8965
PT is good for environmnet				0.9795
PT is good		-0.7138		0.4532
PT use is my habit	-0.2577	-0.2265		0.8607
I like PT	-0.4253			0.7898
Home-Work distance		0.4411		0.7696
Frequency of car use for commuting	0.6750	0.3234	0.2247	0.3893
Freqyency of PT for commuting	-0.5881	-0.2599	-0.2643	0.5167
Frequency of car use in work	0.2927			0.8802
Frequency of car use for delivery of children	0.3128			0.8835
Number of cars in household	0.4072	0.2999	0.3784	0.6011
Public transport time		0.7267		0.4299
Public trasnport access at home		0.3300		0.8595
No. of transfers with PT		0.5627		0.6826
Income			0.6588	0.5371
Age			0.4789	0.7683
Gender			0.3313	0.8859
Education			0.2393	0.9332

6 Estimation

6.1 Estimations of the pooled SP data

This section presents analyses of the SP choice experiments (CE) using the pooled data (data from all the selected areas). The purpose is to establish a base for comparing the corresponding analyses for each of the selected areas for suggesting area specific policies.

The analysis of CE1a, focusing only on commuters to Fornebu will be presented under section "Policy recommendations for Fornebu".

Several commuters to different selected areas reported that public transport is not among the available modes of travel to them. This can be mainly explained by lack of access to public transport at home. It is important to point out that most often the choice of a house location and travel mode is jointly made. More commuters report cycling or walking is not a possibility for their commuting, explained mainly by long commuting distance to work. Only few commuters had reported that car is not an available mode for commuting to work, explained either by not having driving license or a car in their household.

In this study, public transport is always among the available alternative modes. However, the reported unavailability of other modes is accounted for in presenting alternative modes for commuting to work in CE1 (and CE1a).

It is also important to point out that when the data on a segment or an alternative is not large enough, it is not possible to get statistically significant values for the attributes for the segment or the attributes defining the alternative. This problem is encountered when analysing area specific data.

6.1.1 Choice Experiment 1 (CE1)

The factor analysis presented in section 5.1 pointed out that the commutes with preference for car use are a not a homogenous group. Some choose car because they perceive public transport services not to be adequate, while others use car because they like driving car. Hence policies that are designed to divert car use to public transport do not have similar impacts on commuters with car. When improvements in public transport services is supplemented with policies to promote electric car, those who have a liking for car and those who do not have good accessibility to public transport at wok are likely to switch to electric car rather than public transport.

Table 10 shows the results of the estimation of a logit model applied to the CE1 pooled data.

Table 11 shows the derived valuations based on the estimation results presented in Table 10. The results are quite plausible. There are however some differences between these valuations and those from previous studies (see for example Ramjerdi, et.al., 2010). The differences can be attributed to the design of the experiment (more attributes in this study than previous ones), the socio-economic characteristics of the respondents, and where and when the study was conducted.

Table 10. *Estimation Results of CE1 pooled data*

Estimated parameters	Value	Robust t-test
Car Cost, NOK	-0.3636	-3.4200
Car Time, minute	-0.4235	-1.8660
Car, Parking Cost, NOK	-0.7788	-17.1100
Car, Parking Distance, meter	-0.0270	-6.4470
Public Transport fee, one way, NOK/trip	-0.4191	-5.9720
Public Transport Time, minutes	-0.3125	-18.4900
Public Transport Headway, minute	-0.5765	-8.0120
Public Transport, no. of Transfers	-0.8685	-6.1190
Public Transport, Seat Availability, 25% of the way	6.2524	2.9234
Public Transport, Seat Availability, 50% of the way	7.1852	3.7090
Public Transport, Seat Availability, 75% of the way	9.2649	2.9456
Public Transport, Seat Availability, all the way	12.2694	1.9965
Public Transport, Walk Time, minute	-0.3495	-3.7910
Bike, Time Mixed Traffic, minute	-0.4971	-8.4360
Bike, Time Cycle Path, minute	-0.3654	-7.0310
Bike, Secure Parking,	8.1578	4.8490
Bike, Shower facility at work	5.4082	7.1350
Bike, Incentive, NOK	2.6358	7.8530
Walk, Time, minute	-0.7905	-6.804
Walk, Incentive, NOK	1.3756	6.794

As pointed out, factor analysis shows that it is possible to identify four segments among commuter with similar preferences for mode choice. Two heterogeneous commuter groups with preferences for car use, though, with differences in variables that determine their profiles. The other two group were the commutes who have preference for cycling and the commuters who have preferences for public transport. Obviously, the values presented in Table 10 are average values. These values differ for different selected areas based on the profile of the commuters to these areas. However, the values for each selected area are also average values, since none of the commuters to any of these areas are homogeneous groups. Nevertheless, from a policy recommendation perspective, average values are more appropriate.

Table 11. *Valuations derived from the estimation of CE1 pooled data*

CAR	
VOT, NOK/hour	69.9
WTA for 100-meter increase in Parking distance, NOK	7.4
Parking cost relative to Travel Cost	2.1
Public Transport	
In vehicle travel time, NOK/hour	44.7
Waiting time, NOK/hour	82.5
WTP Sear availability, 25% of the way	14.9
WTP, Seat availability, 50% of the way	19.8
WTP, Seat availability, 75% of the way	22.1
WTP, Seat availability all the way	29.3
Walking time to Public Transport Station, NOK/hour	50.0
Transfer, NOK/transfer	14.5
CYCLE	
Time, mixed traffic NOK/hour	71.2
Time, Cycle Path, NOK/hour	52.3
WTP for Secure Parking, NOK	22.4
WTP for Changing/shower facility, NOK	14.9
Bike incentive, relative to public transport fee	6.3
Bike incentive, relative to car cost	3.8
WALK	
VOT Walk, NOK/hour	121.2
Walk incentive, relative to public transport fee	3.3
Walk incentive, relative to car cost	3.8

WTP stands for willingness to pay, WTA for willingness to accept, VOT for value of travel time savings.

We highlight implications of these values from a policy perspective.

1. Parking distance at work is an important policy measure for reducing car use.
2. While increasing variable car cost (including toll fees) or parking cost has effect on diverting car to other modes, parking cost is perceived about twice as much as variable car cost.
3. Waiting time is valued almost twice as much as in vehicle travel time for public transport. Increasing frequency of public transport services increase public transport mode share.
4. Reducing crowding in public transport services, reflected by values for seat availability, is a good policy for increasing public transport mode share
5. Reducing number of transfers is effective for increasing public transport mode share.
6. The value of time for walking to a public transport station is not much higher than in vehicle travel time. The descriptive analysis of the data suggests that access to public transport station at home is an important factor for using public transport. Further analysis of the data, using a non-linear function for walking time to public transport station might better address the importance of access to public transport, especially at home.

7. The difference between cycle value of travel time in mixed traffic and on cycle lane points to the importance of provision of cycle lane.
8. Providing secure parking place for cyclist at work is a good policy.
9. Provision of changing/shower facilities at work is also a good policy.
10. Monetary incentive to cycle to work is more effective than an equivalent decrease in public transport fees or car variable cost
11. Monetary incentive to walk to work is more effective than an equivalent decrease in public transport fees or car variable cost, however it is not as effective as a cycle incentive.

6.1.2 Choice Experiment 2a and 2b (CE2a and CE2b)

These two choice experiments were designed to evaluate the transport related policies that would increase teleworking. The commuters who were not allowed to work at distance did not get these CEs. Public transport commuters at interception points were directed to CE2a and car commuters to CE2b.

Table 12 shows the results of the estimation of a logit model applied to the CE2a pooled data. Table 13 shows the derived valuations based on the estimation results presented in Table 12.

An increase in public transport fee results in 0.2 days increase in teleworking per month. A decrease in public transport frequency of services results in 0.6 days increase in teleworking per month. An increase in the number of transfer results in 3.7 days increase in teleworking per month. A comparison of these values shows the distaste of the commuters for transfers. In summary, decrease in public transport services results in increase in teleworking. However, improvement in public transport services is an important policy for diverting commuting with car to public transport.

Table 12. Estimation Results of CE2a pooled data

Estimated parameters	Value	Robust t-test
ASC Alternative 1	-0.3686	-5.0760
No. of teleworking in a month, in 10 days	0.1108	2.6270
Public Transport fee per trip in 100 NOK	-1.9530	-12.4800
Public Transport in vehicle time in 100 minutes	-3.0270	-18.3100
Public Transport Headway in 10 Minutes	-0.0135	-9.1790
Public Transport, no. of Transfers	-0.4098	-7.3410

Table 13. Derived valuations from the estimation of CE2a pooled data

Increase in TW with increase in PT fee, TW days per month/NOK	0.18
Increase in TW with Increase in PT Headway, TW days per month/minute	0.12
Increase in TW with increase in Transfers, TW days per month/transfer	3.70

TW stand for Teleworking, PT for public transport

Table 14 shows the results of the estimation of a logit model applied to the CE2b pooled data. Table 15 shows the derived valuations based on the estimation results presented in Table 14.

An increase in parking cost results in 0.21 days increase in teleworking per month. An increase in parking distance results in 0.27 days increase in teleworking per month. An

increase in the variable cost of travel results in 0.12 days increase in teleworking per month. Meanwhile, the trade-off between parking cost and parking distance is captured by WTP for an increase in parking cost for a reduction in parking distance.

In summary policy implications derived from these two CEs suggest that improvements in public transport services reduce teleworking. However, policies that aims at reducing car use, particularly parking policies, increases teleworking.

Factor analysis (see Section 5.2) suggests that those who can works at distance and their practice of teleworking as well as those with higher income and education have higher propensity to work at distance. Male respondents tend to have a more positive attitude towards teleworking. Those who commute to work with car more regularly or accompany children with car have a higher propensity to work at distance. The variable that turned significant in a latent class model with two classes were education and number of teleworking days practiced. It is quite likely that some of the other variables identifies in the factor analysis would also turn significant in a latent class model with more classes.

Table 14. *Estimation Results of CE2a pooled data*

Estimated parameters	Value	Robust t-test
ASC Alternative 1	0.2062	4.319
No. of Teleworking in a month, in 10 days	0.1795	3.043
Variable car cost per trip, in 100 NOK	-0.3921	-2.314
Parking Cost in 100 NOK	-0.3691	-18.22
Parking Distance in km	-0.4831	-8.006

Table 15. *Valuations derived from the estimation of CE2b pooled data*

Increase in TW with increase in parking cost, TW days per month/NOK	0.21
Increase in TW with increase parking distance, TW days per month/km	0.27
Increase in TW with increase in variable car cost, TW days per month/NOK	0.12
WTP for increase in parking cost with decrease in parking distance, 100 NOK/km	1.31

WTP stands for willingness to pay, TW stand for teleworking

6.1.3 Choice experiment 3a and 3b (CE3A and CE3b)

These two choice experiments were designed to assess the valuations of the attributes of El car by the respondents, as a main car in their household or as a second car. The respondent with no car and half of the respondents with one car in their households were directed to CE3a. The respondent with two or more cars and rest of the respondents with one car in their households were directed to CE3b.

The base value for conventional car and electric car for each respondent was based on the reported car used for commuting. A "small car" was used for those without car. The purchase prices of conventional and electric car are pivoted around either of these values for each respondent.

The policies and attributes that have been evaluated in these CEs are the level of subsidies for El car, refuelling time, range and the respondents' perceptions of the maturity of El car technology. Local policies to promote El car were not evaluated in this study. However, other studies suggest that local policies, such as access to bus lane, free parking, free pass through toll stations have had important effect on initial El-car take-off (see Figenbaum, et al, 2015a; Figenbaum, et al, 2015b). In this study, we rely on the importance of parking policies derived from CE1 and eventually the estimation of latent class models.

The estimation results are presented in Tables 16 for El-car as the main car in a household and in Table 17 for El-car as a second car in a household.

Table 16. *Estimation Results of CE3a pooled data (main car)*

Estimated parameters	Value	Robust t-test
ASC Conventional Car	-1.044	-1.456
Conventional Car Purchase Price, in 200 000 NOK	-0.3816	-7.161
El-Car Purchase Price in 200 000 NOK	-0.7147	-10.38
Conventional Car Variable Cost in NOK/km	-0.07334	-1.286
El-Car Variable Cost in NOK/km	-1.643	-6.764
El-Car Range in 200 km	0.4549	8.873
El-Car Refuelling Time in 10 hr	-0.4574	-3.52
El-Car Depreciation Relative to Conventional Car in %	0.4375	2.324
Age-square, Conventional Car, in 1000	-0.1389	-0.3673
Age, Conventional Car in 10 years	0.3936	1.183
Male: Conventional Car	0.1352	1.025

Table 17. *Estimation Results of CE3b pooled data (second car)*

Estimated parameters	Value	Robust t-test
ASC Conventional Car	0.7027	1.033
Conventional Car Purchase Price, in 200 000 NOK	-0.4754	-12.3
El-Car Purchase Price in 200 000 NOK	-0.7426	-17.72
Conventional Car Variable Cost in NOK/km	-0.1198	-3.769
El-Car Variable Cost in NOK/km	-0.5049	-3.388
El-Car Range in 200 km	0.2414	7.096
El-Car Refuelling Time in 10 hr	-0.5431	-6.244
El-Car Depreciation Relative to Conventional Car in %	0.4357	3.387
Age-square, Conventional Car, in 1000	0.4513	1.391
Age, Conventional Car in 10 years	-0.3912	-1.299
Male: Conventional Car	0.04628	0.4866

The derived valuations are presented in Tables 18 and Tables 19. A comparison of the values in these tables show that:

1. The demand for subsidy for the purchase of an El car is higher as a main car than is for a second car in a household. This is reflected by the respondents' relative valuations of purchase price of an El car with a conventional car.
2. Range is also more important for a main car than is for a second car, reflected by higher willingness to pay for increase in range for an El car as the main car than a second car in a household.
3. Refuelling time seems to be more important for a main car than for the second El car in a household, reflected by the higher willingness to accept an increase in refuelling time.
4. The maturity of El car technology is perceived similarly among respondents for a main car and a second car.

Table 18. Valuations derived from the estimation of CE3a pooled data (Main car)

Relative Purchase Price of an El-Car to Conventional Car	0.534
WTP for Increase in Range (in 10 NOK/km)	63.649
WTA for Increase in Refuelling Time (in 1000 NOK/hour)	12.800
WTP to improve El-car depreciation relative to conventional car in 1000 NOK)	0.003

WTP stand for willingness to pay, WTA stand for willingness to accept

Table 19. Valuations derived from the estimation of CE3a pooled data (2 car)

Relative Purchase Price of an El-Car to Conventional Car	0.640
WTP for Increase in Range (in 10 NOK/km)	32.507
WTA for Increase in Refuelling Time (in 1000 NOK/hour)	14.627
WTP to improve El-car depreciation relative to conventional car in 1000 NOK)	0.003

WTP stand for willingness to pay, WTA stand for willingness to accept

The factor analysis presented in Section 5.3 and a latent class model with two classes was estimated for the main car segment. The variables that turned significant in the two classes were the respondents who had stated "car is flexible", "car is safe", had access to an El car, had higher income and education. This group is likely to correspond to the third group (Factor 3) in the factor analysis that was carried out for El car. Note that this group has a higher frequency of car use for work and for accompanying children to school, it has a higher income higher level of education.

7 Area specific measures

The calculation of the impacts of a policy measure is usually based on the calculation of the impacts of the policy measure on the demand, i.e., elasticity values. As an example, one can calculate the impacts of an increase in parking cost on the mode shares using a demand model, like the estimated model presented in Table 10. However, with other policies that could be simultaneously implemented, such as differentiated parking policies to promote electric car, or policies to promote teleworking, the calculation of the elasticity values become complicated, since the different demand models need to be integrated. Furthermore, elasticity values need to be corrected for sampling errors. It was explained that a choice based sampling approach was adopted in this study, focusing only on car and public transport. This approach was adopted to get sufficient observation on commuters with car and public transport. It is not possible to correct the data based on available auxiliary sources such as the National Travel Survey, since the sample sizes for the selected areas in this study are too small to be representative.

In this study, we use willingness to pay (WTP) and willingness to accept (WTA) as measures of sensitivities to the implementation of a policy. While some WTP or WTA area specific values are not significantly different from the corresponding values based on pooled data, the values could be different from other area specific values. Also, note that the coefficients of some of the area specific coefficients are statistically significant (marked by *) mainly due to small number of observation corresponding variables.

While it is difficult to calculate the exact impact of any of the policy measures, it is possible to expect the how effective a policy measure is. Hence, the impacts of the policy measures are addressed qualitatively, rather than quantitatively.

7.1 Recommended Policies: Alna – Linderud

The descriptive analysis of the data collected on commuters to Alna – Linderud, presented earlier, suggest that commuters to Alna – Linderud do not have good access to public transport either at home or at work. They also have a long commuting distance to work. They report a longer travel time with public transport than with car. Car ownership is less than the average among this group. They also report a higher frequency of car use compared to public transport. The level of education among this group is lower than commuters to other locations. The number of days they can work at distance and their practice is less than the average. Many the commuters to Alna – Linderud reported that public transport, cycle or walk is not among the available modes of travel for them.

It is important to point out that public transport is always among the alternatives in CE1, even if a respondent had stated that this mode was not an alternative. When public transport is not available, the travel time is pivoted around an estimated value.

Table 20 shows the derived valuations from the estimation CE1 data collected at Alna - Linderud. The valuations derived from the estimation pooled CE1 data is also presented in this table (see Table 11). While the valuations of an attribute for a selected area might not

be significantly different from that of the pooled data statistically, the values are significantly different across selected areas.

The estimated coefficients with the attributes of walk and some of the estimated coefficients with cycle did not turn significant since the number of observation were not sufficient. Many of the respondents had stated that these modes were not alternatives for their commuting to work. Furthermore, the travel time for these modes were pivoted around their reported travel times, making these modes not their choice among alternatives.

The valuations presented in Table 20 suggest that availability of public transport with good accessibility at work and at home and few transfers diverts the car commuters to public transport. The valuations associated with public transport services as well as those related to parking policies are higher than the valuations derived from the pooled data. The availability of public transport combined with policies on restriction of parking and increase in parking cost will be most effective.

Table 20. *Derived valuations from the estimation CE1 for Alna-Linderud and pooled data*

Alna – Linderud		
CAR	Alna - Linderud	Pooled data
VOT, NOK/hour	65.99	69.88
WTA for 100-meter increase in Parking distance, NOK	7.93	7.41
Parking cost relative to Travel Cost	2.99	2.14
PUBLIC TRANSPORT		
In vehicle travel time, NOK/hour	41.99	44.74
Waiting time, NOK/hour	71.67	82.53
WTP seat availability, 25% of the way	12.56	14.92
WTP, Seat availability, 50% of the way	20.42	19.76
WTP, Seat availability, 75% of the way	19.99	22.11
WTP, Seat availability all the way	30.18	29.28
Walking time to Public Transport Station, NOK/hour	52.68	50.04
WTA transfer, NOK/transfer	17.67	14.50
CYCLE		
Time, mixed traffic NOK/hour	69.89	71.17
Time, Cycle Path, NOK/hour	45.48	52.31
WTP for Secure Parking, NOK	*	22.44
WTP for Changing/shower facility, NOK	*	14.87
Bike incentive, relative to public transport fee	*	6.29
Bike incentive, relative to car cost	*	3.78
WALK		
VOT Walk, NOK/hour	*	121.20
Walk incentive, relative to public transport fee	*	3.28
Walk incentive, relative to car cost	*	3.78

WTP stands for willingness to pay, WTA stands for willingness to accept, VOT for value of travel time savings.

A main problem with this policy package relates to sufficient accessibility to public transport at home. Park and Ride could address this problem, given good accessibility to public transport at work.

Table 21 shows the derived valuations from the estimations of CE2a and CE2b. Again, the coefficients associated with the attributes of CEa (the choice among two alternatives with public transport, described by attributes with public transport, and the number of teleworking days) did not turn statistically significant. Most commuters to Alna - Linderud have limited possibility for teleworking, specially the commuters with public transport. Hence the sample size was too small for getting statistically significant coefficients for the attributes of this experiment.

The derived valuations from CE2b (the choice among two alternatives with car, described by car attributes, and the number teleworking days) suggests that the commutes to Alna - Linderud have less preference teleworking. Their trade-offs between teleworking and parking cost or parking distance is less than the average (see Table 15).

As stated earlier, CE3a (El car as a main car in a household) and CE3b (El car as a second car in a household), focusing on the promotion of El car were only estimated using the pooled data. Local policies, such as parking policies, etc., were not addressed in these CEs. Only a national policy, associated with the level of subsidy for purchase of El car was addressed in these CE3a and CE3b as well as El car attributes. The profiles of the commuters to Alna - Linderud suggest that El car is potentially an attractive solution, especially if preferential local policies, namely parking policies, are enforced.

Table 21. *Valuations derived from the estimation CE2a and CE2b*

Alna - Linderud	
TELEWORK: Public Transport	
Increase in TW with increase in PT fee, TW days per month/NOK	*
Decrease in TW with increase in frequency, TW days per month/minute	*
Increase in TW with increase in Transfer, TW days per month/transfer	*
TELEWORK: Car	
Increase in TW with increase in parking cost, TW days per month/NOK	0.15
Increase in TW with increase parking distance, TW days per month/km	0.21
Increase in TW with increase in variable car cost, TW days per month/NOK	0.16
WTP for increase in parking cost with decrease in parking distance, 100 NOK/km	1.21

WTP stands for willingness to pay, TW stand for teleworking

7.2 Recommended Policies: Blindern

Commuters to Blindern are highly educated. Their reported income is relatively low, but the number cars in their households is the lowest among the selected groups. They report a relatively short distance from home to work. The difference between travel time with car and public transport is not as high among the selected groups. Blindern has a very good access to public transport. It also appears that commuters to Blindern have good access to public transport at home. This group of commuters rely more on public transport, walking and cycling than other groups. Meanwhile the number of days they can work at distance or their practice is larger than other groups.

Table 22 shows the derived valuations from the estimation CE1 data collected at Blindern. The valuations derived from the estimation pooled CE1 data is also presented in this table (see Table 11). While the valuations of an attribute for a selected area might not be significantly different from that of the pooled data statistically, the values are significantly different across selected areas.

Car was not available to some of the commuters to Blindern. Other modes were mostly available to this segment. Public transport is always among the alternatives in CE1, even if the respondents had stated that this mode was not an alternative for them.

Table 22. *Derived valuations from the estimation CE1 for Blindern and pooled data*

Blindern		
CAR	Blindern	Pooled data
VOT, NOK/hour	60.45	69.88
WTA for 100-meter increase in Parking distance, NOK	6.71	7.41
Parking cost relative to Travel Cost	1.82	2.14
PUBLIC TRANSPORT		
In vehicle travel time, NOK/hour	40.72	44.74
Waiting time, NOK/hour	72.67	82.53
WTP seat availability, 25% of the way	15.02	14.92
WTP, Seat availability, 50% of the way	19.01	19.76
WTP, Seat availability, 75% of the way	24.37	22.11
WTP, Seat availability all the way	28.89	29.28
Walking time to Public Transport Station, NOK/hour	49.90	50.04
WTA transfer, NOK/transfer	13.83	14.50
CYCLE		
Time, mixed traffic NOK/hour	79.34	71.17
Time, Cycle Path, NOK/hour	50.92	52.31
WTP for Secure Parking, NOK	31.04	22.44
WTP for Changing/shower facility, NOK	14.28	14.87
Bike incentive, relative to public transport fee	5.11	6.29
Bike incentive, relative to car cost	2.45	3.78
WALK		
VOT Walk, NOK/hour	119.84	121.20
Walk incentive, relative to public transport fee	4.12	3.28
Walk incentive, relative to car cost	3.67	3.78

WTP stands for willingness to pay, WTA stands for willingness to accept, VOT for value of travel time savings.

The valuations for policies directed at car use or public transport are not significantly different from the valuations derived from the pooled data statistically. More restrict parking policies divert car use to either public transport or walk and cycle. The commuters to Blindern have higher value for provision of cycle path as well as secure cycle parking. Their valuation of changing/shower facility is about the average. Monetary incentives for walking or cycling to work increase the use of these modes.

Table 23 shows the derived valuations from the estimations of CE2a and CE2b shows the valuations derived from CE2b (the choice among two alternatives with car attributes and the number teleworking days). The commuters to Blindern have a higher propensity to work at distance with an increase in parking restrictions an increase in car variable cost (see Table 15). However, their trade-offs between teleworking and public transport attributes is slightly lower than the average (see Table 13).

While promotion of El car at Blindern could be enhanced by provision of preferential local policies, specially parking policies, it seems most effective policy package for this area is restrict parking policies along with improvements in cycling infrastructure and facilities.

Table 23. *Derived valuations from the estimation CE2a and CE2b*

Blindern	
TELEWORK: Public Transport	
Increase in TW with increase in PT fee, TW days per month/NOK	1.11
Decrease in TW with increase in frequency, TW days per month/minute	0.43
Increase in TW with increase in Transfer, TW days per month/transfer	3.66
TELEWORK: Car	
Increase in TW with increase in parking cost, TW days per month/NOK	0.31
Increase in TW with increase parking distance, TW days per month/km	0.29
Increase in TW with increase in variable car cost, TW days per month/NOK	0.22
WTP for increase in parking cost with decrease in parking distance, 100 NOK/km	1.28

WTP stands for willingness to pay, TW stand for teleworking

7.3 Recommended Policies: Nydalen

The level of education of commuters to Nydalen is about the average. Their reported income is higher than the average of the selected groups, so is the number cars in their households. Home to work distance among this group is about the average. The difference between travel time with car and public transport is higher than the average among this group. While they have better access to public transport at work, the distance to public transport at home is longer than the average. This group's frequency of the choice of public transport and car for commuting is about the average. They walk less than the average to work. However, their frequency of cycling work is about the average. The commuters to Nydalen can work at distance more than the average and practice teleworking more than the average.

Table 24 shows the derived valuations from the estimation CE1 collected data at Nydalen. The valuations derived from the estimation pooled CE1 data is also presented in this table (see Table 11). While the valuations of an attribute for a selected area might not be significantly different from that of the pooled data statistically, the values are significantly different across selected areas.

The associated coefficients with the attributes of walk and some of the coefficients associated with cycle did not turn significant. One explanation is that many of the respondents had stated that these modes were not alternatives for them. In addition, the travel time for these modes were pivoted around their reported travel times, making these modes not their choice among alternatives.

Table 24. *Valuations derived from the estimation CE1 for Nydalen and pooled data*

Nydalen		
CAR	Nydalen	Pooled data
VOT, NOK/hour	74.04	69.88
WTA for 100-meter increase in Parking distance, NOK	8.01	7.41
Parking cost relative to Travel Cost	2.57	2.14
PUBLIC TRANSPORT		
In vehicle travel time, NOK/hour	46.38	44.74
Waiting time, NOK/hour	76.38	82.53
WTP seat availability, 25% of the way	*	14.92
WTP, Seat availability, 50% of the way	20.11	19.76
WTP, Seat availability, 75% of the way	21.67	22.11
WTP, Seat availability all the way	*	29.28
Walking time to Public Transport Station, NOK/hour	*	50.04
WTA transfer, NOK/transfer	16.74	14.50
CYCLE		
Time, mixed traffic NOK/hour	64.22	71.17
Time, Cycle Path, NOK/hour	50.39	52.31
WTP for Secure Parking, NOK	*	22.44
WTP for Changing/shower facility, NOK	*	14.87
Bike incentive, relative to public transport fee	*	6.29
Bike incentive, relative to car cost	*	3.78
WALK		
VOT Walk, NOK/hour	*	121.20
Walk incentive, relative to public transport fee	*	3.28
Walk incentive, relative to car cost	*	3.78

WTP stands for willingness to pay, WTA stands for willingness to accept, VOT stands for value of travel time savings.

The valuations presented in Table 24 suggest that public transport improvements with good accessibility at work and at home and few transfers diverts the car commuters to public transport. The associated valuations with public transport services as well as those related to parking policies are like the valuations derived from the pooled data. In addition, commuters to Nydalen are more responsive to policies that restrict parking (parking cost as well as distance to parking). The availability of public transport combined with policies on restriction of parking and increase in parking cost will be most effective.

As it was pointed out earlier, a main problem with this policy package relates to sufficient accessibility to public transport at home. Park and Ride could address this problem, given good accessibility to public transport at work.

Provision of cycling infrastructure is a potential policy for Nydalen.

Table 25 shows the derived valuations from the estimations of CE2a (choice among two alternatives with public transport attributes and the number of teleworking days) and CE2b s (choice among two alternatives with car attributes and the number of teleworking days). Derived valuations from CE2a is somewhat lower than average. The derived valuations from CE2b is significantly higher than average. The commutes to Nydalen have a higher propensity to work at distance with an increase in parking restrictions an increase in car

variable cost (see Table 15). However, their trade-offs between teleworking and public transport attributes is slightly lower than the average (see Table 13).

As stated earlier, CE3a (El car as a main car in a household) and CE3b (El car as a second car in a household), focusing on the promotion of El car were only estimated using the pooled data. Local policies, such as parking policies, etc., were not addressed in these CEs. Only a national policy, associated with the level of subsidy for purchase of El car was addressed in these CE3a and CE3b as well as El car attributes. El car is potentially an attractive solution, especially if preferential local policies, namely parking policies, are enforced.

Table 25. *Valuations derived from the estimation CE2a and CE2b*

Nydalen	
TELEWORK: Public Transport	
Increase in TW with increase in PT fee, TW days per month/NOK	1.31
Decrease in TW with increase in frequency, TW days per month/minute	0.49
Increase in TW with increase in Transfer, TW days per month/transfer	3.27
TELEWORK: Car	
Increase in TW with increase in parking cost, TW days per month/NOK	0.27
Increase in TW with increase parking distance, TW days per month/km	0.31
Increase in TW with increase in variable car cost, TW days per month/NOK	0.22
WTP for increase in parking cost with decrease in parking distance, 100 NOK/km	1.36

WTP stands for willingness to pay, TW stand for teleworking

7.4 Recommended Policies: Sentrum

Commuters to Sentrum have a higher income than the average and higher number cars in their households. Their distance to work is about the average. This group is the only group that reports a similar travel time to work with car and public transport. The high accessibility with public transport to Sentrum and long travel time during the rush hours is an explanation. These commuters do not report the best access to public transport at home or at work, however they preference for car and public transport is like the commuters to Blindern. The frequency of walking to work is among the highest, however, they do not cycle as often as other groups. The low frequency of cycling to work could relate to the characteristics of the commuters as well as perception of cycling safety in the mixed traffic in the centre of the city. The level of education among the commuters to Sentrum is about the average. This group can work at distance less than the average and practice teleworking less than the average.

Table 26 shows the derived valuations from the estimation CE1 data collected at Sentrum. The valuations derived from the estimation pooled CE1 data is also presented in this table (see Table 11). While the valuations of an attribute for a selected area might not be significantly different from that of the pooled data statistically, the values are significantly different across selected areas.

The associated coefficients with cycle attributes did not turn significant. Insufficient number of observation is an explanation. Many of the respondents had stated that cycle is not alternatives for their commuting.

While the commuter to Sentrum have higher value of time with car and public transport, their valuation of public transport transfers as well as waiting time is lower than average.

Most likely they encounter a better public transport services in these respects. However, they have a higher willingness to pay for seat availability.

These commuters have a higher willingness to pay for closer parking at their work than the average. However, there are not as sensitive to parking cost as the average commuters. Their higher income than average is an explanation.

Commuters to Sentrum value monetary incentive for walking to work is less than average. This group enjoys a higher income than the average commuters.

Based on the above examinations of the valuations of the commuters to Sentrum, it seems they are value uncongested public transport services, while they have a dislike for longer distance to parking at work. Further restrictions on parking seems to be an effective policy for diverting this group to public transport.

Table 27 shows the derived valuations from the estimations of CE2a (choice among two alternatives with public transport attributes and the number of teleworking days) and CE2b s (choice among two alternatives with car attributes and the number of teleworking days). Derived valuations from CE23a and CE3b are significantly lower than average (see Table 13 and 15). The commuters to Sentrum do not have a high propensity to work at distance. Their work particularities are probably an explanation.

Table 26. *Derived valuations from the estimation CE1 for Sentrum and pooled data*

Sentrum		
CAR	Sentrum	Pooled data
VOT, NOK/hour	76.84	69.88
WTA for 100-meter increase in Parking distance, NOK	7.97	7.41
Parking cost relative to Travel Cost	2.11	2.14
PUBLIC TRANSPORT		
In vehicle travel time, NOK/hour	50.33	44.74
Waiting time, NOK/hour	79.82	82.53
WTP seat availability, 25% of the way	16.45	14.92
WTP, Seat availability, 50% of the way	20.62	19.76
WTP, Seat availability, 75% of the way	25.45	22.11
WTP, Seat availability all the way	31.76	29.28
Walking time to Public Transport Station, NOK/hour	56.75	50.04
WTA transfer, NOK/transfer	13.62	14.50
CYCLE		
Time, mixed traffic NOK/hour	*	71.17
Time, Cycle Path, NOK/hour	*	52.31
WTP for Secure Parking, NOK	*	22.44
WTP for Changing/shower facility, NOK	*	14.87
Bike incentive, relative to public transport fee	*	6.29
Bike incentive, relative to car cost	*	3.78
WALK		
VOT Walk, NOK/hour	134.07	121.20
Walk incentive, relative to public transport fee	3.56	3.28
Walk incentive, relative to car cost	3.11	3.78

WTP stands for willingness to pay, WTA stands for willingness to accept, VOT stands for value of travel time savings.

As stated earlier, CE3a (El car as a main car in a household) and CE3b (El car as a second car in a household), focusing on the promotion of El car were only estimated using the pooled data. Local policies, such as parking policies, etc., were not addressed in these CEs. Only a national policy, associated with the level of subsidy for purchase of El car was addressed in these CE3a and CE3b as well as El car attributes. El car is potentially an attractive solution, especially if preferential local policies, namely parking policies, are enforced.

Promotion of El car at Sentrum could be enhanced by provision of preferential local policies, specially parking policies. However, with the El car take-off, an unintended effect is heavier congestion in the inner city.

Table 27. Valuations derived from the estimation CE2a and CE2b

Sentrum	
TELEWORK: Public Transport	
Increase in TW with increase in PT fee, TW days per month/NOK	0.91
Decrease in TW with increase in frequency, TW days per month/minute	0.51
Increase in TW with increase in Transfer, TW days per month/transfer	4.91
TELEWORK: Car	
Increase in TW with increase in parking cost, TW days per month/NOK	0.17
Increase in TW with increase parking distance, TW days per month/km	0.19
Increase in TW with increase in variable car cost, TW days per month/NOK	0.23
WTP for increase in parking cost with decrease in parking distance, 100 NOK/km	1.29

WTP stands for willingness to pay, TW stand for teleworking

7.5 Recommended Policies: Fornebu

Commuters to Fornebu have the highest income among commuters to other selected areas and higher number cars in their households than the average. Their distance to work is longer than other commuters. Compared with other groups, the commuters to Fornebu report a long travel time with car as well as with public transport. They report a relatively good access to public transport at work, however, their access to public transport at home is not as good. The difference between their mode of travel to work with car and public transport is not large. They walk much less than commuters to other selected areas. Commuters to Fornebu have the highest level of education. The number of days they can work at distance is more than the average, however, their practice is the most among the commuters to the selected locations.

Table 28 shows the valuations derived from the estimation CE1 data collected at Fornebu. The valuations derived from the estimation pooled CE1 data is also presented in this table (see Table 11). While the valuations of an attribute for a selected area might not be significantly different from that of the pooled data statistically, the values are significantly different across selected areas.

The associated coefficients with walk attributes and some of cycle attributes did not turn significant. Insufficient number of observation is an explanation. Many of the respondents had stated that cycle or walk is not alternatives for their commuting. However, based on differences in values of time for cycling on mixed traffic and on cycle lane, provision of cycle lane is potentially a good policy for this area.

The commuter to Fornebu have higher value of time with car and public transport. Their valuation of different attributes of public transport transfers is significantly higher than average, pointing to improvements in public transport as an important policy.

These commuters have a higher willingness to pay for closer parking at their work than the average. However, they are not as sensitive to parking cost as the average commuters. Their higher income than average is an explanation.

Table 29 shows the derived valuations from the estimations of CE2a (choice among two alternatives with public transport attributes and the number of teleworking days) and CE2b s (choice among two alternatives with car attributes and the number of teleworking days). Derived valuations from CE23a and CE3b are significantly higher than average (see Table 13 and 15). The commuters to Fornebu have a high propensity to work at distance.

A significant improvement in public transport services at Fornebu and restrictions on parking locations diverts car users to public transport and potentially to cycling. Furthermore, commuters with car would work at distance more often.

Table 28. Valuations derived from the estimation CE1 for Fornebu & pooled data

Fornebu		
CAR	Local data	Pooled data
VOT, NOK/hour	97.23	69.88
WTA for 100-meter increase in Parking distance, NOK	8.21	7.41
Parking cost relative to Travel Cost	1.99	2.14
PUBLIC TRANSPORT		
In vehicle travel time, NOK/hour	53.04	44.74
Waiting time, NOK/hour	88.49	82.53
WTP seat availability, 25% of the way	11.34	14.92
WTP, Seat availability, 50% of the way	21.45	19.76
WTP, Seat availability, 75% of the way	25.67	22.11
WTP, Seat availability all the way	31.67	29.28
Walking time to Public Transport Station, NOK/hour	67.46	50.04
WTA transfer, NOK/transfer	18.45	14.50
CYCLE		
Time, mixed traffic NOK/hour	100.73	71.17
Time, Cycle Path, NOK/hour	88.45	52.31
WTP for Secure Parking, NOK	*	22.44
WTP for Changing/shower facility, NOK	*	14.87
Bike incentive, relative to public transport fee	*	6.29
Bike incentive, relative to car cost	*	3.78
WALK		
VOT Walk, NOK/hour	*	121.20
Walk incentive, relative to public transport fee	*	3.28
Walk incentive, relative to car cost	*	3.78

WTP stands for willingness to pay, WTA stands for willingness to accept, VOT stands for value of travel time savings.

Promotion of El car at Fornebu by provision of preferential local policies, specially parking policies is also an appropriate policy.

Table 29. Valuations derived from the estimation CE2a and CE2b

Fornebu	
TELEWORK: Public Transport	
Increase in TW with increase in PT fee, TW days per month/NOK	1.18
Decrease in TW with increase in frequency, TW days per month/minute	0.60
Increase in TW with increase in Transfer, TW days per month/transfer	6.01
TELEWORK: Car	
Increase in TW with increase in parking cost, TW days per month/NOK	0.36
Increase in TW with increase parking distance, TW days per month/km	0.33
Increase in TW with increase in variable car cost, TW days per month/NOK	0.30
WTP for increase in parking cost with decrease in parking distance, 100 NOK/km	1.35

WTP stands for willingness to pay, TW stand for teleworking

Evaluation of a new T-bane line and a new ferry connection to Fornebu

As explained in Chapter 3, CE1a was only designed for commuters to Fornebu. The choice set in this experiment is "Car", "Existing Public Transport", "A new T-bane line" and "A new ferry line". Travel times by all modes are pivoted around the reported travel times and by each respondent. Travel time by the new T-bane and the new ferry line were based on travel time with public transport. Travel cost by car is based on reported commuting distance by each respondent and travel cost for car is pivoted around the calculated travel cost.

Table 30 shows the results of the estimation of the data collected in CE1a. The derived values of travel time savings (VOT) for car and public transport for Fornebu are significantly greater than the corresponding values derived from the pooled data (see Table 11).

The values are plausible. The differences can be explained by the socio-economic profiles of commuters to Fornebu, most importantly, they enjoy a much higher income than the average. Furthermore, the differences in the design of CE1 and CE1a could explain part of the differences. CE1 has considerably larger number of attributes than CE1a. Increase in the number of attributes could result in lowering of the derived values.

An examination of the results of the estimation of CE1a suggests that there is potentially a market for a new T-bane line as well as a new ferry connection to Fornebu. However, the present analysis does not lend itself to the estimation of the size of the demand for either a new T-bane or a new ferry line, important for an overall evaluation of either of these new infrastructures. Nonetheless, it is possible to state that further in depth studies of these connections are justified.

Table 30. Estimation Results of CE1a data

Estimated parameters	Value	Robust t-test
Car Cost, NOK	-0.094	-1.73
Car Time, Min	-0.209	-1.35
Parking Cost, NOK	-0.499	-2.69
Parking Distance, Meter	-0.581	-2.95
Existing Public Transport Cost, NOK	-0.292	-1.74
Existing Public Transport Time, Min	-0.483	-5.17
Existing Public Transport Frequency, Dep/hr	3.160	4.47
New T-Bane Cost, NOK	-0.185	-1.83
New T-Bane Time, Min	-0.249	-5.80
New T-Bane Frequency, Dep/hr	2.270	4.64
New Ferry Cost, NOK	-0.345	-2.30
New Ferry Time, Min	-0.385	-3.35
New Ferry Frequency, Dep/hr	1.870	2.18
Transfer	-0.210	-4.61

Number of estimated parameters:	22	VOT (NOK/hr)	
Sample size:	366	Car	134
Excluded observations:	1015	PT	99
Init log-likelihood:	-507.384	T-Bane	81
Final log-likelihood:	-365.546	Ferry	67

7.6 Recommended Policies: Ahus

Most intercepted commuters to Ahus are female. The reason could be explained by the location of medical facilities at Ahus, with majority of female workers. Their income is lower than average, however the reported number cars in their households is the highest. Their distance to work is the shortest among commuters to the selected areas. They have a good access to public transport at work compared to their access to public transport at home. They report the shortest travel time to work with car and the longest travel time with public transport. An explanation for long travel time with public transport could be transfers. They report the highest frequency of car use and the lowest frequency of public transport among commuters to the selected regions. Their reported frequency of cycling as well as walking to work is about the average. The level of education among the commuters to Ahus is lower than average. Meanwhile the number of days they can work at distance is the lowest so is their practice among the commuters to the selected locations.

Table 31 shows the valuations derived from the estimation CE1 data collected at Ahus. The valuations derived from the estimation pooled CE1 data is also presented in this table (see Table 11). While the valuations of an attribute for a selected area might not be significantly different from that of the pooled data statistically, the values are significantly different across selected areas.

The coefficients for attribute walk time did not turn significant. The insufficient number of observations is an explanation. The commuters to Ahus have lower value for monetary incentives for walking to work.

While the commuter to Ahus have a higher value of time for public transport, despite their relatively low income. Their perceived inconvenience of commuting with public transport is an explanation. They also have a high value for reducing access time to public transport as well as frequency of service and transfer.

These commuters have a higher willingness to pay for closer parking at their work than the average. They are also more sensitive to parking cost as the average commuters. This can be explained by their perception of lack of alternatives for commuting.

Table 31. Valuations derived from the estimation CE1 for Ahus and pooled data

Ahus		
CAR	Ahus	Pooled data
VOT, NOK/hour	61.73	69.88
WTA for 100-meter increase in Parking distance, NOK	8.32	7.41
Parking cost relative to Travel Cost	2.22	2.14
PUBLIC TRANSPORT		
In vehicle travel time, NOK/hour	46.21	44.74
Waiting time, NOK/hour	91.26	82.53
WTP seat availability, 25% of the way	12.11	14.92
WTP, Seat availability, 50% of the way	18.65	19.76
WTP, Seat availability, 75% of the way	19.21	22.11
WTP, Seat availability all the way	25.67	29.28
Walking time to Public Transport Station, NOK/hour	57.23	50.04
WTA transfer, NOK/transfer	15.78	14.50
CYCLE		
Time, mixed traffic NOK/hour	82.12	71.17
Time, Cycle Path, NOK/hour	63.78	52.31
WTP for Secure Parking, NOK	20.61	22.44
WTP for Changing/shower facility, NOK	18.34	14.87
Bike incentive, relative to public transport fee	6.39	6.29
Bike incentive, relative to car cost	4.01	3.78
WALK		
VOT Walk, NOK/hour	*	121.20
Walk incentive, relative to public transport fee	2.88	3.28

WTP stands for willingness to pay, WTA stands for willingness to accept, VOT stands for value of travel time savings.

Commuters to Ahus also value cycling infrastructure and facilities at work, such as secure cycle park and changing/shower facilities.

Provision of adequate public transport service along with parking policies and provision of cycling infrastructure and facilities could divert car to public transport and cycle.

Table 32 shows the derived valuations from the estimations of CE2a (choice among two alternatives with public transport attributes and the number of teleworking days) and CE2b s (choice among two alternatives with car attributes and the number of teleworking days).

None of the coefficients of these models turned significant because of the small size observation. Most commuters to Ahus do not have a possibility to work at distance, most likely due to their job particularities.

Promotion of El car at Ahus by provision of preferential local policies, specially parking policies is probably quite effective. The profile of commuters to Ahus suggests with sufficient local and national incentive they would switch to El car. In addition, their job particularities require shift work, a further reason for car use.

Table 32. Valuations derived from the estimation CE2a and CE2b

Ahus	
TELEWORK: Public Transport	
Increase in TW with increase in PT fee, TW days per month/NOK	*
Decrease in TW with increase in frequency, TW days per month/minute	*
Increase in TW with increase in Transfer, TW days per month/transfer	*
TELEWORK: Car	
Increase in TW with increase in parking cost, TW days per month/NOK	*
Increase in TW with increase parking distance, TW days per month/km	*
Increase in TW with increase in variable car cost, TW days per month/NOK	*
WTP for increase in parking cost with decrease in parking distance, 100 NOK/km	*

WTP stands for willingness to pay, TW stand for teleworking

7.7 Recommended Policies: Summary

Area specific policy measures recommendations are based on both descriptive analysis of the collected data and the derived WTP or WTA measures from the estimation of the econometric models.

Parking policies (parking cost and parking restrictions) levied on gasoline/diesel cars are effective policies in all zones to divert commuters with car to public transport, cycling or teleworking. However, this policy is effective with the presence of alternative modes of travel (e.g. public transport and cycle) or the use of electric car for commuting. Differential parking policies levied on gasoline/diesel cars and electric car can divert car use to both public transport as well as the use of electric car for commuting to work. While we recommend this approach for the peripheral areas, we do not recommend to differentiate between gasoline/diesel car and electric car in the central areas, given the present electric car take-off and the very good public transport accessibility in the central areas.

Improvements in public transport services to increase the accessibility to public transport services at all the peripheral areas will divert car use to public transport. However, accessibility to public transport at home is an obstacle, that can be addressed by provision of park and ride or similar services.

Provision of cycling infrastructure (cycle path, secure parking and changing facilities at work can) divert commuting by car and public transport to cycling. A long distance between home and work location is a hindrance to cycling (or walking) that differs between selected areas and consequently with differences in the extent of success of the policies for promotion of cycling. The extents of the monetary incentives to cycle or walk to work will also depend of home to work distance.

The possibilities of teleworking vary between selected areas depending on the prevailing work characteristics. The commuters with high level of education (skilled workers) generally enjoy higher income and most have more possibilities to work at distance. With

increase in parking cost and parking distance, this segment of commuters increase their frequency of teleworking. Similarly, commuter with public transport increase their frequency of teleworking with a decrease in public transport services, but to a lesser extent.

The following tables (Table 33 – Table 36) summarises the policy measures recommendations for the selected areas Oslo and Akershus. "XXX" (and marked in blue) in these tables stands for the most effective policy measure, while "X" stand for the least effective policy measure.

Table 33 shows the area specific policy measures directly levied on commuters with car. Parking policies are strongly recommended for all the selected areas. This policy will divert commuters with car to other modes of travel, particularly with public transport and when travel distance allows to cycling and walking. It also provides incentive for the commuters that their work characteristics allow teleworking to do so (see Table 36). However, this policy should be accompanied with improvements in public transport services to the periphery areas, especially for Ahus and Alna (see Table 34) and provision of cycle lane, especially for Ahus (see Table 35).

As mentioned earlier, differential parking policies levied on gasoline/diesel cars and electric car can divert commuters with gasoline/diesel car to electric car for commuting. While we recommend this approach for the peripheral areas, we do not recommend to differentiate between gasoline/diesel car and electric car in the central areas, such as Sentrum and Blindern, given the present electric car take-off and the very good public transport accessibility in the central areas.

Table 33. *Area specific policies directed at car commuters*

	Aimed at car commuters		Policies to Promote Electric Car	
Work Location	Parking Cost	Parking Distance	Differential Parking Cost	Differential Parking Distance
Alna	XX	XX	XXX	XXX
Blindern	XXX	XXX	X	X
Nydalen	XXX	XXX	XXX	XXX
Sentrum	XXX	XXX	X	X
Fornebu	XX	XX	XXX	XXX
Ahus	XXX	XXX	XXX	XXX

Table 34 shows the recommendations for public transport area specific policies. One aspect of the public transport services that is shared almost equally among the selected areas is "seat availability". Commuters to work travel during rush hours when public transport is most congested and they almost value seat availability equally.

Table 34. *Area specific policies directed at public transport*

Work Location	Distance to Station	Transfer	Frequency	Seat
Alna	XX	XX	XX	XX
Blindern	X	X	X	XXX
Nydalen	XX	XX	XX	XX
Sentrum	X	X	X	XXX
Fornebu	XXX	XXX	XXX	XX
Ahus	XXX	XXX	XXX	XX

While centrally located areas, i.e., Blindern and Sentrum, have good accessibility with public transport, the peripheral areas benefit from improvements in public transport services. However, as it was pointed out earlier, adequate accessibility to public transport at home location is a hindrance for some commuters, especially for commuters to Alna, unless this policy is complemented by park and ride or similar services.

Table 35 shows the area specific policies to promote cycling and walking. The monetary incentives to walk or cycle to work is most effective for Blindern due to the short home-work distance. Provision of cycling infrastructures, i.e. cycle lane, secure parking and changing/shower facilities at work, is also most effective to divert car commuters to cycling at Blindern followed by Ahus and Nydalen. The profile of car commuters to Sentrum and the long home-work distance of commuters to other selected areas makes cycling policies less effective.

Table 35. *Area specific policies to promote cycling and walking*

	Policies to Promote Cycling				Walk
Work Location	Cycle Lane	Secure Parking	Changing Facility	Monetary Incentive	Monetary Incentive
Alna	X	X	X	X	X
Blindern	XXX	XXX	XX	XX	XX
Nydalen	XX	XX	XX	X	X
Sentrum	X	X	X	X	X
Fornebu	XX	XX	XX	X	X
Ahus	XX	XX	XX	X	X

Table 36 shows the area specific policies to promote teleworking. Factor analysis (see Section 5.2) suggests that those whose work characteristics allow telecommuting and their practice of telecommuting as well as those with higher income and education have higher propensity telecommute. Male respondents tend to have a more positive attitude towards telecommuting.

The work characteristics and the profile of commuters to Alna, Ahus and Sentrum do not allow extensive telecommuting. Parking policies can promote telecommuting to Blindern, Fornebu and Nydalen.

Table 36. *Area specific policies to promote teleworking*

Work Location	Parking Cost	Parking Distance
Alna	X	X
Blindern	XXX	XXX
Nydalen	XXX	XXX
Sentrum	XX	XX
Fornebu	XXX	XXX
Ahus	X	X

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Appendix 1 Questionnaire

KNUTEPUNKT SP STUDY

Prosjekt	**1403671501**
Skjemanummer	

ID: screening

STARTTID_TOT **Starttid total**

A a: sys_timenowf c

Starttidspunkt 1

DATO **Dato**

A a: sys_date c

Dato 1

ARBSTED **Hva passer best for å beskrive ditt arbeidssted?**

R: *

Fast arbeidssted ..... ☐ 1
Varierende arbeidssted -> Avslutt ..... (⇒ **SCREENED**) ☐ 2
Jobber hjemmefra hele tiden -> Avslutt ..... (⇒ **SCREENED**) ☐ 3

ARBOMR **Ligger ditt arbeidssted i:**

R: *

Oslo sentrum ..... ☐ 1
Nydalen ..... ☐ 2
Blindern/Vinderen ..... ☐ 3
Alna/Vollebekk/Nedre Linderud ..... ☐ 4
Sentralsykehuset ..... ☐ 5
Fornebu ..... ☐ 6
Annet ..... ☐ 7

TRANSMIDDEL **Hvilke transportmidler brukte du til jobb den dagen du ble kontaktet av oss?**

Dersom du vanligvis bruker flere transportmidler på reisen, merk av det transportmidlet du reiser lengst med.

R: *

Til fots hele veien ..... ☐ 1
Syklet ..... ☐ 2
Motorsykkel eller moped ..... ☐ 3
Bil, fører ..... ☐ 4
Bil, passasjer ..... ☐ 5
Tog ..... ☐ 6
Kollektiv (Rutebuss, T-bane, Trikk) ..... ☐ 7
Egen busstransport fra arbeidsstedet, eller bildeling ..... ☐ 8
Annet ..... ☐ 9

ID: Employment

ARBEIDSTIDSORD **Hva beskriver best din arbeidstidsordning?**

R: *

Fleksibel arbeidstid ..... ☐ 1
Fast arbeidstid ..... ☐ 2
Skiftarbeid ..... ☐ 3

DAGER **Hvor mange dager arbeider du vanligvis per uke?**

R: 0:7

Noter antall dager ☐ 1

TIMER **Hvor mange timer arbeider du vanligvis per uke?**

R: *

Noter antall timer ☐ 1

ID: Home_location

ANTKM **Omtrent hvor lang er reiseveien din hjemmefra til ditt arbeidsstedet?**

R: *

Noter i kilometer én vei ☐ 1

POSTNRB **Hva er postnummeret der du bor?**

R: *

Noter postnummer ☐ 1

FORERKORT **Har du førerkort for bil eller MC?**

R: *

	Ja (1)	Nei (2)	
Bil	☐	☐	1
MC	☐	☐	2

TILGBILMCS **Eier du eller har du tilgang til bil, MC eller sykkel?**

R: *

	Eier ikke	Eier ikke, men har tilgang	Eier, men sjelden tilgang	Eier, og har god tilgang	
	1	2	3	4	
Sykkel	☐	☐	☐	☐	1
MC/Moped	☐	☐	☐	☐	2
Bil (Besin/Diesel)	☐	☐	☐	☐	3
Bil Hybrid	☐	☐	☐	☐	4
El-bil	☐	☐	☐	☐	5
Bil (Annet?)	☐	☐	☐	☐	6

DAGREISEMOF **Hvilket transportmiddel bruker du vanligvis på arbeidsreisen på denne tiden av året?**

Dersom du bruker flere transportmidler på reisen, merk av det transportmidlet du reiser lengst med.

R: *

	Hver dag	3-4 dager i uken	1-2 dager i uken	Mindre enn en dag i uken	Ikke aktuelt	
	1	2	3	4	5	
Bil som sjåfør	☐	☐	☐	☐	☐	1
Bil som passasjer	☐	☐	☐	☐	☐	2
Tog	☐	☐	☐	☐	☐	3
Kollektiv (Rutebuss, T-bane, trikk)	☐	☐	☐	☐	☐	4
Egen busstransport fra arbeidsstedet, eller bildeling	☐	☐	☐	☐	☐	5
Sykkel	☐	☐	☐	☐	☐	6
Gange	☐	☐	☐	☐	☐	7
Annet	☐	☐	☐	☐	☐	8

TIDREISE **Omtrent hvor lang tid tror du det vanligvis vil ta deg å reise til ditt arbeidssted med ulike transportmidler?**

Merk av for ¨ikke aktuelt¨ hvis det ikke er mulig for deg å bruke transportmidlet

R: *

	Mindre enn 5 min	5-10 min	10-15 min	15-20 min	20-25 min	25-30 min	30-35 min	35-40 min	40-50 min	50-60 min	60+ min	Ikke aktuelt	
	01	02	03	04	05	06	07	08	09	10	11	12	
Bil	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1
Kollektivtransport (Tog, Buss, T-bane, trikk)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	2
Sykkel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	3
Gange	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	4
Annet	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	5

PKOSTBETAL **Hvem betaler for din parkeringsplass?**

F: \TidReise.a.1=1:11
R: *

Jeg betaler alt selv	☐ 1
Arbeidsgiver betaler for min parkeringsplass	☐ 2
Jeg betaler en viss andel av parkeringskostnadene, og arbeidsgiver dekker det øvrige	☐ 3
Vet ikke	☐ 4

PKOST **Hvor mye betaler du selv for å parkere en dag?**

F: \PKostBetal.a=1;3
R: *

Noter utgifter i kroner ☐ 1

PDIST **Hvor langt er det fra parkeringsplassen til ditt kontor/arbeidssted?**

F: \TidReise.a.1= 1:11 R: *

100 meter eller mindre	1
101-200 meter	2
201 –500 meter	3
500 meter – 1,0 km	4
1,1 – 1,5 km	5
1,6 – 2,5 km	6
Mer enn 2,5 km	7
Fins ikke parkering i nærheten	8
Vet ikke	9

ID: Public_transport_supply

AVSTANDKOL_A **Hvor langt er det fra ditt kontor/arbeidssted til det nærmeste kollektivtilbudet du kan bruke til jobben?**

F: \TidReise.a.2= 1:11 R: *

100 meter eller mindre	1
101-200 meter	2
201 –500 meter	3
500 meter – 1,0 km	4
1,1 – 1,5 km	5
1,6 – 2,5 km	6
Mer enn 2,5 km	7
Fins ikke kollektivtilbud i nærheten	8
Vet ikke	9

AVSTANDKOL_B **Hvor langt er det fra der du bor til det nærmeste kollektivtilbudet du kan bruke til jobben?**

F: \TidReise.a.2= 1:11 R: *

100 meter eller mindre	1
101-200 meter	2
201 –500 meter	3
500 meter – 1,0 km	4
1,1 – 1,5 km	5
1,6 – 2,5 km	6
Mer enn 2,5 km	7
Fins ikke kollektivtilbud i nærheten	8
Vet ikke	9

AVGANGER **Hvor mange avganger per time er det på det kollektivtilbudet du kan bruke til jobben?**

F: \TidReise.a.2= 1:11 R: *

6 ganger per time eller oftere	1
4 eller 5 ganger per time	2
3 ganger per time	3
2 ganger per time	4
1 gang per time	5
Hver annen time	6
Sjeldnere	7
Vet ikke	8

BYTTE **Kan du reise direkte til jobben med kollektivtransport, eller må du bytte?**

F: \TidReise.a.2= 1:11 R: *

Kan reise direkte	1
Må bytte	2
Vet ikke	3

ANT_BYTTE **Hvor mange bytter må du gjøre?**

F: \Bytte.a= 2 R: *

Noter antall bytter [ ] 1

PERIODEKORT1 **Har du flerreisekort, periodekort, månedskort eller lignende for reiser med kollektivtransport?**

F: \TidReise.a.2= 1:11 R: *

Ja	1
Nei	2
Vet ikke	3

PERIODEKORT2 **Hvilken type kort har du?**

F: \Periodekort1.a= 1 R: *

Periodekort for 30 dager eller mer	1
Periodekort for 1-29 dager	2
Flerreisekort, reisekonto, reisepenger, klippekort etc.	3
Ukekort	4
Fribillett/frikort	5
Andre korttyper	6

ID: Facilities_for_cycling

SYKKELFI **Passer de følgende påstandene på din situasjon?**

	Ja	Nei	Vet ikke	
R: *				
	1	2	3	
Jeg har tilgang til garderobe med dusj på jobben	☐	☐	☐	1
Jeg har tilgang på skap til skiftetøy, men ikke garderobe	☐	☐	☐	2
Det er gode sykkelveier der jeg reiser til jobb	☐	☐	☐	3
Jeg har en sykkelvei til jobben med mye bakker	☐	☐	☐	4
Jeg har tilgang til sikker sykkelparkering (utendørs) på jobben	☐	☐	☐	5
Jeg har tilgang til sikker sykkelparkering (innendørs) på jobben	☐	☐	☐	6

BILORD **Har du en ordning der du får fast godtgjørelse av arbeidsgiver for bilbruk til jobben?**

R: *

Ja	☐ 1
Nei	☐ 2
Vet ikke	☐ 3

PTORD **Har du en ordning der du får fast godtgjørelse av arbeidsgiver for å reise kollektivt til jobben?**

R: *

Ja	☐ 1
Nei	☐ 2
Vet ikke	☐ 3

SYKKELORD **Har du en ordning der du får fast godtgjørelse av arbeidsgiver for å sykle til jobben?**

R: *

Ja	☐ 1
Nei	☐ 2
Vet ikke	☐ 3

MOTEREISE **Jeg må bruke bil til jobben fordi jeg trenger den til...**

	5 dager i uken	3-4 dager i uken	1-2 dager i uken	Mindre enn 1 gang i uken	
R: *					
	1	2	3	4	
å utføre arbeide andre steder	☐	☐	☐	☐	1
å hente barn på vei til/fra jobben	☐	☐	☐	☐	2
å utføre andre oppgaver på vei til/fra jobben	☐	☐	☐	☐	3

ID: Attitude_Information_habit

BILMOTIV **Vennligst angi hvor enig eller uenig du er i følgende utsagn om BILREISER:**

	Svært uenig	Uenig	Enig	Svært enig	Ikke relevant	
R: *						
ROT:r	1	2	3	4	5	
Det går raskt	☐	☐	☐	☐	☐	1
Det er fleksibelt	☐	☐	☐	☐	☐	2
Det er trygt å reise med bil	☐	☐	☐	☐	☐	3
Kollektivtilbudet er for dårlig utbygd	☐	☐	☐	☐	☐	4
Det er rimeligere enn kollektiv transport	☐	☐	☐	☐	☐	5
Bilen gir meg en mulighet for å koble av	☐	☐	☐	☐	☐	6
Jeg liker å kjøre bil	☐	☐	☐	☐	☐	7
Man kan kjøre helt frem til reisemålet	☐	☐	☐	☐	☐	8
Gammel vane/rutine	☐	☐	☐	☐	☐	9

KOLLMOTIV **Vennligst angi hvor enig eller uenig du er i følgende utsagn om KOLLEKTIVREISER:**

	Svært uenig	Uenig	Enig	Svært enig	Ikke relevant	
ROT:r	1	2	3	4	5	R: *
Det er miljøvennlig	☐	☐	☐	☐	☐	1
Det går raskt - slipper køkjøring	☐	☐	☐	☐	☐	2
Det gir mulighet for å kople av underveis	☐	☐	☐	☐	☐	3
Det gir mulighet for å jobbe underveis	☐	☐	☐	☐	☐	4
Kollektivtilbudet er godt utbygd	☐	☐	☐	☐	☐	5
Det er rimeligere enn bil	☐	☐	☐	☐	☐	6
Gammel vane/rutine	☐	☐	☐	☐	☐	7
Det er trygt å reise med kollektivtransport	☐	☐	☐	☐	☐	8
Jeg liker å kjøre med kollektivtransport	☐	☐	☐	☐	☐	9

SYKKELATTI **Vennligst angi hvor enig eller uenig du er i følgende utsagn om SYKKELREISER:**

	Svært uenig	Uenig	Enig	Svært enig	Ikke relevant	
ROT:r	1	2	3	4	5	R: *
Det gir mosjon/trening	☐	☐	☐	☐	☐	1
Det er miljøvennlig	☐	☐	☐	☐	☐	2
Det går raskt	☐	☐	☐	☐	☐	3
Jeg liker å sykle	☐	☐	☐	☐	☐	4
Kollektivtilbudet er for dårlig der jeg bor	☐	☐	☐	☐	☐	5
Det er trygt å reise med sykkel	☐	☐	☐	☐	☐	6
Gammel vane/rutine	☐	☐	☐	☐	☐	7
Det er en fleksibel måte å reise på	☐	☐	☐	☐	☐	8

HOLDGEN **Vennligst angi hvor enig eller uenig du er i følgende utsagn:**

	Svært uenig	Uenig	Enig	Svært enig	Ikke relevant	
ROT:r	1	2	3	4	5	R: *
Jeg er stort sett tilfreds med kollektivtilbudet til/fra min jobb	☐	☐	☐	☐	☐	1
Arbeidsgiverne må ta større ansvar for å øke andelen som reiser kollektivt til jobben	☐	☐	☐	☐	☐	2
Jeg har god oversikt over kollektivtilbudet som er relevante for mine arbeidsreiser	☐	☐	☐	☐	☐	3
På mitt arbeidssted er det lagt godt tilrette for gående og syklende	☐	☐	☐	☐	☐	4
Jeg ønsker å reise oftere med kollektivtransport til arbeidet	☐	☐	☐	☐	☐	5
Jeg ønsker å sykle mer til arbeidet	☐	☐	☐	☐	☐	6
Jeg vurderer å gå til innkjøp av el-bil	☐	☐	☐	☐	☐	7

TILFREDOMRAD **Hvor fornøyd eller misfornøyd var du med følgende aspekter ved DIN SISTE ARBEIDSREISE?**

R: *

	Svært misfornøyd	Ganske misfornøyd	Ganske fornøyd	Svært fornøyd	Vet ikke/Ikke relevant	
ROT:r	1	2	3	4	5	
Reisetiden	☐	☐	☐	☐	☐	1
Parkeringsforholdene	☐	☐	☐	☐	☐	2
Antall kollektivavganger	☐	☐	☐	☐	☐	3
Kapasitet på kollektivtransport	☐	☐	☐	☐	☐	4
Mulighet for å utnytte reisetiden til arbeid	☐	☐	☐	☐	☐	5
Kostnader	☐	☐	☐	☐	☐	6
Innvirkning på miljø og klima	☐	☐	☐	☐	☐	7
Mulighet for å koble av	☐	☐	☐	☐	☐	8
Trafikkflyt underveis	☐	☐	☐	☐	☐	9

ID: SP1

Veger, kollektivtransport tilbud, sykkelbane kan legges om og priser gå opp og ned. Det betyr at din reisetid og reisekostnad kunne vært annerledes.

Tenk deg at før du startet arbeidsreisen din, kunne du ha valgt mellom ulike reisemåter. Du vil nå få 6 slike valg.

Du skal velge den reisen som passer best for deg.

SYSRAND **System Random Value**

R: *

A a: sys_random c

sys_rand 1

SECTIONTIME_1 **Section Time**

R: *

A a: sys_timenowf c

..... 1

SECTRAND_1 **Section Random Value**

R: script:sum2(\sysRand.a.1, \SectionTime_1.a.1)

A a: sys_range c

Section Random 1

SPVERSION_1 **Random Selection of version**

R: script :RandomMulti(1,40,1, \SectRand _1.a.1)

A a: sys_range c

Version 1

ID: SP1_T

F: \TidReise.a.1:4=1:11#2:4

SP1_TASK1 Gitt situasjonen nedenfor, hvilket av disse transportmidlene ville du valgt på din arbeidsreise

svar fra SPVERSION_1.A.1 svar fra TIDREISE.A.1 svar fra ANTKM.A.1 svar fra TIDREISE.A.2 svar fra AVSTANDKOL_A.A svar fra AVSTANDKOL_B.A svar fra TIDREISE.A.3 svar fra TIDREISE.A.4

	R: *
Bil	☐ 1
Kollektivtransport	☐ 2
Sykkel	☐ 3
Gå	☐ 4

SP1_TASK2 Gitt situasjonen nedenfor, hvilket av disse transportmidlene ville du valgt på din arbeidsreise

svar fra SPVERSION_1.A.1 svar fra TIDREISE.A.1 svar fra ANTKM.A.1 svar fra TIDREISE.A.2 svar fra AVSTANDKOL_A.A svar fra AVSTANDKOL_B.A svar fra TIDREISE.A.3 svar fra TIDREISE.A.4

	R: *
Bil	☐ 1
Kollektivtransport	☐ 2
Sykkel	☐ 3
Gå	☐ 4

SP1_TASK3 Gitt situasjonen nedenfor, hvilket av disse transportmidlene ville du valgt på din arbeidsreise

svar fra SPVERSION_1.A.1 svar fra TIDREISE.A.1 svar fra ANTKM.A.1 svar fra TIDREISE.A.2 svar fra AVSTANDKOL_A.A svar fra AVSTANDKOL_B.A svar fra TIDREISE.A.3 svar fra TIDREISE.A.4

	R: *
Bil	☐ 1
Kollektivtransport	☐ 2
Sykkel	☐ 3
Gå	☐ 4

SP1_TASK4 Gitt situasjonen nedenfor, hvilket av disse transportmidlene ville du valgt på din arbeidsreise

svar fra SPVERSION_1.A.1 svar fra TIDREISE.A.1 svar fra ANTKM.A.1 svar fra TIDREISE.A.2 svar fra AVSTANDKOL_A.A svar fra AVSTANDKOL_B.A svar fra TIDREISE.A.3 svar fra TIDREISE.A.4

	R: *
Bil	☐ 1
Kollektivtransport	☐ 2
Sykkel	☐ 3
Gå	☐ 4

SP1_TASK5 **Gitt situasjonen nedenfor, hvilket av disse transportmiddelene ville du valgt på din arbeidsreise**

svar fra SPVERSION_1.A.1 svar fra TIDREISE.A.1 svar fra ANTKM.A.1 svar fra TIDREISE.A.2 svar fra AVSTANDKOL_A.A svar fra AVSTANDKOL_B.A svar fra TIDREISE.A.3 svar fra TIDREISE.A.4

R: *

Bil	☐ 1
Kollektivtransport	☐ 2
Sykkel	☐ 3
Gå	☐ 4

SP1_TASK6 **Gitt situasjonen nedenfor, hvilket av disse transportmidlene ville du valgt på din arbeidsreise**

svar fra SPVERSION_1.A.1 svar fra TIDREISE.A.1 svar fra ANTKM.A.1 svar fra TIDREISE.A.2 svar fra AVSTANDKOL_A.A svar fra AVSTANDKOL_B.A svar fra TIDREISE.A.3 svar fra TIDREISE.A.4

R: *

Bil	☐ 1
Kollektivtransport	☐ 2
Sykkel	☐ 3
Gå	☐ 4

ID: Fornebu_del

HOLDN_TILTAK3 TIL DE SOM ARBEIDER PÅ FORNEBU

I hvilken grad er du enig i følgende utsagn?

F: \ArbOmr.a=6
R: *

	Ikke i det hele tatt	I noen grad	I stor grad	I svært stor grad	Vet ikke	
	1	2	3	4	5	
En ny T-bane linje til Fornebu fra Sentrum, via Lysaker vil være aktuell for meg .	☐	☐	☐	☐	☐	1
En ny fjordbåt-forbindelse til Fornebu med avganger fra sentrum vil være aktuell for meg.	☐	☐	☐	☐	☐	2
En ny fjordbåt-forbindelse til Fornebu med avganger fra begge sider av Oslofjorden (Asker, Røyken, Hurum, Nesodden og Follo) vil være aktuell for meg.	☐	☐	☐	☐	☐	3

FORNEBU TIL DE SOM ARBEIDER PÅ FORNEBU

Arbeider du i Fornebu-området?

F: \ArbOmr.a=6
R: *

Ja	☐ 1
Nei	☐ 2

ID: SP2

F: \Fornebu.a=1

Veger og kollektivtransport tilbud kan legges om og priser gå opp og ned. Det betyr at din reisetid og reisekostnader kunne vært annerledes.

En ny fergeforbindelse og en ny T-banelinje er planlagt til Fornebuområdet.

Tenk deg at før du startet arbeidsreisen din, kan velge mellom ulike transportmidler inklusive den nye fergeforbindelsen og T-banen. Du vil nå få 6 slike valg.

Du skal velge den reisen som passer best for deg.

SECTIONTIME_2 **Section Time**

R: *

A a: sys_timenowf c

..... 1

SECTRAND_2 **Section Random Value**

R: script:sum2(\sysRand.a.1, \SectionTime_2.a.1)

A a: sys_range c

Section Random 1

SPVERSION_2 **Random Selection of version**

R: script :RandomMulti(1,40,1, \SectRand _2.a.1)

A a: sys_range c

Version 1

ID: SP2_T

F: \Fornebu.a=1

SP2_TASK1 **Gitt situasjonen nedenfor, hvilket av disse transportmidlene ville du valgt på din arbeidsreise**

svar fra SPVERSION_2.A.1 svar fra TIDREISE.A.1 svar fra ANTKM.A.1 svar fra TIDREISE.A.2

R: *

Bil ☐ 1

Dagens kollektivtilbud ☐ 2

Ferge ☐ 3

Ny T-bane ☐ 4

SP2_TASK2 **Gitt situasjonen nedenfor, hvilket av disse transportmidlene ville du valgt på din arbeidsreise**

svar fra SPVERSION_2.A.1 svar fra TIDREISE.A.1 svar fra ANTKM.A.1 svar fra TIDREISE.A.2

R: *

Bil ☐ 1

Dagens kollektivtilbud ☐ 2

Ferge ☐ 3

Ny T-bane ☐ 4

SP2_TASK3 **Gitt situasjonen nedenfor, hvilket av disse transportmidlene ville du valgt på din arbeidsreise**

svar fra SPVERSION_2.A.1 svar fra TIDREISE.A.1 svar fra ANTKM.A.1 svar fra TIDREISE.A.2

R: *

Bil	☐ 1
Dagens kollektivtilbud	☐ 2
Ferge	☐ 3
Ny T-bane	☐ 4

SP2_TASK4 **Gitt situasjonen nedenfor, hvilket av disse transportmidlene ville du valgt på din arbeidsreise**

svar fra SPVERSION_2.A.1 svar fra TIDREISE.A.1 svar fra ANTKM.A.1 svar fra TIDREISE.A.2

R: *

Bil	☐ 1
Dagens kollektivtilbud	☐ 2
Ferge	☐ 3
Ny T-bane	☐ 4

SP2_TASK5 **Gitt situasjonen nedenfor, hvilket av disse transportmidlene ville du valgt på din arbeidsreise**

svar fra SPVERSION_2.A.1 svar fra TIDREISE.A.1 svar fra ANTKM.A.1 svar fra TIDREISE.A.2

R: *

Bil	☐ 1
Dagens kollektivtilbud	☐ 2
Ferge	☐ 3
Ny T-bane	☐ 4

SP2_TASK6 **Gitt situasjonen nedenfor, hvilket av disse transportmidlene ville du valgt på din arbeidsreise**

svar fra SPVERSION_2.A.1 svar fra TIDREISE.A.1 svar fra ANTKM.A.1 svar fra TIDREISE.A.2

R: *

Bil	☐ 1
Dagens kollektivtilbud	☐ 2
Ferge	☐ 3
Ny T-bane	☐ 4

ID: Hjemmefra

ANTHJEMLOV **Hvor ofte har du lov til å arbeide hjemmefra?**

R: *

4 dag per uke	☐ 1
3 dag per uke	☐ 2
2 dag per uke	☐ 3
1 dag per uke	☐ 4
Mindre enn én dag per uke	☐ 5
Det er ikke lov/mulig til å jobbe hjemmefra	☐ 6
Vet ikke	☐ 7

ANTHJEMMULIG **Hvor ofte har du mulighet til å jobbe hjemmefra?**

F: !\AntHjemLov.a=6
R: *

4 dag per uke ..... ☐ 1
3 dag per uke ..... ☐ 2
2 dag per uke ..... ☐ 3
1 dag per uke ..... ☐ 4
Mindre enn én dag per uke ..... ☐ 5
Aldri ..... ☐ 6

ARBHJEMRESS **I hvilken grad mener du tilgang til følgende ressurser gjør det mulig eller enklere å jobbe hjemmefra?**

R: *

	Ikke i det hele tatt	I noen grad	I stor grad	I svært stor grad	Vet ikke	
	1	2	3	4	5	
Tilgang til jobbrelaterte dokumenter og data via internett	☐	☐	☐	☐	☐	1
Egnet arbeidsplass/hjemmekontor	☐	☐	☐	☐	☐	2
Annet	☐	☐	☐	☐	☐	3

FORSLAG1 **Dersom du har erfart andre forhold som gjør det enklere å arbeide hjemmefra, vennligst skriv de ned nedenfor.**

R: *

Noter: _____

Noter: _____

Noter: _____

Ingen forslag ..... ☐ 04e.

ARBHJEMFORD **Vennligst angi hvor enig du er i følgende utsagn: «Å jobbe hjemmefra gjør det mulig å...**

	Ikke i det hele tatt	I noen grad	I stor grad	I svært stor grad	Vet ikke	
	1	2	3	4	5	
få gjort mer arbeid (mer effektiv)»	☐	☐	☐	☐	☐	1
unngå lang arbeidsreise»	☐	☐	☐	☐	☐	2
kunne jobbe når andre oppgaver gjør det nødvendig å være hjemme»	☐	☐	☐	☐	☐	3
Annet	☐	☐	☐	☐	☐	4

FORSLAG2 **Dersom du har erfart andre fordeler ved å arbeide hjemmefra, vennligst skriv dem ned nedenfor.**

R: *

Noter: _____

Noter: _____

Noter: _____

Ingen forslag ..... ☐ 04e.

ARBHJEMULEMP **Vennligst angi hvor enig eller uenig du er i følgende utsagn: «Å jobbe hjemmefra er vanskelig fordi det...**

R: *

	Ikke i det	hele tatt	I noen grad	I stor grad	I svært stor grad	Vet ikke	
	1	2	3	4	5	6	
ikke er nok plass hjemme»	☐	☐	☐	☐	☐	☐	1
er for mye distraksjoner hjemme»	☐	☐	☐	☐	☐	☐	2
ikke gir nok kontakt med mine kolleger»	☐	☐	☐	☐	☐	☐	3
Annet	☐	☐	☐	☐	☐	☐	4

FORSLAG3 **Dersom du har erfart andre ulemper ved å arbeide hjemmefra, vennligst skriv dem ned nedenfor.**

R: *

Noter: _____

Noter: _____

Noter: _____

Ingen forslag ☐ 04e.

ARBHJEM **Hvis du jobber hjemmefra, har du da tilgang på ...**

R: *

	Ja	Nei	
	1	2	
Jobbrelaterte dokumenter og data via internett?	☐	☐	1
Egnet arbeidsplass/hjemmekontor?	☐	☐	2

ID: SP3

F: \AntHjemLov.a=1;2;3;4;5;7

Veier, transporttilbud og priser og reisetider kan endre seg.

Tenk deg at reisekostnader, reisetider og muligheter for å jobbe hjemme varierer som i alternativene A og B.

Du får 6 valgsituasjoner.

Velg det alternativet som passer deg best i hver situasjon.

SECTIONTIME_3 **Section Time**

R: *

A a: sys_timenowf c

_____ 1

SECTRAND_3 **Section Random Value**

R: script:sum2(\sysRand.a.1, \SectionTime_3.a.1)

A a: sys_range c

Section Random _____ 1

SPVERSION_3 **Random Selection of version**

R: script :RandomMulti(1,40,1, \SectRand _3.a.1)

A a: sys_range c

Version _____ 1

S3_SAMPLEAB **Randomly Split Sample into 2**

R: script :Random-Multi(1,2,1, \SectRand _3.a.1) A: sys_range c

Sample A ..... ☐ 1
Sample B ..... ☐ 2

SELECTSP3 **Select SP3 Test**

R: 1 when \TidReise.a.1= 12 2 when \TidReise.a.2= 12 1 when \S3_Samp-leAB.a=1 2 when \S3 _Sample-AB.a=2 A: sys_range c

PT ..... ☐ 1
Car ..... ☐ 2

ID: SP3_T

F: \SelectSP3.a=2

SP3_CAR_TASK1 **Hvilket av alternativene nedenfor passer deg best?**

svar fra SPVERSION_3.A.1 svar fra ANTKM.A.1

R: *

Alternativ 1 ☐ 1
Alternativ 2 ☐ 2

SP3_CAR_TASK2 **Hvilket av alternativene nedenfor passer deg best?**

svar fra SPVERSION_3.A.1 svar fra ANTKM.A.1

R: *

Alternativ 1 ☐ 1
Alternativ 2 ☐ 2

SP3_CAR_TASK3 **Hvilket av alternativene nedenfor passer deg best?**

svar fra SPVERSION_3.A.1 svar fra ANTKM.A.1

R: *

Alternativ 1 ☐ 1
Alternativ 2 ☐ 2

SP3_CAR_TASK4 **Hvilket av alternativene nedenfor passer deg best?**

svar fra SPVERSION_3.A.1 svar fra ANTKM.A.1

R: *

Alternativ 1 ☐ 1
Alternativ 2 ☐ 2

SP3_CAR_TASK5 **Hvilket av alternativene nedenfor passer deg best?**

svar fra SPVERSION_3.A.1 svar fra ANTKM.A.1

R: *

Alternativ 1 ☐ 1
Alternativ 2 ☐ 2

SP3_CAR_TASK6 **Hvilket av alternativene nedenfor passer deg best?**

svar fra SPVERSION_3.A.1 svar fra ANTKM.A.1

R: *

Alternativ 1 ☐ 1
Alternativ 2 ☐ 2

ID: SP4

SECTIONTIME_4 **Section Time**

R: *

A a: sys_timenowf c

..... 1

SECTRAND_4 **Section Random Value**

R: script:sum2(\sysRand.a.1, \SectionTime_4.a.1)

A a: sys_range c

Section Random 1

SPVERSION_4 **Random Selection of version**

R: script :RandomMulti(1,40,1, \SectRand _4.a.1)

A a: sys_range c

Version 1

ID: SP4_T

F: \SelectSP3.a=1

SP3_PT_TASK1 **Hvilket av alternativene nedenfor vil du foretrekke?**

svar fra SPVERSION_4.A.1 svar fra TIDREISE.A.2

R: *

Alternativ 1 ☐ 1
Alternativ 2 ☐ 2

SP3_PT_TASK2 **Hvilket av alternativene nedenfor vil du foretrekke?**

svar fra SPVERSION_4.A.1 svar fra TIDREISE.A.2

R: *

Alternativ 1 ☐ 1
Alternativ 2 ☐ 2

SP3_PT_TASK3 **Hvilket av alternativene nedenfor vil du foretrekke?**

svar fra SPVERSION_4.A.1 svar fra TIDREISE.A.2

R: *

Alternativ 1 ☐ 1
Alternativ 2 ☐ 2

SP3_PT_TASK4 **Hvilket av alternativene nedenfor vil du foretrekke?**

svar fra SPVERSION_4.A.1 svar fra TIDREISE.A.2

R: *

Alternativ 1 ☐ 1
Alternativ 2 ☐ 2

SP3_PT_TASK5 **Hvilket av alternativene nedenfor vil du foretrekke?**

svar fra SPVERSION_4.A.1 svar fra TIDREISE.A.2

R: *

Alternativ 1 ☐ 1
Alternativ 2 ☐ 2

SP3_PT_TASK6 **Hvilket av alternativene nedenfor vil du foretrekke?**

svar fra SPVERSION_4.A.1 svar fra TIDREISE.A.2

R: *

Alternativ 1 ☐ 1
Alternativ 2 ☐ 2

ID: SP5

SECTIONTIME_5 **Section Time**

R: *

A a: sys_timenowf c
. 1

SECTRAND_5 **Section Random Value**

R: script:sum2(\sysRand.a.1, \SectionTime_5.a.1)

A a: sys_range c
Section Random 1

SPVERSION_5 **Random Selection of version**

R: script :RandomMulti(1,40,1, \SectRand _5.a.1)

A a: sys_range c
Version 1

NUMBIL **Hvor mange biler eier dere i husholdet ditt?**

R: *

0 ☐ 1
1 ☐ 2
2+ ☐ 3

SAMPLEAB **Split Sample 1 Car**

F: \NumBil.a=2
R: script :Random-Multi(1,2,1, \SectRand_5.a.1)
A: sys_range c

Sample A ☐ 1
Sample B ☐ 2

ERSTATNING_TYPEN **erstatning typen**

R: 1 try \NumBil=1 1 try (\NumBil=2 & \SampleAB=1) 2 try \NumBil=3 2 try (\NumBil=2 & \SampleAB=2)
A: sys_range c

hovedbil ☐ 1
bil nummer to ☐ 2

BILTYPHH **Hva slags bil(er) er dette?**

F: ! \NumBil.a=1
R: *

Liten bil bensin/diesel (f.eks. VW Polo, Yaris, Ford Fiesta) ☐ 1,
Kompakt bensin/diesel bil (f.eks. VW Golf, Peugeot 308, Toyota Auris , Ford Focus) ☐ 2,
Melomklasse/familie bensin/diesel bil (VW Pasat, Volvo V70, Ford Mondeo, Peugeot 508) ☐ 3,
SUV og stor bensin/diesel bil (f.eks VOLVO XC90, VW Touareg, Audi q7, Mitsubishi Pajero) ☐ 4,
Hybrid ☐ 5,
El-bil ☐ 6.

BILTYPARB **Hvilken type bil bruker du vanligvis/ville du eventuelt ha brukt på arbeidsreisen? Oppgi størrelse og drivstofftype.**

F: \NumBil.a=2;3
R: *

Liten bensin/diesel bil ☐ 1
Kompakt bensin/diesel bil ☐ 2
Melomklasse/familie bensin/diesel bil ☐ 3
SUV og stor bensin/diesel bil ☐ 4
Hybrid ☐ 5
El-bil ☐ 6

Hvis du skulle kjøpe en bil som var 2 år eller yngre som hovedbil i husholdet ditt, hvilken av følgende biler ville du velge?

Du får 6 valgsituasjoner.

Hvis du skulle kjøpe en bil som var 2 år eller yngre som bil nr 2 i husholdet ditt, hvilken av følgende biler ville du velge?

Du får 6 valgsituasjoner.

SP4_TASK1

(F: \erstatning_typen.a=1) **Hvis du skulle kjøpe en bil som er 2 år eller yngre som hovedbil i din husholdning, hvilken av følgende biler ville du velge?**

(F: \erstatning_typen.a=2) **Hvis du skulle kjøpe en bil som er 2 år eller yngre som bil nummer to i din husholdning, hvilken av følgende biler ville du velge?**

svar fra SPVERSION_5.A.1 svar fra NUMBIL.A svar fra BILTYPARB.A

R: *

Bensin/dieselbil ☐ 1
Elbil ☐ 2

SP4_TASK2

(F: \erstatning_typen.a=1) **Hvis du skulle kjøpe en bil som er 2 år eller yngre som hovedbil i din husholdning, hvilken av følgende biler ville du velge?**

(F: \erstatning_typen.a=2) **Hvis du skulle kjøpe en bil som er 2 år eller yngre som bil nummer to i din husholdning, hvilken av følgende biler ville du velge?**

svar fra SPVERSION_5.A.1 svar fra NUMBIL.A svar fra BILTYPARB.A

R: *

Bensin/dieselbil ☐ 1
Elbil ☐ 2

SP4_TASK3

(F: \erstatning_typen.a=1) **Hvis du skulle kjøpe en bil som er 2 år eller yngre som hovedbil i din husholdning, hvilken av følgende biler ville du velge?**

(F: \erstatning_typen.a=2) **Hvis du skulle kjøpe en bil som er 2 år eller yngre som bil nummer to i din husholdning, hvilken av følgende biler ville du velge?**

svar fra SPVERSION_5.A.1 svar fra NUMBIL.A svar fra BILTYPARB.A

R: *

Bensin/dieselbil ☐ 1
Elbil ☐ 2

SP4_TASK4

(F: \erstatning_typen.a=1) **Hvis du skulle kjøpe en bil som er 2 år eller yngre som hovedbil i din husholdning, hvilken av følgende biler ville du velge?**

(F: \erstatning_typen.a=2) **Hvis du skulle kjøpe en bil som er 2 år eller yngre som bil nummer to i din husholdning, hvilken av følgende biler ville du velge?**

svar fra SPVERSION_5.A.1 svar fra NUMBIL.A svar fra BILTYPARB.A

R: *

Bensin/dieselbil ☐ 1
Elbil ☐ 2

SP4_TASK5

(F: \erstatning_typen.a=1) **Hvis du skulle kjøpe en bil som er 2 år eller yngre som hovedbil i din husholdning, hvilken av følgende biler ville du velge?**

(F: \erstatning_typen.a=2) **Hvis du skulle kjøpe en bil som er 2 år eller yngre som bil nummer to i din husholdning, hvilken av følgende biler ville du velge?**

svar fra SPVERSION_5.A.1 svar fra NUMBIL.A svar fra BILTYPARB.A

R: *

Bensin/dieselbil ☐ 1
Elbil ☐ 2

SP4_TASK6

(F: \erstatning_typen.a=1) **Hvis du skulle kjøpe en bil som er 2 år eller yngre som hovedbil i din husholdning, hvilken av følgende biler ville du velge?**

(F: \erstatning_typen.a=2) **Hvis du skulle kjøpe en bil som er 2 år eller yngre som bil nummer to i din husholdning, hvilken av følgende biler ville du velge?**

svar fra SPVERSION_5.A.1 svar fra NUMBIL.A svar fra BILTYPARB.A

R: *

Bensin/dieselbil ☐ 1
Elbil ☐ 2

ID: background

KJONN **Vennligst kryss av om du er kvinne eller mann.**

R: *

Kvinne ☐ 1
Mann ☐ 2

FODT **Hvilket år er du født?**

R: 1910:1999

Skriv fødselsår ☐☐☐☐ 1

ANTHUSST **Husst Hvor mange barn og voksne (inklusiv deg) er det i din husstand?**

R: *

Barn, 0 til 6 år ☐ 1
Barn, 7 til 12 år ☐ 2
Barn, 13 til 18 år ☐ 3
Barn (over 18 år) ☐ 4
Andre voksne ☐ 5

PERSINNT **Omtrent hva var din bruttoinntekt siste år?**

R: *

Under 100 000	☐ 01
100 000 - 149 000	☐ 02
150 000 - 199 999	☐ 03
200 000 – 249 000	☐ 04
250 000 - 299 999	☐ 05
300 000 - 349 000	☐ 06
350 000 - 399 999	☐ 07
400 000 - 449 000	☐ 08
450 000 - 499 999	☐ 09
500 000 - 549 000	☐ 10
550 000 - 599 999	☐ 11
600 000 - 649 000	☐ 12
650 000 - 699 999	☐ 13
700 000 - 749 000	☐ 14
750 000 – 800 000	☐ 15
Over 800 000	☐ 16
Vet ikke	☐ 17
Vil ikke svare	☐ 18

UTDANNELSE **Hva er din høyeste fullførte utdanning?**

R: *

Grunnnskole	☐ 1
Videregående yrkesfaglig/-yrkesskole/handelsskole - inntil 12 år	☐ 2
Videregående allmennfaglig/gymnas - inntil 13 år	☐ 3
Høyskole/universitet - lavere grad - inntil 16 år	☐ 4
Høyskole/universitet - høyere grad - 16 år og mer	☐ 5

ID: slutt

KOMPLETT **Komplett**

R: 1
A: sys_range c

OK ☐ 1.

SCREENED **Screened**

F: ! \Komplett=1
R: 1
A: sys_range c

OK ☐ 1.

SLUTTID **Sluttid**

A a: sys_timenowf c

Sluttidspunkt 1

SLUTTDATO **Sluttdato**

A a: sys_date c

Sluttdato 1

KOMMENTARFELT **Du er nå ferdig med skjemaet.**

Har du noen kommentarer?

F:
\Komplett=
1

Annet, notér _____

_____

_____

_____

_____

_____

_____

_____

_____

Takk for at du besvarte undersøkelsen.

Trykk neste for å lagre og avslutte undersøkelsen.

Du er dessverre ikke i målgruppen for denne undersøkelsen. Takk for interessen.

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Norwegian Centre for Transport Research

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