




To what degree can carsharing substitute car ownership?

Self-reported evidence from carsharing users and the general population

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1940/2023



Title:	To what degree can carsharing substitute car ownership? - Self-reported evidence from carsharing users and the general population
Tittel:	I hvilken grad kan bildeling erstatte bileierskap? - En analyse av surveydata fra bildelere og den øvrige befolkningen
Author:	Paal Brevik Wangsness, Alice Ciccone, Vibeke Nenseth
Date:	05.2023
TØI Report:	1940/2023
Pages:	57
ISSN Electronic:	2535-5104
ISBN Electronic:	978-82-480-1999-2
Project Number:	NFR 300625
Funded by:	The Research Council of Norway
Project:	4842 – CarNudge
Project Manager:	Alice Ciccone
Quality Manager:	Askill Harkjerr Halse
Research Area:	Transport and Behaviour
Keywords:	Carsharing, car ownership, survey

Summary

We discuss to what extent carsharing can replace traditional car ownership in the Norwegian context. Our analysis builds on two web-surveys: one among members of a carsharing service and one among a large sample of the general population in the largest cities in Norway. The majority (60%) of carsharing members would not have bought a car in the absence of the carsharing service, but they also say that they would have used a rental service (65%) or another carsharing service (77%) instead. Among the general population, about 17% answered that they were likely or highly likely to join a carsharing service in the near future. This share was lower for those who already own a car. The average interest in renting out their cars was also quite low. If our analysis is to be any guide to communicative policies to the general car-owning population, it would be to focus on the convenience motive for getting car owners to consider replacing their car ownership with carsharing, and the personal profit motive for getting car owners interested in renting out their cars.

Kort sammendrag

I denne rapporten diskuterer vi i hvilken grad bildeling kan erstatte tradisjonelt bilhold i den norske konteksten. Analysen bygger på to nettsurveyer – én til medlemmene i den største medlemsbaserte bildelingstjenesten i Norge og én til et stort utvalg av den generelle befolkningen i de største byområdene. Et flertall blant bildelerne (60%) sier de ikke ville ha kjøpt bil hvis det ikke var noen bildelings-tjeneste. Samtidig sier et flertall at de sannsynligvis ville brukt en leiebilordning (65%) eller en annen bildelingsordning (77%) i stedet. Blant den generelle befolkningen er det 17% som oppgir at det er svært eller ganske sannsynlig at de kunne delta i en bildelingsordning i nær framtid, men andelen var lavere for de som allerede eier en bil. Det var også lav interesse for å leie ut egen bil i en bildelingsordning. Hvis analysen skulle brukes til en informasjonskampanje rettet mot norske bileiere, ville man nok fått sterkest effekt av å vektlegge de praktiske fordelene av bildeling kontra bileierskap, og de mulige økonomiske gevinstene av å leie ut egen bil til bildeling.



Preface

This report is an output of the research project CarNudge: The impact of parking policies and nudging on carsharing. Senior Economist Alice Ciccone is project leader. CarNudge is an interdisciplinary project, where research institutes, government agencies and private companies collaborate at both the national and international level to create knowledge and expertise for a more innovative and sustainable transport system. This project is supported by the Norwegian Research Council.

The survey data subject to analysis in this report was gathered in previous research projects at the Institute of Transport Economics. The econometric analysis was conducted by senior research economists Paal Brevik Wangsness and Alice Ciccone. All authors (Paal Brevik Wangsness, Alice Ciccone and Vibeke Nenseth) have contributed to the literature review and the discussion.

The internal quality assurance of this report was done by PhD Askill Harkjerr Halse, Chief Research Economist of the Economic Analysis research group.

Oslo, May 2023
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In this report, we discuss to what extent carsharing can replace traditional car ownership in the Norwegian context. Our analysis builds on two web-surveys: one among members of a carsharing service and one among the general population in the largest cities in Norway offering carsharing.

Our findings show:

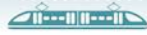
- the majority (60%) of carsharing members would not have bought a car in the absence of the carsharing service, but they also say that they would have used a rental service (65%) or another carsharing service (77%) instead.
- Among the general population, about 17% answered that they were likely or highly likely to join a carsharing service in the near future. This share was lower for those who already own a car. The average interest in renting out their cars was also quite low.

If our analysis is to be any guide to communicative policies to the general Norwegian car-owning population, it would be to focus on the convenience motive for getting car owners to consider replacing their car ownership with carsharing (eg. more practical, larger car-types choice), and the personal profit motive for getting car owners interested in renting out their cars.

In addition to discussing whether carsharing can replace traditional car ownership, we try to disentangle policy-relevant factors which seem to have the strongest effect on this replacement. By surveying both people that are already carsharing and a those from the general population, we try to investigate whether carsharing members would otherwise have owned a car. While, for non-carsharers, we ask whether they would consider switching to carsharing. Car owners are asked to what extent are they interested in renting out their cars.

This report builds on two surveys: one carried out in 2020 among members of the carsharing service Bilkollektivet (BK), and one carried out in 2017 among the general population in the largest cities in Norway that have carsharing services. Our results show that the majority (60%) of BK members would be unlikely or very unlikely to buy a car in the absence of BK.

Responders also indicate that they would be more likely to get around without a car than owning one. However, the majority also say that they would be likely or very likely to use a rental service (65%) or another carsharing service (77%) in the absence of BK, making BK



largely a substitute for other car services. These results lead to the conclusion that for a large share of their members, BK is providing increased mobility to a segment who probably would not have owned a car in the first place, but that have need for a car at least sometimes. One limitation of the study is that the question that was posed in the survey did not ask what they would have done in a scenario without access to *any* carsharing or rental services.

When investigating factors that seem to influence the self-assessed likelihood of buying a car in the absence of BK, we find a positive and statistically significant relationship with the number of children in the household, gender (male), income (median in the borough), how often they use BK and whether they own a car already. The strongest effect is found for current car owners. This may indicate that, at least in our sample, the self-assessed likelihood of getting a car in the absence of BK is higher for households that may get an additional car, than for households getting their first car, and that, for them, carsharing may be used as a substitute for the second car.

From an environmental policy perspective, the main interest in carsharing is to which extent it can replace car ownership, reduce car use and free up public space. We find that carsharing is relatively more appealing vis-a-vis car ownership for those who consider the practicality, the environmental impact, or the expanded car choice-set from carsharing to be important. However, people who put a high weight on these features may also be less likely to own a car in the first place.

Among respondents in the general population in the largest urban areas, only about 17% reported that they were likely or highly likely to join a carsharing service in the near future. This figure was even lower among car owners, who make up 69% of the sample. When asked about their willingness to replace (WTR) their car with a carsharing service, more than 50% were unlikely or highly unlikely to join a carsharing service in the near future. Similarly, we also found that the average interest in renting out (IIRO) their cars was quite low.

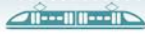
Basic demographic variables such as gender and education, do not seem to have much effect on the WTR car ownership with carsharing (only income is negatively and strongly correlated with the WTR). While women tend to be less interested in renting out their car, older and more educated respondents are more IIRO. Having access to parking and having more than one car seem to have a negative impact on both WTR and IIRO. This seems reasonable, as parking access and the number of cars owned is strongly correlated with self-assessed car dependency - which also, naturally, negatively affects WTR and IIRO.

Adding subjective variables to the regression models significantly increases its explanatory power for both assessing the WTR and the IIRO. WTR is higher for car owners who are planning to change or get rid of their car. The WTR had a significant correlation with several subjective assessments, but it had the strongest correlation with accessibility, the belief of how convenient carsharing is, and how much carsharing fits with one's "identity".

Relevant motivation for car owners' IIRO is the belief that renting out their car saves money, is social, practical and gives status. Note that the strongest correlation, explaining about 76% of the variation, is the belief that it will be economically beneficial. Relevant barriers to IIRO are unwillingness to rent out to strangers or strongly needing their car.

In conclusion, our analysis of survey data points to the fact that the convenience message has the strongest impact in getting car owners to consider switching to carsharing. While the personal profit motive is the most impactful for getting car owners' interested in renting out their cars.

Our analysis comes with a range of caveats. There is a high likelihood of having some omitted variable bias. We would have ideally liked to have data on variables, such as the respondents' distance to workplace, cabin ownership (and frequency of visits) and number of close friends



and family that are best reached by driving. While our findings may give some useful indications, the exact numbers should be interpreted with caution. Our research brings new knowledge about the carsharing sector, but there is still a need for more research in order to better understand the causal effects of increased availability of carsharing, and/or the demand effects for carsharing caused by various transport policies. We emphasize the use of register data, experimental data and more repeated survey data as promising venues of such research.

Finally, we discuss the extent to which carsharing can substitute private cars and reduce car use placing this study in perspective of the existent literature. By doing a simple back-of-the-envelope calculation we conclude that a BK shared car can replace between 4,5 to 8,9 privately owned cars. Similar estimates have been found in Rydén (2005) for Germany and Belgium. following calculation from Byggforsk (2015), we also calculate that given the expected number of avoided cars per BK member, between 2,8 m²–5,6 m² of public space can be freed up in the city, *ceteris paribus*.

More research is needed to study the impact of carsharing on vehicle kilometer travelled (VKT), as it is quite uncertain and highly dependent on the time horizon and assumptions. Similarly, the net effect on emissions is also uncertain. However, given that the shared fleet is on average newer and has lower emissions compared to the privately owned car fleet, emissions are likely to be reduced when private car are substitute by carsharing.

I hvilken grad kan bildeling erstatte bileierskap?

En analyse av surveydata fra bildelere og den øvrige befolkningen

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I denne rapporten diskuterer vi i hvilken grad bildeling kan erstatte tradisjonelt bilhold i norsk sammenheng. Analysen bygger på to nettsurveyer – én til medlemmene i den største medlemsbaserte bildelingstjenesten i Norge og én til et utvalg av den generelle befolkningen i de største byområdene.

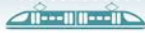
Resultater viser:

- Et flertall av medlemmene i bildelingsordningen (60%) sier de ikke ville ha kjøpt bil uten ordningen. Samtidig sier et flertall at de sannsynligvis ville brukt en leiebilordning (65%) eller en annen bildelingsordning (77%) i stedet.
- Blant den generelle befolkningen er det 17% som oppgir at det er svært eller ganske sannsynlig at de ville kunne delta i en bildelingsordning i nær framtid, og andelen var lavere for de som allerede eier en bil. Det er også lav interesse for å leie ut egen bil til en bildeling.

Hvis analysen skulle brukes til en informasjonskampanje rettet mot norske bileiere, ville man nok fått sterkest effekt av å vektlegge de praktiske fordelene av bildeling kontra bileierskap, og av de mulige økonomiske gevinstene av å leie ut egen bil til bildeling.

I denne rapporten diskuterer vi i hvilken grad bildeling kan erstatte tradisjonelt privat bilhold i den norske sammenheng. Vi prøver også å identifisere policyrelevante faktorer som synes å kunne ha sterkest effekt for et slikt skifte. Vi analyserer spørreundersøkellesdata fra både de som allerede er med i en bildelingsordning ('bildelere') og et utvalg fra den generelle befolkningen. Vi undersøker om medlemmer av en bildelingsordning ellers ville eid en bil hvis det ikke var mulig med bildeling. For ikke-bidelere, spør vi om bileiere kunne tenke seg å skifte til bildeling. Rapporten baserer seg på to nettsurveyer – én sendt ut i 2020 til medlemmer av den eldste bildelingsordningen i Norge, Bilkollektivet (BK), og én sendt ut i 2017 til et utvalg av den generelle befolkningen i de største byområdene.

Undersøkelsene viser at et flertall (60%) av BKs medlemmer oppgir at det ville være svært eller ganske usannsynlig at de ville ha kjøpt egen bil hvis de ikke kunne vært med i BK. Respondentene gir også uttrykk for at de sannsynligvis ville klart seg uten bil hvis de ikke hadde hatt tilgang på bildeling. Samtidig sier et flertall (65%) at de sannsynligvis ville brukt en leiebilordning eller en annen bildelingsordning (77%) hvis det ikke hadde vært for BK. Det vil si at BK langt på vei fungerer som en konkurrent blant flere leie-/delebilordninger. Basert på dette er en



konklusjon at for en stor del av medlemmene, har BK ført til økt mobilitet til et segment som sannsynligvis ikke ville eid en bil uansett. Respondentene ble ikke spurt om hva de ville gjort i et scenario der det verken var bildeling eller bilutleie tilgjengelig.

Ved å undersøke hvilke faktorer som ser ut til å være av betydning for den selvrapporterte sannsynligheten for å skaffe en bil hvis det ikke var bildeling, finner vi en positiv og statistisk signifikant sammenheng mellom antall barn i husholdet, det å være mann, inntekt (median i bydelen), hvor ofte en bruker BK og om en allerede har egen bil. Den sterkeste effekten er det å allerede være bileier. Dette kan tyde på, i hvert fall i vårt utvalg, at den selvrapporterte sannsynligheten for å skaffe seg en bil i fravær av BK er høyere for hushold som muligens skaffer seg en bil til, enn for hushold som skaffer seg sin første bil. For de som allerede er bileiere, fungerer bildeling som en substitutt for bil nummer to.

Fra et miljøpolitisk perspektiv er bildeling interessant i den grad den kan erstatte bileierskap, redusere bilbruk og frigjøre offentlig areal. Vi finner at bildeling relativt sett er mer aktuelt enn eget bilhold, særlig for respondenter som er mest opptatt av de praktiske aspektene, av miljøkonsekvensene, eller av de utvidete mulighetene bildeling gir for valg av ulike typer biler. Like fullt er det mulig at de som vektlegger disse faktorene har mindre sannsynlighet for å eie egen bil i utgangspunktet.

På spørsmålet til den øvrige, urbane befolkningen om hvor sannsynlig det ville være å begynne med bildeling i nær framtid, svarer 17% at det ville være svært eller ganske sannsynlig. Blant bileiere, som utgjør 69% av utvalget, er villighet til å erstatte (willingness-to-replace; WTR) egen bil med en bildelingstjeneste enda lavere. Blant bileiere finner vi at det var svært eller ganske usannsynlig at de ville bli med i en bildelingsordning i nær framtid. Tilsvarende fant vi at den gjennomsnittlige interessen for å leie ut egen bil i en bildelingsordning (interest in renting out, IIRO) var lav.

Villigheten til å erstatte bilhold med bildeling ser ikke ut til å være drevet av demografiske variabler, som kjønn og utdanning. Bare inntekt er sterkt og negativt korrelert med WTR. Mens kvinner tenderer mot å ikke være interessert i å leie ut egen bil, er eldre og høyere utdannede respondenter mer interessert (har høyere IIRO). Det å ha tilgang på parkering og det å ha mer enn én bil slår negativt ut både for WTR og IIRO. Det synes som et rimelig funn, siden tilgang på parkering og antall biler en har er sterkt korrelert med selvrapporert bilavhengighet – som igjen, naturlig nok, har en negativ sammenheng med WTR og IIRO.

Når subjektive variable legges til i regresjonsanalysen, øker forklaringskraften både når det gjelder WTR og IIRO. WTR er høyere for bileiere som planlegger å skifte ut, eller å bli kvitt, egen bil. WTR henger signifikant sammen med flere subjektive synspunkter, med sterkeste sammenheng med tilgjengelighet, troen på hvor lett og praktisk bildeling er, eller i hvor stor grad bildeling egentlig passer til ens «identitet».

Av særlig relevans for IIRO er troen på at det å leie ut egen bil lønner seg økonomisk, at det er sosialt og at det gir status. Verdt å merke seg er at den sterkeste sammenheng (som forklarer omtrent 76% av variasjonen) er troen på at det vil være økonomisk gunstig. Relevante barrierer mot å leie ut egen bil er manglende vilje til å leie ut til fremmede, eller at en virkelig har behov for egen bil. Hvis analysen skulle brukes til design av en informasjonskampanje for overgang til bildeling rettet mot norske bileiere, ville man nok fått sterkest effekt av å vektlegge de praktiske fordelene ved bildeling kontra bileierskap (slippe vedlikehold, parkering), og de mulige økonomiske gevinstene av å leie ut egen bil til bildeling.

Våre analyser må tas med en rekke forbehold. Det er stor sannsynlighet for skjevheter på grunn av utelatte variabler. Vi skulle gjerne hatt data for ulike variabler, som avstand til arbeidsplass, om de eier hytte (og hvor ofte den brukes) og antall nære venner og familie som best kan nås med bil. Selv om våre funn peker på noen nyttige sammenhenger, må resultat-



ene tolkes med forsiktighet. Vår forskning får fram ny kunnskap om bildelingsfeltet, men det er fremdeles nødvendig med mer forskning for å forstå kausale effekter som følger av økt tilgang på bildelingstjenester, og/eller etterspørseffektene av bildeling som følge av ulike transportpolitiske tiltak. Vi vil særlig legge vekt på bruk av registerdata, eksperimentelle data og mer surveydata over tid som lovende innslag til denne typen forskning.

Til slutt diskuterer vi i om og i hvilken grad kan bildeling erstatte privatbiler og redusere bilbruk, og ser denne studien i lys av eksisterende litteratur. Ved å gjøre en enkel beregning konkluderer vi med at en delt BK-bil kan erstatte mellom 4,5 til 8,9 privateide biler. Tilsvarende estimer er funnet i Rydén (2005) for Tyskland og Belgia. Med utgangspunkt i en beregning fra Byggforsk (2015) kalkulerer vi også at mellom 2,8 m² - 5,6 m² av offentlig plass kan frigjøres i byen per BK-medlem, ceteris paribus.

Mer forskning trengs for å studere virkningen av bildeling på kjøretøykilometer (VKT), da dette er ganske usikkert og avhengig av tidsrammen og antakelsene. På samme måte er nettoeffekten på utslipp også usikker. Men gitt at den delte flåten i gjennomsnitt er nyere og har lavere utslipp sammenlignet med privatbilflåten, er det sannsynlig at utslippene vil reduseres når privatbilene erstattes av bildeling.

1 Introduction

1.1 Background and Aim

Switching from privately owned to a shared vehicle has the potential to vastly improve household economics, promote efficient use of the passenger car fleet, free up city space and lower total emissions from the production and use of passenger cars.

This report collects results from self-reported surveys of carsharing members and the general population carried out in Norway between 2017 and 2020. In this research, we aim at assessing to what extent carsharing is replacing traditional car ownership, and what factors seem to have the strongest effect on this replacement. In particular, researchers and policymakers are interested in the factors that can be affected by policies.

We approach this topic from two angles:

- Carsharing members that would otherwise have owned a car – what is driving a carsharing member to assess a higher likelihood of owning a car in the absence of carsharing?
- Non-members, in particular those who own a car, who are strongly considering to carshare – what is driving their consideration?

We want to understand whether the drivers identified from the different angles coincide, as they both address the characteristics of people who are “on the margin” between car ownership and carsharing. We exploit survey data to address these questions and analyze the data using standard econometric techniques like OLS linear regression models.

1.2 Limitations

This report is limited to analyzing self-reported data from a spring 2020 survey among members of the carsharing service Bilkollektivet, and a survey among the general population in Norway’s largest cities in the autumn of 2017. Both surveys explicitly mentioned the topic of carsharing in the invitation.

We present research findings and information about carsharing, but this report does not include a systematic literature review and does not aim to review existing carsharing services in full.

The method of analysis is limited to standard methods such as OLS regression. Due to some of the characteristics of some of the variables in our data, other types of models might be preferable. We do however show that our findings are relatively robust to alternative model specifications.

1.3 Structure of the Report

Section 2 provides a brief introduction to the carsharing sector, with emphasis on the Norwegian situation. Section 3 gives an overview of the research literature on the topic of carsharing as a substitute to ownership. In section 4 and 5 we go through the methods and data used in the analysis. In section 6 we present the main results from the analysis. We discuss the results in section 7, while section 8 concludes.

To what degree can carsharing substitute car ownership?

1.4 Definitions

We will, for textual convenience, employ the following acronyms several places in the report:

- WTR: Willingness to replace (referring to car owners' expressed willingness to replace their current form of car ownership with carsharing)
- IIRO: Interest in renting out (referring to car owners' expressed interest in renting out their car through a carsharing service)
- BK: Bilkollektivet, a carsharing company in Oslo
- B2C: business to consumers carsharing service
- P2P: peer to peer carsharing service
- B2B: business to business carsharing service

2 Background: The carsharing sector

2.1 A brief history of carsharing

Zurich (Switzerland) may have been the place where the first car-sharing service was created in 1948. The goal was originally to save transportation costs during the economically challenging period after World War II (Shaheen & Cohen, 2008). Around the 1980s, new car-sharing schemes began to appear in France, the UK, the Netherlands, and Sweden. This often took the form of households joining forces to buy cars for shared use (Johbraaten, 2019b). Around the mid-1990s, new, more professional car-sharing schemes emerged. In Norway, Bilkollektivet was the first car-sharing service, established in 1995. They started small, and after a few years they had grown to over 100 members who shared about 10 cars (Berge, 1998). About 15 years later the number of Norwegian car users had grown to approximately 4000 (Hald et al., 2011; Nenseth et al., 2012).

In recent years, there has been a sharp increase in the number of car-sharing companies and car-sharing members in Norway. George og Julsrud (2018) points out that at the end of 2018, a total of 11 carsharing companies were registered in Norway, with a fleet of more than 7,000 cars. These companies have over 200,000 registered users/members. Similarly, Nenseth og Julsrud (2019) estimate that about 5% of the Norwegian population with a driver's license are members of a carsharing service. However, the number of active users/members is expected to be much lower. In fact, many of the registered users have probably only downloaded an app, as many of the carsharing services do not have a registration fee, but they have not actually made use of the service yet.

2.2 Carsharing types

There are several types of carsharing schemes, and what people refer to when using the term “carsharing” varies. Carsharing schemes can be categorized in different ways. It can be divided based on their business model, or structure organization. For instance, some companies operate as a non-profit cooperative (e.g., Bilkollektivet and Bildeleringen), while others are fully commercial (e.g., Hyre, MoveAbout). They can be organized as business to consumer services (B2C), business to business (B2B) or peer to peer (P2P like Getaround). Carsharing can also be free-floating (one-way) or station-based (round-trip or two-ways). We elaborate on the last dimension based on a shortened version of the descriptions in Iversen (2021).

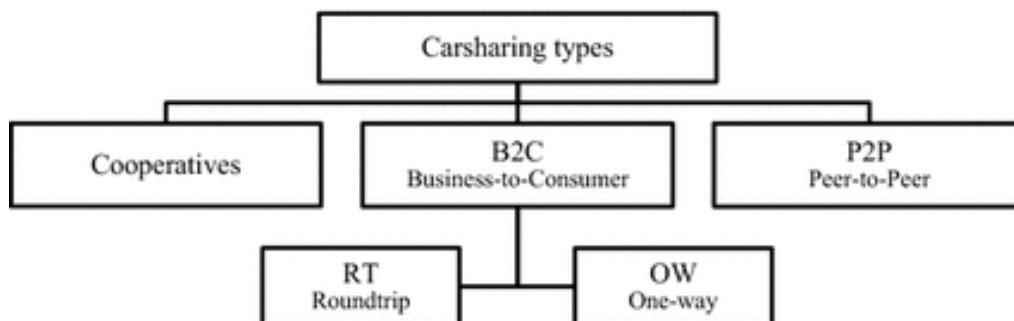


Figure 2.1: Types of carsharing business models. Figure from Münzel et al. (2018).

2.2.1 Free-floating carsharing

Free-floating carsharing means that the cars do not need to be picked up and delivered in the same place. The user can drive from A to B and leave the car there. The cars can usually be picked up and

To what degree can carsharing substitute car ownership?

parked anywhere within a specific geographical area or zone (e.g., within certain districts in a city). Free-floating carsharing is the most flexible form of carsharing and is best suited for users who are only going to travel one way, usually over relatively short distances.

It is common for free-floating carsharing to use a pricing model based on time (per hour or per minute). Because free-floating carsharing is mostly aimed at short one-way trips, it will normally not meet all car needs for a regular household but can replace some private car use. This type of carsharing may substitute public transport the most.

The profitability of this carsharing model depends on a sufficiently large user mass within the area in which they operate, so that the utilization rate is maintained despite the fact that the cars are not always parked in the same place, and is thus best suited to larger, dense cities (Bert et al., 2016). Free access to parking is also a crucial dimension and additional costs associated with redistributing the cars over different areas may incur. After VY-bil (organized by the Norwegian railroad company Vy) closed down in 2022 after a couple of years trial, there are no more free-floating carsharing companies in Norway.

2.2.2 Station-based carsharing

As a concept, station-based carsharing has existed longer than free-flow carsharing. Both pickup and delivery usually need to be done in the same place, making the service unsuitable for one-way trips. The cars can usually be booked online or through an app, and opening the car can be done with a membership card or an app.

In Oslo, Hyre, Move About and Bilkollektivet are examples of station-based car-sharing schemes. All of these are also part of the City of Oslo Carsharing Council, where they will have access to the following discounted schemes after an application process:

- parking permits for pre-determined carsharing stations
- a special parking permit that entitles their cars to parking in areas under the municipal residential parking scheme

Furthermore, the carsharing council is used, among other things, to advise the municipality on where carsharing stations should be established and the distribution of stations among the companies in the scheme (Oslo kommune, 2022).

Peer-to-peer (P2P) carsharing is a scheme that provides a platform where people can rent out their own cars to other people in the community. P2P solutions, such as Getaround (previously Nabobil), can also be considered station-based, as the service consists mainly of private individuals renting out their own cars on the Getaround's platform. The car is picked up and delivered in the same place, usually at the home of the car owner.

2.3 Carsharing services in Norway

One of the latest compilation of carsharing services in Norway was given in Johbraaten (2019a), with 11 different services and more than 200,000 registered users. The numbers have grown since then, with newcomer services like Otto, from Bertel O. Steen, that in 2021 had an offer of 250 cars in various Norwegian cities¹. The largest carsharing service in 2019 was the (mostly) P2P service Getaround, with

¹ <https://www.ostlendingen.no/firmabilen-star-parkert-pa-kveldstid-og-i-helgene-og-da-kan-du-bruke-den/s/5-69-1218481>

about 200,000 registered users. Some Getaround car owners² are professional businesses with several cars to offer, actually making Getaround a hybrid model of P2P and B2C. The largest station-based B2C services are Hyre, with more than 60,000 registered users³, and Bilkollektivet, with more than 11,000 members⁴. Figure 2.2 shows the development of the number of carsharing users, shared cars and the number of bookings from 2016 to 2021.

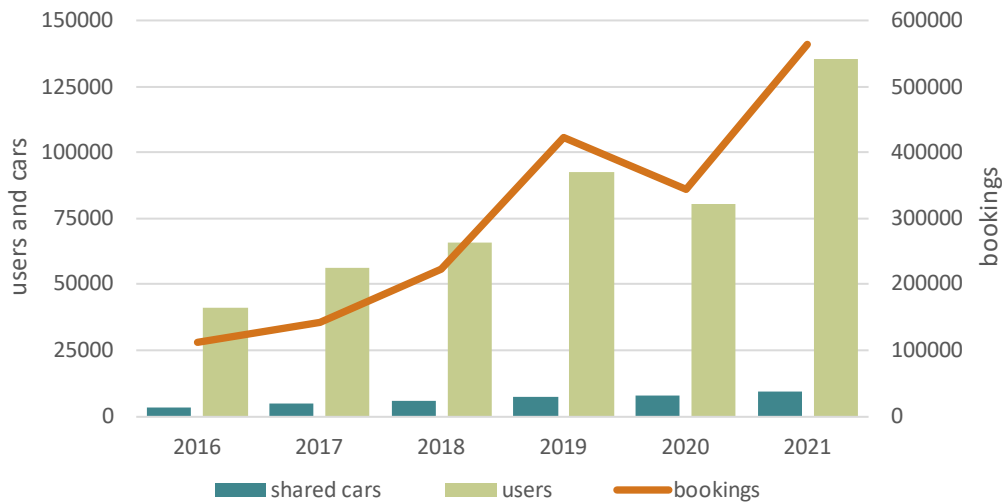


Figure 2.2: The growth of car sharers, shared cars and bookings 2016-2021 (Nenseth, 2022). Left axis: Number of users and number of shared cars. Right axis: Number of bookings.

² paper on a seminar in Bydel (urban district) Gamle Oslo, 24.11.22

³ <https://kommunikasjon.ntb.no/pressemelding/klar-for-het-bildelingsommer-hyre-med-snart-over-1000-biler-i-hovedstaden-har-lansert-i-bergen-og-trondheim?publisherId=15832304&releaseId=17909789>

⁴ <https://moqo.de/en/blog/bilkollektivet>

3 Literature

3.1 Carsharing vs car ownership

Carsharing (which is not to be conflated with carpooling) can be defined as a system that enables people to rent locally available cars at any time, and for a wide variety of (short and long) durations (Frenken, 2013). Carsharing is a rapidly growing phenomenon, both in Norway and in other parts of the world. From being a niche service in the early 2000s, the number of registered users of a carsharing service in Norway had grown to over 200,000 people in 2019 (Nenseth, 2019b).

Car ownership can be seen as a cost for individuals and society. For many, traditional car ownership involves a relatively large upfront acquisition cost and a number of annual fixed costs, which makes owning a car a central decision in the household economy. Moreover, car ownership and usage imply several negative externalities, such as polluting the environment and taking up public space, in form of congestion and parking.

3.2 Potential of carsharing

Carsharing has the potential to reduce the total number of cars in the road network, as well as car use, compared to private car ownership. Privately own passenger cars are underused and parked 95% of the time (Granberg, 2018). Carsharing may replace more than 10 privately owned cars (Martin et al., 2011) and thus plays an important role for the reduction of the number of cars (Handberg et al., 2019; Iversen, 2021). Carsharing vehicles are usually not as accessible as a private car, therefore trip planning becomes more important. This can result in fewer car trips and lower car use (Litman, 2000), and potentially increase the use of alternative modes, such as bike and public transport (E. Martin & S. Shaheen, 2011).

Carsharing can thus be a crucial element in aiding the transition away from car ownership to a more efficient and environmentally friendly transport system. With fewer cars on the streets, congestion and polluting emissions would be reduced. With lower parking needs, valuable city areas would free up. The freed-up space could then be allocated for other, more environmentally friendly, purposes such as bike lanes.

The potential for environmental benefits from a transition from car ownership to carsharing increases further when one looks at the characteristics of the car-sharing fleet against the fleet of cars in household ownership nationally. On average, car fleets of car-sharing companies are *newer* than the national fleet. This is because the shared cars have a higher utilization rate and will achieve a high number of kilometers driven earlier, which leads to earlier replacement enabling faster phasing in of better vehicles in the fleet (Handberg et al., 2019). And because having an updated fleet of newer and better cars may be a highly valued attribute for customers, companies have an internal incentive to offer the newest and more efficient technology. In addition, several of the car-sharing companies invest heavily in *electrification* of their fleet, following users' demands which are often based on economics and environmental motivations. This, all else equal, gives carsharing companies a more environmentally friendly fleet compared to the average national fleet. In the longer term, a greater transition from car ownership to carsharing can contribute to faster innovation and technological development in both Mobility as a Service (MaaS) and car manufacturing, and a higher penetration of electric cars.

It is, however, important to be cautious about expecting major climate gains from carsharing itself, as more research is needed. For instance, there is no consensus on whether carsharing may result in a net reduction in mileage, even though the annual kilometers driven are carried out by fewer cars (Handberg et al., 2019; Johbraaten, 2019b; Klemsdal, 2022). On the positive side, carsharing can provide easy and affordable access to cars to those who just need it occasionally (e.g. Kent og Dowling (2013)), and can

represent an important efficiency improvement in the transport sector and land use by helping to maintain similar levels of mobility with a smaller fleet of cars. However, some research has pointed out that free-floating carsharing schemes may attract people who would normally use public transportation. Hence, environmental impacts might not be transferable between the different carsharing schemes (Becker et al., 2017).

To sum up, there is a potential for large aggregate social benefits when the segment of transport users that may benefit from a transition from car ownership to carsharing is large enough. In other words, if more households choose carsharing over car ownership, we may end up with a scaled-down, newer, and more efficiently used car fleet than today. How big this potential is, depends on how many of those who use carsharing would otherwise own a car (or several cars) and how much more they would drive in the absence of such a service. This potential provides motivation to carry out more research on this topic to better understand the benefits and possible downsides, and how this benefit-cost ratio can be maximized.

3.2.1 Barriers and enablers: can carsharing substitute car ownership?

Barriers and enablers to carsharing need to be fully understood, and the segment of potential users should be further identified in order to facilitate the uptake of carsharing. Attention from academic research on carsharing has grown in recent years, investigating the effects of prices, costs, environmental factors and parking policies on individual choices.

Barriers to joining carsharing are often not economic. Many households have specific needs that may not be available through carsharing, such as requiring special equipment (child seats, dog cages etc.) or dislike the lack of security of having a car available when needed. Moreover, lack of information about carsharing services is also an important barrier. One out of three people surveyed in Norway from the general population in 2017 had never heard of carsharing (Nenseth, 2019). Since then, the level of knowledge has increased. In 2022, only 3% of the population in Bergen had not heard of carsharing, while 35% had some knowledge (Nenseth & Ellis, 2022).

The focus of the research has been mostly on motives - “costs, convenience or conviction” - and practices, especially among the members of such schemes (Burkhardt & Millard-Ball, 2006) (Burkhardt & Millard-Ball, 2006). Several studies conclude that most users are environmentally conscious (Rotaris & Danielis, 2018). Users tend to have a higher level of education, are usually young, single households or couples with children (Juschten et al., 2019; Le Vine & Polak, 2019), have a higher level of income (Le Vine & Polak, 2019), and live in urban areas (Prieto et al., 2017).

While knowledge is building up on what drives the growth in carsharing and the composition of carsharing users, less is known about *what drives people to substitute* car ownership with carsharing. It is therefore important to study those who are currently not using carsharing, but potentially could, along with those who use carsharing, but easily could own a car (or cars) in the absence of carsharing. It would be desirable to understand to which degree household economics (the relative cost difference between carsharing and owning) can drive such a substitution, how much can be driven through increased convenience and accessibility, and how much is driven by attitudes and social norms. In order to understand the social mechanisms behind the likelihood of joining carsharing schemes, it is crucial to study the non-users.

Car dependence is one of the most important determinants of carsharing in Norway, as very car dependent people are less likely to join a carsharing service. Moreover, convenience, financial motivation and environmental concern are also relevant factors (Nenseth, 2019a). Johbraaten (2019b) also indicates that there is a potential for growth in the number of members, but that this potential relies on the ability to change attitudes and behaviors associated with private car use. Some research has also shown that many carsharers use carsharing instead of owning a second or third car (Harms et al., 2016).

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As society becomes increasingly digitized, more services can be delivered using smartphones and apps, and it gets easier to use carsharing than ever before. Carsharing companies are developing new business models and pursuing innovative technological solutions in order to strengthen carsharing as a competitor to car owning.

Geographical variation is also important for carsharing and car ownership levels because of culture, infrastructure, alternative transport modes and political support. In some cultures or subcultures owning a car can be considered a status symbol, and owning a (luxury) good can be associated with a higher level of satisfaction than just temporary use (Hudders & Pandelaere, 2015). Infrastructure that encourages people to use public transport and non-motorized alternatives, which allows households to travel without a private car in their daily commute, may make a carsharing service more beneficial. Authorities and policy makers can play an important role in supporting or limiting carsharing services both in terms of political and financial support. Hence it is important that researched-based knowledge about carsharing is available and used by such institutions for example when dealing with urban or transport planning.

3.3 Knowledge needs

As described so far, the body of research on carsharing is growing. Results on whether carsharing has a positive societal input is not completely clear, but there are several reasons to be optimistic.

Research quite clearly identifies characteristics of its present users, both in terms of demographics and attitudes. However, as we want to look at the substitution between car ownership and carsharing, we need more knowledge on what can drive such a substitution, and what the characteristics of those most likely to make the substitution are.

In the growing research on carsharing, there is a need to increase the knowledge about whether people use carsharing as an alternative to private car ownership, or if their private car ownership status would be the same regardless of a carsharing membership. Knowing what characterizes those who use carsharing as an alternative to private car ownership would make it easier to target the right user segment to get a reduction in the total number of vehicles owned.

4 Method

4.1 Theory

The cost structure for car usage is quite different when comparing car ownership and use of carsharing services.

A car owner will pay for:

- the investment of acquiring the car, with the associated depreciation costs over time,
- annual fixed costs (insurance, tires, inspections etc.) and
- variable costs (fuel, tolls etc.).

A user of carsharing services does not pay any investment costs or annual fixed costs, even though some services have a monthly fee. The carsharing services recover both the fixed and variable costs through price the users pay for using the car (per hour and per km). This means that the variable costs of using a car is higher for a carsharing user than for a car owner, *ceteris paribus*.

These principles are depicted in Figure 4.1, a figure similar to that in Handberg et al. (2019). Note how the average cost curve for a car owner is sharply falling as the number of kilometers driven rises. This is because of the relatively high fixed costs (purchase and annual fixed costs) and the relatively low variable costs, depicted with the variable cost curve in the figure. For simplicity, we depict the average costs of using a carsharing service as a variable costs curve per kilometer (implying that the user only pays for the kilometers driven, and no fixed costs), which is relatively higher than that for car ownership.

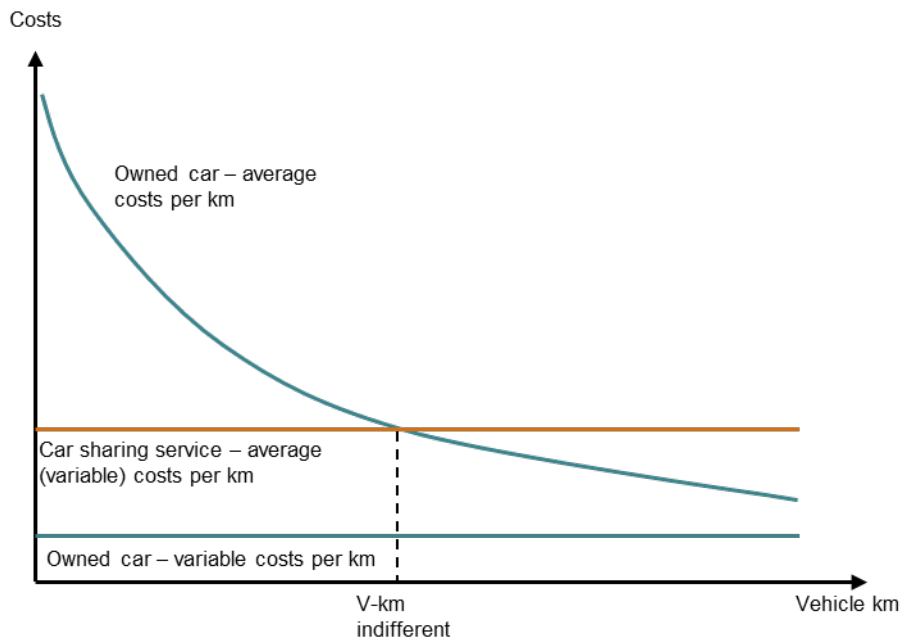


Figure 4.1: Illustration of differences in average and variable costs for car ownership and carsharing service usage.

In this simplified figure, the car user is economically indifferent between carsharing and car ownership at the number of vehicle-kilometers where the average cost curves intersect. If the car user would drive less than this amount, it is beneficial to use carsharing, and vice versa.

The point where the average cost curves intersect will depend on what type of car the user would have chosen to own or chosen to use from the carsharing service, as a newer, more expensive car usually implies higher fixed costs. The time profile of usage will also matter, as the average cost for an hour of

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rental from the carsharing service may differ if the renting period is short (e.g., a few hours) or long (e.g., a few weeks) and based on demand (weekends/weekdays or morning/evening).

Iversen (2021) provides an example calculation of the case with the acquisition of a 1-year-old used car and use over three years with the average number of annual kilometers driven for private cars registered in Oslo (11,182 km) compared to using carsharing with Bilkollektivet for the same amount of vehicle kilometers. He calculates an annual savings of NOK 15,400 for carsharing compared to car ownership. The savings would be smaller or even negative with the ownership of an older, cheaper car and higher annual usage, but this still gives an illustration of a large potential savings for car owners with relatively low car utilization.

There are people with driving patterns that put them close to where ownership and carsharing are approximately equally economically sensible, i.e. where the average cost curves in Figure 4.1 intersect. For the purpose of this report, we are interested in those who currently own but could be interested in switching to carsharing, or those who are currently part of a carsharing scheme, but would be highly likely to buy a car in the scheme's absence.

4.2 Empirical analysis

In this report, we analyze survey data collected in 2017 and 2020 from the general population and from carsharing users. We use the ordinary least squares (OLS) method to estimate parameters of a multivariate regression model, such as:

$$y_i = \alpha + \beta X_i + \varepsilon$$

Where α is the constant term, β is a vector of unknown parameters and ε is the error term.

The outcome variable, y_i is either:

- Likelihood of purchasing a car in the hypothetical scenario that they were not carsharing (7-point Likert-scale);
- Or the likelihood of replacing car ownership with carsharing (7-point Likert-scale);
- Or interest in renting out their own car through carsharing (7-point Likert-scale).

The regressors X_i are objective and subjective self-reported variables such as socioeconomic and demographic attributes, variables about travel habits and several attitudes toward car ownership and carsharing.

Some of our models also include borough fixed effects (FE) to control for unmeasured variables that may correlate with the variables of interest. In other words, including fixed effects help to reduce omitted variable bias at the borough level.

In this report we use the standard OLS method even though our dependent variables are not completely continuous nor completely normally distributed. Alternative model types dedicated to such cases have not been explored. We do however compare the results from model specifications with different sets of explanatory variables.

More details are included in the next section about data.

5 Data

5.1 Survey of Bilkollektivet (BK) members

One of the first steps in this project has been to ask members of the carsharing company Bilkollektivet to answer a survey about their travel habits, their satisfaction with the service and the reasons behind carsharing. The survey was conducted in the spring of 2020.

The online survey was done using Quentech Tech, and followed a similar design as a survey with BKs members conducted in 2017⁵. The 2020-survey was distributed by email in March 2020 to all, approximately 10 000, members, and all participants were promised the chance to win a prize. The respondents answered the survey between March 11th and April 22nd, and the total number of responses ended up at 1362⁶. This renders a response rate of 13,6%, which is a decent result for this type of survey.

5.1.1 Variables included in the analysis

The outcome variable of interest is Likelihood of purchasing a car in the hypothetical scenario that they were not carsharing. More specifically, this variable was recorded with the following question: *“How likely is it that you would buy a car, if you were not a member of BK”*. Respondents rank the likelihood on a 7-point Likert-scale.

The idea is that the more likely responders are to buy a car, i.e., substitute carsharing with car ownership, the more important it is to understand what drives these people to be carsharing members, from a policy perspective.

The exogenous variables of interest are several demographic and socioeconomic information and information about their transport behavior. Table A.1 in appendix provide descriptive statistics for these exogenous variables.

5.2 Survey of general population

The data from the survey has previously been subject to analysis in Hjortset og Böcker (2020) and in Johbraaten (2019b), but with a different focus than in our report. The description of the survey process in this report is largely based on Hjortset og Böcker (2020).

A large lottery-incentivized, web-based, and self-administered questionnaire was sent out in November 2017 via e-mail to a non-stratified random selection of the general population living in our study areas. E-mail addresses were obtained through the Norwegian postal service’s preference database, comprising people who have utilised the postal service. We sent out 156,600 e-mails to residents ages 18 years and older, of which 28,300 (18,1%) were opened.

A total of 4622 recipients (3%) clicked on the link, and 3734 (2,4%) completed the survey, yielding a response rate of 13.19% among those who had opened – and presumably read – the email. The response rate of the total sample was significantly lower, but we have to assume that many of those invited never read the email and didn’t receive the invite. This can be due to faulty email addresses, that they have changed their email address or that they don’t use their email or don’t open emails from unknown senders. The results are in line with a trend of relatively moderate response rates on web

⁵ The questionnaire can be found in the appendix

⁶ This number is reduced in the analysis paragraph due to some more cleaning, eg. business member are excluded from the analysis as their incentive is very different from private users.

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surveys in recent years (Fan & Yan, 2010), but it also poses some challenges regarding representativeness and potential non-response bias. The e-mail was titled *A survey about transport habits* and was sent out under affiliation of the University of Oslo and the Institute of Transport Economics. Information on the theme of the survey may have affected who decided to take the survey and may lead to selection bias.

5.2.1 Variables included in the analysis

The outcome variables of interest are i) the likelihood of replacing car ownership with carsharing and ii) the interest in renting out one's own car through carsharing.

More specifically these variables were recorded using the following questions: i) *"How interested are you in replacing your current car ownership with a carsharing service"* and ii) *"How interested are you in renting out your car through a carsharing service"* among the subset of respondents who either own, lease a car or have a company car. Respondents ranked their interest on a 7-point Likert-scale. The idea is that the drivers with a higher interest in replacing their car, are interesting to study from a policy perspective.

In Table A.2 we provide descriptive statistics for the exogenous variables used in our analysis.

6 Results

6.1 Carsharing with Bilkollektivet

We analyze Bilkollektivet (BK) members' answers when presented with a hypothetical scenario. Our main focus is the self-assessed answers to the questions assessing the *counterfactual* scenario where they are *not* members of BK. It might be interpreted as a self-assessed treatment effect of getting a BK membership.

The effect we are most interested in, is on car ownership and car usage. We would like to understand:

- whether the BK-membership is likely to replace the ownership of a private car,
- or whether it is more likely that the members would never have gotten a car anyway.

Figure 6.1 displays the distribution (in%) of answers to the question “Imagine you were not a member of BK. How likely is it that you would: Buy a car?”



Figure 6.1: Distribution of answers in a 7 point Likert scale N=1315.

The average answer is 3.72, i.e., below the 50/50 value of 4 on the Likert-scale. Moreover about 60% of respondents rank the likelihood of buying a car in the absence of BK to 4 or lower. This implies that the majority of the respondents would not have bought a car, or that there is a higher weight of members with a low likelihood of buying a car, if they were not members.

The respondents were also asked to assess the likelihood five other scenarios, if they were not a member of BK(Figure 6.2)Figure 6.3 report the averages for each category.

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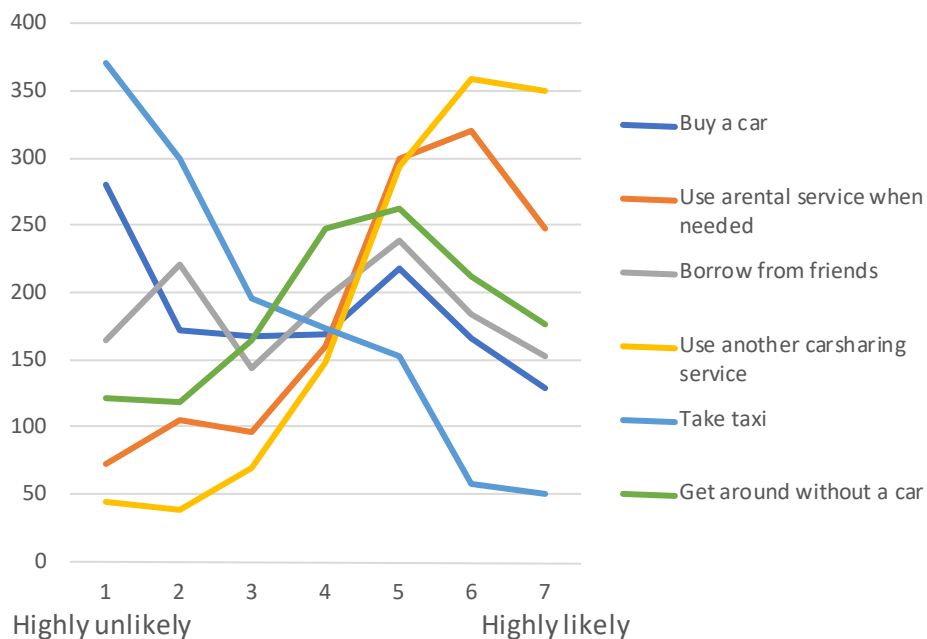


Figure 6.2: Distribution of answers to the question “Imagine you were not a member of BK. How likely is it that you would: [Alternative].” N=1315.

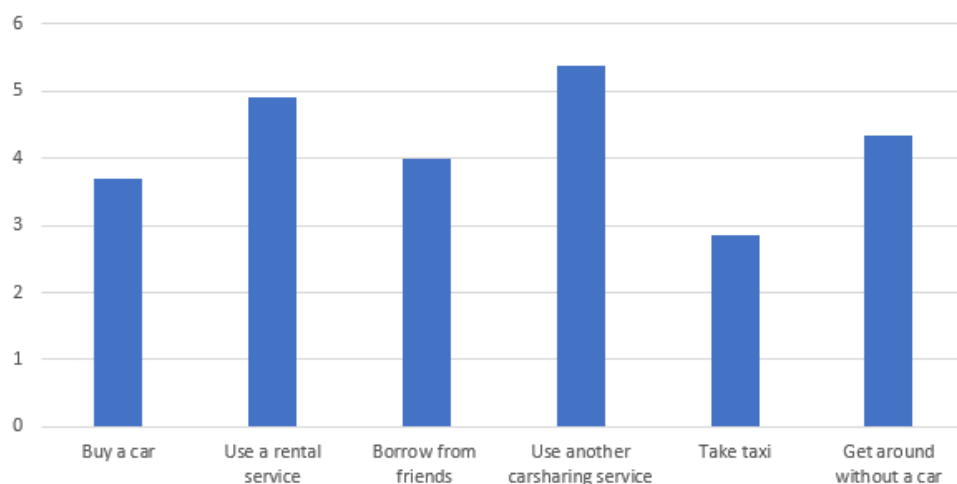


Figure 6.3: Average likelihood of the six alternatives if they were not members of BK. N=1315.

The immediate observations are that:

- BK is largely a substitute for other carsharing services and car rental services
- members say that it is more likely that they would get around without a car, than owning one.

These observations point to the fact that for members of BK, the likelihood of buying a car in the absence of BK is not very high. About 50% of respondents say that it is likely that they could get around without a car (score higher than 4).

To get a better sense of what the potential drivers are behind the members’ likelihood of buying a car if no longer a member, we apply a standard OLS regression analysis.

6.1.1 Likelihood of owning a car in the absence of BK

6.1.1.1 Regression with objectively verifiable variables

In the following section we investigate the relative importance of objective factors for the likelihood of buying a car. Table 6.1 presents the results from OLS regressions where the dependent variable is self-assessed likelihood of owning a car in the absence of a BK-membership. In columns (1-4) we exclude BK members that also own a car, as they can potentially be quite different from the rest of the sample. We do, however, include them in column (5).

We include as independent variables a set of relevant characteristics of the individual and household, such as gender, age, income, education, number of adults and children in the household (column 1) and BK membership characteristics (column 2). Note that in this survey we do not have individual information about income, so we use average income at the borough level. Income is therefore removed when we include borough fixed effects (FE) in columns (4) and (5). This can lead to some difficulties when comparing with results of the general population. In addition, we include some characteristics of the environment individuals make transport decisions in, such as previous car ownership, parking, and public transport access (column 3).

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Table 6.1: Regression results for the relationship between the self-assessed likelihood of getting a car in the absence of a BK-membership and a range of independent objective variables.

Dependent var: Would buy a car in the absence of a BK membership	(1)	(2)	(3)	(4)	(5) Car owners included
N adults household	0.237** (0.111)	0.178 (0.110)	0.184* (0.111)	0.195* (0.112)	0.157 (0.103)
N children	0.206*** (0.073)	0.144** (0.073)	0.145** (0.073)	0.152** (0.074)	0.166** (0.068)
female	-0.269** (0.127)	-0.184 (0.128)	-0.171 (0.129)	-0.231* (0.129)	-0.198 (0.121)
age	0.046 (0.043)	0.041 (0.045)	0.034 (0.045)	0.034 (0.043)	-0.001 (0.040)
age2	-0.001 (0.000)	-0.001 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
high education (university)	0.232 (0.250)	0.279 (0.251)	0.276 (0.252)	0.283 (0.253)	0.406* (0.238)
income 1000NOK (Borough)	0.003*** (0.001)	0.003*** (0.001)	0.003*** (0.001)		
how often use BK		0.433*** (0.079)	0.426*** (0.079)	0.426*** (0.080)	0.401*** (0.074)
satisfied with BK		-0.158* (0.085)	-0.159* (0.085)	-0.144* (0.086)	-0.104 (0.081)
length membership BK		-0.020 (0.056)	-0.010 (0.057)		
no other carsharing membership		-0.222 (0.138)	-0.225 (0.139)		
membership type = 2, Student		-0.134 (0.443)	-0.205 (0.448)		
parking access			-0.004 (0.028)		
PT distance <500m			0.113 (0.149)		
PT frequency <10min			-0.080 (0.166)		
Previous car owner			0.128 (0.134)		
carowner = 1, one car					1.193*** (0.188)
carowner = 2, more than one car					1.737*** (0.576)
Constant	0.533 (1.164)	0.606 (1.254)	0.743 (1.289)	2.063 (1.520)	2.592* (1.468)
Observations	1,021	1,017	1,017	1,017	1,165
R-squared	0.050	0.084	0.086	0.094	0.119
Borough FE	NO	NO	NO	YES	YES

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

From Table 6.1 we notice that the likelihood of buying a car if BK did not exist, increases with the number of adults (weakly significant) and of children in a household, as well as with income (very small effect). Also the likelihood of buying a car is positively correlated with how often they use carsharing and with car ownership, especially for those who own more than one car (N.B. only 14 individuals). The self-assessed likelihood of buying a car in the absence of BK-membership, is somewhat lower for women, although weakly significant and not stable. The likelihood of buying a car is also negatively correlated with satisfaction with BK.

Age and education do not seem to play a role in this hypothetical decision (the coefficient for education become weakly significant only in the last model). Also the type, length of membership, and whether the respondents are members of other carsharing services do not seem to be correlated with the

likelihood of buying a car. Interestingly, also parking access and public transport access do not impact this likelihood.

When we introduce car owners in the model (column 5), we see that car ownership, and owning more than one car has a very strong effect. This can be interpreted as a possibility that carsharing could be used in place of car number 2 or 3 in some households. The correlation between car ownership and likelihood of buying a car in the absence of BK can be seen in Figure 6.4. These findings reinforce the importance of investigating the drivers and barriers for car owners that currently are *not* a part of a carsharing service. We will do so in Section 6.2 General population.

In columns (4) and (5) we remove variables that do not add anything to the model and investigate whether these results are robust to the addition of fixed effects (dummies) for 23 different municipalities and boroughs. Most coefficients remain largely the same, and those that were statistically significant remain so.

We would like to stress that these estimates need to be interpreted with caution. There are several important variables that would be relevant that are not included, which means we should expect some omitted variable bias (Hill et al., 2008). For example, we can expect that the likelihood of buying a car would be positively influenced by, e.g., the distance to the workplace of the adults in the household, whether they own/have access to a cabin (along with distance to the cabin and user frequency) and number of close friends and family that are most easily visited by car. As such variables can be expected to be positively correlated with owning a car in the first place, our estimates regarding the effect of owning a car on the self-assessed likelihood of getting a car in the absence of a BK-membership, are likely to be somewhat overstated. Still, we consider our estimates to provide some important indication of what is the main drivers of the self-assessed likelihood of buying a car.

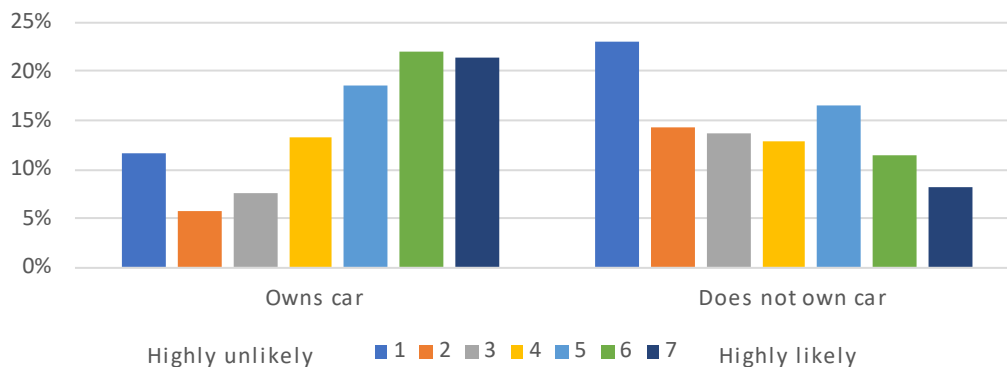


Figure 6.4: Distribution of car owners and non-owners' answers to the question: "Imagine you were not a member of BK, how likely is it that you would buy a car?" Investigating the importance of subjective assessments.

6.1.1.2 Investigating the relative importance of different subjective assessments

The survey asks a large number of questions regarding motivations and attitudes. Since these cannot be directly observed and could easily confound our estimates, we keep them separate from previous estimations and we include them in the following analysis.

The first column is identical to column 4 in Table 6.1 for reference. All models include borough fixed effects (FE). Column 2 also includes self-assessed possibility of borrowing a car from family or friends. While column 3 includes attitudes toward carsharing and column 4 adds answers to the question "What would (on a scale from 1-7) increase your use of carsharing?".

To what degree can carsharing substitute car ownership?

Table 6.2 Regression results for the relationship between the self-assessed likelihood of getting a car in the absence of a BK-membership and a range of independent subjective variables.

Dependent var: Would buy a car in the absence of a BK membership	(1)	(2)	(3)	(4)
N adults household	0.195* (0.112)	0.200* (0.112)	0.226** (0.109)	0.222** (0.108)
N children	0.152** (0.074)	0.152** (0.074)	0.143** (0.073)	0.095 (0.074)
female	-0.231* (0.129)	-0.244* (0.129)	-0.156 (0.127)	-0.177 (0.127)
age	0.034 (0.043)	0.036 (0.043)	0.042 (0.042)	0.044 (0.042)
age2	-0.000 (0.000)	-0.000 (0.000)	-0.001 (0.000)	-0.000 (0.000)
high education (university)	0.283 (0.253)	0.313 (0.253)	0.227 (0.247)	0.292 (0.245)
how often use BK	0.426*** (0.080)	0.420*** (0.080)	0.434*** (0.078)	0.405*** (0.078)
satisfied with BK	-0.144* (0.086)	-0.152* (0.086)	-0.052 (0.086)	-0.007 (0.086)
can borrow car from family/friends = 2, sometimes		0.113 (0.235)	0.001 (0.229)	0.053 (0.227)
can borrow car from family/friends = 3, little		0.307 (0.230)	0.217 (0.224)	0.259 (0.223)
can borrow car from family/friends = 4, never		-0.137 (0.241)	-0.225 (0.235)	-0.143 (0.234)
can borrow car from family/friends = 5, not relevant		-0.129 (0.404)	-0.116 (0.393)	0.023 (0.391)
Practical important			-0.189*** (0.042)	-0.186*** (0.042)
Environmental important			-0.079** (0.039)	-0.095** (0.039)
Choice important			-0.122*** (0.044)	-0.147*** (0.044)
Cost important			0.093** (0.040)	0.075* (0.040)
Idea important			0.067 (0.064)	0.041 (0.064)
Fixed parking spot				0.045 (0.066)
Access bus lanes				0.012 (0.037)
More cars in neighborhood				0.078 (0.062)
Subsidy/reduced cost				0.008 (0.040)
Newer cars				0.117*** (0.041)
Simple organization				0.088** (0.035)
Constant	2.063 (1.520)	1.992 (1.521)	2.268 (1.533)	0.796 (1.565)
Observations	1,017	1,017	1,017	1,017
R-squared	0.094	0.102	0.156	0.180
Borough FE	YES	YES	YES	YES

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

All estimates for the objective variables remain quite stable with the exception of number of children that become insignificant in column 4 and BK satisfaction which become no longer significant in column 3. The likelihood of buying a car in absence of BK decreases when people consider the practicality, the

environmental impact of carsharing or the expanded car choice set from carsharing to be important (column 3). On the contrary, the self-assessed likelihood of buying a car is higher when people choose carsharing because of its (lower) costs (column 3), importance of access to newer and better cars, and easier organization of extra equipment (e.g., children’s seats, dog cages and bike racks) (column 4).

We find no significant effect of whether respondents had access to borrowing a car or not (column 2) or whether the idea of carsharing is important (column 3). Also having a fixed parking spot, access to bus lane, more cars in the neighbourhood and a reduced cost of carsharing does not seem to impact the likelihood of getting a car in the absence of BK.

6.2 General population

6.2.1 Replacing current car ownership with carsharing

We asked our sample of the general population in 2017 how likely they are to join a carsharing service in the near future. The sample average gives a likelihood score of slightly less than 3 out of 7, indicating a higher weight on unlikely than likely. This average score is higher for those in the sample who do not own a car, where 17% answered likely or highly likely. On the other hand, the average score is considerably lower among car owners, who make up 69% of the sample. In this group we find that more than half are unlikely or highly unlikely to join a carsharing service in the near future. This is shown in Figure 6.5. Hjorteset og Böcker (2020) look closer at this difference in likelihood between car owners and those that do not own car.

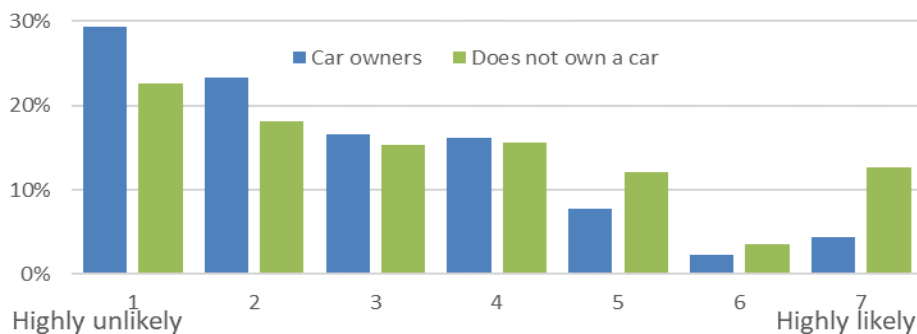


Figure 6.5: Likelihood of joining a carsharing service in the near future among car owners and those who do not own a car. N = 2484

More than half of car owners are unwilling or strongly unwilling to join a carsharing service. The distribution is shown in Figure 6.6.

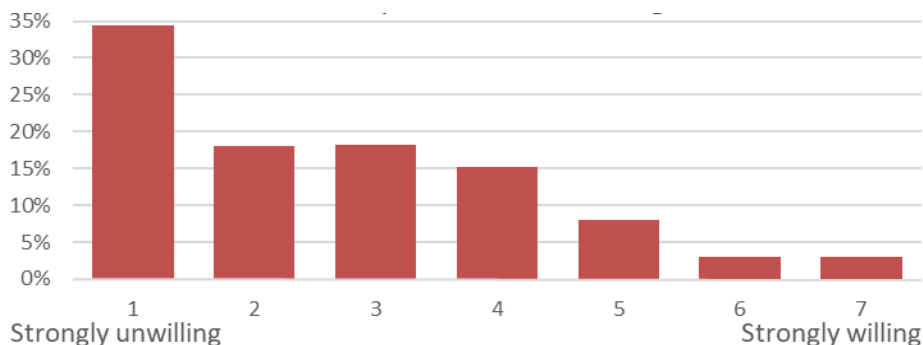


Figure 6.6: Willingness to replace current form of car ownership with a carsharing service. Car Owners only. N = 1017

To what degree can carsharing substitute car ownership?

We seek to explain the variation in the willingness to replace (WTR) their current form of car ownership with carsharing using standard OLS regression analysis in the following two subsections.

6.2.1.1 Regression with objectively verifiable variables

In Table 6.3 we want to investigate the relative importance of various factors that can be identified in objective data (e.g., age, gender, income, transport conditions etc.), that we expect can influence the WTR their current form of car ownership with carsharing. For this reason, the following analysis only includes car owners (2565 people⁷).

In the first column we show estimation of coefficients for the variables gender, age, education and income. In the second column we include also parking access and public transport distance, and frequency. Column 3 includes whether the respondents own more than one car. In column 4 we include borough fixed effects (FE).

Table 6.3: Regression results for the relationship between the self-assessed willingness to replace their current form of car ownership with carsharing and a range of independent variables. Car owners only.

Dependent var: Willingness to replace car ownership with carsharing	(1)	(2)	(3)	(4)
female	-0.138 (0.107)	-0.138 (0.106)	-0.160 (0.106)	-0.104 (0.108)
age	0.040 (0.025)	0.046* (0.025)	0.046* (0.024)	0.065** (0.026)
age2	-0.000* (0.000)	-0.000* (0.000)	-0.000* (0.000)	-0.001** (0.000)
high education (university)	0.233* (0.125)	0.203 (0.125)	0.157 (0.125)	0.211 (0.129)
income>750k	-0.372*** (0.108)	-0.352*** (0.108)	-0.281** (0.110)	-0.348*** (0.113)
parking access		-0.075** (0.031)	-0.076** (0.031)	-0.055 (0.034)
PT distance <500m		0.074 (0.104)	0.039 (0.104)	
PT frequency <10min		0.164 (0.105)	0.107 (0.106)	
Car owner = 2, more than one car			-0.406*** (0.114)	-0.370*** (0.118)
Constant	1.891*** (0.537)	2.077*** (0.565)	2.244*** (0.563)	1.251* (0.734)
Observations	1,017	1,017	1,017	1,017
R-squared	0.015	0.025	0.037	0.118
Borough FE	NO	NO	NO	YES

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Basic demographic variables such as gender and education do not seem to be very impactful on the willingness to replace car ownership with carsharing. Age is positively correlated and has an inverted U shape, but this effect is only weakly significant. Income is instead negatively correlated with the WTR. Parking access seems to have a negative impact as expected, while public transport vicinity doesn't affect it. People owning more than one car seem to be even less willing to start using carsharing. The survey of the general population did not include questions about the number of adults and children in the household, making it impossible to compare such coefficients with the survey of BK members.

⁷ The lower number of observations in the regressions table is due to only 1017 people having answered the question on WTR.

In the last column we investigate whether the results are robust to the addition of dummies for boroughs (if any area has less than ten observations, they have been lumped into a category “other”). The coefficients for parking access is reduced and is no longer significant, while the other coefficients remain quite stable.

As mentioned in the previous section, there is a high likelihood of having some omitted variable bias. We would have liked to have data on variables such as the respondents’ distance to workplace, cabin ownership (and frequency of visits), and number of close friends and family that are best reached by driving. While the findings may give some useful indications, the exact numbers should be interpreted with caution.

6.2.1.2 Investigating the relative importance of different subjective assessments

The survey had a large number of questions regarding motivations and attitudes. We are interested in the relative importance of a few attitudes and motives, in their correlation with their willingness to replace (WTR) their current form of car ownership with carsharing. The results are shown in Table 6.4.

The first column is the same as column 4 in Table 6.3 for reference. The second column includes self-reported possibility of borrowing a car from family or friends, whether the household is planning on changing their car in the next 12 months (no change, change car, get rid of car, get another car) and their degree of car dependence. In column 3 we add the respondents’ subjective beliefs about carsharing. More specifically, answers to the question “What would (on a scale from 1-7) increase your use of carsharing?”. In the last column we add degree of wanting to live in a urban area and attitudes toward cars. All models include borough fixed effects (FE).

To what degree can carsharing substitute car ownership?

Table 6.4: Regression results for the relationship between the self-assessed willingness to replace their current form of car ownership with carsharing and a range of independent variables, including variables on attitudes and motives. Car owners only.

Dependent var: Willingness to replace car ownership with carsharing	(1)	(2)	(3)	(4)
female	-0.104 (0.108)	-0.154 (0.102)	-0.120 (0.094)	-0.026 (0.103)
age	0.065** (0.026)	0.096*** (0.024)	0.078*** (0.022)	0.069*** (0.022)
age2	-0.001** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
high education (university)	0.211 (0.129)	0.130 (0.121)	0.076 (0.110)	0.035 (0.109)
income>750k	-0.348*** (0.113)	-0.280*** (0.107)	-0.252*** (0.097)	-0.278*** (0.097)
parking access	-0.055 (0.034)	-0.029 (0.032)	-0.013 (0.029)	-0.009 (0.029)
Car owner = 2, more than one car	-0.370*** (0.118)	-0.240** (0.119)	-0.186* (0.108)	-0.141 (0.108)
Can borrow car from family or friends		0.227* (0.134)	0.121 (0.121)	0.139 (0.120)
Consider to = 1, change car		0.264** (0.108)	0.277*** (0.098)	0.238** (0.097)
Consider to = 2, get rid of car		0.904*** (0.199)	0.719*** (0.181)	0.654*** (0.180)
Consider to = 3, get another car		0.037 (0.275)	0.068 (0.248)	0.113 (0.246)
Car dependence		-0.289*** (0.030)	-0.160*** (0.028)	-0.144*** (0.032)
Carsharing is social			0.008 (0.031)	0.016 (0.031)
More convenient than own car			0.195*** (0.025)	0.188*** (0.025)
Environmentally friendly			0.049 (0.031)	0.036 (0.031)
Suits my identity			0.230*** (0.032)	0.216*** (0.032)
Economically beneficial			-0.012 (0.034)	-0.046 (0.034)
It is unsafe			-0.040 (0.032)	-0.037 (0.032)
It is easily accessible for me			0.121*** (0.033)	0.122*** (0.033)
want to live urban				0.047* (0.027)
interested in car/tech innovation				0.027 (0.027)
expensive to own car				0.088*** (0.030)
identify as car driver				-0.005 (0.031)
parking makes it less practical				0.043 (0.027)
car less important in the future				0.060** (0.028)
Constant	1.251* (0.734)	1.804** (0.715)	-0.257 (0.699)	-1.129 (0.723)
Observations	1,017	1,017	1,017	1,017
R-squared	0.118	0.228	0.380	0.397
Borough FE	YES	YES	YES	YES

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

We find that the willingness to switch to carsharing is positively correlated with planning to get rid of one's car or change one's car. Naturally, the WTR increases when respondents believe carsharing to be more convenient, when it suits one's identity and when carsharing is perceived accessible. WTR is also positively correlated with the belief that owning a car is expensive and that cars will be less important in the future. Wanting to live in urban areas also seems to be positively correlated with WTR car ownership with carsharing, but it is weakly significant.

As expected, being very car dependent negatively affect the willingness to replace car ownership with carsharing. We find no significant correlation between the WTR and the belief that carsharing is either economically beneficial, social, safe or environmentally beneficial. Also being interested in car or car-related tech, identify oneself as car driver or thinking that difficulty of finding parking makes car owning impractical have no effect on the WTR car ownership with carsharing.

Furthermore, we see that the coefficient for owning more than one car loses in precision and is no longer significant when the subjective variables are added, while the other coefficient estimates remain basically the same.

Adding these subjective variables improves the model's ability to explain the variation of how interested car owners are in replacing car ownership with carsharing. From about 12% in model 1, adding subjective variables help the model to explain almost 40% of the variance in model 4 (see R² at the bottom of the table).

6.2.2 Renting out their own car

In the same 2017 survey we find that, among car owners, more than half are very uninterested in renting out their own car through a carsharing service. The distribution is shown in Figure 6.7.

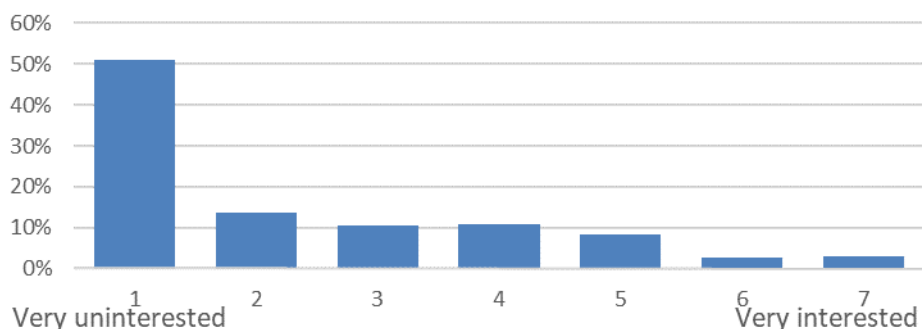


Figure 6.7: Distribution of answers among car owners regarding the interest in renting out one's car through a carsharing service.

We seek to explain the variation in the interest in renting out (IIRO) one's car through a carsharing service by investigating how different factors matter using standard OLS regression analysis.

6.2.2.1 Regression with objectively verifiable variables

In

Table 6.5 we want to investigate the relative importance of various factors that can be identified in objective data (e.g., age, gender, income, transport conditions etc.), that we expect can influence the IIRO. The models 1-4 follow similar logic as in Table 6.3. We include gender, age, education and income in the first column, then parking and public transport access (column 2) and if respondents own more than one car in column 3. In column 4 we include borough fixed effects (FE).

To what degree can carsharing substitute car ownership?

Table 6.5: Regression results for the relationship between the self-assessed interest in renting one's own car out through a carsharing service and a range of independent variables. Car owners only.

Dependent var: interest in renting out own car through carsharing	(1)	(2)	(3)	(4)
female	-0.241*** (0.068)	-0.237*** (0.068)	-0.244*** (0.068)	-0.239*** (0.069)
age	0.024* (0.014)	0.027* (0.014)	0.028* (0.014)	0.031** (0.015)
age2	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.001*** (0.000)
high education (university)	0.214*** (0.075)	0.206*** (0.075)	0.187** (0.075)	0.184** (0.078)
income>750k	-0.115 (0.071)	-0.102 (0.071)	-0.071 (0.072)	-0.106 (0.074)
parking access		-0.042** (0.020)	-0.041** (0.020)	-0.043* (0.022)
PT distance <500m		0.033 (0.068)	0.017 (0.068)	0.027 (0.071)
PT frequency <10min		0.144** (0.070)	0.126* (0.070)	0.069 (0.078)
Car owner = 2, more than one car			-0.167** (0.072)	-0.136* (0.074)
Constant	2.213*** (0.305)	2.284*** (0.324)	2.351*** (0.325)	1.975*** (0.442)
Observations	2,565	2,565	2,565	2,565
R-squared	0.031	0.034	0.037	0.064
Borough FE				YES

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Basic demographic variables (gender, age and education) seem to be relatively important for IIRO. Women tend to be less interested in renting out their car. Older and more educated respondents, on the contrary, seem to be more IIRO, even if the effect for age is only weakly significant - it has an inverted U shape. Income does not seem to matter for IIRO.

Having access to parking seems to have a negative impact, while public transport vicinity or frequency don't play an important role (frequency of public transport is weakly significant in model 2 but is reduced and becomes non-significant in models 3-4). People owning more than one car seem to be even less interested in renting out their car(s).

In the last column we investigate whether these results are robust to the addition of dummies for boroughs (if any area has less than ten observations, they have been lumped into a category "other"). The coefficients for parking access loses precision, while frequency of public transport becomes insignificant.

It is important to notice that the R² is very low for all the models, hence the explanatory power of the tested models is very limited and we should be very careful in interpreting the results.

6.2.2.2 Investigating the relative importance of different subjective assessments

As in the previous sections, we investigate the relative importance of different attitudes, motivation and barriers, and their correlation with interest in renting out their own car. The results are shown in Table 6.6.

As before, column 1 is the same as column 4 from Table 6.5 for reference. The second column includes self-reported possibility of borrowing a car from family or friends, whether the household is planning on changing their car in the next 12 months (no change, change car, get rid of car, get another car) and their degree of car dependence. In column 3 we add variables that measure the degree of importance of various statements in the hypothetical choice of renting out their car (enablers), on a Likert scale (1-7).

To what degree can carsharing substitute car ownership?

In the last column we add variables that measure the degree of importance of various reasons for *not* renting out their car (barriers). All models include borough fixed effects (FE).

Table 6.6: Regression results for the relationship between the self-assessed interest in renting one's own car out through a carsharing service and a range of exogenous variables. Car owners only.

Dependent var: interest in renting out own car through carsharing	(1)	(2)	(3)	(4)
female	-0.239*** (0.069)	-0.260*** (0.069)	-0.056* (0.033)	-0.039 (0.032)
age	0.031** (0.015)	0.050*** (0.015)	0.015** (0.007)	0.013* (0.007)
age ²	-0.001*** (0.000)	-0.001*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
high education (university)	0.183** (0.078)	0.154** (0.077)	0.081** (0.037)	0.083** (0.036)
income>750k	-0.105 (0.074)	-0.080 (0.073)	0.013 (0.035)	0.030 (0.034)
parking access	-0.044** (0.022)	-0.034 (0.022)	0.000 (0.010)	0.008 (0.010)
carowner = 2, more than one car	-0.142* (0.074)	-0.138* (0.077)	-0.019 (0.037)	-0.021 (0.036)
Can borrow car from family or friends		0.248*** (0.094)	0.041 (0.045)	0.017 (0.043)
Consider to = 1, change car		0.199*** (0.075)	0.036 (0.036)	0.032 (0.034)
Consider to = 2, get rid of car		0.517*** (0.137)	-0.017 (0.066)	-0.027 (0.064)
Consider to = 3, get another car		-0.121 (0.183)	-0.145* (0.088)	-0.117 (0.084)
Car dependence		-0.112*** (0.020)	-0.037*** (0.010)	-0.012 (0.010)
renting out saves money			0.395*** (0.020)	0.324*** (0.021)
is social			0.076*** (0.023)	0.066*** (0.022)
is environmental			-0.019 (0.024)	-0.025 (0.023)
is practical			0.065*** (0.023)	0.053** (0.022)
gives status			0.045** (0.023)	0.042* (0.022)
wish to help others			0.127*** (0.025)	0.094*** (0.025)
not enough money				0.067*** (0.009)
no renting out to strangers				-0.117*** (0.011)
too much work				-0.016 (0.011)
need car				-0.036*** (0.010)
Constant	2.032*** (0.436)	1.956*** (0.443)	1.361*** (0.213)	1.992*** (0.213)
Observations	2,565	2,565	2,565	2,565
R-squared	0.064	0.087	0.791	0.808
Borough FE	YES	YES	YES	YES

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

To what degree can carsharing substitute car ownership?

We find that the interest in renting out is positively correlated with the possibility of borrowing and planning to get rid of one's car or change one's car (column 2). However, the effects are no longer significant when we include motivations and barriers to renting out (column 4-5). Naturally, the IIRO increases when people believe that renting out their cars is a way to save money, social, practical and gives status (column 3). Note that the variation in the belief of how economical it would be to rent out one's own car explains 76% of the variation of how interested car owners are in renting out their own car.

However, IIRO is also positively correlated with the belief that renting out their cars does not bring in enough money. This is an unexpected result that may be interpreted to IIRO not being very related to money making, as both those who think they can save money and those who do not, are interested in renting out their cars. A possible explanation is that those who are the most motivated to saving money are also the ones who think they are not earning enough in renting their car out. As in

Table 6.5 IIRO is positively correlated with education and age, but these effects become smaller and less precise when adding motivations and barriers (column 3 and 4).

As expected, being very car dependent negatively affect IIRO (column 2), but this effect is reduced (column 3) and becomes insignificant (column 4) when including motivation and barriers. Moreover, relevant barriers to renting out their cars are unwillingness to rent out to strangers or needing their car. This last barrier is obviously very correlated with car dependency, so this can also be the reason car dependence loses its effect in column 4.

We find no significant correlation between the IIRO and the belief that renting out is environmentally beneficial or that renting out is too much work. Adding subjective variables also reduces the coefficient sizes for all of the objective variables that had statistically significant coefficients, such as parking access, gender and owning more than one car.

Adding enablers (column 3) and barriers (column 4) vastly improves the model's ability to explain the variation of how interested car owners are in renting out their cars with carsharing. From less than 1% in column 1 and 2, the model in column 3 and 4 explains about 80% of the variance (see R^2 at the bottom of the table). The key takeaway from this table is that the clearly strongest correlation, that also explains most of the variation of the interest in renting out, is the belief that it will be economically beneficial. Hence, the results would suggest that if decision makers want to stimulate the IIRO, the message of economic benefits should be in focus.

7 Discussion and Conclusions

In this report we discuss to what extent carsharing can replace traditional car ownership in the Norwegian context. We investigate whether carsharers would otherwise have owned a car in the absence of the carsharing service they use today. For non-carsharers, we ask whether car owners would consider switching to carsharing. Our results show that the majority (60%) of Bilkollektivet (BK) members would be unlikely or very unlikely to have bought a car in the absence of BK. Responders also indicate that they would be more likely to get around without a car than owning one. However, the majority also say that they would be likely or very likely to have used a rental service (65%) or another carsharing service (77%) in the absence of BK, making BK largely a substitute for other services. These results lead to the conclusion that for a large share of their members, BK is providing increased mobility to a segment who probably would not have owned a car in the first place. However, the question that was posed in the survey, did not ask what they would have done in a scenario without *any* carsharing or rental service.

Our analysis provides fuel for discussion of several important points on the role of carsharing in the transport system and in transport and environmental policy. We discuss here the likely net effect of carsharing on the size of the passenger car fleet and total vehicle kilometers traveled (VKT), and some of the constraints on growth from both the demand and the supply side. Finally, we discuss some policy implications.

7.1 Effect of carsharing on the reduction of car fleet

First of all, one member of a carsharing scheme does not imply that there is one less privately owned car. Our results have shown that it is more likely than not, that a member of a carsharing service would *not* have owned a car in the absence of the service. However, the expected reduction in the number of privately owned cars from an extra carsharing member is also higher than zero. To estimate this number, it would be ideal to follow the relevant population over time in the official car registry data and in carsharing membership data. This is out of scope for this report, but we can make a rough example calculation of the expected reduction based on the survey data analyzed in this report.

In Iversen (2021), which was worked on in tandem with this report, such example calculations were made. We will do a similar exercise, but exclude the business members, as they are not relevant for this assessment. The exercise involves translating the Likert score from 1 to 7 (from highly unlikely to highly likely) into a percentage probability. Since we cannot know what probabilities the respondents had in mind when they chose their answer, we prefer to calculate a broad range, from a modest percentage to an optimistic percentage.

In the modest case, we assume that a Likert score of 7 corresponds to a 50% probability of buying a car in the absence of BK, and the other Likert scores are assigned proportionate probabilities. In the optimistic case, we assume that a Likert score of 7 corresponds to a 100% probability of buying a car in the absence of BK. We consider this to be a broad, but reasonable range. We present these example calculations in Table 7.1.

To what degree can carsharing substitute car ownership?

Table 7.1: Example calculations of the number of avoided privately owned cars per BK-member based on survey data, modest and optimistic case.

Probability self-assessment	Likert score	Respondents	Modest percentage likelihood of buying a car	No. of cars, modest	Optimistic percentage likelihood of buying a car	No. of cars, optimistic
Highly unlikely	1	280	0%	0,0	0%	0,0
	2	172	8,3%	14,3	16,7%	28,7
	3	167	16,7%	27,8	33,3%	55,7
	4	169	25,0%	42,3	50,0%	84,5
	5	218	33,3%	72,7	66,7%	145,3
	6	166	41,7%	69,2	83,3%	138,3
Highly likely	7	129	50%	64,5	100%	129,0
SUM		1301		290,8		581,5
Avoided privately owned cars per respondent				0,22		0,45

Based on the survey data and our assumptions, we calculate that each responding BK member on average leads to a reduction of somewhere between 0,22 and 0,45 privately owned cars. In other words, we expect most BK members to not buy a car in counterfactual scenario where BK disappeared, but we also expect that at least one out of five members would have bought one.

We want to assess not just the average replacement per BK member, but the average replacement of a BK shared car. If we naively extrapolate these example calculations to BKs entire membership mass of 10 000 members and divide it by their fleet of 500 cars (like in Iversen (2021)), we arrive at 20 members per shared car. This gives us an average of 4,5 to 8,9 replacements of privately owned cars per shared car. This is roughly the same range as found in Rydén (2005) for Germany and Belgium, but lower than the ranges reported in Shaheen og Cohen (2013) for the US, Canada and Australia.

7.2 Effect of carsharing on VKT

Although a shared car fleet leads to a net reduction in the car fleet, it is not obvious that it leads to reduction in vehicle kilometer travelled (VKT). However, several studies find that carsharing reduces car use by about one third. In Norway, recent research finds that 18 % of carsharers in Bergen use the car more often than before, while 35% use the car less (Nenseth & Ellis, 2022). Relatively large reductions were found in E. Martin og S. A. Shaheen (2011) and Rydén (2005). However, a recent calculation for the Norwegian case was done in Johbraaten (2019b), based on data from the survey of the general population applied in this report. They calculate for a modest carsharing scenario and an optimistic scenario. In the modest scenario only those that scored 7 on the Likert scale on the question of whether they were likely to join a carsharing service in the near future, are assumed to become members of the carsharing service (9% of the sample). In the optimistic scenario, everyone that answered 5-7 on the Likert scale are assumed to become members (26% of the sample).

They point out the importance of differing between the long run and the short run. In the short run they assume that mainly non-car owners become members, and that members that own a car use the carsharing in addition to the cars they own (but less than an owned car). In the long run the carsharing service will replace currently privately owned cars and planned purchased cars. They calculate the annual VKT in the sample population to increase in the short run by between 0,4% and 1,1%, in the modest and optimistic scenario respectively. In the long run they calculate the annual VKT in the sample population to fall by between 0,9% and 2,5%. It is worth noting that this calculation relies heavily on the assumption that the part of the sample that does not own a car drives zero kilometers per year, and that

a user of a carsharing service will drive 33% less than the average annual vehicle kilometers of people owning a car, regardless of whether they owned a car before or not.

Whether the net effect on VKT will be positive or negative can be considered quite uncertain and will depend on the time horizon. This also implies that the net effect on emissions is also a bit uncertain, but as the shared car fleet is newer and has lower average emissions than the privately owned car fleet, the net effect is more likely to be emissions reductions.

7.3 Policy implications

From an environmental policy perspective, the interest in the carsharing sector is mostly about to which extent it can replace car ownership and reduce car use (therefore reducing emissions and use of public space). From our analysis in Section 0, it seems that carsharing is more appealing than car ownership for those who consider the practicality, the environmental impact or the expanded car choice set from carsharing to be important. However, people who put a high weight on these features may be less likely to own a car in the first place. Appealing to the cost saving motive and highlighting access to newer and better cars might have a bigger impact in convincing people prone to purchase a car into trying carsharing, than appealing to environmental, practicality or identity motives. Moreover, improving the access to extra equipment (e.g., children's seats, dog cages and bike racks) could reduce an important barrier to carsharing.

The utilization of the car fleet will be more *efficient* with a higher level of carsharing and can be achieved with fewer vehicles, holding constant the mobility level. Carsharing implies that for a given level of mobility, less city area is occupied by cars. According to Byggforsk (2015) a standard parking spot should have an area of 12,5 m². If we apply the example calculations above on the expected number of avoided cars per BK member, this will imply a 2,8 m²–5,6 m² of freed up space in the city, *ceteris paribus*. The relationship between removed cars and freed-up parking spaces is probably less than 1:1, unless accompanied with tighter parking policies, as there probably would be some latent parking demand at ongoing prices that would start using some of the freed-up space. Nevertheless, car owners who choose to replace their car with carsharing because it makes sense for them (e.g., cost reducing or more convenient) are still contributing to more available space in a city where available space is scarce, reflected in high land- and property prices. From an economic point of view, it does not address the causes of market failure in the parking market, free or underpriced street parking or regulation not aligned with market willingness to pay for parking (Shoup, 2011), but it does provide some relief to the problem.

Regardless of the replacement rate between owned cars and shared cars, carsharing services increase the car mobility offer, especially for low-income households (although currently low-income areas in the Oslo area are relatively undersupplied by carsharing services (Hjortset et al., 2021)). This distributional profile would be viewed as a positive, *ceteris paribus*, from most policy maker standpoints. This point is strengthened by the finding that the self-assessed likelihood of getting a car was (significantly) increasing in income. While the likelihood of a car owner to replace the current car ownership with carsharing was decreasing in income.

While carsharing improves the mobility possibilities for many low-income households, these households may be less likely to own a car in the first place. This dimension indicates that the effects of carsharing with the best distributional profile, may be in slight conflict with goals of reducing car traffic and emissions in cities. Hjortset og Böcker (2020) also touch on this dilemma, pointing to the fact that the role of carsharing should be optimized in regard to cost and accessibility to substitute car ownership, not to replace walking, biking or public transport. However, replacing walking, biking and public transport could be a risk if carsharing would become very inexpensive.

At the other end of the spectrum, we have households that own two or more cars, usually with higher incomes. If policymakers have a goal of reducing the number of privately owned cars, it seems reasonable to target efforts towards households with multiple cars. In many ways it makes sense that

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carsharing may have a stronger replacement effect on a household's second car than the first car, i.e. increased likelihood of buying a car in near future if you already own a car. One would expect diminishing marginal utility of an additional car, which therefore can be more easily replaced by an alternative service.

As for the general car-owning population, it seems like it may be hard to convince "the average car owners" to take the step to either switch to carsharing or rent out their own car. As of 2020, the survey results indicate that this is a niche interest. However, even with a small share of the total household-owned passenger cars being replaced, the share with the currently lowest utilization, there is a vast room for growth in the carsharing industry.

7.4 Caveats

Although it has been mentioned earlier in this report, there are a few caveats with this research that are worth underlining. An important caveat is that all assessments of the likelihood of buying a car in the absence of a carsharing service, and likelihood of joining a carsharing service in the future based on the self-reporting of survey respondents. We do not observe their actual behavior. We can analyze the drivers of the survey answers, but there is some uncertainty of how this would translate into real-life behavior. Moreover, the actual question for BK members did not imply a scenario without carsharing in general, but only without BK. Hence, we find that BK is largely a substitute for other carsharing/renting services.

The surveys used in this report approached the entire membership base of Bilkollektivet in the first case, and a non-stratified random selection of the general population living in some predefined areas of the country in the second case (large cities). Both surveys had reasonable response rates (more than 13%), but not so large that one can rule out challenges regarding representativeness and potential non-response biases.

Finally, the analyses done with the survey data has some challenges. The econometric models applied with the available data have fairly low explanatory power, and some of the important variables included that we a priori would expect to correlate with our variables of interest, were statistically insignificant. Moreover, several important variables that would be relevant to this model that are not included. We should expect that either the likelihood of buying a car, or skepticism towards replacing the current form of car ownership with carsharing would be positively influenced by e.g., the distance to the workplace of the adults in the household, whether they own/have access to a cabin (along with distance to the cabin and user frequency) and number of close friends and family that are most easily visited by car. We therefore point out that the estimates in our analysis should be interpreted with some caution, but we still consider the results to give indications of important drivers related to the choices between carsharing and car ownership, and where it may be wise to focus if the goal is to recruit would-be car buyers into carsharing.

7.5 Further Research

Considering the caveats of the previous section, a promising venue of new research on carsharing is to combine register data (which can be considered to be "objective" compared to survey data) for both car ownership and from carsharing services. The ideal study would involve analyzing individual choices of car ownership and carsharing over time, combined with annual vehicle kilometers travelled. That would allow for a far more accurate assessment of the net effect that the availability of carsharing services have on car ownership and car use (and associated emissions). And even if we would not be able to follow individual car owners or carsharing users, it would still be valuable to follow developments over time on e.g., postal code level. In particular, we want to understand the *causal effects* of increased availability of carsharing, and/or the demand effects for carsharing *caused* by various transport policies,

such as parking policies, tolling policies or, in other parts of this ongoing research project, nudging experiments. Policymaking will be better informed with a better knowledge of the causal effects of policies affecting the carsharing sector.

In spite of the caveats described in the previous subsection, we stress that these surveys on the topic of carsharing still gives access to new and valuable knowledge. And many of the questions that can be answered in surveys would be hard to observe in actual behavior (e.g., to what degree the respondents themselves consider cost, convenience, or environmental aspects to be important). The value of these surveys can also increase as more survey data is collected over time. The obvious benefit would be to understand changes over time and correlate them with changes in the transport sector. It could also be possible to conduct pseudo panel studies and analyze the richness of both subjective and objective assessments related to carsharing, and how they change over time.

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Appendix

Appendix 1. Variables overview

Table A.1: Survey of BK members in 2020. Descriptive statistics – shares and averages.

Variable	Mean or share
Age	46
Female share (%)	36%
Number of adults per household, including respondent (mean)	1,72
Number of children under 18 per household (mean)	0,76
Highest completed education	
10th grade	1,7%
High school	5,8%
University/college up to 4 years	30,4%
University/college 5 years or more	60,7%
No answer on education	1,32%
Car own	
Does not own or lease a car (share)	86%
Owens or leases one car (share)	13%
Owens or leases more than one car (share)	1%
Distance to closest relevant public transport	
Less than 500 meters	76%
500-1000 meters	21%
More than 1000 meters	3%
Frequency at closest relevant public transport station	
6 or more departures per hour	79%
4-5 departures per hour	17%
Less than 4 departures per hour	4%
Time being member of BK	
Less than 6 months	15%
6-12 months	11%
1-4 years	35%
5-9 years	27%
More than 10 years	13%
Type of BK membership	
Private	95%
Student	2%
Company	3%
Access to parking where they live self-assessed, likert scale (mean)	4,52
Degree of access to borrowing a car from family and friends	
Always	9%
Often	28%
Little access	32%
No access	23%
Not relevant	7%
How important are the following things for joining BK for you:	
“carsharing is more practical than owning a car personally”, likert scale (mean)	5,39
“I wish to travel more environmentally friendly”, likert scale (mean)	5,05
“Carsharing gives me more options of choice”, likert scale (mean)	5,18
“I reduce my transport costs by carsharing”, likert scale (mean)	5,64

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Variable	Mean or share
"I like the idea behind carsharing", likert scale (mean)	6,24
What could increase use of carsharing for you:	
Fixed parking spots in my neighborhood, likert scale (mean)	6,28
Access to bus lanes, likert scale (mean)	2,86
Increased access to shared cars in the neighborhood, likert scale (mean)	6,08
Incentives that reduce the cost of carsharing, likert scale (mean)	5,09
Access to newer and better cars, likert scale (mean)	4,69
Simpler organization of extra equipment (baby seat etc), likert scale (mean)	3,66

Table A.2: Survey of general population in 2017. Descriptive statistics – shares and averages.

Variable	Mean value or share
Age (mean)	39
Female share (%)	49%
Highest completed education	
10th grade	3%
High school	29%
University/college up to 3 years	33%
University/college 4 years or more	35%
Car ownership	
Does not own or lease a car (share)	31%
Owns or lease one car (share)	45%
Owns or lease two cars (share)	20%
Owns or leases three or more cars (share)	4%
Distance to closest relevant public transport	
Less than 500 meters	65%
500-1000 meters	27%
More than 1000 meters	7%
Frequency at closest relevant public transport station	
6 or more departures per hour	44%
4-5 departures per hour	30%
Less than 4 departures per hour	26%
Access to parking where they live self-assessed, likert scale (mean)	5,21
Is your household considering to sell/buy a car in the next year:	
Change car	32,2%
Get rid of the car	6,9%
Buy another car	3,7%
No change	57,2%
Degree of importance for joining a carsharing service, likert scale (mean)	
It is social	3,06
More convenient than own car	3,21
Environmentally friendly	4,72
Suits my identity	3,07
Economically beneficial	4,72
It is unsafe	2,92
It is easily accessible for me	3,42
Self-reported dependence on driving, likert scale (mean)	
Degree of wanting to live in urban areas, likert scale (mean)	4,70
Degree of interest for cars and innovations in the car business, likert scale (mean)	3,94
Degree perception of that car ownership is expensive and often non-economical, likert scale (mean)	5,12

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Variable	Mean value or share
Degree of identifying as a car-driver, likert scale (mean)	3,93
Degree of agreement with "Difficulties of finding parking in the city makes it less practical and economical to own a car", likert scale (mean)	4,83
Degree of agreement with "The car's role is changing, and it will be less important in the future", likert scale (mean)	4,20
Degree of importance for renting out their car, likert scale (mean)	
to save money	5,56
it is social	2,88
it is environmental	4,75
it is practical	4,66
it gives status	3,34
I wish to help others	4,61
Degree of importance for not renting out their car, likert scale (mean)	
not enough money to be made	3,25
I do not wish to rent out to strangers	5,71
too much work	4,73
I need my car for own purposes	4,83

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Appendix 2. Survey of Bilkollektivet members

ID:start_samtykke

IDer	
	Open

startdato_1	Dato for oppstart av intervjuet
♦ range:*	
♦ afilla:sys_date c	
Fylles inn automatisk	<input type="text"/> 1

starttid_1	Tid for oppstart av intervjuet
♦ range:*	
♦ afilla:sys_timenowf c	
Fylles inn automatisk	<input type="text"/> 1

samtykke_mlog o_1	 <p>Takk for at du deltar Bilkollektivets brukerundersøkelse! Før vi begynner har vi utdypende informasjon om personvern.</p> <p>Studien gjøres i regi av Bilkollektivet og gjennomføres av Transportøkonomisk institutt (TØI). Hvordan foregår datainnsamlingen?</p> <p>Bilkollektivet får bistand fra Transportøkonomisk institutt (TØI) til å samle inn data via elektroniske spørreskjema. Spørsmålene handler om bruk av bildeling og generell mobilitet. Personopplysninger samlet i dette spørreskjemaet vil benyttes kun av TØI i CarNudge prosjektet og av Bilkollektivet for å forbedre tjenesten og den digitale brukeropplevelsen.</p> <p>Hva skjer med informasjonen om deg?</p> <p>Alle personopplysninger vil bli behandlet konfidensielt og i samsvar med personvernregelverket. Den tekniske registreringen av svarene på spørreskjemaundersøkelsen foretas av Quenchtec (www.quenchtec.com). TØI er behandlingsansvarlig, og forholdet er kontraktregulert. Så lenge du kan kobles direkte til spørreundersøkelsen vil kun utvalgte prosjektmedarbeidere ved TØI ha tilgang til informasjonen. Rapporten fra undersøkelsen vil bare inneholde data for grupper slik at enkeltpersoner ikke kan identifiseres. Ved slutt av prosjektet vil data bli anonymisert, slik at vi kan ikke identifisere enkeltdeltakere, eller slettet innen 31.12.2023. De anonymiserte dataene vil da lagres videre for forskningsformål, uten noen form for kommersiell utnyttelse.</p> <p>Frivillig deltakelse</p> <p>Det er frivillig å delta i studien, og du kan når som helst trekke ditt samtykke uten å oppgi noen grunn. Dersom du trekker deg, vil alle opplysninger om deg bli anonymisert. Det vil ikke ha noen negative konsekvenser for deg hvis du ikke vil delta eller senere velger å trekke deg.</p> <p>Dine rettigheter</p> <p>Så lenge du kan identifiseres i datamaterialet, har du rett til: innsyn i hvilke personopplysninger som er registrert om deg, å få rettet opp personopplysninger om deg, å få slettet personopplysninger om deg, å få utlevert en kopi av dine personopplysninger (dataportabilitet), og å sende klage til personvernombudet eller Datatilsynet om behandlingen av dine personopplysninger.</p> <p>Kontakt</p> <p>Dersom du har spørsmål til studien, eller ønsker å benytte deg av dine rettigheter, ta kontakt med prosjektleder Alice Ciccone (aci@toi.no) ved Transportøkonomisk institutt (TØI). Du kan også kontakte personvernombud på TØI Gro Østlie tlf. 91619347. På oppdrag fra TØI har NSD – Norsk senter for forskningsdata AS vurdert at behandlingen av personopplysninger i dette prosjektet er i samsvar med personvernregelverket.</p>
♦ range:*	
Jeg har lest informasjonen og samtykker til å delta i undersøkelsen	<input type="radio"/> 1
♦ skip:exit	
Jeg samtykker ikke til å delta og ønsker å avslutte undersøkelsen	<input type="radio"/> 2

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ID:Alder_epost

Alder	Før vi begynner har vi noen spørsmål om deg Hvor gammel er du? Skriv inn fødselsdato (dd.mm.åå)
♦ range:*	
Dag	<input type="text"/> <input type="text"/> 1
Måned	<input type="text"/> <input type="text"/> 2
Årstall (siste to siffer)	<input type="text"/> <input type="text"/> 3

Smarttelefon	Har du smarttelefon?
♦ range:*	
Ja	<input type="radio"/> 1
Nei	<input type="radio"/> 2

Oppfolg	Vi skal utvikle en ny app for Bilkollektivet Vil du være med i en test- eller fokusgruppe for appen?
♦ range:*	
Ja	<input type="radio"/> 1
Nei	<input type="radio"/> 2

eposttestgruppe	For å vinne premie og for å teste appen behøver vi din e-postadresse Vennligst oppgi e-postadressen der du mottok undersøkelsen
♦ filter:\Oppfolg.a=1 ♦ range:*	
Skriv inn e-postadressen	Open
Gjenta e-postadressen	Open

epost	For å vinne premie behøver vi e-postadressen din Vennligst oppgi e-postadressen der du mottok undersøkelsen Deltakelse er valgfritt
♦ filter:\Oppfolg.a=2	
Skriv inn e-postadressen	Open
Gjenta e-postadressen	Open

ID:Bilkollektivet

MediBilkoll	Hvor lenge har du vært medlem av Bilkollektivet?
♦ range:*	
Under 6 måneder	<input type="radio"/> 1
6 - 12 måneder	<input type="radio"/> 2
1 - 4 år	<input type="radio"/> 3
5 - 9 år	<input type="radio"/> 4
Mer enn 10 år	<input type="radio"/> 5

Medlemskap	Hva slags medlemskap av Bilkollektivet disponerer du?
♦ range:*	
Privat	<input type="radio"/> 1
Student	<input type="radio"/> 2
Bedrift	<input type="radio"/> 3

Privatdele	Deler du medlemskapet med andre?
♦ filter:\Medlemskap.a=1	
♦ range:*	
Medlem alene	<input type="radio"/> 1
Deler medlemskap med en person utenfor husstanden	<input type="radio"/> 2
Medlem sammen med en i husstanden	<input type="radio"/> 3

Bedriftdele	Hvor mange ansatte er brukere av tjenesten inkludert deg selv?
♦ filter:\Medlemskap.a=3	
♦ range:*	
1 - 4 personer	<input type="radio"/> 1
5 - 9 personer	<input type="radio"/> 2
10 - 19 personer	<input type="radio"/> 3
20 personer eller flere	<input type="radio"/> 4

Hovedmedlem	Er du hovedmedlem eller medbruker?
♦ range:*	
Hovedmedlem	<input type="radio"/> 1
Medbruker	<input type="radio"/> 2
Vet ikke	<input type="radio"/> 3

To what degree can carsharing substitute car ownership?

ID:Medlem_mindre_enn_12mnd
filter:\MedlBilkoll.a=1;2

Innmeldingspros ess	Hvor fornøyd er du med innmeldingsprosessen når det gjelder						
♦ range:*	Svært misfornøyd	Misfornøyd	Hverken eller	Fornøyd	Svært fornøyd	Vet ikke	
	1	2	3	4	5	6	
informasjon om medlemskapet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1
utfylling av innmeldingsskjema og andre praktiske momenter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2

Nettsiden	Søkte du informasjon om medlemskapet på Bilkollektivets nettsider, før du ble medlem?	
♦ range:*		
Ja	<input type="radio"/>	1
Nei	<input type="radio"/>	2

Informasjon							
♦ filter:\Nettsiden.a=1							
♦ range:*	Svært misfornøyd	Misfornøyd	Hverken eller	Fornøyd	Svært fornøyd	Vet ikke	
	1	2	3	4	5	6	
Hvor fornøyd er du med informasjonen du fikk?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1

Innmeldingssyns punkter	Har du andre synspunkter om innmeldingsprosessen?	
Skriv inn her	Open	

Kontaktinnmelding	Var du i kontakt med Bilkollektivet på e-post, chat eller per telefon i forbindelse med innmeldingsprosessen? Det kan velges flere alternativer	
♦ range:*		
E-post	<input type="checkbox"/>	1
Chat	<input type="checkbox"/>	2
Telefon	<input type="checkbox"/>	3
♦ exclusive:yes		
Nei	<input type="radio"/>	4
♦ exclusive:yes		
Vet ikke	<input type="radio"/>	5

To what degree can carsharing substitute car ownership?

Kundeservice							
♦ filter:\Kontaktinnmelding.a=1 \Kontaktinnmelding.a=2 \Kontaktinnmelding.a=3 ♦ range:*							
	Svært misfornøyd	Misfornøyd	Hverken eller	Fornøyd	Svært fornøyd	Vet ikke	
	1	2	3	4	5	6	
Hvor fornøyd er du med hjelpen du fikk?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1

KommentartilBil kollektivet	Dersom det er andre momenter som du synes er viktig for ditt medlemskap i Bilkollektivet
Skriv inn	Open

To what degree can carsharing substitute car ownership?

ID: Bildeling

Kjennskap	Hvordan fikk du kjennskap til Bilkollektivet? Det kan velges flere alternativer		
♦ range:*			
Venner eller familie		<input type="checkbox"/>	1
Sosiale medier		<input type="checkbox"/>	2
Reklame		<input type="checkbox"/>	3
Bekjente		<input type="checkbox"/>	4
Omtale i media/aviser		<input type="checkbox"/>	5
Søkte frem informasjonen selv		<input type="checkbox"/>	6
Annet		<input type="checkbox"/>	7

KjennerAndre	Kjenner du andre husholdninger som benytter bildeling?		
♦ range:*			
Ja		<input type="radio"/>	1
Nei		<input type="radio"/>	2

UformellDeling	Har du tilgang til å låne bil gjennom familie eller venner?		
♦ range:*			
Ja, får alltid låne ved behov		<input type="radio"/>	1
Ja, får låne av og til		<input type="radio"/>	2
Har liten tilgang		<input type="radio"/>	3
Har ikke tilgang		<input type="radio"/>	4
Ikke relevant		<input type="radio"/>	5

MediAndre	Er du eller noen i din husstand brukere eller medlemmer av andre bildelingsplattformer?		
♦ range:*			
Ja		<input type="radio"/>	1
Nei		<input type="radio"/>	2

Hvorfor Bruker	Hvor viktig er de følgende faktorene for at du ble medlem av Bilkollektivet?							
	Svært lite viktig				Svært viktig			
♦ range:*	1	2	3	4	5	6	7	
	1	2	3	4	5	6	7	
Bildeling er mer praktisk enn å eie egen bil	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1
Jeg ønsker å reise mer miljøvennlig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2
Bildeling gir meg økt valgfrihet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3
Jeg reduserer mine transportkostnader med bildeling	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4
Jeg liker idéen bak bildeling	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5

Bruk_leie	Tenk etter hvor mye du i gjennomsnitt har benyttet Bilkollektivet det siste halve året. Omtrent hvor ofte har du leid bil gjennom Bilkollektivet?	
♦ range:*		
Mer enn en gang i uka	<input type="radio"/>	1
Mer enn en gang i måneden	<input type="radio"/>	2
Mellom 3 - 6 ganger i halvåret	<input type="radio"/>	3
Sjeldnere	<input type="radio"/>	4

Formal_siste	Tenk på din siste bildelingstur. Hva var formålet med turen?	
♦ range:*		
♦ rot:r	<input type="radio"/>	1
Til og fra arbeid/studie	<input type="radio"/>	2
Tjenestereiser (også møter ol. i tilknytning til arbeid)	<input type="radio"/>	3
Bringe/hente/følge barn	<input type="radio"/>	4
Kjøre/følge andre for ulike formål	<input type="radio"/>	5
Dagligvareinnkjøp	<input type="radio"/>	6
Større innkjøp	<input type="radio"/>	7
Varetransport	<input type="radio"/>	8
Fritidsreiser (kino, trening, besøke venner/familie eller lignende)	<input type="radio"/>	9
Ferie eller helgetur	<input type="radio"/>	10
Flyttelass	<input type="radio"/>	11
♦ rot:n	<input type="radio"/>	
Annet	<input type="radio"/>	

To what degree can carsharing substitute car ownership?

Lengde_siste	Tenk på sin siste bildelingstur Omtrent hvor lang var denne turen?
♦ range:*	
Antall dager leieforholdet varte	□□□□ 1
Antall kilometer kjørt	□□□□ 2

AltTrans	Hvis det ikke fantes tilgjengelig bil fra Bilkollektivet når du trengte det Hva er alternativet ditt? Det er mulig å svare flere alternativer
♦ range:*	
Kollektivtransport	<input type="checkbox"/> 1
Leie bil av utleieselskaper	<input type="checkbox"/> 2
Låne bil av venner/familie	<input type="checkbox"/> 3
Bruke egen/husstandens bil	<input type="checkbox"/> 4
Leie/låne bil i annen bildelingsordning	<input type="checkbox"/> 5
Ta taxi	<input type="checkbox"/> 6
Leie elsparkesykkel	<input type="checkbox"/> 7
Sykkel/elsykkel	<input type="checkbox"/> 8
Utsatt eller avlyst turen	<input type="checkbox"/> 9
Vet ikke	<input type="checkbox"/> 10
Annet, skriv inn	Open

AltTransfirma	Hvis det ikke fantes tilgjengelig bil fra Bilkollektivet når du trengte det Hvilket leiebilfirma ville du brukt? Det er mulig å svare flere alternativer
♦ filter:\AltTrans.a=2;5	
♦ range:*	
Nabobil	<input type="checkbox"/> 1
Hertz Bilpool	<input type="checkbox"/> 2
Hyre	<input type="checkbox"/> 3
Vy bybil	<input type="checkbox"/> 4
Annet, skriv inn	Open

ID:Meninger

Fornøyd	Hvor fornøyd var du sist du benyttet deg av bil fra Bilkollektivet?
♦ range:*	
Svært misfornøyd	<input type="radio"/> 1
Misfornøyd	<input type="radio"/> 2
Hverken misfornøyd eller fornøyd	<input type="radio"/> 3
Fornøyd	<input type="radio"/> 4
Svært fornøyd	<input type="radio"/> 5
Husker ikke	<input type="radio"/> 6

Fornøydtekst	Utdyp gjerne hva du var fornøyd med
♦ filter:\Fornøyd.a=4;5	
Skriv inn	Open

Misfornøydtekst	Utdyp gjerne hva du var misfornøyd med
♦ filter:\Fornøyd.a=1;2	
Skriv inn	Open

Problemer	Har du opplevd problemer når du har leid bil fra Bilkollektivet i løpet av de siste 12 måneder?
♦ range:*	
Ja	<input type="radio"/> 1
Nei	<input type="radio"/> 2
Vet ikke	<input type="radio"/> 3

Hvilketproblem	Hva var problemet? Du kan velge flere svaralternativer
♦ filter:\Problemer.a=1	
♦ range:*	
Mangelfull forklaring på hvor bilen befant seg	<input type="checkbox"/> 1
Bilen var ikke på plass	<input type="checkbox"/> 2
Kom ikke inn i bilen	<input type="checkbox"/> 3
Nøkkel var ikke på plass	<input type="checkbox"/> 4
Annet:	Open
Bilen hadde skader som ikke var rapportert	<input type="checkbox"/> 5
Bilen hadde tekniske feil/mangler	<input type="checkbox"/> 6
Nesten tomt for drivstoff/strøm ved henting	<input type="checkbox"/> 7
♦ exclusive:no	<input type="checkbox"/> 8
Mangelfull rengjøring	<input type="checkbox"/> 8
Fikk ikke start på bilen	<input type="checkbox"/> 9
Ble logget ut pga av tidsutløp	<input type="checkbox"/> 10
Drivstoffkort manglet	<input type="checkbox"/> 11
Bilen fikk skader/tekniske mangler under kjøreturen	<input type="checkbox"/> 12

To what degree can carsharing substitute car ownership?

Hvilket problem	Hva var problemet? Du kan velge flere svaralternativer	
Parkeringsplass opptatt		<input type="checkbox"/> 13
Overskred bestilt leietid		<input type="checkbox"/> 14
Problemer med lading/ladekabel		<input type="checkbox"/> 15
Glemte igjen personlige eiendeler i bilen		<input type="checkbox"/> 16
Brukerfeil		<input type="checkbox"/> 17

Problemløs	Hvordan ble problemet løst?	
♦ filter:\Problemer.a=1 ♦ range:*		
Løste problemet selv uten assistanse		<input type="radio"/> 1
Jeg søkte assistanse fra Bilkollektivet pr telefon		<input type="radio"/> 2
Jeg søkte assistanse fra Bilkollektivet via chat		<input type="radio"/> 3
Ombooket til annen bil		<input type="radio"/> 4
Betalte for bensin		<input type="radio"/> 5
Fikk ikke løst problemet		<input type="radio"/> 6
Annet:		Open

Fornøydproblem	Hvis du fikk assistanse, hvor fornøyd er du med assistansen?	
♦ filter:\Problemløs.a=2;3;7 ♦ range:*		
Svært misfornøyd		<input type="radio"/> 1
Misfornøyd		<input type="radio"/> 2
Hverken misfornøyd eller fornøyd		<input type="radio"/> 3
Fornøyd		<input type="radio"/> 4
Svært fornøyd		<input type="radio"/> 5
Husker ikke		<input type="radio"/> 6

Vanskeligreservasjon	Når du bruker Bilkollektivet Hva savner du ved reservasjon av bil?	
♦ filter:\Medlemskaputsagn.a.8=1;2;3		
Skriv inn		Open

Vanskeligbruk av bil	Når du bruker Bilkollektivet Hva er vanskelig med å bruke bilen?	
♦ filter:\Medlemskaputsagn.a.10=1;2;3		
Skriv inn		Open

Fatakobil	Hvor lett synes du det er å få i tak bil fra Bilkollektivet når du ønsker det?	
♦ range:*		
Opplever som regel alltid å få bil slik jeg ønsker	<input type="radio"/>	1
Må ofte hente bil fra andre oppstillingsplasser enn det jeg ønsker	<input type="radio"/>	2
Opplever stadig at det ikke er biler tilgjengelig når jeg ønsker det	<input type="radio"/>	3
Må ofte velge annen bilstørrelse enn det jeg ønsker	<input type="radio"/>	4
Annet:		Open

Rerservere	Hvor ofte reserverer du bil via ...				
♦ range:*					
	Aldri	Noen ganger	Som oftest	Alltid	
	1	2	3	4	
PC	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1
App (webapp)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2

Foretrekke	Når du reserverer bil hos Bilkollektivet Hva slags type bil foretrekker du? Det kan velge flere alternativer	
♦ range:*		
Mellomklasse elbil	<input type="checkbox"/>	1
Premium elbil	<input type="checkbox"/>	2
Småbil	<input type="checkbox"/>	3
♦ exclusive:no Mellomklasse bil	<input type="checkbox"/>	4
♦ exclusive:no Stasjonsvogn	<input type="checkbox"/>	5
7-seter	<input type="checkbox"/>	6
SUV 4x4	<input type="checkbox"/>	7
9-seter	<input type="checkbox"/>	8
Liten varebil	<input type="checkbox"/>	9
Varebil	<input type="checkbox"/>	10
Stor varebil	<input type="checkbox"/>	11
Elektrisk varebil	<input type="checkbox"/>	12

Apne bilen	Hva ville du foretrekke å åpne bilen med?	
♦ range:*		
Smartkort	<input type="radio"/>	1
App på mobil	<input type="radio"/>	2

To what degree can carsharing substitute car ownership?

ID:Okt_bruk

Oktbruk	Er det noe spesielt som ville kunne øke bruken av bildeling for dere?							
	I svært liten grad				I svært stor grad			
♦ range:*	1	2	3	4	5	6	7	
	1	2	3	4	5	6	7	
Faste parkeringsplasser for delingsbiler i nærmiljøet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1
Tilgang til kollektivfeltet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2
Økt tilgjengelighet til delingsbiler i nærområdet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3
Incentiver/subsidier for bildeling som gjør dette billigere å bruke	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4
Mindre direkte kontakt med eier (gjennom f.eks. nøkkelløs tilgang)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5
Tilgang på nyere og bedre biler	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6
Enklere organisering av ekstrautstyr (barnesete, hundebur, sykkelstativ osv.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7

ID:Transportressurser

Bilhold	Eier (eller leaser) du eller noen i din husholdning bil?
♦ filter:*	
Ja	<input type="radio"/> 1
Nei	<input type="radio"/> 2

Bilhold_ant	Hvor mange biler eier (eller leaser) din husholdning til sammen?
♦ filter:\Bilhold.a=1	
♦ range:*	
En bil	<input type="radio"/> 1
To biler	<input type="radio"/> 2
Tre eller flere biler	<input type="radio"/> 3

TypeBil1	Hvilken type bil finnes i din husholdning?
♦ filter:\Bilhold_ant.a=1	
♦ range:*	
Bensinbil	<input type="radio"/> 1
Dieselbil	<input type="radio"/> 2
Elbil	<input type="radio"/> 3
Hybridbil	<input type="radio"/> 4
Ladbar hybridbil	<input type="radio"/> 5
Annet	<input type="radio"/> 6
♦ exclusive:yes	
Vet ikke	<input type="radio"/> 7

TypBil	Hvilke typer biler finnes i din husholdning?
♦ filter:\Bilhold_ant.a=2;3	
♦ range:*	
Bensinbil	<input type="checkbox"/> 1
Dieselbil	<input type="checkbox"/> 2
Elbil	<input type="checkbox"/> 3
Hybridbil	<input type="checkbox"/> 4
Ladbar hybridbil	<input type="checkbox"/> 5
Annet	<input type="checkbox"/> 6
♦ exclusive:yes	
Vet ikke	<input type="radio"/> 7

TidBilhold	Har du eller en i din husholdning tidligere eid bil?
♦ filter:\Bilhold.a=2	
♦ range:*	
Ja, har eid bil tidligere	<input type="radio"/> 1
Nei, har aldri eid bil	<input type="radio"/> 2

To what degree can carsharing substitute car ownership?

NyBil	Har du planer om å kjøpe eller selge bil de neste 12 månedene?
♦ filter:\Bilhold.a=1 ♦ range:*	
Selge bil	<input type="radio"/> 1
Selge og kjøpe annen bil	<input type="radio"/> 2
Kjøpe ekstra bil	<input type="radio"/> 3
Har ingen planer om endringer	<input type="radio"/> 4

NyBil_1	Har du planer om å kjøpe bil de neste 12 månedene?
♦ filter:\Bilhold.a=2 ♦ range:*	
Skal helt sikkert kjøpe bil	<input type="radio"/> 1
Vurderer å kjøpe bil	<input type="radio"/> 2
Skal ikke kjøpe bil	<input type="radio"/> 3

KollAvst	Hvor langt er det fra boligen til stoppestedet for det kollektive transportmidlet som du vanligvis bruker, eller som det kan være mest aktuelt å bruke?
♦ range:*	
Under 500 meter	<input type="radio"/> 1
Mellom 500 - 1000 meter	<input type="radio"/> 2
Mer enn 1000 meter	<input type="radio"/> 3

KollAvg	Omtrent hvor ofte går det kollektivtransport fra dette stoppestedet?
♦ range:*	
6 ganger i timen eller mer	<input type="radio"/> 1
4-5 ganger i timen	<input type="radio"/> 2
Sjeldnere enn 4 ganger i timen	<input type="radio"/> 3

ParkTilg	Hvor god tilgang har du til parkering der du bor?
♦ range:*	
	Svært dårlig tilgang
	1 2 3 4 5 6 7 Svært god tilgang
Tilgang:	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> 1

ID:Generellmob

DagligMob	Hvilket transportmiddel bruker du vanligvis ...									
♦ range:*										
	Gange	Sykkel	Elsykkel	Moped/ motorsyk kel	Privatbil	Kollektivt ransport	Bideling	Annet	Ikke relevant	
	1	2	3	4	5	6	7	8	9	
til og fra arbeid eller utdanningssted?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1
til og fra hverdagshandel?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2
til og fra storhandel?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3
til og fra fritidsaktiviteter?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4
til og fra for å besøke venner?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5
til og fra helgeturer?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6

To what degree can carsharing substitute car ownership?

ID:UtenBildeling

Information

Nå følger noen påstander om dine reisemåter etter du ble medlem av Bilkollektivet.

eBilkoll	I hvilken grad er du enig eller uenig i følgende påstander: Etter jeg ble medlem av Bilkollektivet..							
	Helt uenig				Helt enig			
♦ range:*	1	2	3	4	5	6	7	
	1	2	3	4	5	6	7	
går eller sykler jeg mer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1
benytter jeg mindre kollektivtransport	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2
sparer jeg penger på transport	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3
kan jeg reise til stedet jeg tidligere ikke kunne nå	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4
bruker jeg mer bil	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5
har jeg utsatt å kjøpe ny bil	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6
har jeg ikke behov for å kjøpe bil	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7


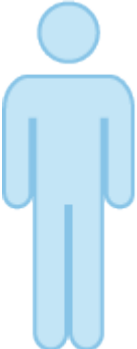
Salt	Tenk deg at du ikke var medlem av Bilkollektivet. Svært usannsynlig Svært sannsynlig Hva ville vært ditt mest sannsynlige eller minst sannsynlige alternativ?							
	♦ range:*	1	2	3	4	5	6	7
	1	2	3	4	5	6	7	
Kjøpe bil	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1
Leie bil av et utleieselskap når jeg har behov for det	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2
Låne bil fra venner eller bekjente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3
Leie gjennom annen bildelingsordning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4
Ta taxi	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5
Klare meg uten bil	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6

To what degree can carsharing substitute car ownership?

ID:Opprett_holdbarhet

To what degree can carsharing substitute car ownership?

ID: Bakgrunnsvariabler

Kjønn		Til slutt - litt om deg
Kjønn		
♦ range:*		
Kvinne		<input type="radio"/> 1
Mann		<input type="radio"/> 2

Husstand	Hvor mange barn og voksne (inkludert deg) er det i din husstand?
Antall barn under 18 år	<input type="text"/> <input type="text"/> 1
Antall voksne	<input type="text"/> <input type="text"/> 2

Postnummer	Hva er postnummeret ditt?
♦ range:0000:9999	
Skriv inn postnummer	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> 1

Utdanning	Hva er din høyeste fullførte utdanning?
♦ range:*	
Grunnskole	<input type="radio"/> 1
Videregående skole	<input type="radio"/> 2
Høgskole/universitet (t.o.m. 4 år)	<input type="radio"/> 3
Høgskole/universitet (5 år eller mer)	<input type="radio"/> 4
Ønsker ikke svare	<input type="radio"/> 5

ID:Avslutning

Kommentarer | Har du noen kommentarer til undersøkelsen?

Skriv her: Open

dato_slutt_1 | Dato for avslutning av intervjuet

♦ **range:***
 ♦ **afilla:**sys_date c 1
 Fylles inn automatisk

tid_slutt_1 | Tidsstempel

♦ **range:***
 ♦ **afilla:**sys_timenowf c 1
 Fylles inn automatisk

Information

♦ **exit:**yes
 ♦ **filter:**\NesteUnd.a=1
 ♦ **redirect:**http://dc.miprocloud.net/DCWebEngine/panelsurvey.aspx?qif=4de1be36-e7a5-486b-aeec-da354920a389
 ♦ **status:**COMPLETE



INFO: lag en ny undersøkelse med bare epost-spørsmålet. Endre "redirect on exit" til lenken til din nye undersøkelse med bare epost-info. Dette vil gjøre det umulig å koble svar mot epost.
 Takk for deltakelsen!
 Klikk på "Neste" for å skrive inn epost i et eget skjema.
 For at dine svar skal være anonyme, vil ikke kontaktinformasjonen din kunne kobles til hva du har svart i denne undersøkelsen.

Information

♦ **exit:**yes
 ♦ **filter:**\NesteUnd.a=2
 ♦ **redirect:**http://www.toi.no
 ♦ **status:**COMPLETE



Takk for besvarelsen din!

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