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Business-to-business carsharing: Evidence from Britain of factors associated with employer-based carsharing membership and its impacts

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Abstract

Carsharing organizations (known as car clubs in Britain) are today evolving in new ways. One noteworthy development is the growth of the business-to-business (B2B) market, which is motivated in part by operators' desire to smooth the temporal profile of overall carsharing demand and thereby increase aggregate fleet-utilization rates. In contrast to the widely-

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studied business-to-consumer (B2C) market, however, comparatively little is known about the B2B segment. This study fills this gap by drawing on a national survey of both Britain's B2B carsharing members (n=682) and employers' corporate travel administrators that oversee an organization's B2B carsharing membership (n=127). Analytical methods included both descriptive statistics and multivariate regression techniques. We find that two-thirds (68%) of B2B members use carsharing for their usual business travel, and that half (51%) of them previously used their own car for such travel. Approximately one in seven (15%) respondents indicated that their carsharing membership through their employer has changed their travel habits by allowing them to commute to work less often by private car, as they do not require their own personal car for work-related travel during their workday. It appears that car use for [non-commuting] business purposes may increase, however. This paper concludes with a discussion of open questions that are suggested to motivate the future research agenda.

Keywords: Carsharing, car club, business-to-business, B2B

1. Introduction

Carsharing has experienced rapid growth in the 2000s, and a wide body of professional and academic literature has taken shape that documents user profiles, usage characteristics, and the impacts on travel behavior and car ownership. The most recent publicly-released data show 3.5 million carsharing users worldwide in 2013 (a 49% growth over 2012), with a total of 69,000 vehicles in carsharing fleets (Frost and Sullivan 2014). Survey data indicate that the typical carsharing member makes use of the service relatively infrequently; in Britain, for instance, the average member uses a carsharing service 8.2 times per year (Carplus Trust 2014).

With notable exceptions, the academic literature on carsharing does not address the unique characteristics of the business-to-business (B2B) form of carsharing, in which a member of staff is provided access to a carsharing organization's fleet through their employer. As we

shall see, such a change may either be implemented on its own, or alternatively as part of wider changes to corporate travel policies. (NB: Various terms are occasionally employed to refer to B2B carsharing, such as corporate carsharing and employer-based carsharing).

The average Briton travels (as of 2012) 606 miles annually for non-commuting business purposes, which represents 9% of mileage for all purposes (DfT 2014). The B2B carsharing market is of interest for several reasons. First, there is evidence that the B2B market segment is now growing faster than carsharing in general; in Britain, for instance, B2B membership increased by 29% in 2013, versus 13% for the business-to-consumer (B2C) segment, in which the vehicle user is a member of the carsharing organization without their employer mediating the relationship (Carplus 2014). Second, B2B has traditionally been a large share of the car rental market, and is therefore a target for growth as carsharing operations scale up in size. Third, the temporal profile of the B2B segment's usage can be complementary to the overall carsharing usage profile, which tends to be busiest at weekends and mid-week evenings (cf. Martin 2007). Therefore increasing the share of usage that is performed by B2B users may smooth the aggregate temporal profile of carsharing usage, thereby allowing more efficient fleet operations (i.e. higher fleet-utilization rates). Indeed, this temporal complementarity was cited as one of the justifications when the largest carsharing provider globally (Zipcar) was acquired by the Avis Budget Group in 2013 (Nelson 2013). Fourth, organizations considering subscribing to B2B carsharing may view it as a mechanism to increase the sustainability of their staff's work-related travel, and such organizations therefore require evidence of the impacts. Finally, in a similar vein, some municipalities that encourage carsharing amongst their residents and businesses (through a variety of support mechanisms, cf. Enoch and Taylor 2006) also choose to direct their staff to use B2B carsharing for work-related travel, in order to provide reliable mid-week daytime usage to their community's carsharing operator. As with employers in general, municipal employers also require evidence of the impacts of B2B carsharing.

The focus of this paper is the back-to-base carsharing concept, in which the user takes a carsharing vehicle (which is owned by a carsharing service operator) from a pre-specified location, performs a round-trip tour with it, and returns it to the same location at the end of their usage episode. In general, an employer reaches an agreement with a carsharing operator to provide the employer's staff with access to the carsharing service at no cost to the member of staff. The member of staff must still, however, successfully complete an initiation process in which their driving license and driving record are verified prior to using carsharing vehicles. When using a carsharing vehicle for their employer's business, the usage fee is charged directly to the employer's account. The arrangements may also include accommodation for the staff member to use the carsharing service for their private travel at a preferential rate, for which the member of staff would be billed directly.

The rest of this paper is structured as follows. Section 2 presents an overview of the literature regarding B2B carsharing. Section 3 presents the data used in this analysis, which was collected as part of a wider survey of Britain's carsharing members in autumn 2012. Section 4 presents and discusses our empirical findings, which are comprised of both descriptive results and a multi-variate regression analysis. Section 5 concludes with a summary and discussion of further research needs.

2. Background

There is a substantial body of literature covering the impacts of carsharing on people's travel patterns, though much of it either addresses the use of carsharing for personal travel or does not distinguish between personal (B2C) and employer-based (B2B) use (e.g. Steininger et al. 1996, Prettenthaler and Steininger 1999, Huwer 2004, Burkhardt and Millard-Ball 2006, Cervero et al. 2006, Martin 2007, Duncan 2010, Martin and Shaheen 2010, Le Vine 2011, Ciari et al. 2013). In this paper we use the terms B2B and B2C to refer to service provision to client organizations and client individuals, respectively (Mokhtarian 2004, Nydegger

2001). For the purposes of this paper, services provided by carsharing services to public-sector and third-sector entities are included in the term 'B2B carsharing'.

By way of contrast, a relatively small number of studies have addressed B2B carsharing in detail (see Table 1). This is despite B2B carsharing accounting for a sizable fraction of carsharing members – for instance, as of 2013 22% of British carsharing members are part of the B2B market segment (Carplus 2013), and in Germany the proportion (as of 2009) was reported to be 23% (Loose, 2009). In North America it may be a lower share of the carsharing market, with results from a 2008 survey showing that (at that time) only 5% of carsharing members indicated they joined via their employer (Martin et al. 2010). The B2B-carsharing literature is accumulating, though it remains fragmentary as Loose points out: *"there is little systematicall*y-collected information on existing customers who use Car-*Sharing for business"* (Loose 2010, p.59). Further, a number of studies (Wanner 2003, Wilke et al. 2007, Italian Ministry of the Environment 2009), are part of the 'grey' (non-refereed) literature, and hence subject to uncertain quality control. Table 1 presents a comparison of studies that have focused on the B2B carsharing market.

A recurrent finding from the literature is that B2B carsharing members on average use carsharing more frequently than B2C customers. It is also of note that Shaheen and Cohen (2013a) posit that B2B carsharing may be associated with higher member-to-vehicle ratios than B2C carsharing.

Shaheen and Rodier (2004) report on the CarLink II project that took place in 2001-2002, a follow-up to the earlier CarLink I. In CarLink II access to a carsharing vehicle at one's worksite (for either work or personal use during office hours) was one of three user-type segments that shared a fleet of cars (the other segments being Home-based Users and Work-based Commuters, the latter defined by their use of a carsharing vehicle to provide last-mile connectivity on their commute between a rail station (which they accessed via public transportation) and their suburban worksite. The carsharing market was embryonic at

the time (with approximately 12,000 members in the United States, compared to 900,000 in 2013 [Shaheen and Cohen 2013b]), and the sample of Work-based Day Users, those that are most directly comparable to today's B2B carsharing member segment, was small (n=34, out of a total population of 63 Work-based Day Users). Though the project was innovative in several respects, the B2B carsharing model that has found commercial success today does not involve the logistical complexity of the operations in the CarLink projects.

Reuter and Böhler (2000) also report on an early B2B carsharing project, through the StadtteilAuto Aachen carsharing provider in Aachen (Germany) in 1998-1999. The authors found B2B carsharing to be particularly attractive to *"newly*-founded companies and those *that do not want acquire their own fleet"* (p.14). Half of participating companies were reported to be architectural/engineering offices, computer firms, or other services. As with B2C carsharing (cf. Millard-Ball et al. 2005), B2B members were found to be relatively highly-educated and concentrated in early-to-middle age (85% between ages 26 and 45). While little quantitative evidence of the impacts of B2B carsharing was reported, the authors suggest that B2B carsharing competes primarily with pool cars provided by an employer for staff to use on an as-needed basis, and with employees' privately-owned cars that they use occasionally for business purposes.

More recently, Costain et al. (2012) analyzed administrative microdata from the Autoshare carsharing provider in Toronto (Canada). The authors estimated a set of six multi-variate regression models for various aspects of carsharing behavior (decision to pay for carbon-offsetting, decision to buy collision deductible, membership duration, frequency-of-use, vehicle-type choice, and monthly vehicle-hours/vehicle-kilometers of travel). The administrative data allowed the researchers to identify which subscribers were members of the carsharing organization through their employer, and this was included as an independent variable, along with others, in the multi-variate analyses. Among the findings were that B2B members tended (as a ceteris paribus effect) to remain members longer than B2C members, and to use the carsharing service more frequently. The use of purely administrative data

limited the study to analyzing behavior that is passively tracked in the normal course of the carsharing organisation's business practices; it was not possible to, for instance, enquire about respondents' motivations or alternate courses of action prior to taking part in carsharing.

It is worth noting several recent studies that have investigated the unique characteristics of carsharing in the university-campus environment. This context partly overlaps with the B2B market segment; employees are a subset of the driving-age adults that can access carsharing on a university campus, and universities are a subset of all employers. Zhou (2013) showed that more than two-thirds (68%) of 'alternative commute participants' (staff who do not regularly commute onto campus by driving alone) self-report using a carsharing service for their personal errands, whereas only a fifth (21%) reported using it for university business. Zheng et al. (2009), using a university-population sample that was 28% university staff, found that staff were less willing to participate in carsharing than students, and more likely to say that they need a car to live their current lifestyle.

In parallel to the carsharing literature, there has been growing interest in the complexities and implications of work-related travel. To take one aspect, employers may view employees using their personal cars for work-related travel (a phenomenon colloquially termed the 'grey fleet', cf. Murray et al. 2009) as an efficient way for staff to access car-based mobility on demand while avoiding the overhead of managing a pool of employer-owned cars. Conversely an employer may view staff use of the heterogeneous 'grey fleet' as a potential source of unwanted liability in case of incident. From an employee's perspective, he or she may wish to drive their personal car for work-related travel, as in most instances they are compensated for their distance driven on an average-cost basis – meaning that each marginal mile driven helps to defray their fixed costs of personal car ownership. By way of contrast, use of the telematics-equipped carsharing fleet is inherently auditable, can be more tightly-controlled by an employer, and provides staff with no financial incentive for driving.

The body of literature addressing workplace-based travel planning highlights a variety of strategies for reducing staff car use, primarily though not exclusively aimed at commuting. Employers may be motivated by notions of corporate social responsibility, or by external pressures such as the need to acquire permission from a public body (e.g. planning permission). The literature focuses on techniques such as restricting or pricing car parking, improving access to workplaces by active forms of travel, encouraging telecommuting, and improving public transport connectivity. Whilst there are examples of B2B carsharing being recognized as a strategy for rationalizing work-related travel (e.g. Sloman et al. 2010), in general the recent academic literature on workplace travel planning does not explicitly consider B2B carsharing in the standard set of travel-planning measures (Van Malderen et al. 2012, Roby 2010, Cairns et al. 2010, MacMillan et al. 2013). Hence it is limited in its ability to assess the effectiveness of B2B carsharing to achieve travel-planning objectives.

This paper contributes to the existing literature in several ways. It analyses people's trajectory into B2B carsharing to a greater degree of detail than earlier studies (see the detailed discussion earlier in this section of Shaheen and Rodier [2004], Reuter and Böhler [2000], Costain et al. [2012], and Zhou [2013], as well as the structured summary of earlier literature in Table 1). To the authors' knowledge, it also presents the first multi-variate analysis of the determinants of individual organizations' degree of participation in B2B carsharing. It extends from earlier studies that are either from an earlier phase in the B2B carsharing market's development (e.g. Reuter and Böhler (2000), Shaheen and Rodier 2004, Haefeli et al. 2006, Wilke et al. 2007), based exclusively on administrative data of B2B carsharing usage (Costain et al. 2012), or that address a single type of employer-organization (Zheng et al. 2009, Zhou 2013).

3. Empirical data

This study's empirical data base was collected as part of the 2012/13 annual survey of Britain's carsharing members. The questionnaire instruments employed in this survey were

administered via the web, with field data collection undertaken between October and December 2012. Carsharing operators recruit their members to participate in the annual survey as part of the guidelines for operator accreditation. Each of Britain's accredited carsharing operators contacted (via email) their own customers to solicit participation, and the survey protocol contained both elements that are common to all operators (as prescribed by operator-accreditation guidelines) and, at each operator's discretion, additional response items of direct interest to the operator. Data from the common survey elements collected by each operator were then pooled together to produce the dataset that is analyzed in this paper. As an incentive to take part in the survey, respondents providing contact information were entered in a drawing for a tablet computer.

Different versions of the survey were administered to each of the five segments within the overall sample:

1. People that had been B2C members of a back-to-base carsharing service for 3+ months
2. People that had joined as B2C members of a back-to-base carsharing service in the 3 months prior to completing the survey
3. People that are members of peer-to-peer carsharing services (only people that rent cars through the service; people that offer their car through the service were not surveyed)
4. People that are members of B2B carsharing services through their employer
5. Administrators of B2B carsharing membership programs (i.e. the member of staff responsible for administering an organisation's B2B carsharing scheme)

Segments 4 and 5 are the focus of this paper. Of the 5,166 total survey responses, the achieved usable sample size of the B2B-member and B2B-administrator member segments were n=682 and n=127 respectively (this includes only responses that were complete and also passed checks for internal consistency).

The response rate for the B2B-member segment was 3%; the December 2013 administrative data provided by carsharing operators indicates that there were at that time

26,787 B2B carsharing members in Britain. Though participation in this survey was solicited from the full population of B2B carsharing members, we do not know the demographic characteristics of either B2B carsharers at large or the B2B-segment survey respondents, and hence cannot assess the degree to which our survey respondents were representative of B2B carsharers at large (in their demographic profile). By way of comparison, the response rate for the concurrently-sampled B2C segment of British carsharers was 4%, and the most recent large-scale multi-operator survey in North America (Martin and Shaheen 2010) achieved a response rate of just under 10%. Returning to the present study, the response rate for the B2B-administrator segment cannot be known with certainty, as there is no register of the number of organizations in Britain that provide their staff with access to B2B carsharing.

A complete listing of items included in the questionnaire instrument is available at (Carplus 2013). The survey questions employed in this study are found in the Appendix; descriptive statistics of responses are embedded with each response, in the following format: XX%/Y% (XX=mean, Y=standard error).

4. Data analysis

We begin the discussion of results with the B2B-member segment, and then proceed to cover the administrators of B2B carsharing programs.

4.1 B2B carsharing members segment

Table 2 contains descriptive statistics for data from B2B carsharing members; it can be seen that over a fifth (22%) of B2B carsharing members in our sample report that they use the service at least once per week, with another 31% using it less than weekly but more than once per month. By comparison, a smaller proportion of B2C carsharing members indicate that they use carsharing at least once per week, (10%), a larger proportion of B2C members use it less than weekly but at least monthly (44%), and a similar proportion of B2C

carsharing members report using it on a less-than-monthly basis (45%) (Carplus 2013). The finding that B2B members tend on average to be heavier carsharing users than B2C members is consistent with earlier studies (Haefeli et al. 2006, Wilke et al. 2007, Loose 2010, Costain et al. 2012).

Figure 1 shows survey respondents' frequency of carsharing use when disaggregated by their self-reported usual mode of business travel before joining B2B carsharing. It can be seen that B2B carsharing members who previously used public transport as their usual form of business travel tend to be relatively light users of B2B carsharing. By contrast, those who previously used their own car (i.e. the 'grey fleet') tend to be heavy B2B carsharing users.

It can be seen from Table 2 that a larger share of B2B carsharing respondents reported making more [non-commuting] business-related journeys than report making fewer business journeys (12% v. 5%, $p<0.01$). We re-visit this issue via multivariate analysis, as described later in this section.

Table 2 also shows that 68% of B2B carsharing members report that it is their main mode of business travel, meaning that the remaining 32% of B2B carsharing members report that their usual mode of travel for business is another mode. Table 3 investigates the transition in people's business travel mode from how they usually traveled prior to and after joining a B2B carsharing service. For instance, it can be seen that 80% of those that indicated that they previously usually cycled reported that it continued to be their usual form of business travel after joining B2B carsharing. By contrast, only 9% of those previously usually using traditional car rental continued to do so after joining B2B carsharing. From Table 3 it can be seen that the rate of switching to B2B carsharing for one's usual business travel was above 50% for all non-car modes of travel (except the 'Other' category), but below 50% for the various types of car use (car rental, 'grey fleet' use of a personal car, taxi, pool cars, etc.) For instance, 88% of those previously using taxis switched to usually using B2B carsharing, and the same percentage was found for people that had been usually using car rental.

When all forms of car use are combined, 48% of respondents report having used some type of car as their usual mode for business travel before they joined a B2B carsharing service. After joining, this percentage (which includes carsharing vehicles) fell to 40%; the percentage difference is statistically significant ($p<0.01$, calculated via an independent sample test). The survey responses to this 'usual mode for business travel' question cannot provide an exact calculation of mode share for business journeys, we can however conclude that use of cars as B2B carsharing members' 'usual' mode for business travel decreased after joining the service.

Table 4 shows similar information as Table 3, but here the column percentages are shown. We can therefore observe that a majority (51%) of respondents who indicate that after joining a B2B carsharing service they use it as their usual business-travel mode had previously been using their own car. The next largest 'donor' forms of business travel were employers' pool cars (accounting for 14% of those usually using B2B carsharing) and public transport (13%).

To further investigate factors linked with B2B carsharing usage, we estimated a set of four multivariate regression models of distinct aspects of behavior associated with B2B carsharing (results are found in Table 5):

- Model Run #1: Binary logit model of whether a person decreased their private car use for commuting after joining a B2B carsharing service. (Reference category is 'no decrease')
- Model Run #2: Ordinal logit model of whether a person makes fewer, the same, or more business trips (implicitly per unit time) after joining
- Model Run #3: Binary logit model of whether carsharing is a person's usual mode of transport after joining (reference category is 'carsharing is not usual mode')
- Model Run #4: Binary logit model of whether a person sold or otherwise disposed of their car after joining (reference category is 'did not sell/dispose')

Data from all questions asked of B2B carsharing members were included in the regression analyses. The set of independent variables shown in Table 5 was generated through stepwise regression with backwards elimination (using a variable-retention criterion of p=0.10), an exploratory data analysis technique in which independent variables are iteratively removed one at a time from the model until only statistically-significant variables remain. While this method is useful to identify the relatively important relationships in a complex dataset, its known weakness is that the parameter standard errors are biased downwards while regression-level statistics (e.g. r^2) are biased upwards (Rencher and Pun 1980). This arises due to the violation of the assumption that model specification is independent of the empirical dataset. Due caution is therefore called for in interpreting the results in Table 5; the analyses must be interpreted as exploratory.

Before discussing the results of Model Runs #1-4 (shown in Table 5), it must be noted that the estimation data are purely cross-sectional, and we therefore cannot make any reliable objective inferences about the direction of causality for the statistical associations found in the data.

Model Run #1 investigates factors associated with whether or not a person decreases their private car use for commuting. We found a monotonic positive all-else-equal relationship between frequency-of-carsharing use and whether a person decreased their private car use for commuting, and another positive ceteris paribus association (at p=0.07) with a person having sold/disposed of a private car upon joining. A third positive relationship was found with respect to a person's usual mode of business travel before joining being their own private car (relative to it having been their employer's pool car fleet). A negative net statistical relationship was found between carsharing being a person's usual form of business travel (after joining) and whether their car use for commuting decreased. It is not clear how to interpret this finding; it suggests that a decreased rate of driving one's personal car to work less after joining a carsharing service is linked all-else-equal with using

carsharing for a minority of one's business travel. The accumulation of further evidence from other contexts will be needed to interpret this result with any confidence.

Model Run #2 looks at whether a person reports making fewer, the same, or more business trips after joining B2B carsharing, through an ordinal logit specification. As with Model Run #1, a monotonic positive relationship was found with frequency of B2B carsharing usage. In other words, those whose business travel is stimulated by joining a B2B carsharing service tend to use B2B carsharing relatively frequently.

Having sold/disposed of one's private car was found to be associated, net of confounding effects, with making fewer business trips after joining. Using public transport ($p=0.09$), cycling, or walking ($p=0.07$) as one's usual mode for business travel are positively associated with an increase in business trips after joining (relative to the reference category of an employer's pool cars). Finally, carsharing being a person's usual form of transport after joining is positively associated ($p=0.07$) with an increase in the frequency of business travel.

As with the previous two models, Model Run #3 shows a monotonic (positive) ceteris paribus relationship due to frequency-of-B2B-carsharing-usage, in this case its association with whether B2B carsharing is a person's usual model of business travel. Selling/disposing of one's car is negatively associated ($p=0.08$) with carsharing being one's usual mode for business travel. This same ceteris paribus finding holds in the alternative specification of Model run #4 (with $p=0.03$ in the latter case). Private car, taxi, car rental, and unspecified 'Other' forms of transport being one's usual mode for business travel before joining are associated with carsharing being one's usual mode for business travel after joining (relative to the reference category of an employer's pool cars). The opposite relationship was found for public transport, cycling, and walking ($p=0.08$ in the latter case). Model Run #3 is the only person-level model in which one's employer's policies were found to be statistically significant factors: whether one's employer replaced its pool cars with carsharing

membership, and whether staff car use is 'discouraged' were both found to positively associate, net of confounding effects, with B2B carsharing being one's usual form of business travel.

Model Runs #1 – #3 investigated various aspects of travel behaviour; by contrast Model Run #4 looks at car ownership impacts – specifically whether or not a person reports having sold or otherwise disposed of a private car upon joining B2B carsharing through their employer. Here we found that using B2B carsharing at least once weekly is positively associated with having sold/disposed of a private car. Using carsharing for one's private trips (in addition to business purposes) is also positively linked, net of confounding effects, with selling one's car. Finally, having used an employer's pool car fleet for one's usual business travel before joining is negatively and statistically-significantly associated (at p=0.10 or lower) with having sold one's car upon joining the service. The only two exceptions are taxi and car rental (both of these are not statistically distinguishable from having usually used one's employer's pool cars).

4.2 B2B carsharing program administrators

Table 6 shows that 78%, 10%, and 11% of the administrators of employers' B2B carsharing programs indicated that their organizations are part of the private, public and third sectors, respectively. Whilst the comparable distribution for British organizations at large is not available, it is known that 73%, 25%, and 3% of Britain's workforce report working in the private, public and third sectors respectively. Despite the public sector accounting for 25% of employment but only 10% of B2B-carsharing-participating-organizations, it cannot be concluded from this analysis that public sector employers are under-represented amongst organizations that participate in B2B carsharing. This is because it is known that public-sector organizations on average are larger operations (in terms of number of employees per workplace) than private-sector employers, with third-sector employers tending to have the fewest employees (McKay et al. 2013)

Approximately two-thirds (68%) of organizations participating in B2B carsharing report that they have fewer than 10 staff, and 91% report having fewer than 10 staff enrolled in B2B carsharing.

A total of 70% of organizations joined their B2B carsharing service within the two years prior to taking part in the survey. Half (50%) of B2B administrators report that carsharing accounts for less than 10% of their organization's work-related travel (mileage), with 25% indicating that it accounts for more than half of their work-related travel. One in six (17%) report that their organization has a formal Travel Plan, with 28% reporting that they have a policy for work-related travel. Only 25% of administrators report that their organizations allow staff to use their own car for some or all of their business travel.

13% of organizations that participate in B2B carsharing report that they also maintain pool cars for employee use. The majority of organizations (56%) report that no other changes were made to travel policies when joining B2B carsharing; the most common concurrent policy was to 'actively discourage' staff from using their own cars for business travel (17%).

Financial savings were cited most frequently (62%) by administrators as a benefit of B2B carsharing membership, followed by reduced administrative burden (38%).

Table 7 shows results from a multi-variate linear regression model of the proportion of an organization's travel that is reported to take place via B2B carsharing. It is inappropriate to use a proportion as the dependent variable in a linear regression analysis; proportions are bounded by 0 and 1, whereas linear regression does not respect such bounds. Therefore, the proportion values were first unbanded by taking a random draw for each organization from a uniform distribution between the endpoints of the response category (0 – 10%, 11 – 20%, etc.) indicated by its administrator. Then, to yield a quantity that is unbounded from both above and below the proportion values were converted into log-odds values.

As with Model Runs #1 – #4, the specification for Model Run #5 arises from a stepwise specification search with backward selection, using the variables shown in Table 6 as

candidate dependent variables. The F-statistic ($F [7,119] = 3.94$) indicates that the overall regression is significant at the $p<0.01$ level.

With respect to individual explanatory variables a number of statistically-significant relationships were found. The size of an organization (measured as the natural log of the staff headcount) was found to be negatively associated with the proportion of an organization's business travel that is in carsharing vehicles.

Being a public-sector organization was positively associated with carsharing's share of business travel, but having a Travel Plan was negatively associated with this quantity. We cannot infer causality from a regression analysis, however, so it would be incorrect to conclude that implementing a Travel Plan necessarily leads to less carsharing usage. Other plausible mechanisms exist; further research is needed to confirm this result and identify the causal mechanism(s) that underlie it.

It can be seen in Table 7 that an organization prioritizing business travel by public transport, cycling and walking is ceteris paribus associated with a high proportion of carsharing usage. By contrast, requiring staff to use carsharing vehicles for work-related car trips was negatively associated ($p=0.06$) with this quantity. As with the previous result, the relative saliency of candidate causal mechanisms cannot be known at this point.

The final two results are broadly intuitive. First, organizations that report reduced parking as one of their 'key benefits' from participating in B2B carsharing tended, net of other effects, to exhibit a low proportion of their business travel taking place in carsharing vehicles. Finally, providing pool cars is negatively associated with an organization's share of business travel that takes place in carsharing vehicles, which suggests that carsharing and pool cars are substitutes for each other.

5. Conclusions

B2B carsharing is an emerging sub-market of the wider shared-mobility sector, and there is some evidence that it is now growing faster than the larger business-to-consumer (B2C) sector.

This paper quantifies the usage and impacts of B2B carsharing, drawing on a unique national survey of B2B carsharing activity in Britain. Respondents included both individual members of staff that have access to a carsharing service through their employer, and a separate questionnaire for the corporate administrators of an organization's B2B carsharing program. Among other results, we find that B2B carsharing members tend to be heavier users than B2C members (a result that is in keeping with several earlier studies), and that people transitioning to B2B carsharing from previously using their private car for work-related travel tend to use carsharing more frequently than other B2B carsharing members. 15% of B2B members report that they commute to work by car less than they did prior to joining, and they are more likely than others to have previously used their private car for business-related travel during the workday.

We now turn to a discussion of specific further research needs regarding B2B carsharing. The empirical data collected via this surveying effort contain very limited demographic information, which are likely to correlate in various ways with B2B carsharing. Future empirical data collection efforts should collect a range of structural demographic indicators, as well as attitudinal data and more-detailed information on the types of employees that work at each establishment participating in B2B carsharing. It would also be desirable to collect panel data (or employ other data-collection strategies that can provide insight into the direction and mechanisms of causality). Further, the findings we present here are limited to Britain, and there are plausible reasons why analyses in other contexts may yield different results (e.g. differences in urban spatial structure, public-sector transport policies, types of economic activity, or socio-demographics). Such comparable analyses will be important to

strengthen the evidence base – by identifying which impacts are common and which are context-dependent, and how they are changing as this market matures.

This data collection effort aimed to take into account confounding effects (e.g. from other concurrent policy changes), so that the factors linked specifically to taking part in B2B carsharing could be identified. For instance, it was found that B2B-participating organizations that have policies prioritizing sustainable transport tend, all else equal, to have a higher proportion of their business travel made in the carsharing fleet. This area is ripe for further enquiry, as there is a need to better understand the degree to which trigger events akin to those linked with joining B2C carsharing (e.g. childbirth, switch of jobs, residential relocation, cf. Millard-Ball et al. 2005) have analogues in the B2B carsharing sector.

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References

Burkhardt, J., Millard-Ball, A. (2006) Who is attracted to carsharing. Transportation Research Record #1986, p.98-105.

Cairns, S., Newson, C., Davis, A. (2010) Understanding successful workplace travel initiatives in the UK. Transportation Research Part A, 44(7), p.473-494.

Carplus Trust (2013) Carplus annual survey of car clubs 2012/13. Accessed January 2014 via: http://www.carplus.org.uk/resources/reports/annual-survey-of-car-clubs/results-for-london-201213/

Carplus Trust (2014) Car club membership data, segmented by B2C and B2B customers. Unpublished.

Cervero, R., Golub, A. and Nee, B. (2006), San Francisco City CarShare: Longer-term travel demand and car ownership impacts. Prepared for City of San Francisco Department of Transportation & Parking.

Ciari, F., Schuessler, N., Axhausen, K. (2013) Estimation of Carsharing Demand Using an Activity-Based Microsimulation Approach: Model Discussion and Some Results. International Journal of Sustainable Transportation, 7(1), p.70-84.

Clark, M., Gifford, K., Le Vine, S. (2014) The usage and impacts of emerging carsharing business models: Evidence from the peer-to-peer and business-to-business market segments. Paper presented at the 93rd Annual Meeting of the Transportation Research Board, Washington DC, January 2014.

Costain, C., Ardron, C., Nurul Habib, K. (2012) Synopsis of users' behaviour of a carsharing program: A case study in Toronto. Transportation Research Part A, 46(3), p.421-434.

Department for Transport [DfT] (2014) Table NTS0404: Average distance travelled by trip purpose: Great Britain, 1995/97 to 2012.

Duncan, M. (2011) The cost saving potential of carsharing in a US context. Transportation, 38(2), p.363-382.

Enoch, M., Taylor, J. (2006) A worldwide review of support mechanisms for car clubs. Transport Policy, 13, p.434-443.

Frost and Sullivan, Inc. (2014) Strategic Insight of the Global Carsharing Market. Report #ND90-18, published June 2014.

Haefeli, U., Matti, D., Schreyer, C., Maibach, M. (2006) Evaluation Car-Sharing. Final report. Swiss Federal Office for Energy.

Huwer (2004) Public transport and car-sharing—benefits and effects of combined services. Transport Policy, 11, p.77-87.

Italian Ministry of the Environment (2009) Customer Satisfaction Analysis of the Users of the Italian Network Initiativa dei Comuni per il Car Sharing (I.C.S.).

Le Vine, S. (2012) Strategies for personal mobility: A study of consumer acceptance of subscription drive-it-yourself car-services, Dissertation, Imperial College London.

Loose, W. (2009) Sharing for Business Sharing fact sheet No. 4. MOMO Project, European Commission Grant IEE/07/696/SI2.499387.

Loose, W. (2010) The State of European Car-Sharing. MOMO Project Final Report D 2.4 Work Package 2, European Commission Grant IEE/07/696/SI2.499387.

MacMillan, A., Hosking, J., Connor, J., Bullen, C., Ameratunga, S. (2013) A Cochrane systematic review of the effectiveness of organisational travel plans: Improving the evidence base for transport decisions. Transport Policy, 29, p.249-256.

Martin, B. (2007) Caractérisation du système d'autopartage dans l'agglomération montréalaise et analyse spatio-temporelle de ses différents objets : usagers, stationnements, vehicules. Masters thesis, Ecole Polytechnique de Montreal.

Martin, E., Shaheen, S., Lidicker, J. (2010) Impact of Carsharing on Household Vehicle Holdings Results from North American Shared-Use Vehicle Survey. Transportation Research Record. #2143, p.150-158.

McKay, S., Heywood, J., Jochum, V., McHugh, J. (2013) UK Voluntary Sector Workforce Almanac 2013.

Millard-Ball, A. Murray, G., ter Schure, J., Fox, C., Burkhardt, J. (2005) Carsharing: Where and how it succeeds. Transit Cooperative Research Program Report #108.

Mokhtarian, P. (2004) A conceptual analysis of the transportation impacts of B2C e-commerce. Transportation, 31(3), p.257-284.

Murray, W. Ison, S., Gallemore, P., Singh Najjar, H. (2009) Effective Occupational Road Safety Programs. Transportation Research Record #2096, p.55-64.

Nelson, R. (2013) *Investor presentation regarding Avis Budget Group's Acquisition of Zi*pcar, January 2013. Accessed January 2014 via: http://www.sec.gov/Archives/edgar/data/723612/000119312513001136/d460253dex992.htm

Nydegger, R. (2001) B2B, B2C and Other "Business Methods": To Be or Not To Be Patent Eligible? University of Baltimore Intellectual Property Law Journal.

Prettenthaler, F., Steininger, K. (1999) From ownership to service use lifestyle: the potential of car sharing. Ecological Economics, 28, p.443-453.

Rencher, A.C., Pun F.C. (1980) Inflation of R^2 in best subset regression. Technometrics, 22, p.49-53.

Reutter, O.; Böhler, S; Warmke, G (1999): Pilotprojekt Car-Sharing für Betriebe in der Region Aachen: Abschlussbericht. Wuppertal Institute.

Reutter, O., Böhler, S. (2000) Car Sharing for Business: The Aachen region pilot project. World Transport Policy and Practice, 6(3), p.11-17.

Roby, H. (2010) Workplace travel plan: Past, present and future. Journal of Transport Geography, 18(1), p.23-30.

Shaheen, S., Cohen A., (2013a) Carsharing and Personal Vehicle Services: Worldwide Market Developments and Emerging Trends. International Journal of Sustainable Transportation. 7(1), p.5-34.

Shaheen, S., Cohen A., (2013b) Innovative Mobility Carsharing Outlook: Carsharing Market Overview, Analysis, and Trends. Accessed January 2014 via: tsrc.berkeley.edu/node/629

Shaheen, S., Rodier, C. (2004) Travel Effects of a Suburban Commuter Carsharing Service: CarLink Case Study. Transportation Research Record #1927, p.182-188.

Sloman, L., Cairns, S., Newson, C., Anable, J., Pridmore, A., Goodwin, P. (2010) The Effects of Smarter Choice Programmes in the Sustainable Travel Towns: Research Report. Report to the UK Department for Transport.

Steininger, K., Vogl, C., Zetl, R. (1996) Car-sharing organizations: The size of the market segment and revealed change in mobility behavior. Transport Policy, 3(4), p.177-185.

Van Malderen, Wanner, M. (2003) Statusquo und Entwicklungsmöglichkeiten im Stadtgebiet Karlsruhe(Car-Sharing for business customers – status quo and development possibilities in metropolitan Karlsruhe).Diplomarbeit am Geographischen Institut der Rheinischen Friedrich-Wilhelms-Universität Bonn.

Wilke, G.; Böhler, S.; Bongardt, D.; Schäfer-Sparenberg, C.: Zukunft des Car-Sharing in Deutschland.Schlussbericht (The Future of Car-Sharing in Germany. Final report), gefördert durch das Bundesministerium für Wirtschaft und Technologie (Förderkennzeichen 19 M 2091). Wuppertal Institute.

Zheng, J., Scott, M., Rodriguez, M,. Sierzchula, W., Platz, D., Guo, J., Adams, T. (2009) Carsharing in a University Community. Transportation Research Record #2110, p.18-26.

Zhou, J. (2013). Study of Employee Carsharing on the University Campus. J. Urban Plann. Dev., 139(4), 301–310.

Citation	Location (year)	Composition of sample	Sample size (B2B carsharing members)	B2B carsharing members in study area	Key results	Limitations
Shaheen and Rodier (2004)	San Francisco Bay Area, United States (2001-'02)	Individual 'Workbased Day Users'	n = 34 (in Workbased Day User segment)	63	23% reduction in drive-alone commuting 26% reported less household-vehicle use for non-commute purposes	Small scale of B2B carsharing operation (relative to today); Contemporary B2B carsharing operates somewhat differently than the CarLink II model; Small sample
Haefeli et al. (2006)	Switzerland (2005)	Organizations that participate in B2B carsharing	n = 144	N/A	Average annual carsharing usage among B2B members (1,815 km/year) is twice the level of B2C members 5% of B2B-participating companies disposed of all of their pool cars upon joining B2B carsharing	No information collected from end users (staff that use B2B carsharing); Study not refereed
Reutter and Bohler (2000), summarizing Reutter et al. (1999)	Aachen, Germany (1998-'99)	Organizations that participate in B2B carsharing	N = 43	N/A	45% of B2B-participating firms had fewer than 5 employees Pilot project with incentives for B2B carsharing led to B2B increasing from 8% to 13%of combined B2B/B2C members 4% of B2B members reported using carsharing for private journeys, in addition to business travel	Small sample from earlier era in the development of carsharing; No information collected from end users (staff that use B2B carsharing)

Wanner (2003)	Karlsruhe, Germany (2003)	Organizations that participate in B2B carsharing	n = 66	Unknown	35% of B2B-participating firms also keep at least one company-owned car Approximately 25% of B2B-participating firms report >90% of their business travel is in carsharing vehicles	Small sample; No information collected from end users (staff that use B2B carsharing); Study not refereed
Wilke et al. (2007)	Germany (2004)	Individual B2B carsharing members	n = 249	Unknown	B2B customers are more active carsharing members than B2C customers, and use larger vehicles B2C customers use carsharing vehicles less after first year of membership; B2B customers use them more	Study focused primarily on B2C customers; No data on B2B carsharers' motivations or behavioral change associated with carsharing participation
Italian Ministry of the Environment (2009)	Various cities in Italy (data collection period not stated)	Individual B2B carsharing members	Unknown (n = 3,060 for combined B2B/B2C segment)	Unknown (15,580 for combined B2B/B2C segment)	20% of B2B customers indicated they reduced their car use 27% reported cost savings 92% of B2B customers worked in private sector	Unknown B2B-member sample size / sampling protocol; Study not refereed
Zheng et al. (2009)		University employees that are prospective carsharing members	N = 1,100 respondents to a stated-preference survey (not existing B2B members)	Not in operation	University employees were less willing to participate in carsharing than students, and more likely to say that they need a car to live their current lifestyle.	Hypothetical (stated-preference) context focused exclusively on university campus environment

Loose (2010)	Pan-Europe, all known carsharing providers (2009)	Carsharing providers	n = 108	60,000 (across Europe)	Average of 3.3 registered drivers per B2B-participant organization Average B2B (B2C) customer drives 1,868 (737) kms/year in a carsharing vehicle	Study not refereed; No data on B2B carsharers' motivations or behavioral change associated with carsharing participation
Costain et al. (2012)	Toronto, Canada (2008-'10)	Individual B2B carsharing members	Unknown (n = 6,085 for combined B2B/B2C segment)	N/A (all users analysed via administrative data)	B2B members have shorter membership duration than B2C members B2B 'professional-organization' members had higher monthly usage than B2B non-profit-organization and B2C members	No data on B2B carsharers' motivations or behavioral change associated with carsharing participation; results limited to information recorded passively in the carsharing-provider's administrative database
Zhou (2013)	UCLA, Los Angeles, United States (2010)	Individual B2B carsharing members	n = 125	249	Higher-than-average rates of B2B carsharing participation among female employees, lower-than-median-income employees, and employees that do not commute by driving alone	Limited to university-campus employees who do not drive alone to work

Table 1: Summary of earlier studies of business-to-business carsharing

Question	Response	Frequency (standard error)
On average, how often do you use a car club vehicle for work-related trips? (Choose one)	Once a week or more	22% (2%)
	Once a month or more	31% (2%)
	At least once every two months	22% (2%)
	At least once per year	25% (2%)
Please tell us your usual form of transport for work-related trips before and after joining the car club?	Used my own car (before joining the car club))	45% (2%)
	Used my own car (after joining the car club)	7% (1%)
	Used a company car (before)	2% (1%)
	Used a company car (after)	1% (<0.5%)
	Used a pool car owned by my employer (before)	13% (1%)
	Used a pool car owned by my employer (after)	4% (1%)
	Traditional car rental (before)	5% (1%)
	Traditional car rental (after)	1% (<0.5%)
	Public transport (before)	21% (2%)
	Public transport (after)	15% (1%)
	Walk (before)	1% (<0.5%)
	Walk (after)	1% (<0.5%)
	Cycle (before)	3% (1%)
	Cycle (after)	1% (1%)
	Taxi (before)	6% (1%)
	Taxi (after)	1% (<0.5%)
	Car club car (before)	Not applicable
	Car club car (after)	68% (2%)
	Other (before)	4% (1%)
	Other (after)	0%

Has joining the car club changed your own habits in any of the following ways? (Tick all that apply)	I travel to work by car less often	15% (1%)
	I make more work-related trips	12% (1%)
	I make fewer work-related trips	5% (1%)
	I now use a car club for private (non work-related) trips	14% (1%)
	I have sold or disposed of my own car	7% (1%)
	None of the above	56% (2%)
Has your organisation made any changes to its business travel arrangements or policies since joining the car club?	Yes, pool cars have been replaced by car club cars	15% (1%)
	Yes, the number of company cars has been reduced	4% (1%)
	Yes, car mileage allowance rates have been reduced	4% (1%)
	Yes, employees are actively discouraged from using their own cars	18% (1%)
	Yes, other changes to travel policies	5% (1%)
	No changes to travel policies	26% (2%)
What type of car club vehicle do you use most often?	Car	95% (1%)
	Van	5% (1%)

Table 2: Descriptive results from survey of B2B carsharing members (n=682)

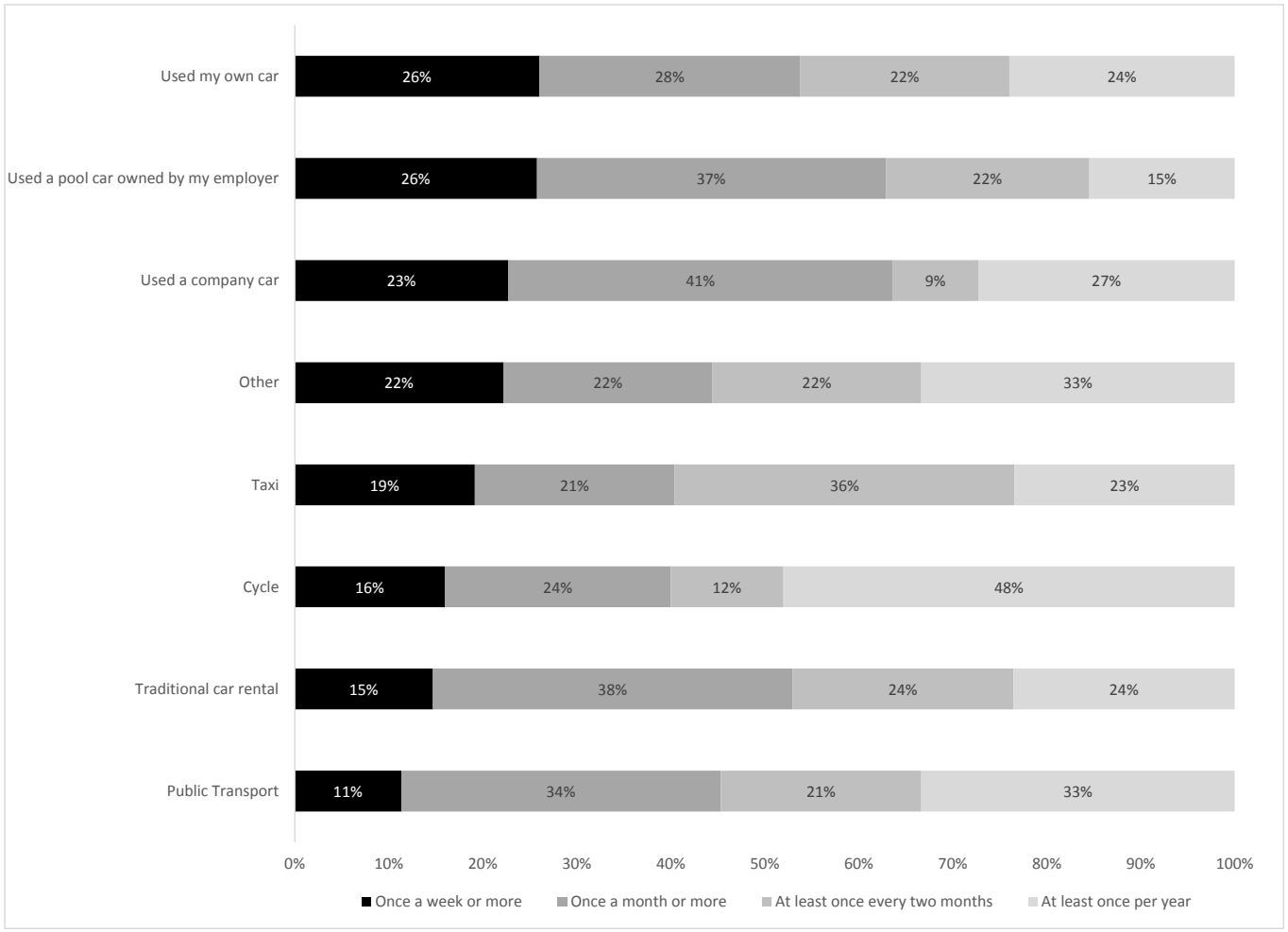

Figure 1: Percentage distribution of stated frequency of carsharing usage by self-reported usual mode of business travel BEFORE joining.

Usual mode of business travel BEFORE joining a carsharing service	Usual mode of business travel AFTER joining a carsharing service: Cycle	Public transport	Taxi	Traditional car rental	Used a carsharing car	Used a company car	Used a pool car owned by my employer	Used my own car	Walk	Other modes	Sample size
Cycle	80% (9%)				20% (9%)						20
Public transport	1% (1%)	56% (4%)			41% (4%)				1% (1%)		140
Taxi			12% (5%)		88% (5%)						42
Traditional car rental				9% (5%)	88% (6%)			3% (3%)			33
Used a carsharing car					--						0
Used a company car		13% (8%)			56% (12%)	25% (11%)		6% (6%)			16
Used a pool car owned by my employer		2% (2%)		1% (1%)	72% (5%)		24% (5%)				90
Used my own car	1% (1%)	6% (1%)			76% (2%)	1% (1%)	1% (1%)	14% (2%)	1% (1%)		308
Walk	13% (12%)				25% (15%)				63% (17%)		8
Other modes	4% (4%)	4% (4%)			92% (5%)						25
Sample size	23	101	5	4	461	8	26	44	10	0	682

Table 3: Of people that reported using a mode of transport as their usual mode for business travel BEFORE joining a carsharing service, the percentage distribution of their usual mode AFTER joining. Values in brackets are standard errors.

Usual mode of business travel BEFORE joining a carsharing service	Usual mode of business travel AFTER joining a carsharing service: Cycle	Public transport	Taxi	Traditional car rental	Used a carsharing car	Used a company car	Used a pool car owned by my employer	Used my own car	Walk	Other modes	Sample size
Cycle	70% (10%)				1% (0%)						20
Public transport	9% (6%)	78% (4%)			13% (2%)						140
Taxi			100 % (0%)		8% (1%)						42
Traditional car rental				75% (22%)	6% (1%)			2% (3%)			33
Used a carsharing car					--						0
Used a company car		2% (1%)			2% (1%)	50% (18%)		2% (4%)			16
Used a pool car owned by my employer		2% (1%)		25% (22%)	14% (2%)		85% (4%)				90
Used my own car	13% (7%)	17% (4%)			51% (2%)	50% (18%)	15% (2%)	96% (1%)	40% (3%)		308
Walk	4% (4%)							0% (0%)	50% (18%)		8
Other modes	4% (4%)	1% (1%)			5% (1%)						25
Sample size	23	101	5	4	461	8	26	44	10	0	682

Table 4: Of people that reported using a mode of transport as their usual mode for business travel AFTER joining a carsharing service, the percentage distribution of their PREVIOUS usual mode. Values in brackets are standard errors.

	Model #1			Model #2			Model #3			Model #4		
	Parameter	Std. error	p-value	Parameter	Std. error	p-value	Parameter	Std. error	p-value	Parameter	Std. error	p-value
Constant	-3.70	0.39	<0.005				-0.16	0.41	0.69	6.12	1.09	<0.005
Threshold parameter (between fewer business trips and no change)				-3.15	0.47	<0.005						
Threshold parameter (between no change and more business trips)				1.96	0.45	<0.005						
Frequency of use: Once a week or more	1.57	0.41	<0.005	0.90	0.28	<0.005	2.74	0.36	<0.005	1.10	0.39	0.01
Once a month or more	1.41	0.39	<0.005	0.42	0.25	0.09	1.30	0.25	<0.005			
At least once every two months	1.18	0.41	<0.005									
At least once per year	Fixed at zero			Fixed at zero						Fixed at zero		
Employee sold or disposed of private car when joining carsharing service	0.67	0.37	0.07	-1.09	0.41	0.01	-0.68	0.39	0.08			
Usual carsharing vehicle used is a car (as opposed to a van)				-0.89	0.43	0.04						
Employee uses carsharing for their personal trips										2.36	0.41	<0.005
Employee's usual form of transport for business trips prior to joining the carsharing service…												
Employer's pool car	Fixed at zero			Fixed at zero						Fixed at zero		

Private car	1.97	0.27	<0.005				0.83	0.30	0.01	3.68	1.06	<0.005
Company car										3.35	1.39	0.02
Public transport				0.45	0.26	0.09	-0.74	0.31	0.02	1.81	1.10	0.10
Cycling				1.13	0.56	0.04	-2.22	0.69	<0.005	2.85	1.32	0.03
Walking				1.47	0.82	0.07	-1.67	0.94	0.08	2.98	0.61	0.07
Taxi							1.62	0.56	<0.005			
Traditional car rental							1.80	0.62	<0.005			
Other							2.42	0.81	<0.005	3.96	1.23	<0.005
Carsharing is employee's usual form of transport for business travel after joining	-0.61	0.27	0.03	0.46	0.25	0.07				-0.87	0.39	0.03
Employer made the following changes since joining the carsharing service…												
Pool cars replaced by carsharing membership							0.89	0.31	<0.005			
Staff car use is discouraged							0.58	0.27	0.03			
Pseudo-r^2 (McFadden's)	0.157			0.067			0.234			0.231		
Sample size	682			682			682			682		

Table 5: Results from multivariate regression models (Models #1 – #4; see descriptions in main text) with individual B2B-carsharing-member employees as the unit of analysis

Question	Response	Frequency (standard error)
Which sector is your organisation is?	Private sector	78% (2%)
	Public sector	10% (1%)
	Third sector	11% (1%)
How many staff are employed at your organisation (at the location where car club cars are available to employees)	Less than 10	68% (4%)
	10-30	20% (4%)
	31-70	5% (2%)
	71-100	0%
	101-500	7% (2%)
	501-750	0%
	751-1,000	0%
	1,001-1,500	0%
	1,500-2,000	1% (<0.5%)
	2,001+	0%
How many employees have joined the car club at your organisation?	10-30	91% (3%)
	31-70	6% (2%)
	71-100	2% (1%)
	101-500	1% (<0.5%)
	501-750	0%
	751-1,000	0%
	1,001-1,500	0%
	1,500-2,000	0%
	2,001+	0%
In which year did your organisation become a corporate member?	2005	1% (<0.5%)
	2006	1% (<0.5%)
	2007	2% (1%)
	2008	7% (2%)
	2009	5% (2%)
	2010	14% (3%)
	2011	26% (4%)
	2012	44% (4%)
Approximately what proportion of car mileage consumed by your organisation for work-related journeys is undertaken using car club cars?	Less than 10%	50% (4%)
	11-20%	9% (3%)
	21-30%	8% (2%)
	31-40%	5% (2%)
	41-50%	3% (2%)
	51-60%	7% (2%)
	61-70%	4% (2%)
	71-80%	4% (2%)
	81-90%	10% (3%)
	91-100%	0%
Does your organisation have a Travel Plan?	Yes	17% (3%)
	No	80% (4%)

Does your organisation have a travel policy for work-related travel during the working day?	Yes – it prioritises travel by public transport, walking and cycling for any work-related trips	15% (3%)
	Yes – it prioritises travel by public transport, walking and cycling for some work-related trips	11% (3%)
	Yes – it requires employees to use a car club car if making any work-related car trips	6% (2%)
	Yes – it requires employees to use a car club car if making some work-related car trips	16% (3%)
	Yes – but employees are permitted to use their own vehicle for any work-related travel during the working day	8% (2%)
	Yes – but employees are permitted to use their own vehicle for some work-related travel during the working day	17% (3%)
	Yes – but employees are permitted to claim a private vehicle mileage allowance for any work-related travel	12% (3%)
	Yes – but employees are permitted to claim a private vehicle mileage allowance for some work-related travel	13% (3)
	No	72% (4%)
Does your organisation provide any of the following for employees to use when making work-related trips? (please tick all that apply)	Pool cars	13% (3%)
	Company cars	8% (2%)
	Leased cars	11% (3%)
	Salary sacrifice cars	2% (1%)
	Pool bikes	10% (3%)
	Pre-paid public transport ticket	22% (4%)
Has your organisation made any changes to its business travel arrangements or policies since joining the car club?	Pool cars have been replaced by car club cars	6% (2%)
	The number of company cars has been reduced	6% (2%)
	Car mileage rates have been reduced	1% (<0.5%)
	Employees are actively discouraged from using their own cars	17% (3%)
	Other changes to travel policies	7% (2%)
	No changes to policies	56% (4%)
	Don't know	8% (2%)
What have been the key benefits of joining the car club for your organisation? (tick all that apply)	Financial savings	62% (4%)
	Reduced CO2 emissions	26% (4%)
	Reduced administrative burden	38% (4%)
	Reduction in the number of parking spaces required	24% (4%)
	Reduced levels of business mileage	20% (4%)
	Improved employee satisfaction	31% (4%)
	Other	15% (3%)

Table 6: Descriptive results from survey of B2B carsharing program administrators (n=127)

	Parameter	Standard error	p-value
Constant	-0.56	0.41	0.18
ln(number of organization's employees)	-0.37	0.17	0.04
Organization is a public-sector entity	1.34	0.64	0.04
Organization has a Travel Plan	-1.55	0.59	0.01
Organization prioritizes 'sustainable' work-related travel (by public transport, cycling and walking)	2.15	0.93	0.02
Organization requires employees to use a carsharing car if making work-related car trips	-1.75	0.92	0.06
Organization reports that reduced parking is a key benefit of B2B carsharing participation	-0.88	0.39	0.03
Organization provides pool cars for employees' business travel	-0.99	0.53	0.07
r^2	0.188		
F(7,119)	3.94 ($p<0.01$)		
Sample size	127		

Table 7: Results from multivariate regression model (Model #5) of the proportion of an organization's business mileage performed by B2B carsharing (NB: proportions converted to log-odds prior to model estimation)