



The impact of company-car taxation policy on travel behavior

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ABSTRACT

This paper explores the impact of company car taxation on travel behavior. It focuses on a nationwide case study in Israel, which experienced a massive growth in the extent of company cars and which has implemented various policy changes in the taxation of company cars. A survey of 400 employees who have a company car and 230 employees who have only a privately owned car clearly points out the significant impact exerted by company cars on travel behavior, negatively affecting sustainable transportation development. The practice of and taxation policy in regard to the company car result in considerable extra mileage and encourage car usage by the employee's entire household. Changes in the taxation of a company car as well as in employer's policy toward company car usage may bring about a significant change in drivers' decisions regarding the willingness to have a company car and their travel behavior.

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1. Introduction

A “company car” or “employer-provided car” refers to passenger cars that an employer provides to an employee. The employee may use this car for commuter trips, work-related trips, as well as private trips; in many cases, other members of the employee's family are also allowed to use this car.

Company cars are well known and common in Europe, where some 20 million company cars were on the roads in 2008, constituting about 12% of the total stock of passenger cars. Of all the new passenger cars sold in that year, 7.5–50% were registered as company cars, e.g., 7.5% in Ireland, 42% in Germany, 45% in the Netherlands and 50% in Belgium (European Commission Directorate General for Environment, 2002; Cohen-Blankshtain, 2008b; De Witte and Macharis, 2010; Gutiérrez-i-Puigarnau and van Ommeren, forthcoming). In Israel, these estimates are similar to the upper range of these figures, with approximately 13% of the car fleet and 54% of the new cars purchased in 2008 being company cars (Israel Tax Authority, 2009). Regarding socio-economic characteristics of company-car drivers, Clarke et al. (2005) reported that most company cars in the UK were given to men. De Witte and Machairs (2010)

reported that 70% of company-car holders in their sample in Belgium were male employees and that 39% (the largest group) of all those with a company car were in their thirties.

From a tax point of view, a company car is considered a fringe benefit; that is, the sum total of this benefit, which is determined by the Ministry of Finance, is added to the employee's gross income, and tax is paid on it accordingly. The sum total of the benefit is often called the “value of personal use”. In most countries, Israel among them, the value of personal use is significantly biased downwards. This is making the company-car arrangement advantageous to both the employer, who is eligible to deduct most of the car expenses for tax purposes, and to the employee, who receives the company car benefit but pays relatively low tax on this benefit (this is further demonstrated with some values in Section 2.2). The employer would have to spend much more in direct wages to make the employee receive the same equivalent income, thus both sides are benefiting from this arrangement, and this results in an increase in the company cars' share (Israel Tax Authority, 2009; Berning, 2009; Black, 2008; Cohen-Blankshtain, 2008b; Cohen-Blankshtain, 2008a; Gutiérrez-i-Puigarnau and van Ommeren, forthcoming; Ehrlich and Tzadik, 2006).

Furthermore, in most of the countries where this benefit is given, it also includes full financing of the car's use: fuel, insurance, maintenance, parking fees and tolls. This provides the employer another opportunity to increase the employee income at a low cost: for the employer this is a tax deductible expense, for the employee this is a non-taxable income. This is a low cost

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fringe benefit that the employer can offer to attract employees. The consequence of such practice is that the marginal cost of a trip made in a company car to the employee is zero. In other words, the cost of the car to the employee is constant, regardless of its use. This practice may increase the private use of company cars; Gutiérrez-i-Puigarnau and van Ommeren (forthcoming) found that the large majority of company cars (about 80% in their data) in the Netherlands were not used for business purposes. The company-car arrangement encourages the intensive use of company cars, resulting in considerable negative transport-environmental consequences (De Witte and Macharis, 2010; Gutiérrez-i-Puigarnau and van Ommeren, forthcoming; Berning, 2009; Cohen-Blankshtain, 2008b; Johansson-Stenman, 2002; Lynn and Lockwood, 1998).

Company-car taxation policy is a key tool available to policy and decision-makers to influence this phenomenon. (Gutiérrez-i-Puigarnau and van Ommeren, forthcoming; De Borger and Wuyts, 2010; Cohen-Blankshtain, 2008b). The UK experience clearly points out that changes in taxation policy affect both the demand for company cars and travel patterns. Until 2002, the extent of the phenomenon was the highest in the UK. That year, the UK changed its company-car taxation policy to encourage more environmental friendly cars, by making the tax level a function of the amount of CO₂ emitted and the type of fuel used; the result was an overall increase in the value of personal use. As a result annual business miles driven decreased by about 300–400 million miles. This reduction resulted from a change in travel behavior on the part of drivers; it did not represent a reduction in the number of company cars (HMRC, 2006).

The aim of this paper is to evaluate the impact of company car taxation and employers' policy in regard to company cars on travel behavior, using Israel as a case study. The scope of this evaluation does not include the individual benefits of increased mobility and various long-run effects such as on the labor market and welfare. The following hypotheses were analyzed and examined:

- Drivers of company car exhibit different travel behavior characteristics than do drivers who purchase and maintain privately owned cars. Company cars provide incentives for and strengthen car use. Therefore, extra car trips are made in company cars, and more kilometers are traveled. Furthermore, having a company car affects the travel patterns of the entire household.
- The elasticity of demand for company cars, with respect to the value of personal use, is high. Employees' willingness to be involved in a company-car arrangement might be strongly influenced by the value of personal use. Furthermore, an employer's policy toward a company car (e.g., the extent of covering fuel and parking expenses) affects the willingness to be involved in a company-car arrangement.

Consequently, exploring and confirming our two hypotheses may indicate the significant impact of the company-car policy and arrangements on travel behavior. It also emphasizes the importance of the value of personal use and employers' arrangements regarding company cars.

The analysis is based on a survey of 400 employees who use a company car and 230 employees who do not have a company car but do own a private car. The questionnaire included stated-preference questions regarding travel behavior under different company-car taxation policies. The paper is organized as follows: the next section surveys the situation in Israel according to two sub-topics: characteristics of the passenger-car market and travel behavior patterns, and company-car taxation policy. Following that, we present the methodology, results and an analysis of the findings. The paper ends with a discussion and conclusions section.

2. Background: The Situation in Israel

2.1. Characteristics of the passenger-car market and travel patterns

The level of motorization in Israel is relatively constant over the last few years. In 2008 it was 257 passenger cars per 1000 residents, which was 45% lower than the average level of motorization in OECD countries (National Director of Revenues, 2009). A strong increase in the level of motorization occurred in the early 1990s, and the level became relatively stable in the mid-1990s. The motorization level is, to a large extent, influenced by car prices derived from the taxation of new vehicles. The vehicle purchase tax in Israel is high, particularly because of historical motives, the general past conception of the passenger car being that of a luxury good (Israel Tax Authorities, 2009). In 2008, this tax amounted to 84%, a figure that was lower than ever before. Its decrease from a level of 149% in 1990 resulted in an increase in car ownership.

In Israel 57% of the commuter trips in 2008 were made by passenger cars, 20% by public transportation and 11% by foot; the average annual mileage of passenger cars was 16,700 km (Central Bureau of Statistics, 2009). These figures have remained relatively constant over the past few years. The monthly maintenance cost of a typical passenger-car (1.6 petrol engine), with an annual mileage of 15,000 was NIS 2,700 in the first quarter of 2011 (\$1 = NIS 3.55 as of Dec. 31, 2010). The components of this cost are fuel (32%), depreciation (31%), insurance (15%), repairs (18%) and licensing (4%). (Heshev, 2011).

In the first decade of the new millennium, a massive increase occurred in the share of company cars sold in Israel, e.g., in 2003, their share of the total fleet was 3% and increased to 13% in 2008. However, the economic crisis that began at the end of 2008 caused a temporary deceleration in their growth owing to the wave of lay-offs of hi-tech employees, most of whom had company cars (Israeli Tax Authorities, 2009).

Quantitative assessments (Israel Bank, 2008) show that the mileage rate of all company-car users is 24% higher than that of privately owned cars, and for hi-tech employees who use company cars (52% of the total employees in this sector), it is 30–60% higher than that of privately owned cars. The Israeli "driving hi-tech" forum, which represents hi-tech companies having large fleets of company cars, found that the average mileage rate of forum cars is double the national average (Ehrlich and Tzadik, 2006). Cohen (2009) reported that the average daily car mileage per household having at least one company car was 100 km, compared to 65 km per household with only a privately owned car.

The Haifa metropolitan area (the third largest metropolitan area in Israel) travel behavior survey conducted in 2006 showed that the average annual mileage for a household having a company car was 34,000 km compared to 16,000 km for household owning only private cars. These data also reflect the fact that the socio-economic status of households with a company car is higher than that of the average population; the higher status leads to more activities and, therefore, to more trips. Another possible explanation is that having a company car may influence residential location, as travel is then cheaper or even free.

The Central Bank of Israel (Bank of Israel Report, 2008) showed that the monthly fuel expense for company car users is 24% higher than for those who own private cars. This estimate controls for household socio-economic characteristics (e.g., income, number of children per household) but ignores some latent variables (e.g., the level of household activities and the impact of having a company car on residential location). The bank's report also estimated that the practice of company cars increases the average mileage in Israel by 5–8%.

2.2. Taxation policy in regard to company cars

The company-car taxation policies have been changed many times, even in recent years. In 1994, a reform was instituted (enforced and legalized a year later) that consolidated all company cars into seven price groups. The Ministry of Finance determined the price-group division each year according to the purchasing price of the car, with price group 1 being the cheapest and price group 7 the most expensive. For each group, the annual value of personal use was set at between 9% and 15% of the car's purchasing price (Cohen-Blankshtain, 2008a). This reform brought about a significant increase in the number of company cars (Israel Tax Authority, 2007).

The Finance Ministry's 2005 report, however, stated that the value of personal use had been set at less than half the real value of this benefit. This distortion was estimated at \$450 million a year. Following this report, the value of personal use was raised by 20–30% for the different price groups.

In 2007, the Knesset, the Israeli Parliament, passed a law increasing the value of personal use gradually from 2008 to 2011. Table 1 presents the values and the increments each year according to this reform (\$1 = NIS 3.85 as of Dec. 31, 2007).

As can be seen from Table 1, the value of personal use goes up notably, especially in 2010 and 2011. However, at the end of the reform process, in 2011, this value will still be lower than the value of the real benefit; furthermore, it does not take into account mileage rates and fuel consumption. For example, the real value of personal use for the most popular price group, group 2, is estimated at NIS 2,300–NIS 3500 (in accordance with the variable expenses, such as mileage rate, capital price, ongoing maintenance costs, type of fuel, etc.), whereas the value of personal use for this price group at the end of the reform will be NIS 2450 (Israel Tax Authority, 2009).

During 2009, new regulations for the car-purchase tax were introduced, based on the recommendation of the Committee for Green Taxation. In parallel with this reform, it was decided to switch from January 1st 2010 to a linear calculation for the monthly value of personal use, instead of the price-group system. The linear calculation was determined as 2.04% of the (new) car's purchasing list price for cars up to NIS 130,000 and as 2.48% of the (new) car's purchasing list price for cars above NIS 130,000. Starting on January 1st, 2011, this value is set at 2.48% regardless of the purchasing list price. The linear calculation was applied only to cars that were on the road for the first time beginning January 1st, 2010. The value of personal use for older company cars continues to be accounted for according to the previous reform.

As illustrated in Fig. 1, this new model of calculating the value of personal use leads to similar values of personal use as would have pertained according to the price-group procedure.

Consequently, the value of personal use in Israel will remain lower than its real value, and the marginal cost of a trip made by a company car will continue to be zero for the employee.

3. Methodology

While Section 2 presents some interesting aggregate revealed data about the company car phenomena, lack of the range of important data over the years and too many compounding factors including car and gas prices, the labor market, economic crisis, etc. prevented us from relying on longitudinal revealed data. In order to evaluate our hypotheses, we therefore chose to conduct a survey including reveal, stated and attitudinal data and based the analysis on descriptive statistics and model estimation based on these data. The survey was completed by 400 drivers who had a company car and 230 drivers who had only a privately owned vehicle, the latter serving as a control group. Of the 400 questionnaires of company-car drivers, 250 were collected at high-tech employment centers by personally addressing employees during their lunch break. The 150 remaining questionnaires were collected by personally addressing individuals and some small companies that were willing to participate in the survey. Attempts to create a pure random sample, as well as the recruitment of large firms offering their employees a company-car arrangement, were not feasible because of the lack of cooperation on the part of such companies. Therefore, the disadvantage of a lack of randomness in the survey should be noted. However, in

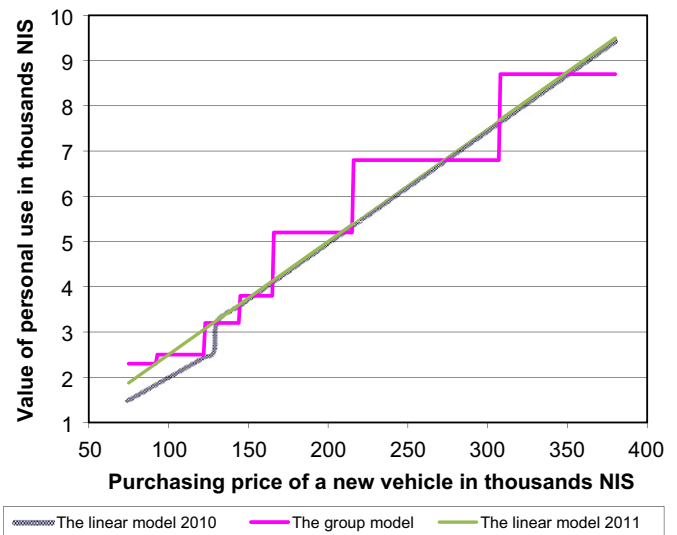


Fig. 1. Value of personal use: Price-group model for 2011 and linear models.

Table 1
Monthly personal use value according to price group, 2007–2011 (in NIS, 2007 prices).
Source: Israel Tax Authority (2009).

Marginal value							
Price group	Value of personal use in 2007	2008	2009	2010	2011	Value of personal use at the end of the process	Total addition to the value of personal use
1	1180	200	200	340	340	2260	1080
2	1330	200	200	360	360	2450	1120
3	1740	360	350	350	350	3150	1410
4	2160	410	410	410	400	3780	1620
5	3030	550	550	550	550	5230	2200
6	3850	740	730	730	730	6780	2930
7	4850	970	970	970	960	8720	3870

the places chosen for the sampling, the recruiting of respondents was done randomly. The 230 questionnaires of the control group from firms not offering a company-car arrangement were collected by personally addressing individuals and employees in these firms.

The questionnaire included 46 questions in several sections:

- Socio-economic and demographic questions, including gender, age, marital status, household characteristics, car ownership and working hours per week.
- Travel behavior patterns.
- Stated preference questions regarding willingness to give up the company car (for the control group, to receive one) and travel mode to and from the workplace in response to potential changes in the value of personal use and to employer's company-car arrangements (who pays the various costs elements, such as fuel, parking, maintenance, etc.).

The compiled data regarding company-car drivers and company-car characteristics were compared, where possible, to national averages from Ministry of Transport statistics and to the compiled control group data.

The stated preference data were used to analyze the impact of personal use on travel behavior. Three models were estimated: first, a model estimating the variables affecting the annual amount of mileage driven; second, a model estimating the likelihood that an employee would give up a company car; third, a mode-choice model estimating the likelihood that an employee who gave up a company car would continue to commute by a passenger car.

4. Results and analysis

4.1. Socio-economic characteristics

The socio-economic variables of the sample population, consisting of respondents who have a company car, are presented in Table 2. The majority of the study respondents were married men in their thirties, employed in industry (especially in high-tech companies), and having a relatively high income. Their household typically had two cars, one of which was a company car. A comparison with the socio-economic characteristics of the control

group confirmed that the company-cars users were on a higher socio-economic level. A significant difference in gender was found: 76% of the company-car users were men, compared to 60% of all driving license holders in Israel in 2008 and to 45% of the control group population.

4.2. Employer's policy

Most (69%) of the sample population were given a company car from price group 2, the most common price group in Israel; 24% were roughly evenly distributed among price groups 1, 3 and 4; and another 5% were given a company car in groups 5–7; 3% of the sample was not aware of the price group of their car. Table 3 shows that the employer usually bears the variable expenses, paying a high proportion of all fuel expenses and tending to pay for parking.

4.3. Travel behavior

The annual average mileage of the company-car population was found to be 26,600 km, which is 70% higher than the 15,650 km driven by those with only a privately owned car. Given that 13% of the passenger-car fleet in Israel consists of company cars, these results are consistent with the annual average mileage per passenger car in Israel of 16,700 km.

Fig. 2 presents the annual car mileage distribution for the company-cars drivers and the privately owned drivers in our sample and a comparison with the national figures from the 2008 census. As can be seen, the mileage of company-car drivers is significantly higher than that of the general population and the control group of drivers, with almost 40% of the first group having a mileage of over 30,000 km per year. These results are consistent with the estimates given in the Background section of this paper. It is interesting to note that 44% of the company-car drivers stated

Table 3
Employer's policy toward variable company-car expenses.

	Does not pay at all	Partially pays	Pays most	Pays all
Fuel expenses	4%	3%	5%	88%
Parking expenses	31%	10%	14%	45%

Table 2
Socio-economic characteristics of the company-car sample.

	Women	Men			
Gender	24%	76%			
Age	Over 60 3%	50–60 14%	40–50 28%	30–40 42%	Under 30 13%
Marital status	Divorced 5%	Married 81%	Single 14%		
Working hours per week	Above 60 4%	50–60 17%	40–50 67%	30–40 10%	Below 30 2%
Household size	1 7%	2 18%	3 16%	4 28%	5 6+ 24% 7%
No. of wage earners	1 20%	2 70%	3+ 10%		
Total no. of cars	1 30%	2 64%	3+ 6%		
No. of company cars	1 86%	2 13%	3 1%		
Income	Much above average 60%	Above average 33%	Average 5%	Below average 1%	Much below average 1%

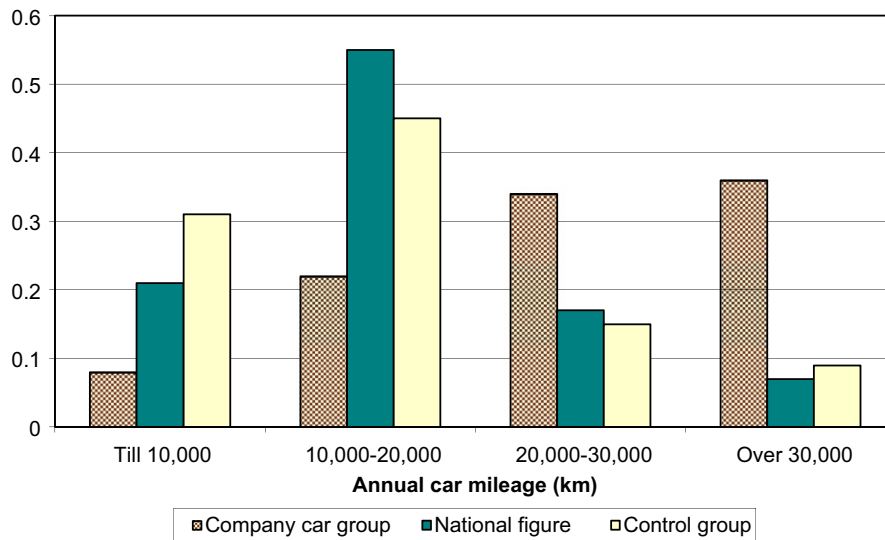


Fig. 2. Annual average mileage (km.) distribution: sample populations (company-car drivers and privately owned car drivers) vs. the national figure.

Table 4
Estimation of annual mileage driven.

Variable	Estimated parameter	t-statistics
Constant	10,421.1	6.13
Gender (female=1)	-3,085.3	-3.24
Employer bears parking expense	2,410.4	4.21
Household size	1,570.1	4.23
Marital status (married=1)	-2,886.4	-2.32
Company car (yes=1)	3,000.1	1.88
$R^2=0.25$	$N=481$	

that they would make fewer trips and 42% stated that they would choose alternative modes if they had only a privately owned car instead of a company car.

In order to estimate the difference in mileage driven between company car owners and privately own car drivers, a regression model of the annual mileage driven as reported by the respondents was estimated for the pooled data of the two sub-samples. The estimation results of this model are shown in Table 4. These results show that the coefficient of a dummy variable of company car owner is 3000, i.e., all things being equal the company car driver drives 3000 km more than privately owned car driver. However, this tells only part of the story as the level in which the employer bears parking expenses has a coefficient of 2410. As can be seen in Table 3 this variable can get values ranging from zero (the employer does not cover parking expenses at all) to three (the employer fully covers parking expenses). Table 3 shows that 45% of the company car drivers have a value of 3 for this variable. These 45% would drive 10,230 km more ($3000+3 \times 2410$) than privately owned car drivers. We tried to include both parking expenses' coverage and fuel expenses' coverage in the model, but those were highly correlated, i.e., those who are covered for fuel expenses are usually also covered for parking expenses. Other results show that among socio-economic, gender, household size and marital status have a significant impact on the annual car mileage.

Fully 92% of the company-car sample stated that they used a passenger car as their mode for work trips, compared to 75% of the control group and 57% of the general population. In 20% of the cases, the company car was used not only by the employee but also by other household members, where in some cases other household members use it as their main car. 93% of the

respondents who use the car for commute also combine trips for other purposes in their commuter trip.

4.4. Impact of the value of personal use

Respondents who have a company car were asked if they would give up their company car at the end of the reform in 2011, and also in case the value of personal use would go even higher than planned by the reform. They were asked to indicate the extent to which they agreed with the statement that they would give up their company car on a scale of 1–5 (with 1=strongly believe that they would and 5=strongly believe that they would not). Only 9% stated that they would definitely give up their company car at the end of the reform. However, this percentage is significantly and positively related with the value of personal use: it is 29% if the value of personal use would increase by additional NIS 1,000 and 47% if it would increase by additional NIS 2,000. By comparison, it was reported in September 2010 that 5% who had a company car had already given it up because of the reform (The Marker, 15 September 2010).

A detailed analysis was carried out for respondents who owned a car belonging to the most popular price group (price group 2), which consisted of 69% of the sample. In response to a question as to what value of personal use would cause them to decide not to continue with a company car, the average value was found to be NIS 3540. This is almost NIS 1100 more than the planned value at the end of the reform in 2011. As mentioned in the Background section, the estimation of the real value of personal use for price group 2 was NIS 2300–NIS 3500 (in accordance with the variable expenses). It can be concluded, therefore, that the upper estimation for the value of personal use, which resulted from a higher mileage rate, seems acceptable to users.

In order to evaluate the elasticity of demand for company cars in price group 2 with respect to the value of personal use, the relationship between willingness to pay and the value of personal use was estimated by the equation: $x = cy^z$, where x is the percentage of respondents willing to pay within a given range of values of personal use (in NIS 500 intervals), y is a range of values of personal use and z represents the elasticity with respect to the value of personal use.

The R^2 corresponding to this estimation was found to be 0.9, and the value of z to be -2.1. This high value of elasticity indicates that the demand for a company car from price group

2 is elastic; therefore, the value of personal use may have a robust impact on employees' willingness to receive company cars.

It should be noted that the value of personal use might have a significant impact on the willingness of employees who currently do not have a company car to accept a company-car arrangement. Indeed, 48% of the control group respondents stated that they were willing to receive a company car under the 2008 value of personal use. However, if the value of personal use went up to its value at the end of the reform in 2011, the percentage of those willing to accept the arrangement clearly reduces, from 48% to 30%.

4.5. Variables affecting the likelihood to give up a company car

Table 5 shows the results of a multinomial logit model estimating the impact of different variables on the likelihood to give up a company car. There are three alternatives in this model: (1) Give Up, representing respondent choices 1 and 2 ("definitely give up" and "likely give up"); (2) Don't Know, representing respondent choice 3 ("don't know") and (3) Won't Give Up, representing respondent choices 4 and 5 ("likely won't give up" and "definitely won't give up"). All the coefficients were estimated for the first two alternatives, with the third one serving as the reference. Table 5 shows the estimated coefficients for each variable, together with the t-statistic in parentheses.

The results show that an increase in the value of personal use (in thousands of NIS) on top of what is planned for the end of the reform significantly increases the willingness to give up a company car. The employers' policy also exerts a strong impact on the willingness to give up a company car: when the employer bears most or all of the parking expenses, the willingness to give up the company car significantly decreases. A similar result was obtained for fuel expenses; however, because these two variables were highly correlated, it was not possible to include them both in the model. As the number of driving licenses in the household increases, the likelihood to give up a company car significantly decreases, as there is more competition for cars in the household. The price group of the company car given to the respondent is also significant in the model: the higher the price group (i.e., the more expensive the purchasing price of the company car), the less likely respondents are to give it up. This finding may represent a socio-economic effect, as a higher car-group price is correlated with higher income. It may also be explained by the claim that employees given relatively expensive company cars would not purchase such a vehicle privately, and therefore they are more willing to keep their company-car arrangement. Finally the variable trip-chaining that represents the level of the employee's combining trips for other purposes during the commute to or from work is also noteworthy. The positive coefficient, which is significant only for the "Give up" alternative, shows that travel behavior also impacts the willingness to give up a company car: employees with more complex travel patterns are less likely to

Table 5
Estimation of the willingness to give up a company car.

Variable	Don't Know	Would Give Up
Alternative specific constant	1.22 (1.99)	1.99 (3.61)
Increase in value of personal use	0.000575 (3.62)	0.00125 (8.65)
Employer bears parking expense	-0.584 (-2.15)	-1.22 (-5.03)
Number of licenses in household	-0.273 (-1.81)	-0.422 (-3.09)
Price group	-0.313 (-3.95)	-0.313 (-3.95)
Trip chaining	-0.0835 (0.78)	-0.162 (1.68)
Initial log likelihood: -697.62		
Final log likelihood: -573.16		
ρ^2 : 0.178		

Table 6
Estimation of mode choice in the absence of a company car (all parameters are for the utility of a private car).

Variable	Estimated parameter	t-statistics
Alternative specific constant	-1.92	-2.53
Autos available in the household	0.49	2.81
Income	0.28	2.35
Gender (female=1)	1.20	-4.98
No. of children per household	0.25	3.01
Marital status (married=1)	-0.64	-2.36
Young (less than 40 years old)	1.22	3.94
Initial log likelihood: -440.148		
Final log likelihood: -388.419		
ρ^2 : 0.118		

give up their company car, as the alternative of public transport is less convenient for them.

4.6. Mode choice without company cars—A hypothetical scenario

Respondents who have a company car were asked to indicate the mode they would choose for their commute trip in a hypothetical scenario in which they had to give up their company car. Only 50% of the respondents stated that they would use a privately owned passenger car as their major mode of commuting in such a scenario. This outcome might be considerably underestimated, reflecting a social satisfaction bias in stated preference data; as mentioned previously, 57% of the general population in Israel use a passenger car as their major mode of commuting.

Table 6 presents the estimation results of the binary logit mode-choice model estimating the probability of commuting by private car vs. all the other modes in the absence of a company car. The variables shown are for the utility of commuting by car, while the utility of commuting by other modes is zero.

The results show that the more cars that are available in the household and the higher its income, the greater is the likelihood of commuting by a private passenger car. Females are more likely to continue to commute by car in the absence of a company car. This may be due to the fact that the wife-mother is usually the one responsible for the major household activities that can be done before and after traveling to/from work (e.g., dropping-off and picking-up children, shopping). This may also explain the finding that the more children in a household, the likelihood of commuting by passenger car increases. Interesting and not trivial is the effect of marital status and age: single employees and young employees are more likely to continue to commute by private passenger car.

5. Discussion and conclusions

This paper evaluates the impact of a company-car policy and employers' policy regarding company cars on car ownership and travel behavior, using Israel as a case study.

The results show that the majority of employees who have a company car are males in their thirties, employed in industry (especially in high-tech companies), with relatively high income. Their household typically possesses two passenger cars, one of which is a company car. These socio-economic characteristics of employees who receive a company car are similar to the socio-economic characteristics of company-car users in Europe (Clarke et al., 2005; De Witte and Macharis, 2010). Of the drivers who have a company car, 92% use a passenger car as their main commuting mode, compared to 75% of the control group and 56% of the general

population. In 20% of the cases, it was found, the employee's company car is also used by other household members.

The results allow us to confirm the hypotheses presented in the introduction. The mechanism of the company car, which is given to employees as a fringe benefit, especially because of its low value of personal use, results in a significant level of extra mileage. The annual mileage of a company car was found to be 70% higher than that of a privately owned car (26,000 km, compared to 15,650 km). This was also confirmed with a model estimating that the extra mileage driven by company car drivers is on average 3000 km if they are not reimbursed for their parking and fuel expenses, and can go up to more than 10,000 km in the more common case where they are reimbursed for such expenses. The Israeli finding is consistent with a recent study in Belgium showing a comparable figure of 65% (Ramaekers et al., 2010) and in line with other evidences from Europe about this impact of company cars (e.g., De Witte and Macharis, 2010; Gutiérrez-i-Puigarnau and van Ommeren, forthcoming; Berning, 2009). It is likely that if the employers were not offered company cars, the labor market would dictate that valued employees be compensated in other ways, most obviously through higher wages. With higher incomes their levels of automobile ownership and use may also rise. However, this is not likely to be in the scale of the case of subsidized company cars. This is partially confirmed by the results that 44% of the company-car drivers stated that they would make fewer trips and 42% would choose alternative modes if they had to use a privately owned car instead of a company car. While commute trips may change mode, it seems plausible to assume that the extra trips made in a company car that can be avoided are for private use rather than for business purposes. Twenty percent of the respondents also stated that the car is used by other household members. These suggest that company car highly strengthens private use and is in line with Gutiérrez-i-Puigarnau and van Ommeren (forthcoming) findings about the massive use of company cars for private use.

Taxation policy determined by the value of personal use and the employer's policy regarding the coverage of variable car expenses have significant influence on drivers' decisions regarding both their willingness to have a company car and their travel patterns using the company car. None of the new reforms implemented in Israel reflects the real value of personal use, and therefore they will incur almost no real changes in the usage or driving patterns of a company car. However, taxation policies that determine a higher value of use in accordance with the real value of a company car may indeed change the decisions of company-car users, especially in certain types of households. It was shown that respondents who have a company car taken from the most popular price group 2 are willing to pay, on average, NIS 1,100 over the value of personal use that is planned at the end of the reform. This higher value is in line with estimates of the real value of personal use for company cars with a high mileage rate from price group 2. Furthermore, the demand elasticity with respect to the value of personal use was found to be -2.1 , indicating that employees might be strongly affected by the value of personal use when considering accepting a company-car arrangement. This finding is in line with other studies, which show that the demand for cars is price elastic (see Gutiérrez-i-Puigarnau and van Ommeren's (forthcoming) and the references therein).

Based on the research results of this study and considering the negative safety implications of company cars (for more details on this subject, see Shiftan and Albert, 2010), the following recommendations might be suggested: First, the practice of a lower than actual value of personal use should be terminated, and the value of personal use should be increased to reflect the real, full value of the benefit. The value of personal use should also take into

consideration variables such as mileage driven and fuel consumption. This means that the new reforms in company-car taxation policy in Israel should be re-examined, and the current tax distortion corrected accordingly. Second, decision-makers should consider policies directed at limiting the types of arrangement that employers offer to employees (e.g., toll coverage, parking fees). This includes limiting the types of employees eligible to receive a company car. These two recommendations, depending on the manner they are implemented, can serve as substitutes for or as complementary means of controlling employees' decisions regarding a company car: the willingness to accept one in the first place, which is a fixed component, and the travel behavior pattern with it, which is a variable component.

Furthermore, with regard to decision-makers, it is clear that correcting the present tax distortion and affecting employers' policies on this fringe benefit are insufficient tools by themselves; much must be done in addition to promoting and improving alternative transport modes to the passenger car. Further research avenues, accordingly, should evaluate the desired change in the value of personal use of a company car that will lead to a desired change in the modal split and in travel behavior. Comparative studies should also be conducted with other countries where there is a wide use of company cars, such as Belgium, Netherlands and the UK.

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