

Safety implications of company cars—the Israeli experience

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Abstract

Purpose This paper explores the safety implications of the use of company cars. It focuses on a case study in Israel that shows a massive growth in the extent of company-car use in recent years.

Methods The methodology consisted of two main elements: the first was a market review regarding the situation in Israel, the second was a questionnaire-based survey distributed to 400 drivers who had a company car and to a control group of 230 drivers who did not have a company car and drove their own vehicles.

Results The results clearly indicate that company cars have a significant negative impact on both travel behavior and safety. First, company-car arrangements result in significant extra mileages which lead to an excessive level of exposure. In addition, company cars are installed with fewer safety features than privately owned cars, and drivers of company cars tend to exhibit fewer safe-driving characteristics. The consequence of such practice is that company-car drivers were also found to be more involved in road crashes than were drivers who did not have a company car.

Conclusions The consequences suggest that decision-makers may need to re-examine company car arrangements in order to control the excessive exposure and to require that company cars come with a core of sufficient safety features.

Keywords Company cars · Safety features · Safety implications · Travel behavior · Driving behavior

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1 Introduction

A ‘company car’ or ‘employer-provided car’ is a passenger car that the employer provides to the employee. The employee may use this car for commuting to work, for all work-related trips, as well as for his or her own private use at any time. In many cases, members of the employee’s family are also allowed use of this car. This general arrangement predominates in Israel, but it may well vary in other countries.

In Europe, company cars constituted 12 % of all passenger cars in 2008. Data from 2002 shows that a significant share of all new passenger cars sold in Europe were registered as company cars; e.g., 7.5 % in Ireland, 42 % in Germany, 45 % in the Netherlands and 50 % in Sweden [5,18]. A 2010 report indicates that company cars account for roughly 50 % of all new sales of cars in the EU [8]. In Israel, estimates of these elements even surpass the EU figures: 54 % of the new cars purchased in 2008 were company cars, and their share was approximately 13 % of the total passenger car fleet [29].

There are various reasons for the increase in the relative number of company cars in Israel and the EU, the main one being that taxation policies make it advantageous for both employer and employee. This is not the case in the USA, where the extent of the phenomenon is quite limited.

In most EU countries, business-related trips are considered part of the production costs for tax purposes. The employer usually bears all the major expenses (e.g., purchasing cost, insurance) and deducts these expenses for tax purposes [13,18,29]. From the employee’s point of view, a company car is considered a fringe benefit; the sum total of this benefit is added to the employee’s gross income, and tax is paid on it accordingly. The benefit is commonly called the ‘value of personal use’. As in most countries in the EU, the value of personal use in Israel is significantly biased downwards for tax purposes; i.e., it is lower than the value of the real benefit. There are various reasons for this, including

historical causes and increased lobbying by the leasing companies. As a result, the proportion of company cars has increased [2,3,5,13,18,29].

In many cases, the benefit also includes full financing of the car's use (e.g., fuel, insurance, maintenance, parking fees and other payments). The consequence of such a practice is that the marginal cost to the employee of a trip made in a company car is zero, which encourages excessive driving. This issue has been explicitly investigated in Israel [26]. In the U.S., unlike Israel and most EU countries, the personal use of a company car is considered a non-cash fringe benefit, and therefore its value must be determined and reported at least once a year [12]. In consequence, the mixed use of a company car for both business and personal use is rather controlled.

Important questions arise regarding the safety implications of company cars. It is well known that traveling by passenger car is less safe than using modes of public transportation (see, for example, [20]). Therefore, the encouragement of passenger car usage engendered by providing company cars should be evaluated. Additionally, certain relevant questions need to be answered: Are the safety features installed in company cars different from those in privately sold cars? Do drivers of company cars exhibit different driving behavior from drivers of private cars with regard to energy use and, in particular, safety? These questions should be of concern, especially in a country like Israel, which has experienced a massive growth in the proportion of company cars in recent years.

While the effect of company cars on an increase in the amount of mileage traveled has received some attention in the literature [2,18,26], there has been relatively little research regarding the safety implications of company car use. Most of the latter studies were conducted in Great Britain, where the share of company cars was the highest for many years. Accordingly, this paper addresses a number of safety aspects of the use of company cars in Israel: the amount of travel, driving behavior, and the level of safety equipment installed in the car.

Lynn and Lockwood [24] found that the average mileage of a company car in England was more than double that of a privately owned car. Furthermore, the crash rate of company cars totaled 0.19 crashes per driver per year, compared to 0.10 for drivers of privately owned car on work-related car trips and 0.08 for non-work-related trips. The researchers reported that even after controlling for differences in mileage, company car drivers are 50 % more likely to be involved in a car crash than are other drivers. Therefore, the proportion of company car drivers involved in collisions is higher than their share in the fleet [21]. Clarke et al. [6,7] found that the main reason for road crashes involving company cars in Great Britain was excess speeds. Dimmer and Parker [11] found that 27 % of company car drivers reported involvement

in at least one crash over the previous 3-year period, which is considerably higher than the 18 % reported by drivers of privately owned cars in Great Britain. They also concluded that driving under pressure in company cars was a significant cause of crashes of these cars. The foregoing findings suggest that these drivers tend to drive above-average mileage and are exposed to a variety of stressors [21]. The implication is that these factors constitute particular risk factors that are associated with company car drivers and that result in higher collision liability [10,27].

These findings and implications should be a cause of concern in Israel because of the large usage of company cars in the country. In order to evaluate the travel behavior and safety implications of company cars in Israel, the following hypotheses were advanced and examined:

- Company car drivers exhibit different travel-behavior characteristics than do drivers who purchase and maintain their own cars.
- Company cars provide incentives for and increase car use; therefore, more car trips are made in company cars, and more kilometers are traveled in them.
- The safety characteristics of company cars are relatively poor compared to those demanded and purchased by private car owners.
- Having a company car can lead to changes in one's driving behavior and is associated with more aggressive and dangerous driving behavior, thus producing a considerable negative impact on safety and a consequent increase in road crashes.

The first two of these hypotheses is examined in more detail in Shiftan et al. [26], while this paper focuses on the last two.

The paper is organized as follows: Section 2 presents the methodology. Section 3 describes and analyzes the results of an examination of the two hypotheses. Lastly Section 4 discusses the issues and offers conclusions.

2 Methodology

The methodology consisted of two main elements: the first was a market survey regarding the situation in Israel, including the car market in general, the company car market, mileage rates and safety characteristics, all based on the available official statistics; the second was a questionnaire-based survey distributed to 400 drivers who had a company car and to a control group of 230 drivers who did not have a company car and drove their own vehicles. The focus of the study was on company car drivers, and the control group was used to compare some average figures per driver.

A total of 250 out of the 400 questionnaires of company car drivers were collected in areas with many hi-tech

companies by personally addressing employees during their lunch break. The 150 remaining questionnaires were collected after personally addressing individuals who had a company car, working at various small companies. Attempts to create a pure random sample, as well as to get the cooperation of large firms that offered their employees a company car arrangement were not found to be feasible. Therefore, the disadvantage of a lack of randomness in the survey should be noted. However, the recruiting of respondents was carried out randomly in the places chosen for the sampling. The 230 questionnaires of the control group were collected by personally addressing individuals and employees of firms not offering a company car arrangement.

The questionnaire included 46 items organized in several sections as follows:

- Socio-economic and demographic questions: gender, age, marital status, household characteristics, car ownership, and working hours per week.
- Characteristics of the company car: price group, safety features and driver's awareness of them, and employer policy regarding reimbursement of various car costs, such as fuel, parking and maintenance.
- Travel behavior patterns using the company car; e.g., number of trips, mileage rate, and trip chaining.
- Attitudes toward driving behavior in a company car compared to a privately owned passenger car.

It should be noted that a-priori it was impossible to create two sub-samples with similar characteristics and no attempt was made in this direction. However, the data compiled on company car drivers and company car characteristics were compared, where possible, to national averages from the Israel Ministry of Transport and to the control group data.

3 Results and analysis

3.1 Market survey

3.1.1 The passenger car market

In Israel, the vehicle fleet at the end of 2008 stood at 2.4 million vehicles, 78 % of which were passenger cars [28]. This reflects a motorization rate of 257 passenger cars for every 1,000 residents, a level of motorization 45 % lower than the average in OECD countries [25]. The main explanation for this low level is the high price of cars, which is caused to a large extent by a high tax on new vehicles. While most OECD countries levy a tax of about 40 % on car purchases, the tax for purchasing a private car in Israel in 2008 was 84 %, and this rate was the lowest ever [8,25].

In an attempt to encourage the purchase of safer passenger cars, the tax rate has been reduced over the past few years

and favors cars with better safety features [29]. Table 1 presents the sales distribution of new cars in Israel from 2005 to 2008, according to the type of safety devices installed in the vehicle; an increase is seen in the level of safety features installed in new cars during these years.

It should be noted that the Anti-lock Braking System (ABS) is now considered standard, since this feature can be found in 98 % of the passenger cars purchased since 2008. As can be seen from Table 1, the number of air bags has gone up significantly. An additional important development is the introduction of a new technology, Electronic Stability Protection (ESP) [17].

A comparison between Israel and the EU countries regarding the proportion of new cars purchased in 2008 of the total fleet indicates figures that are as promising as they are worrisome. On the one hand, 9.6 % of the vehicles in Israel were registered as new cars, while this share was only 6.8 % in the EU countries. On the other hand, the EuroNCAP Star Rating scores awarded in Israel for new passenger cars were significantly lower than those awarded in the EU countries, especially compared to the western European countries and Scandinavia, but they are even lower than the scores awarded in some eastern European countries [15,16]. Table 2 demonstrates these differences.

As presented in Table 2, Israel has the highest percentage of non-tested cars and the lowest share of 5-star rating among all European countries. The scores awarded in Israel on the NCAP Star Rating test should be a cause of concern, especially given the relatively high proportion of vehicles registered in Israel as new cars (at least in 2008). The relatively low rating score for new cars in Israel is most likely due to the smaller number of airbags installed in each new car (see Table 4). One question worth examining is whether the low rating is associated with the high share of company cars in Israel.

3.1.2 The company car market

Over the past years, a massive increase has occurred in the proportion of company cars sold in Israel. This upward trend exists in every price group and in every model year as can be seen in Table 3. The division into price groups is determined

Table 1 Sales distribution for new passenger cars, 2005–2008, according to type of safety device

Safety device	2005	2006	2007	2008
2 airbags +ABS	48 %	27 %	16 %	10 %
6 airbags +ABS	23 %	41 %	53 %	57 %
More than 6 airbags+ABS	1 %	2 %	4 %	6 %
ESP	8 %	15 %	27 %	53 %

Source: [29]

Table 2 Occupant protection in new passenger cars sold in 2008

Country	5-star	4-star	3-star	2-star	Non-tested
Israel	29 %	46 %	1 %	3 %	22 %
Sweden	64 %	27 %	2 %	0 %	7 %
Spain	58 %	30 %	5 %	1 %	6 %
Germany	55 %	30 %	4 %	0 %	10 %
Poland	48 %	37 %	5 %	2 %	8 %
Slovakia	32 %	51 %	5 %	2 %	11 %
EU-27	53 %	31 %	7 %	1 %	8 %

Source: [15]

by the Ministry of Finance each year according to the purchasing price of the car, price group 1 being the cheapest (as of 2008, up to NIS 92,000, where 1 USD = 3.8 NIS in Dec 2008), and price group 7 the most expensive.

In 2008, 72 % of the company cars were in the second price group, the most common group [29]. The economic crisis that began at the end of 2008 caused a deceleration in the growth of company car rates because of the wave of lay-offs of hi-tech employees, who constituted a large percentage of the company car-user population.

The increased ratio of company cars also had a noteworthy impact on the used-car (second-hand) market. A Tax Authorities [29] survey of the passenger car market in Israel in 2008 indicates that 78 % of the cars 4–5 years old that are owned privately by second owners were originally company cars. For certain models, this rate is even higher.

Similar to the common company car arrangement in Europe [18], a new car is usually given to an employee for a period of 3 years; consequently, the average age of a company car in Israel is 1.5 years. In comparison, the average age of privately owned passenger cars in Israel over the last decade has been quite constant and, in 2009, stood at 7.1 years [28]. This average age is similar to that in European countries,

Table 3 Share of company cars of the total number of cars, according to price group and model year

Price group	Model year				
	Till 2003	2004	2005	2006	2007
1	2 %	13 %	29 %	56 %	65 %
2	2 %	23 %	47 %	57 %	62 %
3	2 %	11 %	12 %	15 %	16 %
4	1 %	23 %	38 %	46 %	49 %
5	4 %	16 %	25 %	30 %	31 %
6	5 %	19 %	27 %	33 %	39 %
7	8 %	27 %	35 %	46 %	59 %
Total	3 %	19 %	37 %	47 %	51 %

Source: [29]

whose share of company cars is relatively large; e.g., in Germany, the average age of a car was 8.1 years in 2007 [2].

3.1.3 Mileage rate of company cars

The average mileage rate of passenger cars in Israel was 16,700 km in 2008 [28]. This rate has remained relatively constant over the past few years. Quantitative assessments [1] show that the mileage rate of company car users is 24 % higher than that of privately owned cars; for hi-tech employees who use company cars (52 % of the total employees in this sector), the mileage rate is 30–60 % higher than the national average.

These estimates are consistent with other evaluations that have been made about mileage rates of company cars in Israel. The Israeli “hi-tech driving” forum, which represents hi-tech companies having a large fleet of company cars, found that the average mileage rate of forum cars is double the national average [13]. Cohen [4] found that the average daily car mileage per household having at least one company car was 100 km. in 2006, compared to 65 km. per household with only privately owned cars.

A driving habits survey conducted in the metropolitan area of Haifa in the north of Israel (the third largest metropolitan area in Israel) in 2006 [31] found that the average annual mileage for households having a company car was 34,000 km. per year, compared to 16,000 km. for households with privately owned cars. However, this data also reflect the higher socio-economic status of households that have a company car and that leads to more activities, and therefore to more trips. Another possible explanation is that some households with company cars may choose to live further away from their work place, given the relatively inexpensive or even free commuter trips.

A calculation presented by the Central Bank of Israel [1] showed that the monthly fuel expense for company car users was 24 % higher than that for private cars. This calculation controlled for the household’s socio-economic characteristics (e.g., income, number of children per household), but ignored some latent variables (e.g., the level of household activities or the impact of having a company car on choosing a residential location). According to the assessment, the total average mileage in Israel is 5–8 % higher as a result of the existence of company cars.

3.1.4 Safety characteristics of company car use

The Israeli Knesset (Parliament) Center for Research Information gathered the following information in an internal report for the Knesset Finance Committee. The report pointed to safety features, or their lack, as the main fault in relation to the safety of leased cars [13]. A car’s level of safety is, to a considerable extent, a function of its safety accessories,

including such features as airbags and ESP systems, which were the focus of the review. These features are established in the literature as having a positive effect on safety [9,14,19,22,23]. Since price groups 1–3, especially price group 2, are the most popular and less expensive of the price groups in Israel, a more detailed description of the safety features in manufactures consisting more than 80 % of this group are presented in Tables 4 and 5. Table 4 shows the average number of airbags in company cars versus those in privately owned cars in the largest price groups - groups 1–3 - for model years 2006–2007. The average number of airbags in privately owned cars is seen to be noticeably higher than in company cars. Table 5 presents the gap for ESP in the most popular price group - group 2 - for model year 2008. The table shows that the percentage of privately owned passenger cars equipped with ESP is noticeably higher than for company cars.

The 2009 Tax Authorities Report indicates that the phenomenon of leasing companies' purchasing cars with minimal safety devices has existed for several years. However, as a result of the recent change in tax incentives intended to encourage purchasing cars equipped with more safety devices, there are indications that the gap in the level of installed safety devices between company cars and privately owned cars is closing. This is prominent in the number of airbags. The difference in the number of airbags between company cars and privately owned cars was reduced in 2008.

Despite the closing of the gap, the report still notes a tendency for leasing companies 'to save' when it comes to safety devices for company cars and also not to install such cars with the most advanced safety features. This 'saving' was specifically encouraged, given the price groups for tax purpose, which resulted in the convergence of car prices toward the highest price within each group [13]. For example, the maximum price in price group 2 in 2008 was NIS 111,000, and the cars that belonged to this group (i.e., leading models such as Mazda 3, Ford Focus, and Toyota Corolla) were sold for exactly this price, which often required

Table 4 Average number of airbags in price groups 1–3, model years 2006–2007

Manufacture	Average number of airbags			
	Model year 2006		Model year 2007	
	Privately owned	Company car	Privately owned	Company car
Hyundai	3.1	2.1	4.8	3.0
Mazda	5.6	2.3	6.0	6.0
Toyota	3.7	4.0	4.0	4.0
Ford	5.3	2.1	6.0	6.0

Source: [29]

Table 5 Percentage of cars equipped with ESP in price group 2, model year 2008

Manufacture	Privately owned	Company car
Hyundai	69 %	35 %
Mazda	78 %	7 %
Toyota	4 %	0 %
Ford	35 %	45 %

Source: [29]

foregoing some safety features to remain in that group. Obviously, this consideration is not relevant for the private passenger car owner.

A recent change in company car taxation policy has cancelled the price groups; instead, the value of personal use is calculated as a constant percentage of the purchase price. The new calculation was put into effect partially in an effort to eliminate the described problems, associate with price groups.

3.2 Analysis of questionnaire results

3.2.1 Socio-economic characteristics

The majority of the sample of company car drivers are married men in their thirties, employed in industry (especially in hi-tech companies), with a relatively high income. Two thirds of these drivers work from 40 to 50 h per week. Their household typically has two cars, one of which is a company car. In 70 % of the cases, there are two wage earners in the household. A fairly high variance was found in the number of children in a household. A comparison with the socio-economic characteristics of the control group reveals that, as indicated in the market review section, the company car drivers belong to a higher socio-economic level. A significant difference in gender was also found: men composed 76 % of the company car sample population, compared to 60 % of all driving license holders in Israel in 2008 and 45 % of the control group sample population.

3.2.2 Company car safety characteristics

Tables 6 and 7 present some of the safety characteristics of the company car as self-reported by the respondents, in comparison to the control group of privately owned cars. In comparing the safety characteristics of company cars to privately owned cars, there are two factors to consider: new privately owned cars are installed with better safety characteristic than are new company cars; on the other hand, company cars are newer than privately owned cars and newer cars in general are installed with better safety characteristics.

Table 6 Number of airbags as self-reported by respondents

No. of airbags	Respondent group	
1 or 2	Company car drivers	59 %
	Privately owned car drivers all model years	29 %
	Privately owned car drivers model year less than 3 years	20 %
4+	Company car drivers	36 %
	Privately owned car drivers all model years	63 %
	Privately owned car drivers model year less than 3 years	73 %
Not aware	Company car drivers	5 %
	Privately owned car drivers all model years	8 %
	Privately owned car drivers model year less than 3 years	7 %

The average age of a company car is 1.5 years compared with the average age of a privately owned car in the control group, which was found to be 7 years (similar to the estimated average age of privately owned cars in Israel: 7.1 years, as reported previously). Tables 7 and 8 show car safety characteristics according to three groups: respondents who use a company car ($N=400$), respondents who have only privately owned cars ($N=230$), and a sub-sample of the latter who have relatively new privately owned cars (3 years or less, $N=63$) so their average age is similar to that of company cars, even though the sample size is limited.

Table 6 presents a comparison of the number of airbags. As can be seen, the majority of company cars (59 %), as self-reported by the company car drivers, are equipped with at most two airbags, compared with the majority of privately owned cars (which are even older than the former), which are equipped with at least four airbags. Whereas only 36 % of the company cars are equipped with at least 4 airbags, 63 % of the privately own cars are so equipped, a percentage that goes up to 73 % if we consider only the newer privately owned cars.

It should be noted that in response to a different question, 75 % of the company car drivers stated that they would be willing to pay for additional safety improvements if they were to purchase a passenger car of their own.

Table 7 presents a comparison of the distribution of ABS, ESP, and Electronic Brake-force Distribution (EBD) according to car type. As can be seen, the figures are similar. The data show that the main difference in safety characteristics is in the number of airbags. One should remember that company cars are usually sold to the private market as second-hand cars, thus affecting the safety features of old privately owned cars, as well.

3.2.3 Travel behavior

In 2008, the Israeli annual average mileage per passenger car was 16,700 km., including both privately owned and company cars. The questionnaire results show that the annual average mileage of a company car is 26,600 km., compared to 15,650 km. for a privately own car; that is, 70 % higher. Given that 13 % of the passenger car fleet in Israel consists of company cars, these results seem plausible and provide an explanation of how the annual average mileage per passenger car in Israel is split between company cars and privately owned cars.

Figure 1 presents the annual car mileage distribution for the company car driver sample population, the privately owned driver sample population, and the general population in Israel in 2008. As can be seen, the mileage of company car

Table 7 Safety features as self-reported by respondents

Safety feature	Respondent group	Equipped	Not equipped	Not aware
ABS	Company car drivers	90 %	4 %	6 %
	Privately owned car drivers all model years	69 %	21 %	10 %
	Privately owned car drivers model year less than 3 years	77 %	14 %	9 %
ESP	Company car drivers	29 %	38 %	33 %
	Privately owned car drivers all model years	17 %	47 %	36 %
	Privately owned car drivers model year less than 3 years	28 %	35 %	37 %
EBD	Company car drivers	17 %	35 %	48 %
	Privately owned car drivers all model years	20 %	34 %	46 %
	Privately owned car drivers model year less than 3 years	21 %	36 %	43 %

Table 8 Estimation of model of annual mileage driven

Variable	Estimated parameter	T- statistic
Constant	13,697.0	8.92
Gender (female=1)	-2,851.6	-2.95
Household size	1,667.8	4.42
Marital status (married=1)	-3,120.9	-2.47
Company car (yes=1)	8,483.4	8.97
R square=0.22	N=481	

drivers is significantly higher than that of the general population and of the control group drivers, with almost 40 % of the first group having a mileage of more than 30,000 km. This large gap in mileage rates between privately owned cars and company cars is in line with the estimates mentioned previously in regard to this issue. It is interesting to note that 45 % of the company car drivers stated that they would make fewer trips or would choose alternative modes to a passenger car if they had a privately owned car instead of a company car.

Additional travel behavior characteristics of the company car sample population indicate that 92 % of the study population uses passenger cars as their trip mode for commuting, compared to 57 % of the general population [28] and 75 % of the control group population. In 20 % of the cases, the company car is used not only by the employee, but also by other household members.

In order to estimate the difference in mileage between company car owners and privately owned 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, presented in Table 8, show that the coefficient of a dummy variable of company car owner is 8,483. In other words, all other things being equal, company car drivers annually drive 8,483 km. more than do privately owned car drivers. Among the socio-economic variables, gender (males drive more),

household size (positively related to the mileage driven), and marital status (singles drive more) were found to have the greatest effect on mileage driven. Income was found to be highly correlated with having a company car, and therefore it was not possible to include this variable in the model.

3.2.4 Driving behavior

All sample respondents (i.e., respondents who use a company car and respondents who have only a privately owned car) were asked about their attitudes toward driving style and behavior in a company car, compared to a privately owned car. Table 9 includes the three statements presented to the respondents in this regard, and the distribution of the responses in each sub-sample.

As can be seen from Table 9, the results of all three statements are quite consistent, showing that about two thirds of all respondents believe that company car drivers and privately owned car drivers have different driving styles. Moreover, about a quarter of all respondents specifically agreed that company car drivers drove more aggressively and less carefully.

Comparisons of the attitudes of the two sub-samples indicate that privately owned car drivers agree with the statements, “Most people drive differently in a company car compared to a privately owned car” and “In a privately owned car, driving style is more careful compared to a company car” significantly more than do company car drivers. It is important to note that company car drivers agree significantly more than do their counterparts with the statement, “In a company car it is possible to drive more aggressively compared to a privately owned car”. The second and third statements try to catch the same issue of comparing perceptions regarding driving style. It makes sense that people response differently to a positive presentation (driving style is more careful) versus a negative presentation (driving style is more aggressive); it is not trivial

Fig. 1 Annual average mileage (km.): the sample population (company cars drivers and privately owned drivers) versus the general population

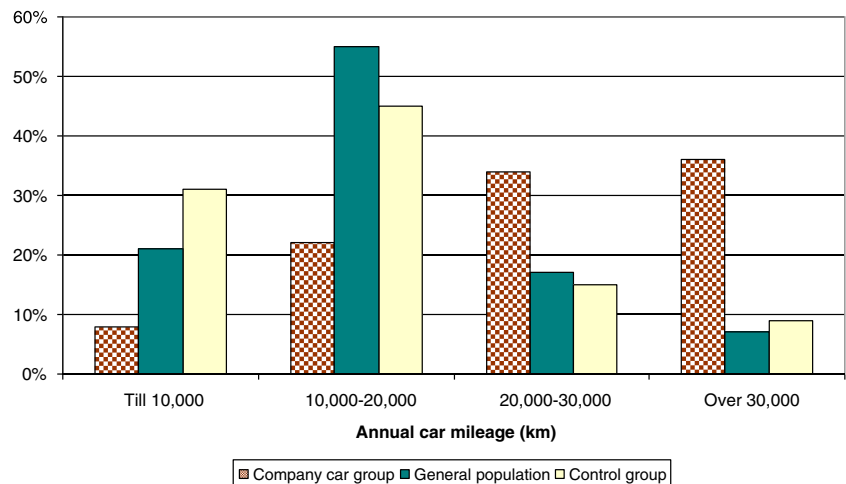


Table 9 Attitudes of all survey respondents toward driving styles in company cars and in privately owned cars

Statement	Agree		No opinion		Disagree	
	Company car drivers	Privately owned car drivers	Company car drivers	Privately owned car drivers	Company car drivers	Privately owned car drivers
Most people drive differently in a company car than in a privately owned car	53 %	57 %	9 %	12 %	38 %	31 %
In a company car, it is possible to drive more aggressively than in a privately owned car	26 %	17 %	6 %	8 %	68 %	75 %
In a privately owned car, driving style is more careful compared to a company car	26 %	38 %	5 %	5 %	69 %	57 %

to make self-statements about aggressive driving style due to having a company car. This result points out that a relatively more aggressive driving style in company cars is perceived as common, not only among privately owned car drivers, but even more so among company car drivers. Consequently, the driving behavior of company car drivers might reflect the perception and, hence, be less safe than that of privately owned car drivers.

3.2.5 Rate of involvement in car crashes

All respondents (i.e., those who use a company car and those who have only privately owned cars) were asked to self-report their involvement in road crashes in the past 3 years. A comparison of the two sub-samples indicates a significant difference in the respective involvement rates in crashes: the percentage of drivers in the sample who were involved in a road crash in the past 3 years was 9 % among company car drivers, which more than double that of privately owned car drivers (4.2 %). This difference is similar to the mileage difference between the two driver categories, indicating that the high crash rate is mainly due to greater exposure. Other detailed characteristics (e.g., type or severity of road crash) were not possible to analyze because of the limited number of relevant observations.

4 Discussion and conclusions

This paper presents an assessment of the company car phenomenon in Israel and explores its potential safety implications. The appraisal, based on a market review and survey results, allows us to confirm the study's hypotheses:

- The mechanism of the company car, given to employees as a fringe benefit, results in a significant level of extra mileage and increases a household's car usage.

An Israeli driver's annual average mileage in passenger cars was 16,700 km. in 2008. Questionnaire results show that

the annual average for company cars is 26,600 km., compared to the annual average for privately owned cars of 15,650 km. The model results verify that having a company car, and controlling for other variables, significantly increases the annual mileage driven. It should be noted that 45 % of company car drivers stated that they would make fewer trips or would choose alternative modes to a passenger car if they had a privately owned car instead of a company car.

Ninety-two percent of the drivers who have a company car use it as their main mode of travel to and from the workplace, compared to 75 % of the control group and 56 % of the general population. In 20 % of the cases, the company car is used not only by the employee, but by other household members, as well.

- Company cars are installed with fewer safety features than are cars purchased in the private market.

Company cars are insufficiently equipped with safety features, most notably with fewer airbags. As self-reported by the respondents, the majority of company cars (59 %) are equipped with at most two airbags, and only 36 % are equipped with 4 or more airbags, compared to 63 % of the privately owned cars despite their older age. This finding supports the assertion that the relatively low rating awarded new Israeli passenger cars in the EuroNCAP rating is due to the low number of airbags installed in company cars. However, as the market review and the results indicate, the gap in safety features between new company cars and new privately owned cars is closing. Furthermore, the cancelation of price groups, according to which Israeli-owned cars are taxed, may also positively affect the situation. Nevertheless, this issue should still be of concern, since the impact on the general car market becomes more extensive as company cars become part of the used-car market once the company car arrangement has come to an end.

- Having a company car can lead to changes in driving behavior and may be associated with more aggressive, less careful driving behavior.

More than half of all respondents agreed with the statement indicating that there are different driving styles

between company car and privately owned car drivers. About one third of all respondents in the sample specifically agree that company car drivers drive more aggressively and less carefully.

Consequently, there is no doubt that the excessive level of exposure of company cars drivers together with the foregoing characteristics, and especially a combination of them, may have a negative influence on safety. Moreover, a comparison of the two sub-samples indicates a significant difference in the car-crash involvement rate: from self-reports, it appears that company car drivers' involvement in road crashes is more than double that of privately owned car drivers: 9 % compared to 4.2 %. This result is in line with studies carried out in Great Britain that concluded that company car drivers were at a higher risk of being involved in road crashes than was the general driving population. The main reason for this conclusion seems to be the significant differences in the level of exposure between the two driver categories (the annual mileage of a company car was found to be 70 % higher than the annual mileage of a privately owned car). In addition, differences in driving behavior and safety characteristics may also contribute to the gap in the car-crash involvement rate. Another possible explanation for the gap in car-crash involvement is that company car drivers tend to report smaller damage crashes, whereas privately owned car drivers tend to overlook them.

The results suggest that decision-makers may need to re-examine company car arrangements and require that company cars come with a core of sufficient safety features; e.g., a minimum of six airbags. Furthermore, employers should re-examine the type of company car arrangement offered to employees in order to control their excessive level of exposure. For example, to limit their employees' permitted mileage rate, to regulate variable expense coverage (e.g., fuel, tolls), etc. In this regard, we would like to note that a recent report [30] which summarizes the company car market for 2011, a year after the last reform in the value of personal use calculation, points out that the absolute number of company cars in Israel remains constant whereas their share in the total fleet has slightly decreased to 12.2 %. Figures in this report show that the gap in the average annual mileage driven is similar to the study findings: annual average for company cars in 2011 was 27,900 km., compared to the annual average for privately owned cars of 15,800 km. These recent data indicate the continued importance of the results and discussion presented here.

This study is the first to explore the potential safety implications of company cars in Israel. It relies on available national figures, a market survey, and a questionnaire-based survey of company car drivers and privately owned car drivers which lacks randomness. However, the purpose of this study was not to quantify the safety implications of company cars accurately, but to point out the issues and their

potential implications. Since company cars are common in the Western world (except for the United States) and enjoy an increasing share of the general car population in many countries, their safety implications should be of concern; however, this issue has not received much attention in the literature and the implications were found to be worrisome. The conclusion of this paper, therefore, should be noted in other countries beyond Israel. Further studies are required to better estimate and quantify the safety implications of company cars, including driving violations and road-crash involvement in various countries.

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