

# ADULTEROUS BEHAVIOUR WITHIN THE CAR-OWNER COUPLE

## –Some Analyses from French Panel Data on Car Rental and Car Sharing within Households–

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The objective of this paper was to analyse two activities: who rents a car and why? Which households share the driving of their cars? In order to do that, the *Parc-Auto* (Car-Fleet) database, built from annual postal surveys conducted with a panel of 10,000 French households, has been processed. Among approximately one hundred questions in the survey, two key questions have been crossed against many social, economic, demographic, geographic or time variables. KQ1: “During the last 12 months, did you — or another person from your home — rent a car in France for personal purposes?” KQ2: “Is this car occasionally used by other persons?” Here are the main findings. Renting households are mainly working, high income households, living in the core of big cities, and in particular in Paris. Most of them have two wage-sheets and two cars, one of which is generally a recent, high power, high quality car. Car rental is mainly an occasional practice. Yet for a minority of renters, it is a sustained habit. Households with more licence holders than cars share the most: about three quarters of them share their cars. On the contrary, single driver-single car households have less opportunity to share: only 15% share. Household car sharing shed light on the gender role within households: while 58% of the main users of the shared cars are male, 55% of secondary users are female. Household car sharing is mainly a regular practice. Finally, without diminishing the merits of innovative transport solutions proposed here and there, it is not a waste of time to give some insight on self established behaviour within households. This reveals that complex patterns have been built over time by the people themselves, to cope with diverse situations that cannot be easily handled by straightforward classifications. The car cannot be reduced to a personal object. Household car sharing also carries strong links with the issue of car dependency. Sifting car availability and choice universes may be useful for fitting disaggregated models of sharing.

**Key Words:** Automobile, Panel, France, Car rental, Household car sharing

### 1. BREAKING THE « CAR & OWNER » PARADIGM

Wide-spread car ownership within western societies has led to the dominant paradigm where nearly all adults who can drive and afford a car do own a car and drive it most of the time. The owner rarely rides other vehicles and seldom lets somebody else drive his/her car. The car and owner form a harmonious couple. Nevertheless, the huge burden that excessive solo driving puts on the natural, urban and human environment has made researchers, planners and maybe politicians think of alternative ways of travelling. While enhancing public transit, promoting non-motorised modes and integrating urban and transport planning are important ingredients to attract drivers away from their cars, research has shown that the French average mileage per car has remained roughly

constant for the last 10 to 15 years<sup>1</sup>. So reducing car use also implies reducing car ownership and breaking the dominant paradigm. But to make not owning a car attractive, alternative modes may not be always convenient; therefore other means of driving a car, when needed, should be considered. Recently, emphasis has been laid on car sharing clubs, whose members can borrow one of the club vehicles against an annual membership fee and a per ride fare. This paper will not address these schemes, but will consider more ordinary multi-drivers behaviour.

In fact, surprisingly, more traditional methods for driving a car that is not personally owned have received little attention: car rental and sharing the driving of a car within households have existed for a long time. From data from the French transport surveys in 1967 and 1982, Barjonet et al. analysed and typified the uses and users of the automobile<sup>2</sup>. They observed: “In addition to the gen-

eralized everyday use of the automobile in the home, there is also the development of role distribution within the couple and family, and this, irregardless of the number of vehicles owned. Families resort to a complex system of negotiation and conflict over access to the car, situated between the utopian extremes of exclusive individual and shared collective use. The position and age of the driver, as well as negotiated compromises form the practical basis for car use and its real status within the family.”

Travel behaviour according to the availability of the car and other modes have later been investigated after the 1994 French transport survey: drivers belonging to households with fewer cars than licences drive only 69% of their trips instead of 82% for persons individually owning a car. This sheds light on the potential of household car sharing for reducing vehicle mileage<sup>3</sup>.

Tissier-Desbordes et al. (2005) have comprehensively addressed the rental-ownership relationship in an international comparison between France, Italy, Germany and the UK, reviewing sociologists’ and economists’ literature, highlighting etymology, analysing frequently rented articles, surveying consumers and interviewing companies. In France, the car rental market scored 1.6 billion euros in 2002; “rent-a-car” societies, insurance companies, car manufacturers seem very interested in this market evolution. But existing travel behaviour survey data have not been processed to study car rental practice<sup>4</sup>.

Following this study, the City on the Move Institute has organised an interesting seminar questioning the societal issue “to buy or to rent”, with multi-dimensional approaches including the consumption disparities between social classes, the value of circulating objects in society, the psycho-pathology of relations to objects, the physical sensorimotor appropriation of machines, the link of sharing with ownership and ego<sup>5</sup>.

The objective of our paper was to analyse both of these activities: who rents a car and why? Which households share the driving of their cars? Although both activities are alternatives to driving one’s own car, the two analyses will be conducted separately, since the data that are available deal with these activities on the basis of different statistical units: households for renting and households’ cars for sharing.

## 2. THE FRENCH « PARC-AUTO » DATABASE

Our methodology is greatly data driven. The Parc-Auto database has been built from annual postal surveys conducted by SOFRES (a French private polling institute)

with a panel of 10,000 French households since 1983. The renewal rate of the sample is approximately 1/3 per year. The answers are weighted according to five criteria: region, agglomeration size, number of persons in the household, age and occupation of household head, so as to be representative of French households and cars. About one hundred questions were asked in the survey about car ownership, car characteristics, main and secondary users, previous car characteristics, car use behaviour, attitudes towards automobiles, opinion vis-à-vis car brands, purchasing intents. The head of household answers the questionnaire. No definition of head of household is given in the questionnaire, but when a couple is part of the household, the male partner is generally head of household\*.

The key question about car rental is: “During the last 12 months, did you — or another person from your home — rent a car in France for personal purpose?” A total of 2,308 answered “Yes” representing 4.2% of a sample of non weighted 54,742 households-years made by fusing data from 1994 to 2001\*\*. This answer has been detailed by year and by the number of short and long rentals, then crossed with variables relating to household socio-economics, demographic structure, residential location, car ownership level, household car type, rental context, car rental formulas. A model has been derived to establish a hierarchy of variables explaining rental behaviour.

The key question about car sharing within households says: “Is this car occasionally used by other per-

\* The head of household is defined as the person of reference by INSEE (the French Institute for Statistics and Economic Studies). The person of reference has been substituted to the notion of head of household from the 1982 census. The person of reference of the household is defined according to a rule based on the predominance given to families, to fathers, to activity and to age. The precise rule is the following:

1. If the household includes at least one couple, the person of reference is the male in the couple. If there are several couples, the oldest working male is chosen, or the oldest male if there is no working man.
2. Otherwise, if the household includes at least one single parent family (adult raising alone one or several children) then the person of reference is, among the parents of these single parent families, the oldest working parent, or the oldest parent if there is no working parent.
3. Otherwise, if the household includes no family, then the person of reference is, among all persons in the household, excluding guests or lodged employees, the oldest working person, or the oldest person if there is no working person.

Source : *Recensement de la population (Population census) de 1990, France métropolitaine et régions. Résultats du sondage au 1/20, INSEE Résultats n°179/180/181, January 1992, p.364.*

\*\* This fusion of eight annual waves, supposing that there is no long term temporal effect or trend, was useful to have more observations, so that the share of renting households could be known with a rather good precision; the semi-amplitude of the 95% confidence interval is 0.17%. 1994 is the first year of introduction of this question in the questionnaire, 2001 is the last available annual wave.

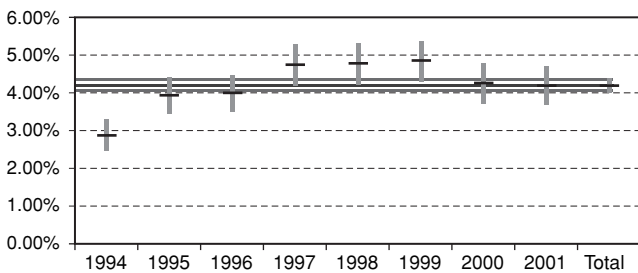
sons?” It does not specify whether these other persons are members of the household or not. So the question does not exactly deal with “car sharing within households”, but more precisely with sharing household cars with other persons, from the household or not. Overall, the answer to this question is “Yes” for 3,256 cars (40%) out of a sample of non-weighted 8,177 cars for the last year, 2001. This answer is very dependent on whether the considered car is the sole car in the household, the main car in the household\*, or a secondary car, and on whether the number of driving licences\*\* is one, more than one while not exceeding the number of cars, or exceeding the number of cars. Other household variables have also been selected to elucidate sharing behaviour. When the answer was “Yes”, a brief description of up to two other secondary users of the car was asked.

### 3. RESULTS: CAR RENTAL

More detailed results may be found in the report<sup>6</sup>. Only the most prominent features will be reported here.

#### Car rental: no trend and occasional practice

The proportion of households renting a car on a particular year averages 4.2%. The difference between successive years is smaller than the amplitude of confidence intervals at the 95% threshold, so there was no significant trend from 1994 to 2001 (Fig. 1). But for the preceding decade, an increase in renting had been registered. It would be interesting to study this evolution by



Source: Processing of the French Parc-Auto panel data 1994-2001

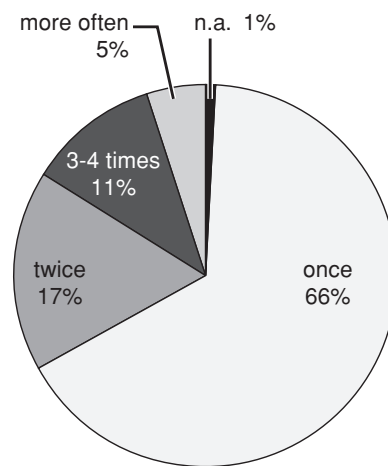
**Fig. 1 Proportion of households renting a car during the year, with 95% confidence interval bars**

\* The main car is freely chosen by the respondent (head of household).

\*\* Licences do not equate drivers, as some licence holders may not effectively drive. Conversely, some drivers may illegally drive without a proper licence (estimated at approximately 1.5% of drivers by the national inter-ministry observatory of road safety), or legally when they are in the course of learning how to drive. But only one type of licence is considered here (the “permis B” for driving cars, private cars or light duty vehicles, less than 3.5 tonnes), so there is only at best one licence per driver.

population segment, but smaller samples would make it more difficult to prove a significant change. During the same eight year period, several general indicators about demography and motorisation appear to show a more regular (monotonous) trend: the number of households increased by 1% per year, the French car fleet increased by almost 2% per year (1.83), while the number of non-motorised households decreased by 0.7% per year, and the number of multi-motorised households increased by 2.7% per year.

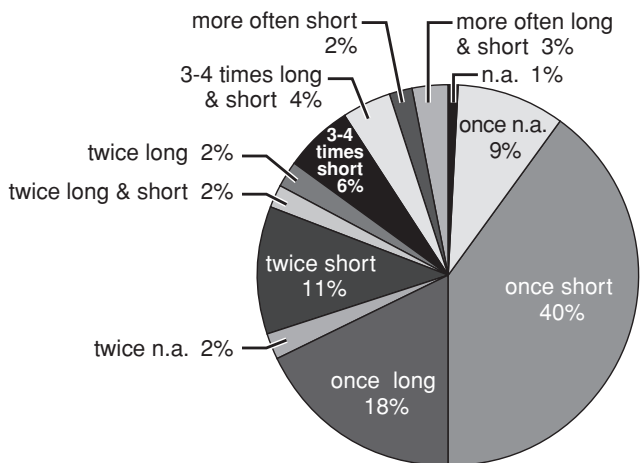
About two thirds of households renting a car rent a car only once during the year (Fig. 2).



Source: Processing of the French Parc-Auto panel data 1994-2001

**Fig. 2 Annual renting frequency**

A similar proportion of car hires are for a short period, i.e. one to four days (Fig. 3).



Source: Processing of the French Parc-Auto panel data 1994-2001

**Fig. 3 Annual renting frequency and length**

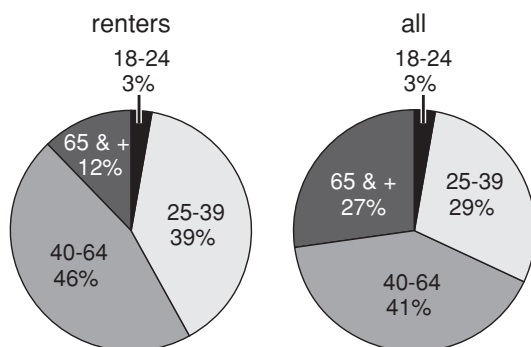
Car rental is mainly an occasional (and not specifically recurrent) practice: using the panel feature of the data, only 29% of those renting a car in a particular year, rent again the year after. But 51% of those renting on two consecutive years rent again on the third year, meaning that for a minority of renters, renting has become a sustained habit. Those renting several times on a particular year are also more likely to rent again the year after than those renting only once (47% vs 22%), but if they do so, they only do it once again for two-thirds of them. Not renting in a particular year (which is the overwhelming behaviour) decreases the probability of renting the year after by only one-third as compared to the general population.

#### Car rental: high profile households

The socio-economic profile of households renting a car is high. Half of renters belong to the highest quartile of income distribution, and only 10% to the lowest quartile. This means that renting is a rather expensive activity that can be afforded more frequently only by the most well-off. Less affluent households may find other solutions than commercial rental, for example by borrowing a vehicle from a friend, car pooling, riding public transport, hitch-hiking, or aborting the journey. High income households also travel more often long distance journeys, or maybe also move more often, but in this case they also prefer commercial removal services rather than moving themselves.

As far as geography is concerned, 38% of renters live in the Paris agglomeration which represents only 16% of the French population; on the contrary, rural areas which account for 25% of the nation is home of only 14% of renters.

As regards the demographics of the household heads (Fig. 4), age groups 25-39 and 40-64 tend to be more rep-



Source: Processing of the French Parc-Auto panel data 1994-2001

**Fig. 4 Distribution of households by age group for renters and all households**

resented among renters (respectively 39% and 46%) than in the general population (respectively 29% and 41%), which shows a lower interest or ability in renting for the other, youngest and oldest.

When looking at the occupation of the heads of households renting a car, a much greater proportion of upper position (31%) than in the whole population (10%) is evidenced, while the reverse is true for pensioners (18% of renters vs 33% of all).

When the size of households is considered, an increased renting proportion is monitored for households with two or four adults or persons above 15, while one-person households record the lowest renting percentage (3.6%).

Finally, renting households hold more often several driving licences, and expectedly hardly include households with no driving licence, which represent 11% of the general population.

#### Car rental: not a substitute to a lack of owned good cars

Households owning one car only are less frequent among renters (44%) than among all households (50%), but non-motorized households do not rent significantly more or less than all households, at the 95% confidence threshold. This means that renting is not a substitute to owning a car.

On the contrary, the type of owned cars has a significant effect on renting: those owning young cars (less than three years old), large engine cars, or high quality cars do rent more often, which blatantly supports the former analysis in terms of income and position.

#### Car rental: different contexts including moving house

Thirteen percent of renters against 7% of all households moved house during the previous year (probably influenced by renting the year of moving), and those moving house rented a car twice more often. Similarly, those renting a van rented a car 2.5 times more often and those renting a car rented a van 2.5 times more often. Among van renters, 59% of respondents declared that the last time they rented a vehicle was for moving house, other contexts (weekend, vacation, regular use, other) bringing low percentages. Unfortunately, due to a flaw in the questionnaire formulation\*, this question was only asked to van renters, while it would have been useful to ask it to all car renters. Another group of questions dealing with

\* This flaw has been corrected in more recent years, for which data are not yet available.

the appreciation of car rental formulas were also only asked to van renters, and results are not reported here.

### Car rental: modelling stresses the primacy of income, urban area size and head age

Finally, different procedures were applied to select the most significant variables explaining renting behaviour.

The probability  $p_i$  for the household  $i$  to rent a car (answer “yes” to the above mentioned question) is assumed to follow a linear logistic model, where the logit function of  $p_i$  is a linear function of explanatory variables (vector  $x_i$ ). When these explanatory variables are class variables, a dummy variable is created for all classes but one reference class.

$$\log\left(\frac{p_i}{1-p_i}\right) = a \otimes x_i \oplus b \quad (1)$$

The backward elimination procedure estimates the complete model with all explanatory variables and then eliminates the least significant variable if it does not meet a specified level (here the probability of being above the computed chi-squared statistic from the Wald test must be below 10%). The next step estimates the model without this eliminated variable, and eliminates again the least significant variable if it does not meet the specified level, and so on until all remaining variables meet the threshold.

The forward selection procedure considers the model with no explanatory variable, and adds the most significant variable taken alone. It goes on adding variables until no chi-square statistic for any variable not in the model meets a specified level (here 5%).

The stepwise selection procedure is similar to the forward selection procedure except that variables already in the model are removed from the model if they do not meet anymore the specified level (for more details see SAS<sup>7</sup>).

Table 1 displays the results of these procedures, with removed or entered variables, and corresponding chi-square statistics.

The first three selected variables in the forward and stepwise selections are: income, urban area size (habitat) and household head age. On the contrary, the first removed variables in the backward procedure are the number of working persons in the household, the number of persons above 18 in the household, the residential zone type (urban, suburban rural, etc.) and the number of cars in the household: for that variable, the chi-square statistics show that there is nearly a 75% (0.7364) probability that it has

no influence on renting.

According to Belsley's, Kuh's and Welsch's criteria, the remaining variables in the backward procedure do not show co-linearity that could lead to unstable behaviour of the model. Therefore, these variables are kept to estimate a model (equation 1) with the maximum likelihood method.

Odd ratios (Fig. 5), with confidence interval bars, were also calculated for different variables so as to give the probability of renting a car as compared to a reference. For example, rural areas show only 40% of the renting activity of the Paris agglomeration, while upper position heads induce a renting proportion multiplied by 1.4 as compared to middle position heads.

### Who rents?

Renting households are mainly working, high income middle-aged households, living in the core of big cities, and in particular in Paris. Most of them hold several driving licences, have two wage-sheets and generally recent, high power, high quality cars. Car rental is mainly an occasional practice, and, to the contrary to what could be expected a few years ago, no monotonous trend can be observed, such as an increase over years. Yet for a minority of renters, it is a sustained habit: 30% of households renting a car in year  $n$  rent again on year  $n+1$ .

## 4. RESULTS: CAR SHARING

From the formulation of the questionnaire, the concept of sharing a car owned by the household is rather wide in several respects. First, the “other driver” occasionally using the car is not necessarily part of the household. Second, the structure of the questionnaire survey refers to the last twelve months: so sharing the car can occur occasionally or regularly; it can correspond to the loan of a car for certain trips (or purposes), but also with the division of the driving task during a long trip that can be more often seen for the main vehicle and in the case of departure on holiday. Besides, only drivers sharing the car are considered here, passengers are not turning cars into shared cars.

From a rather different point of view from rental, previously evoked under the household point of view (with questions to household head), here it should be noted that the basic statistical unit is the car (shared or not) and that the “sharing household” is built *a posteriori*. Also, the focus here is put on cars occasionally driven by “others”, without any reference to the recurrence and the frequency of this sharing behaviour during the past year.

**Table 1 Most significant variables selection process**

**Summary of Backward Elimination**

Step	Effect		Number		Wald	
	Removed		DF	In	Chi-Square	Pr > ChiSq
1	#working persons in hh		1	18	0.0000	0.9977
2	#over 18 persons in hh		1	17	0.0017	0.9672
3	zone type		1	16	0.0312	0.8597
4	#cars in hh		1	15	0.1133	0.7364
5	region		1	14	0.5220	0.4700

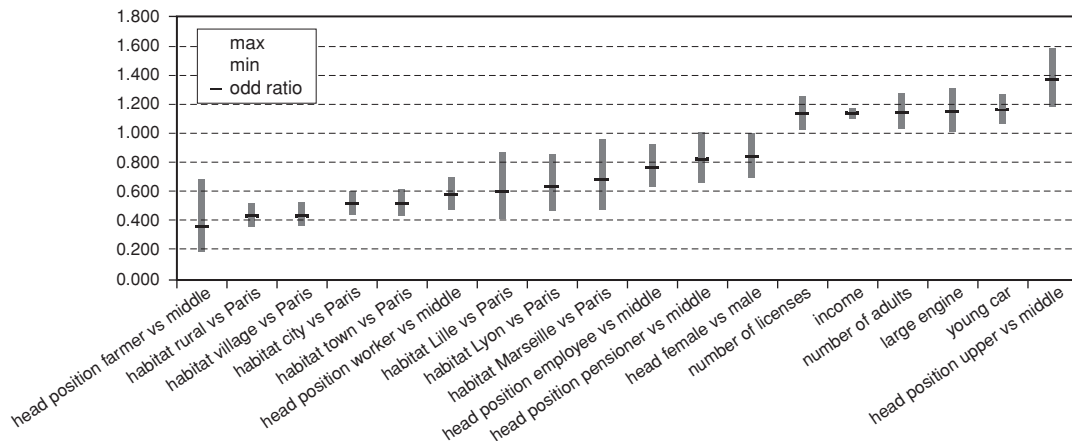
**Summary of Forward Selection**

Step	Effect		Number		Score	
	Entered		DF	In	Chi-Square	Pr > ChiSq
1	income		1	1	628.6530	<.0001
2	habitat		1	2	241.5569	<.0001
3	hh head age		1	3	154.8652	<.0001
4	hh head position		1	4	39.5618	<.0001
5	#persons in hh		1	5	21.4154	<.0001
6	#licences in hh		1	6	24.1829	<.0001
7	#young cars in hh		1	7	15.1814	<.0001
8	#large engine cars in hh		1	8	11.7215	0.0006
9	#over 15 persons in hh		1	9	6.5337	0.0106
10	#high quality cars in hh		1	10	4.0310	0.0447

**Summary of Stepwise Selection**

Step	Effect		Number		Score		Wald	
	Entered	Removed	DF	In	Chi-Square	Pr > ChiSq		
1	income		1	1	628.6530	<.0001		
2	habitat		1	2	241.5569	<.0001		
3	hh head age		1	3	154.8652	<.0001		
4	hh head position		1	4	39.5618	<.0001		
5	#persons in hh		1	5	21.4154	<.0001		
6	#licences in hh		1	6	24.1829	<.0001		
7	#young cars in hh		1	7	15.1814	<.0001		
8	#large engine cars in hh		1	8	11.7215	0.0006		
9	#over 15 persons in hh		1	9	6.5337	0.0106		
10	#high quality cars in hh		1	10	4.0310	0.0447		

Source: Processing of the French Parc-Auto panel data 1994-2001



Source: Processing of the French Parc-Auto panel data 2001

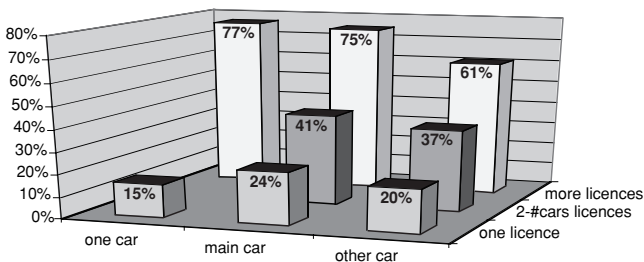
**Fig. 5 Selected odd ratio values with confidence interval bars at the 95% threshold for the probability of renting**

**Car sharing: a confrontation of licences and cars**

Car sharing behaviour within households is highly dependent on the comparison between the number of cars and the number of licences in the household. More precisely considering motorised households only, the considered car can be the sole car in the household, the main car (as freely defined by the respondent, usually household head) out of several cars, or a secondary car (i.e. not main, secondary which can be for example the car mostly driven by another main driver-partner, spouse or grown-up child- or even a car with the same main driver but more or less dedicated to most specific purposes) out of several cars. This variable (sole, main, secondary) is called car rank. The number of licences can be one (since the household is motorised), comprised between two and the number of cars, or greater than the number of cars. In the latter case (Fig. 6), the proportion of shared cars is much higher, and decreasing with the number of cars. In all cases (and almost independently of household demographic and licence structure), the proportion of shared cars is slightly lower for secondary cars than for main cars. One-licence households share the least, because they have to share with drivers outside the household. They share slightly more if they own two cars: one can assume that in this case, the second car is intended to be driven by a relative, friend or neighbour outside the household .

Among all cars (of the national fleet), most cars are owned in households where the number of drivers does not exceed the number of cars, especially if there are several cars. But specifically among shared cars, this proportion is lower: for example, 10% of shared cars are owned by households owning only one car and holding one licence, when this proportion is 26% for all cars. Overall, households with more licences than cars own 41% of shared cars but only 23% of all cars.

Another way of studying this licence-car relationship is to consider the household structure by licence



Source: Processing of the French Parc-Auto panel data 2001

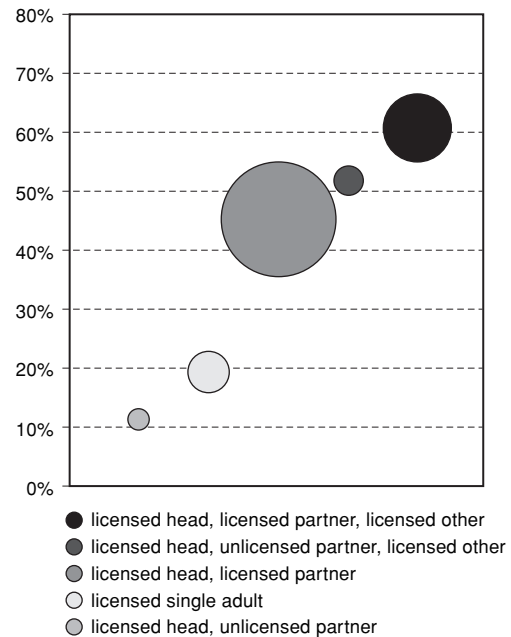
**Fig. 6 Proportion of shared cars according to the number of licences in the household and to the number of cars and the rank of the cars**

holders and adults with no licence. Many combinations are possible. The most frequent are (Fig. 7): double licence couple, with an average sharing behaviour at 45%; triple licence family, with the highest sharing proportion at 61%; single licensed adult, who seldom (19%) shares; double licence head and other person in the household, with an unlicensed partner, with 52% sharing; licensed head, with unlicensed partner, with the lowest sharing proportion at 11%.

Considering again the car rank variable (Fig. 8), whatever the licence structure, the secondary car is less shared than the main car, which in turn is in general less shared than the sole car, except for single licence households who may prefer sharing this main car when they own two cars. But there is a significant drop in sharing from 75% to 39% for double licence couples when they upgrade from one to two cars. When they have the possibility of being multi-motorised, sharing behaviour strongly decreases and the car seems to become more and more an object of personal appropriation.

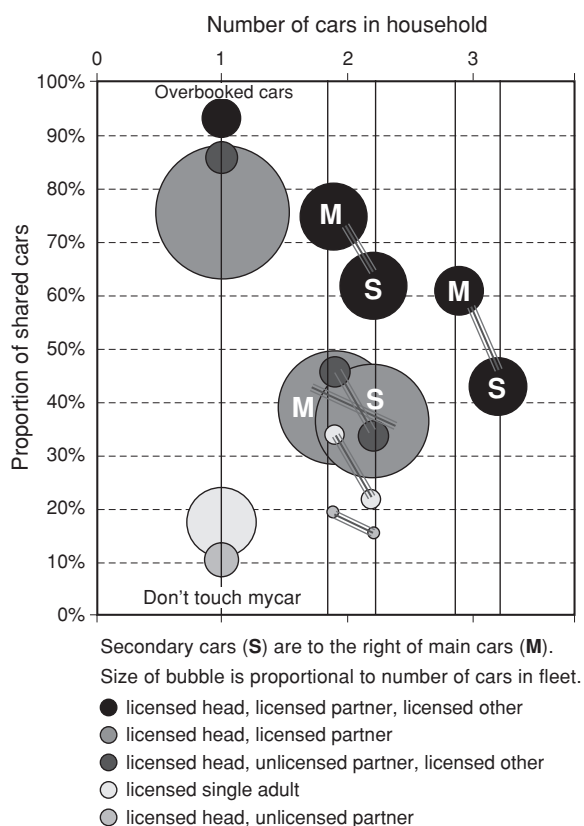
**Car sharing: enhanced by higher wages**

High income households share their cars more, but this is mainly a structural effect since they own more cars and hold more licences. Nevertheless, when the licence-



Source: Processing of the French Parc-Auto panel data 2001

**Fig. 7 Proportion of shared cars (y-axis) according to the structure of households by licence holders (legend); the size of each bubble is proportional to the number of cars it represents**



Source: Processing of the French Parc-Auto panel data 2001

**Fig. 8** Proportion of shared cars (y-axis) according to the structure of households by licence holders (legend), the number of cars (1, 2, 3+; x-axis) and the rank of the car (if 2 or more: left bubble = main car, right bubble = secondary car); the size of each bubble is proportional to the number of cars it represents

car structure is given, high income households also share more, in particular their secondary cars. Maybe, low income household members fear more that their property could be damaged if it is used by somebody else, or their cars are needed for more essential trips such as commuting and cannot be lent, whereas rich households may own cars that can be less exclusive and more flexible.

On the contrary, sorting sharing proportions by the occupation of household head and the car licence-structure yields a forest of proportion buildings with no significant disparity.

More complex, the proportion of shared cars increases when the number of working persons in the household increases, but this is again a structural effect, as when the licence-car structure is given, the reverse is observed: multi-income household working persons do need their car all day when they use it, and can share less; other in-

come earners have to rely on other modes if the number of cars is not sufficient.

### Car sharing: gender prejudice

When investigating which users share their car, it has been found that when the main user of the car is the head of the household, the car is less shared (38%) than when the main user is the head's partner (47%). When the main user is another person in the household (mainly a grown-up child), the proportion of shared cars is again lower.

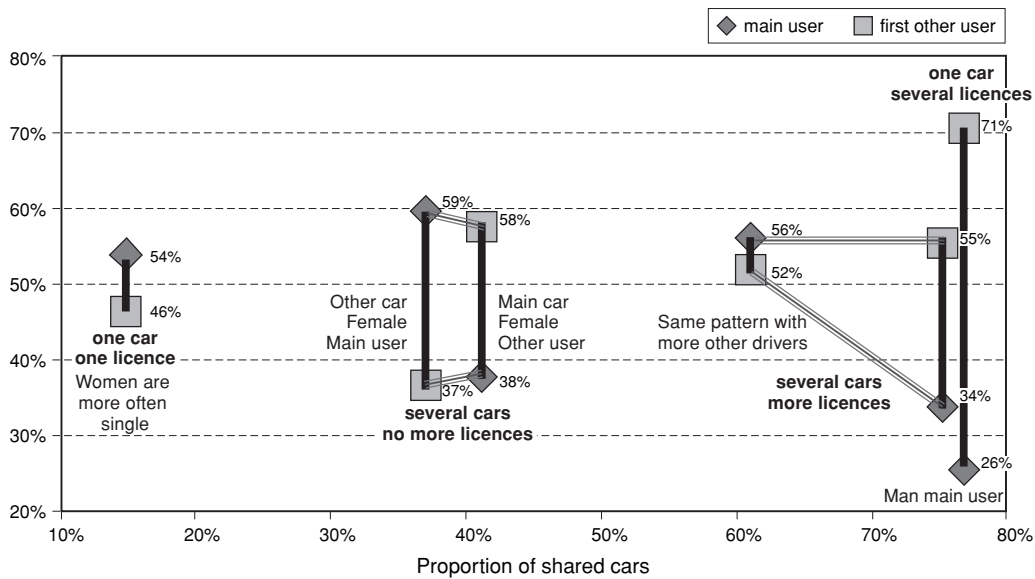
As household heads are more often male than female, it is interesting to directly consider the gender of the main user. Women share more often than men, except when they are the main user of the sole car in households with other drivers; in this case, the reason for not having a male main user as it is ordinary the case may explain the lack of sharing (husband with no licence or unable to drive).

The role of gender for driving cars can be further analysed by plotting on a graph with the x-axis representing the proportion of shared cars and the y-axis the proportion of female users, both for the main user (as asked in the survey) and the first secondary user (as described in the survey), by licence-car structure. The main user of the sole car in one-car-one-licence households is more often female (54%) because such households are mainly single women. In households with two or more cars, and no more licences, the plotted points for the two users of the two cars form an interesting trapezium showing that the main user of the main car is more often male, and the secondary user of the main car female, and the reverse is true for the secondary cars, otherwise slightly less shared. A similar pattern is observed when the number of licences exceeds the number of cars, but with less gender difference for the secondary car as there are more often children driving this car. Finally, when one car is shared by several drivers, in 74% of households a male is the main driver, and a woman female the secondary driver.

The gender can also be examined through the household head with similar results: households with a female head share more.

### Car sharing: age related

Age is another characteristic of the household head: in the youngest households (18-24), cars are shared the most with a given car-licence structure, and then sharing decreases over time as households get older, with a renewal of sharing in the 40-64 age group when household children begin to drive.



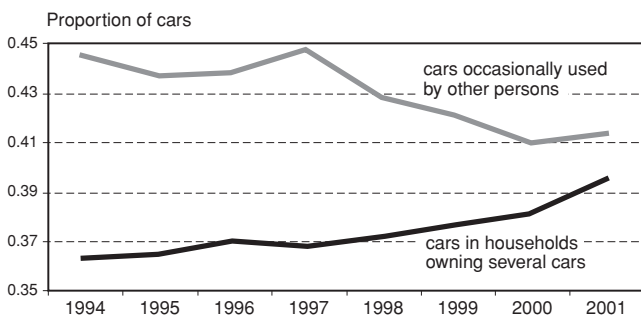
Source: Processing of the French Parc-Auto panel data 2001

**Fig. 9 Proportion of female users (y-axis), as main user (diamond) and as secondary user (square) against the proportion of shared cars (x-axis), for different household structures by car ownership and licence holding (black legend); when there are several cars in household, the main car is to the right (more shared), and the secondary car to the left (less shared)**

Considering now the age of the main user, a slightly different picture is obtained: as the youngest main users share less when they do not form a household, the proportion of shared cars increases with the age of the main user, as there are more partners and children with whom to share.

**Household car sharing: decreasing and mainly a matter of car ownership matching licences**

The analysis of sharing has been conducted with data for year 2001. Now, if data for several years are used, the cross-sectional trend indicates that the proportion of



Source: Processing of the French Parc-Auto panel data 1994-2001

**Fig. 10 Household car sharing is decreasing, trends for household car sharing and multi-ownership**

shared cars has been decreasing over time between 1994 and 2001. This movement is the mirror image of the proportion of households owning several cars which has increased (2.7% per year) during the same period: as households own more cars, there is less need to share; or the French are becoming more individualistic or the car is becoming a more personal item.

When modelling the proportion of shared cars in a similar fashion that the one used for renting, eliminating less significant variables such as head position, and selecting the most significant variables explaining sharing behaviour, most of the likelihood is explained by two variables, the number of licences and the number of cars: one more licence quintuples the proportion of shared cars, while adding one car halves it.

**Car sharing: regular practice over time**

The longitudinal analysis of our panel data shows that household car sharing is a rather regular practice: each year, 4 cars out of 10 are shared, and 3 of them will be shared the next year; on the other hand, among the 6 cars out of 10 remaining not shared, 1 of them will be shared next year. Household car sharing is rather regular a practice concerning almost half of the French car fleet.

**Who shares?**

Households with more licence holders than cars

share the most: about three quarters of them share their cars. On the contrary, single driver-single car households have less opportunity to share: only 15% share. Household car sharing sheds light on the gender role within households: while 58% of the main users of the shared cars are male, 55% of secondary users are female. Household car sharing is mainly a regular practice: four cars out of ten are shared in year  $n$ , three of them are shared again on year  $n+1$ .

## 5. CONCLUSION

Finally, without diminishing the merits of innovative transport solutions proposed here and there, it is not a waste of time to give some insight on self established behaviour within households. This reveals that complex patterns have been built over time by the people themselves to cope with diverse situations that cannot be easily handled by straightforward classifications. The car cannot be reduced to a personal object, even it seems to become more and more personal. Household car sharing also carries strong links with the issue of car dependency. Developing renting practices can result in decreasing the volume of the overall fleet, while sharing can also be used as a short-term solution for those who do not have alternatives. According to the results of this study, however, these activities do not necessarily decrease overall car traffic. But sharing and renting may support a depersonalisation of the object, resulting in managing it more jointly, and perhaps in pooling it more often and in curbing households' behaviours into a more collective sense. Another important issue - for car dependency, energy and environmental impacts and finally for sustainability - would be to in depth study practices (behaviours and mobility patterns) and their temporal evolutions relating to the collective occupancy of cars (escort, pooling, etc.). Sifting car availability and modal choice sets may also be useful for fitting disaggregated models of sharing.

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