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DYNAMIC OF CAR OWNERSHIP AND CAR USE IN FRANCE SINCE THE 1960S

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ABSTRACT

Transportation has experienced extraordinary growth during the last century and still evolves throughout the twenty-first century. To clarify the changes to come, studies of the history of past habits and behaviors are essential. The knowledge of mobility in France is partly based on National Travel Surveys (NTS). In the past these surveys have been conducted five times (1966-67, 1973-74, 1981-82, 1993-94 and 2007-08), which gives five photographs of mobility for households living in France. The definitions and principles of these surveys

haven't been modified since the beginning which makes the measurement of structural changes easier. The goal of this paper is to analyze the behavioral changes related to the motorization since the 1960s. The analysis of changes will be focused on the evolution of household motorization (non-motorized, with one car and multi motorized) and the number of driving license holders since the 1960s.

Keywords: motorization, car ownership, car use, driving license, behaviour, dynamic, surveys.

INTRODUCTION

Transportation has experienced extraordinary growth during the last century and still evolves throughout the twenty-first century. To clarify the changes to come, study of the history of past habits and behavior is essential. The knowledge of mobility in France is partly based on National Travel Surveys. In the past these surveys have been conducted five times (1966-67, 1973-74, 1981-82, 1993-94 and 2007-08), which gives five photographs of mobility for households living in France. NTS are rich in information, but they are generally run every ten to twelve years, it is difficult to measure the trends in behaviors and understand the story of a subtle history of mobility. The protocol of NTS has changed which requires the development of tools to analyze mobility in comparative static. However the definitions and principles of these NTS haven't evolved which facilitates the measurement of structural changes.

The goal of this paper is to analyze behavioral changes related to the motorization since the 1960s. After a short description of the French National Travel Survey, we will analyze the evolution of the households' car fleet, and then a phenomenon directly linked to the evolution of the fleet, the numbers of individuals who hold a driving license. In the last 60 years we have known a major change as at the beginning of the period we have a rapid growth in term of household motorization and in the last 20 years car fleet is rising by multi-equipment. Thus we will see these dynamic throughout the analysis of these five cross-sections surveys¹, it will provide an historical perspective for France.

THE FRENCH NATIONAL TRAVEL SURVEYS

Once per decade, the Ministry of Transport and the National Institute of Statistics use to conducting a National Travel Survey with the scientific support of INRETS. Each survey is fitted into a continuation of the previous to allow one to measure the structural changes.

The aim of these surveys is the description of short and long distance trips made by households living in France, as well as their access to and use of public and private transport means. In France, The NTS is the only survey completed at the nation level describing all trips made by households living in France, whatever their purpose, length, mode, season or time of day. These surveys also emphasize the knowledge of the vehicle fleet, use and of

¹ Figures from the National Transport Survey 1966 come from: Villeneuve, A., "L'équipement des ménages en automobiles : enquête transports 1967", les collections de l'INSEE, M15, 1972.

Figures from the National Transport Survey 1973 come from: Nguyen Huu, T., "Le parc automobile des ménages : enquête transports (1973-1974)", les collections de l'INSEE, M65-66, 1978.

individuals' access to public transport (including tickets and discounted fares) (Armoogum & all, 2007).

The definitions and principles of these NTS haven't evolved (Armoogum, 2007). However, as one might envisage, some field of surveys and issues have changed over the 5 surveys requiring us to take a common field to all surveys. Thus, the results presented below will only state that cars without taking into account the light-utility vehicles. Similarly, the variables of geographic zoning in France have changed significantly since the first survey. The results presented below are in a constant zoning, the reference being the last zoning dating from the 1999 census. The definition of the zones area is as follow: city center, suburb and rural area. These zones area can be use only for the 3 last surveys.

EVOLUTION OF THE HOUSEHOLDS' MOTORISATION: MULTI-MOTORIZATION AND FLEET OF VEHICLES OLDER

Cars have penetrated our lifestyle in the last century. The household motorization is marked by two major evolutions (Fig. 1). The first is linked with the acquisition or not of a car by the household. In 1966, slightly more than half of households had a car. Until now, this proportion increases, more than 80% of households had a car in 2007. The motorization had a strong growth between 1966 and 1981. The share of non-motorized households decreases of less than 18 points between these 2 dates, that is an average annual decline of 3.0%. The second evolution is linked with the number of cars available in each household. Since mid 60's we note a continuous growth of the share of the households multi-motorized. In 1966, less than 6% of households had at least two cars this figure is about one third in 2007. This last trend pushes the average number of cars per household. It were 0.58 cars per household in 1966, 0.73 in 1973, it reached 1 vehicle per household in 1993 and it is now 1.2 in 2007.

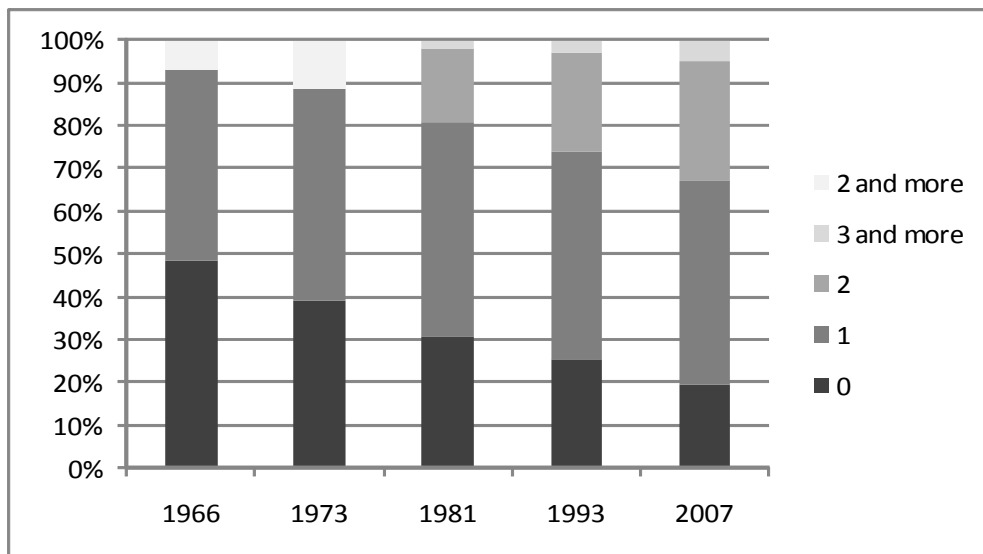


Figure 1 : Evolution of car-ownership

What are the factors that may affect the household's motorization? Henry Fraisse (1996) showed that household car equipment is explained by the influence of economic characteristics (income), demographic (age, sex, etc.) and spatial (habitat type, housing environment etc.). For this initial exploratory work on the history of the motorization, we will only take an interest in household size and the zone of residence. Does the number of cars increases proportionally with the size of the household? Is it higher when households live in rural areas?

The average number of cars per household grows strongly with the size of household: it is 0.6 for one-person households and nearly 1.7 for households with three persons or more in 2007 (Fig. 2). Indeed, the motorization of a household is all more profitable when it concerns the largest number of people. Over the period 1981 and 2007, the average number of cars per household increases parallel for households of two persons and three persons or more (+0.6 point). However, the single-person households have the highest growth rates between these 2 dates: 90% on the overall of the period against 63% for two persons households and 31% for larger households size. We can think that, for multi-persons households of, a car is the family transport mode. However, this strong shift for one-person households can be explained partly by the use of the car that is more and more individualized and on the other hand, certainly by a cohort effect. Indeed, in 1981, one person households aged 65 and over had 0.13 vehicles in average against 0.46 in 2007. The elderly households keep their past habits and still use their cars today (Bodier, 1996).

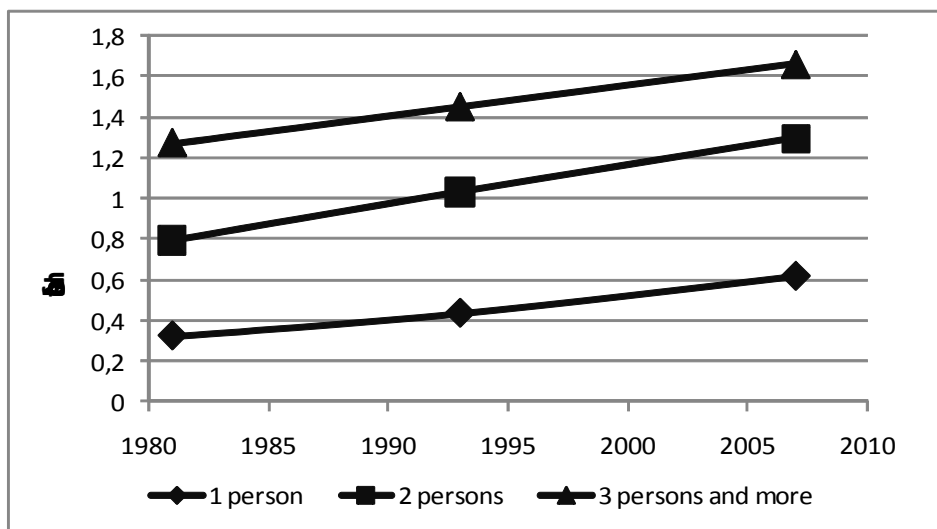


Figure 2: Average number of cars per household by household size at different period

When examining the share of the number of cars depending on the zone of residence (city center, suburb and rural area), we find the same trends as those described above: decrease of the share of non-motorised households and an increase of multi-cars households in the 3 zones. However, these two phenomena evolve in different ways depending on area of residence (Bussière, Armoogum, Madre, 1996). The share of households having no car is highest in the cities centers and is the lowest for multi-motorization regardless of the period (Fig. 3). We can think that the public transport more developed in city center competes with the automobile. Conversely, where access to public transport is more difficult, particularly in

rural areas, the share of households with at least one car is more important, as well as multi-motorization (Fig. 4). In 2007, car ownership is almost generalized in rural areas. The motorization of households living in suburbs is between these two extremes, where the transport network is more developed than in rural areas but less than in cities centers (Fig. 5). Our previous work on the capital region (Madre, Armoogum 1996), show that the motorisation increases with the distance from the city center. We found that the level of motorisation for the city center of Paris was the lowest in France but this figures reach the highest level for France in the outer suburbs of Paris.

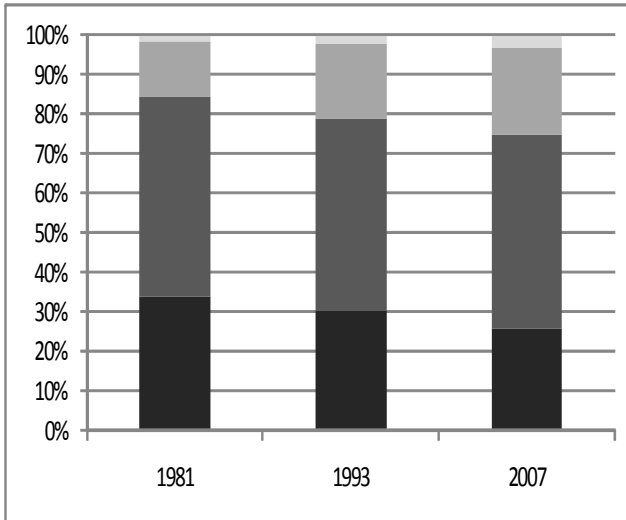


Figure 3: Share of number of cars ownership in the city center

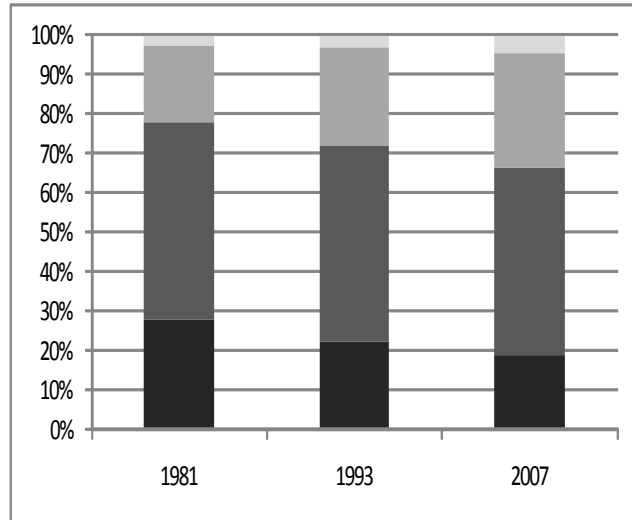


Figure 4: Share of number of cars ownership in the suburb

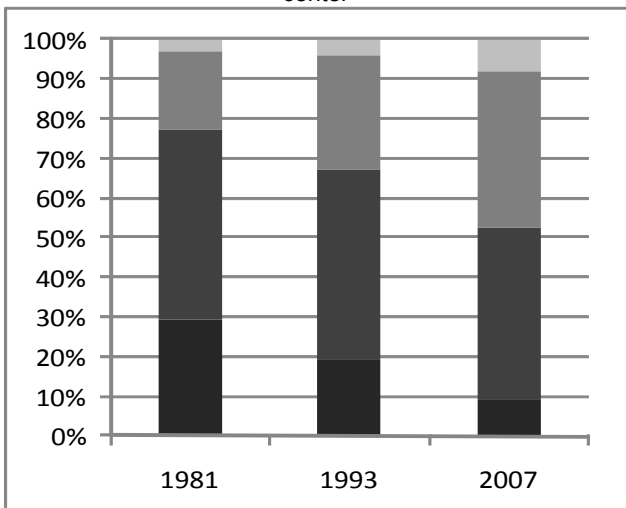
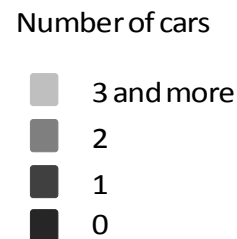


Figure 5: Share of number of cars ownership in rural areas



CONDITION OF ACQUISITION AND AGE OF CARS: AN AGEING FLEET

In 1966, about 50% of the cars were acquired new by households, they are less than 28% in 2007 (Fig. 6). Second-hand cars take up an increasingly important place in the equipment of

French households. Between 1973 and 2007, the share of cars purchased second-hand has increased by 34%. We can thus conclude that the vehicle fleet of households tends to get older over time (Bodier & all, 1995) (Hivert, 2008). The sharing out of age of cars and the age of cars at the time of purchase tends to increase the average age of cars (Fig. 7 and 8). Actually, during the year 1966, the average age of cars was 5.4 years against 8.8 years in 2007 and the average age of the cars at the time of purchase has increased from 2.7 years to 4.2 years between 1981 and 2007. (Fig. 9). Technological advances have greatly contributed to the increase in the average age of cars (cars are more robust). Households now keep their vehicles longer than before (Jeger, 2001). But one can also wonder whether this increase is not the combined result of the multi-motorization of households and a different use of the second or third vehicle, less recent. Indeed, older car had lower annual mileage (Fig. 10). This phenomenon is identical over time in all surveys. We can think that households would tend to use older vehicles to make short trips, thereby lengthening the time of life of the car, and to use the main car more frequently. The household would tend to share their mileage between several vehicles (Join-Lambert, 1981).

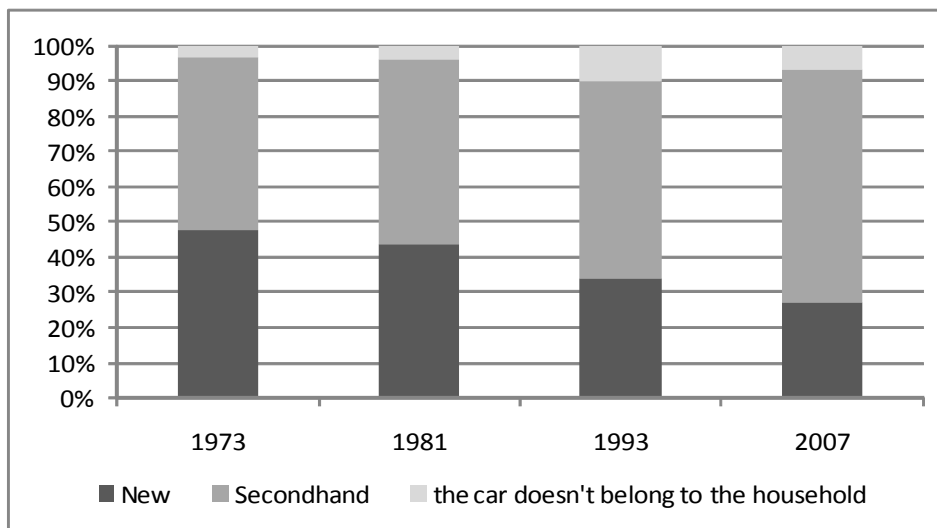


Figure 6: Number of cars according to the condition of acquisition at different period

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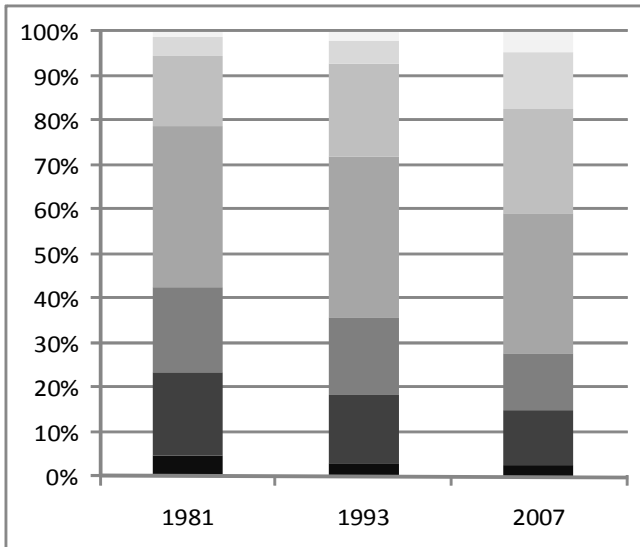


Figure 7: Number of cars according to age of the car at different period

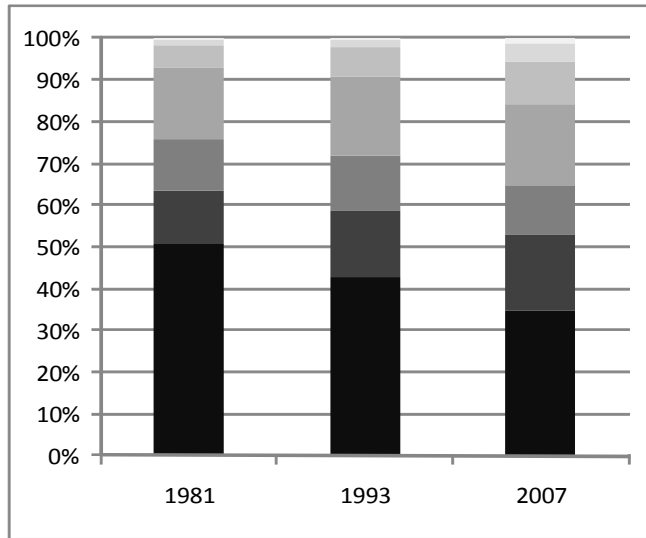


Figure 8: Number of cars according to age at the time of purchase at different period

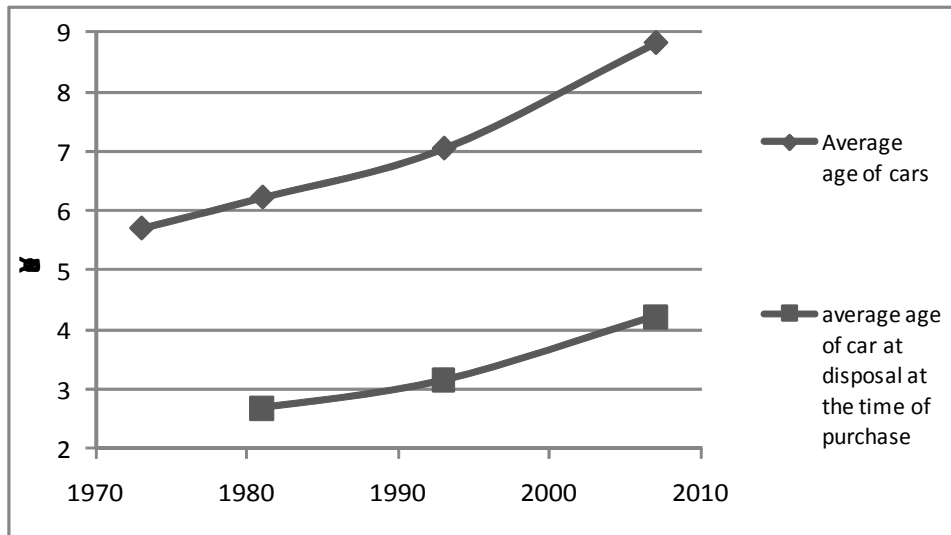
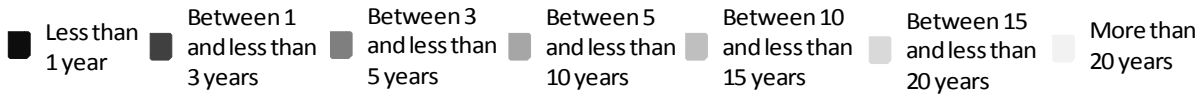


Figure 9: Average age of car and average age of car at the time of purchase at different period

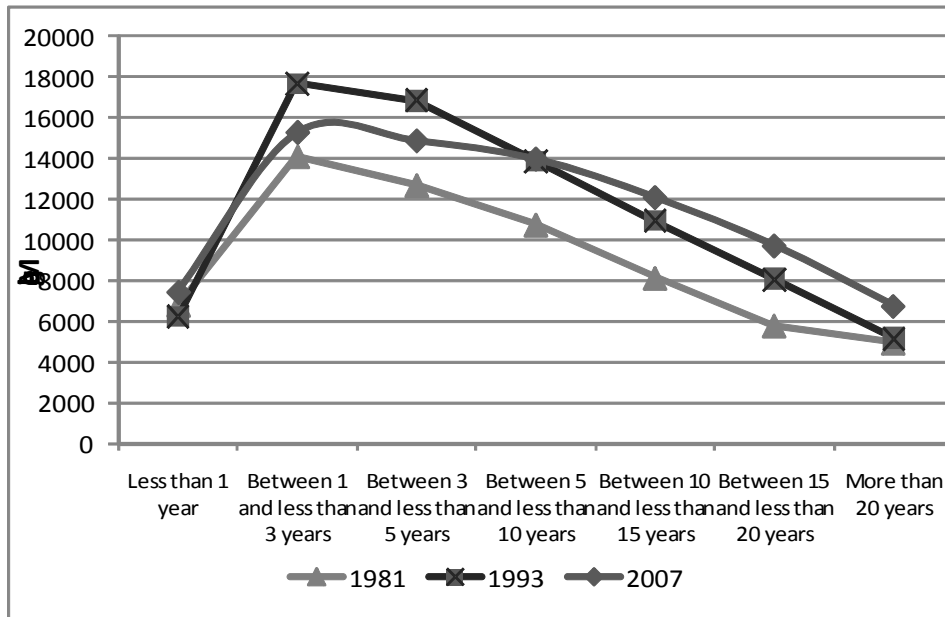


Figure 10: Average annual mileage according to age of the car at different period

The evolution of household car ownership is a consequence of the democratization of driver's licence. Indeed, the more people hold a driving licence, the more the population are likely to drive and the more they are likely to increase the car fleet by buying cars. The study of driver's license holding therefore goes hand in hand with motorization.

DRIVING LICENCE HOLDERS: MORE AND MORE, MORE AND MORE WOMEN, AND MORE AND MORE SENIORS

Since 1966, the rate of driving licenses holders is constantly increasing. It is nearly 42% in 1966 and has doubled in 2007, nearly 84% among people aged 18 and over (Fig. 11). A cohort effect can be suspected. According to the biographical section of the 2007 NTS, the analysis of obtaining the driver's license by cohort sheds a twofold light. The first concerns the proportion of respondents having a driver's license: more the cohort is young and more the proportion of persons in possession of the driver's license is high. The second evolution is that of the age when obtaining the driver's license. It decreases with the youth of the cohort (Papon & all, 2009). When comparing the proportion of men and women who have driver's license, we observe that for different period men have more often driver's license than women (Fig. 12). Men are more than 70% in 1973 to hold it and more than 91% in 2007. But the major factor for the difference in proportion of driver's licences between both genders: it is decreasing over time from nearly 37 points in 1973 to 15 points in 2007. Women were 33% to have their license in 1973 and over 76% in 2007. Women in 2007 have slightly exceeded the level reached by men in 1973. The driver, male "privilege" in the 60s (Fagnani, 1977), has faded over the surveys. Before 1997, young people could get their driving license for free when in France we used to have a military service (which was mandatory for young male). With the end of this military service, there was a decrease in the number of driving licenses issued to young male especially those living in rural areas (Avrillier & all, 2008). We can probably also attribute the increased number of women who have a driver's license during

the 2nd half of the 20th century to the movement in pursuit of emancipation and empowerment of women, particularly professional. Arguably, the commute pushes the massive car use, and, in the recent decades this correlation is very evident among women. This car use is probably due to the poor access to public transport.

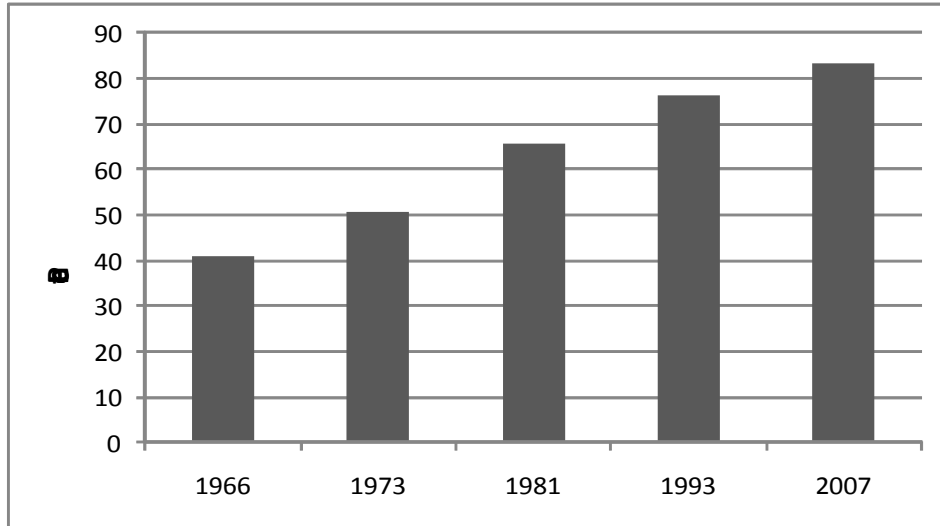


Figure 11: Proportion of individuals aged 18 and over having a driver's license at different period

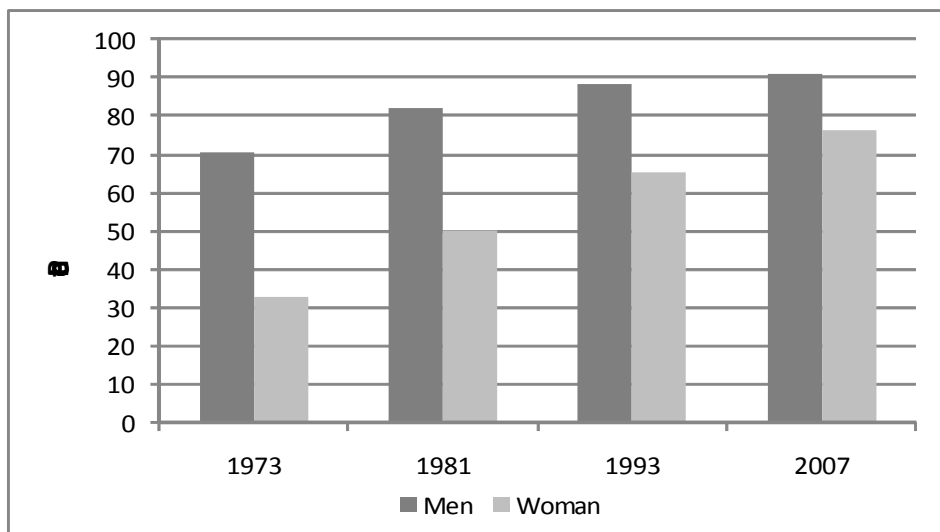


Figure 12: Proportion of individuals aged 18 and over having a driver's license depending on gender at different period

At the same age, the proportion of people with a driving license is higher and higher over time (with one exception, 18-24 years living in suburbs and rural areas) and for people over 55 years, the differences between surveys are highest (Fig. 13, 14 and 15). People aged over 65 have experienced the development of the automobile during their middle age, and thus have practiced driving late or not (Gallez & all, 1997) at all especially women. The democratization of the driver's license, its non-renewable phenomenon in France, and a lower average age of obtaining a driver's license led to the fact that people who had the driver's license in the early 80s have always a driver's license today. Overall, the proportion of people with driving licenses is higher for people living in a rural area, and then follows those living in suburbs and finally those living in the city center. We see logically the same

phenomenon already described for the motorization of households. More public transport is developed, the less people have the driver's license.

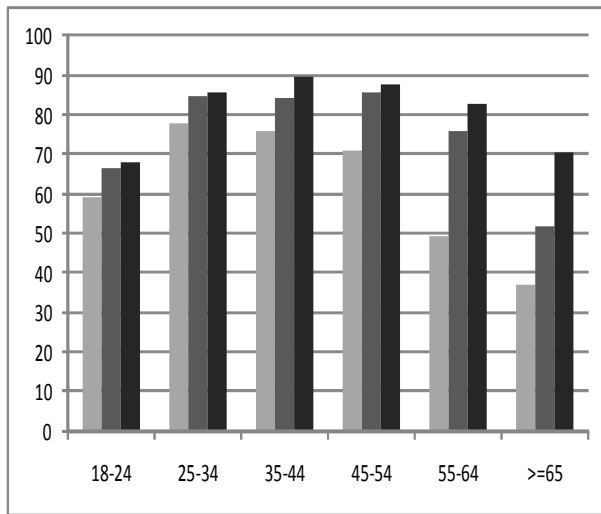


Figure 13: Proportion of individuals to hold a driving license depending on age in the city center at different period

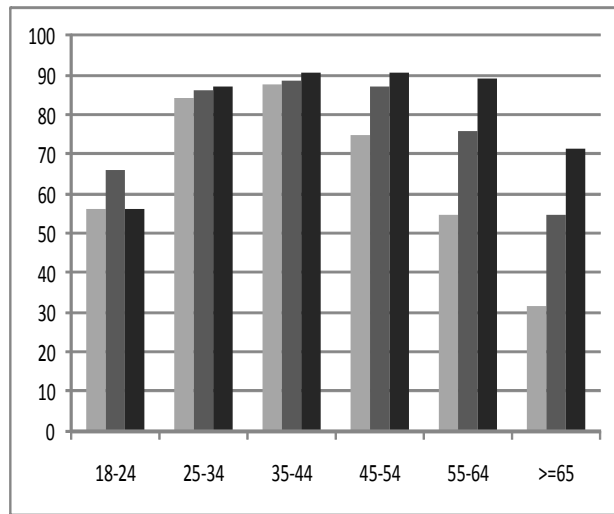
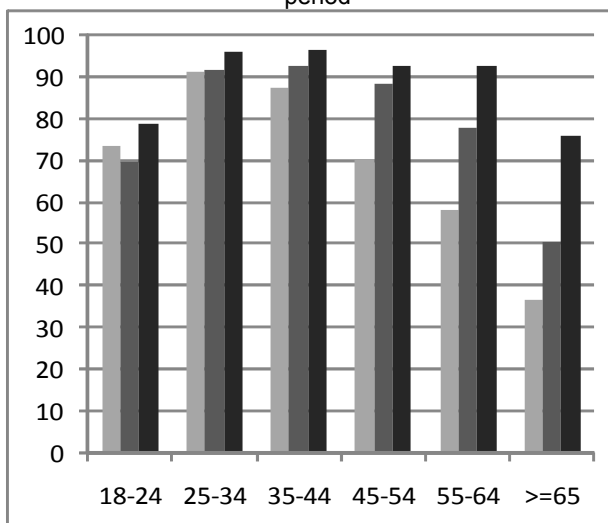


Figure 14: Proportion of individuals to hold a driving license depending on age in the suburb at different period



Survey

- 2007
- 1993
- 1981

Figure 15: Proportion of individuals to hold a driving license depending on age in the rural area at different period

CONCLUSION

Since the '60s, the motorization of households has rapidly increased resulting by a decrease in non-motorization of households accompanying by an increase in the multi-motorization and an aging of the car fleet in household. We note a decrease in the driver's license age and the increasing share of women who hold it is link to the evolution of the motorization.

Indeed, the multi-motorisation could allow the second partner (who was most often a woman (Fagnani, 1977)) to drive a car, especially to reach their workplace. The growth of the motorization and its diffusion to the women allows the urban sprawls. Moreover, the possession of a car is now closely linked to the type of territory where we live.

However, these surveys do not allow on the one hand to follow individual changes of behavior as data are collected once per decade on a new sample, and on the other hand to describe the history of mobility continuously. The method that is traditionally used to catch life stories is the biographic survey. In France, the 2007-08 issue of the NTS innovates as compared with the previous ones, among other additions, by the collection of biographic retrospective data giving way to the analysis of individuals' past behavior over their lifetime. By providing longitudinal data on the interviewees' lives, these data will allow richer analyses on mobility behavior and habits, and present a historical perspective on travel means in France in the past.

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