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Car traffic reaches a peak: and now, the beginning of decline?

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Since the 2000s, after decades of steady growth, there has been a shift in behavior relative to car ownership and use. This has resulted in a cap on car traffic at the national level (France) in a larger context of decline in car travel in large urban areas, increased use of public transportation, a revival of active modes and the emergence of alternatives to individual car ownership (carpooling, car sharing, car rental between individuals, etc.). How to explain it?

Research participants

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Thesis title : L'auto-mobilité au tournant du millénaire. Une approche emboîtée, individuelle et longitudinale.

Country : France

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Since the 2000s, after decades of steady growth, there has been a shift in behavior relative to car ownership and use. This has resulted in a cap on car traffic at the France national level in a larger context of decline in car travel in large urban areas, increased use of public transportation, a revival of active modes and the emergence of alternatives to individual car ownership (carpooling, car sharing, car rental between individuals, etc.)

This trend can be observed in OECD countries where car traffic has capped, though at different times and at different levels depending on the country. Certain authors have predicted a decline in auto-mobility in terms of both ownership and use based on this

trend, a theory popularized by the term "peak car," by analogy with "peak oil"¹.

My research points to economic factors as the principal cause of these changes and thus supporting the hypothesis of gradual slowdown in the growth of car traffic as a result of the diminution of the effects of the spread of the car use on traffic.

1/ What is your research topic? What thesis are you defending?

Several studies have explored the causes of recent changes in mobility patterns. After reviewing these explanations, I ranked them according to several criteria, notably based on the existence of empirical evidence for explaining these trends. I observed the following points:

- Economic explanations help explain recent developments. The increase in fuel prices in addition to other car (maintenance/repair, inspections, driver's education, etc.) and household expenses (housing, food, etc.) are a potential explanation for households' increasingly rational attempt to limit transportation expenses. This may have been reinforced by the 2008 recession following the subprime crisis.
- Given the increase in average daily commute times, it is also possible that individuals are attempting to reduce certain trips in order to limit the time they spend traveling. Increased road traffic and public policies have made parking and driving more difficult in urban areas (lower speed limits, speed bumps, narrower roads, restricted bus/bike lanes, etc.). At the same time, public transportation has improved both quantitatively and qualitatively (i.e. frequency, schedules, reliability, comfort, etc.).
- The hypothesis of saturation of the demand (number of cars owned) must also be taken into account. Originally conceived as a household asset, the automobile has gradually come to reflect an individual's status, with the massive entry of women into the work force following WWII. However, the car ownership rate also shows signs of partial saturation among the upper and middle classes.
- Some authors explain the decline in car use as being due to demographics and geographical structures. The aging of the population has contributed to a decline in mobility, with a gradual decrease in professional travel upon retirement. In the past two decades, there has also been a move to rebalance demographic growth between urban centers and peripheral areas, likewise resulting in a decrease in automobile dependency.
- Others speak of changes in preferences, attitudes and opinions, resulting in a more rational relationship to the car and greater environmental awareness. Some consider that communication technologies can reduce physical mobility by replacing it with "virtual" mobility (e-commerce, telecommuting, social networks, videoconferencing, etc.). However, the idea that virtual mobility will substitute physical mobility on a large-scale has generally been invalidated by the scientific literature, which suggests more complex relationships (complementarity, induction, modification).
- Finally, numerous studies recognize new generations' contribution to the changes currently taking place, be it in Germany, the United Kingdom, the Netherlands, the United States or Australia. We have notably observed a decrease in the number of car

trips young men are making, in addition to greater multi-modality.

Finally, I show that economic factors appear to have the most obvious influence on car use. This hypothesis is reinforced by a new rise in traffic after 2012 (in line with lower fuel prices during this period) and an analysis of long-term trends. Two independent processes whose interplay impacts changes in traffic can effectively be dissociated:

- The spread of the automobile: in the long term, the increase in the average traffic per adult is directly correlated with that of the number of cars per adult - or, in an almost equal way, the number of vehicle drivers, the two indicators being quite close ².
- Conversely, vehicle use follows a steady trend, with the exception of cyclical fluctuations linked to changes in fuel prices. In some respects, the period beginning in the mid-1990s has been like a new oil shock ³.

This model, which is based on the relationship between the number of cars per adult and buying power, helps explain both the long-term traffic increase and the traffic cap since 2000.

2/ If your thesis/dissertation involves empirical research, what does this consist of?

My method was essentially inductive and empirical. I started by observing behavioral patterns and analyzing long-term trends in car use and ownership to build an econometric model to allow for the best possible understanding. I modelled the probability of an adult having a driver's license, of she or he being the vehicle's main user, and the annual mileage of the vehicle(s) of which she or he is the main user.

My approach is also original in that it considers these trends over the long term; while it is true that many economic phenomena occur in short and medium-term cycles, socio-demographic and urban phenomena (the birth of generations with new behaviors, increased participation of women, peri-urbanization, etc.) are characterized by greater inertia and are essentially the result of long-term processes. Much of my analysis is based on data from the TNS-SOFRES ParcAuto panel ⁴, and supplemented by the Household Surveys (ECAM) ⁵ for the earlier periods.

I chose to use an individual rather than the typical 'per household' approach. My thesis does not attempt to justify this theoretical choice.

One nuance in particular has important consequences, however, and merits attention. It is generally assumed that the driving force behind changes in motor vehicle traffic is the number of drivers with a personal vehicle. I considered and analyzed the number of cars per adult: one individual can, in fact, be the primary user of several vehicles. Hence, the average number of drivers is slightly lower than the average number of cars per adult. One of the main advantages of this approach is that it allows for a consistent, synthetic analysis of several findings, including the decline in sensitivity to traffic according to individuals' income level and apparent dissociation between car ownership and use (between the number of cars per adult, which continues to increase, and the average traffic per adult, which has capped) as a result of the decline in vehicle use per individual

due to the increase in fuel prices.

3/ What is your contribution to theoretical and policy debates?

My analyses permit me to take a stance on the "peak car" issue, i.e. the prospect of an inexorable decline in car use). For me, they confirm the hypothesis of saturation of the demand in the medium term - to the demographic factor. Assuming that a change in car traffic is essentially determined by that of the number of individual drivers, average car use should reach a saturation point when all those who can and want to have their own vehicle⁶.

To date, policies aimed at reducing car use have largely been based on four points:

- developing alternatives to the car (public transportation, bike routes, self-service bikes, etc.)
- restricting traffic and parking (reserved lanes, restricted traffic areas, lower speeds, etc.)
- encouraging people to "change their habits" by raising awareness of environmental issues and emphasizing the benefits of active modes for health
- urban planning based on better urban planning and transportation service (densification around public transportation hubs) and integration of modes between themselves (intermodality, car parks, etc.)..

Given the trends observed, these strategies seem to have borne their fruit. However, the influence of public policies in these changes is unclear: in reality they may only have a secondary influence compared to more cyclical and/or outside causes. Consequently, it is difficult to ensure that these changes will be lasting ones, as traffic is likely to rise again due to drops in fuel prices, as has been the case since 2013.

Moreover, these policies have thus far and above all proved effective in the places where they were the "easiest" to implement, meaning urban areas with good car alternatives. However, they fail to resolve the structural issue of car dependency in peri-urban and rural areas, which has worsened since the late 1990s due to the increase of the price of fuel whereby households must either increase their transportation budget allowance or travel less. It is therefore important to closely consider the social impact of mobility policies by identifying vulnerable groups. Four main types of policies designed to limit people's mobility carbon footprint can be envisaged:

- An authoritarian policy based on regulations and sanctions that seeks to prohibit car use in certain cases (e.g. restricted traffic areas, alternating traffic, etc.);
- A "liberal" policy that uses market mechanisms (environment tax, carbon tax, no-claims bonus, etc.) to change behavior based on economic incentives;
- A supply policy entailing quantitative and qualitative improvement of the public transportation supply in conjunction with spatial and urban planning;
- A "technical" option based on technological and organizational improvements in telecommunications to reduce the need for travel and new engine technology designed to reduce vehicle emissions. It also uses the new mobility services which, through better collective organization of mobility, increase efficiency (higher vehicle occupancy, trip coordination, etc.).

These strategies, however, conflict philosophically. The authoritarian and liberal types

seek to impose limits on mobility by restricting individual freedom and reflecting the scarcity of non-renewable resources (e.g. fossil fuels) and climate issues in consumer prices. The authoritarian option will likely result in poorer living conditions for local residents impacted by traffic deferrals resulting from the ban on vehicles in certain areas, but also for commuters who will face delays and increased gridlock and discomfort on certain routes where traffic backups are already significant. While the liberal option allows actors to accept or reject additional mobility costs via an adjustment mechanism based on their preferences, it could also result in the worsening of households' living standards and an increase their potential vulnerability, particularly given the lack of viable alternatives or compensatory mechanisms.

Finally, the policy of supply and "technical" options are somewhere between the authoritarian and liberal types. Less directive and judgmental, I feel they can help reduce the carbon footprint of mobility and at the same time respect lifestyles. They also helps ensure households' standard of living by lowering the cost of using resources, especially energy.

4/ What questions have arisen from your research that could be addressed in the future?

In order to deepen certain research hypotheses, better predict long-term transportation demands and evaluate the potential impact of different policy options, I identified several avenues of research.

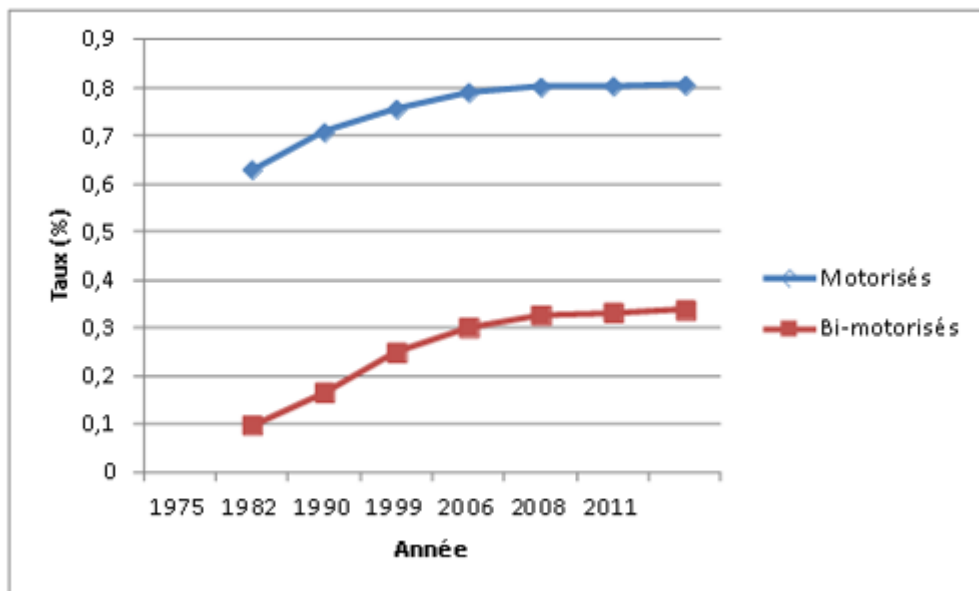
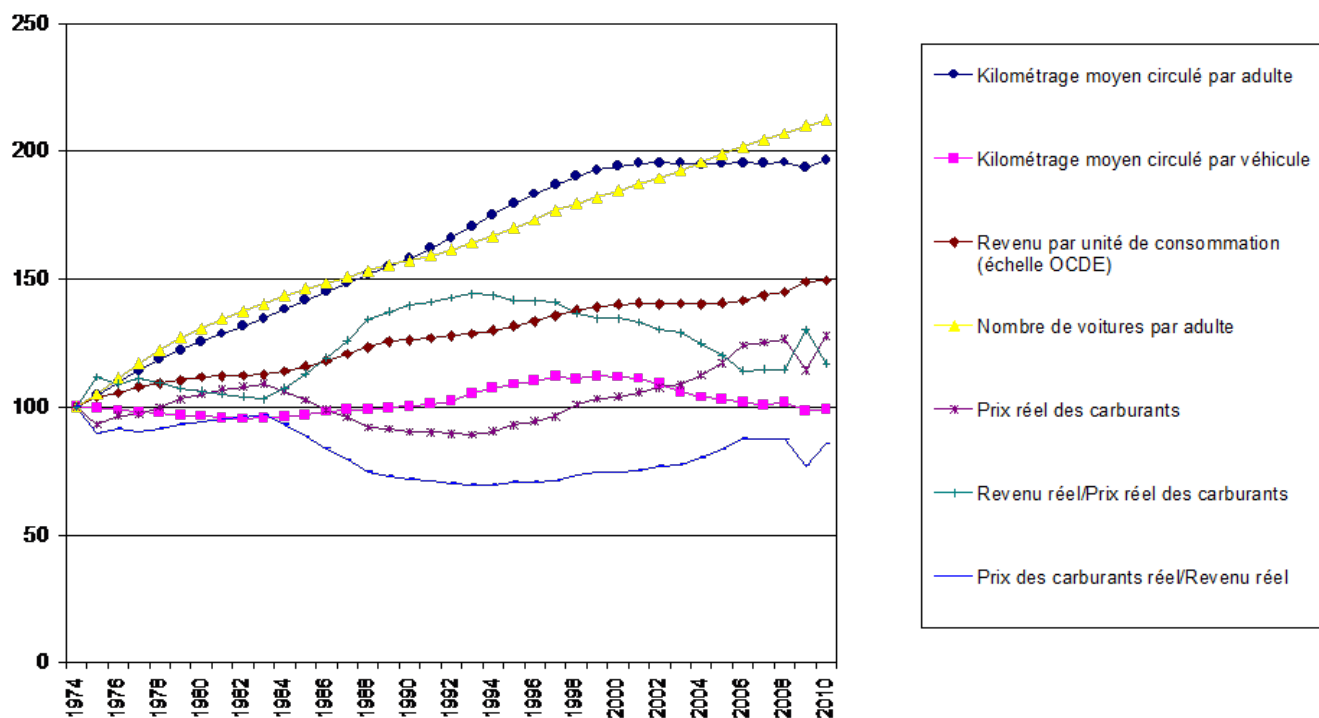
One is the behavior of new generations. For example, it is possible that having learned to use new mobility services early on (long distance carpooling, car sharing, car rentals between individuals, etc.) will allow them to keep these habits later in life and thus be less dependent on owning a vehicle than previous generations.

Another key issue is determining saturation thresholds. One can imagine either the culmination of the car individualization process (the number of people who own a car continues to grow), or, conversely, shared vehicle use combined with alternative modes and new mobility services. This will depend in part on economic and regulatory constraints and the development of a substitute offer that can provide the same services as individual vehicles. One can imagine a change in the car model, with a quasi-complete dissociation between the ownership and use of vehicles with the development of mobility services, more so than its decline. This nevertheless raises issues of acceptability, as it means shifting from an individualistic model - which hitherto has emblemized the car's success - to a more restrictive collective model (forced cohabitation with other users, obligation to negotiate and comply, etc.). Ultimately, such a model will make the car a means of public transportation among others. Other topics raised in the thesis could give rise to in-depth studies, such as:

- Engines, be they conventional/classic or new engines, notably electric and hybrid engines.
- The degree of interdependency between technical progress and price effects, which is crucial for determining the most efficient policies for reducing emissions.
- The interplay between budgetary items: how do households choose between mobility and other expenditures in a context of a general increase in the prices of

staples (housing, food, etc.)?

Séries longues pour plusieurs indicateurs, en indice base 100 en 1974



Left: change in car traffic and car ownership rate relative to income and fuel prices from the 1970s to the present: sources ParcAuto (1994-2010) and ECAM (1974-94). [Translation of the graph legend from french: average vehicle mileage per adult/average mileage per vehicle/income per consumer unit (OCED scale)/number of cars per adult/real fuel prices/real (net) income/real (net) price of fuel/real (net) price of fuel/income]

Right: Percentage of households that own one or more cars. (Interpretation: 0.5 = 50 % households with cars). Source: population censuses from 1968, 1975, 1982, 1990 and annual waves from 2006, 2008 and 2011 of the permanent census.

The graphs above illustrate changes in car ownership and use. The first, based on data from the ParcAuto panel and the Household Economic Surveys (see Section 2 for a brief description of these files), reflects the long-term relationship between growth in the average traffic per adult and the increase in the ownership rate (number of cars per adult). It also highlights cyclical fluctuations in average vehicle mileage, which can be considered relative to fuel price fluctuations. Stagnation in the average traffic per adult in the 2000s notably can be explained this way.

The second graph illustrates the gradual slowdown in the car ownership rate based on census data. The latter seems to have stabilized since the mid-2000s, suggesting the reaching of a threshold of equilibrium in the distribution of households according to their ownership level. The two graphs are not necessarily consistent in how they take ownership rate trends into account, particularly given that one is based on an analysis at the household level and the other on the ownership rate at the adult level. However, the stabilizing of household ownership rates does not reflect that of the adult ownership rate, as the average household size continues to decline. In reality, we can interpret changes in households' car ownership levels as being the result of two contrary trends: households' tendency to have more cars and the decrease in the size of households, which has a moderating effect on the change in ownership levels.

[Download the thesis](#)

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1

Notes

1 Namely the prospect of an inevitable decline in oil production with the future depletion of fossil resources.

4 To the extent that the increase in the number of vehicles goes hand in hand with that in the number of drivers and reflects a demand for autonomy through the individualization of car ownership and use.

5 The last oil "shock," however, differs from the previous ones in that it was long and gradual, characteristics that are more akin to a change of system, the causes of which are multiple (greater demand from emerging countries, the prospect of "peak oil," derivative portfolios from raw materials at the level of speculative institutions (banks, insurance companies, etc.), increased environmental taxes, etc.).

6 Survey of households in metropolitan France. Each year, 6,000-7,000 households are surveyed regarding the vehicles available to them (including annual mileage for each vehicle) and their use. The survey, carried out by the TNS-SOFRES survey institute since 1976, is financed by a consortium of public and private partners and used by the French Institute of Science and Technology for Transport, Development and Networks (IFSTTAR).

7 ECAMs, carried out from 1974 to 1994, are general consumer surveys conducted by the INSEE among 10,000 to 13,000 households annually, includes a section on the number of cars and their use.

8 Even if the number of cars per adult were to continue to rise above this threshold, additional vehicles would cease facilitating/no longer facilitate individuals' autonomy and would therefore not generate additional traffic, but merely result in a different distribution of use between vehicles.

Car sharing

Car sharing is the pooling of one or several vehicles for different trips at different times. Three types of car sharing exist: commercial car sharing, peer-to-peer car sharing and "informal" sharing between individuals.

More

Mobility

Broadly, the word mobility can be defined as the intention to move and the realization of this movement in geographical space, implying a social change.

More

Lifestyle

A lifestyle is a composition of daily activities and experiences that give sense and meaning to the life of a person or a group in time and space.

More

Disciplines : Social sciences, Economy, law and management

Transport mode(s) : Automobile, All modes of transport

¹ <http://en.forumviesmobiles.org/marks/car-sharing-2137>

² <http://en.forumviesmobiles.org/marks/mobility-450>

³ <http://en.forumviesmobiles.org/marks/lifestyle-1756>

⁴ <http://en.forumviesmobiles.org/disciplines/sciences-sociales>

⁵ <http://en.forumviesmobiles.org/disciplines/economie-droit-et-gestion>

⁶ <http://en.forumviesmobiles.org/modes-transports/automobile>

⁷ <http://en.forumviesmobiles.org/modes-transports/tous-modes-transport>