From travel surveys to policy appraisal

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Travel surveys

In general they provide a detailed view of the characteristics of the trips (purpose, time, duration, O/D, modes) over a single day. Their current empirical analysis provides "photographs" of the situation in 3 directions:

- **Incorporation of basic data in models**
- **Group based analysis: Comparative analysis of groups behaviour: mean trip numbers, modal split, etc. for poor and rich, urban and suburban**
- **City based analysis: General state of mobility in the city: modal split, structure of O/ D, etc.**
- **With possible comparisons over time: Beijing in 2000, in 2010, Etc.**

Classical analysis of travel surveys: problems

- **The analysis is generally conducted without reference to a theoretical framework**
- **The analysis is generally conducted without adding new infos, though they are often available elsewhere**
- **Many analysis are conducted “at the mean”**
- **The analysis is generally conducted without reference to a policy stake**

A broad and flexible theoretical framework

- **The movement of people over the day is limited by 2 "envelops", the share of income they have to allocate to movement (and lodging) and a maximum share of daily time**
- **Tensions occur when commitments to move exceed these "budgets"**

  ("Soft reinterpretation of Zahavi hypothesis)

Adding new info is generally easy

Examples

- **The mean cost of lodging, by zones in the city**
- **The mean cost / km, in different modes, computed from fares (P.T.), fuel price and parking fees for cars, etc.**
- **The mean ownership cost of a new vehicle (promotion of electric vehicles for example)**
- **The travel time in the potentially competing modes (currently used in disaggregated modelling)**

Many analysis are generally conducted “at the mean”

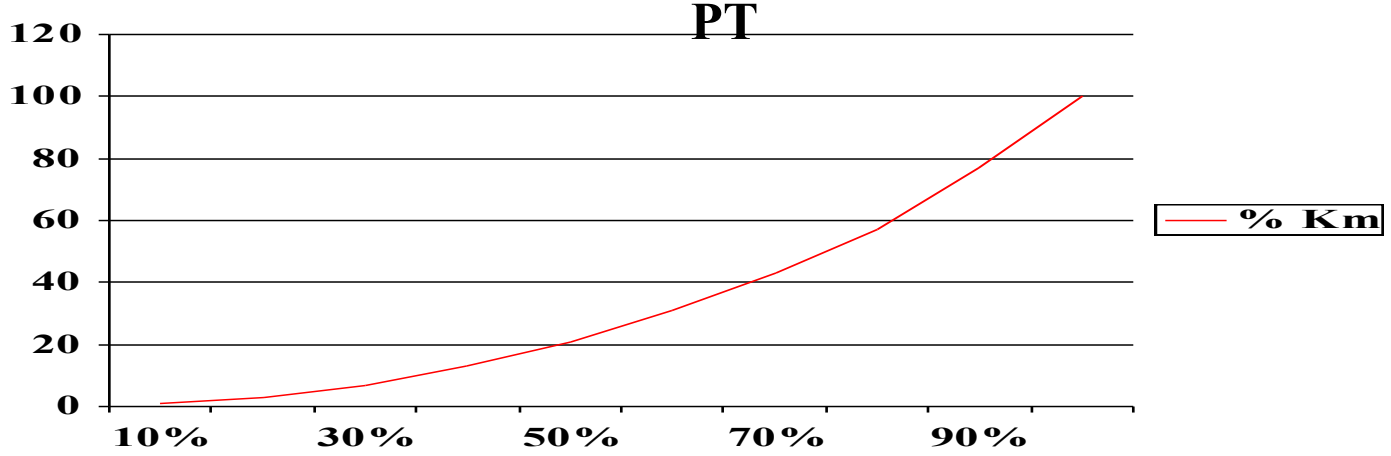
But mobility consumption has nothing to do with the “gaussian hypothesis”

(a mean behaviour and people regularly dispersed in a standard deviation interval)

The mean means nothing

In general, a great share of the population brings a low contribution to traffic (roads or PT), a small share brings a very high contribution, such as in graph below

For example, 75 % of the adult population produces 25 % of car mileage, while 25 % of the population produces 75 %, the same for PT



Classical modelling is of "blackbox" type

- **Modellers conceive models which are not understandable by the populations, and are not flexible to incorporate new hypothesis**
- **But more and more people want to discuss experts views and policy directions, and this is a long term trend in any society / country**

Budget approaches and the questions of urban sprawl and low income: from mobility analysis to policy recommendations

Principles of analysis

- **To compare the situation of “urban residents” to that of “suburban residents”**
- **To incorporate new data: fuel consumption, cost of trips, cost of lodging, access to the the job market**
- **To create “budget indicators” at the level of the day, the month, etc.**

Results: Fuel consumption and CO2 emissions

- **In the Paris region, comparable persons (same lifecycle position, same income, etc.) use 3 times as much energy and emit 4 times as much CO2 for their daily trips when they live in suburban locations (around 30km from Paris centre) than in Paris and inner suburbs residents, in relation to higher distances and higher use of cars**
- **The difference holds also for suburban train commuters to Paris: they use train to Paris, but they use car within suburbs, and this is enough to "make the difference**

Policy implication:

Mitigating urban sprawl is useful for emissions, developing new CO2 free services within the suburbs is useful, but developing new P.T. links to Paris is *not* the solution

Results: tensions on budgets

- **In Ile-de-France, suburbanites have not a higher travel time budget than core city residents, despite their higher distance travel, due to much higher speed on roads and PT (more train, less bus, tram, tube)**
- **Despite lower rental unitary costs for lodging, they devote around 50 % of their budget to lodging + mobility, instead of 35 % for core city residents, due to higher distances in car AND lower incomes in suburban zones**

Policy implications:

Housing expenses are controlled by banks and renters (no more than 1/3 of budget to housing), while travel expenses are not controlled. The "control ratio should apply to lodging+ expected transport budget

Results: access to the job market

Principle of the indicator of the "effective size of the potential job market":

Computation thanks to an O/D trip duration matrix for PT and car of the number of jobs of each profession which can be reached from a residential location within a duration threshold (and a monetary threshold)

Results in the Paris region

Share of the total job market which can be reached within 1 hour:

- **By PT: 39 % (Executives: 51 %, blue collars: 30 %)**
- **By car: 73 % (Executives: 81 %, blue collars: 66 %)**
- **Max for Paris residents: 85 %**
- **Max for outer suburbs residents: 62 %, PT: 14 %, car 62 %**
- **Outer residents, blue collars: PT 11 % car without budget constraint: 54 %, car, if less than 5 % of income for commuting: 15 %**

Policy implications:

Suburban development is not only a problem for the environment, but for the economy as well, since more and more people, especially at the lower levels of income, live in metropolitan areas without the advantages of the metropolitan job market

Results in the Surabaya region

Hypothesis: "reachable" jobs are within thresholds of time budget and monetary budget

In the current situation of mode ownership

Car: 3 %

PT: 46 %

Motorcycle: 44 %

Any available mode: 68 %

If motorcycle ownership is generalized: 87 % by motorcycle, 93 % for "any available mode"

Simulations: examples of the "what if" approach

A systematic orientation towards "soft modes": principles

Base of the study: Paris and inner suburbs residents using a car for some of their trips

Hypothesis; keeping their O/D, they will move at the level of H/ H trip chains systematically to walk, bike, ou PT use, under conditions:

- **At the trip level , if the trip does not consist of escorting young children, elderly people, or conveying heavy shopping baskets, and (for biking and cycling) under a distance threshold**
- **At the day level: if this move does not translate into an excessive daily travel time budget**

A systematic orientation towards “soft modes”: results

In the current state of PT supply:

13 % of car trips, accounting for 4 % of car km, may be transferred, mostly on PT (70 % of transfers). 44 % of “mode splitting” persons would save time, 56 % would loose time

In an (greatly) improved state of PT supply

(Supply: +50%, speed improved for buses)

21 % of car trips and 13 % of car mileage could be transferred

34 % of car trips and and 23 % of car mileage with the same improvement of PT supply and services taking care of escorts, baskets, and improved access to stations by bike

Policy implications:

huge developments of PT are costly and with limited effects on car use. Services may provide good complementary results

Introduction of electric vehicle: principles

General aim:

To test the ability of different types of ev: e bikes, e scooters, e cars to meet the needs of car users to day, at the disaggregate level of car use in the survey

Principles

To start from current car use in Paris region, to assess the share of car use which can be transferred to e mobility, characterized by limits (for example, no more than 2 persons and less than 30 km / day for a escooter)

Technical / economical interest

- **Technical assessment: the transfer is technically possible**
- **Economic assessment 1: the individuals have interest to the transfer in terms of marginal generalized cost (time+ money, vot= 10€ / h)**
- **Economic assessment 2: the individuals have interest to transfer in terms of full generalized cost (including ownership cost)**

Introduction of ev: technical assessment

	ebikes	escoot	ecar
% persons concerned	40	62	99
% car mileage	14	31	98

Introduction of ev: economic assessment (marginal costs)

Ebike virtually disappears due to insufficient speed. Good score of e car (electricity supposed cheaper than fuel and no ownership costs)

	escoot	ecar
% persons	54 %	30 %
% car miles	27 %	61 %

Introduction of ev: economic assessment (full costs)

Escoot resists, ecar reserved to persons with a high mileage, the energy price difference compensating for higher ownership costs Higher levels for ecars if parking preferences (availability and price) for ev

	escoot	ecar
% persons	41 %	8 %
% car mileage	25 %	24 %

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