ITF Round table on Zero value of time
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Changes in mobility practices, value(s) of travel time and consequences for cost-benefit analysis

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Outline

- Introduction

- The value of time (VoT) in French CBA guidelines

- Other benefits usually linked with VoT

- Quantitative evolution of VoT over 50 years

- Prospective impacts of changing mobility practices on CBA and project evaluation

- Conclusion

Introduction

- Value of time (VoT) is central in transport CBA

- Reasons to think that ICT developments will impact VoT perceived by travelers

- Need to go back to what VoT is, how it has evolved in CBA, and how issues linked to VoT could evolve in reaction/adaptation to ICT developments and other factors possibly impacting mobility practices

→ Proposition to review how VoT « grew up » in a specific country (France) so as to get hints for possible futures

Value of time savings in CBA France

- Value of time in the early '60s :
  - « In the beginning was the Number… » :

    observation of route choices : travel times versus costs
    → simple derivation of VoT for cars, consistent with Jules Dupuit's surplus approach

  - « collective value equal to individual value »

  - Consistency $\begin{cases} \Delta S = VoT \times TT \\ \text{traffic model} : \Delta TT = f(VoT, \ldots) \end{cases}$

CBA and reference VoT: what for?

- Need for « sound comparability » of socio-economic performance estimates, to help prioritising projects competing for national funding

→ Common methods

+ equity / neutrality / redistribution + cost of building assumptions locally

→national reference values (mandatory use)

vs « pure economic value », much more variable in practice and more consistent with travel behaviour

→Increased differentation of VoT in guidelines over 50 years

Parallel diversification of traffic models

→ VoT for NPV ≠ VOT for models

Differentiation of VoT in French CBA guidelines

Differentiation of VoT in French CBA guidelines

- Differentiation : due to auto-selection (trip purpose, income level,…)
- Differentiation of VoT by distance per se, or non-linear preferences in time ?
- Versus road comfort

Other benefits usually linked with VoT

Other components of individual utility : Comfort:

Traveler's situation	Multiplier K(p) p = nb standing pax / m²	
	p=0 (seats available)	p > 0
Seated	K(p) = 1	Ka(p) = 1 + 0,08 p
Standing		Kd(p) = 1,25 + 0,09 p

Other benefits usually linked with VoT

- Other components of individual utility : Reliability:
  - again, ΔS is supposed to be proportional to VoT
  - using a « reliability ratio » multiplied by VoT and by an indicator of TT spreading

Both estimate coefficients from measure of $\Delta S/(VoT * TT)$

→ VoT is so central in CBA that other (dis)benefits of the traveler have naturally been anchored to it

Quantitative evolution of VoT over 50 years

- Value of time in successive French guidelines, for the year the guideline was issued, for cars, in €2010 :

vs GDP/capita multiplied by ≈ 2,7

- But still overwhelming importance of TT gains in most projects, although environmental impacts may represent 10% to 30% in some cases

Quantitative evolution of VoT over 50 years

• First study report (1960): update VoT relatively to households' consumption per capita (abandoned in first guidelines until 1995 since « neutralised by increasing access to cars for lower income households »)

• VoT evolution depends on revenue increase but also on structural evolution of demand (access to cars,..), or rather on interactions between demand and supply (lower costs, increasing revenues,...)

• ε_{income} seems to be rather low and possibly diminishing : linked to evolution in TT uses ? Possible to study these past evolutions and their impact on VoT, for feedback useful for prospective analyses « ICT uses vs VoT » ?

VoT €2010 for year 2010

Importance of evolution rules : flat rules ($\varepsilon = 0$) seem to underestimate, and rules with $\varepsilon = 1$ seem to overestimate

VoT €2010 for year 2010 : comparison 3 countries

Source: Dahl et al, Transportation Research Procedia 13, 2016

No clear picture: seems to increase slightly in France and UK, while German approaches show no definite trend; methodological changes for estimating VoTs may have also had an important impact.

In any case, not the clear and rather strong impact income increases would have been expected to have

→ broader international comparisons might be useful and help explain if/why role of $\mathcal{E}$ would tend to decrease (consistent with « richer / more valuable use of TT in the past »?

Prospective impacts of mobility changes on CBA

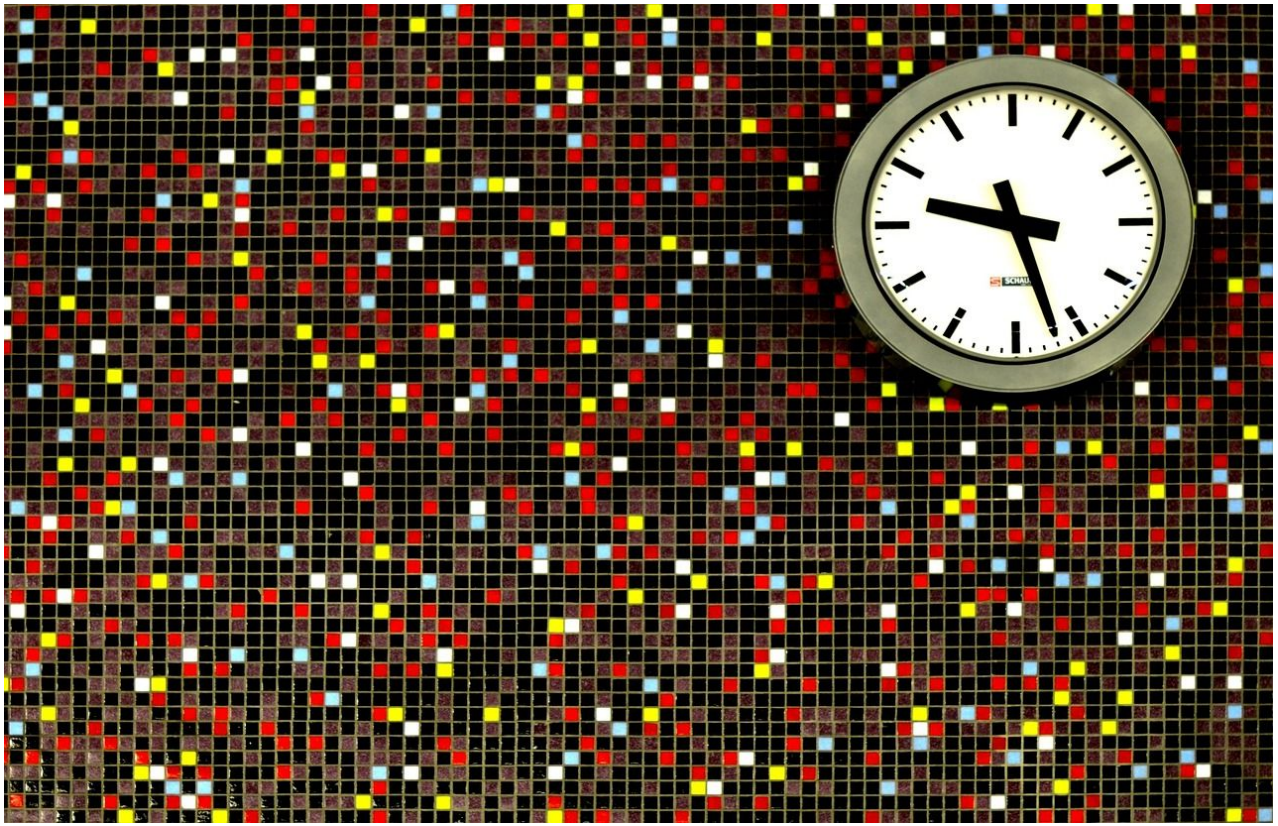
- increased differentiation of VoT ?

- types of impacts of ICT

More diversified activities during transport, due to ICT ?

- would mean higher differentiation of TT uses due to ICT

- then to an increased differentiation of VoT ?



Impacts of ICT : on what ?

- also on activities during leisure time (out of transport)
→ if similar evolutions as activities during transport, minor changes in the end for VTTS ?

- on comfort / reliability?
  - disutility of physical discomfort is not obviously linked to ICT-induced changes and, if ITCs impact, not necessarily in relation with TT (ex : transport supply integration reduces transaction costs, help better organise individual daily programme, this is not proportional to TT ; nor, for reliability, on board information on TT variation)
  - If VoT evolves sharply, does it make sense to go on relating comfort and reliability (dis)benefits proportionally to VoT ?
  - ICT applications may be less easily used when comfort/reliability levels decrease (other activities too...)

Impacts of ICT on VoT : for CBA ?

- how would VoT evolutions due to ICT be measured ? And anticipated, since CBA needs projections ?

- RP ? Needs models able to capture changes due to ICT

- SP ? Survey using an increased diversity of situations depending on ICT activities' possibilities while traveling ?
→ continuation of the traditional approach « increasing differentiation of VoT » (or parallel surplus variations estimates due to ICT activity choice)
- but anyway, how to feed the new information back into traffic models ? They would still need to evolve to capture ICT impacts

Impacts of ICT : on VoT only ?

- back to : $\Delta S = VoT \times \Delta TT$:

➢ ICT may influence both terms, directly or indirectly
→ probably , need to adapt traffic models for better TT estimates
➢→ how to capture ICT impacts on transport choices ?

- If VoT decreases : importance of costs > time in GC
→ more traffic for low speed transport ?

- Choice of transport mode / route depending on ICT possibilities ?

- Influence of routing ICT

- …

Impacts of ICT : possible evolutions of models

- models already need adaptations due to evolutions of transport supply, themselves closely linked to ICT (carsharing, easy bike rental in cities, real time scheduling of transport services,…)

- as regards use of time while traveling :
  - ➢ What of time-cost models if distribution of VoT → 0 ?
  - Refinements of usual models, whether applied trafic models / 4 step or more theoretical (recent refinements from Hensher/De Serpa with « mixed activities » : would lead to combinatory explosion of differentiated cases again

- but ICT impact is not limited to ICT induced activities while traveling during an exogenously imposed trip:
  - ➢ Ex : on-line buy at home or while traveling, then delivery at home or pick-up on route (in stations for instance)
  - ➢ In fact, ICT may impact the whole organisation of individual activities, not only how pleasantly flows time while traveling

Impacts of ICT : ABM models ?

- activity-based models are already complex, but their approach could be more adapted to representation of ICT changes

- for the moment they just seem to consider ICT changes induced on classical parameters (« what if VoT diminishes, or if speed-flow curves evolve due to ICT/ autonomous vehicles,.. ») :

- but it could be worth considering developing ABMs using a modular approach, modeling on different levels the choices of schedule for « main » activities that determine travel needs, and the choice of activities while traveling

  - Ex : on-line buy at home or while traveling, then delivery at home or pick-up on route (in stations for instance)
  - In fact, ICT may impact the whole organisation of individual activities, not only how pleasantly flows time while traveling

Conclusion

- The VoT issue remains central for CBA, although less dominant
- VoT past evolution, together with analyses of past evolution of activities while traveling, would be worth studying
- If VoT evolves sharply, disconnection from VoT of the valuation of other impacts such as comfort, reliability ?
- Ever-increasing differentiation of VoTs due to increased diversity of activities offered by ICT ?
- Need to consider ICT/VoT issue for CBA together with ICT issue for TT estimation and traffic models evolution, both because
  - $\Delta S = VoT \times \Delta TT$
  - VoT possible evolution needs adapted models to be estimated, and to be anticipated for CBA
- Evolution of models to capture both (secondary) activity choice while traveling, and main activites scheduling linked to trip/travel organisation : post-ABMs ?
- We should not forget the issue « collective versus individual VoT »

Thanks for your attention

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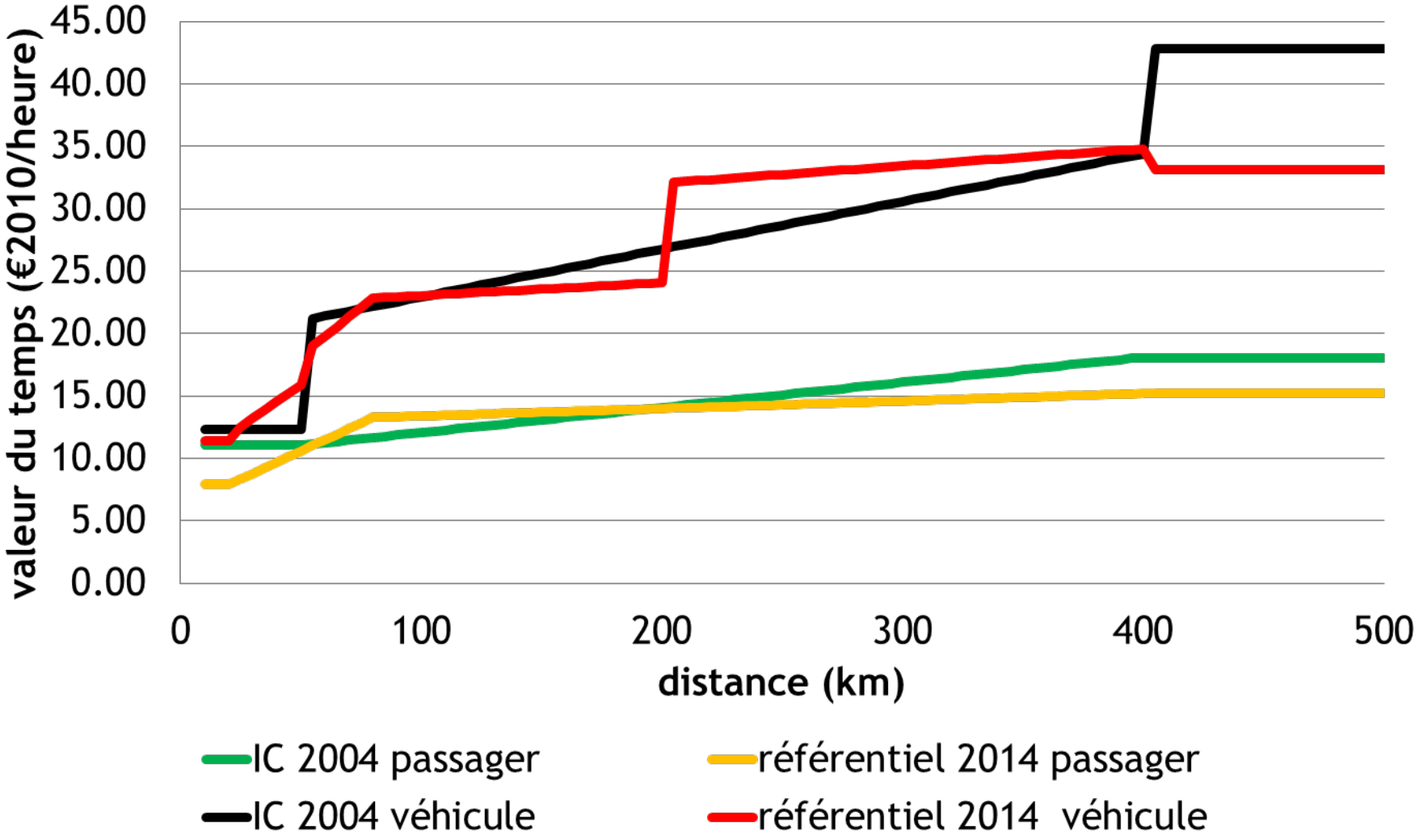
Valeur du temps par distance et taux d'occupation



Evolution des valeurs pour 2010

Trajectoires des valeurs : une illustration