



Tradable driving rights in urban areas: a relevant and realistic alternative to road pricing?

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Outline

- relevance of tradable permits in urban transport
- specifications
- tradable driving rights in urban areas
- implementation and assessment
- conclusion



Relevance of tradable permits

- what are tradable permits (TP)?
 - fixation of quantified constraints (quotas)
 - quotas (or rights) allocated or auctioned to agents
 - agents authorised to transfer them
 - penalties to ensure conformity of emissions to rights hold by the agent
- tradability guarantees minimisation of (global) abatement cost
- separation of efficiency and equity

Relevance of tradable permits (cont.)

- which nuisances and targets?
- nuisances in urban areas
 - congestion
 - local / regional pollution
- targets
 - car ownership
 - land use
 - end user vkt or trips
 - vkt according to emission category

M1 petrol vehicles	Date of application for new vehicles	HC (in CH ₄ equivalent)	NO _x (in NO ₂ equivalent)	Particulate matters
		g/km	g/km	g/km
Euro I	1993	0.97 (HC+NO _x)	0.97 (HC+NO _x)	
Euro II	1997	0.5 (HC+NO _x)	0.5 (HC+NO _x)	
Euro III	2001	0.20	0.15	
Euro IV	2006	0.10	0.08	
M1 diesel vehicles				
Euro I	1993	0.97 (HC+NO _x)	0.97 (HC+NO _x)	0.14
Euro II	1997	0.7 - 0.9 (HC+NO _x)	0.7 - 0.9 (HC+NO _x)	0.08 - 0.1
Euro III	2001	0.56 (HC+NO _x)	0.56 (HC+NO _x)	0.05
Euro IV	2006	0.30 (HC+NO _x)	0.30 (HC+NO _x)	0.025

Source: Hugrel and Joumard 2006

Table 1: European road vehicle emissions standards

Relevance of tradable permits (cont.)

- Appropriateness to nuisances in urban areas

<i>Targets</i>	Car ownership	Land use	End user VKTs or trips	VKTs adjusted according to emission category
<i>Nuisances</i>				
Congestion	x	xx	xxx	xxx
Local / regional pollution	x	xx	xx	xxx

Specifications

- available technology: ERP (Electronic Road Pricing)
 - on-board unit
 - dialogue with roadside readers (DSRC) on gantries
 - video enforcement system
 - debit "on the fly" of a smartcard: issue of privacy solved
 - in operation in Singapore since 1998
- GPS-based toll collection currently not suitable

Specifications (cont.)

- unit to be traded: driving rights (DR), based on time/place and level of emissions
- entities liable to return rights?
- which allocation: free or not?
- to whom: vehicle owners or inhabitants?
- period of validity of rights?
- which transaction mechanism?
- privacy and "border effects" issues

TDR for urban areas

- DR = "trip" or distance + weighting / congestion and emissions

M1 petrol car	Euro I	10	Zone with low population density	1
	Euro II	5	Zone with high population density	2
	Euro III	2		
	Euro IV	1	Off-peak period	1
VP Diesel M1	Euro I	10	Peak period	2
	Euro II	9		
	Euro III	5		
	Euro IV	3		

TDR for urban areas (cont.)

- global free quota allocation = f(current total of trips)
- rights distributed free of charge equally between all the inhabitants
 - obvious incentive to carpooling
- global quota of free distribution should evolve depending on the transport policy
- other rights sold by the agency: for motorists living outside the agglomeration, business users

TDR for urban areas (cont.)

- "market" and trading
 - avoid totally free market?
 - rights sold or bought back at the same price fixed by the agency but individual balance should never be negative
 - direct transfer possible between holders, joint account in families
- period of validity
 - allocation on a weekly basis?
 - valid one year for use? could be bought back at any time?

TDR for urban areas (cont.)

- other "marketing" aspects:
 - electronic OBU provided free of charge
 - identifies type of vehicle + its Euro class
 - maximum daily number of DRs debited to be set
- coping with occasional users
 - malfunctions, violations or non OBU-equipped vehicles: video enforcement system
 - post-driving charging and payment (Internet, etc.)
 - incentive to be equipped: regular fee = maximum daily number of DRs debited (see above)

Example of implementation

- Lyon area (1,200,000 inhab.), typical European urban form
- simplified implementation of DRs:
 - DR = one "trip", e.g. one hour after vehicle detection
 - during congestion period: ex 6h-19h Mon-Fri
- free allocation of DRs to inhabitants of the regulated zone (where DRs must be returned)
 - Lyon-Villeurbanne or Greater Lyon

Example of implementation (cont.)

- starting with allocation of say 3 DRs per day

Workers	%	Number of car trips (driver or passenger)
Low income	24.2	2.62
Medium income	34.7	2.93
High income	41.1	3.33
Total	100%	3.02

Daily average number of trips by car for workers
according to income class

Source: Household Travel Survey, Lyon (1995)

Assessment

- 1995: 2.6 million car trips, 8% by people living outside the area
- compared to a conventional road-pricing scheme on the area of Greater Lyon (€3 per day), reduction by 5% of car trips: revenues of €370 million / year
- TDR: if free allocation to GL inhabitants, €342 million distributed/exchanged among inhabitants, €28 million revenues (external passenger traffic)

Conclusion

- "capping" mechanism: limitation of congestion or pollution
- technically feasible and affordable
- free allocation of driving rights: acceptability, advantage over conventional road pricing...
- but loss of *potential* revenue for the local government: the "price to be paid" for effective implementation of traffic limitation