CONGESTION AND SLOT ASSIGNMENT IN THE RAIL INDUSTRY

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I. DESIGNING PRICE SIGNALS

Why do price signals matter?

1. *Allocative efficiency*

   Static: Guide slot allocation towards best usage

   - across lines of business
     - long-distance passengers, commuters, freight
     - but also maintenance!
     - no usage at all (WTP < MC)
   - among operators.

If congestion: relevant "marginal cost" = WTP of displaced service.

[Complex auctions: see Jan-Eric Nilsson's work.

Digression: the history of short-term power markets.]

Dynamic allocative efficiency: guide investments.

[Example: Future implementation of European Rail Traffic Management System (ERTMS 2) to increase slot capacity. Proper pricing of slots will encourage implementation.]

2. *Revenue adequacy*

Ramsey-Boiteux: full or partial coverage of infrastructure global cost.

- Markups related to (inverse) elasticities, like any private price structure.

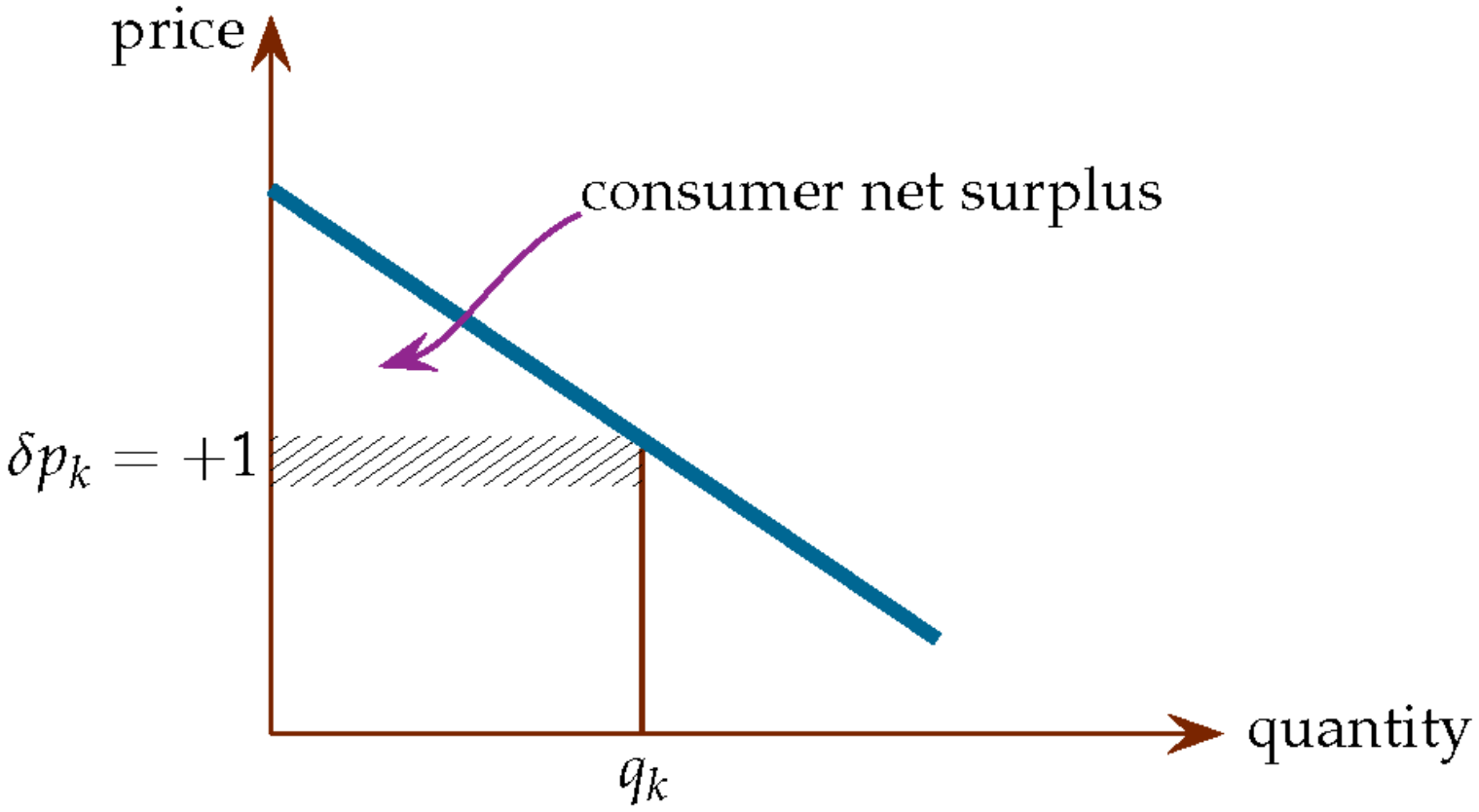
  [Ramsey-Boiteux always applies- e.g. non-linear pricing, intertemporal pricing, etc., although sometimes in more subtle forms than commonly understood.]
- Decentralization: price cap.

- Implementation: price cap

$$\Sigma_k w_k p_k \leq \bar{P}$$

where weights should be close to expected quantities.

Interpretation as an externality payment: $w_k = \bar{q}_k$.



- Practical issues about price caps.
- Concerns about Ramsey pricing:
  - redistributive concerns

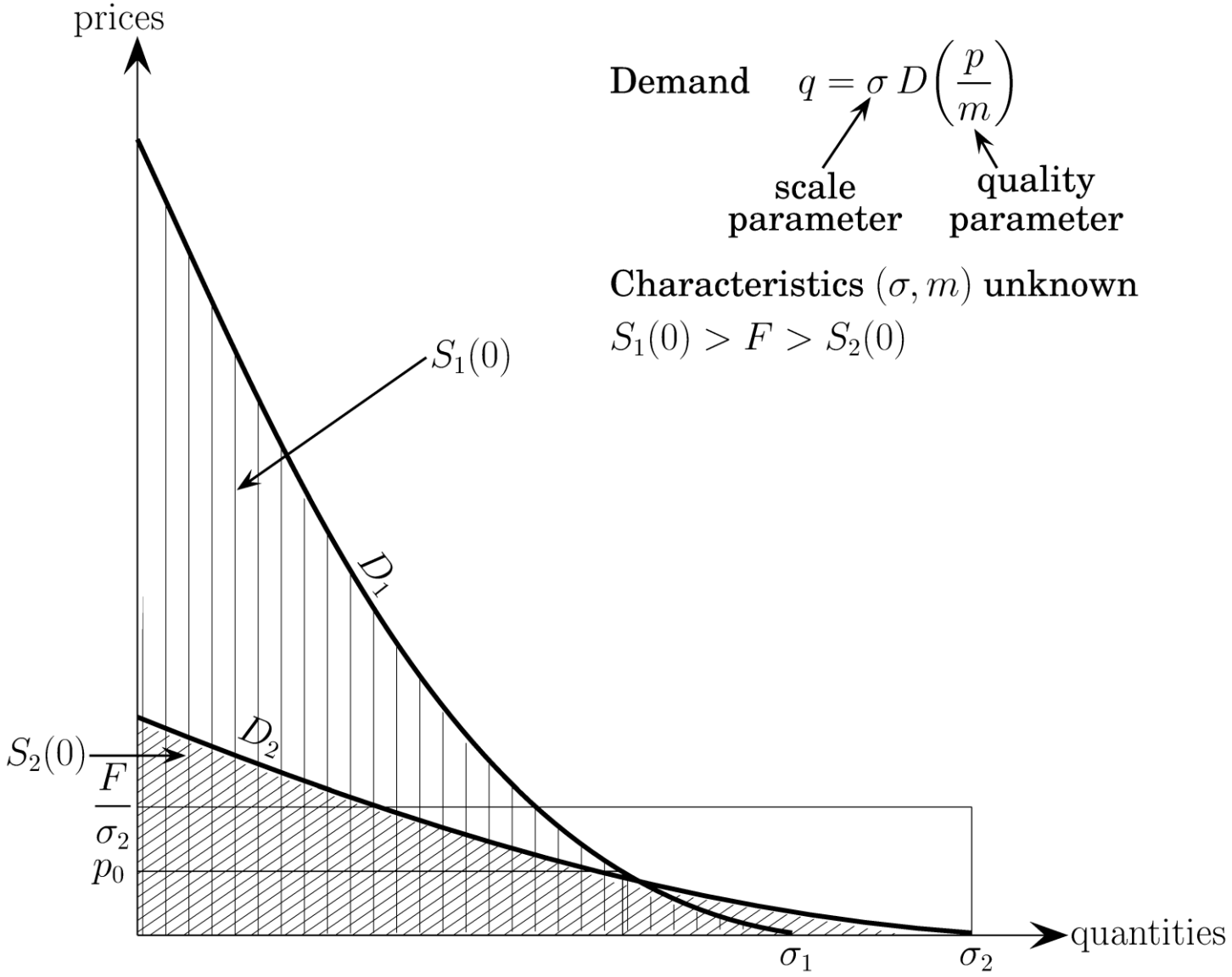
    [examples: no bypass opportunity; monthly subscriber fees. Universal service obligations.] Regional planning: should be covered by explicit public subsidy.
  - downstream market power: more on this shortly
  - upstream market power: takings

    [non-discrimination rules]
  - potential benefits of budget compartmentalization.

3. *Viability test*

   [starting with Adam Smith]

   Full-cost coverage at level of a line guarantees its viability if demand function (social surplus created by the line) unknown.



[Modeling: Weyl-Tirole, *Quarterly Journal of Economics* 2012]

II. FRANCE: A VERY LONG WAY TO GO…

1991-2019: Still little visibility as to long-term evolution:

1. *Staggers-Act-like efficiency improvements unlikely*

   Besides technical constraints (lack of height for double stacks for freight),

   - need nimble companies, with fewer constraints on management
   - new jobs should be under ordinary employment contracts and be subject to firm-level agreements

   [current project: derogatory employment contract plus industry-level agreement].

2. *Price signals are often missing*

   Examples: late release of slots for maintenance, no secondary market for slots (should have one even if primary market slots are free); foregone usage's WTP if congestion …

3. *France has halted in midstream, with drawbacks of both monopoly and competition*

Inglorious 1997 law

- No competition in maintenance
- France has slowly and incompletely transferred infrastructure services from RO to infrastructure owner
  - maintenance
  - train schedulers and dispatchers.

- Price structure: linear pricing vs. two-part tariffs

  [1997-8 discussion resurfaces today for high-speed trains]

Simple-minded Ramsey-Boiteux model:

- q = number of trains or of passengers (depending on application)
- $c = c^u + c^d$ marginal cost on a line

  [u= upstream, d=downstream]
- λ= shadow cost of revenue

  [budget balance constraint or, if subsidies, shadow cost of public funds]
- η= elasticity of demand

Ramsey-Boiteux: $$\frac{p^* - c}{p^*} = \frac{\lambda}{1+\lambda}\frac{1}{\eta}$$

Implications for pricing of access by infrastructure owner

a) Perfect competition downstream. Linear pricing of access:

$$p^* = a^* + c^d \implies a^* > c^u$$

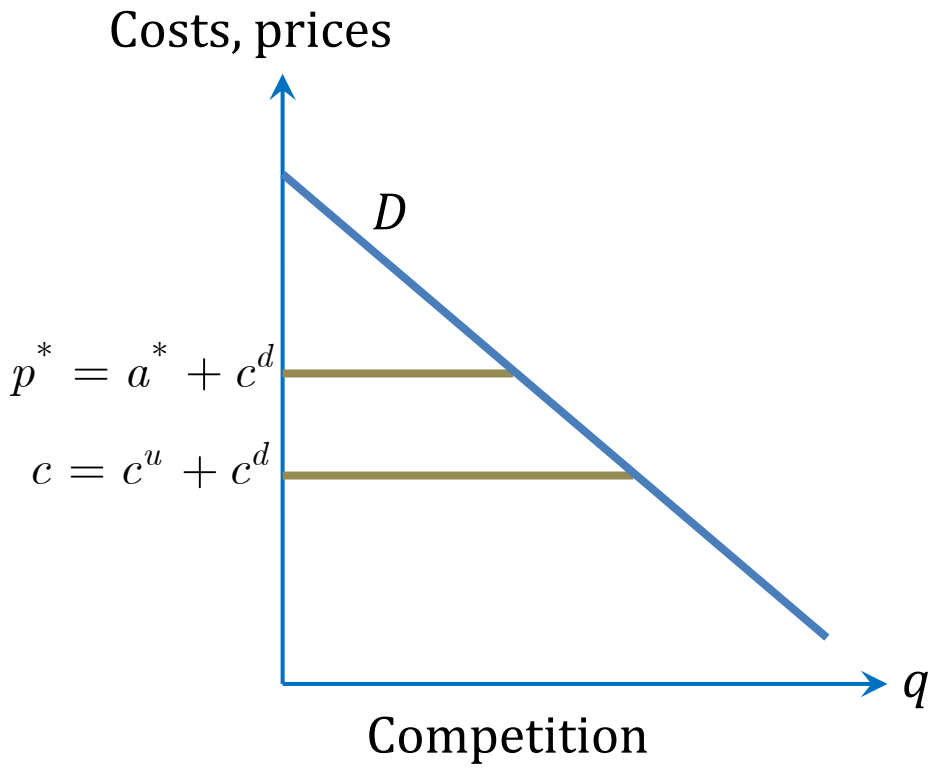
[levy Ramsey markup at upstream level]

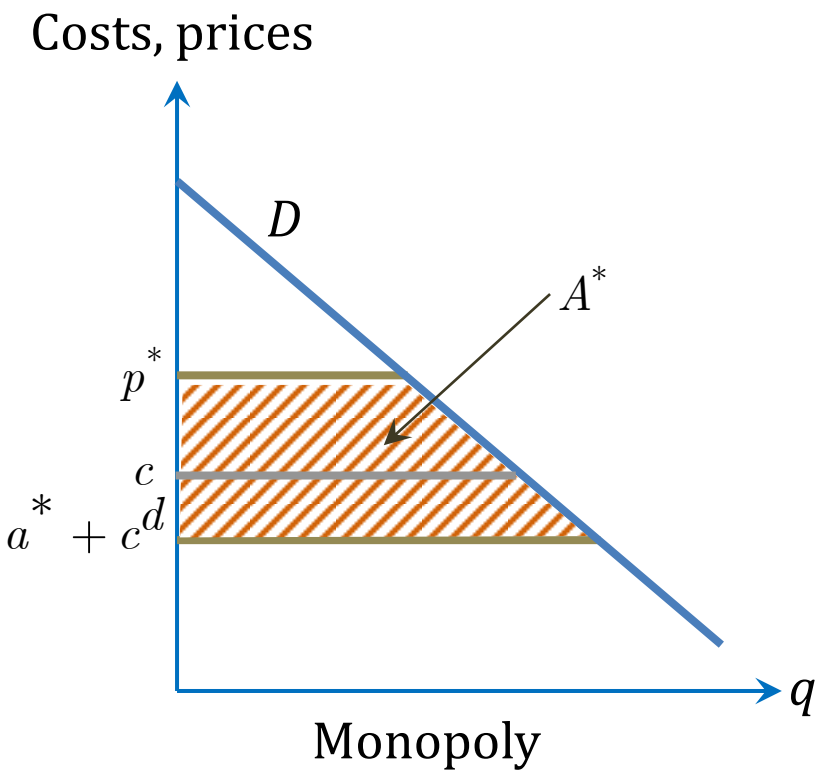
b) Monopoly downstream: Two-part tariff: $A^* + a^* q$ (lump-sum payment A^* paid by R0 to infrastructure owner)

Goals: $p^m(a^*) = p^* \Rightarrow a^* < c^u$

A^* captures monopoly profit

Equivalent here





Worse-case scenario: monopoly and linear pricing!

[Ivaldi-Pouyet on French context.]

- Makes sense to have
  - linear pricing when competition in the market

    [high speed trains, LD passengers, freight]
  - two-part pricing for concessions/contracts

    [commuter trains; competition for the market in above services]

  Still issue of level-playing field when congestion….

- Choice affects bargaining power?

  [RO always gains when A ↘ ; a ↘ also benefits entrants]

4. *International price signals*

   Cournot n^{th} marginalization: need for European-level agreements

   [Analogy: IP]

5. *De facto grandfathering of slots*

6. *Final blow: Even well-designed price signals are bound to be ineffective*

Communicating vessels: In the end overall negotiation infrastructure owner-operator-government

$\Rightarrow$ individual price signals are irrelevant

[taking from Peter in order to give to Paul.]

III. PREREQUISITES FOR ENHANCED EFFICIENCY

- Need strong regulators
  - national authorities
  - European level ("Railroad Union" at last?)

- Restore incentives.

  [X-inefficiency. Example: limited use of automatic coupler in Europe; instead: unsafe, slow and potentially buffer-locking chain coupler]

- Make allocation of slots flexible
  - allocate to highest WTP
  - no grandfathering.

- Standards: in theory (although apparently not in practice) easier in regulated environment

  [lots of interfaces between rolling stock/on board and infrastructures.]

- Antitrust.

  [Capacity release; ERTMS 1 on interoperability; …]

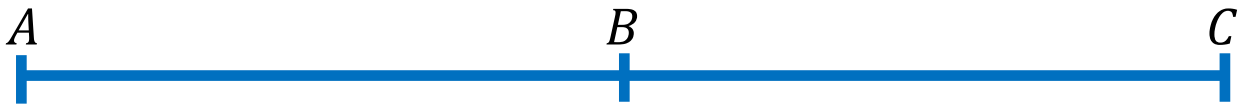
- Incentivized infrastructure owner in charge of all relevant infrastructure

  [including train stations- two-sided markets BTW. France: infrastructure owner not yet in charge of passenger information, stations' track capacity management, non-platform estate.]

Rethinking access charges

- Reservation/usage;
- Charge maintenance for slots; use-it-or-lose-it and penalties for non-timely release of slots for maintenance.
- Improve measurement of, and accountability for externalities (proper charges for induced delays, …).

- Elasticity-based access pricing (Ramsey-Boiteux)



Strong intermodal competition on AC (airplane), little on AB. Would mandate

$$(a_{AB} - c^u_{AB}) / a_{AB} > (a_{AC} - c^u_{AC}) / a_{AC}$$

i.e., a non-additive price structure

[if additive, must price a^u_{AB} too low to let *AC* survive.]

- Infrastructure does not know demand on segment.

Revenue-based pricing (analog of an excise tax) to try to capture profit/avoid abandonnent of a low-demand segment; drawback: extra marginalization.

- Find ways of simplifying combinatorial auctions without engaging too much in command-and-control/second guessing of demand for packages.

IV. WHAT SCOPE FOR ENTRY?

Long-distance passenger trains: a bit of competition *in* the market

Can't expect as much competition in the market as in some other deregulated network industries:

- Business travellers' demand for frequency

  [experience with airlines]

- Entry is costly (rolling stock and gighly risky (not much growth in demand)

  [Standard enforcement would reduce entry costs.]

- Problems with complementary segments

[Cherbonnier-van der Straeten: competition on AB, monopoly on BC. Treatment of schedule coordination and management of delays for AC/CA segment.]

- Low-cost
- Cabotage
  - [open access mandated by 2007 third railway package for 2010 on; not yet a reality.]
- Virtual operators
  - [similar to EdF capacity auctions; but see also pricing of access to local loop; telecom virtual operators; …]

Local services

Contracts: competition *for* the market

Freight

Has virtually disappeared in France in last 30 years(but not elsewhere: Germany, US, …).

Need better efficiency and access to slots.

THANK YOU VERY MUCH