Funding USO and Optimal Worksharing Discounts

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Background

- 9 years of collaboration with H Cremer (IDEI, Toulouse) and F Rodríguez and P Dudley (Royal Mail, UK).
- 14 scientific papers, including 10 published in the yearly book edited by M Crew and P Kleindorfer.
- Most papers share the same approach (theoretical model first solved analytically, then calibrated and simulated), but with different themes:
  - 2007-: Vertical disintegration of incumbent and VAT status.
Methodology (1): Building a theoretical model

The model is a stylized representation of the postal sector in Europe, with following building blocks:

- Postal products offered: single-piece mail and bulk mail (also: parcels);
- Operators: Incumbent, entrants;
- Delivery areas: Urban (high density), Rural (low density), with different delivery costs;
- Senders and recipients: Firms and Households, with demands differing in size and in sensitivity to price;
- Consumer surplus (household senders) and profit functions (firm senders), which give rise to demand functions;
Objectives of operators: maximize profit or welfare;

Regulatory constraints:

– none on entrants;
– obligation to serve all markets at a uniform price that is “affordable” for incumbent (hence Universal Service Provider, USP);

Cost assumptions: variable costs for entrants and USP plus fixed cost for USP because of USO ($\Rightarrow$ increasing returns to scale for USP).

Remark: we do not model quality (taken as exogenous; e.g. delivery frequency)
Methodology (2)

- We first develop the theoretical model and solve it analytically.
- We obtain “first-order conditions”, i.e., optimal pricing formulas or rules.
- Example:

\[a_i^E = d_j^I + (p - c^I - d_{ij}^I) \sigma_j^{IE} + (a_j^D - d_j^I) \sigma_j^{DE} \frac{1 + \lambda - \omega_j}{1 + \lambda} \left| \frac{a_j^E}{\varepsilon_j^E} \right|, \ j = U, R.\]

- These do not give us directly information about levels, especially volumes and WELFARE.
- Society’s total welfare is (unweighted) sum of consumer surplus and operators’ profits.
• We then calibrate the model to be representative of European postal market.

• Crucial assumption in calibration: degree of substitution between goods offered by USP and by entrant.

• We then proceed to numerical simulations of different scenarios.

• We also provide sensitivity analysis (what if USP costs were larger, products closer, etc.)
I concentrate on two questions, using two papers:


1. Funding USO in a liberalized environment

- Two kinds of operators: incumbent and entrants.
- Each operator offers a single good: average mail.
- Eight different sub-markets: (2 types of senders) X (2 types of recipients) X (2 delivery areas).
- USO: uniform pricing by incumbent (USP), entrants can post 8 different prices.
- We start from monopoly situation where the USP maximizes welfare subject to breaking even.
- We then open the market to competition, with entry in all markets (because no entrant’s fixed cost) and profit-maximizing entrants.
Full competition - USP price at monopoly level

- Entrants make profit, all customers surplus increase, but especially firm senders (because larger volume and more elastic demand).
- USP makes a loss. This loss is called COMUSOUL: Cost Of continuing to Meet the USO Under Liberalization.
- In other terms: Difference in profitability levels between liberalization and monopoly when USO are unchanged.
- Total welfare increases: gain by customers and entrants larger than loss by USP.
Two ways to finance COMUSOUL:

- Compensation fund.
- Reserved area (i.e., partial liberalization).

**Compensation fund financed by tax on entrants.**

- No tax studied \((t \leq 0.1\text{€})\) generates enough proceeds to fund USP loss when USP price kept at monopoly level.

- Only full pricing flexibility + compensation fund allow the USP to break-even. In that case, total welfare increases (compared to monopoly case) because entrants’s profits are larger than loss in consumer surplus.

  ⇒ Both types of consumers (but especially households) lose surplus with liberalization!
Reserved area:

- We assume that the same proportion $r$ of all 8 submarkets constitutes a reserved area.

- USP freely chooses its uniform price so that the profit made in the reserved areas exactly balances its loss in non-reserved areas.

- We choose the proportion $r$ that maximizes welfare.

- Trade-off: large $r$ means little liberalization, but also small USP loss to fund on (large) reserved area.

- As an extension, we allow the USP to increase its uniform price only in reserved areas.
Results:

- Total welfare is slightly larger than monopoly case, but consumer welfare always lower (same as for compensation funds).

- Better to allow USP to increase its price in reserved area only (Intuition: easier to raise profit there ⇒ allows for lower average price).

- Better still to combine reserved area with compensation fund. Total welfare larger, but household senders always lose compared to monopoly (firm senders may benefit).
Main results: household senders always suffer from opening to competition.

Intuition: Competition prevents incumbent from exploiting returns-to-scale.

Critique: model light on advantages of competition

- Quid if entrants were to offer goods that were more differentiated? We assume displacement ratio of 0.75: out of every 4 items sold by entrants, 3 are displaced from USP and 1 is new volume.

- Quid if USP’s marginal costs were to decrease following opening to competition? We look at how much these costs should decrease to 1) fully compensate USP; 2) for consumers a whole to gain with optimal reserved area.
2. Access pricing

- The postal sector has 3 main characteristics:
  - Imposition of USOs on incumbent but not on entrants;
  - Ability of entrants to bypass the incumbent’s delivery network (the bottleneck);
  - Provision of access to both competitors and customers.
Questions asked:

- How should access be priced in competitive environments?
- What are the ingredients in its pricing (beyond marginal delivery costs)?
- Should the access prices be the same for competitors and for customers?
- What is the impact of offering access in competitive market?
Model

- Operators: USP and entrants.
- Two delivery areas: urban and rural, with different delivery costs.
- Two segments in postal activity: upstream (collection, transport, sorting) and downstream (delivery).
- Both USP and entrants sell end-to-end product: “average” mail.
- Large customers can also use third possibility: bear preparation cost for upstream activity and pay for access to USP delivery network: Customer Direct Access (CDA), modelled as third good.
- The entrants can also choose whether to access USP delivery network or to bypass.
Choices:

- USP sets final price for E2E product + access charges for entrants and for customers, in order to maximize welfare subject to break even.

- Entrants choose to access or bypass by comparing access charge and own delivery costs. Competitive fringe.

- Representative customer chooses how much of the three goods to buy (USP E2E, entrant’s E2E, CDA).

- USP has fixed cost $F$, entrants only have variable costs.
Analytical results: access pricing formulas

- Optimal access charge maximizes total welfare subject to USP breaking even.

- They are obtained as the sum of 3 components:
  - USP delivery cost;
  - Displacement term, measuring how much E2E demand the USP loses when one unit of access is provided;
  - Ramsey term: mark-up (in order to fund fixed cost $F$), that is inversely proportional to the elasticity of demand.
Comments

- Only first two components if no fixed cost.
- Displacement term perfectly compensates the USP for any E2E business lost $\Rightarrow$ the USP has no incentive in preventing/degrading access.
- Optimal entrant’s and CDA access charges need not be equal even with same delivery cost and no Ramsey term!
- With optimal access charge above USP delivery cost, we may have inefficient bypass by entrants and by large customers.
Numerical results: welfare levels

We need numerical simulations to assess

• which access/bypass regime will occur in each delivery area;
• the consequences on volumes and welfare levels.

We study three scenarios:

• (1) No bypass available - No CDA
• (2) No bypass available - CDA
• (3) Bypass available - CDA
Results

(1) USP delivers more mail than under monopoly

• ⇒ lower average cost

• ⇒ lower prices and more choice for customers

• ⇒ everybody gains, larger welfare than pre-liberalization

(2) Same effects than (1)

• **Remark 1**: Even rural consumers who do not buy CDA benefit from its introduction because it allows to decrease USP prices.

• **Remark 2**: CDA access charge larger than entrant’s access charge because demand elasticities and displacement ratios are different.
(3) Urban bypass, because optimal access charge larger than entrant’s delivery cost.

- USP loses delivery volume and increases prices.
- Urban consumers benefit from lower entrant’s prices but lose more surplus because of higher USP E2E and CDA prices.
- Rural consumers lose surplus because of higher prices.
Same conclusion as previous paper: consumer welfare lower than before liberalization.

- **Main drivers here**: inefficient entry coupled with loss of returns to scale for USP.

- **Remark**: results are not very different if USP minimizes E2E price rather than maximize welfare. Minimum E2E price is larger than pre-liberalization!
Conclusion

Welfare impact of liberalization quite mixed:

- Offering competitors and customers access to USP delivery network increases welfare;

- allowing for bypass decreases welfare and may even prevent the USP from breaking even;

- Potential need for mechanisms like compensation funds and reserved area.

Begs the question: Would US model be better than European model?
Liberalization fares better if

- New products are very differentiated from USP products;
- Competition leads to a more efficient USP;
- Regulation is optimal (e.g. global price caps).

Essentially empirical questions, and the jury is still out...