Funding USO and Optimal Worksharing Discounts

Philippe De Donder

IDEI, Toulouse School of Economics

and

Yale University

Background

- 9 years of collaboration with H Cremer (IDEI, Toulouse) and F Rodriguez 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:

  - 1999-2001: Funding Universal Service Obligations (USO) in a liberalized environment.
  - 2002-2004: Access pricing.
  - 2005-2006: Price controls.
  - 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:

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

- 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.

4

- 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:

- "Funding the USO under Liberalisation: An Analysis of the Postal Market", (with H Cremer and F Rodriguez) in Postal and Delivery Services: Pricing, Productivity, Regulation and Strategy, edited by M. Crew and P. Kleindorfer, Kluwer Academic Publishers, Boston, 2002, 31-53

- "Access pricing in the Postal Sector: Theory and Simulations", Review of Industrial Organization, 2006, 28:307-326.

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 ($t \leq 0.1$€) 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.

$\Rightarrow$ Both types of consumers (but especially households) lose surplus with liberalization!

9

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 $\Rightarrow$ 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

- $\Rightarrow$ lower average cost

- $\Rightarrow$ lower prices and more choice for customers

- $\Rightarrow$ 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...