Toulouse School of Economics

Foreclosing Competition through Access Charges and Price Discrimination

Ángel L. López, IESE (SP-SP)
Patrick Rey, Toulouse School of Economics

Producers and distributors: can regulation of retail help for better regulation of the Internet

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Outline of presentation

- Background and motivation
- Framework
- Asymmetric competition with on-net pricing
- Impact of the termination charge
- Policy implications

Background and motivation

- **Cooperation or competition?**
  - Interoperability requires cooperation
    - standards, protocols (QoS)
    - interconnection agreements
  - … between competitors
    - “cooperation” may prevail over “competition”
    - lack of cooperation from incumbents may hurt new entrants

  → analyze impact of interconnection prices on retail competition

Background and motivation

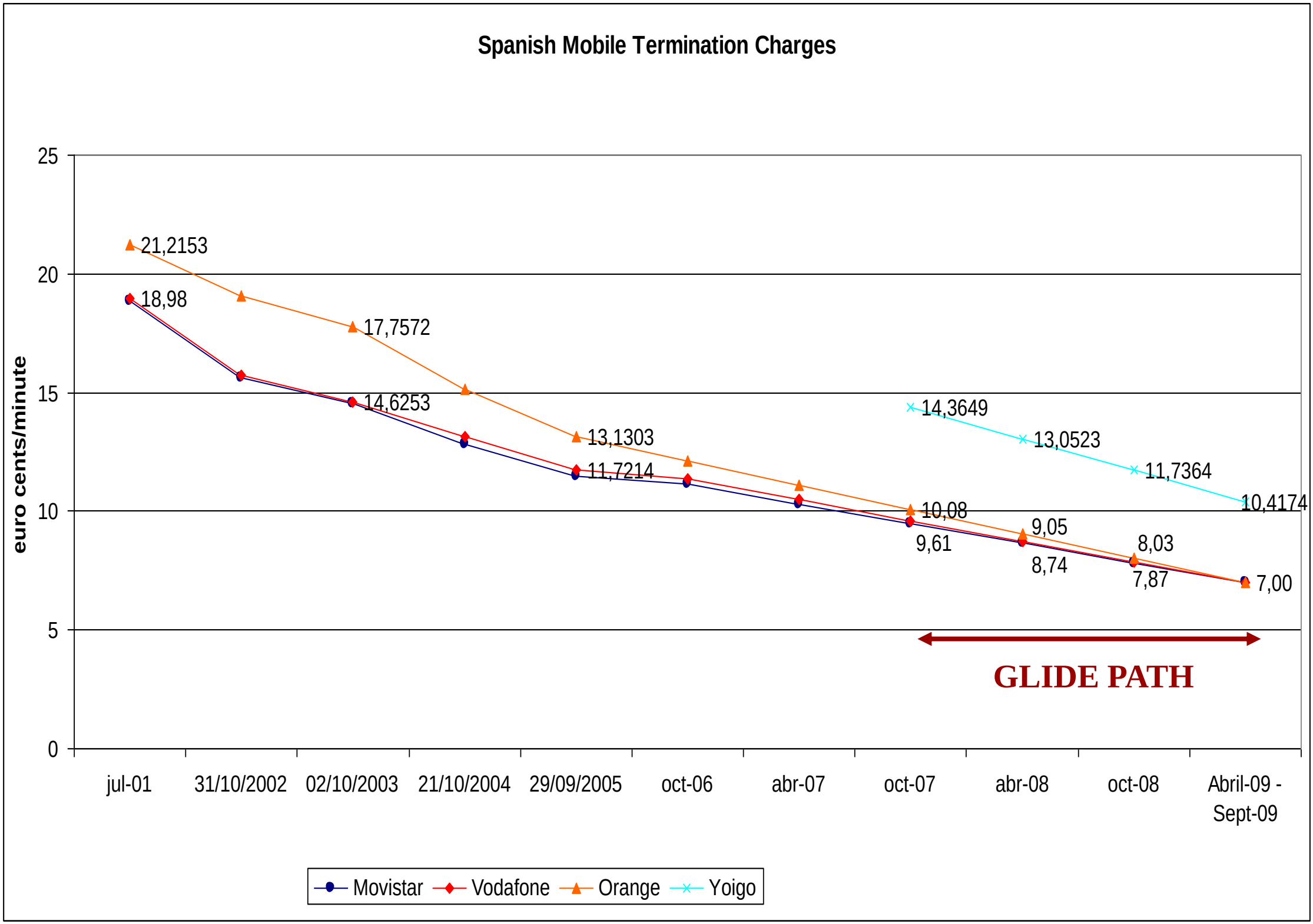
- **Termination charge and entry**
  - Supply side: scale economies
    - Smaller operators face higher long-run incremental costs
    - European regulators have relied on this argument to justify the adoption of asymmetric termination rates
  - Demand side: network effects (*this paper*)
    - Termination-based price discrimination (on-net pricing) generates club effects
    - If the access charge is above cost

      → lower prices for on-net calls

      → customers favour larger networks

Background and motivation

- **European regulators have also relied on this demand-side argument to call for asymmetric termination charges**
  - French regulator (ARCEP) stressed in an Oct. 07 decision the presence of network effects due to the off-net/on-net tariff differentials that impede smaller networks' ability to compete effectively
  - Spanish regulator (IMT) argued in a Sept. 2006 decision that network effects can place smaller networks at a disadvantage, and that higher access charges can increase the size of such network effects
  - Common Position adopted on February 2008 by the European regulators (ERG): because of network effects, "an on-net/off-net retail price differential, together with significantly above-cost mobile termination rates, can, in certain circumstances, tone down competition to the benefit of larger networks"


Spanish Mobile Termination Charges
euro cents/minute
25
20
15
10
5
0
21,2153
18,98
17,7572
14,6253
13,1303
11,7214
14,3649
13,0523
11,7364
10,4174
10,08
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Abril-09 - Sept-09
Movistar
Vodafone
Orange
Yoigo

What we do

- **To study this concern, we study competition between two asymmetric networks in the presence of switching costs**
  - When switching costs are not ‘too large’, departing from cost-based termination charges can help the incumbent maintain its monopoly position and increase its profit
  - Qualified support for a cap on termination charge and/or a ban on on-net pricing

Insights

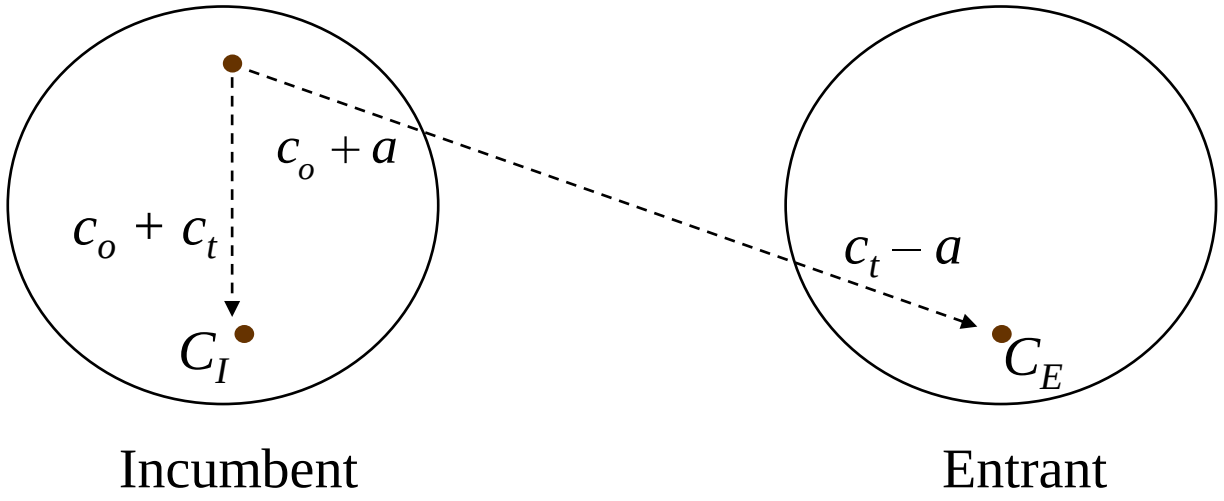
- **On-net pricing and *customer inertia* favourable to the incumbent**
  - By insisting on the highest possible (reciprocal) access markup, incumbent can foreclose the market and exploit fully the resulting monopoly power
  - A large termination subsidy could also yield the same outcome; however subsidies may be limited by feasibility constraints and arbitrage
- **On-net pricing and *customer activism* favourable to the entrant**
  - While the incumbent may still try to prevent entry, too high an access charge would allow the entrant to overtake the incumbent
  - The incumbent may then prefer to set an above- or below-cost access charge, and foreclosure strategies are profitable only when switching costs are sufficiently large
- **In the absence of on-net pricing, foreclosure strategies are not profitable – and moreover no longer feasible in a receiver pays regime**

Framework

- **Two asymmetric networks**
  - Incumbent *I*
  - Entrant *E*
- **Demand side**
  - Customers initially attached to *I*
  - Incur switching cost *s* if moving to *E*
  - Substitutable services with Hotelling-type differentiation
    networks located at the two ends of segment, “transportation” cost t>0
  - Full participation: u(0) >> t

Framework

- **Supply side**
  - Total cost: $c = c_o + c_t$
    - on-net cost: c
    - off-net cost: $c = c_o + a = c + m$, where $m = (a - c_t)$



Framework

- **Competition**
  - Each network *i=I,E* offers a three-part tariff:

$$T_i(q,\hat{q}) = F_i + p_i q + \hat{p}_i \hat{q}$$

  - Assuming a *balanced calling pattern*, net surplus is

$$w_i = \alpha_i v(p_i) + \alpha_j v(\hat{p}_i) - F_i$$

  - where α_i denotes the market share and $v(p) \equiv \max_q u(q) - pq$

Preliminary analysis

- **Marginal cost pricing**
  - Network *i*'s profit is

$$\pi_i \equiv \alpha_i [\alpha_i (p_i - c) q(p_i) + \alpha_j (\hat{p}_i - c - m) q(\hat{p}_i) + F_i - f] + \alpha_j q(\hat{p}_j) \alpha_i m$$

  - Optimizing w.r.t. usage prices, adjusting subscription fees to keep consumer surplus (and thus market shares) constant

$$\rightarrow \quad \max \quad \alpha_i [(p_i - c) q(p_i) + v(p_i)] + \alpha_j [(\hat{p}_i - c - m) q(\hat{p}_i) + v(\hat{p}_i)] - w_i - f$$

$\rightarrow$ prices reflect "perceived" marginal cost: $p_i = c, \quad \hat{p}_i = c_0 + a = c + m$

Preliminary analysis

- **Coordination in consumer responses**
  - If consumers anticipate market shares $\bar{\alpha}_I, \bar{\alpha}_E = 1 - \bar{\alpha}_I$, they expect a net surplus

$$w_i = \bar{\alpha}_i v(c) + \bar{\alpha}_j v(c+m) - F_i$$

  - The actual consumer response is then

$$\hat{\alpha}_i(\bar{\alpha}_i) = \frac{1}{2} + \frac{1}{2t}\left(w_i - w_j + \delta_i s\right)$$

$$= \frac{1}{2} + \frac{1}{2t}\left(F_j - F_i + \delta_i s\right) + \frac{1}{t}\left(\bar{\alpha}_i - \frac{1}{2}\right)\left(v(c) - v(c+m)\right)$$

Preliminary analysis

- **Possible outcomes**
  - Any fixed point $\overline{\alpha}_i = \hat{\alpha}_i(\overline{\alpha}_i)$ that lies in (0,1) constitutes a consumer response where the networks share the market:

$$\alpha_I = 1 - \alpha_E = \frac{1}{2} + \frac{F_E - F_I + s}{2\tau(m)}$$

    where $\tau(m) \equiv t - (v(c) - v(c+m))$

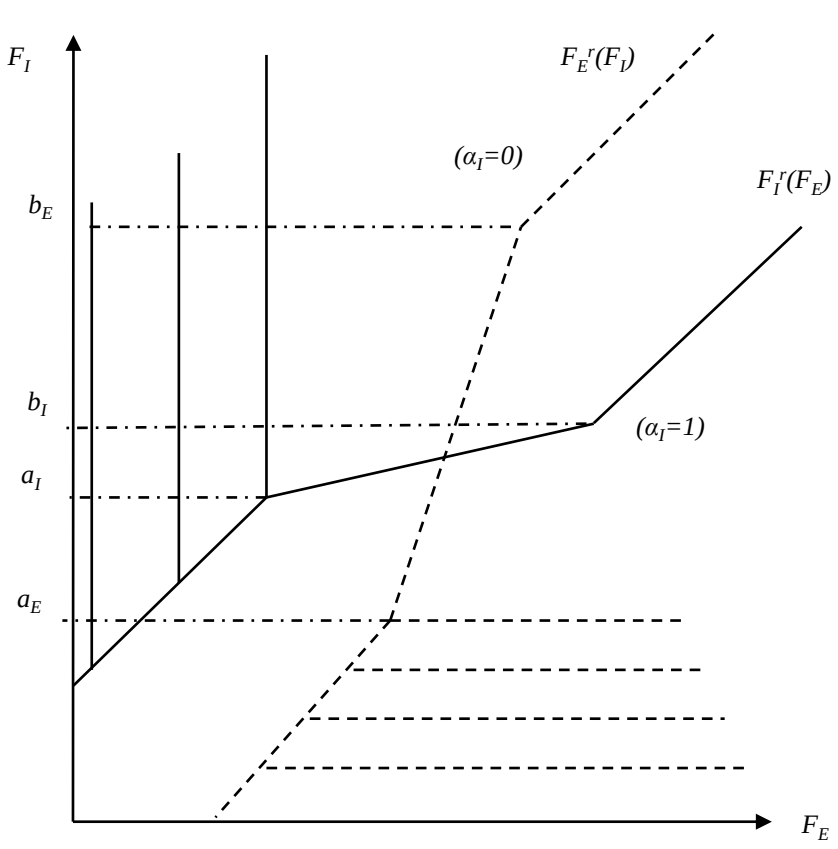
  - Similarly, there exists a continuation equilibrium where network *i* corners the market if $\hat{\alpha}_i(1) \geq 1$ (or $\hat{\alpha}_j(0) \leq 0$)
  - Unique stable response if $\tau(m)>0$, otherwise two stable responses, where either network corners the market

Retail price competition

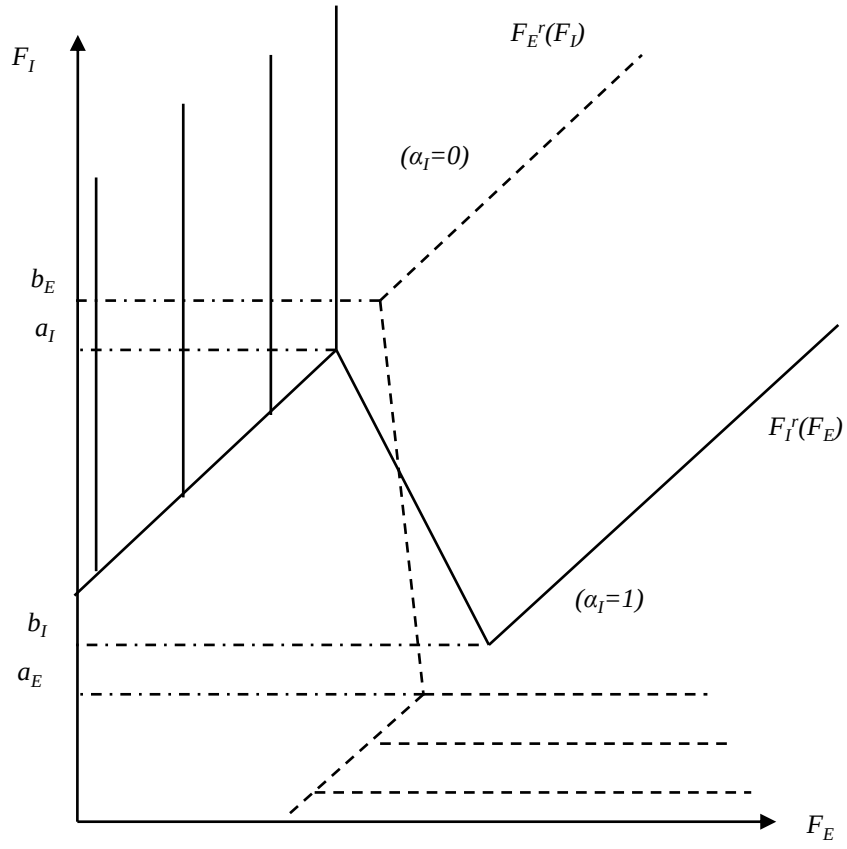
- **Termination markups and on-net pricing create problems**
  - Multiple consumer responses to given prices
    - Stable / unstable responses
    - Customer inertia / activism
  - Strategic complementarity / substitutability *(m<<0*)
  - Concavity issues
    - Determines nature of response / deviations
    - Generates cornered-market equilibria
  - Multiple equilibria (weakly dominated strategies)

→ complete (painful?) characterization of all possible retail equilibria

Possible equilibrium configurations

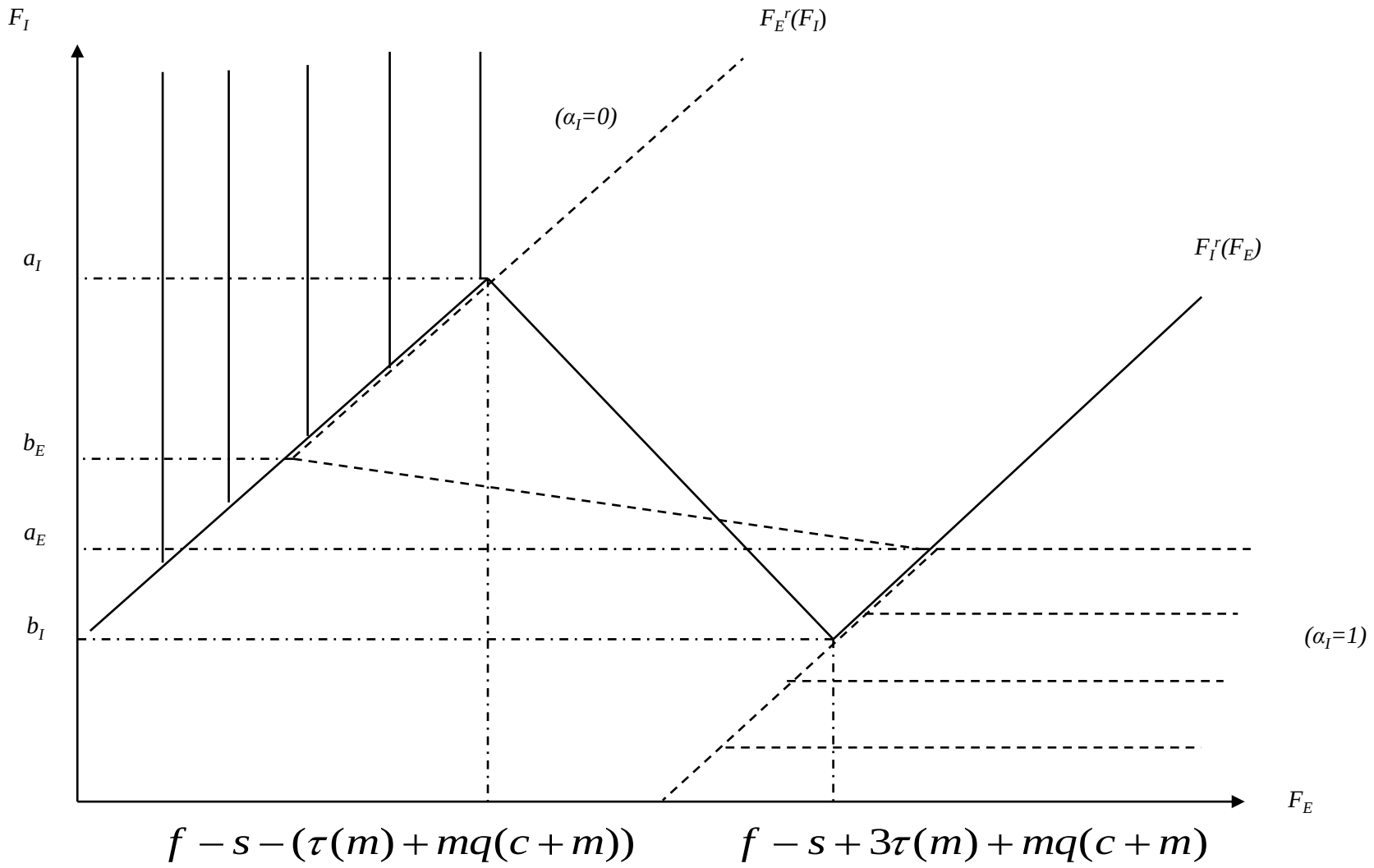


A. Strategic complements

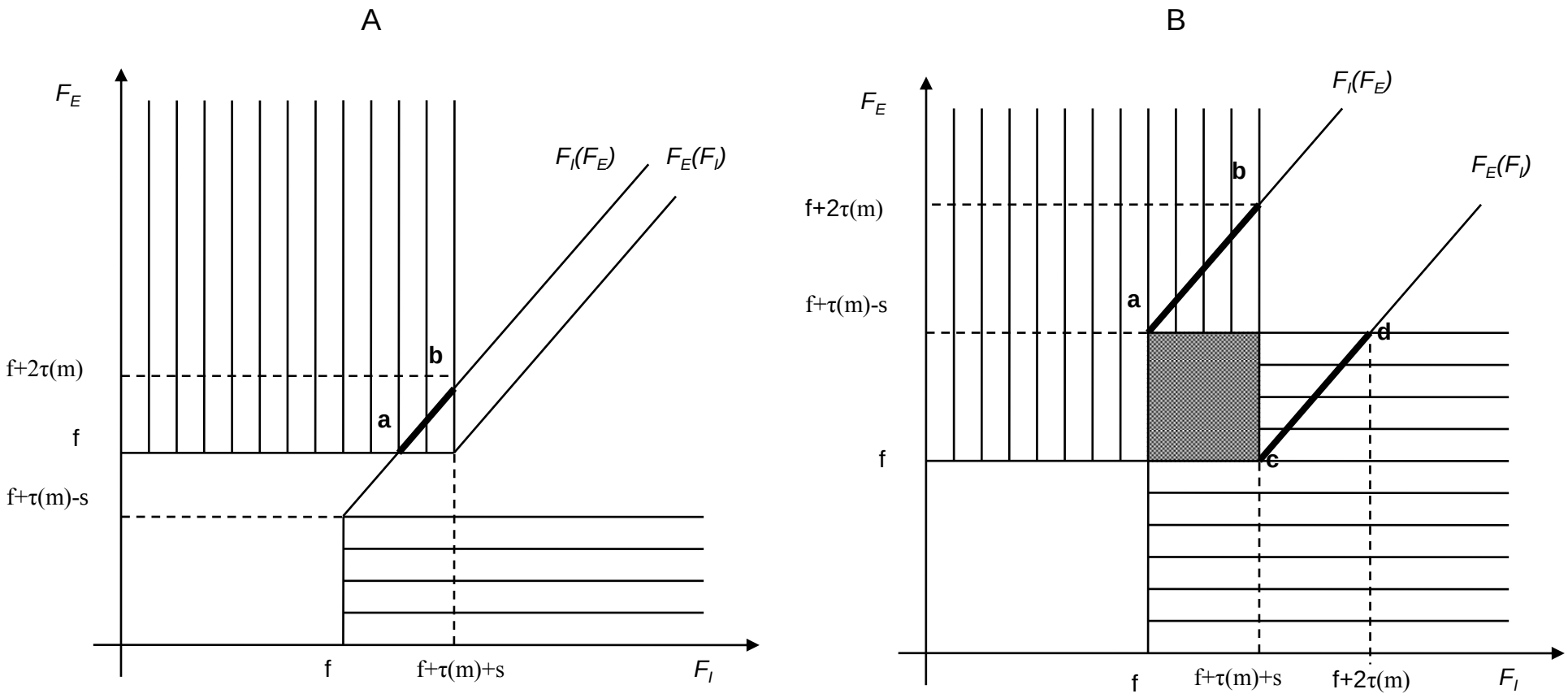


B. Strategic substitutes

Possible equilibrium configurations



Possible equilibrium configurations



Choice of the access charge: accommodation

- **Impact of the termination charge**
  - Suppose that, in a first stage, *I* can choose the (reciprocal) access charge: what would be its best choice?
  - In the range of termination charges yielding a shared-market equilibrium, there exists a termination subsidy (*m<0*) that gives both networks greater profits than any non-negative termination markup
    - Generalizes Gans and King (2001) to the case of asymmetric networks: as long as the two networks share the market, price competition is softened when *m* decreases below zero
    - However, networks may actually favour more extreme termination markups to corner the market and charge higher prices

Access charge as a foreclosure device

- **Market foreclosure through high termination charges**
  - A large enough termination charge allows *I* to corner the market
    - As long as consumers' response is unique, *I*'s profit increases with *m*
    - *I* can potentially earn in this way up to the monopoly profit
  - Limitations
    - Network effects must be large enough: $v(c) - v(c+\infty) > t - s/3$
    - In case of multiple consumer responses, *E* may corner the market
      - this happens when $v(c) - v(c+m) > t$
      - with consumer activism, *I*'s profit from foreclosure is then at most *s*
      - such foreclosure is not profitable when switching cost is moderate

Access charge as a foreclosure device

- **Market foreclosure through termination subsidies**
  - *I* could also foreclose the market through large termination *subsidies*
  - Limitations
    - Feasibility constraints: $a \geq 0$ (i.e., $m \geq -c_t$)
    - *I*'s foreclosure profit *decreases* with subsidy as long as profits remain concave
      - need "larger" subsidies
      - no guarantee that concavity fails for large subsidies
    - For large enough subsidies and convex profits, *E*, too, may corner the market
      - unique consumer response, but multiple equilibria
      - avoiding this requires $\tau(m)<s$, limiting the size of the subsidy / profit
    - Subsidizing termination may generate abuses
    - Offering lower prices for off-net calls may not fit well with marketing strategies

Access charge as a foreclosure device

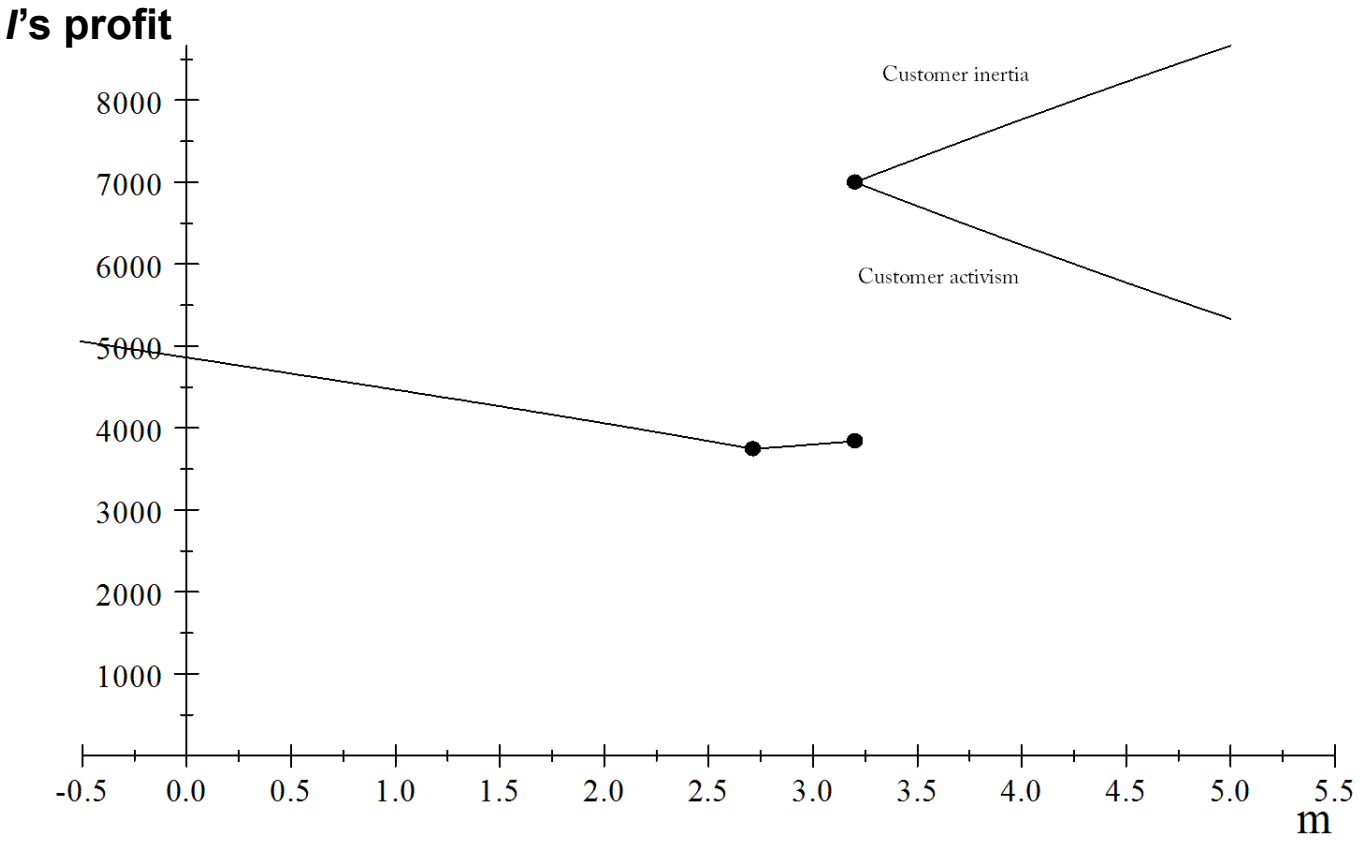
- **Illustration**
  - Linear demand function

$$u(q) = aq - \frac{b}{2}q^2 \longrightarrow q = (a - p)/b$$

  - Calibration based on De Bijl and Peitz (2002, 2004)
    - a = 20 cents
    - b = 0.015 cent
    - c_T = 0.5 cent
    - c = c_0+c_T = 2 cents
    - Feasible range for *m* is thus $m \geq = a\text{-}c_t$ = - 0.5 cent

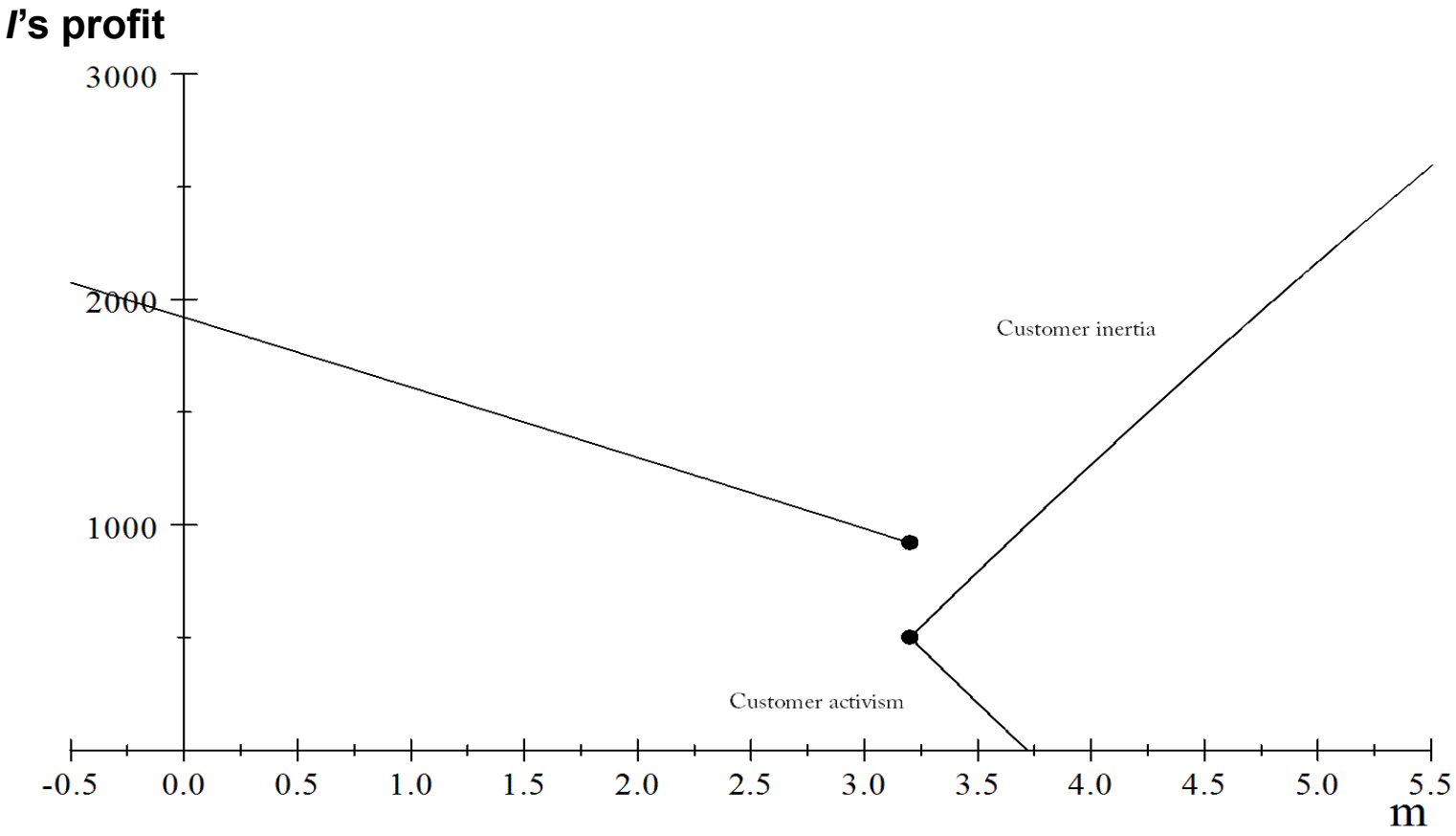
Access charge as a foreclosure device

- **Large switching costs: s = 70 €**



Access charge as a foreclosure device

- **Small switching costs: s = 5 €**



No termination-based price discrimination

- **Suppose that operators must charge same price for off-net and on-net calls**
  - A small departure from a cost-based termination charge decreases *I*'s profit (Carter-Wright 2003, Lopez 2007)
  - A large enough termination charge allows *I* to corner the market

    … but decreases profits
  - Moreover, under the *Receiver Pays Regime*, neither operator can use the access charge to foreclose competition

    $p=c+m$; $r=-m$: m has no impact on equilibrium profits

Policy implications

- **Qualified support for the concern expressed by entrants and regulators**
  - *I* can deter entry by insisting on a high termination charge (even if it is reciprocal)
  - However
    - This is profitable only when the entrant is completely deterred from entering the market
    - Such foreclosure is never profitable (and not even feasible in a receiver pays regime) in the absence of on-net pricing