



Called-calling party interaction: Implications for call termination

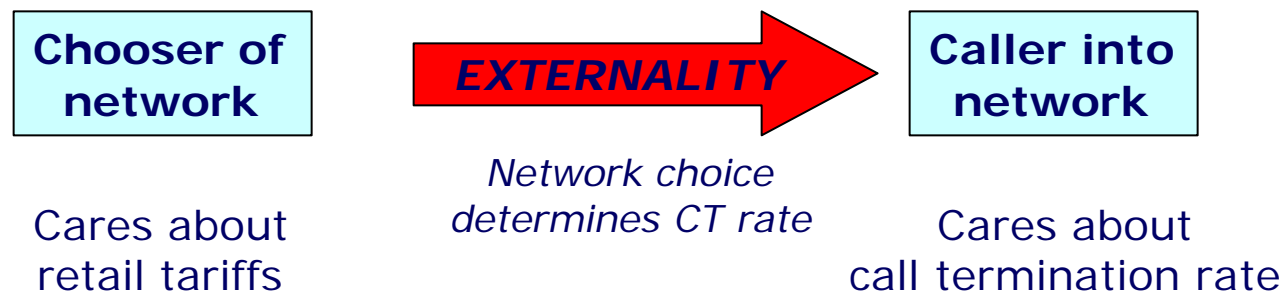
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Background



- ❑ Ongoing regulatory scrutiny of call termination rates, especially on mobile networks
- ❑ Calling party pays leads to an externality



- ❑ This could give operators an incentive to raise call termination rates above optimal levels to fund lower retail tariffs
- ❑ Closed user groups internalise this externality

Repeated bilateral calling

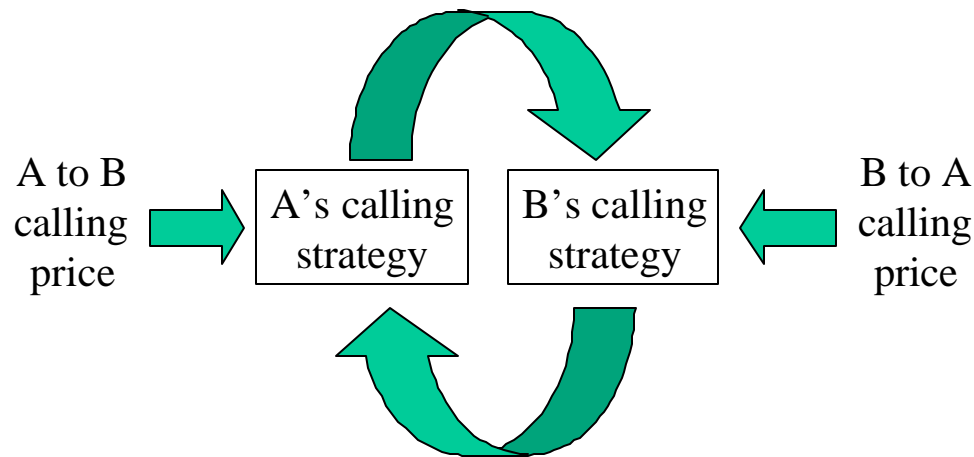


- ❑ Many calls occur in the context of repeated ongoing relationships, especially where one party is a mobile
- ❑ In such relationships, demand for calls in each direction may be interrelated
- ❑ A call in *one* direction may allow *both* parties to exchange news and reduce the need to call in the *reverse* direction

Calling equilibrium



- Given these interactions, calls within a repeat calling relationship will be determined by a Nash equilibrium



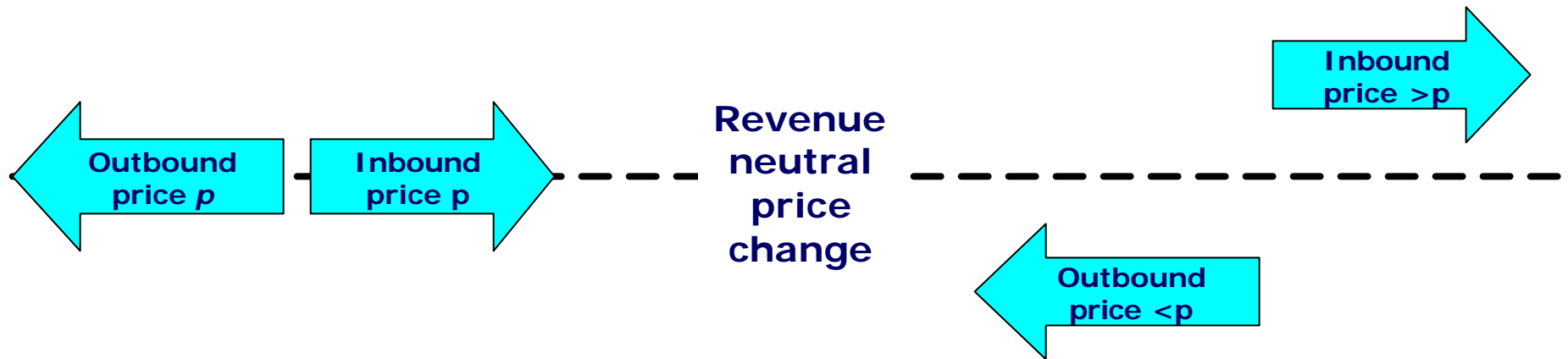
- Calls in each direction may act *as if* they are substitutes even without there being a single agent "choosing" between them

Thought experiment

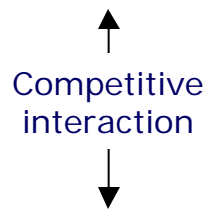


Initially balanced position

Higher termination rate



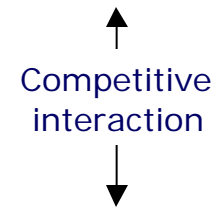
Utility of consumers



Profitability

Which is higher?

Utility of consumers



Profitability

Simple model

•econ

- Linear demands symmetric in each direction

$$q_I = 1 - \mathbf{b} q_O - \mathbf{g} p_I$$

$$q_O = 1 - \mathbf{b} q_I - \mathbf{g} p_O$$

↑
Call direction substitution

- Mobile customers indirect utility

$$v(p_O, q_I) = \mathbf{f}(q_I) - (1 - \mathbf{b} q_I) p_O + \frac{\mathbf{g}}{2} p_O^2$$

↑
Inbound call externalities
when outbound calls free

Equilibrium demands



- Equilibrium call demands depend on prices in each direction

$$q_I^* = \frac{1}{1+b} - g \frac{p_I - b p_O}{1-b^2}$$

$$q_O^* = \frac{1}{1+b} - g \frac{p_O - b p_I}{1-b^2}$$

- Higher prices in the reverse direction increase demand

Revenue neutral price movement



- Let r be the call termination rate as a proportion of the fixed-to-mobile retail price at the initially balanced prices
- Outbound prices fall at least as much as inbound prices increase for revenue neutrality

$$\Delta = \frac{-d p_o}{d p_I} = \frac{1 - b + [2b - (1 + r)]gp}{1 - b + [(1 + r)b - 2]gp} \geq 1$$

Welfare change

□ The change in welfare is given by

$$dv = -q \cdot dp_o + dq_I^* \cdot \left(e + \frac{1+2b^2}{1+b} p \right)$$

Lower price
for outbound

Impact of change in
calls received

□ Sign of welfare change depends on sign of

$$S = \underbrace{\frac{1}{g}}_{\text{outbound consumer surplus}} - \underbrace{e \frac{b+1/\Delta}{1-b}}_{\text{call externalities}} - \underbrace{p \left[1 + \frac{(b+1/\Delta)(1+2b^2)}{1-b^2} \right]}_{\text{call direction substitution}}$$

Comparative statics



- ❑ If no call externalities or direction substitution, increasing CT rate is welfare improving for mobile customers
- ❑ Even if there is no direction substitution, once there are sufficiently strong call externalities, increasing CT rate is welfare reducing for mobile customers
- ❑ Where there is sufficiently strong call direction substitution, increasing CT rate is welfare reducing for mobile customers, this being more likely:
 - ❑ The higher are initial call prices;
 - ❑ The more price sensitive calls are;
 - ❑ The smaller the originating operator's retention.

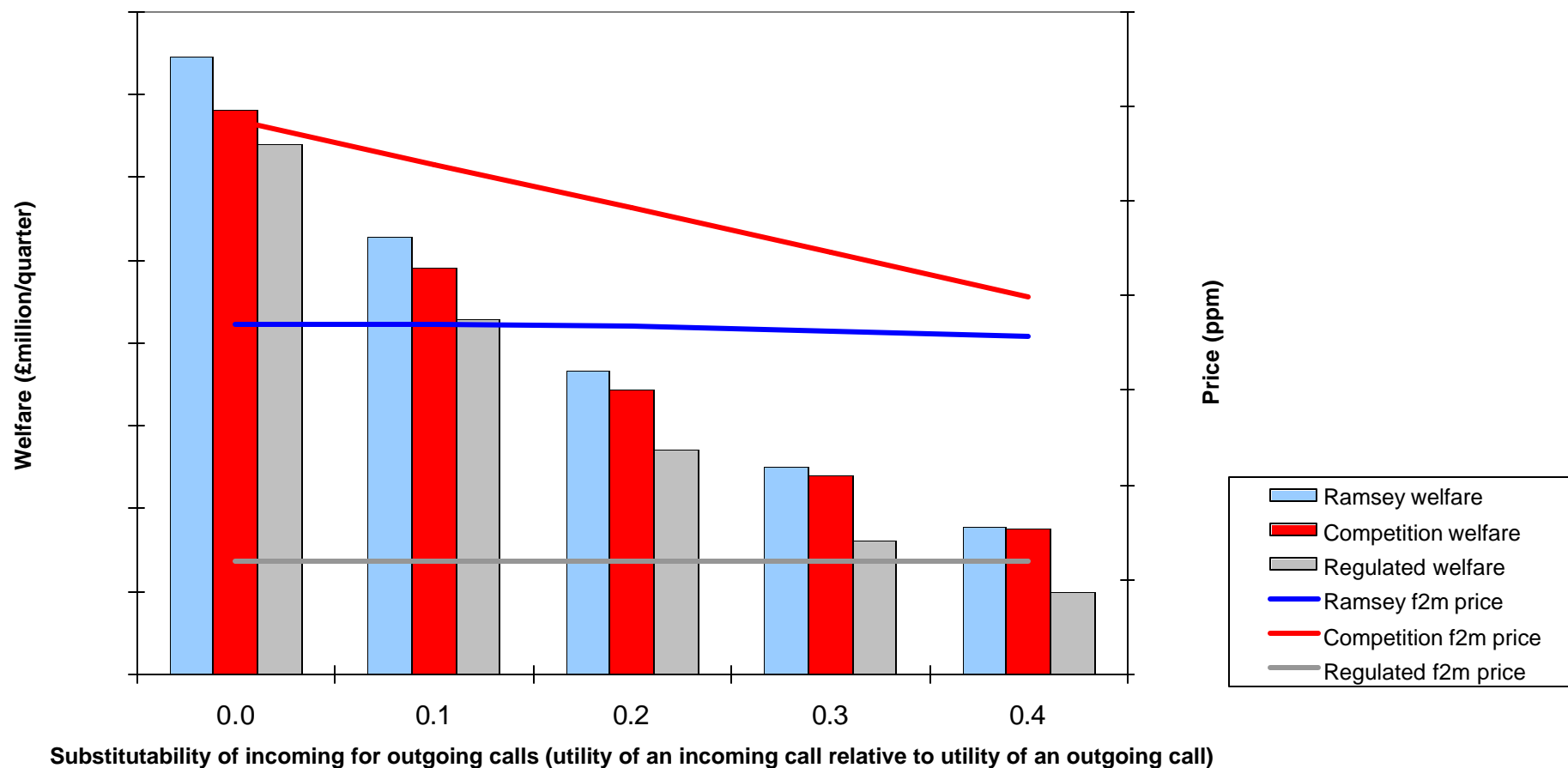
Competitive vs. optimal CT rates – general setup



Can embed these demands into a model of optimal and competitive pricing and compare:

- a Ramsey planner, maximising the total surplus of mobile users and fixed to mobile callers subject to recovering industry costs;
- competitive mobile operators, proxied by operators maximising the surplus of mobile customers (and not fixed to mobile callers) while making zero profits;
- a regulated operator, which has the same incentive structure as the competitive operator, but with fixed to mobile prices are set equal to LRIC.

Results



Conclusions



- ❑ Repeated call relationships can lead to “substitution” between incoming and outgoing calls as an equilibrium outcome
- ❑ This is not substitution as SSNIP test practitioners know it
- ❑ Call direction substitution can substantially reduce incentives to set call termination rates above socially optimal levels