Interconnection Theory & Benchmarking

Dr. Christoph Stork
Economic theory

- Call termination = monopoly
- Regulated price should thus be cost based, eg cost of efficient operator + mark up
- There exist no alternative pricing concept
- Waterbed effect, two sided market arguments to defend the status quo of arbitrarily set termination rates
- None of the scholars arguing against cost based termination rates presents an alternative concept
OECD countries (TMG2010)

Cost of OECD basket in US cents

Mobile Termination Rates 2009 in US cents

Monday, 8 April 13
Example UK

Average MTR in US Cents

Mobile subscribers per 100 Inhabitants

Monday, 8 April 13
<table>
<thead>
<tr>
<th>Country</th>
<th>OECD low mobile user basket price in 2008 compared to 2006</th>
<th>MTR 2008 compared to 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>77%</td>
<td>54%</td>
</tr>
<tr>
<td>Belgium</td>
<td>84%</td>
<td>62%</td>
</tr>
<tr>
<td>Denmark</td>
<td>73%</td>
<td>75%</td>
</tr>
<tr>
<td>Finland</td>
<td>60%</td>
<td>67%</td>
</tr>
<tr>
<td>France</td>
<td>90%</td>
<td>70%</td>
</tr>
<tr>
<td>Germany</td>
<td>85%</td>
<td>72%</td>
</tr>
<tr>
<td>Greece</td>
<td>67%</td>
<td>80%</td>
</tr>
<tr>
<td>Hungary</td>
<td>94%</td>
<td>80%</td>
</tr>
<tr>
<td>Iceland</td>
<td>82%</td>
<td>65%</td>
</tr>
<tr>
<td>Ireland</td>
<td>74%</td>
<td>94%</td>
</tr>
<tr>
<td>Italy</td>
<td>84%</td>
<td>88%</td>
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<tr>
<td>Luxembourg</td>
<td>95%</td>
<td>64%</td>
</tr>
<tr>
<td>Netherlands</td>
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<td>82%</td>
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<tr>
<td>Norway</td>
<td>78%</td>
<td>95%</td>
</tr>
<tr>
<td>Poland</td>
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<td>79%</td>
</tr>
<tr>
<td>Portugal</td>
<td>86%</td>
<td>94%</td>
</tr>
<tr>
<td>Slovak Republic</td>
<td>95%</td>
<td>65%</td>
</tr>
<tr>
<td>Spain</td>
<td>97%</td>
<td>63%</td>
</tr>
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<td>88%</td>
<td>58%</td>
</tr>
<tr>
<td>Switzerland</td>
<td>77%</td>
<td>75%</td>
</tr>
<tr>
<td>UK</td>
<td>94%</td>
<td>89%</td>
</tr>
</tbody>
</table>
Fixed-subscribers subsidised mobile networks?

- Initial models assumed 1 fixed-line operator and 1 mobile operator
- If it is true than based on what economic principle?
- Should horse cart drivers have been taxed to finance roads for cars?
Waterbed effect statements are becoming less bold

- Latest Genakos & Valetti Paper from 2012: May not be a two sided market for all operators but for some
- No longer a market but a strategic consideration of a single firm
- Then no longer of regulatory concern
More competition = no longer two sided market?

- Credit cards: Visa, Master, American Express, Dinners...still a two-sided market
- Newspapers?
- In two sided market competition shrinks the margins but does not change the nature of the market
The Paper

Impacts of Mobile Termination Rates (MTRs) on Retail Prices: The Implication for Regulators
Generally in agreement with conclusions

- Lower MTRs = lower retail prices
- MTRs and retail price do not constitute a two-sided market no water effect
- Cost based MTR allow lowering gap between on-net and off-net call prices, neutralising the advantage of subscriber numbers and club affects (Large operators may keep gap high, though)
Reduce MTRs to at least the same level as the operators’ cost...

- New entrant has different cost from dominant operator due to economies of scale and other factors
- Potentially an argument for asymmetric termination rates
- Asymmetric termination provide good reason for high off-net / on-net differential
- Thus better: cost of efficient operator
Improving the conceptual framework

- Obvious examples of the two-sided market are... communication networks...
- “According to the two reasons above, the author implied that mobile termination is one side of a two-sided market.”
  - Network size: “sender and the receivers will have more utilities when using the phone if they have more communications.”
  - Price discrimination: Off-net / On-net or Peak / Off peak
<table>
<thead>
<tr>
<th>Author</th>
<th>1st Side</th>
<th>2nd Side</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sandbach (2007a)</td>
<td>Services to own subscribers</td>
<td>Connectivity to other networks</td>
<td>Operator has little control over calls received from other networks due to off-net prices of other networks and user profiles of own and other network users</td>
</tr>
<tr>
<td>Evans (2007)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CentrePiece (2007)</td>
<td>Subscriptions (access)</td>
<td>Outgoing Services</td>
<td>Prepaid no access charge Postpaid: bundled airtime and data often exceed monthly subscription</td>
</tr>
<tr>
<td></td>
<td>Handset + Sim</td>
<td>Retail prices</td>
<td></td>
</tr>
<tr>
<td>Hausman &amp; Wright (2006)</td>
<td>Mobile subscribers</td>
<td>Fixed-line callers</td>
<td>Operator has little influence over retail prices of fixed-line operator. MTR only defines downward barrier</td>
</tr>
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<td></td>
<td></td>
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</tr>
</tbody>
</table>
Two sided market Argument

- Interdependent prices: Price are being determined interdependently, ie changing the price for the one side will change the price of the other side

- No cost causation: No direct link between incremental cost for a good or service and the price
Two-sided market would predict
Relationship between wholesale price and retail prices do not constitute a two-sided market

- Prices are not Interdependent
  - There exist no unidirectional relationship between termination rates and retail prices
  - Reduction in MTR affects net-payer and net-receivers differently
- Cost causation is clear for off-net calling prices
Argument 1
Wholesale Price: contractually fixed
Retail Prices: Many prices varying product by product and change frequently
Argument 2
Termination rates are mostly symmetrical, which contradicts the two-sided market argument

- If Asymmetry then smaller has higher MTR
- MTR cannot be increased because of higher market share (newspaper example)
Argument 3
MTRs are wholesale costs and wholesale revenue at the same time

- Reductions in termination revenues at the same time as reductions in termination expenditure
- Who benefits from termination rate reductions depends on many factors
  - Generally, net-payers pay less and net-receivers receive less
  - However, net-receivers may also receive more, eg Vodacom South Africa in 2012
Argument 4

Operators have a choice to pass on MTR reductions - no automatism

- MTR reductions can be passed on to subscribers = lower off-net prices
- Should it not be passed on, then the operator makes more money for each outgoing minute
- Concrete choices an operator to maximise profits
- No automatic response in retail prices to changes in termination rate
- Retail prices are complex and diverse and pricing strategies are driven by user profiles and market niches, not by revenue replacement
Profit from off-net calls increases with lower MTR (MTR = wholesale cost)

\[
\text{Profit}_{\text{offnet}} = (P_{\text{offnet}}^{\text{own}} - \text{MTR} - \text{Cost}_{\text{origination}}) \times Q_{\text{outgoing}}
\]

\[
Q_{\text{outgoing}} = f(P_{\text{offnet}}^{\text{own}})
\]

- Pass on MTR reductions to subscribers = lower off-net prices = more traffic
- Off-net constant = operator makes more money for each outgoing minute, same traffic
Profit from termination 
(MTR = wholesale revenue)

\[ \text{Profit}_{\text{termination}} = (MTR - \text{cost}_{\text{termination}}) \times Q_{\text{incoming}} \]

\[ Q_{\text{incoming}} = f(P_{\text{offnet}}) \]

- Incoming minutes depend on off-net price of other operators
- MTR limits the off-net price of other operators downwards
Argument 5
Operators can only set their own retail prices but not those of other operators...

\[ \text{Profit}_{\text{termination}} = (MTR - \text{cost}_{\text{termination}}) \times Q_{\text{incoming}} \]

\[ Q_{\text{incoming}} = f(P_{\text{offnet}}) \]

- Incoming minutes depend on off-net price of other operators
- MTR limits the off-net price of other operators downwards, not upwards
- The consequences of own choices depend on the decision of others
Argument 6
Price interdependence has to work both ways

- If termination rates and retail rates were interdependent, then one would also be able to observe increases in termination rates while retail prices decrease.
- If lower termination rates lead to higher retail prices, why has no one suggest to increase the arbitrarily set terminations rates?
- MTRs of US 5$ leading to free calling and data?
Let us assume that country A increases MTR from 10 cents to US$5 to achieve lower retail prices.

What are the consequences?
Consequences

- Off-net price goes up = US$ 5 + x
- \( x = \text{cost of origination} + \text{mark up} \)
- Termination rate revenues would drop
- Subscriber numbers go up (duplicated SIM cards for cross network calls)
Argument 7

Termination rate payments are payments between operators

- The industry consists of net-payers and net-receivers of termination rate payments.
- Termination could not be a two-sided market for net-receivers and an ordinary market for net-payers.
- Net payers will benefit directly from lower termination rates and may set their prices in response differently to net-receivers.
High MTR = subsidisation within the sector

- No funds from outside the sector
- Why should subscribers of one network subsidise subscribers from other networks?
- Why should one operator be given a subsidy to roll out network infrastructure at the expense of another operators?
Waterbed Effect Argument

- Predicted outcome of a Two sided market
- The waterbed effect describes a situation where if mobile termination rates go down, some other prices need to go up, usually usage and access prices
- Speculation about the pricing behaviour of mobile operator
- Assumes that all operators react the same way (even net interconnection payers)
- Assumes operators base their decisions on revenue replacement rather than profit maximisation
Off-net calls and size of operators
**Off-Net call definition - footnote 9**

- “An on-net call is a call made by a caller and receiver with the same mobile operator while an off-net call is a call made by a caller and receiver from different mobile operators.”

- Instead: caller from one network and received by a caller from another network.
Benefit of size:
Off-net Price > On-net price = expensive to be called for people of smaller network (Initially, mostly on-net calls, after switching mostly off-net calls)

New entrant needs to compete with its off-net prices with the on-net prices of incumbent to gain market share
Above cost MTR - help dominant to avoid competition pressure

- Preventing smaller operators to compete with their off-net prices with own on-net price (Namibia MTR > on-net price)
- High off-net prices of dominant mobile operator makes it expensive to be called for people changing to new entrant or smaller operators
- Generating club effects with high on-net / off-net price differentials
- Possible consequences are: traffic imbalance, net termination payment outflow of new entrants and fixed-line networks
Cash Flow Issue
Net Termination Payment

\[ Net_{termination} = MTR \times (Q_{incoming} - Q_{outgoing}) \]

- Balanced traffic: MTR reduction revenue neutral
- However traffic often not balanced hence termination net payments
  - dominant operator can set off-net prices very high eg
  - different user profile
  - use of Please Call MEs
Traffic imbalance 2008/09 (minutes)

Off-Net call N$ 1.79

6,182,581

4,498,632

Off-Net call N$ 2.5
Welfare effects
## Share of households with fixed-lines

### South Africa
- 2007/8: 18.2%
- 2011/12: 18.0%

### Namibia
- 2007/8: 17.4%
- 2011/12: 11.5%

### Botswana
- 2007/8: 11.0%
- 2011/12: 15.0%

### Ethiopia
- 2007/8: 7.6%
- 2011/12: 4.0%

### Ghana
- 2007/8: 2.6%
- 2011/12: 1.8%

### Kenya
- 2007/8: 2.3%
- 2011/12: 0.6%

### Cameroon
- 2007/8: 1.8%
- 2011/12: 2.2%

### Tanzania
- 2007/8: 0.9%
- 2011/12: 0.4%

### Uganda
- 2007/8: 0.3%
- 2011/12: 1.5%

### Rwanda
- 2007/8: 0.1%
- 2011/12: 0.2%

### Nigeria
- 2007/8: 0.3%
- 2011/12: 0.3%

**Fixed-lines on the way out except Botswana, Cameroon, Uganda and Rwanda**

**High MTR = active contribution to fixed-mobile substitution?**

**Monday, 8 April 13**
Data issues
Mobile penetration rates and mobile retail prices depend on many factors:

- Number of operators, sequence of market entry, technologies deployed, market shares, subscribers profiles, business models, past regulatory interventions, communication laws and policies, institutional arrangements...

- Constructing data sets with enough data points to account for such diversity is impossible
Change in profits after MTR cuts evidence for waterbed effect?

- MTR down, retail prices cannot go up due to competition, hence lower profits / EBITDA margins?
- Genakos & Valletti papers
  - Net payers may be better off, net receivers worse off
  - Increased competition may mean lower EBITDA margins
  - This is not a waterbed effect or a two sided market?
Using prices that only reflect dominant operators

- Impact of MTR reduction on retail prices using OECD price baskets methodology, which only capture the retail prices of dominant operators
  - together 50% market share, 2006 definition
  - Two largest operators, 2010 definition
- Smaller operators are more likely to pass through reductions in MTRs
Implied prices noise

- Implied per minute price = ARPU / MOU
- ARPU usually includes SMS, data, handset for postpaid, termination revenue
- Higher implied prices would be expected due to higher smart phone penetration and data use
  - Who thought about buying a 600 Euro mobile phone 6 years ago?
Further research

- Wholesale international roaming agreements?
  - A subscribers operators may have several roaming partners in foreign country, thus no monopoly
  - Outside jurisdiction of national operators what operators in other countries charge for roaming
- High MTR impact on fixed-line penetration and knock on effect for fixed broadband subscriptions
- What has been the welfare cost of arbitrarily high termination rates?