DF profitability for investors and access seekers in different regulatory environments and investment settings

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ESMT Competition Analysis
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Telecommunication industry is in the midst of a disruptive technological development

- Next generation networks (NGN) allow data transmission speeds to increase from the current 16 Mbit/s to – at least – 100 Mbit/s
- Enable new applications and potential benefits to consumers
  - higher bandwidth allowing IPTV, HDTV
  - interactive gaming and TV
  - higher capacity than copper based access
- However, uncertainty whether consumers are actually willing to pay for new services

Debate as how to regulate access to next generation networks

- Relatively slow NGA take-up in Europe
- Incumbents cite tight or uncertain regulatory regimes as barriers to investment
- Entrants seem to consider the existing regulatory regime appropriate for NGA
- Regulators have to balance (ex-ante) investment incentives and (ex-post) access / competition
Introduction

Challenges to investment

NGA success:
- Access rights are used
- ROI under LRIC do not reflect optionality

NGA failure:
- Access rights not used
- NGA not most efficient technology

- Market participants may prefer not to invest but to seek access in the success case
  - This leads to lower or delayed investment
  - European Commission and other regulators accept the need for amended regulation
Practical approaches to NGA regulation

- **LRIC** Cost based access option; investor bears network investment costs alone if *NGA fails*
- **Risk premium** Access seekers have to pay Risk Premium; investor bears network investment costs alone if *NGA fails*
- **FDC** Cost based access option; investor and access seeker bear network investment costs if *NGA fails*
- **Risk sharing** Incumbent and entrant agree on NGA deployment, internal access rights, cost sharing
- **Regulatory holiday** Investor forecloses access

Questions

- How do the various regulatory approaches affect investment and profitability of market participants?
- How can institutional design (e.g. access prices between risk-sharing partners) be optimised?
- What is best from regulators' perspectives?
Agenda

Introduction

Investment, profitability and consumer surplus in various regulatory regimes

The impact of State aid

Assessment of risk sharing options

Summary and conclusions
Main elements to model effects of different regulatory regimes

The model and regulatory regimes

Investment decision

NGA success

NGA failure

Product market competition

Outcomes depend on
• Access price in success and failure case
• Investment decision

Profits and consumer surplus as a function of both investments and access regulation
Investments are stimulated by all regulatory alternatives

- **Fully distributed costs (FDC)** stimulate investments
  - investor faces lower risk of stranded assets
  - ex-post cost recovery via wholesale price softens competition and increases returns on investment

- **Holiday**: in the case of success, access asymmetry, disadvantage for the entrant, incumbent has incentive to invest

- **Risk sharing** stimulates investments
  - investment costs and risks are shared
  - *but* no ex-post cost recovery via wholesale price intensifies competition and decreases returns on investment somewhat

- **Risk premium** has relatively low (high) leverage if the probability of success is low (high)
  (example, requires more robustness checks)

Source: ESMT model, parameters: $a = 100$, $c = 20$, $\gamma = 5$, risk premium (1+10%)
Investor profits are stimulated by all regulatory alternatives

- **Holiday** is best for investors
  - right to exploit NGA exclusively
- **FDC** also creates more profits for the investor
  - insurance effect
  - somewhat relaxed product market competition
- **Risk sharing** is still better than the LRIC counterfactual
  - shared risks
  - no ex-post cost recovery via wholesale price intensifies competition and decreases profits somewhat
- **Risk premium** appears better than LRIC but is only effective when the probability of success is rather high

Source: ESMT model, parameters: $a = 100$, $c = 20$, $\gamma = 5$, risk premium (1+10%)
**Consumer surplus** is increased under most regulatory alternatives

- **Risk sharing** creates the biggest benefit to consumers
  - increased investment (less as under FDC)
  - ex-post access to all participating Parties
  - *no* ex-post investment cost recovery via wholesale price (intensifies competition)

- **FDC** benefits consumers
  - increased investment
  - ex-post access to all Parties
  - *but* ex-post investment cost recovery via wholesale price (softens competition)

- **Risk premium** may benefit consumers if the success probability is high; but then it hurts entrants most (example, requires more robustness checks)

- **Holiday** induces asymmetric market structure; high NGA investments do not seem to benefit consumers

\[
\text{NGA success probability (0\% - 100\%)}
\]

Source: ESMT model, parameters: \(a = 100, c = 20, \gamma = 5, \text{risk premium (1+10\%)}\)
### Summary of key results – Ranking

<table>
<thead>
<tr>
<th>Regulatory setting</th>
<th>Largest NGA investments</th>
<th>Investor’s profits</th>
<th>Highest consumer surplus</th>
</tr>
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<tbody>
<tr>
<td>LRIC</td>
<td>5</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Holiday</td>
<td>2</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Fully distributed costs</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Risk premium (1)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Risk sharing</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

Notes: All results are valid for success probability being sufficiently small, e.g. smaller than 85%

(1) Result and ranking depend on the premium (here + 10%). Further sensitivity checks necessary for validation.
Extensions and refinements

- Robustness check with respect to other risk premium cases (optimal risk premium?)
- Incorporate ex-post margin squeeze regulation
- Explore effects of alternative risk-sharing arrangements (next section)
- More than one non-investor; several investors
- Check results for further asymmetries regarding e.g. market share
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Does State Aid make grey areas white?

**Background**
- National Governments plan significant DF subsidies
- European Commission has published State Aid Guidelines for broadband*
- Three-Area-Approach
  - Black: at least two broadband infrastructure providers (State Aid per se illegal)
  - White: no private investment expected (State Aid per se legal)
  - Grey: Even if private investor exists: State aid for second NGA infrastructure possible

**State aid to foster entry is a new concept**
- Expectation of expected future (subsidised) competition lowers investment incentives
- Uncertainty regarding such investments may make grey areas white

*Community Guidelines for the application of State aid rules in relation to rapid deployment of broadband networks.*
### Dimensions of risk sharing options

<table>
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<tr>
<th>Ownership</th>
<th>Commitment</th>
<th>Number of partners</th>
<th>Access charges</th>
<th>Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Contract length</td>
<td>Quantities / prices</td>
<td>Upfront payment</td>
<td>Depending on area:</td>
</tr>
<tr>
<td>JV</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>White, Grey, Black</td>
</tr>
<tr>
<td>Investor</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>At cost</td>
</tr>
<tr>
<td>State</td>
<td></td>
<td>more</td>
<td></td>
<td>With premium</td>
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Types of risk sharing options

- **JV**: up-front cost sharing, equal access rights limited ex-post access charges, two (or more?) investors
- **Commitment model**: up-front payment, minimum quantities, minimum contract length, bilateral negotiation
- **Auction**: time slot for access seekers to participate in an open tender for the risk sharing contract

**Regulatory Environment**
- Competition policy
  - Margin squeeze
  - Excessive pricing
- Access regulation
  - See previous section
- State aid
  - See Community Guidelines for the application of State aid rules in relation to rapid deployment of broadband networks

**Other institutional dimensions**
Assessment of risk sharing options

Assessment criteria for risk sharing options

• Investment incentives

• Effect on long-run competition
  – Access price
  – Margin squeeze
  – Coordinated effects (common cost floor)

• Practicalities
  – Size of areas (in electricity: 900 DSOs in the German electricity market)
  – Sequencing
  – Conditional offers
  – Financing
Assessment of risk sharing options

Risk sharing and regulated access with premium

Decision on whether to participate in ex-ante risk-sharing

Option 1: participate

Decision parameters

Ex-ante parameters:
- No of firms
- Type of firm
- Amount of up-front payment
- Degree of commitment
  - Quantity and prices
  - Duration and timing

Ex-post parameter:
- Premium
- Duration

Option 2: do not participate

Regulation:
Help balancing parameters so as to optimize among:
- Investment incentives
- Effect on long-run competition
- Practicalities
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Summary and conclusions

• From consumers’ perspectives, NGA regulation should simultaneously consider both aspects, investment incentives and access / competition conditions
  - all regulatory alternatives seem to induce more investment than LRIC
  - Risk sharing, fully distributed costs and risk premium may also create higher consumer surplus
  - Instruments can be combined: e.g. risk premium and risk sharing

• Regulatory alternatives may involve gains for all stakeholders: incumbents, entrants and consumers
  - Consumers benefit from a departure from LRIC (except for regulatory holiday)
  - Investors gain more than non-investors lose (relative to the LRIC counterfactual); that is alternatives increase the pie

• Next step is to get risk-sharing and the transition “from copper to fiber” right – balancing incentives for participation and non-participation
  - Investment incentives
  - Effect on long-run competition
  - Practicalities
Thank you!

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Mathematical implementation

- Two players
  - investor (incumbent)
  - access seeker (entrant)
- Both firms have symmetric access to the legacy network
- Two-stage game theoretical framework
  - NGA investment stage
  - Cournot retail competition, given the regulatory setting, the legacy network and NGA (non-)success
- Solution via backward induction
- Formal results and numerical results via Mathematica
  (robust over the plausible parameter range, caveats apply for risk-premium case)