esmt european school of management and technology

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

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Dr. Rainer Nitsche
Managing Director
ESMT Competition Analysis

Agenda

- Introduction
- Investment, profitability and consumer surplus in various regulatory regimes
- The impact of State aid
- Assessment of risk sharing options
- Summary and conclusions

Background

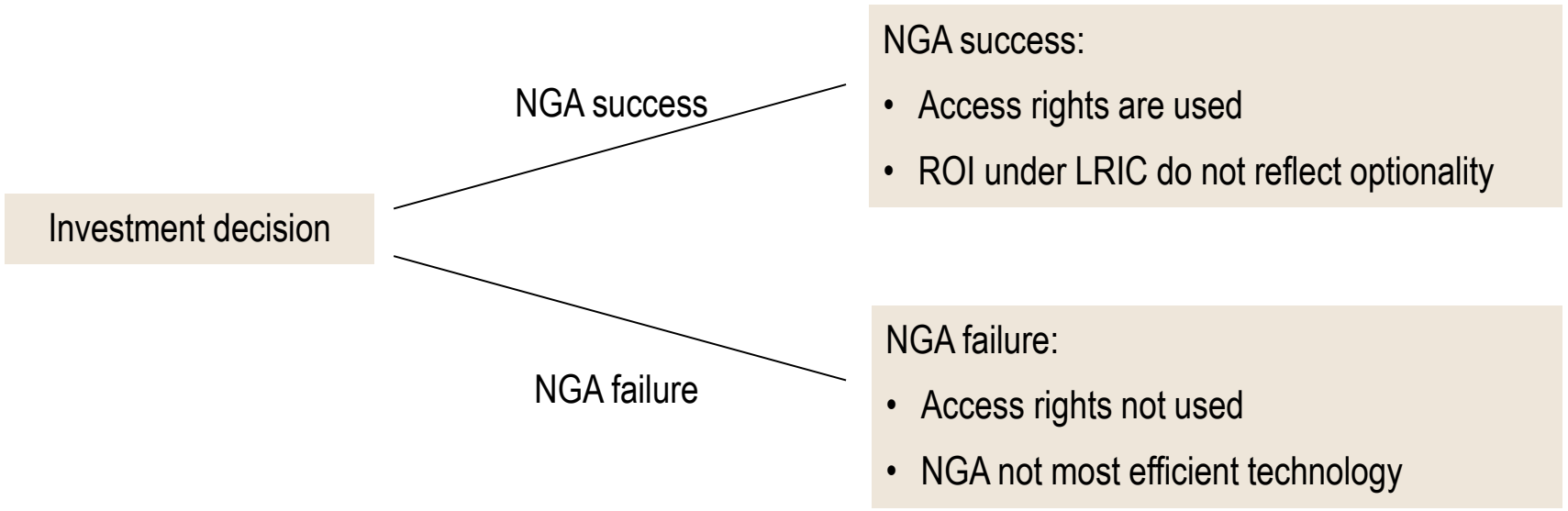
Telecommunication industry is in the midst of a disruptive technological development

- 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**

Challenges to investment



- 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?

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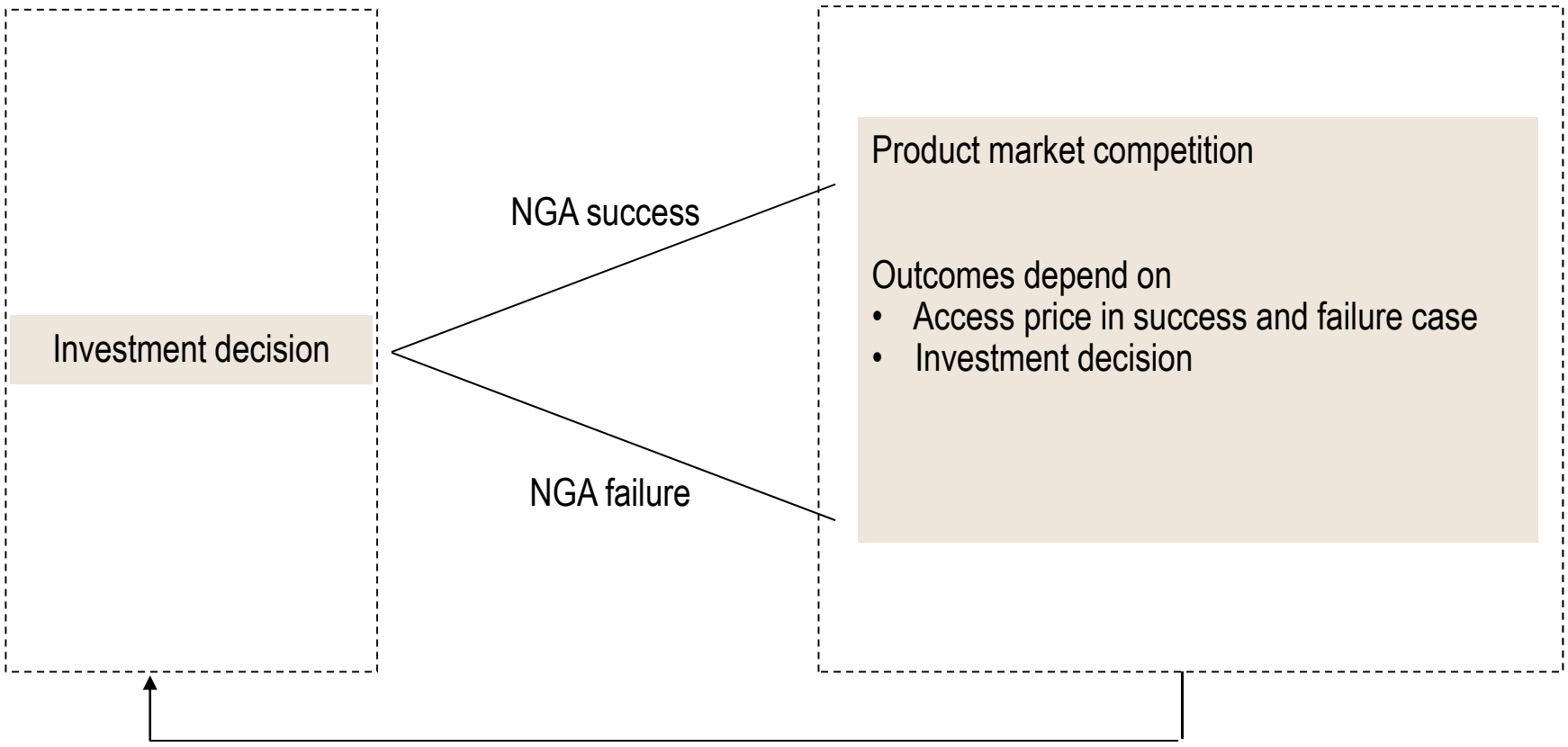
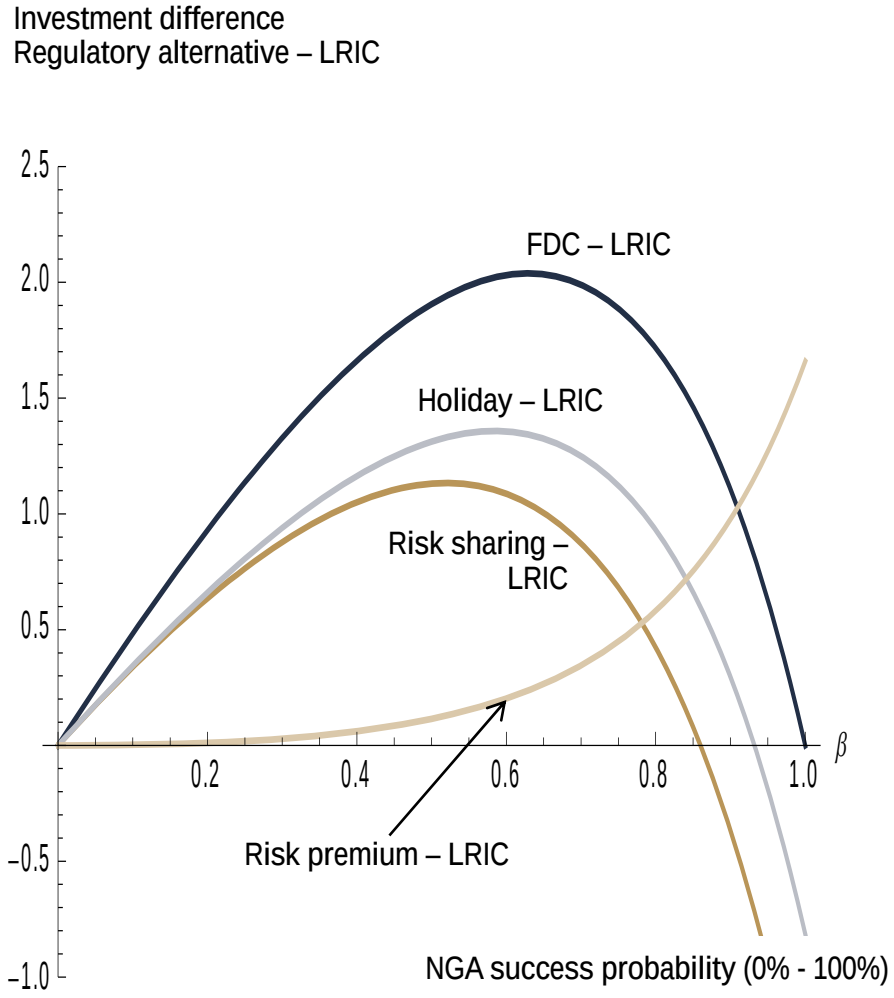
Main elements to model effects of different regulatory regimes



Profits and consumer surplus as a function of *both* investments *and* access regulation

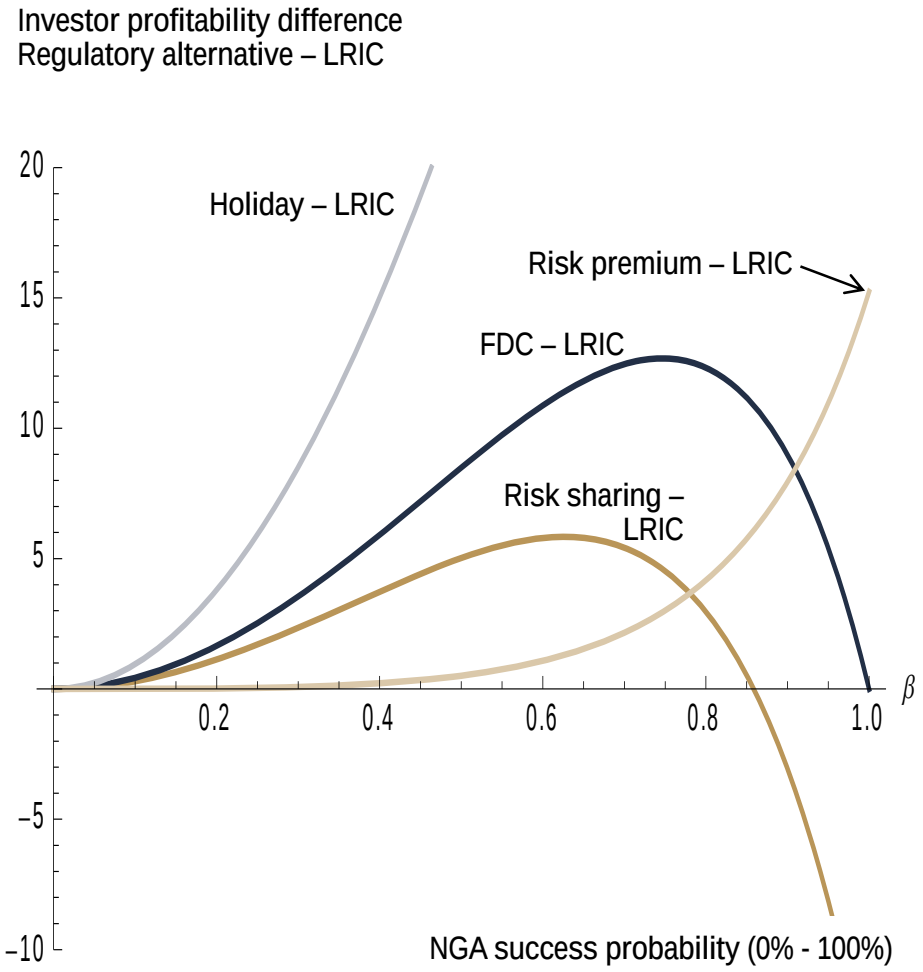
Investments are stimulated by all regulatory alternatives



Source: ESMT model, parameters: *a* = 100, *c* = 20, *γ* = 5, risk premium (1+10%)

- **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)

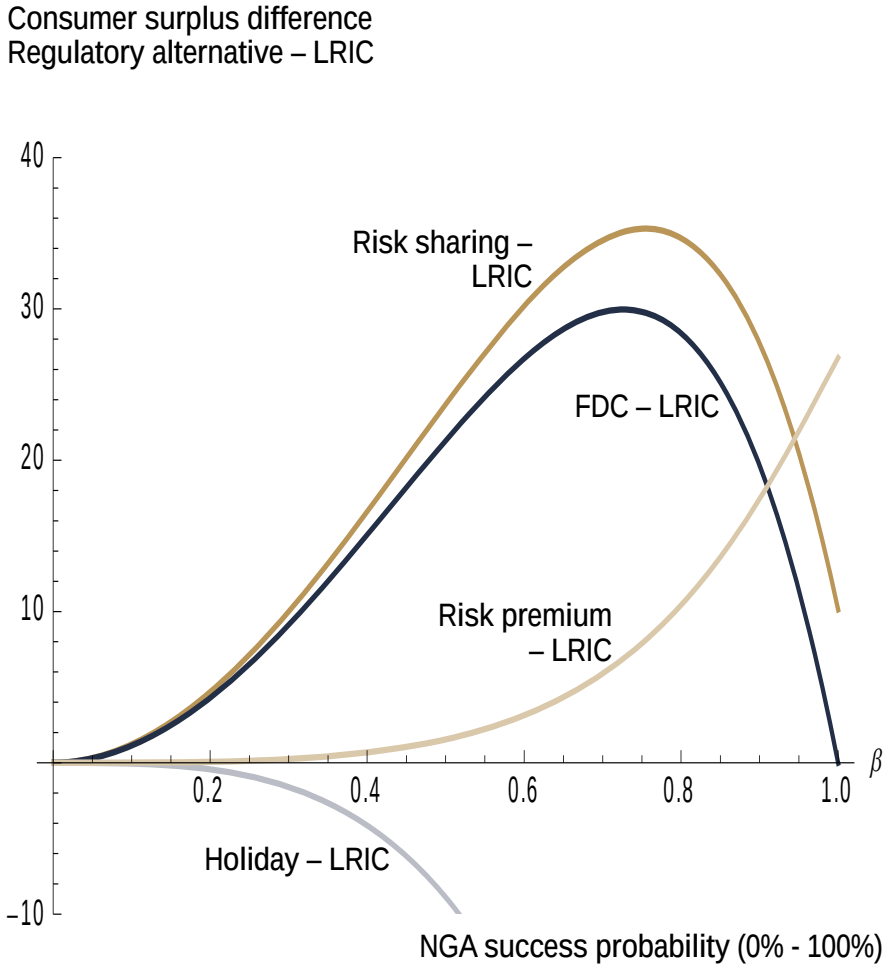
Investor profits are stimulated by all regulatory alternatives



- 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, γ = 5, risk premium (1+10%)

Consumer surplus is increased under most regulatory alternatives



Source: ESMT model, parameters: *a* = 100, *c* = 20, *γ* = 5, risk premium (1+10%)

- **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

Summary of key results – Ranking

Regulatory setting	Largest NGA investments	Investor‘s profits	Highest consumer surplus
LRIC	5	5	3
Holiday	2	1	5
Fully distributed costs	1	2	2
Risk premium (1)	4	4	4
Risk sharing	3	3	1

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 Governements 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
  - Exectation 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.

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Dimensions of risk sharing options

Ownership	Commitment			Number of partners		Access charges	Allocation
	Contract length	Quantities / prices	Upfront payment				
JV	Low	Low	Low	1	Depending on area: White Grey Black	Below cost	Bilateral negotiation
Investor	High	High	High	2		At cost	Regulated access
State				more		With premium	Auction

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

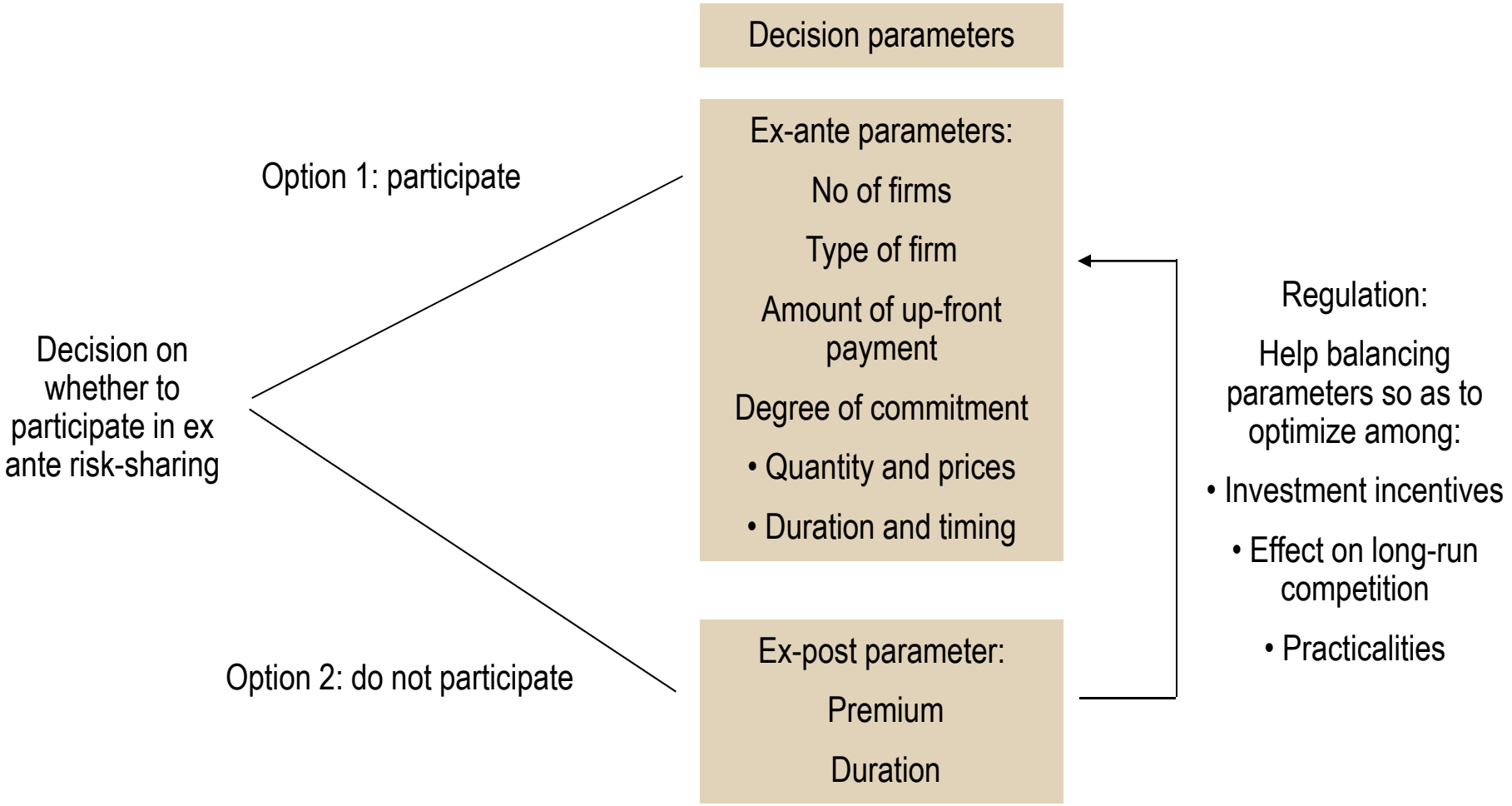
- Regulatory Environment
  - Competition policy
    - Margin squeeze
    - Excessive pricing
  - Access regulation
    - See previous section
  - State aid
    - See Community Guidelines for the application of State aid rules in relation to rapid deployment of broadband networks

- Other institutional dimensions

Assessment 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

Risk sharing and regulated access with premium



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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!

Dr. Rainer Nitsche

Managing Director
nitsche@esmt.org
+49 30 21231-7020

Dr. Lars Wiethaus

Manager
wiethaus@esmt.org
+49 30 21231-7094

ESMT
Competition Analysis GmbH

Schlossplatz 1
10178 Berlin

Phone: +49 (0) 30 192 31-7009
Fax: +49 (0) 30 192 31-7099

www.esmt.org/competition_analysis

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)