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Access regulation and investment in Next Generation Networks – a ranking of regulatory regimes

Facilitating the roll-out of
Next Generation Access Networks

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Introduction (I)

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 (II)

Practical approaches to NGA regulation (examples)

- Existing regulatory regime
  - practically, often based on long-run incremental cost regulation (LRIC)
- Risk premium
  - European Commission, Draft Recommendation on regulated access to Next Generation Access Networks, 2008
- Risk sharing
  - Deutsche Telekom (and others) proposition
- Regulatory holiday

Question

- What is the relative performance of different regulatory approaches?
- While many suggested approaches to NGA regulation may stimulate investments, do they benefit consumers?

Introduction (III)

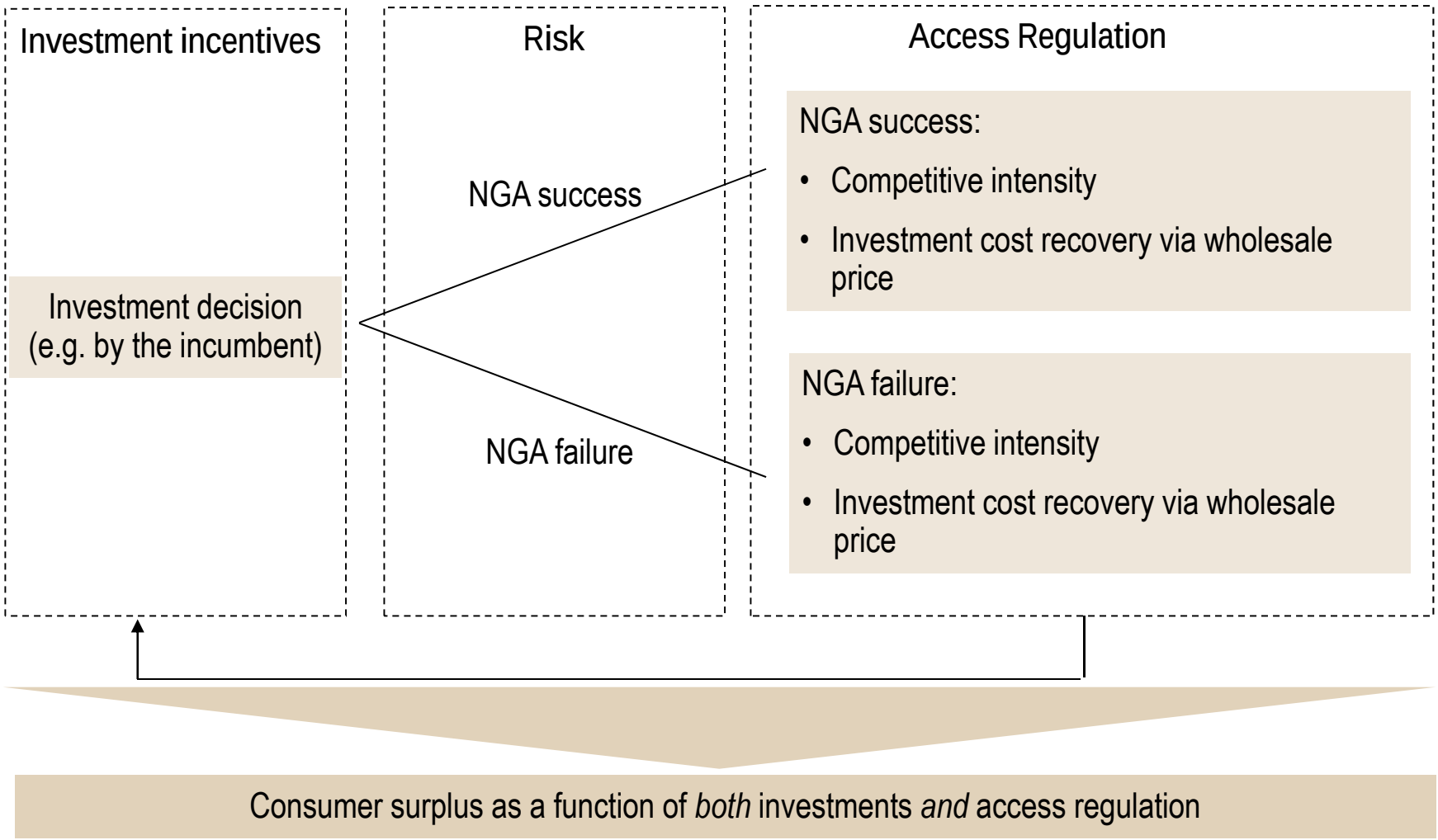
Purpose of this presentation

- Introducing the main elements of a quantitative equilibrium model, incorporating
  - uncertainty about NGA market success
  - (ex ante) investment incentives
  - (ex post) access / competition conditions
  - different regulatory regimes in a consistent single framework
- Based on independent research undertaken by ESMT CA (EEA conference paper)
- Presenting numerical solutions to the model
  - illustrating outcomes of the model
  - no ultimate recommendation for a specific regulatory regime, further robustness checks necessary
- Suggesting directions for further investigations

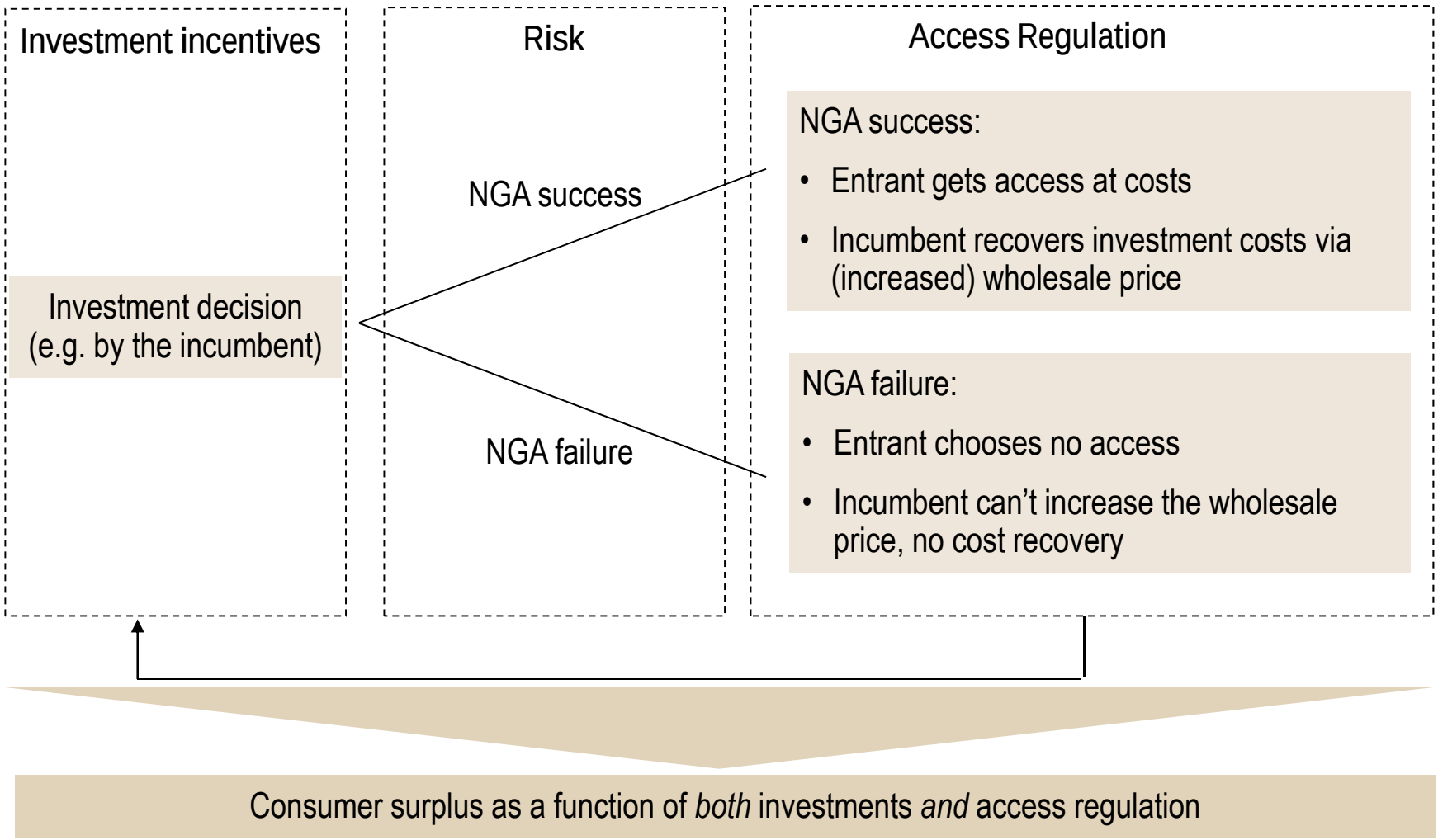
Structure

- The model and regulatory regimes
- Results
- Extensions and refinements
- Summary and conclusions

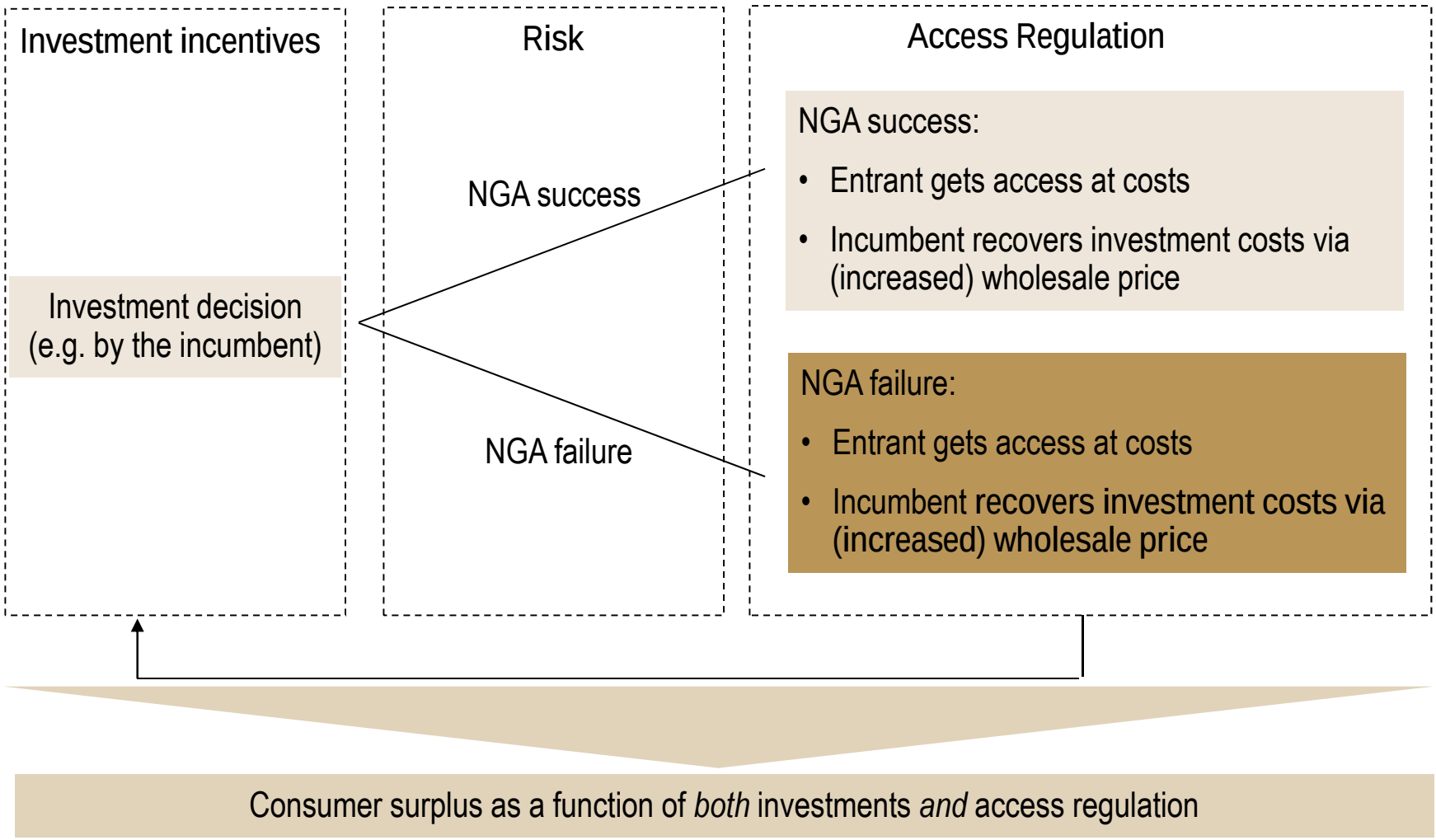
Main elements to model effects of different regulatory regimes



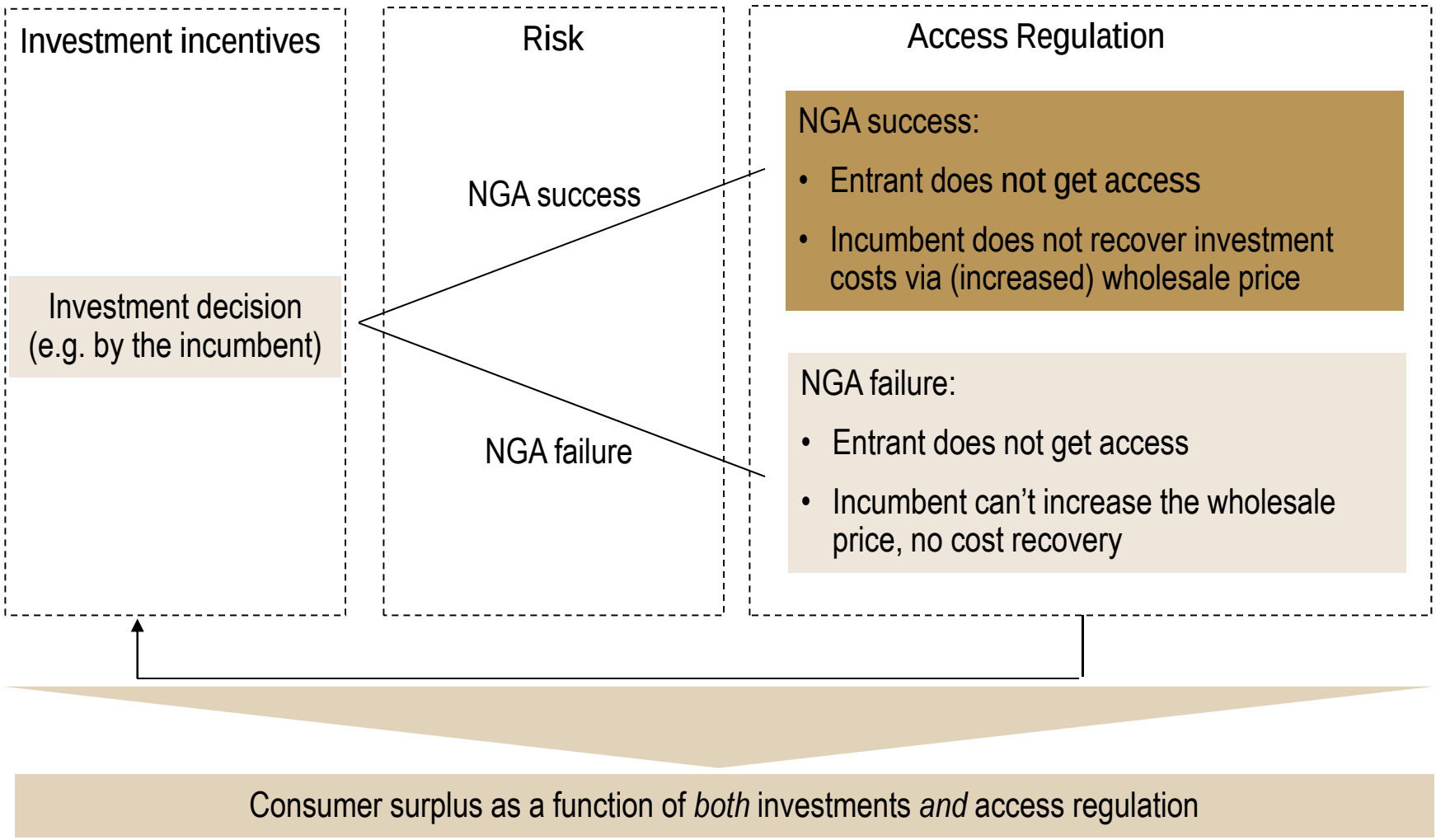
Long-Run-Incremental-Cost (LRIC) regulation as the benchmark case



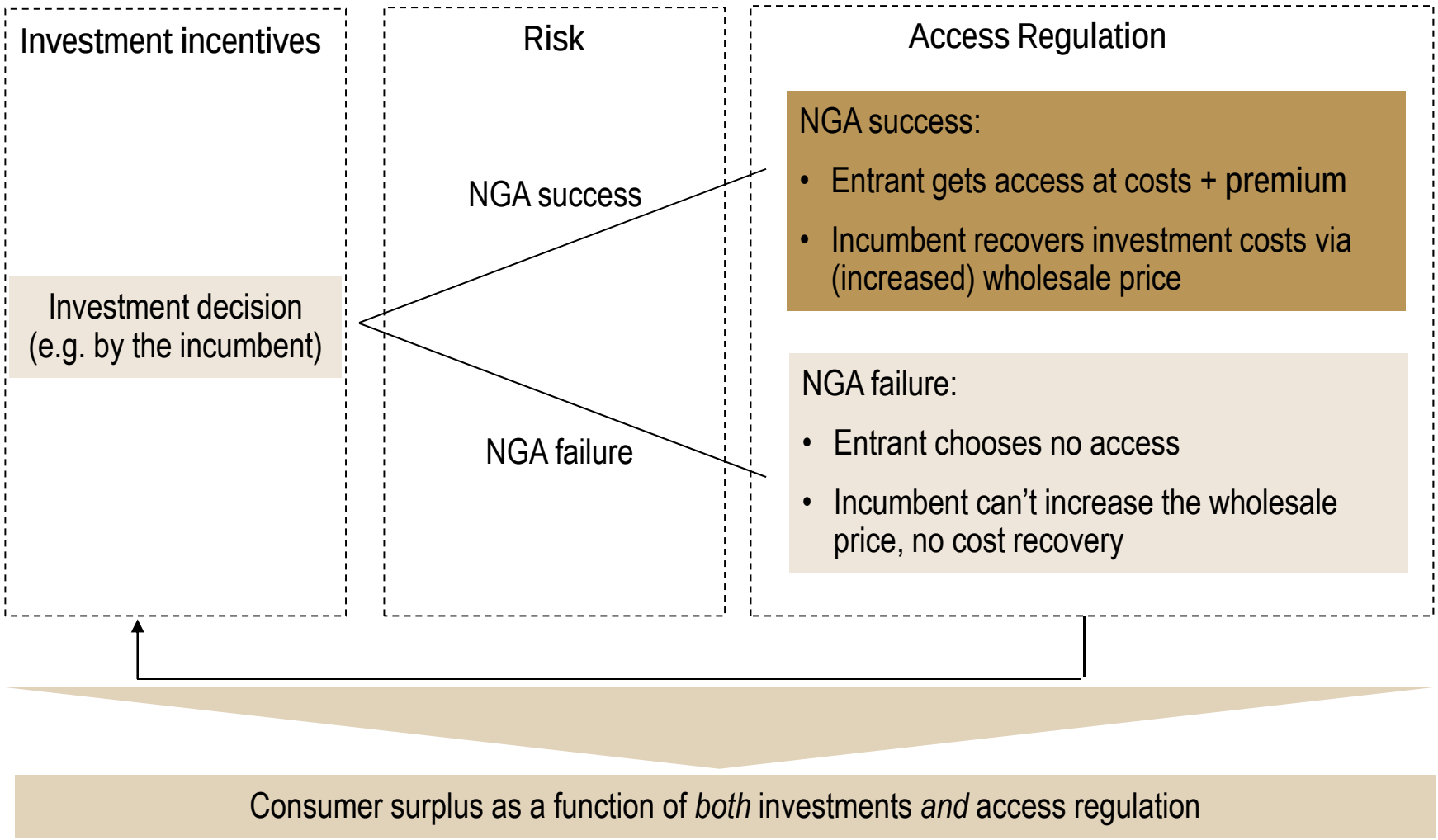
Alternative # 1: Fully Distributed Cost (FDC) regulation



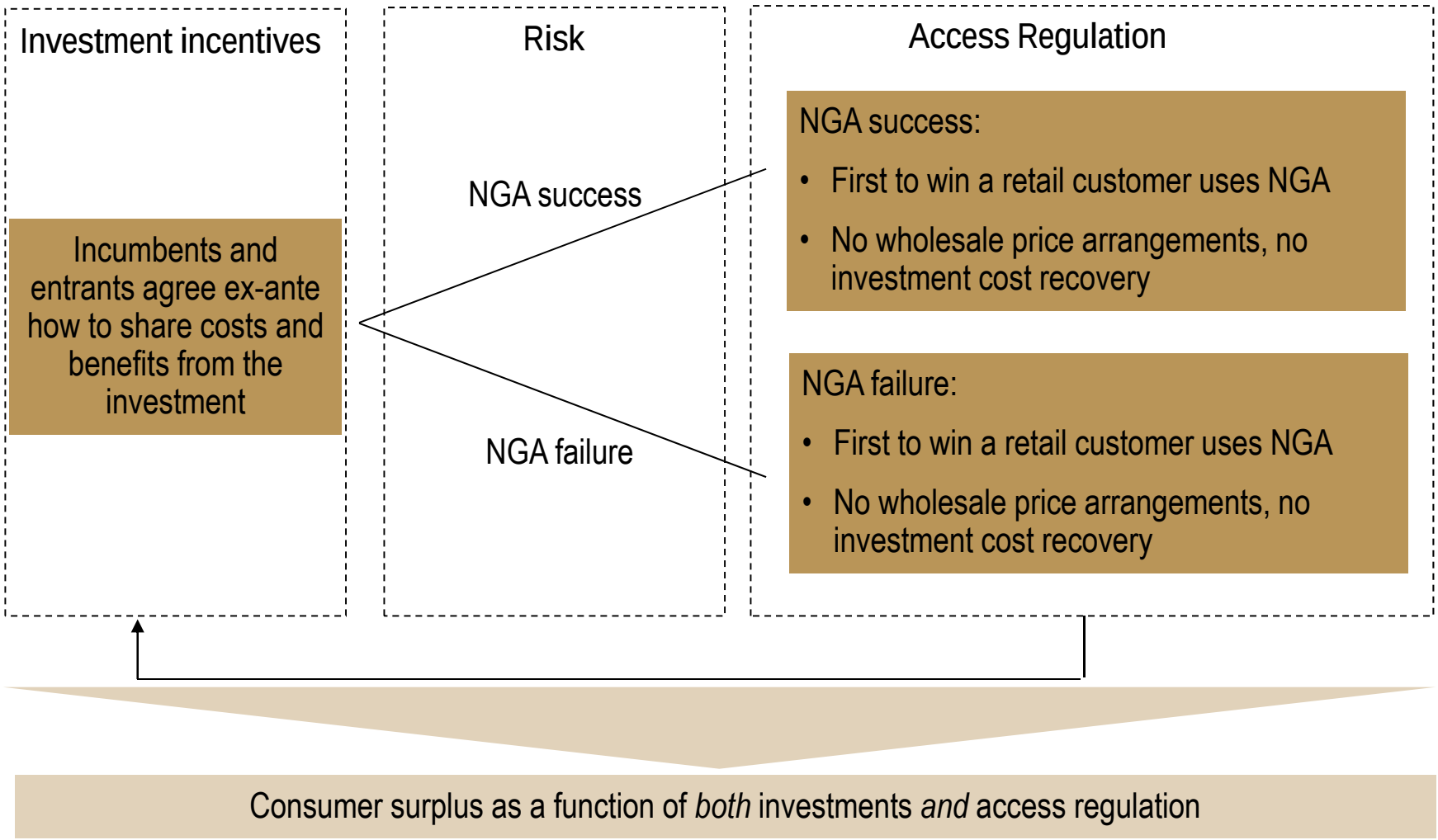
Alternative # 2: Regulatory Holiday



Alternative # 3: Risk Premium



Alternative # 4: Risk Sharing



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)

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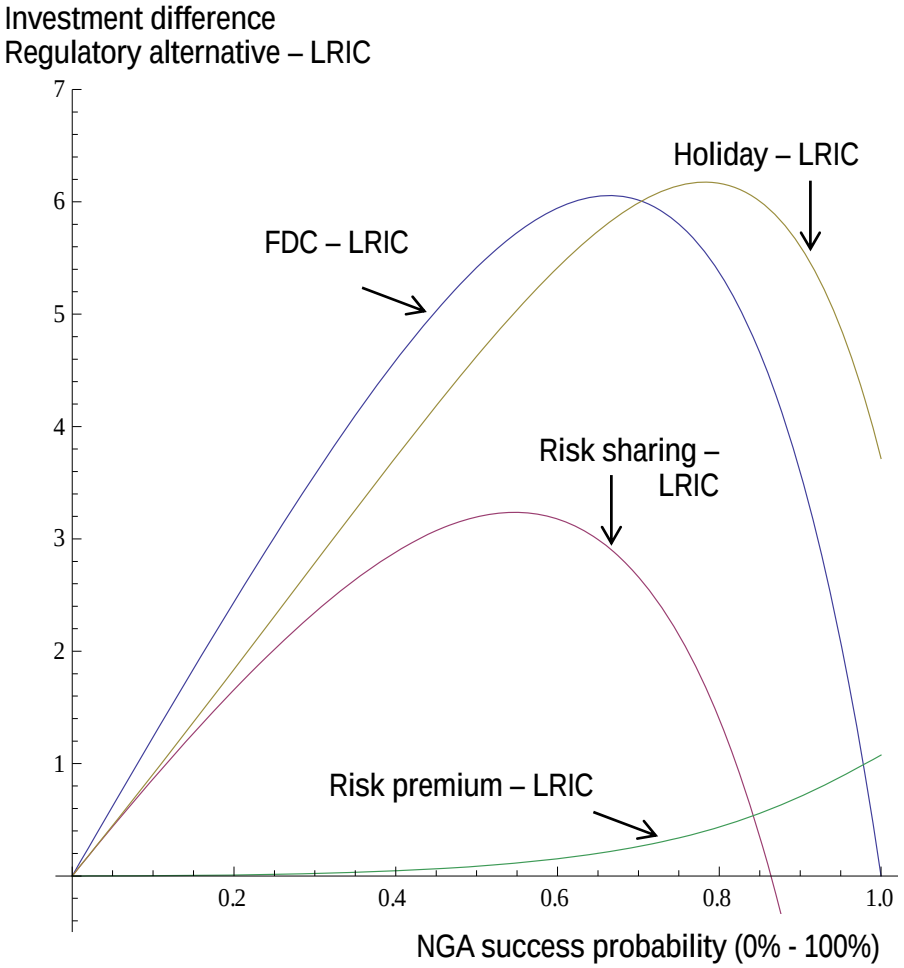
Extensions and refinements

Summary and conclusions

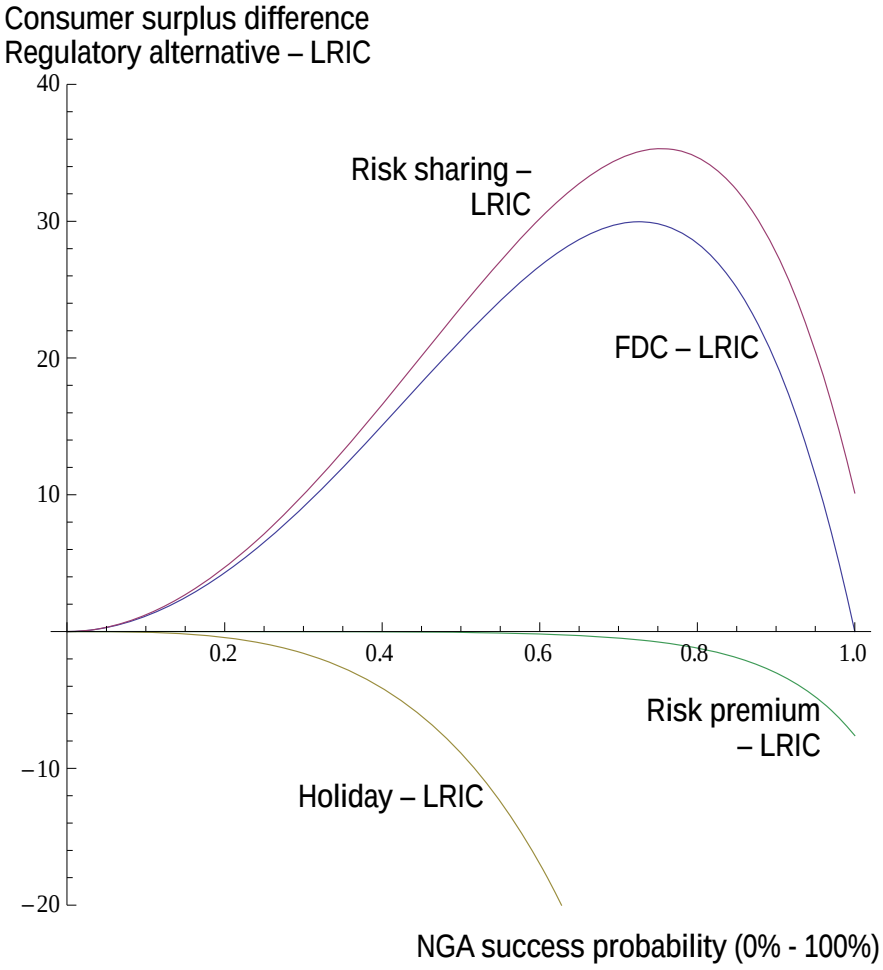
Investments are stimulated by all regulatory alternatives



- **Fully distributed costs** (FDC) stimulate investments
  - 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 as 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+20%)

Consumer surplus is only increased by some regulatory alternatives



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

- **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)
- **Fully distributed costs (FDC)** benefit consumers
  - increased investment
  - ex-post access to all Parties
  - *but* ex-post investment cost recovery via wholesale price (softens competition)
- **Risk premium** also seems to induce asymmetric market structure (to a lesser extent as holiday); if it has any leverage, it may not benefit consumers [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	Highest consumer surplus
LRIC	5	3
Holiday	2	5
Fully distributed costs	1	2
Risk premium (1)	4	4
Risk sharing	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 + 20%). Further sensitivity checks necessary for validation.

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Extension and refinements (I)

Risk premium

- Robustness check with respect to other risk premium cases (optimal risk premium?)

Incorporate ex-post margin squeeze regulation

- Current set-up only regards ex-ante regulation
- However, in practice there is an ex-post non margin squeeze obligation
- A non margin squeeze obligation may limit the incumbent's scope to set low retail prices and to penetrate the market
- Hence, a non margin squeeze obligation affects the incumbent's investment decision in the first place
- Does a non margin squeeze obligation benefit consumers in the context of investments under uncertainty?

Risk sharing

- Current set-up supposes no ex-post wholesale price arrangements
- Explore effects of alternative risk-sharing arrangements
  - wholesale prices according to NGA investment costs
  - wholesale prices freely set by risk-sharing firms

Extension and refinements (II)

More than one entrant

- Current set-up only regards one incumbent and one entrant
- Impact of numerous entrants on investment incentives and competition
- Sufficient number of entrants to sign risk-sharing agreements

Incumbent / entrant asymmetry

- Current set-up only considers asymmetry in terms of investor / non-investor role
- Check results for further asymmetries regarding e.g. market share

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Summary and conclusions

- Currently, little theoretical and empirical evidence of how different regulatory approaches perform, taking into account *both* ex-ante investment incentives and ex-post access / competition
- NGA regulation should simultaneously consider both aspects, investment incentives and access / competition conditions
  - all regulatory alternatives seem to induce more investment than LRIC
  - however, results derived from the ESMT model suggest that only risk sharing and fully distributed costs may also create higher consumer surplus
- Regulatory alternatives may involve gains for all stakeholders: incumbents, entrants and consumers (model extension required)
- ESMT model offers framework for integrated analysis, further analysis is necessary to gain comprehensive understanding
  - validate robustness
  - allow for extensions

Thank you!

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