Competition and Investment In Mobile Telecommunications
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OUTLINE
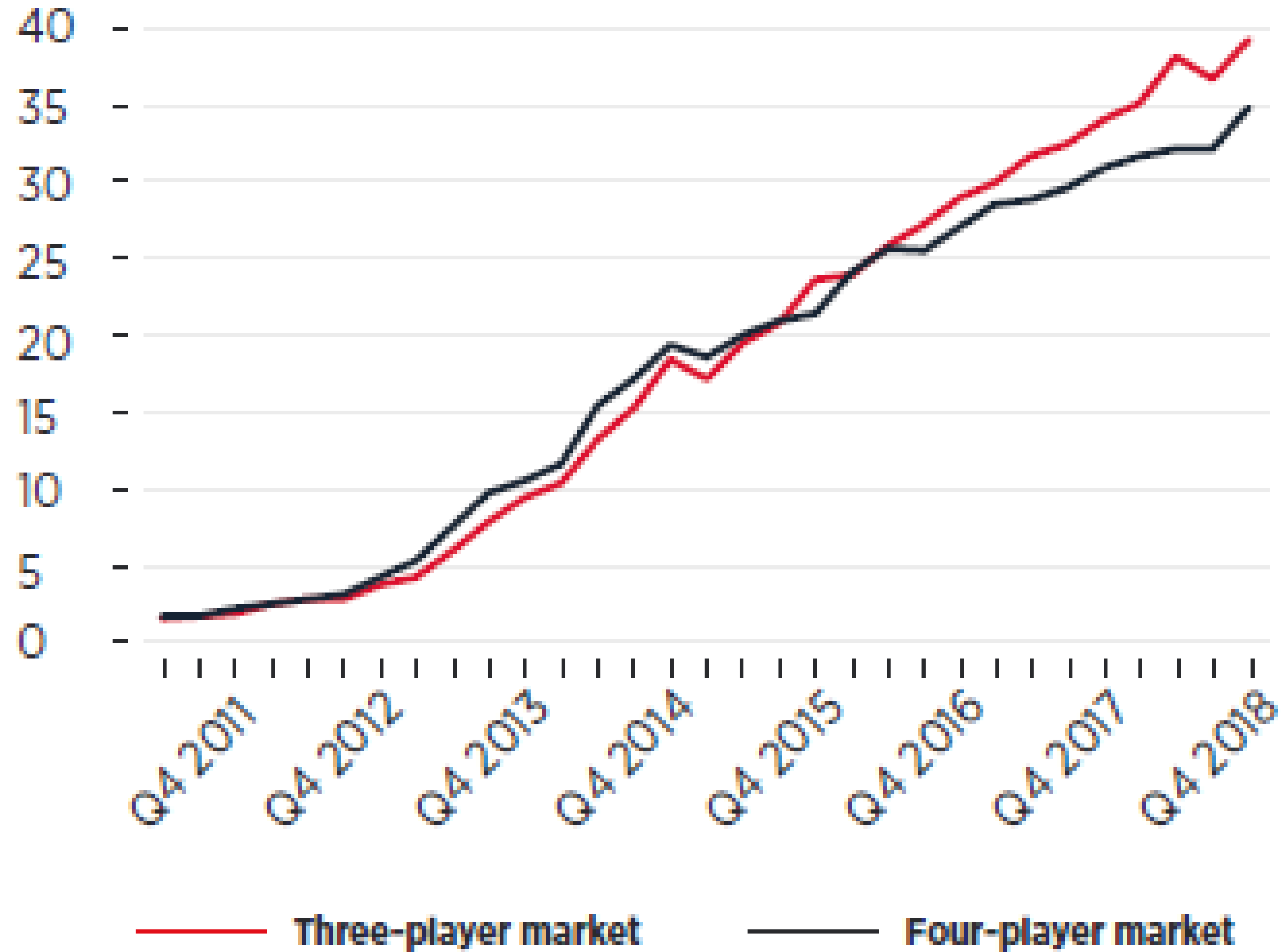
1. Market structure and performance since the 4G
2. The issue of mergers in telecoms
3. A research study for the French case
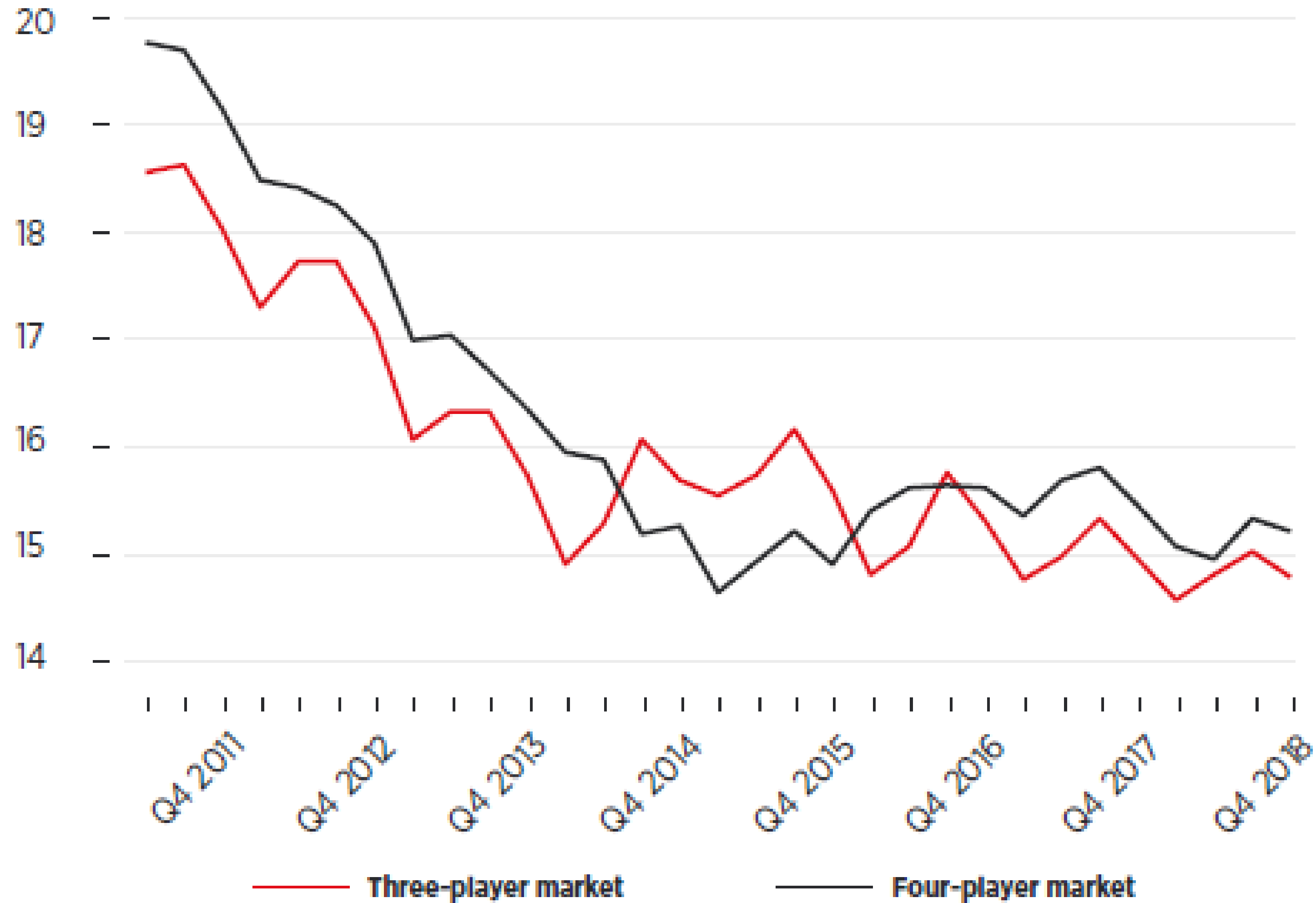4. Simulation results
5. Conclusion

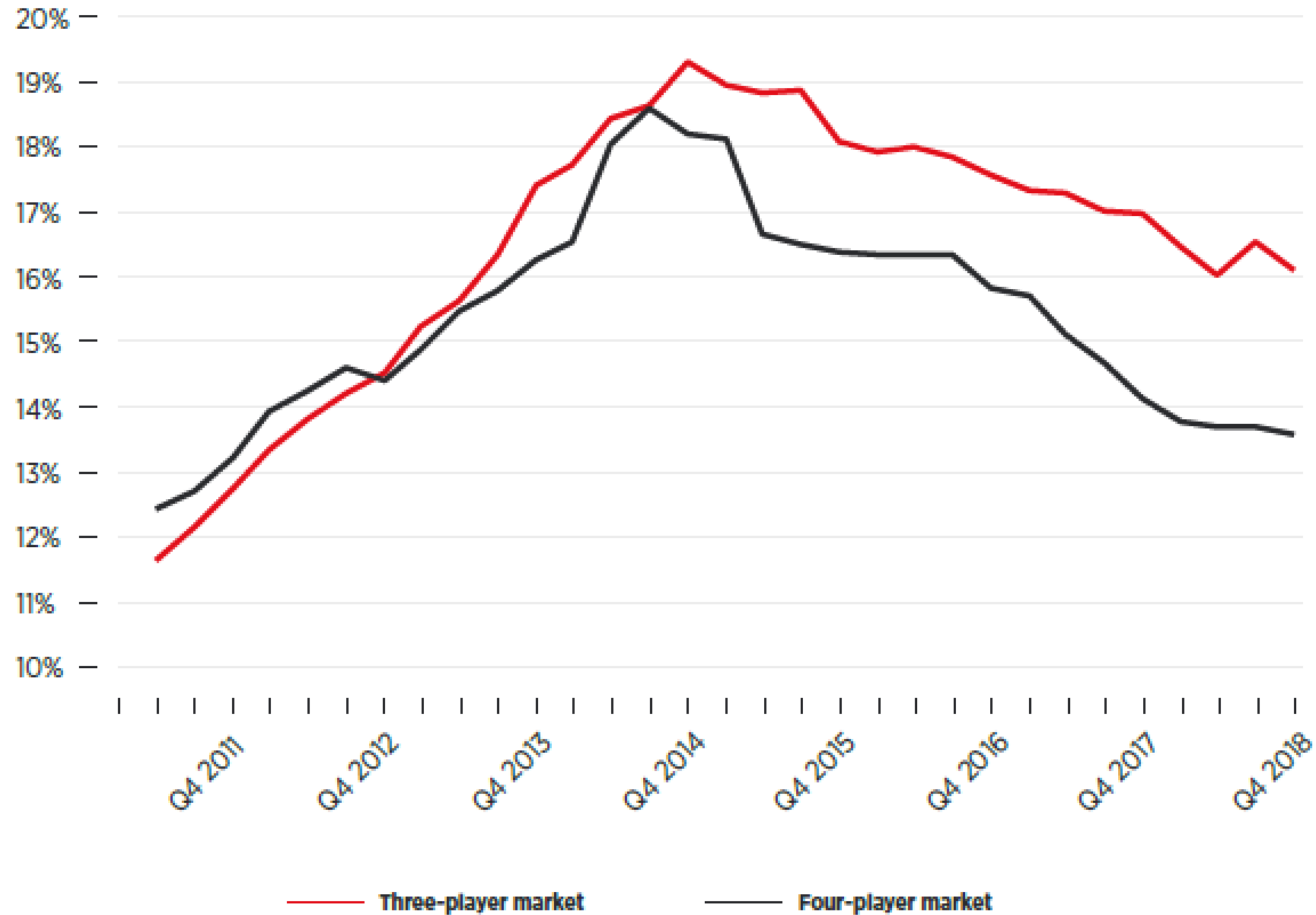# 1. Market structure and performance of the mobile telecoms industry in Europe

Market performance: Quality (download speed)

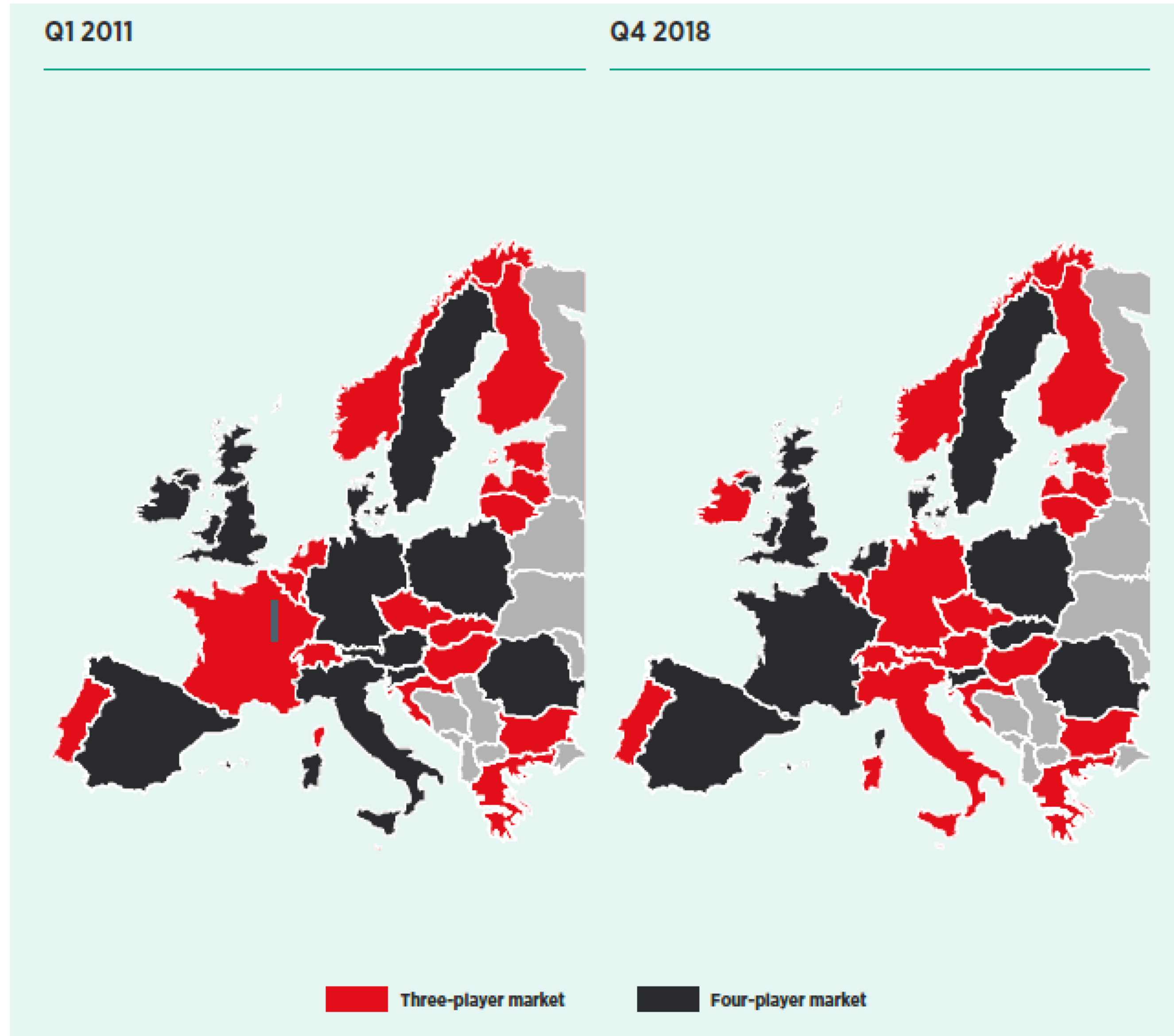
Legend: Three-player market (red), Four-player market (black)

Market performance: Prices (average revenue per user ARPU)

Market performance: Investment (CAPEX)
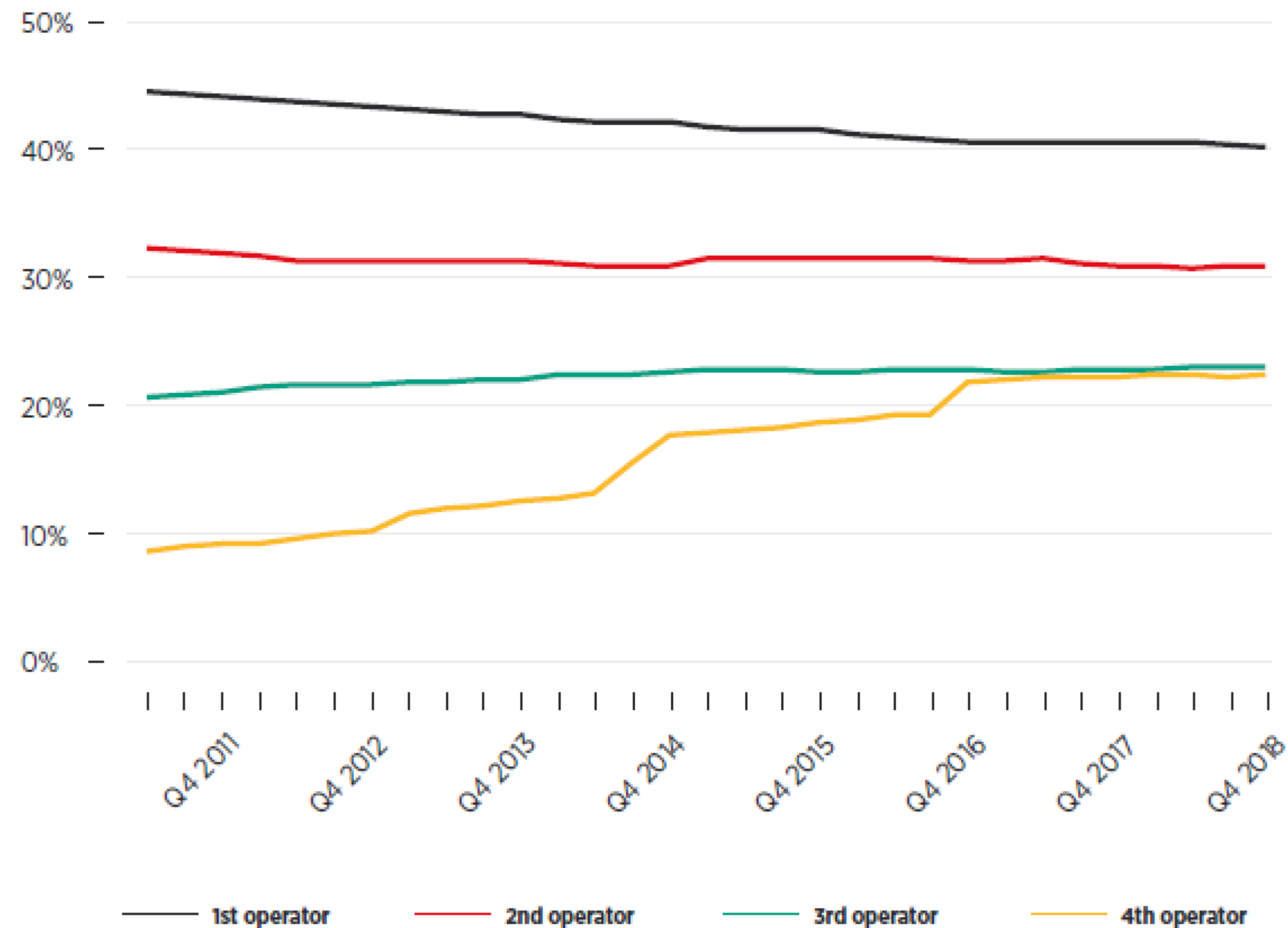

Three-player market ——— Four-player market

Market structure

Market structure

- Less concentration with less players
  - Market shares are getting more symmetric

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2. The issue of mergers in Telecoms

Motivation

- Traditional merger evaluation

  - Trade-offs between market power and economies of scale

    - Increasing concentration   ⟶   higher prices

    - Increased firm size   ⟶   cost efficiencies   ⟶   lower price

  - An empirical matter

Motivation

- Traditional merger evaluation

- Modern telecommunications industry

  - Impact of consolidation on costs ➜ Impact on quality of service

    - Same level of transmission capacity spread

      - Across a large / small number of customers with low / high download speed

- Mergers in Telecoms

  - A question of quality of service

  - Discussion on Network Sharing Agreements (NSAs)

Objective

- How to change in market structure impact
  - Price
  - Quality
  - Cost
  - Welfare

- What is the future of the mobile telecom industry in the EU?
  - Only 3 operators per countries ?
  - Only 3 operators at the EU level ?

- Need: A model of infrastruture costs and delivered quality

Literature

- Market power vs. scale efficiencies
  - Williamson (1968)

- Market power and antitrust in telecom
  - DeGraba and Rosston (2018)
  - Bourreau, Sun and Verboven (2018)
  - Sinkinson (2016)

- Network effects in telecom
  - Bjorkengren (2018), Weiergraeber (2018)

Literature

- Market power vs. scale efficiencies
- Market power and antitrust in telecom
- Network effects in telecom

- Congestion externalities
  - Vickrey (1969)
  - Dinkelman and Schulhofer-Wohl (2015)

- Infrastructure in mobile telecommunications
  - Nevo, Turner, and Williams (2016)
  - Sun (2015)
  - Baszczyszyn and Karray (2015)

3. A research study for the French case

Structure

- ## 4 MNOs + MVNOs

Orange	Bouygues	Free	SFR	MVNO
31.76%	14.12%	14.12%	24.71%	15.29%

- ## 4G technology
  - Focus on data

- ## Each MNO has its own network in urban areas
  - Allocated frequency bandwidth and build base stations
  - Quality = download speed

Data

- Detailed municipality-product-level data for all customers from one firm (Orange)

- Aggregate (national) market shares for other firms

- Full menu of contracts for each firm obtained from catalogs

- Municipality-level measure of download speed derived from data on network infrastructure (ANFR)

- Demographic information from INSEE

Model

- Transmission equilibrium

  - Queueing + network effect (congestion)

  - Quality delivered by each firm = difference between

    - Theoretical upper bound on capacity (engineering rules)

      - Bandwidth

      - Size of base station (radius)

    - Arrival rate of download requests

      - Depends on demand, ie, on price …. and quality of others !!

Model

- Transmission equilibrium (engineering model)
  - Quality as a function of bandwidth and radius of base stations

- Price competition
  - Given quality, which prices?
  - Prices as a function of bandwidth and radius of base stations

Model

- Transmission equilibrium
  - Quality as a function of bandwidth and radius of base stations
- Price competition
  - Prices as a function of bandwidth and radius of base stations

- Infrastructure competition
  - LR Profit as a function of bandwidth and radius of base stations
  - Outcome: Vector of bandwidth and radius
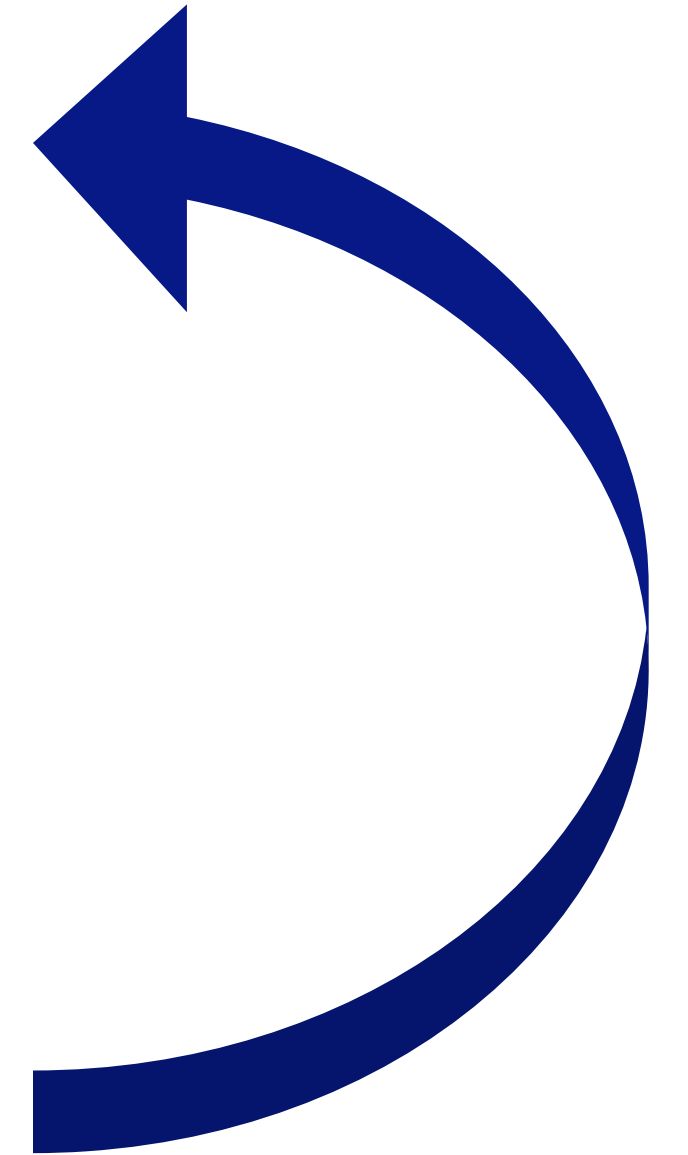
Scale efficiencies

- Economies of density
  - Merged firm has a higher effective density of consumers
    - Data requests completed more efficiently the closer one is to the base station
    - On average, consumers and base stations are closer together, yielding higher download speeds

- Congestion: Merged firm has twice the bandwidth
  - Increased bandwidth increases the channel capacity by more than the added data demanded offsets it, yielding higher download speeds

A merger of two symmetric firms can yield higher quality
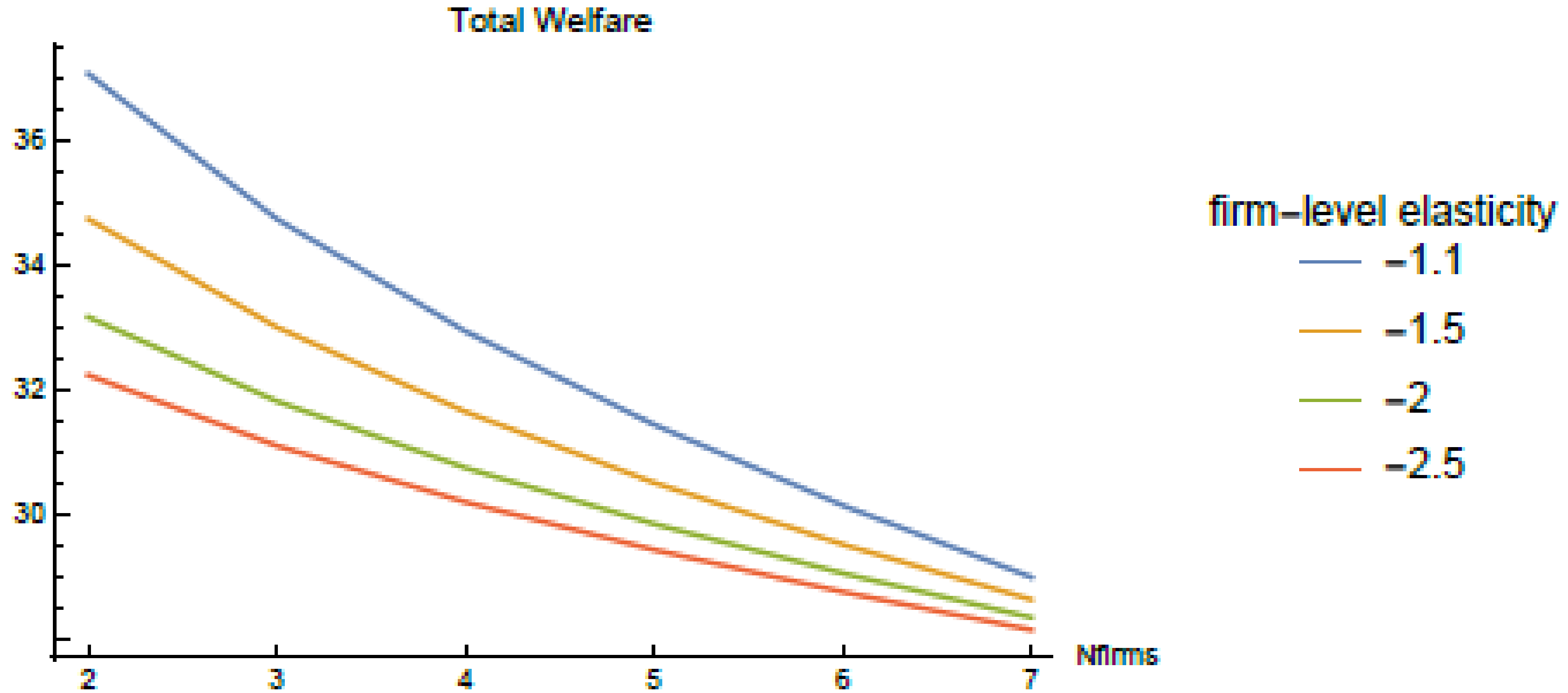
at the same cost, holding data demanded constant

4. Simulation results

Per–base station fixed cost
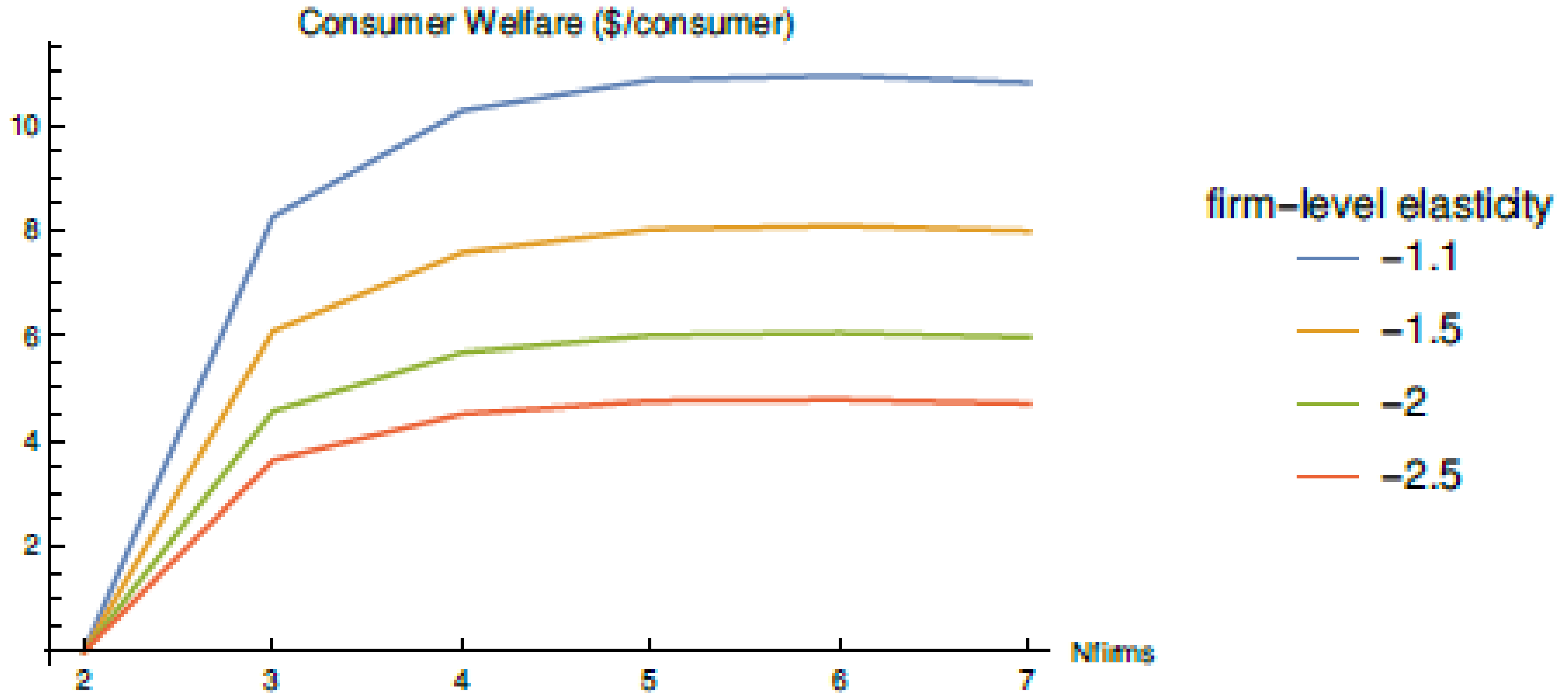
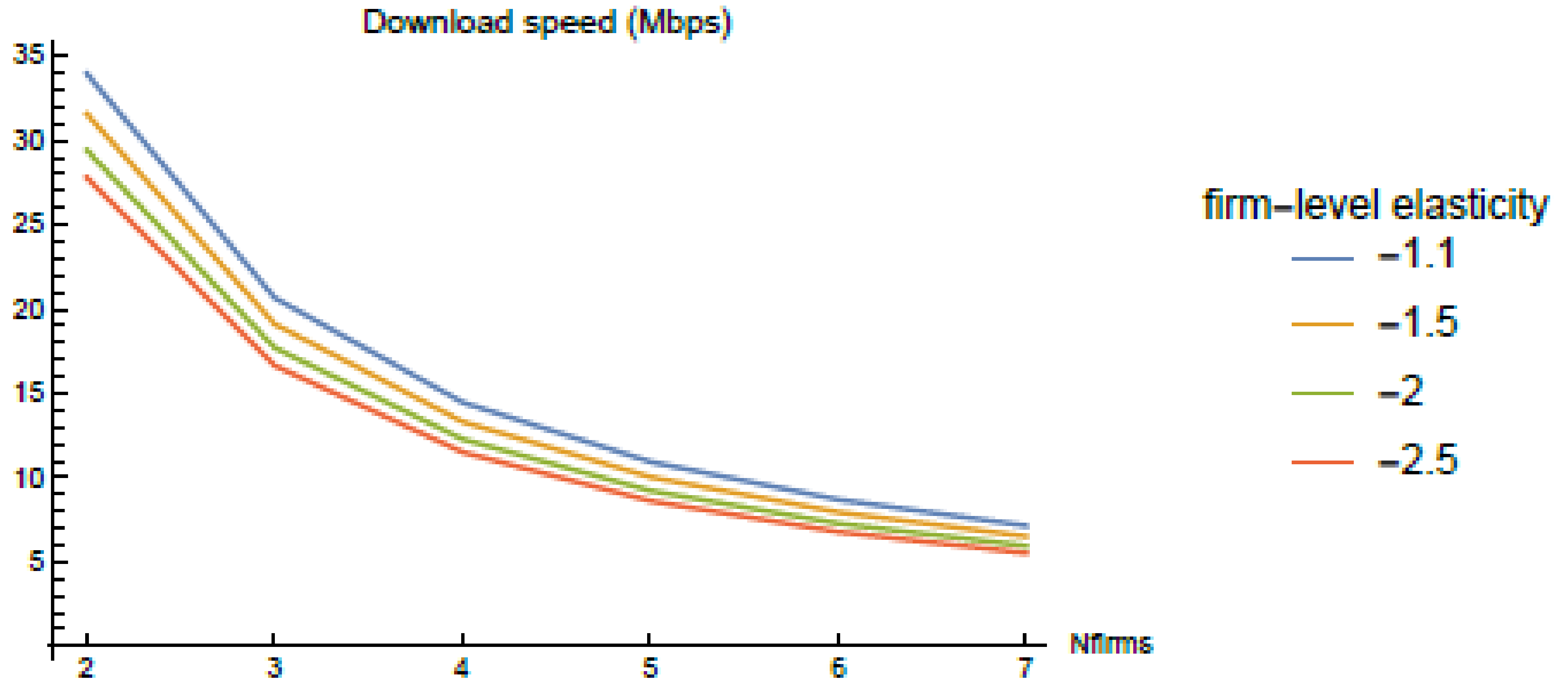Consumer Welfare ($/consumer)
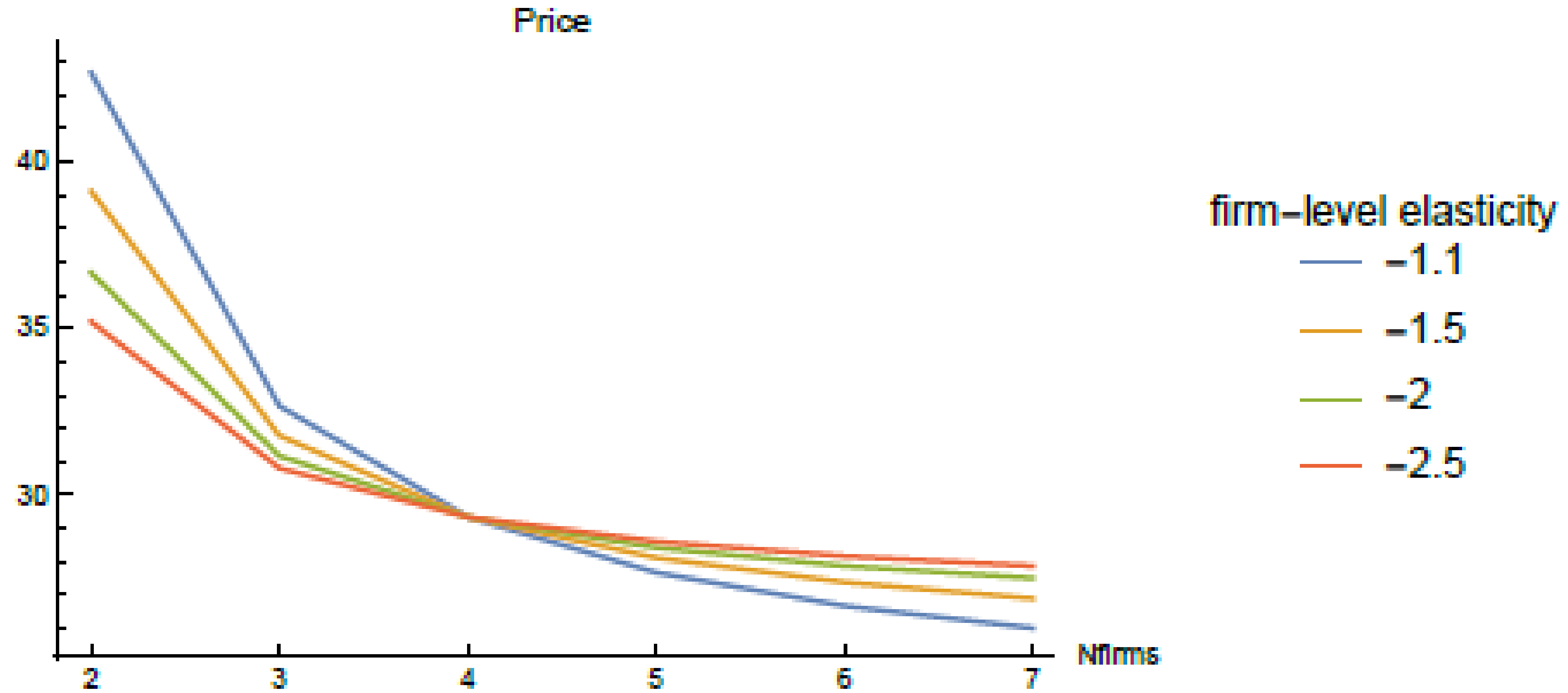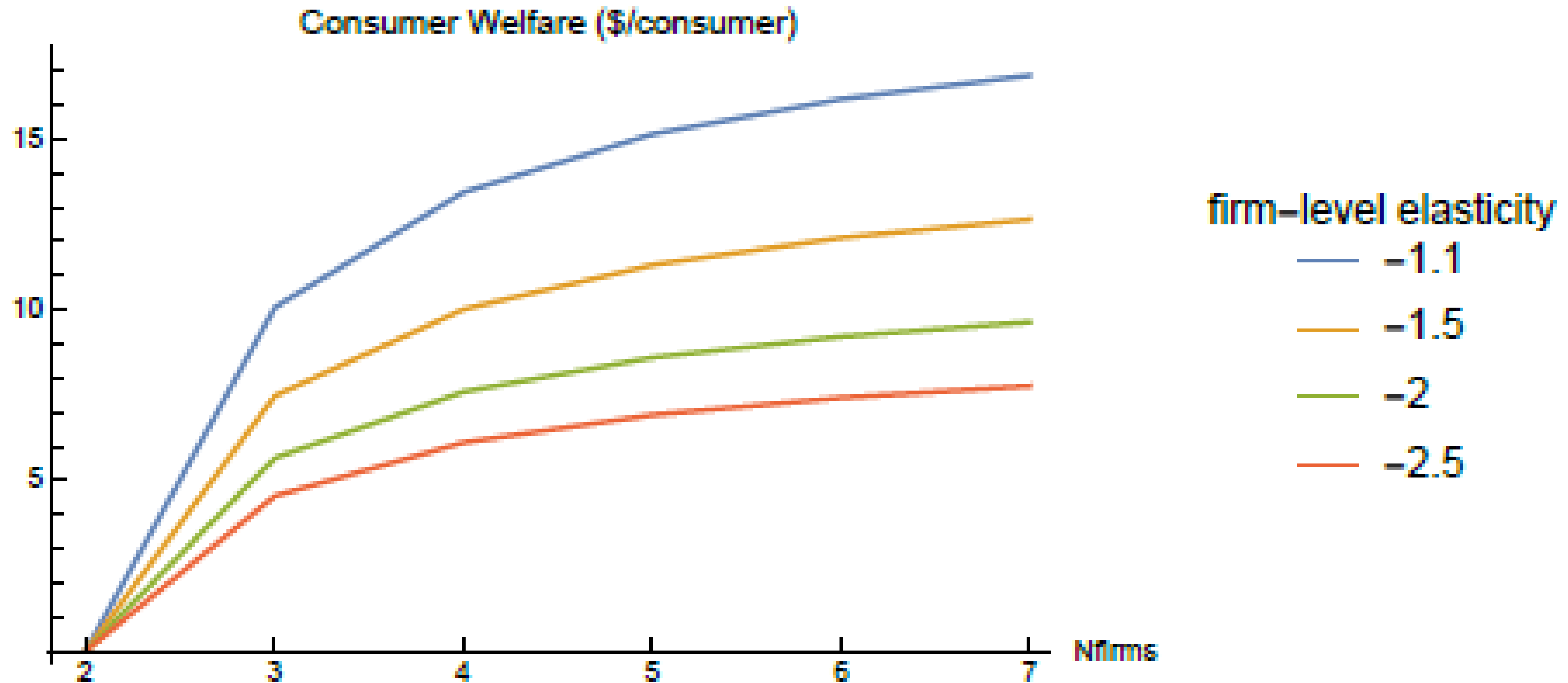
firm–level elasticity
— -1.1
— -1.5
— -2
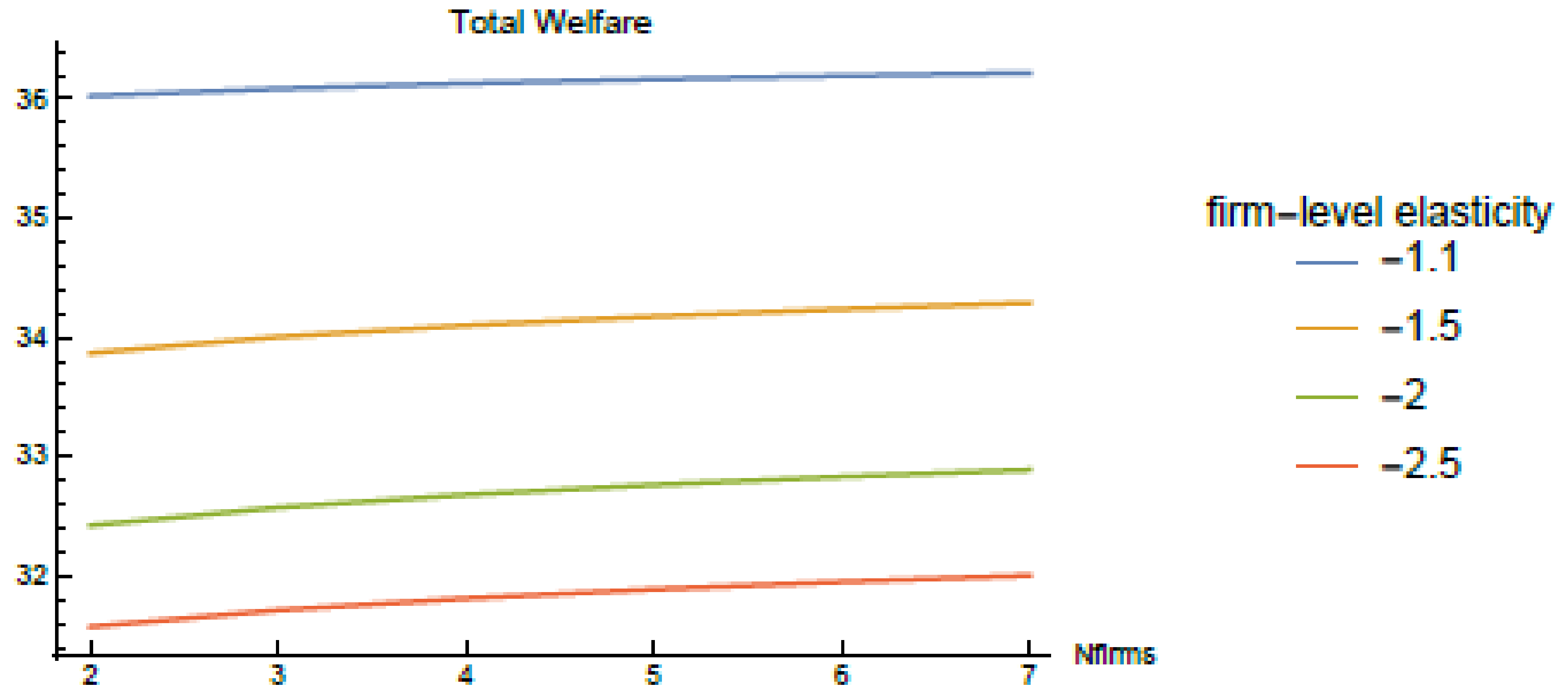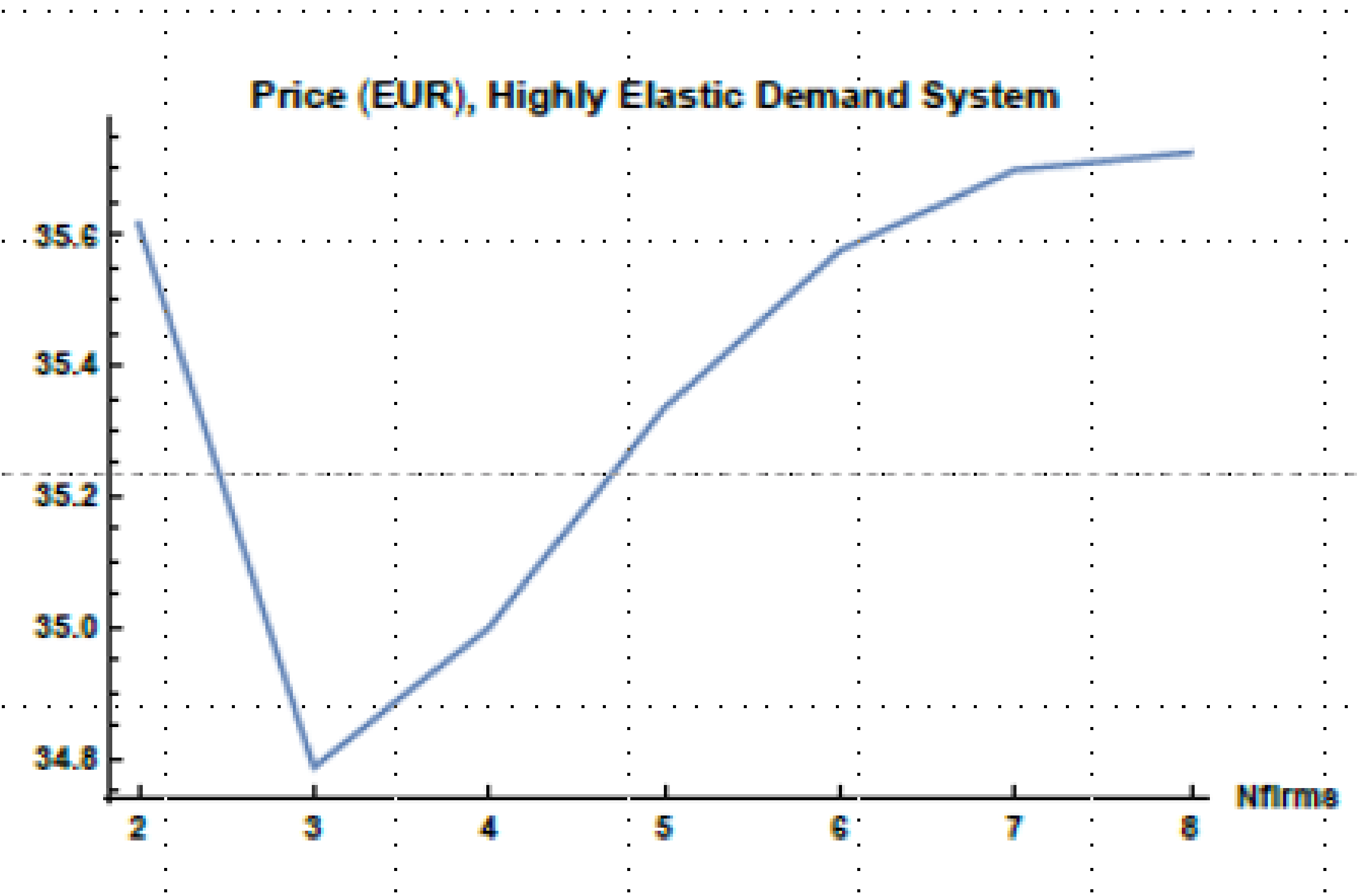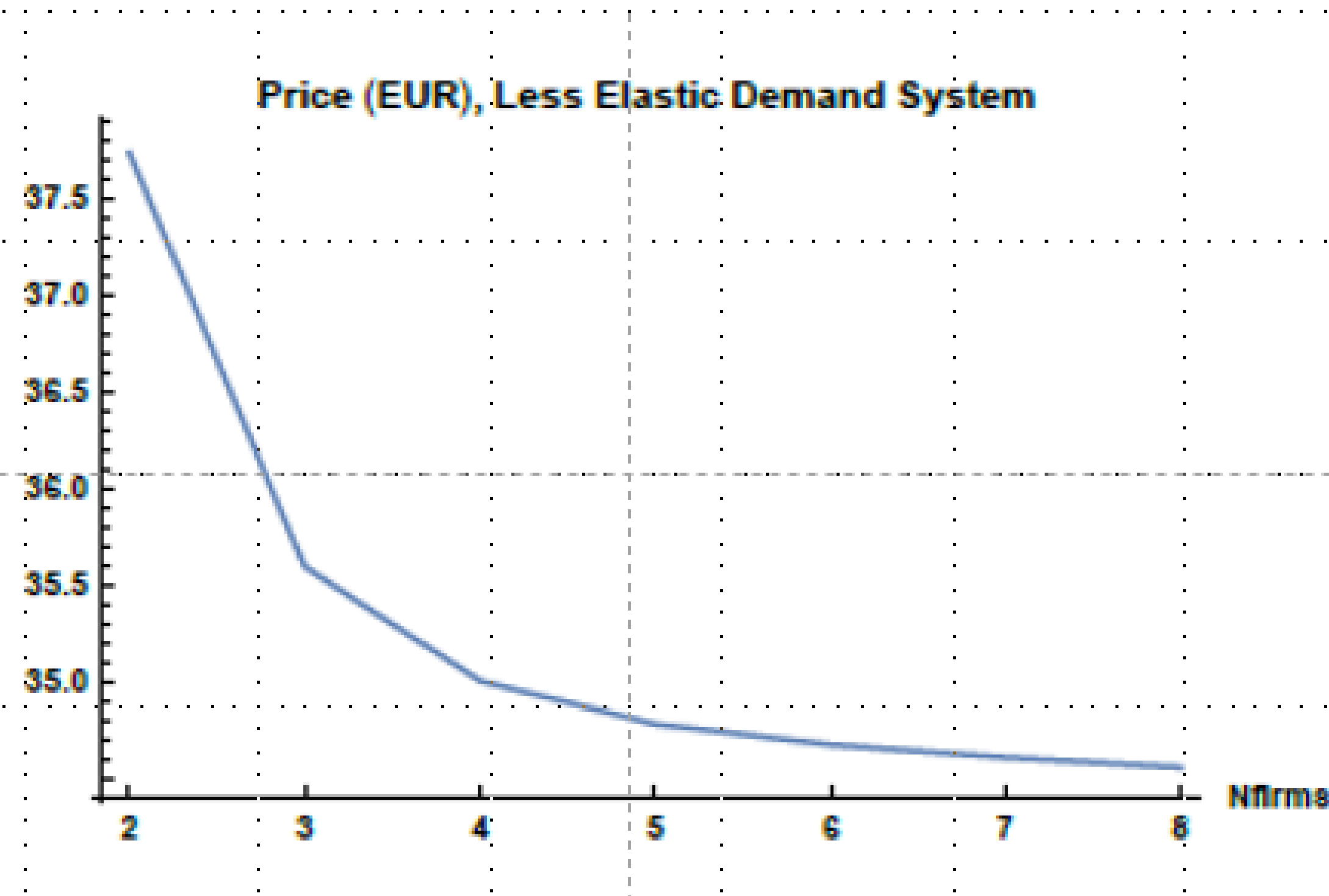— -2.5

Per-base station fixed cost

Per-base station fixed cost

Per-base station fixed cost

Per-base station variable cost (with bandwidth)

Consumer Welfare ($/consumer)

firm-level elasticity
—— −1.1
—— −1.5
—— −2
—— −2.5

Per-base station variable cost (with bandwidth)

A merger in the general case

Price (EUR), Less Elastic Demand System

Price (EUR), Highly Elastic Demand System

5. Conclusion

Main technical points

- Trade-off between between scale efficiencies and market power
  - Key issue of integrating an engineering-based model of infrastructure with an economic model of competition

- U-shaped relation between price and number of firms
  - Due to congestion
  - Only for highly ealstic demand
  - Can make the case for mergers from n to 3 firms

Main policy recommendations

- The market structure impacts the trade-off between quality and price
    - Scope for regulation

- Both passive and active should be encouraged
    - Active sharing on the RAN (excluding sharing the spectrum?)
    - Not fully a matter of population density

Thank you