



CASE AT.40305 NETWORK SHARING CZECH REPUBLIC: ECONOMIC ANALYSIS

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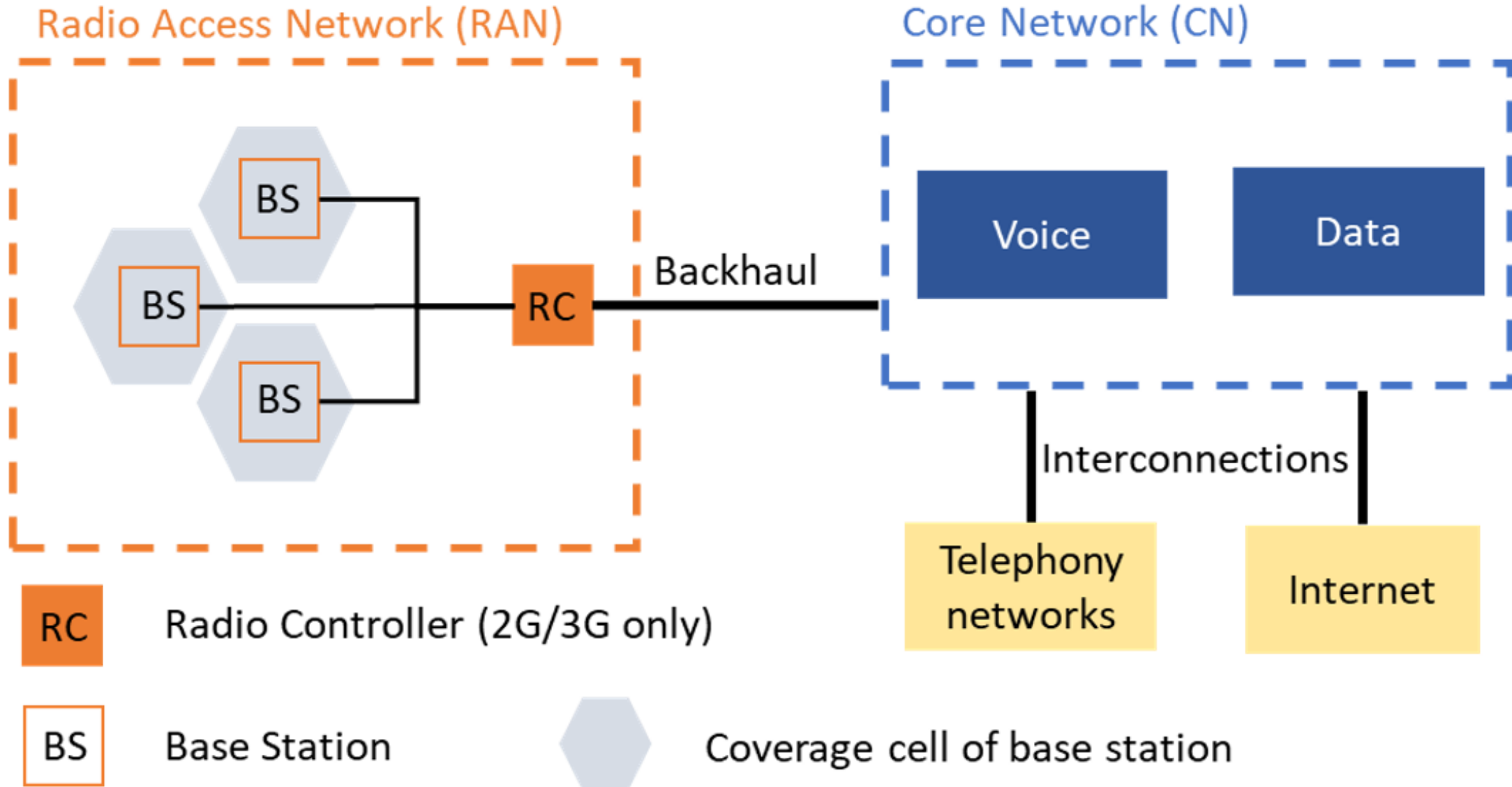
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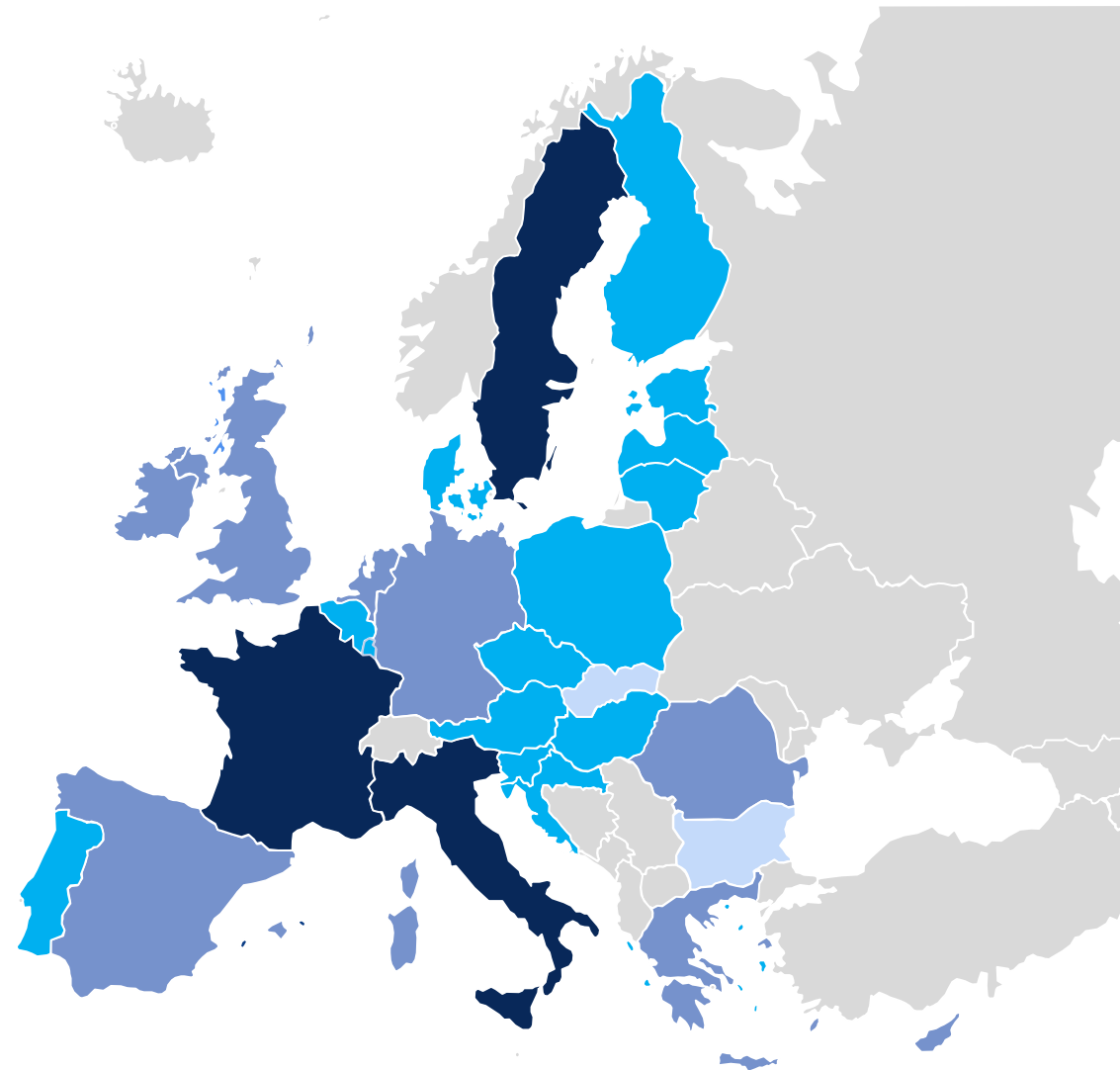
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The telecommunications mobile technology



NSA in Europe



3 NSAs

2 NSAs

1 NSA

0 NSAs

Not EU27+UK

The scope for economic analysis

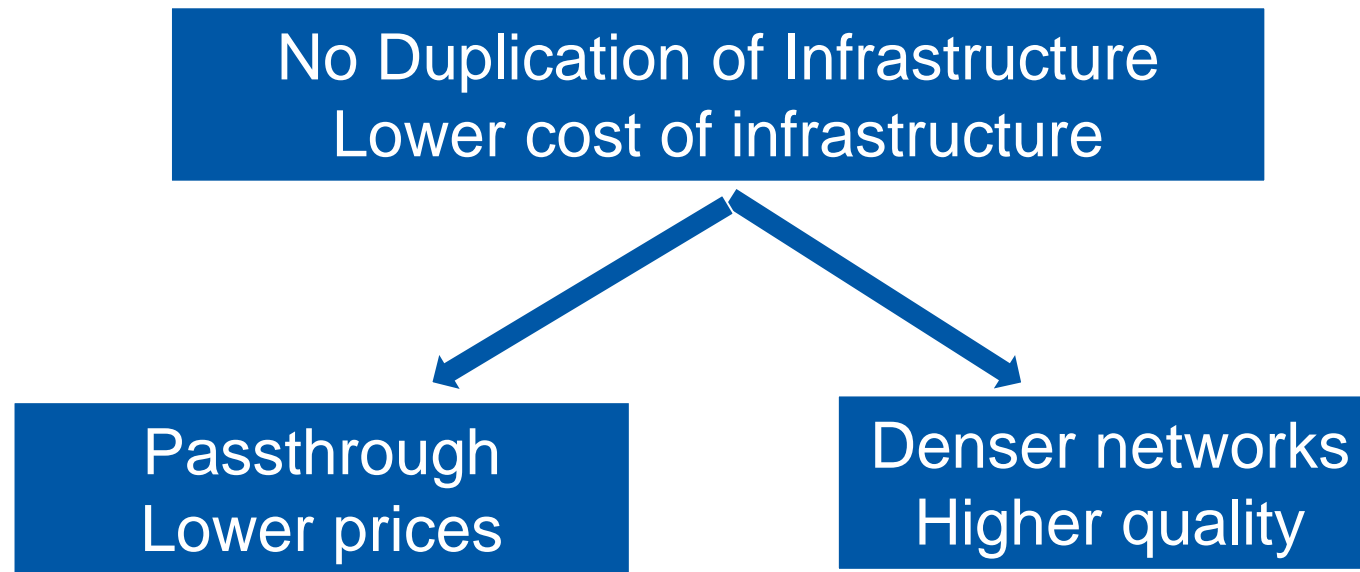
Issues

- Cooperation on investment  Impact on prices and quality
- Competition on prices and quality  Impact on investment

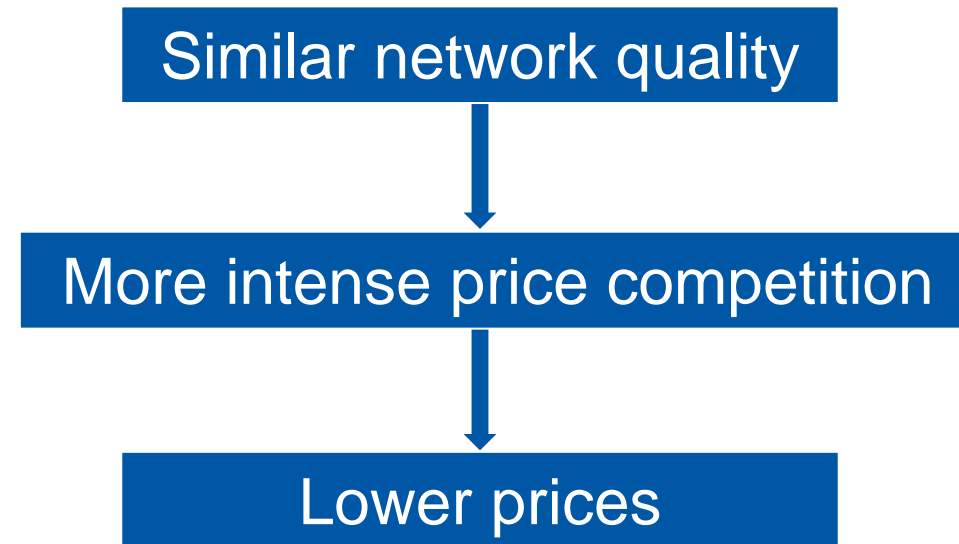
Questions

- Does cooperation drive the market away from the competitive outcome?
- Is a NSA welfare enhancing compared to a but-for situation without NSA?

Potential pro-competitive effects



Potential pro-competitive effects



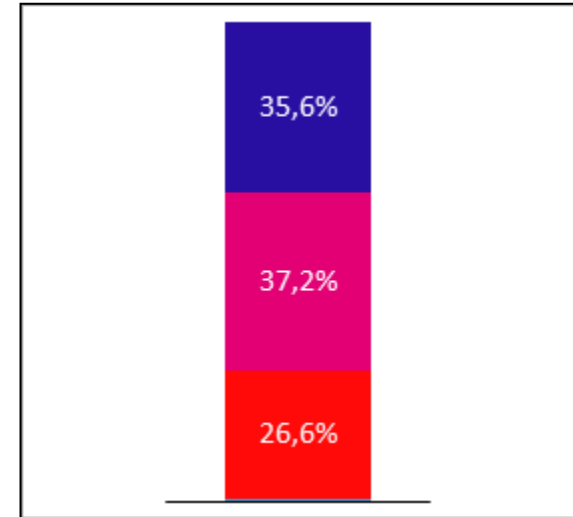
Potential anti-competitive effects

Cooperation on investment

- Exchange of information  Co-ordination for higher prices
- Negotiation on technologies  Lower network quality

NSA in Czech Republic (CZ)

- 3 MNOs = Almost 99% of the market
 - O2, TM and Vodafone
- Passive and active sharing between O2 and TM
 - 2G/3G agreement in October 2013
 - 4G/LTE agreement in May 2014
- Geo-split



Difference of quality between West and East

- One of main (quantitative) critiques of the Commission
- True !
 - 16% difference in download speed for TMCZ
- Meaning : To download 5.6 Gbits (worldwide average monthly data usage)
 - 127 seconds in the West
 - 151 seconds in the East
 - Difference = 26 second
- Evaluation
 - Value of 1 second for an average CZ citizen = 0.0016 euro
 - Total loss for all CZ citizen in the East = 3.8 Millions euros
 - **Peanuts!**

Economic analysis

- Effect of the NSA on
 - Prices
 - Quality
 - Consumer surplus

Impact on prices: Method

- Benchmarking (DiD) on the expenditure on baskets of telecoms services
 - CZ versus European countries with no NSA
- Quarterly data from Telingen database from 2010 to 2019
 - Tariffs of two biggest MNOs per country for 36 countries

OECD (2010, 2012) Usage Basket Volumes
for Monthly Consumption

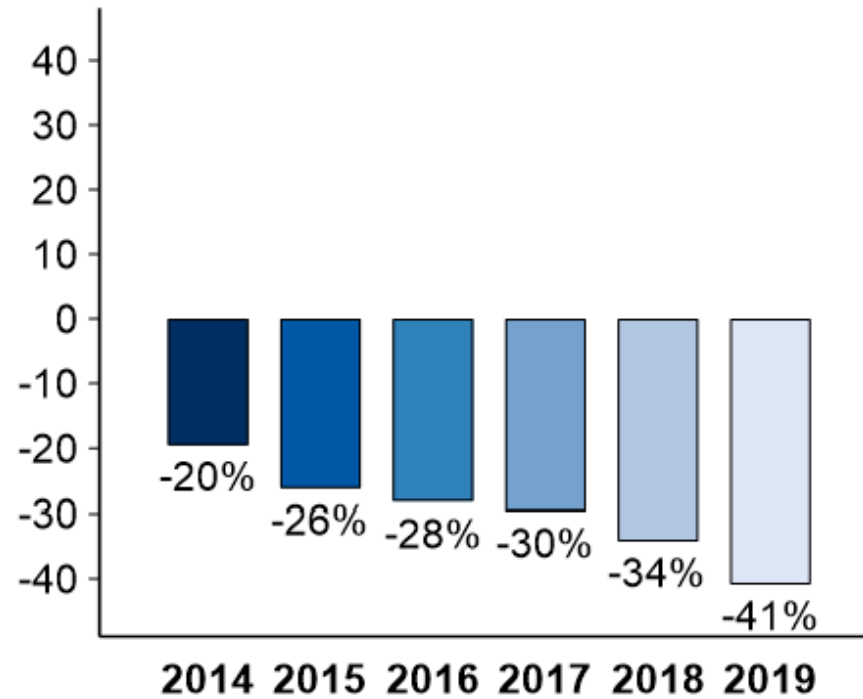
| Basket Name | Calls | SMS | Data |
|--------------------|--------------|------------|--------------|
| | | | ----(Mb)---- |
| OECD1 | 30 | 100 | 100 |
| OECD2 | 100 | 140 | 500 |
| OECD3 | 300 | 225 | 1,000 |
| OECD4 | 900 | 350 | 2,000 |
| OECD5 | 100 | 140 | 2,000 |

Source: OECD (2010, 2012).

Impact on prices: Results

% Change in expenditure

OECD5



Impact on prices: Results




Resulting RBE change for the main specification

| Basket | OECD1 | OECD2 | OECD3 | OECD4 | OECD5 |
|------------|---------------|-----------|-----------|-----------|-----------|
| Year: | ----- % ----- | | | | |
| 2014 | -17.35*** | -16.96*** | -18.36*** | -20.68* | -19.56*** |
| 2015 | -17.58*** | -27.2*** | -24.55*** | -34.61*** | -26.19*** |
| 2016 | -25.29*** | -30.33*** | -18.48** | -29.41** | -28.21** |
| 2017 | -38.45*** | -30.38*** | -10.27 | -19.5 | -29.68** |
| 2018 | -45.25*** | -33.65*** | -2.91 | -13.63 | -34.22** |
| 2019 Q1-Q2 | -43.91*** | -39.19*** | -4.96 | -18.28 | -40.9** |

Impact on quality: Method

- Change in quality index before & after the NSA
 - Download speed
 - Upload speed
 - Latency
- Quaterly data from Ookla database from 2010 to 2019
 - Only for CZ operators

Impact on quality: Results

| | | |
|-----------------|--|-----------|
| Download speed |  | 22 – 26 % |
| Upload speed |  | 52 – 62 % |
| Network latency |  | 27 - 30 % |

Impact on consumer welfare: Method

- Oligopoly model with differentiated products
 - Two strategic variables: prices and quality
- Situation
 - Investment is given
 - Investment impacts costs of access and quality
- Comparison of market organization
 - Simultaneous competition on prices and quality
 - Coopetition
 - Cooperation on quality
 - Competition on prices

Impact on consumer welfare: Method

- A nested logit demand model

$$\ln \left(\frac{s_{it}}{s_{0t}} \right) = \mu_0 + \beta q_{it} - \alpha p_{it} + \sigma \ln(s_{i|gt}) + x_{it} \delta + \xi_{it}$$

- Price (Analysys Mason data)
 - ARPU = average revenue per user
- Quality (OoKla data)
 - Aggregate download speed per operator per year
- Capacity
 - total 4G spectrum in MHz that is deployed on shared and non-shared sites
- Firm fixed effect

Impact on consumer welfare: Method

- Marginal cost of access

$$c_{it} = c_0 + \theta_i \mu_i + \gamma \text{year}_t + \phi \text{quarter}_t \\ + \rho^{\text{shared}} \text{shared_sites}_{it}^{4G} + \rho^{\text{nonshared}} \text{nonshared_sites}_{it}^{4G} + MTR_t + \omega_{it}$$

- Quality cost parameter

$$k_{it}^T = c_0 + \theta_i \mu_i + \gamma \text{year}_t + \rho^{\text{shared}} \text{shared_sites}_{it}^{4G} \\ + \rho^{\text{nonshared}} \text{nonshared_sites}_{it}^{4G} + MTR_t + \omega_{it}$$

Impact on consumer welfare: Results

- Full competition and coopetition are indistinguishable
- Diversion ratios

| Diversion ratios before and after the NSAs | | | | |
|---|------------|------------------------|-----------|-----------------|
| Operator | NSA | Diversion ratio | | |
| | | TMCZ | O2 | Vodafone |
| O2 | Before | 58.57 | - | 35.00 |
| TMCZ | | - | 58.67 | 34.91 |
| Vodafone | | 47.29 | 47.51 | |
| O2 | After | 60.63 | - | 34.25 |
| TMCZ | | - | 59.65 | 35.11 |
| Vodafone | | 48.91 | 46.96 | |

Impact on consumer welfare: Results

Consumer surplus  2 - 6% under **NO** NSA

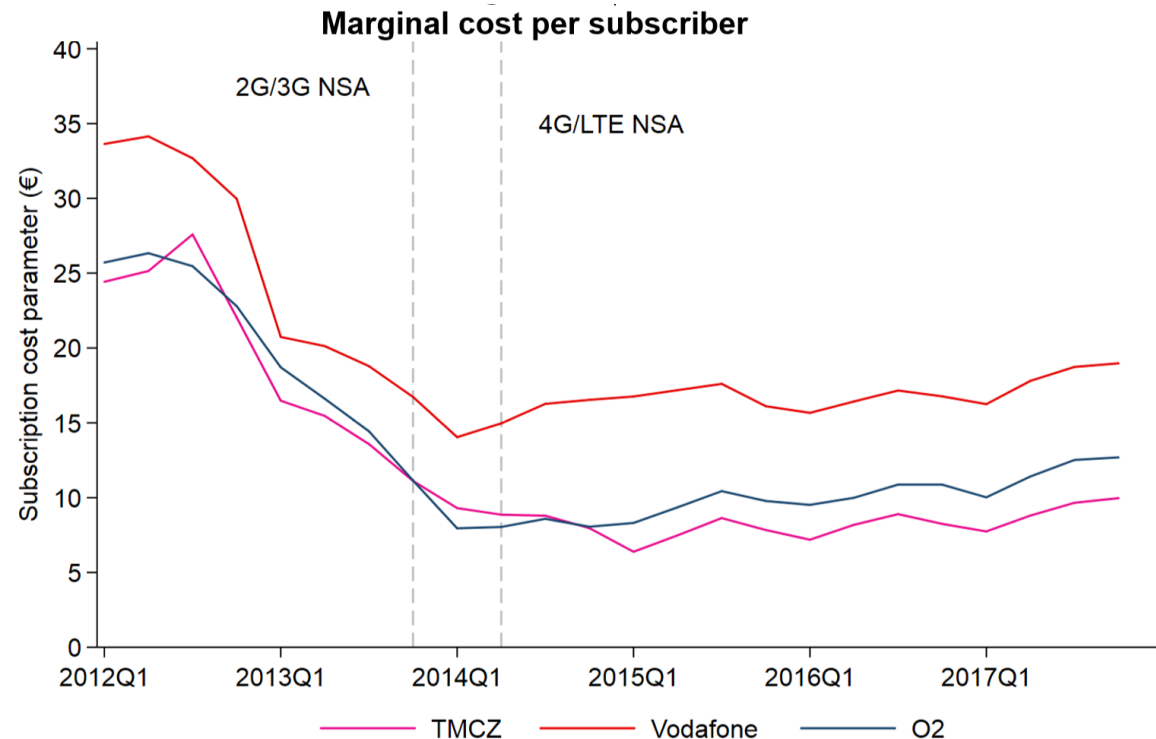
depending on investment strategy of competitor

$$c_{it} = c_0 + \theta_i \mu_i + \gamma \text{year}_t + \phi \text{quarter}_t \\ + \rho^{\text{shared}} \text{shared_sites}_{it}^{4G} + \rho^{\text{nonshared}} \text{nonshared_sites}_{it}^{4G} + MTR_t + \omega_{it}$$

$$k_{it}^T = c_0 + \theta_i \mu_i + \gamma \text{year}_t + \rho^{\text{shared}} \text{shared_sites}_{it}^{4G} \\ + \rho^{\text{nonshared}} \text{nonshared_sites}_{it}^{4G} + MTR_t + \omega_{it}$$

Impact on consumer welfare: Results

- Spillover effect on investment
 - The competitor to NSA partners needs to adapt its investment strategy



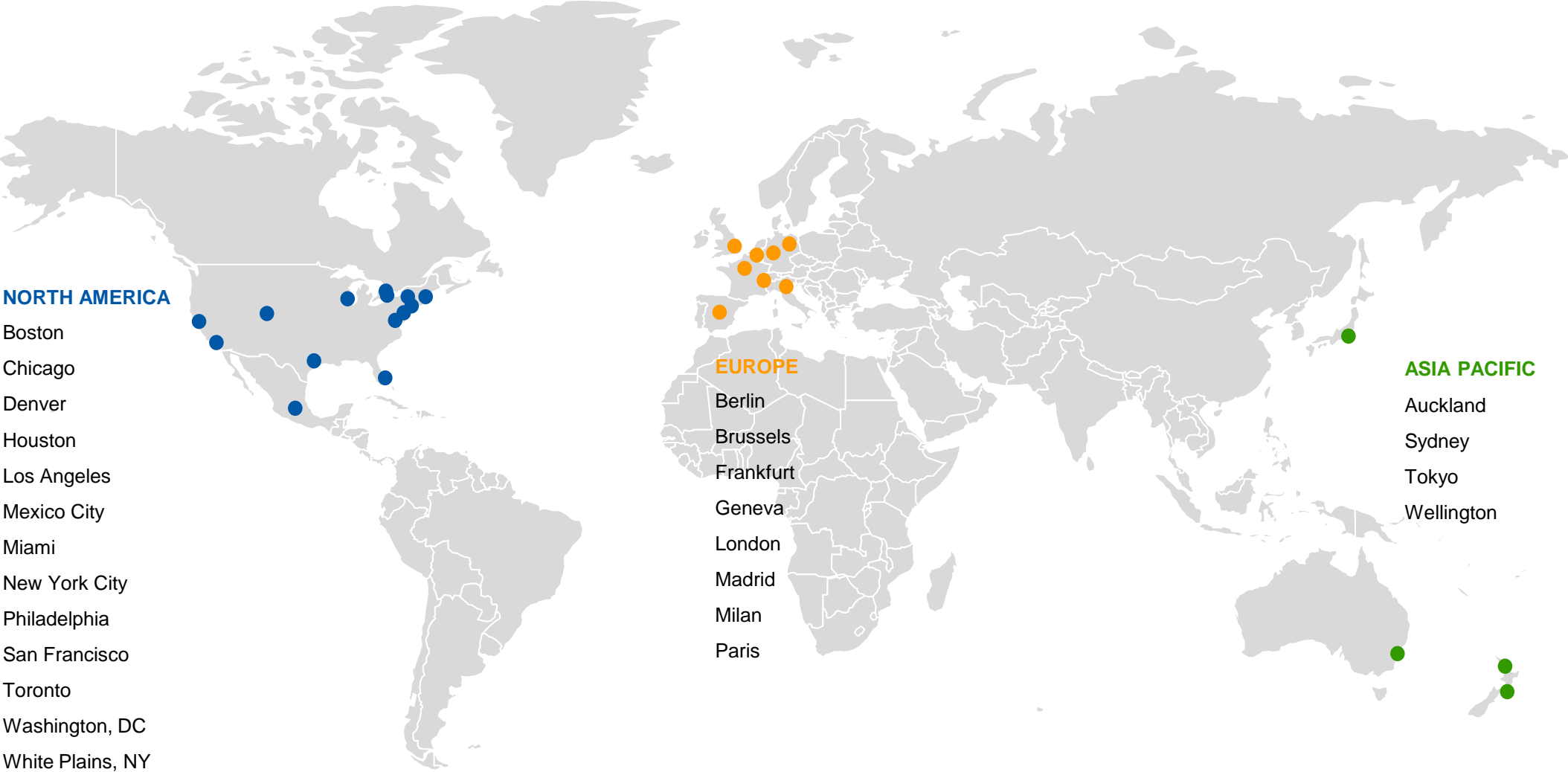
Main finding and concluding remark

- Empirical analysis: A NSA between 2 among 3 MNOs is welfare enhancing
- 5G NSA among telecom operators should be encouraged



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