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# A theoretical approach to oligopolistic market analysis applied to the Czech mobile market

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*Opinions and arguments presented in this presentation are opinions solely of Candole Partners and in no way reflect or indicate views held by ČTÚ and in no way indicate potential conclusions of the ongoing analysis of the market.*

# Relevant market

- Product market:
  - Wholesale market for mobile phone calls, SMS, data transfer
- Geographic market:
  - Czech Republic

# Identifying collective dominance

- Airtours and ČTÚ ordinance (no. 228/2012) criteria
  - Market transparency
  - Retaliatory mechanisms
  - Reaction of possible competitors
  - Reaction of consumers (price elasticity of demand)
  - Similar market shares
  - Profitability
  - Lack of countervailing buying power
  - Legal or economic barriers to entry
  - Vertical integration with collective refusal of supply

# Identifying collective dominance

- Profitability of collusion can be e.g. explained in infinitely played static game
  - N firms, 2 strategies
- Firms have the option of colluding, or deviating from collusion
  - Monopoly profits: $\pi^M$
    - Assuming symmetric division of profit: $\frac{\pi^M}{N}$
  - Profits in competitive market: $\pi^W$ = 0, MC = P

# Identifying collective dominance

- Repeated game, infinite number of repetitions
  - $V_i = \sum_{t=0}^{+\infty} \delta^t \pi_i\left(a_{i,t}, a_{-i,t}\right)$

$$V_0 = \sum_{t=0}^{+\infty} \delta^t \pi_t$$
$$= \delta^0 \pi_0 + \sum_{t=1}^{+\infty} \delta^t \pi_t$$
$$= \pi_0 + \sum_{t=0}^{+\infty} \delta^{t+1} \pi_{t+1}$$
$$= \pi_0 + \delta \sum_{t=0}^{+\infty} \delta^t \pi_{t+1}, \qquad V_1 = \sum_{t=0}^{+\infty} \delta^t \pi_{t+1}$$
$$= \pi_0 + \delta V_1$$

  - Under stationary conditions: $V_t = V_{t+1} = V_t$
  - Lifetime profits are the function of one period profit $\pi$ and discount rate $\delta$ $\qquad V = \pi_0 + \delta V \rightarrow V = \frac{\pi_0}{1-\delta}$

# Identifying collective dominance

- When all N firms cooperate they each earn:

$$V_i^C = \sum_{t=0}^{+\infty} \delta^t \frac{\pi^M}{N} = \frac{1}{1-\delta}\frac{\pi^M}{N}$$

- In deviation (competition):

$$V_i^D = \pi^M + \sum_{t=1}^{+\infty} \delta^t \pi^W = \pi^M + \frac{\delta}{1-\delta}\pi^W$$

# Identifying collective dominance

- When is a collusion a profitable strategy:

$$V_i^C \geq V_i^D$$

$$\frac{1}{1-\delta}\frac{\pi^M}{N} \geq \pi^M + \frac{\delta}{1-\delta}\pi^W$$

$$\delta \geq \frac{\pi^M}{(\pi^M - \pi^W)}\left(1 - \frac{1}{N}\right) \; or \quad 1 - \frac{1}{N}, \text{ when } \pi^W = 0$$

# Identifying collective dominance

- Less firms → higher probability of collusion

$$\delta \geq \frac{\pi^M}{(\pi^M - \pi^W)}\left(1 - \frac{1}{N}\right) \; or \quad 1 - \frac{1}{N}, \text{ when } \pi^W = 0$$

- In conclusion, collusion is more likely when:
  - $\delta$ is higher (more patient firms)
  - $\pi^M$ is higher (higher cooperation payoff)
  - $\pi^W$ is lower (lower competition profits)
  - $N$ is smaller (less firms)

# Identifying collective dominance

- What if strategy pay-offs are not symmetric?

| | Telefonica O2 | T-Mobile | Vodafone |
|---|---|---|---|
| Median share of market EBITDA (2006-2011) | 42% | 39% | 17% |

*Source: Company financial statements*

- Telefónica: $\frac{2\pi^M}{5} \rightarrow \delta \geq \frac{3\pi^M}{5(\pi^M - \pi^W)} = \frac{3}{5}$
- T-Mobile: $\frac{2\pi^M}{5} \rightarrow \delta \geq \frac{3\pi^M}{5(\pi^M - \pi^W)} = \frac{3}{5}$

Vodafone: $\frac{\pi^M}{5} \rightarrow \delta \geq \frac{3\pi^M}{5(\pi^M - \pi^W)} = \frac{4}{5}$

# Identifying collective dominance

- Probability of collusion increases with the firm's share on monopoly profits
  - The larger the payoff share, the higher the share of monopoly profits deriving from collusion
  - Entrants with small share will not collude, as their share from monopoly profits would be small and it would be more profitable to compete.
  - Once a certain critical payoff share has been achieved it becomes more profitable to collude
- To calculate this critical payoff share, we find a proxy for the discount rate at which firm discounts future profits
  - WACC -> capital intense market means business decisions are made
- Take result of model and replace *N* with payoff share (s) $\delta \geq 1 - \mathrm{s}$
- Define discount rate from discount factor: $\delta = 1 - i$
- Critical payoff share is equal to the discount rate

$$s \geq i$$

# Identifying collective dominance

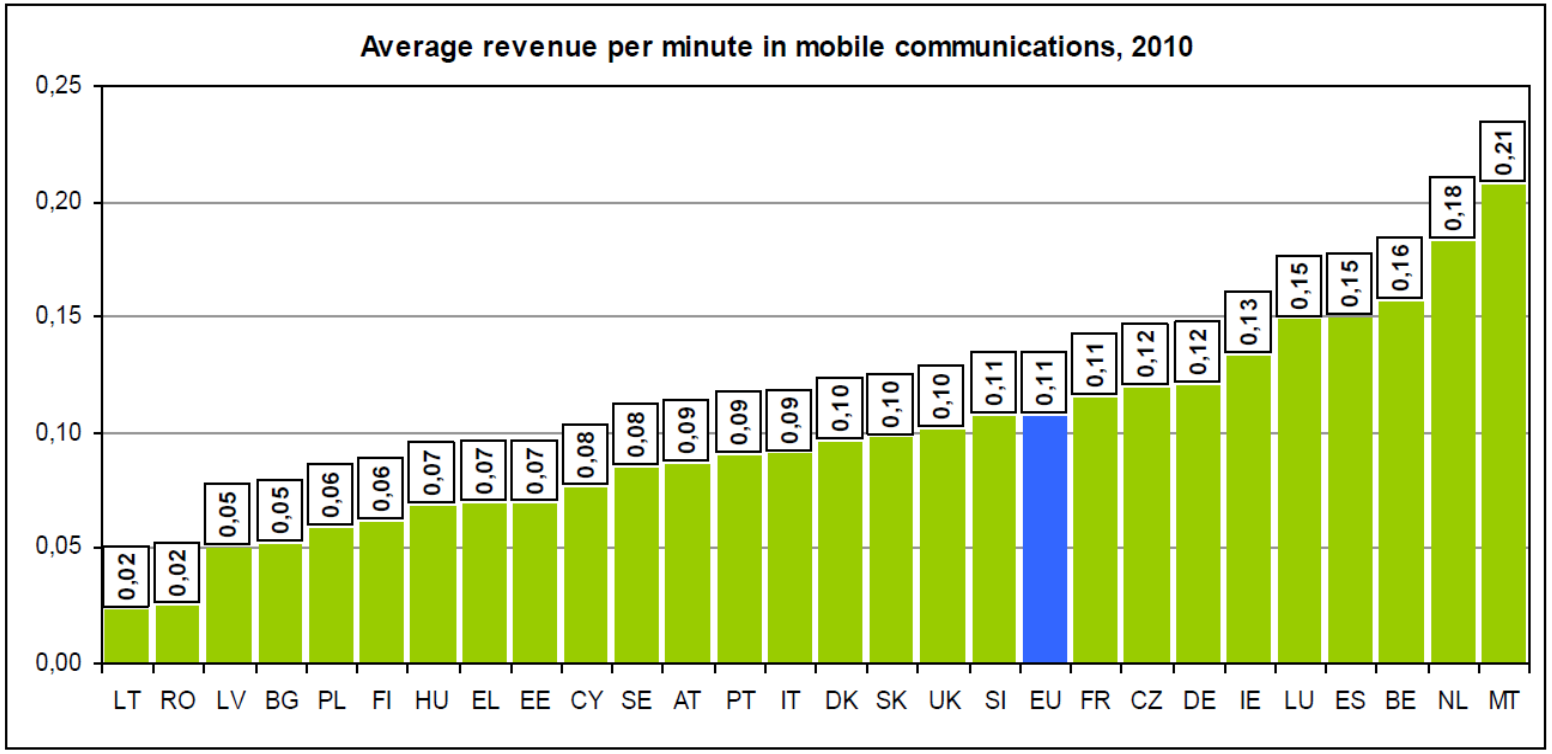
- WACC = discount rate = 5 – 10%
- Results: Critical payoff share:  5 – 10%
  - All 3 operators have a payoff share larger than this (17– 42%)
- Retaliatory mechanisms
  - Price war: Threat → Austrian market conditions

| | Czech average | Austrian average |
|---|---|---|
| ROCE | 15 – 20 % | 0 – 5 % |
| Post-tax nominal WACC | 5 – 10 % | 5 – 10 % |
| Difference | 10 – 15 % | -5 – 0 % |

Source: Company financial statements & own calculations

# Identifying collective dominance

- Result: above average prices




Source: European Commission

# Identifying collective dominance

- Reaction of consumers (price elasticity of demand)
  - Elasticity based on revenues per minute and real minutes

$$arc\ elasticity = \frac{P_1 + P_2}{Q_1 + Q_2} * \frac{\Delta Q}{\Delta P}$$

  - Industry elasticity lower than 1 in 2008-2011
  - Stagnant and static market

# Conclusions

- Game model and market indicators point to high probability of collusion

# Thank you for your attention!

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