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DOES THE NUMBER OF MOBILE OPERATORS MATTER?

Empirical food for thought for policy
discussion about in-market consolidation

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Fact:

Mobile prices are generally decreasing in time

But... debates about causes and effects

- What is the role of the number of players in this process?
- Are prices lower if the number of operators is higher?

Price as a proxy of market performance

- Price is good (though not exclusive) indicator of the market performance
- Price comparisons can help in assessing relative performance
- But... what is the object and method of comparison?
- Cross section data exists – there are many simple price comparisons out there
- But a simple cross-sectional price comparison is a half-baked evidence
- Controlling for other relevant factors is required
- It is better analyzing variance in space and time together (ie. panel)

Empirical studies for policy evaluation

Voice:

- Gergely Csorba and Zoltán Pápai: Does one more or one less mobile operator affect prices? A comprehensive ex-post evaluation of entries and mergers in European mobile telecommunication markets
 - panel data analysis
 - last public version <http://econstor.eu/bitstream/10419/88503/1/773139184.pdf>

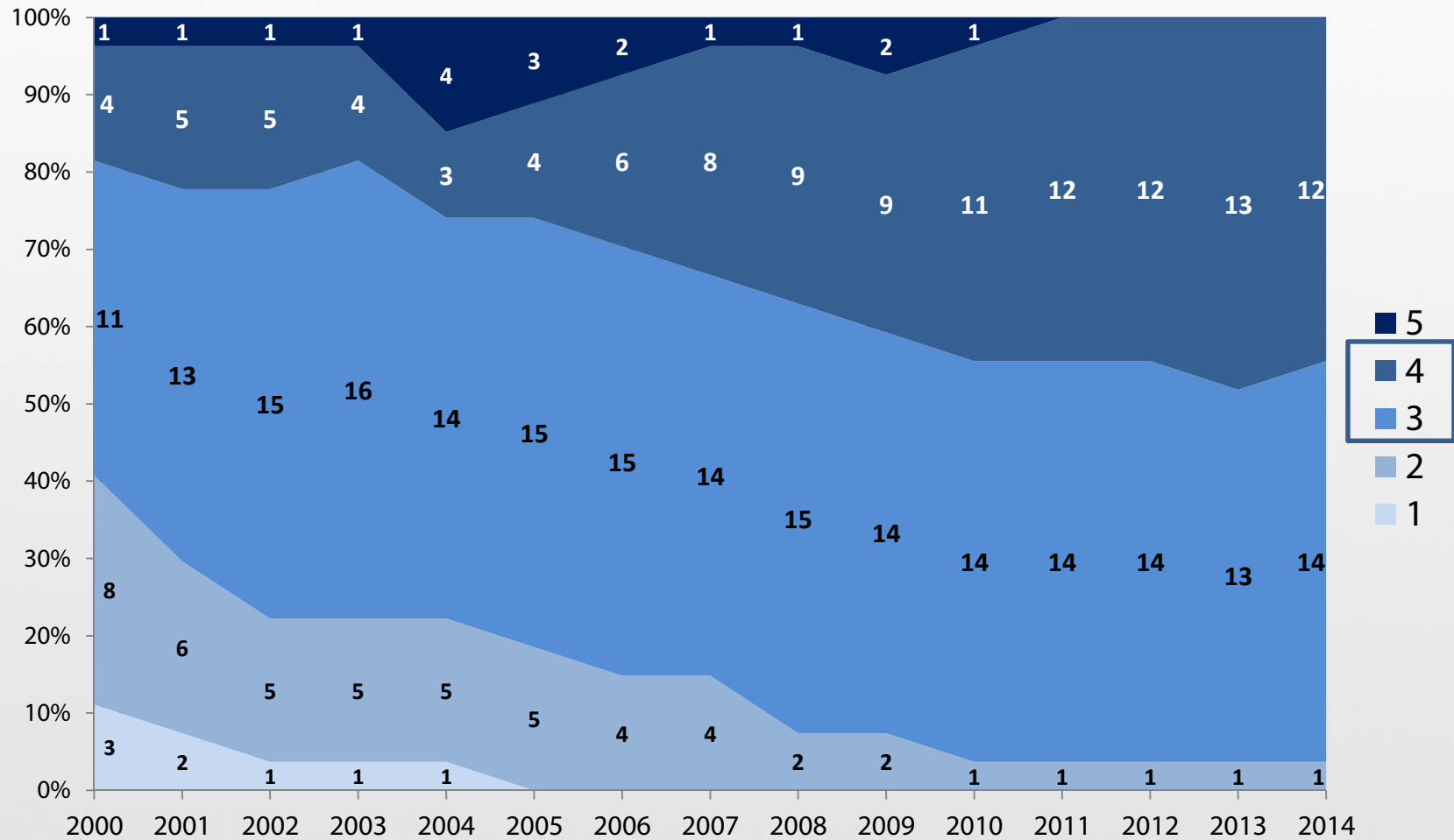
Data (large screen mobile broadband only):

- Zoltán Pápai, Péter Nagy, Gergely Csorba: Analysis of Large Screen Mobile Broadband Prices in the EU: A Comparative Quantitative Study, Infracapont 2013
 - cross section 2013 March
 - available at: http://infracapont.hu/dokumentumok/Large-screen-mobile-broadband-report_Infracapont.pdf

Voice & Data (smartphones):

- ???

Number of mobile network operators (EU27) 2000-2014



Current competition common sense (from consumer welfare's point of view) about the number of players is practically an analogue of the Essential Principle of Animalism in Orwell's Animal Farm:

„FOUR LEGS GOOD, TWO LEGS BAD.”

But what about THREE?

MOBILE VOICE PRICE STUDY

2003-2010, EU27, panel

Data, controls and treatments

- **2003-2010 Voice (+SMS) price data** from DG InfoSoc annual implementation reports (Teligen data)
 - Countries in the sample only from the year of joining the EU (15 markets from 2003, for 10 from 2004 and 2 from 2007) → **195 observations**
 - Prices are from **August/September** of **each year**
 - Lowest available prices for the **2 leading operators** for **3 predefined baskets**
 - **OECD2002 baskets** (Voice + SMS): **Low** (25 calls+30 SMS), **Medium** (75+35), **High** (150+42)
 - Use (1) **average prices for each basket**;(2) **mean of basket averages**
- **Effective entry time: the start date of commercial activity** (not the date of winning the license)
 - 3 months of adjustment period allowed, so only events before May are assumed to effect the leading 2 operators' prices in August
- **Controls** from Eurostat & DG InfoSoc & other public sources (mostly company home pages)
 - **Demand:** GDP per capita, population
 - **General price level:** exchange rate, inflation, VAT
 - **Costs:** population density, termination rate (MTR)
 - **Mobile market structure:** penetration, presence of MVNO (weak positive effect)

Assessed entries and mergers (2003-2010)

Differences in events' type and timing allow us to separate treatment and control groups for most effects to be studied

- **No events in 10 countries** (1 w 2 ops, 8 w 3 ops, 1 w 4 ops)
- **16 entries* & 7 mergers****
- Differentiate between types of entrants as multinational (#M=7) or local (#L= 9)
 - Note: all 4-5 and 3-4 multinational entrants are Hutchison (except TeliaSonera, Spain)

	2003	2004	2005	2006	2007	2008	2009	2010
2-3 entry			L	L	M	L	L	
3-4 entry	M	M		M	L (3)		L	L
4-5 entry	M (2)	M						
3-2 merger				1				
4-3 merger	1					1		
5-4 merger			1	2				1

* Cyprus totally and Bulgaria before 2007 were left out

** exits was practically considered small mergers and a Romanian entry and merger in the same year cancelled each other

Estimation methodology

- Standard quasi-experimental policy evaluation method (difference-in-differences, DID): compare pre- and post-event price differentials between
 1. countries that were affected by the event (treatment group) and
 2. countries those that were not (control group)

$$p_{it} = \sum \alpha_j s_{jt} + \beta \times controls_{it} + u_i + v_t + \varepsilon_{it}$$

- s_{jt} -s are the country-specific shocks to be examined
 - In the simplest case, $s_{jt} = 0$ before the event and 1 thereafter
- If estimated standard errors serially correlated, it biases results
 - They are in our case, especially because prices follow a decreasing trend
 - We correct this problem by **estimating the model on first differences**
 - (One could perform two-stage estimation procedures as well)

... and results (1)

Step	Level of analysis	Expectation (based on intuition or theory)	Results
(1)	Simple changes in operator number	More (less) operators results in lower (higher) price?	One more operator means slightly (but significantly) lower price
(2)	(1) + Separating entries and mergers	Do they have symmetric effects?	Entries and mergers are not symmetric <ul style="list-style-type: none"> ▪ with entry there is a significant decrease in price ▪ merger effect is ambiguous and not significant
(3)	(3) + Market context conditional on operator number before the event	Theory and regulatory assessments suggest larger effects with fewer firms	Effects depend on the pre-entry number of operators

... and results (2)

Step	Level of analysis	Questions	Results
(4)	(3) + Effects conditional on the type of entrant	Is the effect sign and size depends on (the context and) entrant type?	Effects crucially depend on entrant type: Multinational versus Local
(5)	(4) + Separating short-run and long-run effects: effects for year 1 and 2 accounting for short term adjustments, and average effects from year 3 on for "stabilized" states	Are the dynamics conditional on market context and entrant type?	Dynamics are different according to entrant types and pre-entry number of operators <ul style="list-style-type: none"> ▪ Local 3-to-4 entrants and Multinational 4-to-5entrants: even if there is a short run price decreasing effect, it does not last in the long run ▪ Multinational 3-to-4 entry no short term effect, but larger long run price decrease

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	d_logPlow		d_logPmid		d_logPhigh		d_logPav	
VARIABLES	coef	se	coef	se	coef	se	coef	se
d_e23big_1	0.17**	(0.09)	0.22**	(0.09)	0.20**	(0.10)	0.21**	(0.09)
d_e23big_2	0.31**	(0.15)	0.36**	(0.18)	0.34**	(0.17)	0.34**	(0.16)
d_e23big_3	0.39**	(0.19)	0.24	(0.21)	0.14	(0.20)	0.20	(0.19)
d_e34big_1	0.01	(0.15)	0.02	(0.07)	0.04	(0.06)	0.03	(0.07)
d_e34big_2	-0.22	(0.17)	-0.16	(0.11)	-0.16	(0.12)	-0.17	(0.12)
d_e34big_3	-0.13	(0.27)	-0.14	(0.17)	-0.20	(0.21)	-0.17	(0.20)
d_e45big_1	-0.39**	(0.15)	-0.15	(0.16)	-0.18	(0.13)	-0.20	(0.14)
d_e45big_2	0.03	(0.17)	0.04	(0.11)	-0.07	(0.10)	-0.02	(0.10)
d_e45big_3	0.34*	(0.18)	0.27	(0.21)	0.11	(0.23)	0.21	(0.19)
d_e23sm_1	-0.30	(0.27)	-0.46*	(0.27)	-0.43*	(0.26)	-0.42	(0.26)
d_e23sm_2	-0.22	(0.31)	-0.39	(0.30)	-0.39	(0.28)	-0.36	(0.29)
d_e23sm_3	-0.17	(0.32)	-0.30	(0.31)	-0.25	(0.31)	-0.24	(0.31)
d_e34sm_1	-0.18*	(0.10)	-0.22***	(0.08)	-0.27*	(0.14)	-0.24**	(0.10)
d_e34sm_2	-0.00	(0.15)	0.06	(0.13)	0.06	(0.13)	0.05	(0.12)
d_e34sm_3	0.16	(0.11)	0.20*	(0.12)	0.28**	(0.12)	0.24**	(0.11)
d_m32_1	-0.27***	(0.07)	-0.10	(0.08)	-0.02	(0.07)	-0.08	(0.07)
d_m32_2	-0.29**	(0.12)	0.02	(0.12)	0.09	(0.14)	0.01	(0.12)
d_m32_3	0.17	(0.32)	0.46	(0.31)	0.55*	(0.31)	0.46	(0.31)
d_m43_1	0.19	(0.27)	0.03	(0.17)	0.11	(0.19)	0.10	(0.19)
d_m43_2	0.12	(0.17)	0.07	(0.11)	0.09	(0.14)	0.09	(0.13)
d_m43_3	0.03	(0.21)	0.10	(0.22)	0.06	(0.21)	0.06	(0.21)
d_m54_1	-0.07	(0.11)	0.03	(0.09)	0.09	(0.11)	0.05	(0.09)
d_m54_2	-0.26	(0.24)	-0.22	(0.20)	0.01	(0.24)	-0.09	(0.19)
d_m54_3	-0.61	(0.44)	-0.40	(0.32)	-0.31	(0.32)	-0.39	(0.31)
d_mvno	-0.05	(0.06)	0.14**	(0.07)	0.12	(0.08)	0.10	(0.07)
d_logGDPcap	0.12	(0.63)	-0.25	(0.54)	0.07	(0.55)	-0.02	(0.52)
d_logPop	9.15***	(2.98)	8.76***	(2.89)	10.64***	(3.40)	9.80***	(2.96)
d_logPen	-0.69**	(0.32)	-0.58*	(0.33)	-0.32	(0.40)	-0.46	(0.34)
d_logExch	0.85	(0.77)	1.05	(0.77)	0.91	(0.78)	0.92	(0.71)
d_inflation	-0.00	(0.01)	-0.00	(0.01)	-0.01	(0.01)	-0.01	(0.01)
d_vat	0.00	(0.03)	-0.00	(0.03)	-0.01	(0.03)	-0.01	(0.03)
d_logTerm	-0.19	(0.14)	0.01	(0.12)	-0.05	(0.13)	-0.05	(0.12)
Constant	0.00	(0.09)	0.00	(0.08)	-0.05	(0.08)	-0.02	(0.08)
Observations	168		168		168		168	
R-squared	0.41		0.39		0.39		0.42	

Summary of results

Entry effects on average price compared to the (decreasing) path of counterfactual countries not affected by specific entry type (red is significant)

	2-to-3 entries (5)		3-to-4 entries (8)		4-to-5 entries (3)	
Firm type	Multi (1)	Local (4)	Multi (3)	Local (5)	Multi (3)	Local (0)
1 st year	+21%**	-42%	+3%	-24%**	-20%	-
2 nd year	+34%**	-36%	-17%	+5%	-2%	-
3 rd y on	+20%	-24%	-17%	+24%**	+21%	-

Merger effects on average price compared to the path of counterfactual countries not affected by specific merger type (note that there are only a few)

- 4-to-3 (2): no significant effects
- 5-to-4 (4): no significant effects
- Note selection problem: most mergers were investigated, some cleared only with remedies

Discussion of results

- Simple cross-country comparison is not the good way, it is better with classical DID panel in case of mobile markets
 - No differently affected local markets within a country
 - Panel benefits: less fear for omitted variables + real changes analyzed
- Note that Teligen basket prices are imperfect proxies
 - However, no other public time series data
 - Quarterly data would also help considerably, but again not public
- No price info for mobile data
 - But mobile data services were less important in the 2003-2010 period
- Note that results are sensitive to effective entry dates
 - Again, trusted quarterly data would be helpful here
- Endogeneity may be a problem
 - see no other way than a classical DID approach, but need for careful checking of the robustness of results
 - for 3-to-4 entries, we checked what happens if we use only stable 3 operator countries as counterfactuals, results do not change

MOBILE DATA

(LARGE SCREEN MOBILE BROADBAND)

PRICE STUDY

2013, EU27, cross-sectional analysis

Infrapont Large Screen Mobile Broadband Study 2013

- A comprehensive quantitative analysis of large screen mobile broadband prices in the European Union
- The research was conducted by Infrapont Ltd. in March 2013 and covers **all publicly advertised post-paid contracts offered to residential customers** in the **27 European member states**, totaling **331 publicly available offers** made by **90 European mobile network operators**
- **Large Screen Mobile Broadband** = mobile broadband service used with laptops, netbooks or tablets, usually with USB sticks or data cards.
- Motivation: what is the effect of the number/type of mobile network operators on LS MBB prices?
 - simple comparison does not provide satisfactory insight for policy
 - even a cross-section econometric analysis controlling for the different underlying factors explains differences in large screen mobile broadband prices better and provides a more appropriate input for policy

Infrapont LS MBB Study (2013) findings

in Countries with...	on average Prices are...
Operator number effect	
4 operators (compared to 3)	lower
Controls	
higher population higher purchasing power parity (PPP)	higher higher
presence of LTE technologies larger mobile broadband penetration	lower lower

bold means that the effect is significant

Infrapont LS MBB Study (2013) findings

in Countries with...	on average Prices are...
Presence of a special operator type*	
presence of any of the "Big4" (Orange, O2, Vodafone T-Mobile)	no significant effect
presence of regionally active group (Telekom Austria, KPN, ...)	no significant effect
presence of a regional/local challenger	no significant effect
presence of Hutchison	lower

bold means that the effect is significant

* type and number effects must be tested separately

Wrap up

We cannot say that ... „THREE IS BETTER“

But it is not necessarily worse

- Need more checks
- Other factors (like operator type, wider market context) also play
- No simple answer even from consumer welfare point of view
 - Welfare consists of more than just price, ie. choice, innovation, quality, ... and all of these require investment
- Economies of scale and scope matter
 - and these are subject to change

NUMBER OF OPERATORS MATTERS

BUT SLIGHTLY

BEWARE OF BEING FIXED ON THE NUMBERS