

The Effects of Regulation on Investment in Network Industries: Evidence from European Telecoms

Michał Grajek (*ESMT*)

Lars-Hendrik Röller (*ESMT*)

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Main Question

How access regulation affects infrastructure investment in the European telecommunications markets?

Theoretical Backdrop

➤ Regulation vs. competition

- Changing paradigm in the economics of telecoms: regulated monopoly to access regulation (Hellwig, 2008)
- Service-based vs. facilities-based competition (Cave, 2004)
- Static efficiency – optimal allocation of resources (Armstrong, 2002)
- Trade-off: Static vs. dynamic efficiency (Valletti, 2003)

➤ Access regulation – dynamic efficiency

- Net Present Value of infrastructure investment (textbook)
- Real Options approach – uncertainty (Jorde et al., 2000)
- More variety and innovative service of entrants boosts end-consumer demand (Foros, 2004, Kotakorpi, 2006)
- “Ladder of investment” hypothesis (Cave, 2006)
- Preemption game (Gans & Williams, 1999; Guthrie, 2006)

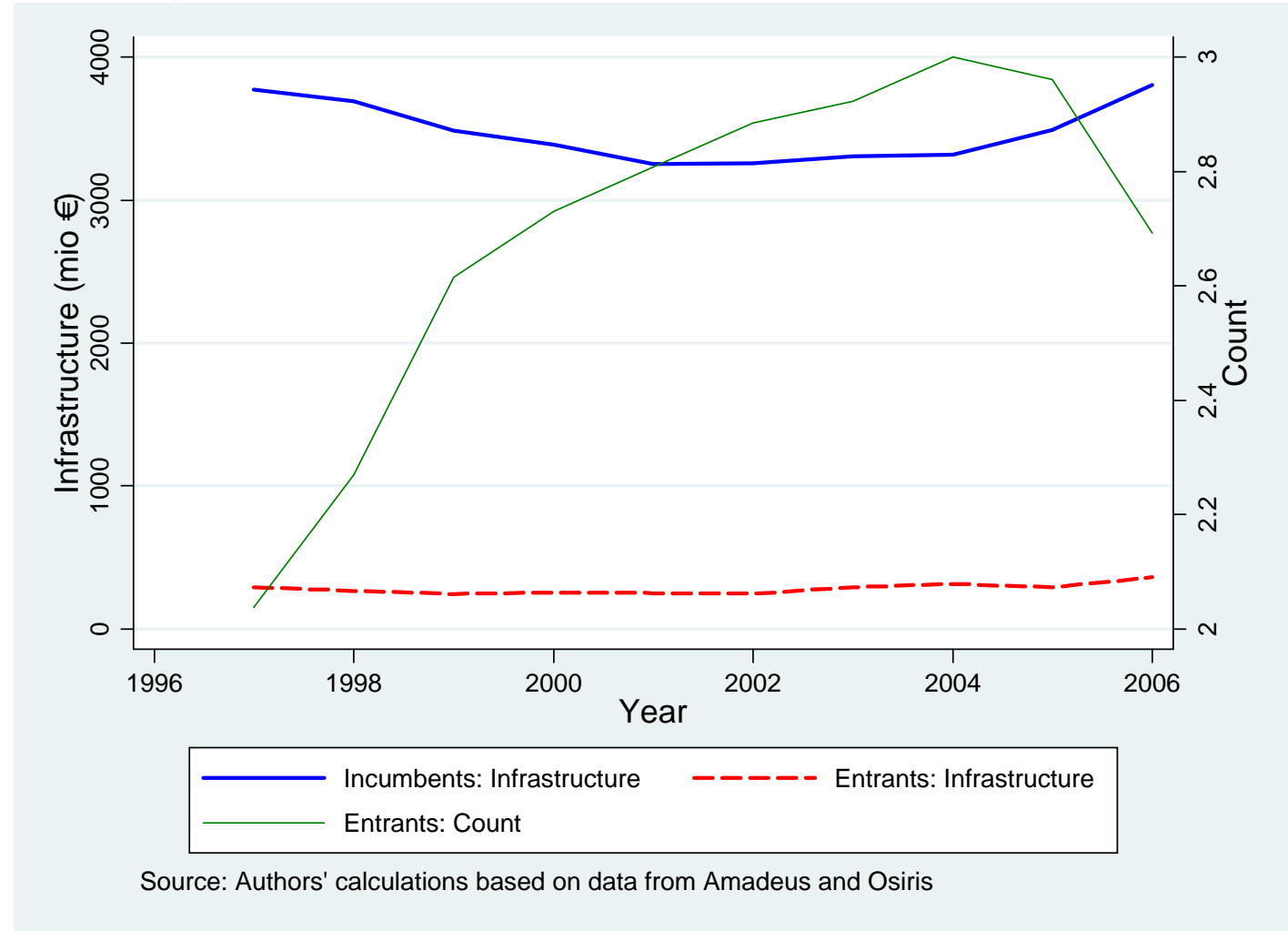
Existing Empirical Evidence

- Mixed results on effects of regulated entry on investment
- Aggregate level of analysis
- Ignores endogeneity of regulation
- Mostly U.S. studies

Dataset and Main Variables

- Data used in the analysis covers over 70 fixed-line telecom operators from 20 European nations over the period 1997-2006 (yearly observations)
- Domestic tangible fixed assets – proxy for infrastructure
 - Nominal figures corrected by Producer Price Index for telecom equipment
- Regulatory index (Plaut Economics)
 - Based on inputs
 - Sector-specific index: it captures regulations specific to fixed-lines
- Control variables (costs, demand, M&A activity, etc.)

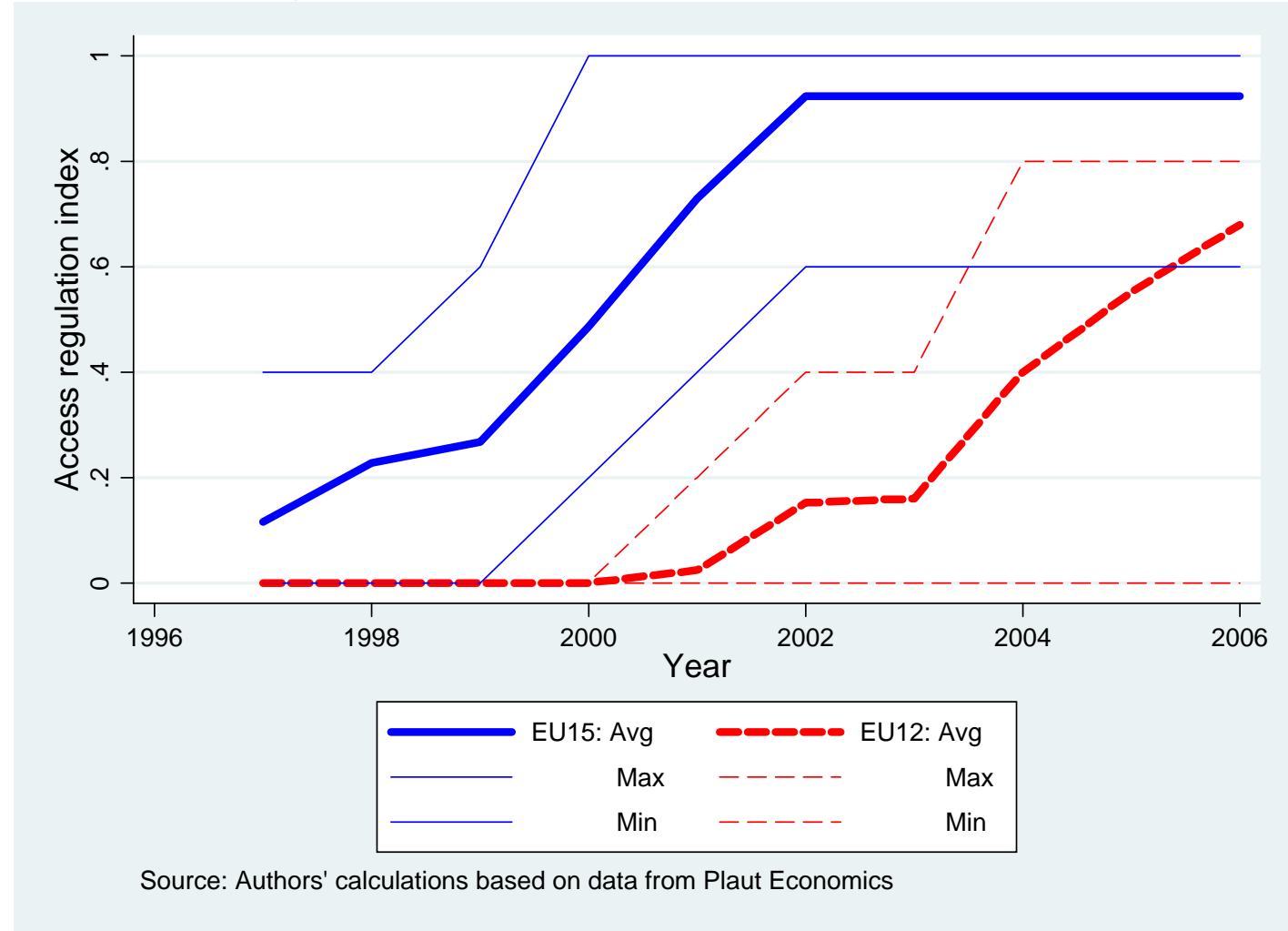
EU Fixed-line Telecoms: Average Stock of Infrastructure by Operator's Type



Regulation Variable

- Fixed-line segment
 - Existence of accounting separation obligation
 - Existence of full unbundling regulation
 - Existence of subloop unbundling regulation
 - Existence of regulated line sharing regulation
 - Existence of regulated bitstream access

Telecoms in "Old" and "New" EU Member States: Access Regulation



Empirical Model of Investment in Fixed-line Telecoms

THREE SIMULTANEOUS EQUATIONS:

i. Incumbent

$$\Delta IncInfr_{it} = \alpha^I_i + \beta^I IncInfr_{it-1} + \gamma^I \Sigma EntInfr_{it} + \delta^I Reg_{it} + \mathbf{X}_{it}^I \boldsymbol{\theta}^I + \varepsilon_{it}$$

ii. Entrants (Competitive fringe)

$$\Delta EntInfr_{it} = \alpha^E_i + \beta^E EntInfr_{it-1} + \gamma^E IncInfr_{it} + \delta^E Reg_{it} + \mathbf{X}_{it}^E \boldsymbol{\theta}^E + \zeta_{it}$$

iii. Regulation (Access to the local loop)

$$\Delta Reg_{it} = \alpha^R_i + \beta^R Reg_{it-1} + \gamma^R IncInfr_{it} + \delta^R \Sigma EntInfr_{it} + \mathbf{X}_{it}^R \boldsymbol{\theta}^R + \eta_{it}$$

Instrumental Variables

- Index of access regulation in neighboring markets
 - Separately for new EU and old EU
- Political variables (Comparative Manifesto Project, 2006)
 - Measure of government's attitude toward market regulation
 - Position of government on the right-left scale
 - Measure of government's attitude toward European integration
- Lagged levels of the infrastructure stock and exogenous variables

IV Estimation Results

<i>equation:</i>	Incumbent	Entrants	Regulation
<i>dep var:</i>	$\Delta \ln_incumb_infra$	$\Delta \ln_entra_Sigma infra$	$\Delta entry_fix$
<i>dynamic effects:</i>			
lagged level	-0.695*** (0.144)	-0.807*** (0.074)	-0.671*** (0.091)
<i>strategic effects:</i>			
ln_incumb_infra	-	-0.029 (0.180)	0.163** (0.079)
ln_entra_Sigma infra	0.244** (0.112)	-	-0.022*** (0.007)
entry_fix	-0.666* (0.377)	1.181* (0.636)	-
<i>controls:</i>			
no_entra_infra	1.253* (0.731)	-3.001*** (0.857)	-
...
N	129	110	120
Hansen J	7.01 (5)	2.28 (3)	7.10 (7)
Serial correlation	0.41	-0.15	-0.06

* p<0.1, ** p<0.05, *** p<0.01; robust standard errors in brackets

Main Findings

- Access regulation discourages investment by incumbents in fixed-line telephony
- Access regulation encourages **total** investment by entrants
- Competitive pressure encourages infrastructure investment by incumbents
- National regulators toughen access regulation in response to
 - Increased total stock of infrastructure
 - Increased infrastructure gap between incumbent and entrants

Estimation Results for Individual Entrants

<i>estimation method:</i>	OLS	IV
<i>dep var:</i>	$\Delta \ln_infra$	$\Delta \ln_infra$
<i>dynamic effects:</i>		
L.ln_entra_infra	-0.071** (0.030)	-0.073** (0.033)
<i>strategic effects:</i>		
ln_incumb_infra	-0.125 (0.230)	-0.170 (0.248)
ln_entra_infra		
entry_fix	-0.959* (0.543)	-0.784 (0.658)
<i>controls:</i>		
...
N	237	209
Hansen J	-	5.76 (4)
Lagged residual	-0.03	-0.03

* p<0.1, ** p<0.05, *** p<0.01; robust standard errors in brackets

Additional Finding

- Access regulation discourages infrastructure investment by **individual** entrants

Implications for policy

- ❖ Careful with simplified empirical assessments
 - Endogeneity of regulation
- ❖ Our findings imply that regulation hampers future facilities-based competition

The Commission has argued:

"Empirical evidence shows that investment and innovation are strongest where there is effective competition between infrastructures. However, there is still no infrastructure-based competition on around 80% of the EU's local loops. This means that ex-ante regulation continues to play a crucial role in maintaining competition and protecting consumers by setting conditions for access to the incumbent's infrastructure." Staff paper, p.3

⇒ The current system does not lead towards infrastructure-based competition.

- ❖ Regulatory commitment problem