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The impact of local loop unbundling revisited

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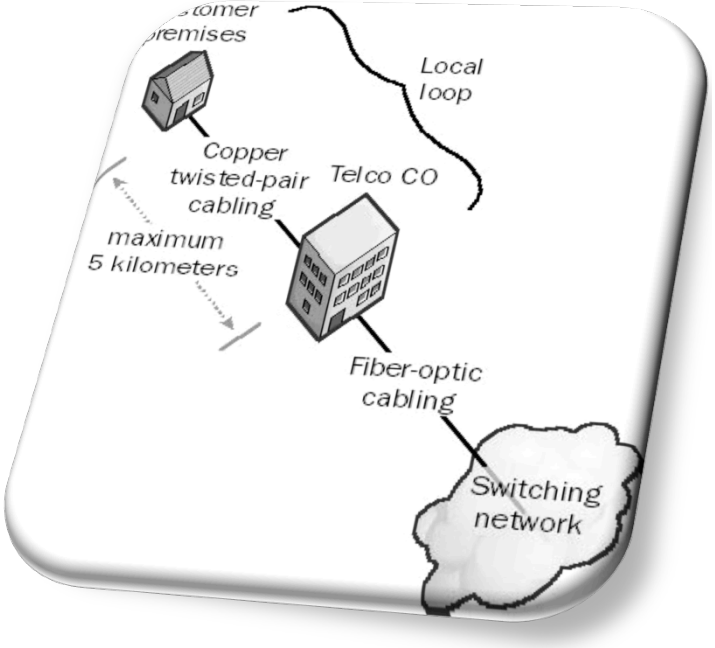
What is this paper about?

Full LLU includes physical installation of equipment by competing firm in local exchange of incumbent firm and connects subscriber line with it

For more than 15 years: Unbundling of local loop as regulatory mean to install competition in DSL networks

Retrospective analysis of unbundling regulation on broadband market performance (i.e. penetration)

Closer look at **design** of unbundling



Source: The Network Encyclopedia

Local access unbundling and investment

Infrastructure investment vital for economic growth, but general worldwide downward trend -> Key objective in „Digital Agenda for Europe“ and „Europe 2020 strategy“

- **Role of LLU?** Rationale: Intensification competition

  But: inherent **trade-off** (static vs. dynamic)

  and

  access regulation lowers market entry barriers for entrants: lower incentives to invest in own network elements
- **Regulatory response: Ladder of Investment (Cave 2006)**
- **At least two overall effects of LLU on investment:**
  1) Strengthens service-based competition (helps to increase complementary investment and increased competition in final customers markets)
  2) Incentives for facility-based competition seems to be lower (investment incentives of incumbents likely to be reduced in middle and long run, i.e. if access prices are set low)

Demand-side effects of unbundled access on penetration?

- Controlled wholesale prices should lead to reduced retail prices
- **Competition as major driver**
- Adoption of fixed wired broadband varies significantly between EU MS

➢ Inter-platform competition: no positive effects of unbundling on penetration as customer still served by same subscriber line (Gruber/Koutroumpis 2013)

➢ Intra-platform competition: positive impact on diffusion rate of broadband in initial stage, disappearing over time (Denni/Gruber 2006); LLU with no signif. effect on bb penetration (Wallsten 2006)

- **Height of fees?** More intense access regulation (lower LLU tariffs) -> Stimulation intra-platform competition (often includes overall expansion of bb market); also substitution away from alternative access platforms to copper-based platforms (Waverman et al 2007)

Description of our sample

- Empirical analysis of determinants of Public Telecommunication Operators (PTO) investment and broadband penetration in 17 EU countries for 2000-2010
- Sources of data: OECD, ITU, Cullen International
- Estimations via fixed effects and robust standard errors option; unbalanced panel with 138 observations

Dependent Variables

BBP Broadband penetration rate -> total number of broadband connections per country as share of total population and expressed as percentage (Reflection of demand side, which regulator must consider, reflected in subscriber shares)

INV PTO Investment, expressed per capita in USD and in logarithm

Key explanatory Variables

LLU dichotomous variable taking value 1 when LLU is available to access seekers in a country and 0 when it is not

X Vector of monthly fees for active loop (Monthlyact) and subscribtion fee for residents (Monthlysub_t)

LLU*X Interaction terms between LLU dummy and each of monthly fees

Summary of key variables and expected impact on BBP and Investment

Variable	Description	Expected Impact on…	
Dependent variables		**BBP**	**Inv**
BBP	Broadband penetration rate = Total Broadband / Population	n.a.	n.a.
INV	PTO Investment / capita in USD in logarithm	n.a.	n.a.
Explanatory Variables			
LLU	local loop unbundling dummy, 1 if present, 0 otherwise	+/-	Incumb.:- Entrants:+/-
X includes Fees active loop	All fees are monthly, USD	-*	Incumb.:+ Entrants:+/-
Subscription fee for residents		-/+	+
LLU*X	interaction terms between the LLU dummy and each of the monthly fees noted above	-/+	-/+

*Read: If wholesale fees go up, broadband penetration declines, and vice versa;

Econometric model

Use of standard panel fixed effects model for estimation;
level of oberservation: particular country, observed over time

$$BBP_{i,t} = \alpha_{i,t} + \beta_1 LLU_{i,t-1} + \beta_2 X_{i,t-1} + \beta_3 LLU_{i,t-1} * X_{,t-1} + \beta_4 InstallFee_{t-1} + \text{Fixed Effects} + \varepsilon_i t \quad (1)$$

$$Inv_{i,t} = \alpha_{i,t} + \beta_1 LLU_{i,t-1} + \beta_2 X_{i,t-1} + \beta_3 LLU_{i,t-1} * X_{,t-1} + \beta_4 InstallFee_{t-1} + \text{Fixed Effects} + \varepsilon_{i,t} \quad (2)$$

Preliminary results

Table 3 Impact on total broadband penetration, fixed effects estimation

	1	2	3	4	5	6	7
$Unbundling_{t-1}$	0.1513***	0.0849***	0.1197***	-0.0254	0.1683***	0.1226***	0.1081***
	(0.0129)	(0.0149)	(0.0152)	(0.0268)	(0.0187)	(0.0281)	(0.0346)
$Unbundling_{t-2}$		0.0163***					
		(0.0057)					
$Unbundling_{t-3}$		0.0207**					
		(0.0091)					
$Unbundling_{t-4}$		0.0693***					
		(0.0157)					
$Oneofffee\ activeloop_{t-1}$			-0.0002***	-0.0019***			
			(0.00004)	(0.0003)			
$Unbundline_{t-1}$#One off fee $activeloopt._{-1}$				0.0017***			
				(0.0003)			
$Monthlysubscriptionforresident_{t-1}$					-4.21e-06***	-4.61e-06***	
					(9.51e-07)	(1.05e-06)	
$Unbundling_{t-1}$#$Monthlysubscriptionforresident_{t-1}$						0.0011*	
						(0.0006)	
$CablePenetration_{t-1}$							-0.2153***
							(0.0396)
$Unbundling_{t-1}$#$CablePenetration_{t-1}$							-0.1585**
							(0.0663)
Constant	**0.0546*** **	**0.0657*** **	**0.1395*** **	**0.2688*** **	**0.0768*** **	**0.0682*** **	**0.201*** **
	(0.0058)	**(0.0064)**	**(0.0072)**	**(0.0219)**	**(0.0059)**	**(0.0088)**	**(0.022)**
R^2	**0.2313**	**0.3696**	**0.2909**	**0.5134**	**0.1722**	**0.1864**	**0.5340**
Observations	**271**	**225**	**134**	**134**	**177**	**177**	**224**

Table 4:Impact on PTO investment per capita, fixed effects estimation

	1	2	3	4
$Unbundline_{t-1}$	1.42e+09***	-4.34e+08	1.28e+08	-2.49e+08
	(3.46e+08)	(2.58e+08)	(3.10e+08)	(5.56e+08)
$Oneofffee\ activeloop_{t-1}$		-7603086***		
		(2484073)		
$Unbundline_{t-1}$#One off fee $activeloopt_{-1}$		8365549***		
		(2596085)		
$Monthlysubscriptionforresident_{t-1}$			-65270.2***	
			(4395.614)	
$Unbundling_{t-1}$#$Monthlysubscriptionforresident_{t-1}$			-1965596	
			(2577597)	
$CablePenetration_{t-1}$				7.20e+08
				(9.16e+08)
$Unbundling_{t-1}$#$CablePenetration_{t-1}$				-5.34e+08
				(9.55e+08)
Constant	**3.69e+09*** **	**4.04e+09*** **	**3.34e+09*** **	**4.05e+09*** **
	(1.09e+08)	**(1.88e+08)**	**(4.69e+07)**	**(3.11e+08)**
R^2	**0.04**	**0.10**	**0.01**	0.03
Observations	**396**	**134**	**182**	222

Conclusion

Our contribution:

- gross-country framework and EU regulatory policy-making
- respective design has been widely ignored –> we consider in particular unbundling tariffs
- Additional benefit: use of only recently available data

Our results:

i. Effect of unbundling on broadband penetration seems to be positive and dependent on price level of market observed
ii. Intensity of intermodal competition seems to be important (the higher cable penetration rate, the lower is potential benefit of unbundling on bb penetration)
iii. Positive effects may be short-run, contervailed by negative effects on investments (work to do)

THANK YOU!

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