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Local Deregulation of the Wholesale Broadband Access Market

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Introduction

Geographically differentiated regulation schemes are currently discussed in European telecommunication markets. The debate focuses on the so called wholesale broadband access (WBA) market, where broadband providers with little of their own infrastructure gain access to end-users via the incumbent's network. Under geographically differentiated regulation, the incumbent infrastructure provider is no longer regulated on a *national* basis in the WBA market, but is released from regulation in those *subnational* areas where sufficient infrastructure-based competition has developed. In such cases regulation only concentrates on areas in which competition does not arise under free market conditions.

Even though the topic has been discussed in many European countries, only the UK and Portugal have adopted the geographically differentiated regulation to date. The WBA is currently under review with the UK and German authorities, in accordance with European Commission guidelines, which require regular revisions and updates of the status quo.

From a theoretical perspective, a question mark still hangs over how the deregulation of areas with high levels of competition affects future competitive development. On the upside, entrants benefit from the WBA regulation since they are able to test local markets "risk-free" via the incumbent's network, and regulation thus creates competition. On the downside, the guaranteed access may, in fact, lower competitors' incentives to invest in their own networks, which hampers infrastructure-based competition.

But in any case, a competitor with little of its own infrastructure faces higher degrees of uncertainty in deregulated markets: future access to the incumbent's network is no longer guaranteed and future wholesale prices might increase. Competitors with little of their own infrastructure are therefore likely to expand their networks in markets with high demand for their services. A higher number of competitors that operate in the broadband market based on their own infrastructure are likely to influence the incumbent's investment behaviour. One way for the incumbent to escape such strong competitors would be to upgrade its own infrastructure and to offer a higher quality (i.e. bandwidth) to the end-user. However, the ultimate effects of a deregulation are unknown and there has been no rigorous empirical analysis of the subject to date. We therefore want to contribute to the discussion by empirically analysing the local deregulation of the WBA in the UK, which was the first European country to introduce a geographically differentiated regulation scheme in 2008. Our aim is to identify the effect of deregulation on infrastructure investment, and therefore on the competitive environment, in the deregulated areas. Infrastructure investments are of direct relevance to regulators. Regulators, which tended to focus on fostering competition in already existing networks in the past, now need to take a more dynamic perspective. According to the European Commission, substantial investments in telecommunication infrastructure are necessary in order to ensure European competitiveness and growth (European Commission 2012a).

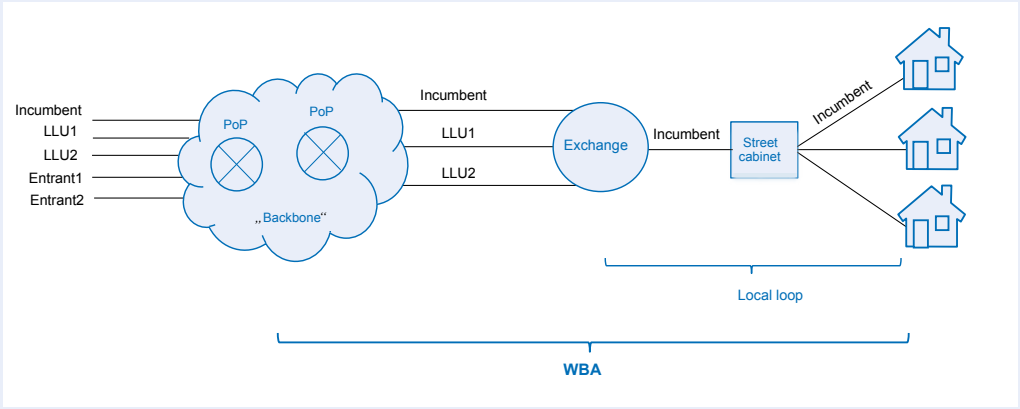
Wholesale broadband access

Wholesale broadband access refers to the market in which an internet service provider with a limited amount of its own infrastructure buys transmission services from an infrastructure-based telecommunication carrier in order to provide internet services to end-users under its own name. The European Commission

[1] Ifo Institute (both).

Figure 1

Structure of the WBA market



Notes: Incumbent = British Telecom; LLU = Local Loop Unbundling operator (infrastructure based competitor); Entrant = Competitor with little own infrastructure; WBA = Wholesale Broadband Access; PoP = Point of Presence.

Source: Fabritz and Falck (2013).

(2007a) defines the WBA market in its ´Relevant Markets Recommendation´ from 2007 as Market 5: *"This market comprises non-physical or virtual network access including 'bit-stream' access at a fixed location..."*. Figure 1 displays the structure of this market. A broadband provider with little of its own infrastructure transports the data stream over its own network up to an interface (the point of presence), where the data stream is handed over to the incumbent (or an alternative provider) who then delivers it via its own network to the end-user.

Traditionally, the incumbent used to be the sole provider of WBA and was regulated on a national basis. The regulation typically comprised of cost- and access regulation, as well as a number of other remedies. During the last decade, the regulation of the WBA market was necessary and facilitated entry during an earlier phase of market development. Entrants were able to test local markets "risk-free" via the incumbent's network without the commitment of building their own infrastructure. In recent years, however, competitors have begun to invest in their own networks in areas in which they have a sufficiently large customer base. The incumbent's networks are thus gradually being replicated, and in some cases, competitors even offer WBA services themselves.

Competitors typically replicate the incumbent's network from their respective points of presence up until the local exchanges, where main switches and hardware are located that connect the end-users to the backbone network. Broadband providers whose network reaches the exchange are called Local Loop Unbundlers. These infrastructure-based competitors only depend on the part of the incumbent's network that connects the local exchange with the respective end-user, or the "last mile" which is also known as the "local loop". Access to the local loop (Market 4 in the European Commission's Relevant Markets Recommendation) is a separate market from WBA, and deregulation of the local loop is not under discussion, meaning that access to end-users is always guaranteed to Local Loop Unbundlers.

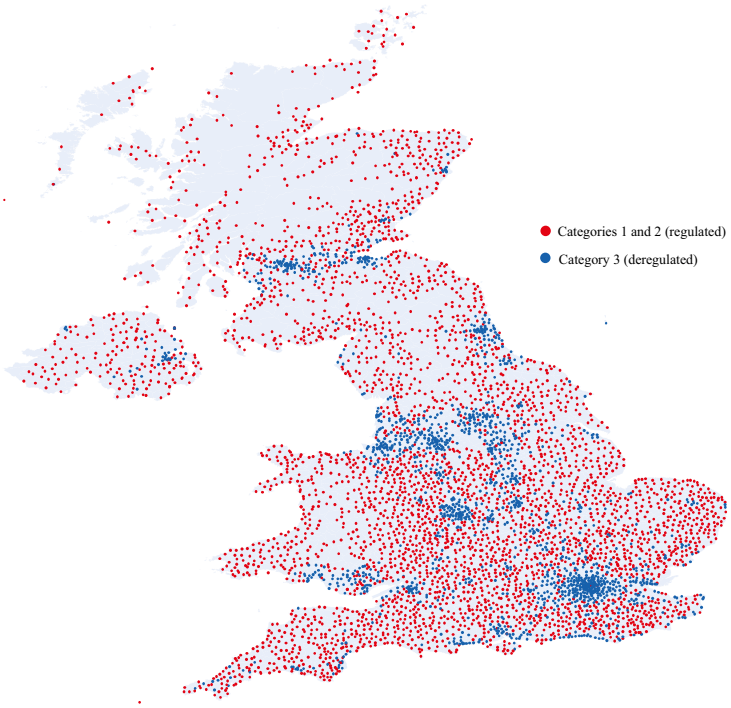
Table 1

Ofcom's criteria for deregulation in 2008/2010

	2008/2010	2008	2010
	no. of principal operators	**market size**	**BT market share**
regulated	≤ 3	-	-
deregulated	≥ 4 or 3 & 1 forecast **if**	- > 10,000 premises	- ≤ 50%

Source: Ofcom (2008; 2010).

Figure 2
Distribution of deregulated areas in the UK



Notes: The figure represents the status quo as of 2010.
Source: Own representation based on data provided by Samknows (2012).

The process of local deregulation in the UK

In the UK, the WBA market used to be regulated on a national basis, but in 2008 geographically differentiated regulation of the WBA market came into effect. The European Commission supported Ofcom's – the national regulator's – decision as ex ante regulation should be relaxed when infrastructure-based competition becomes sufficiently developed (European Commission 2007b).

Figure 2 shows the geographical distribution of deregulated areas in the UK as of 2010, mapping areas that were deregulated in 2008 and 2010. The decision of whether or not an area is deregulated is primarily based on the number of large, infrastructure-based competitors that provide broadband services in the respective exchange area. Besides British Telecom and Virgin Media (the cable operator), six Local Loop Unbundlers with a national coverage of more than 45 percent of UK premises were considered relevant for the deregulation. Ofcom grouped all areas into three categories based on their competitive situation. Categories 1 and 2 remain regulated, but the incumbent British Telecom was released from regulation in Category 3 areas. Category 1 is comprised of areas where British Telecom is the only operator. Category 2 contains areas in which some competition has developed. These are areas where two or three principal operators are actually present, or are forecast to be so. In Category 2 there are also areas with three principal operators actually present and one forecast principal operator if the areas number less than 10,000 premises. Category 3 consists of areas with four or more principal operators, and areas with three and at least one more forecast operators that number more than 10,000 premises. In its 2010 revision of WBA market regulation, Ofcom considered the 10,000 premises rule as redundant and introduced a new criterion for deregulation. In addition to the number of principal operators, British Telecom's market share had to be lower than 50 percent, the standard threshold at which significant market power can be assumed according to Commission guidelines (Ofcom, 2010). Table 1 summarises the criteria underlying the market definitions in 2008 and 2010 respectively.

Local deregulation of WBA in an international comparison

Many countries experienced increasingly infrastructure-based competition that led to the reconsideration of the national regulatory approach. It has been suggested that areas with well-developed infrastructure-based competition may now actually stand to benefit from deregulation. As a result, starting with the UK in 2008, a number of European countries have introduced – or at least debated – a subnational geographically differentiated regulation of the WBA market.

A geographically differentiated regulation has only been introduced in the UK and in Portugal to date.[2] The Portuguese national regulatory authority Anacom chose to adopt an approach similar to Ofcom's (European Commission 2008a). Areas were categorised in 2008 based on the number of infrastructure-based competitors (Local Loop Unbundlers) and the presence of cable operators. Competitive areas were eventually deregulated. However, in contrast to the UK, where the incumbent faces direct competition in the WBA market, the Portuguese incumbent Portugal Telecom was the sole provider of WBA services. Anacom still argued that competition from cable operators and Local Loop Unbundlers in the retail market put indirect pressure on prices in the WBA market.

[2] We describe the *National Regulatory Authorities' requests for geographic differentiation of the WBA market* in more detail in the CESifo DICE Report 2/2013 (Summer) Database Article, available at http://www.cesifo-group.de/w/42U7Ss3gu.

In general, the European Commission is in favour of the geographical differentiation, provided it is in accordance with EU law: *"For the Commission, Ofcom's proposal represents a reasonable move towards better targeted regulation, concentrating on those geographic areas where structural competition problems persist"* (European Commission 2008b). However, in other countries the European Commission expressed "serious doubts" as to the implementation of the geographically differentiated regulation (for example, Spain, Finland, Poland, Czech Republic (European Commission 2008c;d, 2012b;c)) and the scheme has not been adopted. In some cases, national authorities have already declined the proposition (Germany, Austria). The German regulator argued in 2009 that future developments in the broadband wholesale markets were too unforeseeable. With the roll-out of fibre-based infrastructure, many exchanges would become redundant in the future. Local Loop Unbundlers would thus depend on WBA to provide broadband services in the areas concerned (despite the fact that their network reached the exchange). In such cases, WBA becomes necessary for competition in the retail market and should therefore remain regulated. In addition, the German regulator had defined a national WBA market that should also be regulated on a national basis (Bundesnetzagentur 2010). In Austria the Administrative Court objected to the national regulator's decision to deregulate in 2008, since it had defined the national scope of the WBA market (European Commission 2008e).

Infrastructure investment by the incumbent and its competitors

The data for our analysis stem from *Samknows*, a not-for-profit website that was originally founded in order to inform the general public about local broadband speeds. In addition, the website offers detailed information on the competitive situation in the various areas.

We are interested in how the local deregulation of the Wholesale Broadband Access market has influenced the investment behaviour of the incumbent British Telecom and its competitors. To this end, we measure the incumbent's infrastructure investment by the availability of British Telecom's fibre-based access networks (Next Generation Access) in an area. This technology allows for super-fast broadband connections due to higher bandwidth. Competitors' infrastructure investments are measured by the number of infrastructure-based competitors (Local Loop Unbundlers) in an area. In order to become Local Loop Unbundlers, broadband providers had to make large infrastructure investments. Information about fibre-based access networks and the number of infrastructure-based competitors are available for the year 2007, immediately prior to the introduction of the local deregulation and for the year 2012, two years after the last change in the regulatory scheme.

The challenge with this analysis lies in separating the true effect that deregulation may have on infrastructure investment from the effect that investment behaviour has on deregulation: Regulated and deregulated areas already differed in their characteristics before the first regulatory change in 2008. Prior to 2008, deregulated areas had developed higher levels of competition, which also directly influenced the regulatory decision (since a subset of competitors count as relevant for deregulation). Moreover, these areas have more premises on average, exhibit a higher population density and usually enjoy a higher income. Mere differences in the number of infrastructure-based competitors and fibre availability between regulated and deregulated areas in 2012 would thus largely reflect initial differences in the levels of competition and local characteristics, instead of the deregulation effect. In what follows, we therefore do not compare *levels,* but rather the differences in the *development over time* between the two groups (regulated and deregulated areas). Differences between areas that already existed before 2008 are accounted for with this method. In addition, we consider the fact that areas that start from different levels might develop differently by including the starting levels from 2007 in our analysis.

Deregulation and investment incentives

Table 2 shows the results from comparing the changes in investment between the incumbent and its competitors. Columns (1) and (2) present the basic results, from a comparison of all areas. In this sample, by 2012, deregulated areas count on average one Local Loop Unbundler more and are 26 percentage points more likely to have fibre-based technology installed, even just a few years after deregulation was introduced.

This method already accounts for many differences between the areas. In order to further improve comparability between regulated and deregulated areas, we next present results from a subsample in columns (3) and (4) that only considers areas with 3 or 4 principal operators in 2007. They started out with very similar competitive conditions in 2007, but some of these areas were deregu-

Table 2

The effect of local deregulation on infrastructure investment

	All exchange areas		3 and 4 principal operators 2007		3 and 4 principal operators in 2007 & premises < 10,000		
	(1) ΔLLU	(2) ΔNGA	(3) ΔLLU	(4) ΔNGA	(5) ΔLLU	(6) ΔNGA	(7) ΔLLU
Deregulated (in 2008 or 2010)	1.06***	0.26***	0.61***	0.17**	0.42**	0.16*	
	(0.07)	(0.03)	(0.19)	(0.08)	(0.20)	(0.08)	
Deregulated 2008							0.22
							(0.25)
Deregulated 2010							0.46**
							(0.19)
# LLU (in 2007)	-0.48***	0.04***	-0.46***	0.06**	-0.39***	0.08**	-0.32***
	(-0.02)	(0.01)	(-0.09)	(0.03)	(-0.09)	(0.04)	(-0.11)
Broadband via cable (in 2007)	-0.17***	-0.12***	-0.18	-0.16**	-0.12	-0.12*	-0.05
	(-0.05)	(-0.02)	(-0.17)	(-0.06)	(-0.18)	(-0.07)	(-0.19)
Premises (in 1,000s)	0.08***	0.02***	0.13***	0.03***	0.27***	0.03	0.27***
	(0.01)	(0.00)	(0.02)	(0.01)	(0.05)	(0.02)	(0.05)
Δ Regional characteristics	yes	yes	yes	yes	yes	yes	yes
Regional characteristics in 2007	yes	yes	yes	yes	yes	yes	yes
Country dummies	yes	yes	yes	yes	yes	yes	yes
# of exchanges	2,276	2,276	451	451	340	340	340
R-squared	0.33	0.39	0.25	0.22	0.26	0.20	0.21

Notes: LLU = Local Loop Unbundler; NGA = Next Generation Access (fibre-based broadband).
The table shows results from multivariate regressions. We estimated a difference-in-differences model for the time period 2007–2012. Included are controls for initial values as well as changes over time of socio-economic characteristics of the exchange areas. Moreover the number of infrastructure-based competitors in 2007, the availability of broadband internet via cable, market size and country-fixed effects (England, Wales, Scotland, Northern Ireland) are considered.

Source: Dexia (2007 and 2012).

lated and some were not. The positive investment effects still hold in this sample, even though they decline in size. In this even more homogenous sample, deregulated areas count on average 0.61 Local Loop Unbundlers more by 2012 and fibre-based access technology is 17 percentage points more likely to be installed in deregulated areas.

In columns (5) and (6) we additionally restrict the size of the local market to a maximum of 10,000 premises. These areas are similarly attractive to potential entrants in terms of levels of competition and market size (very large, profitable local markets are excluded here). Again, deregulation has a positive effect with 0.42 additional Local Loop Unbundlers and a 16 percentage point greater likelihood of having fibre-based access installed.

In a next step, we address the problem of a "self-fulfilling prophecy" that arises when we measure the competitor's investment decisions: a subset of Local Loop Unbundlers is relevant for deregulation. If one of these Local Loop Unbundlers is forecast to become active in the exchange between 2008 and 2010, the exchange will be deregulated (when 3 others are active and the market serves at least 10,000 premises). This attributes an increase in the number of Local Loop Unbundlers to deregulation, which it did not cause. In fact, the inverse is true: namely it is the forecast investment that causes deregulation! In order to avoid this, we reconsider those areas that had three or four principal operators in 2007 and that, in addition, number less than 10,000 premises. In the sample of these 340 exchanges, the change in the deregulation rules between 2008 and 2010 allows us to separate the effect of deregulation from a self-fulfilling prophecy. In 2008 120 of these areas were already deregulated, since they counted at least four currently active principal operators. In 2010 the regulatory criteria changed and those areas with three relevant operators present could also be deregulated (if one more was forecast and BT's market share was below 50 percent). As a result, 179 additional areas were deregulated, since at least one principal operator would soon be active in these areas. In this sample, the 2008 ef-

fect reflects the pure deregulation effect, while the 2010 effect reflects the deregulation together with the forecast effect. Column (7) shows the results of this procedure. The pure deregulation effect is at 0.22 additional Local Loop Unbundlers. Even although our finding points in a positive direction, the estimated coefficient is only imprecisely estimated because of the small sample size. The confidence interval around this coefficient is [-0.28; 0.71]. This indicates, that with a 95 percent probability, we can rule out the large negative effects of deregulation (maximum -0.28). However, economically important positive effects (of up to 0.71 Local Loop Unbundlers) may occur.

Conclusion and outlook

This study first provides empirical evidence of the relationship between local deregulation and subsequent competitive development in the WBA market. Although theoretical predictions about competition-related developments in deregulated local markets have been unclear to date, our findings shed some light on this "black box". We find that local deregulation has consistently positive effects on infrastructure investments by the incumbent, measured by the availability of fibre-based access. Furthermore, we find no indication that local deregulation of the UK WBA market has a negative effect on infrastructure investment by competitors, measured by the number of Local Loop Unbundlers. On the contrary, all estimates point in the positive direction.

We do not know with any certainty how deregulated markets would have developed in the absence of deregulation, since this cannot be observed. However, our statistical approach accounts for time-invariant area characteristics and we control for local conditions in 2007. In addition, we can identify the effect of a self-fulfilling prophecy created by the deregulation rule, and separate it from the actual deregulation effect. We are thus confident that our results accurately reflect the investment incentives of deregulation.

The debate over the pros and cons of the local deregulation of the WBA market is a recent development. We chose to study the effects of local deregulation of the British WBA market because the UK was the first country to take this step. This allowed us to study the medium-term effects on the investment behaviour of British Telecom and its competitors. We have no direct measure of consumer welfare, such as retail price levels or broadband penetration rates. Our findings still have important policy implications since promoting investments in telecommunication infrastructure is the explicit goal of the European Commission in order to ensure and sustain long term growth and competitiveness.

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