Wholesale market definition in telecommunications: The issue of wholesale broadband access

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Abstract

The scope of a wholesale market may, in addition to demand- and supply-side substitution at the wholesale level, also be determined by substitution patterns at the retail level. Considering wholesale broadband access markets, it is argued that each of these forces can be strong enough to render a 5-10% price increase by a hypothetical monopolist at the wholesale level unprofitable and thus may lead to a wider wholesale market definition including, for example, cable networks in addition to DSL. Based on the theory of derived demand elasticities it is discussed under which circumstances this could be the case. The position of the European Commission and the practice of national regulatory authorities are then reviewed in light of these arguments.

Keywords: market definition, hypothetical monopolist test, wholesale markets, elasticity of derived demand, wholesale broadband access, DSL, cable networks, European Commission

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3 All views expressed are solely the author’s and do not bind RTR or the Telekom-Control-Kommission (TKK) in any way nor are they official position of RTR or TKK.
1. Introduction

In the telecommunications sector, national regulatory authorities (NRAs) as well as competition authorities frequently will have to deal with the issue of market definition at the wholesale level. The Recommendation of the European Commission on electronic communications markets susceptible to ex ante regulation,\(^4\) for example, encompasses 18 markets, 11 of which are wholesale markets. Although wholesale market definition is, from a conceptual point of view, not much different from retail market definition, there is an additional issues which has to be taken into account and which this article wants to highlight upon: The role of retail markets for wholesale market definition. Economic literature has, as far as we are aware, not been very explicit on this issue so far, but nevertheless (or because of that), there have recently been intensive discussions between the European Commission and NRAs on exactly these point in particular in the context of wholesale broadband access markets. This article is using a simple framework in which these questions can be thought about and applies this framework to the definition of wholesale broadband access markets.

Section 2 sketches the discussion between the European Commission and some national regulatory authorities on the definition of wholesale broadband access markets; section 3 discusses the role of retail markets for wholesale market definition from a theoretical point of view; section 4 outlines how competitive constraints via the retail level can be evaluated; sections 5 reviews the position of the European Commission and the practice of the national regulatory authorities in light of these arguments; section 6 summarizes and concludes.

2. Wholesale broadband access markets – the issue

A discussion about the definition of wholesale broadband access markets has developed since the European Commission Art 7 Taskforce\(^5\) has received notifications concerning this market from OfTEL (now Ofcom, the NRA of the United Kingdom) and Comreg (Ireland). The wholesale broadband access market, according to the Recommendation of the European Commission “… covers ‘bit-stream’ access that permit the transmission of broadband data in both directions and other wholesale access provided over other infrastructures, if and when they offer facilities equivalent to bit-stream access.”\(^6\)

One of the crucial questions with regard to this market is whether access via cable networks or alternative infrastructures (e.g. wireless broadband or fibre) delivering broadband services at the retail level should be included in addition to wholesale DSL products. Whereas DSL wholesale products provided by the incumbent telecommunications operator (in most cases due to regulatory obligations or regulatory pressure) are available in many EU Member States,\(^7\) wholesale broadband access via cable networks or other infrastructures is only provided rarely. Until recently there has even been a dispute whether such a wholesale product on cable networks would be technically possible at all but it seems to be commonly recognised today that “… technical solutions do exist for cable operators to provide “bitstream” type services to third parties” as it is stated in ERG (2005, p. 24).

However, wholesale broadband access via cable networks exists in few countries and to a limited extent only, which makes a direct competitive constraint imposed by cable networks on DSL at the wholesale level indeed unlikely. Even if such a wholesale product existed, switching would be difficult for internet service providers as this would require in most cases

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\(^5\) The so-called Art 7 Taskforce of the European Commission reviews market definition and market analysis of NRAs of EU Member States according to Art 7 of the Framework Directive (Directive 2002/21/EC, OJ L108/33). The European Commission has a veto power with respect to these issues.

\(^6\) See the Annex of the Recommendation of the European Commission.

\(^7\) See ERG (2005) pp. 9-11.
cooperation with several cable network operators\(^8\) and even then coverage at the national level would be smaller than in case of DSL (see Table 1 in section 5).

Oftel and Comreg included access via cable networks into the wholesale broadband access market despite their opinion that there is no direct constraint of cable operators on DSL wholesale providers in their countries, and argued as follows: A hypothetical monopolist of DSL wholesale access would be constrained not only by direct supply and demand-side substitution at the wholesale level, but also by cable-based broadband internet services at the retail level, which have sufficient impact at the wholesale level to justify their inclusion into the wholesale broadband access market.\(^9\)

The European Commission commented on this market definition as follows (emphasis original, footnotes omitted):\(^{10}\)

> The approach to defining a wholesale market on the basis of the competitive conditions in the corresponding retail market is, in principle, consistent with the methodology set out in the Recommendation and in the Commission's Guidelines on market analysis and the assessment of significant market power. However, differences in the patterns of demand-side and supply-side substitutability between retail and wholesale level need to be analysed and taken into consideration. Therefore, the Commission draws attention to the definitions of wholesale broadband access in the Annex to the Recommendation on relevant markets, which covers both (PSTN) and "wholesale access provided over other infrastructures, if and when they offer facilities equivalent to bitstream access."

\(^8\) In most countries there is a number of cable network operators operating their own network and networks usually do not overlap.


Accordingly, NRAs should give greater consideration to the technical, practical and economic feasibility for cable operators to offer facilities equivalent to bit-stream access before possibly including cable in the relevant market. The Commission considers that it would thus be appropriate to provide evidence of a potential direct constraint and not merely refer to the indirect pricing constraint based on the assumption of substitutability at the retail level. The Commission considers however that the indirect pricing constraint could be taken into account at the stage of the SMP assessment.

The position of the European Commission therefore seems to be that only direct supply- and demand-side substitution at the wholesale level would justify an inclusion into the relevant market, whereas competitive constraints via the retail level on their own cannot justify such an inclusion. Constraints via the retail level should therefore only be taken into account at the subsequent stage of SMP assessment.

The following two sections discuss the definition of wholesale markets from a theoretical point of view. Section 5 will then discuss the position of the European Commission and the practice of NRAs in light of these arguments.

**3. The definition of wholesale markets**

Market definition for the purpose of market analysis serves to identify all relevant and significant competitive constraints which affect the behaviour of undertakings producing a certain good.\(^\text{11}\) The standard tool for market definition, which is also embraced by the European Commission,\(^\text{12}\) is the hypothetical monopolist test (HM-Test). This test asks whether, starting from the competitive level, a non-transitory 5-10% price increase would be

\(^{11}\) See nera (1992), pp. 9 et sqq. and Bishop/Walker (1999), pp. 46 et sqq.

\(^{12}\) See the European Commissions Guidelines on market analysis and the assessment of significant market power under the Community regulatory framework for electronic communications networks and services ("SMP-Guidelines"), §§ 40 et sqq.
profitable for a hypothetical monopolist in the market of consideration. The smallest set of products for which the price increase can be sustained constitutes the relevant market. If it is not possible for the hypothetical monopolist to enforce such a price increase, there obviously exist other goods which constrain the behaviour of the monopolist and therefore should be included into the market definition.\textsuperscript{13} Applying the hypothetical monopolist test to wholesale markets is, from a conceptual point of view, equivalent to its application to retail markets.

Where the HM-Test is not applied empirically (e.g. based on estimates of demand elasticities) but as a "thought experiment", which is frequently the case in practice for various reasons, one has to think about why such a 5-10% price increase could not be sustainable.

In general, there are two main forces which potentially could make such a price increase unprofitable: Supply-side substitution and demand-side substitution.\textsuperscript{14} Whereas supply-side substitution refers to the extent to which other undertakings currently not producing the good in question would start producing it in response to a 5-10% price increase, demand-side substitution refers to the extent to which buyers would substitute to other products in response to such a price increase.

The same forces are of course also present at the wholesale level. In addition to demand- and supply-side substitution at the wholesale level, however, different wholesale providers may be linked to one another via a retail market. If and how the link via the retail level can constrain the behaviour of a hypothetical monopolist at the wholesale level is analysed with reference to figure 1.

\textsuperscript{13} For a general description of the HM-Test see, for example, OFT (2001), pp. 7-15.
\textsuperscript{14} See, for example, Bishop/Walker (1999), pp. 48 et sqq., OFT (2001), pp. 8 et sqq, and §§ 49 et sqq. of the SMP-Guidelines.
Consider A to be a hypothetical monopolist of an input $a$, which is supplied to the companies C1 and C2, which produce product $c$ that is supplied at the retail level. B offers a product $b$ (which is differentiated from $a$) at the wholesale level, which is supplied to C3 and C4, which also offer product $c$ at the retail level.

Consider now a price increase of product $a$. As a response to such a price increase,

(i) the undertakings C1 and C2 might switch to supplier B (demand-side substitution at the wholesale level), and/or

(ii) supplier B might take up the production of Product $a$ (supply-side substitution at the wholesale level), or

(iii) neither of (i) or (ii) might happen.

In the case of retail markets, the conclusion would be that $a$ and $b$ belong to the same market if demand-side substitution or supply-side substitution (cases (i) and (ii)) is sufficiently strong to render a 5-10% price increase unprofitable. In case (iii) one would conclude that product $a$ forms a separate market, as neither demand- nor supply-side substitution is sufficiently strong to prevent the hypothetical monopolist A from profitably increasing its price.
Whereas the conclusions in cases (i) and (ii) remain the same when the analysis is done at the wholesale level, this is not necessarily true for case (iii). Even if the undertakings C1 and C2 are unable to switch and undertaking B is unable to supply product \(a\), C1 and C2 will still face an increase in input prices, which usually will also force them to increase prices at the retail level. As a response to the price increase at the retail level, consumers might switch to undertakings C3 or C4. C1 and C2 lose sales and will, as a consequence, reduce their demand for input \(a\). This may well make a 5-10% price increase by the hypothetical monopolist A unprofitable. Only a hypothetical monopolist producing \(a\) and \(b\) could then (in the absence of further alternative inputs) profitably impose such a price increase at the wholesale level if demand-side substitution at the retail level is sufficiently strong.\(^{15}\)

The conclusion is that, in addition to supply- and demand-side substitution, the price-setting behaviour of a hypothetical monopolist is constrained because the wholesale products \(a\) and \(b\) are linked to each other via the retail market. Thus, there are three forces which have to be considered in the definition of wholesale markets:

1. demand-side substitution at the wholesale level,
2. supply-side substitution at the wholesale level, and
3. indirect competitive constraints which depend on demand-side substitution at the retail level\(^{16}\)

Each of these forces can either on its own or together with the other ones be strong enough to justify a market definition which includes both products \(a\) and \(b\). The main difference between wholesale and retail markets therefore is that wholesale products can belong to the

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\(^{15}\) This thought has been expressed, for example, by RBB Economics (2002), Stumpf, U.: “Controversial issues in definition of relevant wholesale markets”, presentation at the WIK workshop Market reviews under the new EU regulatory framework for electronic communications services, Berlin 27 October 2003 and Geroski/Griffith (2003, p. 7). Oftel (2003) and Comreg (2004) and later some other NRAs also argued along these lines for the inclusion of cable networks into wholesale broadband access markets.

\(^{16}\) Supply-side substitution at the retail level is less relevant in the framework considered, as undertakings C3 and C4 already produce product \(c\).
same market even in the absence of direct supply- and demand-side substitution, whereas this is not the case for retail markets.

If demand-side substitution at the retail level is strong enough, the application of the HM-Test therefore will lead to a market definition which embraces both products \( a \) and \( b \) at the wholesale level.\(^ {17} \)

This conclusion can easily be transferred to a situation, where one of the operators is vertically integrated, such as in figure 2.

![Figure 2: A vertically integrated and a non-integrated operator linked via the retail level](image)

By the same line of reasoning as above, the constraints via the retail level can lead to an inclusion of the internally provided products of B into the relevant market, as only a monopolist of both product \( a \) and the internal supply of B would be able to profitably raise prices.

\[^ {17} \text{It has been implicitly assumed above that} \ a \ \text{and} \ b \ \text{are used only to produce} \ c. \ \text{If they are used to produce other goods than} \ c, \ \text{the extent of substitution between these other goods would also have to be considered. Broadband wholesale access, however, can be assumed to be used only (or at least to the largest extent) for broadband retail services.}\]
It follows from the above that constraints via the retail level can play a role in wholesale market definition in a way which is perfectly compatible with the HM-test methodology. This is not to argue that wholesale DSL is necessarily in one market with wholesale cable access. Whether the two products are part of the same market will always depend on the extent of the identified constraints and is, after all, an empirical question. The following section therefore aims at providing some initial guidance on how to approach the evaluation of constraints via the retail level and roughly estimates the extent of these constraints in wholesale broadband access markets.

4. Evaluating the extent of retail competitive constraints

For the evaluation of the extent of constraints via the retail level facing the hypothetical monopolist, the formal relation between wholesale and retail demand elasticities turns out to be helpful. Demand for inputs at the wholesale level is derived from demand at the retail level and therefore the elasticity of demand at the wholesale level will be related to the elasticity of demand at the retail level. The relationship between wholesale and retail demand elasticity has first been investigated by Alfred Marshall (1920) and has later been formalised by John R. Hicks (1963) in the context of labour economics. The Marshall-Hicks formula for the elasticity of derived demand is:

$$\sigma \varepsilon = c \varepsilon_r - (1 - c) \sigma$$

where $\varepsilon_W$ is the (derived) elasticity of demand for the wholesale input, $\varepsilon_R$ is the elasticity of demand for the final good, $c$ is the share of the costs of the wholesale input in total costs, and $\sigma$ is the elasticity of substitution between the respective input and another input. The

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18 A derivation can also be found in Ewerhart (2003)
underlying assumptions are a constant returns to scale production function, competitive supply (at the wholesale as well as at the retail level), and a fixed price of the other factor.\textsuperscript{19}

Wholesale demand therefore will be more elastic

(i) the more elastic retail demand is (which depends on the possibility of substitution at the retail level);

(ii) the larger the share of the input in total costs; and

(iii) the easier it is to substitute the input with another input.

The market for retail broadband access is characterised by a particular production function as each operator needs exactly one connection at the wholesale level to provide one connection at the retail level. Furthermore, the input “wholesale broadband access” cannot be substituted by other inputs. Therefore, demand at the wholesale level can be expressed as:\textsuperscript{20}

\begin{equation}
D_w(w) = D_R(p(w))
\end{equation}

Here, $D_w$ denotes wholesale demand, which depends on the wholesale price $w$ and $D_R$ denotes retail demand, which depends on the retail price $p$, which in turn depends on the wholesale price $w$. Differentiation with respect to $w$ and straightforward multiplication yields:

\[
\frac{\partial D_w}{\partial w} \cdot w = \frac{\partial D_R}{\partial p} \cdot p \cdot \frac{\partial p}{\partial w} \cdot D_w,
\]

which can be written as

\textsuperscript{19} Furthermore, for (1) to hold, $\sigma$ must be larger than $\varepsilon_R$

\textsuperscript{20} The derivation follows Verboven, F.: “Empirical methods in competition policy”, presentation given at a workshop at the University of Vienna 16-17 September 2004, based on Van Reenen (2004, p. 11).
\[(3) \quad \varepsilon_w = \varepsilon_r \frac{\partial p}{\partial w} \frac{w}{p}\]

with

\[\varepsilon_w = \frac{\partial D_w}{\partial w} \frac{w}{D_w} \quad \text{and} \quad \varepsilon_r = \frac{\partial D_r}{\partial p} \frac{p}{D_r}.\]

That is, wholesale demand elasticity is equal to retail demand elasticity times the term

\[(4) \quad \frac{\partial p}{\partial w} \frac{w}{p},\]

which can be referred to as „pass-through elasticity“ as it measures the percentage change of the retail price relative to the percentage change of the wholesale price.

In this representation, wholesale demand will be more elastic:

(i) the larger the elasticity of demand at the retail level;
(ii) the more responsive the retail price is to a change in the wholesale price, and
(iii) the larger the ratio of wholesale to retail price \(w/p\).

Representation (3) differs from the Marshall-Hicks elasticity of derived demand (1) in that there is no assumption of competitive supply at the retail level (which implies that \(\partial p/\partial w\) can be smaller than 1) and there is no alternative input at the wholesale level.

Representation (3) implies that wholesale demand will usually be less elastic than retail demand for the following reasons:

- The change of the retail price in response to a change of the wholesale price mainly depends on the competitive conditions at the retail level. With perfect competition, for
example, all retail undertakings are forced to pass on the entire price increase at the wholesale level to their consumers, i.e., $\frac{\partial p}{\partial w}=1$. If undertakings at the retail level have market power, this ratio will be smaller than 1, e.g. 0.5 in the case of monopoly (at the retail level) with linear (retail) demand. In general, the ratio is likely to lie between 0 and 1.21

- The same applies to the ratio $\frac{w}{p}$, which is equal to 1 if the retail price is equal to the wholesale price and goes to 0 the smaller the wholesale price in relation to the retail price.

To summarize: $0 \leq \frac{\partial p}{\partial w} \leq 1$ and $0 < \frac{w}{p} \leq 1$ and therefore $\varepsilon_w \leq \varepsilon_R$, i.e., wholesale demand will usually be more inelastic than retail demand.22

What does this mean in the HM-Test situation outlined above (see figure 1)? The profitability of a price increase of the hypothetical monopolist A clearly depends on the elasticity of demand at the wholesale level, which in turn depends on the retail elasticity and the pass-through elasticity (see equation (3)). Whether the wholesale elasticity is sufficiently large to make a 5-10% increase of the hypothetical monopolist unprofitable will of course be an empirical question. However, it can be assumed that the retail elasticity $\varepsilon_R$ usually should be well in the elastic range as we consider demand side substitution from companies C1/C2 to C3/C4, which is substitution within a single product market (the retail market for product $c$). If there is perfect competition at the retail level and $c$ is a homogenous good, for example, the elasticity faced by a single firm goes to infinity, i.e., the firms C1 and C2 would lose all sales in response to even a very small price increase at the wholesale level, which of course would make such a price increase by a hypothetical monopolist unprofitable.

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21 Although this is the likely range of the effect, the actual relation between wholesale and retail prices can be quite complex, see Bulow and Pfleiderer (1983).
22 This need not necessarily hold in representation (1) where an alternative input at the wholesale level exists.
In reality of course, products are usually differentiated (in particular if they are produced by use of different wholesale products) and switching costs, for example, might reduce the extent of substitution. But still the fact that the products constitute a single market tells us that they fulfil the HM-Test at the retail level, i.e., that a monopolist holding less than the entire retail market could not profitably impose a permanent 5-10% price increase due to demand- or supply-side substitution. The demand elasticity facing the firms C1 and C2 thus is at least as large as to satisfy the HM-Test at the retail level.

Are DSL and cable internet access at the retail level likely to be in the same market? As Crandall et al (2002) note, both services provide similarly high bandwidths, both are “always on” and both allow to use the internet and the telephone at the same time (all characteristics which distinguish them from narrowband services) and prices (in the US) are “similarly enough”. Dotecon (2003) investigating a set of OECD countries finds that the services offered on the two platforms are similar and that the prices are converging. More recently several European NRAs concluded that DSL and cable belong to the same retail market, mainly based on a comparison of prices and performance (see Table 1 in section 5). Two Econometric estimates based on 2000 and 2001 data for the US support these conclusions: Using a nested-logit discrete-choice model Crandall et al (2002) estimate an own-price elasticity of DSL of -1.184 and a cross-price elasticity of demand for cable with respect to a change in the price of DSL of 0.591 for those households where both DSL and cable are available. The respective estimates in Rappoport et al (2003), which use a similar approach, are -1.462 and 0.766. Both conclude that broadband internet access via DSL and cable are substitutes and belong to the same retail market.23

As the extent of the constraints via the retail level does not only depend on $\epsilon_R$ but also on the pass-through elasticity, both factors will have to be considered before making a judgement about their strength.

With regard to the ratio of the wholesale to the retail price \( w/p \), Oftel (2003), for example, concludes that wholesale costs constitute around approximately 45% of the retail price of ADSL based broadband. AGCOM (Italy) states that “… the cost of the wholesale side in question represents circa 50% of retail.”\(^{24}\) RTR (2005) estimates this ratio to amount even to 70-80% in Austria, a figure which appears similar to Germany.\(^{25}\) It therefore can be concluded that the cost of wholesale broadband access make up a significant part (if not the bulk) of total costs.

As for the parameter \( \partial p/\partial w \), it will usually be reasonable to assume that it is between 0.5 and 1, and usually will be close to 1 if the market is considered to be competitive. Oftel (2003, p. 51), for example, implicitly assume that this factor is equal to 1 (\( w/p = 0.45 \) and “a 10% price increase of the wholesale element would translate into a 4.5% price increase at the retail level”). This assumption appears reasonable for three reasons: First, it seems sensible to start the HM-Test from the competitive level not only at the wholesale but also at the retail level as otherwise distortions at the wholesale level which impact on the retail level may lead to problems similar to the “cellophane fallacy”.\(^{26}\) Second, if a vertically integrated monopolist is considered, it is reasonable to assume that a price increase at the wholesale level is also passed on (internally) to the retail level. As the provision of broadband internet access is characterised by a high degree of vertical integration (i.e., the company providing internet access to the final consumer in most cases also operates the transmission network in most countries) such a consideration seems reasonable. Third, the retail market is not part of the Recommendation of Relevant Markets of the European Commission and no country so far found this market to be a relevant market for ex ante regulation. This means that the retail market is considered to be effectively competitive (in most cases due to wholesale

\(^{24}\) See p. 43 of the unofficial translation of AGCOM’s notification to the European Commission.

\(^{25}\) See BNetzA (2005, p. 37) where it is stated that a 10% price increase at the wholesale level would translate into a “high one-digit” percentage price increase at the retail level as the cost for bitstream make up the major part of total costs.

\(^{26}\) This refers to the case where the market is mistakenly defined too wide as an undertaking with market power has already raised prices above the competitive level, see OFT (2001).
regulation, however) which is again consistent with the assumption that $\partial p/\partial w$ will be close or equal to 1.

Taken the three factors ($\varepsilon_R$, $w/p$, and $\partial p/\partial w$) together, a range for the elasticity of demand for DSL bitstream products at the wholesale level can be derived for those areas where both DSL and cable are available. The minimum of this range is calculated with $\varepsilon_R = -1.184$ (Crandall et al, 2002), $w/p=0.45$ (Oftel, 2003) and $\partial p/\partial w=0.5$ (monopoly with linear demand at the retail level) which results into $\varepsilon_W = -0.266$ according to (3). The maximum is calculated with $\varepsilon_R = -1.462$ (Rapoport et al, 2003), $w/p=0.8$ (RTR, 2005) and $\partial p/\partial w=1$ (competitive retail level) and yields $\varepsilon_W = -1.169$. This is a quite large interval going from the inelastic to the elastic range of demand. This suggests that the competitive constraints via the retail level may be sufficient to fulfil the HM-test in some cases while they may not be sufficient in others.

Another factor which has not been taken into account so far is the coverage of alternative platforms relative to the coverage of DSL networks. As Table 1 in section 5 shows, the coverage of cable networks is usually smaller than the coverage of DSL networks and varies considerably across countries. How can this be taken into account in the calculation? One approach would be to estimate $\varepsilon_R$ not only for the area where both cable and DSL are available but for the entire geographic market, which may also include areas where only DSL is available. Another approach would be to calculate $\varepsilon_R$ as

$$\varepsilon_R = \varepsilon_{R \text{DSL+C}} \mu + \varepsilon_{R \text{DSL}} (1 - \mu)$$

(5)

where $\varepsilon_{R \text{DSL+C}}$ is the retail demand elasticity of DSL where both DSL and cable are available, $\varepsilon_{R \text{DSL}}$ is the retail demand elasticity of DSL where only DSL is available and $\mu$ is the share of DSL lines which is sold in areas where cable networks also exist. This share is likely to correlate closely with cable network coverage. If cable is the best substitute for DSL at the
retail level, $\varepsilon_{R}^{DSL+C}$ will be larger than $\varepsilon_{R}^{DSL}$. Knowing $w/p$, $\partial p/\partial w$, $\varepsilon_{R}^{DSL+C}$ and $\varepsilon_{R}^{DSL}$ one can calculate the minimum $\mu$ necessary to fulfil the HM-test at the wholesale level by use of representations (3) and (5). If, for example, $w/p=0.8$, $\partial p/\partial w=1$, $\varepsilon_{R}^{DSL+C}=-1.462$ and $\varepsilon_{R}^{DSL}=-0.8$, $^{27}$ $\mu$ would have to be at least as large as 0.68 for $\varepsilon_{W}$ to remain in the elastic range.

In conclusion, it can be said that there may be instances where the substitution between DSL and cable at the retail level is sufficient to constrain DSL at the wholesale level. However, an a priori conclusion that this will always be the case seems unjustified. Unless the elasticity of retail demand for DSL is not considerably larger than estimated by Crandall et al (2002) or Rappoport et al (2003), it appears that the constraints via the retail level between DSL and cable will only be strong enough if the cost of bitstream access relative to the retail price as well as the coverage of cable networks in relation to DSL are significantly larger than 0.5.

The approach outlined above can of course also be applied to other platforms than cable like, e.g., wireless broadband or fibre, or to several platforms taken together.

A final remark relates to the time dimension of the HM-test, i.e., the period within which the competitive constraints become effective. How long this period should be is in fact an open question. Equivalent to the extent of the price increase to be applied (5-10%) it is more or less arbitrary. The SMP-Guidelines only state that “[t]he time frame to be used to assess the likely responses of other suppliers in case of a relative price increase will inevitably depend on the characteristics of each market and should be decided on a case-by case basis”, $^{28}$ which is of little help in practice. However, the EC Horizontal Merger Guidelines $^{29}$ and common practice suggest that this period should be somewhere between six months and (at

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$^{27}$ Rappoport et al (2003) calculate an $\varepsilon_{R}^{DSL}$ of -1.364. However, they expect that price elasticity to become inelastic as the penetration rates of ADSL service increase.

$^{28}$ §52, footnote 37

a maximum) two years.\textsuperscript{30} To assess whether retail competitive constraints are likely to become effective within this period, one needs a judgement on (i) how fast the increase of the wholesale price is passed on to the retail level and (ii) how fast consumers would switch in response to such a price increase. Point (i) will again depend on competitive conditions at the retail level, whereby the price increase will usually be passed on faster the more competitive the retail level is.\textsuperscript{31} For the same reasons discussed above in the context of the parameter $\frac{\partial p}{\partial w}$ it will usually be reasonable to assume that the price increase will be passed on quickly. Point (ii) will significantly be influenced by the duration of contracts, the associated costs of pre-mature termination and the number of consumers which are affected by these switching costs. As contractual obligations are usually not longer than one year, the time dimension of the HM-test should be fulfilled at least if the two-year benchmark is applied.

\textbf{5. Approaches in Europe}

How have EU Member States dealt with the issue of the definition of wholesale broadband access markets so far? Table 1 gives an overview of some key data of those countries which have notified their market analysis to the European Commission by February 2006.

\begin{flushright}
\textsuperscript{30} § 74 of the Horizontal Merger Guidelines notes in the context of market entry which may defeat anti-competitive effects of a merger: “… entry is normally only considered timely if it occurs within two years.”
\textsuperscript{31} A monopoly may also be quick in passing on price increases, however, for the range of competitiveness usually prevailing in retail broadband markets it can be assumed that price increases will be passed on faster the lower price-cost margins were prior to the price increase.
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<table>
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<th>Retail market share June 2005</th>
<th>Altern. operators’ ULL DSL lines as % of total DSL, Q3/05</th>
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<th>Cable (f: Sat) 2004</th>
<th>Date of notification</th>
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</tr>
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<tbody>
<tr>
<td>Austria</td>
<td>56.1% 43.1% 0.9% 15%</td>
<td>15% 60% 50% 30.11.2005</td>
<td>Cable, WLL, Fibre</td>
<td>no D. S.</td>
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<td>-</td>
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<tr>
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<td>95%</td>
<td>57%</td>
<td>30.06.2006</td>
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<tr>
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<td>90%</td>
<td>n.a.</td>
<td>n.a. 28.05.2004</td>
<td>-</td>
<td>D.S.</td>
</tr>
<tr>
<td>France (national)</td>
<td>93.4% 6.6% 0.1% 30%</td>
<td>90%</td>
<td>25%</td>
<td>13.04.2005</td>
<td>-</td>
<td>D.S.</td>
</tr>
<tr>
<td>France (regional)</td>
<td>98.8% 2.6% 0.8% 21%</td>
<td>90%</td>
<td>15%</td>
<td>11.10.2005</td>
<td>-</td>
<td>D.S.</td>
</tr>
<tr>
<td>Germany (ATM level)</td>
<td>60.5% 39.5% 0.0% 28%</td>
<td>99%</td>
<td>90%</td>
<td>04.11.2006</td>
<td>-</td>
<td>eff. comp.</td>
</tr>
<tr>
<td>Hungary</td>
<td>62.8% 34.1% 3.1% 0%</td>
<td>60%</td>
<td>n.a.</td>
<td>02.06.2006</td>
<td>-</td>
<td>n.a. D.S.</td>
</tr>
<tr>
<td>Ireland</td>
<td>80.3% 8.5% 11.1% 2%</td>
<td>70%</td>
<td>10%</td>
<td>29.06.2004</td>
<td>Cable, PWA</td>
<td>no D.S.</td>
</tr>
<tr>
<td>Italy</td>
<td>94.1% 0.0% 5.9% 12%</td>
<td>80%</td>
<td>100%</td>
<td>03.10.2005</td>
<td>Cable, Sat. Fibre</td>
<td>D.S.</td>
</tr>
<tr>
<td>Lithuania</td>
<td>n.a. n.a. n.a.</td>
<td>0%</td>
<td>n.a.</td>
<td>21.10.2005</td>
<td>-</td>
<td>n.a. D.S.</td>
</tr>
<tr>
<td>Netherlands (high quality)</td>
<td>68.6% 34.1% 3.1% 1%</td>
<td>100%</td>
<td>47%</td>
<td>17.12.2003</td>
<td>Cable</td>
<td>no D.S.</td>
</tr>
<tr>
<td>Netherlands (low quality)</td>
<td>52.1% 47.9% 0.3% 6%</td>
<td>90%</td>
<td>70%</td>
<td>24.11.2004</td>
<td>Cable, PWA</td>
<td>D.S.</td>
</tr>
<tr>
<td>Norway</td>
<td>81.2% 13.8% 5.1% 2%</td>
<td>90%</td>
<td>70%</td>
<td>24.11.2004</td>
<td>Cable, PWA</td>
<td>no D.S.</td>
</tr>
<tr>
<td>Portugal</td>
<td>68.6% 16.3% 15.1% 30%</td>
<td>90%</td>
<td>50%</td>
<td>02.06.2004</td>
<td>-</td>
<td>no D.S.</td>
</tr>
<tr>
<td>Sweden</td>
<td>71.8% 28.1% 0.1% 1%</td>
<td>100%</td>
<td>45%</td>
<td>17.12.2003</td>
<td>Cable</td>
<td>no D.S.</td>
</tr>
<tr>
<td>Source</td>
<td>OECD, OECD, OECD, ECTA, OECD, Notifications</td>
<td>Analysys, Notifications, Notifications</td>
<td>Corresponding responses</td>
<td>D.S.</td>
<td>D.S.</td>
<td>D.S.</td>
</tr>
</tbody>
</table>

* Remedies were only imposed with respect to DSL

Table 1: Market definition and SMP assessment in wholesale broadband access markets in Europe (by Feb. 2006)

Sources:
- OECD: OECD Broadband statistics June 2005, and OECD Communications Outlook 2005
- Notifications: Official notification of (draft) measures to the European Commission or the EFTA Surveillance Authority (in case of Norway) and corresponding responses
- Analysys: International Broadband Market Comparison, report for the Department of Trade and Industry, April 2004

By February 2006, 15 countries had notified 19 wholesale broadband access markets. Whereas 11 countries defined a single market, 4 countries split the market according to network hierarchy (Germany, UK), geographic considerations (France) and quality (Netherlands). The geographic market definition was in all cases national or according to the network coverage of the incumbent DSL operators. The columns headed “coverage” show

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32 [http://www.oecd.org/document/16/0,2340,en_2649_34225,35526608_1_1_1_1,00.html](http://www.oecd.org/document/16/0,2340,en_2649_34225,35526608_1_1_1_1,00.html)
that DSL coverage (homes passed as percentage of total households) is high and similar across countries whereas the coverage of alternative platforms varies substantially. This partly explains the differences in the market shares of alternative platforms at the retail level which are also shown in the table.

Alternative platforms (in most cases cable networks) were included in 10 of the 19 markets, 9 were defined as DSL-only markets. Virtually all countries found the DSL operator to hold significant market power (SMP) and imposed some form of access regulation, except for the Netherlands who found the low quality segment of the wholesale broadband access market to be competitive.

What is driving the differences in market definition? A look at Table 1 tells us that cable network coverage or the market share of cable at the retail level cannot fully account for these differences. Countries with relatively high cable (retail) market shares have not included cable (most notably Hungary with 34%) while others included cable despite low retail market share and coverage (most notably Ireland with 8.5% and 10%). Although network coverage and market shares of alternative platforms are certainly not the only criteria which are considered in a market definition, this still suggests that, in addition to differences in market conditions, difference in approaches may explain the market definitions adopted. And indeed most of the countries which included cable explicitly alluded to the constraints via the retail level while most of the other countries seem not to have done so.

What is the right approach?

The correct approach to market definition according to the HM-test would be to start, according to the Recommendation on Relevant Markets, with a DSL monopolist and ask, for a certain area, whether this monopolist would be constrained either at the retail level or at the wholesale level by an alternative platform or by several alternatives platforms able to deliver
similar services at the retail level taken together.\footnote{34} This will certainly depend on the product characteristics, the price and the geographic availability of the products delivered via alternative platforms. If the competitive constraint of alternative platforms is strong enough, they should be included in the relevant market. This implies, however, that a DSL-only operator cannot be dominant on such a market, as even the hypothetical DSL monopolist is constrained by alternative platforms and the actual DSL incumbent is usually smaller than the hypothetical monopolist, mainly due to the existence of local loop unbundling. How could so many countries then find the DSL-only operator (only in Denmark and Portugal the incumbent DSL operator also owns cable networks) to be dominant despite including alternative platforms in the market?

The answer to this question relates to a conflation between market definition and market analysis which can hardly be avoided in the case of wholesale broadband access markets. As the incumbent DSL operator in most countries is more or less identical with the hypothetical DSL monopolist (the amount of unbundled DSL lines varies but was not more than 30% of all DSL lines in all countries considered in Q3/05, and in many of them much below, see Table 1) the answer to the hypothetical monopolist test amounts to the answer to the market analysis itself: If the hypothetical monopolist can profitably raise prices by 5-10%, so can the DSL incumbent, if not, the market is effectively competitive.\footnote{35} This leaves NRAs with two options: Either one collapses market definition and market analysis into one step, or – and this is most likely what many countries including cable did – identify potential competitive constraints in the stage of market definition and take a closer look at the actual extent of these constraints at the stage of market analysis. In the case of wholesale broadband access this was done by identifying products which are substitutes at the retail

\footnote{34} This also satisfies the principle of technological neutrality in market definition. \footnote{35} As there is some form of regulation on bitstream access in most counties the current price level appears to be an appropriate starting point for the HM-test.
level in those areas where they are offered\textsuperscript{36} at the stage of market analysis, to evaluate the actual constraint – which also depend on network coverage – at the stage of market analysis.

Ofcom, for example, replied to a consultation input as follows (emphasis added):\textsuperscript{37}

BIG suggested that Ofcom should construct a product market definition test that takes into account the fact that cable is only available in some areas. […] Ofcom believes that BIG has not used the appropriate analytical framework to conduct the test for product market definition. The question of whether products based on DSL are constrained by those provided over cable is dependent on whether consumers are likely to view these two services as substitutes where both are available. […] BIG’s analysis is more akin to a market power test.

In a similar manner, ComReg argues (emphasis added):\textsuperscript{38}

ComReg must assess whether different broadband products are substitutes for each other from the demand and the supply side in terms of pricing and functionality. Thus the relative take-up of broadband services is less important to the market definition and is more important to the assessment of market power.

Similar statements can be found in RTR (2005, p. 37) and BNetzA (2005, p. 37).

\textsuperscript{36} As alternative networks in general have a smaller coverage than DSL networks the question arises if there is a need for the definition of geographic markets. Most countries refrained from defining geographic markets with reference to a common pricing constraint exerted by the DSL incumbent which in general has national coverage and is setting a nationally uniform price. Although this appears to be reasonable, there seems to be a need for further research if and under which circumstances local markets should be defined.

\textsuperscript{37} Oftel (2004), p. 51

\textsuperscript{38} ComReg (2004), p. 23.
As the stages of market definition and market analysis more or less collapse in the case of wholesale broadband access in many countries, it does not seem to matter if the constraints exerted by cable via the retail level are analysed in detail in the market definition or in the market analysis stage as both involves the same analysis and therefore will lead to the same result. Obviously, except for one, none of the NRAs including cable in the market definition concluded that it was strong enough – mainly due to limited coverage – to constrain the DSL incumbent sufficiently to declare the market to be effectively competitive.  

What about those countries which did not include alternative platforms into the market? While some countries (e.g. France, Lithuania) explicitly refer to the limited coverage of cable networks (which suggests that substitution at the wholesale as well as at the retail level will be limited), other countries (e.g. Denmark, Sweden) seem to have focused primarily on substitution between DSL and alternative platforms at the wholesale level. Given the retail market share and the coverage of cable networks, it seems unlikely, however, that the result would have changed if the indirect constraints via the retail level had been taken into account more explicitly.

The case of the Netherlands (low quality wholesale broadband access market) finally shows that taking into account retail competitive constraints may indeed lead to a different result in the SMP assessment if alternative platforms are strong enough (as can be seen from Table 1, cable network coverage in the Netherlands is the largest by far).

How is the position of the Art 7 task-force of the European Commission as outlined in section 2 to be evaluated? Given the considerations in sections 3 and 4 it hardly seems justified to

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39 In general, an incumbent competing with an “entrant” with limited coverage and setting a uniform price faces a trade-off between high prices in “monopoly areas” and low prices in “competitive areas” and will hold more market power the smaller the coverage of the entrant is (see Valletti et al, 2002).

40 This is of course only a first guess, as a fully fledged market analysis will comprise much more than (current) retail market shares and the (current) coverage of cable networks (e.g. barriers to entry and expansion and a judgement about the future development of alternative platforms).
ask for supply or demand side substitution at the wholesale level as a necessary condition in order to include alternative platforms into the wholesale market. Although the Recommendation on Relevant Markets states that alternative platforms can only be included “if and when they offer facilities equivalent to bit-stream access”, it should be possible to deviate from this if there is evidence that the competitive constraints via the retail level are strong enough to fulfil the HM-test at the wholesale level in a particular country. A consideration of the indirect constraints via the retail level at the stage of SMP assessment, as recommended by the European Commission, may be at odds with the HM-test and appears to be only a “second-best” solution. However, the European Commission has not made use of its power to veto decisions related to market definition and market analysis so far in those cases in which alternative platforms have been included in the market. Whenever the DSL incumbent was found to hold SMP, the European Commission argued that even with alternative platforms excluded the result of the market analysis would not have changed, which is certainly correct and not unreasonable given that in those cases an exclusion of cable networks at the stage of market definition would have also been consistent with the HM-test methodology. Finally, the European Commission did not even make use of its veto power in the only case so far where the inclusion of cable networks indeed lead to a different result of the market analysis – in the Netherlands. This appears to have been a reasonable decision in light of the high cable network coverage in this country. In the cases of Austria and the Netherlands, the European Commission even noted that NRAs should take account “… of demand elasticity in order to substantiate the claim of an indirect pricing constraint coming from demand side substitution at the retail level.” This comment certainly goes into the right direction, although the standard of proof demanded by the European Commission

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41 The European Commission only expressed its concerns regarding OPTA’s conclusion and asked OPTA to “carefully monitor market developments, to re-conduct a market analysis and to notify its results within one year from the date of this letter.” (EC letter SG-Greffe (2005) D/206588 to OPTA)

42 See EC letter SG-Greffe (2005) D/206588 to OPTA.

43 Another comment by the European Commission in the cases of Austria and the Netherlands seems less justified. The European Commission states that “it would have to be shown that […] even in case ISPs pass on the price increase, all or most of the customers of the ISPs forced to raise prices would switch to retail cable operators and not, for example, to the retail arm of the WBA provider, in particular if the latter does not raise its own retail prices.” This reasoning
is much higher compared to what is asked for in other cases (as far as we are aware estimates of demand elasticities by NRAs for the purpose of market definition have been rare in the past – if there have been any at all).

6. Conclusions

It has been argued that wholesale market definition may depend, in addition to supply- and demand-side substitution at the wholesale level, on substitution patterns at the retail level. The impact of the constraints via the retail level will in general be stronger the larger the demand elasticity at the retail level is, the more of a wholesale price change is passed on to the retail level (i.e., the more competitive the retail level is), and the larger the ratio of wholesale to retail price is.

The constraints via the retail level may be particularly important for the definition of wholesale broadband access markets, where DSL competes with alternative platforms at the retail level and the costs for bitstream access account for a large part of total costs. Retail competitive constraints therefore should be considered at some stage of the regulatory process.

Some countries and the European Commission have followed “unconventional” approaches to this issue in the case of wholesale broadband access markets: While some disregarded the actual coverage and the actual resulting competitive constraint of alternative platforms at the stage of market definition, others appear to have followed the approach of the European Commission and looked at supply and demand side substitution at the wholesale level only. These approaches, however, do not seem to have lead to wrong decisions regarding the SMP-assessment so far as appears flawed as a price increase of a hypothetical DSL-monopolist at the wholesale level (encompassing all external and internal DSL sales) would certainly lead to a price increase of all DSL products at the retail level.
- those countries which disregarded the actual coverage of alternative platforms at the stage of market definition accounted for this factor at the stage of market analysis;
- in those countries which excluded alternative platforms mainly with reference to supply and demand side substitution at the wholesale level a consideration of retail competitive constraints would probably have not lead to a different conclusion;
- the European Commission did not make use of its veto power, not even in case of the Netherlands, the only decision in which the inclusion of cable networks indeed is likely to have changed the result of the SMP assessment.

In light of the estimates derived in section 4, the relative coverage of cable networks, and the relatively low share of ULL-based DSL broadband services (see Table 1), the results of the market analyses appear reasonable. Only in the Netherlands cable network coverage seems indeed large enough\textsuperscript{44} to provide a sufficient competitive constraint via the retail level.

Nevertheless there seems to be need for a change in the Recommendation on Relevant Markets. In the spirit of technological and competitive neutrality, the restriction “if and when they offer facilities equivalent to bit-stream access” imposed to alternative platforms should be deleted from the Recommendation.\textsuperscript{45} Instead it should be recognised that competitive constraints via the retail level may exist and that these constraints may be strong enough to fulfil the HM-test at the wholesale level. Of course, NRAs would need to provide evidence in a particular case that the extent of these constraints is indeed strong enough (with a standard of proof comparable to the one applied in past cases). In the mean time the European Commission should continue not to veto decisions where alternative platforms are included into the market and the competitive constraints via the retail level are indeed likely to be strong enough to constrain a hypothetical monopolist and, in the end, the DSL incumbent. If these competitive constraints are not taken into account, there remains the

\textsuperscript{44} Although satellite has coverage of 100% in Italy (see Table 1), it can be assumed that DSL and satellite are not as close substitutes at the retail level as DSL and cable. The Recommendation is currently reviewed by the European Commission.
danger that DSL operators are regulated despite the existence of several alternative infrastructures delivering similar services (in large enough areas) at the retail level.

Having discussed the issue of retail competitive constraints, the question remains how to deal with alternative platforms delivering broadband services at the retail level in cases where wholesale as well as retail competitive constraints are not strong enough to put them into the same market as DSL. Consider a case, for example, where the wholesale price only makes up a small part of total costs and retail demand elasticity is not large enough to compensate for that. If one strictly applied the HM-test methodology, alternative platforms would not be part of the relevant wholesale market, even if they have full coverage. Still, undertakings operating on these platforms are fully-fledged competitors at the retail level which do not depend on non-replicable infrastructure (or put differently, there is infrastructure-based competition at the retail level). Insofar as regulation at the wholesale level serves the promotion of downstream competition, it appears that finally even those platforms will have to be taken into account in regulatory decisions although they do not develop a sufficient competitive constraint on DSL at the wholesale level (neither at the wholesale level directly nor via the retail level). If there are several vertically integrated operators with large enough coverage, retail competition is unlikely to be impeded even if none of these operators is willing to grant access to third parties. Regulation at the wholesale level therefore is likely to be inappropriate even if a market for, say, DSL bitstream access can be defined by means of the HM-test and an SMP position is found.\textsuperscript{46} Whether the HM-test is the appropriate or the only instrument for NRAs in such situations is certainly a question warranting future investigation.

\textsuperscript{46} Such market power, if it exists, seems to be better dealt with by general competition law if necessary and not by sector specific regulation.
References


