

Response to the Public Consultation on Termination Rates

initiated by the Commission of the European Communities

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1. Background

The EU Commission is currently preparing a recommendation on the regulatory treatment of mobile termination rates (MTR) in the EU. On June 26, 2008, the Commission initiated a public consultation on a draft version of its recommendation which is accompanied by an explanatory note. The present effort responds to the Commission's request to assess whether the proposed regulatory intervention can be expected to achieve its objectives.

An important novelty compared to current regulatory practice in many EU countries is the suggestion that "National Regulatory Authorities should set symmetric termination rates based on the costs incurred by an efficient operator" (European Commission 2008a, p. 7). It appears to be important to shed light on two terms. (1) How are costs defined? (2) What is the definition of an efficient operator? The answer to these questions will determine the effects of regulation on competition and consumer welfare. In my response I will not elaborate on the cost concept. Arguably, forward-looking long-run incremental costs do not necessarily guide pricing decisions and may therefore be questioned as the appropriate cost concept. However, since this cost concept is well established, it certainly does not constitute a break from current regulatory practice and is therefore taken for granted in my exposition below.¹

The main point of my present effort is to question the wisdom of the definition of efficient operator chosen by the European Commission. I find that the proposed new approach is biased against small efficient operators and that its implementation is likely to lead to more polarized market outcomes, in contrast to the proclaimed goal of reaching more symmetric market outcomes. Consumers are likely to suffer in the short and long term. I will first discuss the efficient operator approach chosen by the commission. I will then question the claims brought against asymmetric

¹ In Section 3 I relate to regulation at marginal costs that has been the focus of the academic theoretical literature on the topic.

termination rates. My exposition is conceptual and thus applies across the different member states.²

2. Efficient operator approach

According to the Commission recommendation, NRAs should set symmetric MTRs based on a single “efficient” cost level, which is calculated under the assumption of equal market share (European Commission, 2008a, p. 5). The Commission elaborates on its approach as follows: “To determine the efficient scale for the purposes of the cost model, the recommended approach is to set that scale as follows: 1/Number of Mobile Infrastructure Operators. The rationale for this is that the number of market players is to a large extent determined by regulatory policy, such as spectrum assignment, as well as by competitive factors. It may be expected that operators, having entered the market, would strive to maximise efficiency and revenues and thus be motivated to achieve greater market share. Thus, one could reasonably expect that an efficient operator would or could achieve a minimum market share of 1/Number of Mobile Network Operator.” (European Commission, 2008b, p. 22.) I agree with the Commission’s statement that the number of competitors should be taken as given. However, due to strong asymmetries between operators in most European countries it is highly questionable whether competition among profit-maximizing efficient operators would lead to a symmetric market outcome in the near future, as envisaged by the Commission. Furthermore, the Commission’s approach will undermine or, at least, slow down, tendencies towards more symmetric market outcomes if markets are currently characterized by asymmetries that are beyond the control of small operators.

My argument against the proposed efficient operator approach formulated by the Commission rests on a couple of observations.

² My arguments are partly based on previous academic research that is cited at the relevant points.

Observation 1. Cost recovery includes investment costs. Due to an initially unexpected growth of the mobile market, early entrants have recovered their early investments rapidly, whereas late entrants still have to recover part of their investment costs.

Observation 1 implies that since early entrants were already allowed to recover costs, termination rates between early and late entrants have to differ because of cost recovery. However, the cost recovery statement ignores the possibility that some operators operate inefficiently. If this were case, there would be no reasons to allow these inefficient operators to recover their costs through high termination rates. I will return to this possibility below.

Observation 2. Because of important scale economies the actual cost of an efficient operator decreases in its market share.

It is widely acknowledged that a mobile operator's costs per call minute strongly decrease in the number of subscribers and in call volume (see e.g. European Regulators Group, 2008, p. 90). Hence, for different numbers of subscribers and different call volumes, the efficient use of resources leads to different cost levels. Operating at a low scale does not imply that the operator is inefficient. It may simply mean that market conditions at a particular point in time do not allow the firm to operate at a larger scale, as I will discuss below.

The scale economy observation complements the cost recovery observation because there is a high correlation between date of entry and scale of the operator. Hence, late entrants face at least two disadvantages compared to early entrants: they have not yet recovered their costs (this is relevant for dynamically consistent regulation according to which operators must be confident to be able to recover their initial investment

costs) and they operate at a lower scale which leads to higher costs (which is relevant to determine the relevant cost level of an operator).

Implementing the Commission's approach implies that, in a market with strongly asymmetric market shares, large efficient operators receive a payment for termination above true costs (and thus make a profit from termination), whereas small efficient operators receive a payment below their true costs (and thus make a loss from termination). This cannot be an appropriate policy recommendation at least for a number of years to come if (i) in several countries there exist strong asymmetries between operators and (ii) these asymmetries mostly cannot be attributed to inefficiencies that operators control themselves. An appropriate policy takes into account that, for exogenous reasons, efficient operators have unequal market shares and thus have to be treated differently. Small efficient operators incur higher costs and thus have to be granted larger mobile termination rates.

Asymmetries between firms may be due to a number of reasons. Only one of those reasons is that the smaller firm is the less efficient firm. In markets with frictions, such as the market for mobile telephony, many asymmetries can be attributed to factors which are outside the control of later entrants. Firstly, time of entry matters. The technological aspects (time needed to build the network) is well recognized but loses its importance since most operators are now active for quite a number of years. More important is the cost advantage of early entrants with GSM900-networks (and possibly a higher quality if this leads to better coverage). However, at this point in time technological factors should not be seen as the main impediment to a more symmetric market structure in the near future. The key observation is that these technological factors together with a first-mover advantage contributed to strong asymmetries in market share between early and late entrants in the past. Consumer switching costs lead to the prolongation of asymmetries in the market.

These switching costs arise e.g. from transaction costs consumers have to bear when switching the network (including asymmetric consumer search costs), quality uncertainty (which applies to untested operators), time to build a brand reputation, and long-term contracts.³ This implies that the market structure is not symmetric and in a way may resemble more markets with so-called vertical differentiation than with horizontal differentiation.⁴ These market characteristics are of course partly internalized by market participants. Consequently, late entrants, at least initially, focus on consumer segments with new or price-sensitive consumers. This suggests that while gaining market share quickly from a very low base is possible, moving closer towards a symmetric market structure becomes increasingly more difficult for late entrants.⁵

In light of these continuing asymmetries it is a heroic assumption that the market equilibrium among efficient operators should be seen as symmetric in the near future. Therefore, the proposed "efficient" operator approach according to which costs are calculated for an operator with a symmetric market share is inappropriate for quite a number of years to come.⁶ Note that this observation holds for most member states based on the recent development of market shares. An implementation of the

³ Klemperer (1995) gives various reasons for the existence of consumer switching costs. The presence of switching costs makes installed base valuable. Late entrants with a small installed base are at a disadvantage compared to early entrants.

⁴ On the distinction between vertical and horizontal differentiation see e.g. Anderson, de Palma, and Thisse (1992). Vertical differentiation naturally leads to asymmetric market outcomes. Higher profits and market shares of early entrants are not due to efficiency reasons but due to the fact that the most valuable consumers are typically served by early entrants. For a discussion of switching costs and their relationship to vertical differentiation in the context of telecommunications markets see de Bijl and Peitz (2002b).

⁵ For instance, as data for Germany (released by the Bundesnetzagentur) reveal, the latest entrant, O2, started in 1998 and increased its market share (in terms of subscribers) from 7.7 in 2002 to 12.8 in 2007. The second-latest entrant, E-Plus, started in 1994 and increased its market share from 12.4 in 2002 to 15.2 in 2007. Looking at subscriber numbers across operators in EU member states, current market share is typically declining with date of entry. Also note that asymmetries are typically more pronounced in terms of traffic.

⁶ Due to significant consumer acquisition costs that depend on the market segment, a targeted marketing strategy by late entrants focusing on particular market segments may be privately and socially optimal; this naturally leads to asymmetric market shares.

currently proposed “efficient” operator approach is certainly counterproductive because it tends to amplify existing asymmetries.

An implementation of the proposed approach is likely to lead to a strengthening of the entrenched position of early entrants and a decrease of late entrants’ profits. Consumers are likely to face higher prices because small competitors are weakened and forced to abstain from making competitive offers to consumers. Whether small efficient operators are able to survive such a hostile environment is an open question. Even if they do they may be relegated to niche players that leave important market segments to the entrenched players.

These implications actually confirm the concerns of the Commission: “A large proportion of calls originated on late entrant networks is terminated on other networks, i.e. offnet. If new entrants pay a regulated termination charge in excess of actual costs they effectively give a transfer to the large network. As a result, their ability to offer retail rates comparable to the retail rates of an established operator, which terminates a majority of its calls on-net, is impeded.” (European Commission, 2008b, p. 7) Hence, the proposed “efficient” operator approach puts into danger recent advances by late entrant in strengthening their position in the market.

If regulatory practice is perceived to be hostile to late entrants this may have severe repercussions for future investment decisions. Being relegated into a second league implies that small entrants or entrants that confront a relatively unfavourable situation scale down their investments to the effect that the market becomes even more asymmetric. Such an outcome would make the equal market share assumption a pure fiction.

One further aspect deserves mentioning. In the light of new services that are possibly made available by third parties, weakening small operators

puts into danger investment incentives by third parties because this increases the bargaining power of large operators vis-à-vis third parties. In other words, a more asymmetric market structure may reduce investment incentives by third parties because they can only extract a smaller share of the surplus that is generated by the investment compared to a less asymmetric market.

3. A Closer Look at Asymmetric Termination Rates

The Commission provides a number of reasons against asymmetric termination rates. Clearly, dealing with asymmetric termination rates makes the task for NRAs more difficult. However, asymmetric termination rates may be the appropriate instrument in asymmetric markets. Thus, the merits of asymmetric termination rates depend on the allocative outcome. Here, the Commission has voiced some concerns which, in the light of recent advances in economic theory, are questionable.

Concerning asymmetric termination rates in favour of late entrants the Commission states: "It may also be expected that consumers will end up paying higher retail prices than would otherwise be the case in a situation of cost-based symmetric termination rates." (European Commission, 2008b, p. 16) More precisely, "consumers may end up paying higher prices than would otherwise be the case in a situation of cost-based symmetric termination rates. This is because the higher termination rates have to be recovered by the originating operators and will presumably be passed onto consumers in the form of higher retail prices. This effectively creates a cross-subsidy from lower-cost operators and their consumers to their less efficient rivals, thereby generating allocative-efficiency concerns. Meanwhile, the less efficient operator benefits from the lower termination rates of its rivals, thus enabling it to lower its retail prices and win customers. As the subsidised operators expand, the negative impact on retail prices and consumer welfare is even greater." (European

Commission, 2008b, p. 18.) This argument is flawed for two reasons. First, it does not correctly capture the strategic incentives of operators. If the termination rate for call termination on the smaller network is increased, this increases the value of additional subscribers and thus tends to make competition more intense. I will take a closer look at this point below. Second, the Commission assumes that the smaller operator is inefficient. In the light of scale effects and exogenous asymmetries such a general assumption is highly problematic. I will return to this point when discussing the “inefficient entry”-claim below.

The underlying argument concerning strategic incentives goes as follows.⁷ To better understand the mechanism at work, consider a setting with only two competing mobile operators, an early and a late entrant. The early entrant has a large installed base (or the market exhibits asymmetries that favor the early entrant). Consider the case where the early entrant is subject to regulation at marginal cost.⁸ In the extreme, where the difference between marginal costs and long-run incremental costs is negligible for the large operator, this is a valid approximation of cost-based regulation that takes into account scale. Note however that regulation at marginal costs can be replaced by regulation at long-run incremental costs more generally without affecting the argument.⁹ As a result of such regulation, the early entrant does not make profits from incoming traffic.

Suppose that the regulator allows the late entrant to charge a “reasonable” markup of the termination rate above marginal costs. Here, a reasonable markup may be of the magnitude that covers the difference

⁷ In the formal analysis, asymmetric regulation and asymmetric market characteristics are introduced into the models of Armstrong (1998) and Laffont, Rey, and Tirole (1998a, 1998b), which are the seminal contributions in the field. Subsequent work has been reviewed in Armstrong (2002) and Peitz, Valletti, and Wright (2004).

⁸ According to the theoretical literature cited in the previous footnote, cost-based regulation means regulation at marginal costs not long-run incremental costs.

⁹ The mathematics, however, become much more complicated so that the result can only be shown through numerical simulations.

between long-run incremental costs and marginal costs of a small operator. This difference is larger for a small operator than for a large operator because of scale effect. Such a reasonable mark-up implements cost-based regulation using long-run incremental costs that take into account the smaller scale of the operator.¹⁰

Because of the markup on marginal costs market share is not only valuable for the entrant in that it generates profits in the retail market, it also generates short-term profits in the wholesale market because consumers still subscribed to the early entrant's network make some calls that terminate on the late entrant's network. For these calls the early entrant has to pay for termination. Since this makes an additional consumer more valuable for the late entrant, the late entrant has an incentive to set lower prices, given the early entrant's prices.

The early entrant can keep its perceived marginal costs down by maintaining a large consumer base. It turns out that both operators have an incentive to price more aggressively, meaning that they give a higher net surplus to consumers. In effect, the proposed asymmetric termination rates give higher net surplus to all consumers than symmetric termination rates and consequently consumer welfare increases.

As the Commission correctly observes, the smaller (but, as I would like to emphasize, not necessarily less efficient) operator sets lower prices and expands demand. Both operators compete more aggressively. In light of this observation, let me reiterate the last sentence of the general claim made by the Commission: "It may also be expected that consumers will end up paying higher retail prices than would otherwise be the case in a situation of cost-based symmetric termination rates." As I have argued above, through the implementation of cost-based asymmetric termination rates retail prices go down and consumer welfare goes up, exactly the

¹⁰ To be precise, market shares have to be correctly anticipated by the regulator.

contrary to the claim in the Commission document. This result has been shown to be robust to various pricing strategies: introducing an asymmetry in favour of small operators makes competition more intense, i.e., prices fall and consumers are better off.¹¹

The argument in more detail: Suppose that operators set a subscription fee, an on-net per-minute and an off-net per-minute price. The detailed argument then goes as follows (see Peitz, 2005b). Consider for simplicity a market with one early and one late entrant. To show that subscription fees are locally decreasing in the late entrant's termination rate it is sufficient to show that best responses shift inward. Consider first the early entrant. The early entrant has an incentive to reduce the number of calls that travel from its network to the other network because this allows it to appear more attractive to consumers. Note that this number of calls is maximal when the market is equally split. Hence, taking into account the effect of asymmetry on market shares under termination rates equal to marginal costs, the early entrant should lower the subscription fee to reduce the loss in market share resulting from higher off-net per-minute prices. For a given competitor's price, the early entrant's retail prices as a function of the termination rate it has to pay can be called the cost effect. The entrant has an incentive to increase the number of incoming calls because it gains more from additional consumers if the termination rate is higher. To attract more consumers the late entrant has to price more aggressively (that is, it sets a lower subscription fee). This effect can be called the termination rate revenue effect, for given prices of the early entrant. With strategic complements, competition generates a downward pressure on subscription fees and reinforces the other two effects. This effect is called the competition effect. Ultimately, one wants to know whether consumers are better off. The effect on consumers subscribed to the late entrant is unambiguously positive, a lower subscription fee and constant per-minute prices increase the net utility of consumers subscribed to this operator. Consumers subscribed to

¹¹ For a verbal exposition see Peitz (2003). For a formal analysis see Peitz (2001, 2005a, 2005b) and de Bijl and Peitz (2002a). For numerical illustrations see de Bijl and Peitz (2002b, 2004). For an analysis that incorporates call externalities see Hoernig (2007, 2008). While Hoernig analyzes the reduction of termination rates of large operators, similar results to the ones in the work by Peitz can be obtained if the termination rate of late entrants is set to be above costs. Note that with call externalities cost-based regulation (with marginal costs as the relevant benchmark) is no longer efficient but prices should be below costs.

If one takes the weighted sum of operator profit and consumer welfare results are, in general, less clear because, in the basic settings of the papers cited above, the large operator is assumed to be more efficient and strongly loses from asymmetric termination rates in favour of small operators. Dynamic aspects that lead to changes of relative efficiency and scale effects would need to be included for a full welfare comparison. Dynamic efficiency calculations and the inclusion of scale effects into welfare calculations are likely generate results that are broadly in line with consumer welfare results.

the early entrant experience lower subscription fees but also higher per-minute prices. Taking the late entrant's prices as given, the early entrant reacts to a higher termination rate for calls terminating on the late entrant's network by increasing the off-net per-minute price and decreasing the subscription fee – this is the cost effect. Overall, the net utility of consumers subscribed to the early entrant is increased. In addition, in the equilibrium with a higher termination rate for calls terminating on the late entrant's network, the late entrant tends to set a lower subscription fee due to the termination revenue and competition effect. This reinforces the cost effect. The net effect on consumers is always positive.

Another concern of the Commission is inefficient entry. Here, the term "efficient" is not clearly defined as it may refer to efficiency in terms of technology and use of resources or it may refer to allocative efficiency. On this I want to make two points. The first refers to markets with imperfect competition in general. With respect to allocative efficiency, standard oligopoly theory tells that an imperfectly competitive market may attract too many or too few firms (where firms are ranked according to their productive efficiency and more efficient firms enter first). Let me reiterate that the possibility of excess entry or its reverse here refers to the total welfare criterion and thus includes allocative considerations. Under imperfect competition, welfare can increase even if a firm with an inferior technology (or an inefficient use of resources) enters the market because allocative efficiency is improved.

Note that as long as the number of operators is largely determined by regulatory decisions (number of licensed operators, assigned spectrum), the dimension of the number of firms seems of limited relevance in the context of mobile telecommunications. However, if bankruptcy of network operators or mergers are an issue the above findings become relevant because the number of active network operators decreases. In particular, (abstracting from mergers) it is relevant whether all of the entrants remain active (and, therefore, profitable) in spite of the disadvantages some of them may face (where, as argued before, productive inefficiencies are only one possibility).

My second point concerns the relationship between market share and productive efficiency. With respect to inefficient entry the Commission states (see European Commission, 2008b, p. 16): "... rewarding an operator for its smaller size ... risks promoting inefficient entry." Here, the Commission implicitly equates being small to being less efficient.

In the presence of exogenous factors that put certain operators at a disadvantage, there is no clear link between productive efficiency and market share, as already argued above. Hence, appropriately designed asymmetric termination rates do not lead to inefficient entry (using the definition of productive efficiency). By contrast, symmetric termination rates have a drawback: Since they favor operators with a large installed base (as implied by the Commission's proposal) an inefficient large operator may enjoy profits from termination whereas an efficient small operator makes losses. This is likely to hurt consumers and consolidates the position of large inefficient operators. Small efficient operators suffer and may have to scale back operations.¹²

Consistent with its approach, the Commission questions whether existing asymmetries can be due to anything but inefficiencies: "The fact that many fixed and mobile markets in the EU have been liberalised for some time now raises a question as to the efficiency of the operators in question if they still cannot survive in the market without some form of entry assistance." (European Commission, 2008b, p. 16.) I reiterate that allowing an efficient small operator to recover its costs does not amount to an entry assistance. Rather the proposed one-size-fits-all symmetric termination rate amounts to a punishment of late entry.

¹² The fact that late entrants who start as small operators suffer from symmetric termination rates and, as a consequence, gain market share more slowly may explain the slow market penetration of late entrants in member states which did not or only very recently implemented asymmetric termination rates. Unfortunately, an empirical analysis to check this hypothesis is not very promising because of the multidimensionality and complexity of the problem, which makes it so hard to identify the true reasons for the slow increase of market share by late entrants in most member states until now.

Clearly, in the presence of scale economies a monopoly (presuming it operates efficiently) leads to minimal overall costs. However, the decision to liberalize the market and introduce competition is based on the firm believe that the positive effects of competition on static and dynamic allocative efficiency outweigh the increase in costs. In these circumstances firms have to be able to recover their investment costs in order to be discouraged from exit and to continue investing; these costs include costs that are due to termination. This lesson risks being lost in the current proposal because small efficient operators are punished for being small. Since late entrants are likely to remain small for a long period of time they are effectively punished for arriving late.

I can see two likely scenarios that emerge if the Commission's proposal is implemented. According to the first, small networks find their niches that allow them to remain profitable in spite of the termination loss they encounter. According to the second, small network operators cannot become profitable and therefore exit the market. None of these two scenarios are consistent with the initial goal of ensuring effective competition among a predetermined number of firms. Since being small at least in the medium term is typically the result of a hostile market and regulatory environment for late entrants and not of any inefficiency, competitive pressure is not as strong as it could be and consumers will suffer from higher prices. Given the high risk of implementing the Commission's proposal a more flexible approach that allows for asymmetric termination rates is highly recommended.

One further argument in favour of asymmetric termination rates deserves to be mentioned. As a thought experiment, let me abstract from differences in costs but take into account that the NRAs do not perfectly know the operators' costs and thus have to regulate under uncertainty. The NRAs want to regulate at (expected) cost under the constraint that

the risk that the termination rate is substantially below true costs is low or nil. A substantial error occurs if there is a strong negative effect on an operator's profit. Clearly, the effect is stronger for a firm that has a larger share of off-net traffic. Hence, the regulator has to be more conservative with small operators. This shows that, in asymmetric markets, asymmetric regulation is desirable even in the case of symmetric expected costs because of the uncertainty a regulator faces.

4. Conclusion

To summarize, the Commission's proposal to implement symmetric termination rates based on cost models with an "efficient" scale equal to 1 over the total number of operators is likely to reduce competition in the market to the detriment of consumers. Furthermore, it is likely to exacerbate existing asymmetries in the market. The Commission fails to appropriately account for exogenous factors that lead to these asymmetries and are unrelated to the inherent efficiency of an operator. In short, the one-size-fits-all approach put forward by the Commission appears inappropriate given the market conditions in most member states.

Instead the Commission should acknowledge that installed base and other first-mover advantages take a long time to overcome. Here, regulation needs to take into account existing asymmetries and allow for asymmetric termination rates. Otherwise it risks cementing current asymmetries in market share and putting efficient late entrants at an unfair disadvantage.

Regulation should rather focus on lowering average levels of termination rates than quickly phasing out asymmetric termination rates. Then consumers will benefit in the short and the long term.

While symmetric one-size-fits-all regulation may be a desirable long-term goal, I consider it to be counterproductive for at least the next five years

in the vast majority of member states (based on observed changes in market share over the past eight years). Given the uncertainties involved, it is currently difficult to make clear predictions when the market in most member state will resemble a level-playing field.

As stated above, the Commission should allow for asymmetric termination rates that reflect differences in costs that are due to exogenous asymmetries beyond the control of the operators and the differences in scale, which are the direct and indirect consequence of these exogenous asymmetries. The question then is: What is the right regulatory approach in the phase with persisting asymmetries more precisely? One approach is to compute the cost structure of an efficient operator and to set cost-based termination rates that directly depend on market shares in terms of traffic volumes. A concern against this approach is that operators can strategically exploit such regulation. (Note that operators loose less from being smaller so that they might compete less aggressively in the market with the effect that consumer welfare decreases.) Another approach is to allow NRAs to set asymmetric termination rates reflecting exogenous asymmetries and implied scale differences.¹³ Rather than imposing the above formula, NRAs would have discretion in their rate setting. NRAs then have to monitor the market; simply observing market share is insufficient. In particular, NRAs have to look at underlying market frictions such as operator-specific switching costs. A good understanding of these frictions gives a good indication when the market starts resembling a level-playing field so that termination rates can be equalized across operators.

Using such a more flexible approach that is truly cost-based (in contrast to the proposed approach that rules out existing exogenous asymmetries by assumption) allows NRAs to act in the best interest of consumers. If,

¹³ To evaluate exogenous asymmetries the regulator may want to rely on estimated price-elasticities that the different operators face. These price-elasticities reflect the market power the operators enjoy. However, they are only partly due to exogenous factors but also affected by the strategic decisions of operators.

however, the Commission is not willing to change its current approach with respect to its understanding of an efficient operator, the transition period should at least be substantially extended.

References:

- Anderson, S., A. de Palma, and J. Thisse (1992), *Discrete Choice Theory of Product Differentiation*, MIT Press.
- Armstrong, M. (1998) Network Interconnection in Telecommunications, *Economic Journal* 108, 545-564.
- Armstrong, M. (2002), The Theory of Access Pricing and Interconnection, in: Cave, M., Majumdar, S., and I. Vogelsang (eds.), *Handbook of Telecommunications Economics*, North Holland.
- De Bijl, P. and M. Peitz (2002a), New Competition in Telecommunications Markets: Regulatory Pricing Principles, *CESifo Economic Studies* 48, 27-52.
- De Bijl, P. and M. Peitz (2002b), *Regulation and Entry into Telecommunications Markets*, Cambridge University Press.
- De Bijl, P. and M. Peitz (2004), Dynamic Regulation and Competition in Telecommunications Markets: A Policy Framework, *Information Economics and Policy* 16, 411-437.
- European Commission (2008a), Draft Commission Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, Brussels (C(2008)), URL: http://ec.europa.eu/information_society/policy/ecom/doc/library/public_consult/termination_rates/termination.pdf (accessed: 07/30/2008).
- European Commission (2008b), Draft Commission Staff Working Document Explanatory Note – Accompanying document to the Commission Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, Brussels, URL: http://ec.europa.eu/information_society/policy/ecom/doc/library/public_consult/termination_rates/explanatory.pdf (accessed: 07/30/2008).
- European Regulators Group (2008), ERG's Common Position on symmetry of fixed call termination rates and symmetry of mobile call termination rates (ERG (07) 83 final 080312), URL: http://www.erg.eu.int/doc/publications/erg_07_83_mtr_ftr_cp_12_03_08.pdf (accessed: 07/31/2008).
- Hoernig, S. (2007), On-Net and Off-Net Pricing on Asymmetric Telecommunications Networks, *Information Economics and Policy* 19, 171-188.
- Hoernig, S. (2008), Tariff-Mediated Network Externalities: Is Regulatory Intervention any Good? CEPR Discussion Paper 6866.
- Klemperer (1995), Competition when Consumers Have Switching Costs: An Overview with Applications to Industrial Organization,

Macroeconomics, and International Trade, *Review of Economic Studies* 62, 515-539.

- Laffont, J.-J., P. Rey and J. Tirole (1998a), Network Competition: I. Overview and Nondiscriminatory Pricing, *Rand Journal of Economics* 29, 1-37.
- Laffont, J.-J., P. Rey and J. Tirole (1998b), Network Competition: II. Price Discrimination, *Rand Journal of Economics* 29, 38-56.
- Peitz, M. (2001), Asymmetric Access Price Regulation in Telecommunications Markets, Working Paper, University of Frankfurt.
- Peitz, M. (2003), On Access Pricing in Telecoms: Theory and European Practice, *Telecommunications Policy* 27, 729-740.
- Peitz, M. (2005a), Asymmetric Access Price Regulation in Telecommunications Markets, *European Economic Review* 49, 341-358.
- Peitz, M. (2005b), Asymmetric Regulation of Access and Price Discrimination in Telecommunications, *Journal of Regulatory Economics* 28, 327-343.
- Peitz, M., Valletti, T. and J. Wright (2004), Introduction: Special Issue on Competition in Telecommunications, *Information Economics and Policy* 16, 315-321.