Journal of Competition Law and Economics 1(3), 449–472
doi:10.1093/joclec/nhi013

BARGAINING OVER FIXED-TO-MOBILE TERMINATION RATES: COUNTERVAILING BUYER POWER AS A CONSTRAINT ON MONOPOLY POWER

Ken Binmore & David Harbord***

ABSTRACT

The conventional wisdom that mobile operators are able to act as monopolists in pricing call termination on their networks has recently been challenged by Hutchison 3G's entry into European mobile markets. The European Commission's electronic communications regime allows national regulatory authorities to regulate mobile termination rates if an operator is found to possess 'significant market power'. This requires that the mobile operator not be constrained by the 'countervailing buyer power' of incumbents. The claim that incumbent operators possess countervailing buyer power has been dismissed repeatedly because of their obligation to interconnect with other networks. This conclusion is erroneous. We analyse bargaining over fixed-to-mobile termination rates and demonstrate that the existence of an interconnectivity obligation is entirely consistent with new entrants such as Hutchison 3G having no market power at all in pricing call termination on their own networks.

I. INTRODUCTION

It has become the conventional wisdom that, whereas many European mobile telephony markets are fairly competitive when it comes to vying for new subscribers, each mobile operator is nevertheless an outright monopolist in the setting of termination rates for calls made to its own network. Thus, all over Europe, mobile termination rates are subject to zealous regulatory scrutiny, and even direct price regulation. Although incentives for setting high charges for mobile-to-mobile (M2M, or 'off-net') call termination

* Professor of Economics, University College London. Email k.binmore@ucl.ac.uk.
** Director, Market Analysis Ltd, Oxford. Email dharbord@market-analysis.co.uk. This article is based on research undertaken for Hutchison 3G UK Ltd. The views expressed are the authors' alone. We thank Matthew Cherry (H3G UK), Richard Feasey (Vodafone), Angel Hernando-Veciana (University of Alicante), Keith Jones (Baker and McKenzie), Julian Keeley (O2), Tim Lord (H3G UK), Simon Persoff (Wanadoo UK), and Georg von Graevenitz (University of Munich) for useful comments and discussions.

remain the subject of some economic controversy,[1] it is widely accepted that fixed-to-mobile (F2M) termination 'if unregulated, provides an opportunity for mobile operators to exercise market power derived from the termination bottleneck'.[2]

In Britain, since the Competition Commission's exhaustive inquiry in 2002–03, each of the four incumbent 2G mobile operators' termination rates has been subject to price regulation by the telecoms and media regulator Ofcom. In Ireland, 2G call termination rates are still unregulated, but the Commission for Communications Regulation (ComReg) asserts that recent falls in M2M and F2M rates have been largely due to 'regulatory pressure' rather than market forces.[3] The story in other European countries is similar. The incumbent 2G operators have had finally to accept that, once categorized as individual monopolists of call termination on their own networks, regulatory oversight of some sort or other is bound to follow.

The recent entry of Hutchison 3G (H3G) into mobile markets across Europe has reopened this issue, however, and in an interesting way. New European regulations require each country's regulatory authority to define the relevant mobile call termination 'markets' and determine whether or not mobile operators have 'significant market power' (SMP) in these markets.[4] The conventional wisdom asserts that, because each mobile operator is a call termination monopolist on its own networks, no matter how small the subscriber base, they will possess significant market power. Thus H3G was found to have SMP in the United Kingdom, despite having fewer than a million subscribers (compared to an average of 10–15 million subscribers for the incumbent 2G operators), and in Ireland, despite the fact that H3G had not yet fully rolled out its service and so had almost no subscribers at all!

In arriving at an SMP determination, local regulatory authorities are supposed to consider a number of factors. These include the companies' market shares, the degree of countervailing buying power they face, the ease of market entry (or absence of potential competition), and any evidence of excessive pricing or profitability. The first and the third of these are straightforward.

[1] For instance, Mark Armstrong 'The Theory of Access Pricing and Interconnection', in Martin Cave, Sumit Majumdar and Ingo Vogelsang (eds) (2002) *Handbook of Telecommunications Economics* (North-Holland 2002); and Patrick Rey and Bruno Julien, 'Mobile to Mobile Call Termination', in *Regulating Mobile Call Termination* (2004) Vodafone Policy Paper Series, Number 1.

[2] Rey and Julien, above n 1. Dissenters do not argue with this conclusion. Rather, they suggest that there are better alternatives to regulation. See, e.g., Robert W. Crandall and J. Gregory Sidak, 'Should Regulators Set Rates to Terminate Calls on Mobile Networks?' 21 Yale Journal on Regulation 261 (2004).

[3] ComReg, 'Response to Consultation and Notification to European Commission — Wholesale voice call termination on individual mobile networks', 8 June 2004, paras 4.19–4.21.

[4] Directive 2002/21/EC on a common regulatory framework for electronic communications networks and services (the Framework Directive). SMP is equivalent to dominance in competition law terms.

Each company has a 100% market share on its own network and because entry into the mobile market is strictly controlled by the granting of spectrum licences, entry barriers are near absolute.[5]

The remaining two criteria pose more interesting problems. Neither Ofcom in Britain nor ComReg in Ireland claimed that H3G's call termination rates were excessive. Indeed, in Ireland, H3G had yet to reach an interconnect agreement with the dominant fixed network operator *eircom*, so its termination rates were unknown. Hence, the SMP determinations in call termination excluded any analysis of H3G's prices or profitability, but relied solely on a finding that

1. H3G possessed a 100% market share in wholesale call termination on its own mobile network, and
2. the incumbent fixed telephony operators (i.e., BT in the United Kingdom and *eircom* in Ireland), lacked sufficient countervailing bargaining power to restrain H3G's exercise of monopoly power in this market.

The conclusion that the dominant fixed network operators (FNOs) lacked sufficient countervailing bargaining power is significant, because the European Commission's Explanatory Memorandum to its Recommendation on Market Definition expressly allows that this could be the deciding factor.[6] Indeed, the Commission made it clear that small networks facing large buyers with sufficient countervailing bargaining power will not automatically be found to have SMP, despite having a 100% market share in call termination on their networks. The Commission's recommendations would therefore appear to require a careful analysis of any constraints on H3G's ability to set 'excessive' termination charges in its interconnection negotiations with incumbent FNOs, such as BT and *eircom*, and with other mobile network operators (MNOs).

Neither Ofcom nor ComReg found it necessary to analyse the bargaining situation between H3G and the incumbent FNO in any detail, however. Rather, Ofcom disposed of the issue by reasoning as follows:[7]

> *3.32 Countervailing buyer power exists when a particular purchaser (or group of purchasers) of a good or service is sufficiently important to its supplier to influence the price charged for that good or service. In order to constrain the price effectively,*

[5] In fact, the entry of new competitors, even if possible, would not change matters, because each operator is assumed to have monopoly power over the termination of calls to its own network's subscribers.

[6] European Commission's Explanatory Memorandum to its Recommendation on Market Definition, pp. 20 and 34.

[7] Ofcom 'Wholesale Mobile Voice Call Termination: Proposals for the identification and analysis of markets, determination of market power and setting of SMP conditions'. See also Ofcom, 'Wholesale Mobile Voice Call Termination: Statement', 1 June 2004, para 3.30.

> *the purchaser must be able to bring some pressure to bear on the supplier to prevent a price rise by exerting a credible threat, for example not to purchase or to self provide. 3.34 . . . In theory, BT might credibly threaten not to purchase termination from an MNO and this would deprive that MNO of the pricing freedom that it derives from its monopoly over termination. In practice, this issue is irrelevant since BT, even if it did have buyer power, has not been able to exert it because of its obligation to complete all calls whatever the terminating network . . . . That requirement curbs any buyer power that BT may have and leaves the MNOs free to set terminating charges above the competitive level.*

ComReg adopted a similar position in arguing that:[8]

> *Countervailing buyer power exists where large customers have the ability within a reasonable timeframe to resort to credible alternatives, e.g. not to purchase or to retaliate. eircom does not have the alternative not to purchase, as it is obliged to provide interconnection to all operators, nor does it have much scope to retaliate . . . .*

Thus, both regulatory authorities took the view that an obligation to interconnect deprived the incumbent FNO *of all of its countervailing buyer power* in its negotiations with H3G, leaving H3G free to act as an unconstrained monopolist in setting F2M termination rates. To paraphrase ComReg, 'in the absence of any legal or practical means of exercising countervailing buyer power, H3G, like all other MNOs, is free to set termination rates at whatever level it chooses'.

Our purpose in this article is to explain why the regulators' reasoning in these statements is erroneous, and how the modern economic theory of bargaining provides us with a tool capable of assessing the relative bargaining power of the negotiating parties, as would seem to be required by the Commission's guidelines. The immediate question is whether the legal obligation to interconnect deprives dominant FNOs such as BT or *eircom* of their countervailing bargaining power in negotiating termination rates with a new mobile entrant, consequently endowing a new entrant like Hutchison 3G with significant market power. Our answer is that the existence of such an obligation is entirely consistent with new entrants having no market power at all in respect of termination pricing on their own networks.

As we shall show, in the absence of any explicit threat of regulatory intervention beyond that required by the interconnectivity obligation, we would never expect an incumbent FNO to offer a new entrant termination rates that exceed the average rates paid to the incumbent 2G operators, and typically they will offer much less than this. This is because all of the factors that determine the relative bargaining powers of the two parties favour the incumbent

[8] Above n 3; at para 4.17.

operators over a new entrant like H3G. The fact that, in a number of European countries, including the United Kingdom, H3G has achieved termination rates equal to rates paid to 2G operators is probably best explained by an expectation that the regulatory authority would impose such a rate if a dispute were referred to it for adjudication.

II. ANALYSING MARKET POWER IN THE PRESENCE OF THE REGULATOR

It would be easy to draw misleading conclusions about the underlying distribution of market power in an industry subject to regulation by observing the actions taken by economic agents who are aware that their actions are likely to influence the beliefs or behaviour of the regulatory authority.[9] The fact that the prospect of future regulatory intervention may influence agents' current behaviour means that it is important to discuss the question of the market power that a new entrant would be able to exercise in call termination on its network under a specific regulatory regime *on the hypothesis that the prospect of further regulatory intervention is absent.* If the legal rationale for further regulatory intervention is that one party or another would otherwise exercise SMP, then it would clearly be circular to be looking primarily at the distribution of market power created by the anticipation that such further regulatory intervention will take place.

Our discussion will therefore distinguish between three levels of actual or hypothetical regulatory intervention:

1. no intervention at all, including those interventions already made or anticipated,
2. the intervention requiring that the incumbent FNO reach a deal with the new entrant, together with the potential future interventions that would presumably follow from any perceived flouting of this directive, and
3. further potential interventions deriving from a finding that the new entrant is able to exercise SMP.

Our focus will be on the second of these levels of regulatory intervention. The *actual* behaviour of incumbent operators and new entrants at this level are likely to be influenced by their beliefs about the impact that their actions will have on the prospect of intervention at the third level. However, in discussing the extent to which an interconnectivity obligation may or may not affect the market power held by an incumbent operator, it is necessary to proceed on the hypothesis that actions taken by incumbent operators and new entrants

[9] In some cases, the actions of the economic agents will be motivated almost entirely by a perceived need to influence the regulator, with the consequence that their behaviour conveys little or no information about the market fundamentals of the industry.

are not influenced by the prospect of intervention at the third level, because it is predictions about what would happen under this hypothesis that are relevant to determining whether direct intervention at the third level is justifiable.

III. MONOPOLY OR BILATERAL MONOPOLY?

Before considering the factors that influence the outcome of negotiations between a new entrant and an incumbent FNO, it is useful explain why use of the term *monopoly power* may be misleading in the context of analysing the pricing of call termination on mobile networks.

In the classical theory of monopoly, a monopolist is a single seller in a market with a large number of small buyers. Because each buyer is small, no action taken by a single buyer can have more than a negligible effect on market aggregates. Individual buyers, therefore, have no market power, which is why their aggregate behaviour can be represented by a market demand curve.

The monopolist in the classical theory exercises market power by restricting supply or by fixing the price, depending on the context. In either case, the market power derives from the fact that if the monopolist were to increase supply slightly or to lower price a little, there would be competition among the buyers to take advantage of the relaxation in the selling strategy. The degree of such competition is normally represented in economics textbooks by the price elasticity of demand. A monopolist in the classical theory therefore chooses price or quantity to maximize profits subject to the demand curve faced, where the demand curve represents the (nonstrategic) *price-taking* behaviour of many small purchasers.[10]

In the context of bargaining over wholesale termination rates, however, we are a long way from a classical monopoly. In the first place, the customers for wholesale call termination on a new entrant's mobile network are small in number and relatively large in size, consisting of an incumbent FNO and the incumbent 2G MNOs. In the absence of regulation, there is no reason to expect that such large buyers would behave as if they had no ability to influence the price paid to an entrant for termination on its network, and hence no reason to assume that the entrant would be in a position to fix its termination prices 'at whatever level it chooses', that is, to set prices as if it were a monopolist facing a large number of small buyers.

Even with such a small number of large customers, a monopolist in most markets would still be able to induce competition between them to increase price, although their small numbers and large size would limit the extent to which the potential customers could be exploited in this way. However, such

[10] To see how classical monopoly prices would be calculated in practice in the call termination market, see Oftel, 'Termination Charges in the Absence of Regulation', 2002. Similar results are reported in Mark Armstrong, 'Call Termination in Mobile Networks', (Oxford: Nuffield College 2001) and Julian Wright, 'Access Pricing under Competition: An application to cellular networks', 50 Journal of Industrial Economics (2002), at 289–315.

an opportunity for exploiting even this measure of market power is absent in the market for termination, and for two reasons.

First, a new mobile entrant *must* have an interconnection arrangement with the incumbent FNO to operate its mobile network at all, so it cannot exert bargaining pressure by (implicitly or explicitly) threatening to deal with an alternative operator.[11]

Secondly, whatever interconnection agreement the new entrant reaches with an incumbent FNO will be available to all other MNOs, because the MNOs will have the option of routing traffic to the new entrant's subscribers via the incumbent FNO's network. By doing so, they are guaranteed the same average termination rate as that negotiated by the incumbent FNO, plus a regulated transit charge.[12] Thus, once a deal with the incumbent fixed operator has been reached, any other operator will have the 'outside option' — in any future negotiations with the entrant — of using the FNO's network to terminate calls on the entrant's network. A consequence of this is that the incumbent operators have no incentive to compete for the new entrant's business. The existence of multiple operators therefore confers no bargaining advantage on a new entrant, because it cannot induce competition among them for its termination business.

This means that an entrant's position in its negotiations with an incumbent FNO is essentially one of *bilateral monopoly* in which there is a single buyer and a single seller. A bilateral monopoly is obviously very different from a classical monopoly. The price at which exchange takes place in a bilateral monopoly is not unilaterally set by one party to maximize its profits. Rather, it is determined by the *relative bargaining power* of the two parties. To assess whether the circumstances endow one or both agents with SMP, it is therefore necessary to investigate the extent to which one party or the other has bargaining strategies available that allow them to force a final deal that favours their own side.

Without any regulatory intervention at all, it is evident that nearly all the bargaining power in the bilateral monopoly between an incumbent FNO and a new entrant would be exercised by the FNO, because while the entrant needs an interconnection agreement to operate at all, an incumbent FNO will typically have little reason to welcome the entry of an additional mobile competitor into its market. In the absence of an interconnectivity

[11] In H3G's UK appeal of its SMP designation, it was accepted by both Ofcom and BT that H3G had no choice but to negotiate a termination agreement directly with BT prior to launching its UK network (see *Hutchison 3G (UK) Limited v Office of Communications*, Case Number: 1047/3/3/04 available at www.catribunal.org.uk). In its Irish appeal, ComReg's economists disputed this point; however, *eircom* had insisted, in writing, that H3G have a termination agreement with *eircom* in place three months prior to its commercial launch in Ireland (see ECAP 2004/01: *Hutchison 3G Ireland Limited v Commission for Communications Regulation*, available at www.ecap.ie).

[12] BT's regulated transit charge is of the order 0.2 pence per minute. *eircom*'s average charge for transiting traffic across its network is currently of the order of €0.016 cents per minute.

obligation, therefore, a new entrant might well find that it had little prospect of reaching a profitable agreement of any kind with an incumbent FNO.

How does an interconnectivity requirement forcing incumbent FNOs to conclude a deal with an entrant alter the distribution of bargaining power? As we will specify more precisely below, it eliminates the incumbent FNOs 'outside option' of not concluding a deal at all, so that both the incumbent and the entrant are placed on a level playing field in this respect. The incumbent is forced to negotiate by virtue of the interconnectivity requirement imposed on it by regulation; the entrant does not have the option of leaving the bargaining table, because it cannot launch its mobile network without an agreement.

However, the mere fact that the incumbent's outside option of refusing to negotiate has been eliminated by regulatory intervention should not be expected to have more than a negligible effect on the distribution of bargaining power between the two parties. What then matters is the expectation that the two parties have concerning future regulatory intervention at the second level — for example, if the incumbent FNO were to attempt to avoid its interconnectivity obligation by delaying an agreement indefinitely.

We follow up these points in the discussion that follows by first considering the factors affecting bilateral negotiations between a new entrant (such as H3G) and incumbent FNOs in the absence of any explicit threat of regulatory intervention at the second level to enforce the mutual interconnectivity obligation. That is, we suppose that the interconnectivity obligation ensures only that each side is willing to enter into negotiations, but places no other restraint on the bargaining outcome.[13] We subsequently consider the role of the regulator in arbitrating or adjudicating a dispute over termination rates should negotiations between the entrant and the incumbent result in an impasse.

IV. WHAT MATTERS IN BARGAINING?[14]

What determines who gets how much when two economic agents bargain? The leading strategic factors that determine the nature of the deal we would expect to be agreed by two bilateral monopolists are outlined in the following.

- *Feasible set*: This is the set of all possible agreements available to the two bargainers. From the strategic point of view, all we need to know about

[13] The German regulatory authority, Regulierungsbehörde für Telekommunikation und Post (RegTP), for example, takes the view that the interconnection obligation solely prohibits a refusal to interconnect under 'reasonable conditions', but does not oblige incumbents to accept 'unreasonable conditions' for interconnection. See further below.

[14] For accounts of the theory, see Ken Binmore, *Fun and Games: A Text on Game Theory* (D.C. Heath & Co. 1992); Martin Osborne and Ariel Rubinstein, *Bargaining and Markets* (San Diego, CA: Academic Press 1990); or Abhinay Muthoo, *Bargaining Theory With Applications* (Cambridge University Press 1999).

each possible agreement is the payoff each agent will receive if the agreement is implemented. The payoff to an agent is usually most conveniently interpreted as the income flow that will accrue to the agent as a consequence of the agreement.[15]

- *Status quo*: This pair of payoffs is also variously called the 'disagreement point' or the 'deadlock point'. Each payoff is the income flow that each agent expects to receive if the negotiations were prolonged indefinitely without an agreement being reached.[16]
- *Outside options*: These are the income flows that each agent will obtain if one or the other chooses to break off the negotiations unilaterally. They therefore represent the best alternative business opportunities available to each agent if they are unable to settle on a deal that both regard as satisfactory.
- *Impatience*: How important is it to each side that a deal is reached sooner rather than later? Forcing delay is a standard bargaining strategy that agents who can afford to be patient use to extract concessions from impatient bargaining partners.
- *Risk*: How risky is it for each side to hold out for a better deal? It is obvious that the more risk averse an agent, the worse he will fare if uncertainty about the future course of the negotiations is increased.
- *Information*: Who knows what? Each side would benefit from knowing the most that the other side would be willing to concede, and so each side seeks to reveal as little as it can about this information.

The first four of these factors are probably the more significant for assessing the bargaining power of a new entrant relative to an incumbent FNO in negotiations over termination rates. The fourth factor is particularly important in view of the opportunities available to incumbents to use delay as a strategic weapon in extracting concessions from new entrants. However, we discuss briefly the role of each item on the list before turning, in more detail, to the question of how economists model the use of delay as a strategic weapon in bargaining.

Risk aversion considerations doubtless act to the disadvantage of an entrant operator, but they are too hard to assess adequately. Asymmetries in information between entrants and incumbent FNOs about each other's payoffs may also be significant, but they also are too hard to assess, so for simplicity

[15] By an 'income flow', we simply mean income, or profit, per unit time.

[16] Sometimes it is said that the location of the status quo cannot be significant, because rational bargainers will necessarily reach an agreement, and so what would happen if they did not is irrelevant. It is true that, ideally, rational bargainers with perfect information will reach an agreement immediately, but the particular agreement that they reach depends on *what would have happened* if one or the other had refused to agree. Similarly, people do not cross the road when a car is coming, but their expectation of what would happen if they did try to cross the road in front of a car is not irrelevant, because it determines *when* they choose to cross the road.

we assume that all of the relevant information is common knowledge between the two bargainers.

V. THE PLAYERS' PAYOFFS

When players sit down to bargain, the payoffs they would receive in a number of scenarios, or contingencies, are relevant to the deal they can be expected to reach, and can be described as follows.

1. The income flow each agent will receive after an agreement. We refer to these income flows as the *agreement payoffs.*
2. The income flow each agent expects to receive if the negotiations are prolonged indefinitely. We refer to these income flows as the *status quo payoffs.*[17]
3. The income flow each agent expects to receive if someone voluntarily and irrevocably ends the negotiations to take up their next best alternative. We refer to these income flows as the *outside option payoffs.*[18]

In many bargaining situations, the agents' outside options are crucial in determining the final agreement. This would be the case in the absence of any regulatory intervention in the negotiations between an incumbent FNO and a new entrant, because the entrant would then have no choice but to offer the incumbent whatever it takes to prevent the latter refusing to deal at all.

However, in negotiations over a new entrant's termination rates, outside options cease to be relevant, because neither the entrant nor the incumbent FNO are free to leave the bargaining table without a deal. The entrant cannot leave the table without a deal, because an agreement over termination rates is necessary for it to launch its business.[19] The incumbent cannot leave the bargaining table because this would contravene its interconnectivity obligation.

While still at the second level of regulatory intervention, both the incumbent and the entrant formally have the option of calling upon the regulator to intervene in the event of a sustained disagreement (see Section VII below), but such an appeal to the regulator does not count as the exercise of an outside option in the sense that this term is used in bargaining theory. In a fully strategic situation, whichever bargainer is most advantaged by the availability of this option would exercise it at the earliest opportunity. Negotiations would then continue while the regulator considered whether it

[17] They are also called 'deadlock' or 'disagreement payoffs'. A. Muthoo, above n 14, calls them 'inside options'.

[18] Sometimes they are said to be the players' 'breakdown payoffs'.

[19] And it has already been explained why it cannot hope to play off other incumbent operators (i.e., MNOs) against the incumbent FNO.

should respond to the appeal to intervene. In the interim, each bargainer would write his expectation of the uncertain result of the regulator's deliberations into its *current* income flow.

The two parties will therefore assess the role of the regulator in their bargaining problem by taking account of the likelihood of further regulatory intervention at the second level in their estimate of their status quo payoffs. In a stationary situation, which we will consider here, they would attach a small probability ρ to the regulator intervening on any given day. If an agent's income on any given day that passes without an agreement or an intervention by the regulator is q, and the agent's estimate of his income flow after an intervention is e, then the expected income flow that represents his status quo payoff is $(1 - \rho)q + \rho e$.

We return to the issue of locating the players' status quo payoffs in the presence of the regulator in Section VII. Our immediate purpose has been to clarify why the bargaining situation between an incumbent FNO and an entrant is simpler than would normally be the case, because we can neglect the qualifications on the range of validity of our analysis that the existence of realistic outside options would normally require.

We now turn to the assessment of the parties' agreement payoffs. The entrant's agreement payoff will necessarily consist of two elements: first, the direct flow of net revenues or profits it will receive from terminating calls on its network at the agreed termination price, and secondly, the flow of indirect revenues or profits it will receive from being able to launch its 3G mobile business (i.e., nontermination revenues). That is, because the entrant cannot launch its business without a prior interconnection agreement with the incumbent FNO, the entire flow of profits to its mobile business is relevant to its bargaining position.

The incumbent FNO's agreement payoff also potentially consists of two elements: first, the flow of (typically regulated) profits it will receive from originating calls on its network for termination on the entrant's network, and secondly, the negative externality it will potentially suffer from facilitating the early entry of another competitor into its market. This negative externality can derive, for instance, from the direct affect of losing fixed line subscribers (or call volumes) to the new entrant, or from the fact that the mobile market will become more competitive and the incumbent may have intentions to enter this market, or both.

The two parties' status quo or disagreement payoffs will be considered in more detail immediately below. It seems clear that the entrant's disagreement payoff will be (at most) zero, as it will receive no revenues, but incur some costs, before the launch of its mobile business. The incumbent's disagreement payoff will depend upon the (expected) number of the entrant's subscribers who did not previously own a mobile phone. If the mobile telephony market is saturated, then calls to the entrant's network from the incumbent's subscribers will simply represent calls that would otherwise have been made to

another mobile network, for which the incumbent would have received call revenues (less the 2G termination payment). In this case, which we consider realistic for a new mobile entrant, the incumbent's status quo payoff will be the flow of net revenues it will receive from terminating those calls on 2G networks that will subsequently (that is, post-agreement) be terminated on the entrant's network.

A. Bargaining Over a Pie of Fixed Size: An Example

To obtain a feel for how the structure of payoffs for the two bargainers can affect the bargaining outcome, we consider an unrealistically simple example. Two bargainers are negotiating on how to share a daily pie of size 1. Neither bargainer has an outside option, and on each day that passes without an agreement each bargainer receives an income of zero.

The first thing to note is that a threat to leave the bargaining table will carry no weight in this situation. No rational bargainer would be influenced by a threat to terminate bargaining when it is common knowledge that a mutually profitable agreement can be reached. So, a regulatory requirement to negotiate and reach an agreement has no effect on this bargaining problem.

The second thing to note is that if one player, Bargainer 1 say, could emulate a classical monopolist by making a binding, take-it-or-leave-it offer, he would demand the whole pie. Bargainer 2 would then be forced to accept or end up with nothing, because he has no 'countervailing bargaining power'.[20]

When the two players are *bilateral monopolists*, neither can credibly make such a take-it-or-leave-it offer.[21] Nash bargaining theory is the only fully developed theory for analysing these situations. The Nash bargaining solution to this problem is found by maximizing the product of the daily gains to each player over the status quo. The bargainers' shares will therefore be x^* and $1 - x^*$, where x^* is the value of x that maximizes the Nash product $x(1 - x)$. Because this product is maximized when $x = 1/2$, the pie will therefore be split equally in this simple case.[22]

Moving from a situation in which Bargainer 1 is a classical monopolist to a situation of bilateral monopoly therefore deprives Bargainer 1 of half of the pie in this example. We would certainly have to say that Bargainer 1 faces some countervailing bargaining power from Bargainer 2, although he still retains some (roughly speaking, half) of his market power. How much countervailing bargaining power does Bargainer 2 have? The answer will depend upon the

[20] Bargainer 1 might make an offer just slightly less than 1 to break Bargainer 2's indifference.

[21] They could try, but what would they do when the offer was rejected? Refuse to hear a counter-offer? Again, no rational bargainer would leave the table when such an offer was refused, so a threat to do so will have no effect on the bargaining outcome.

[22] See Binmore, above n 14, at Chapter 5, for the derivation of the Nash bargaining solution we are using here.

structure of the players' payoffs and any other relevant asymmetries between the bargainers.

Assume first that Bargainer 1 can obtain a second daily pie (for example, exploit another business opportunity), but only *after* an agreement over the division of the first daily pie has been reached. If his additional payoff from the second pie is X, then the new product of gains over the status quo is $(X+x)(1-x)$, which is maximized when Bargainer 1's share of the first pie is $(1-X)/2$, and the second bargainer's share is $(1+X)/2$. That is, the *total* surplus of $1+X$ is now split equally between the two bargainers. The reason is that Bargainer 2 has just as much bargaining power over the second pie as the first, because Bargainer 1 cannot obtain it without a prior agreement over the division of the first pie.[23]

We now complicate the model further by imposing a negative externality on Bargainer 2 if he reaches an agreement with Bargainer 1. This negative externality is modelled as his *losing* a third pie of size $Y<1$. The new product of gains over the status quo is then $(X+x)(1-x-Y)$, which is maximized when the first bargainer gets $(1-X-Y)/2$ and the second bargainer gets $(1+X+Y)/2$. That is, the total surplus of $1+X-Y$ is now split equally between the two bargainers. Bargainer 2 not only acquires half of any positive externality accruing from the deal to Bargainer 1, he is also able to unload half of any negative externality of his own.

B. A Simple Model of Bargaining Over Termination Rates

The example above modelled, in a stylized way, two effects that would appear to be relevant to the negotiations between a new mobile entrant and incumbent FNOs over termination rates. These are the fact that the entrant cannot launch its business until an agreement is reached, and that the incumbent FNO may suffer a loss in future profits from the entry of an additional competitor into its market. Both factors can be expected to have a significant effect on the outcome of negotiations between a new entrant and an incumbent FNO.

To consider these effects in more detail, we now describe a more realistic, albeit still simple, model of the entrant's and an incumbent FNO's payoffs when negotiating a termination rate. Fixed-to-mobile retail prices are regulated in slightly different ways in different countries. *eircom*'s F2M retail prices, for example, are regulated by a price cap, so we may consider this price as fixed for our purposes. BT's retail prices, on the other hand, are unregulated, but the margin (or 'retention') made by BT on each F2M call is regulated. Rather than attempt to encompass all of these possibilities in a simple

[23] The result would, of course, seem mysterious to an onlooker who failed to take account of the existence of the second pie, especially if $X>1$, so that Bargainer 1 seemingly bribes Bargainer 2 to take the entire first pie.

model, we assume that F2M retail prices are fixed by regulation, implying that the quantity of F2M calls may be treated as being independent of the termination rate agreed between the entrant and the incumbent operator. The consequence of relaxing this assumption is to complicate the analysis while not significantly affecting the conclusions.[24]

We denote the incumbent's regulated F2M retail price by P and its (typically regulated) origination cost by C_0. Assume, without further loss of generality, that the total quantity of F2M minutes received *per subscriber* per period at this price is one, and let s denote the entrant's (expected) total number of subscribers.[25] We let π_e denote the positive externality that accrues to the entrant as a consequence of reaching a termination rate agreement with the incumbent (i.e., the flow of indirect, nontermination profits that result from an interconnection agreement), and π_I the corresponding negative externality of the incumbent (e.g., the expected loss in future profits as a result of the mobile market becoming more competitive).[26] The incumbent's profit from agreeing a termination rate a_T with the entrant (i.e., its agreement payoff) may then be written

$$\Pi_I = s(P - a_T - C_0) - \pi_I,$$

while the entrant's profits from an agreement are given by

$$\Pi_e = s(a_T - c_T) + \pi_e,$$

where c_T is the entrant's marginal or incremental termination costs.[27]

[24] If we fixed the incumbent's retention, rather than its retail price, a higher mobile termination rate would reduce its profits by reducing F2M demand for a given retention rate. It is sometimes assumed in the literature that the demand for fixed-to-mobile calls depends upon the average, rather than an individual firm's, fixed-to-mobile price (see J. Gans and S. King 'Mobile Network Competition, Customer Ignorance, and Fixed-to-Mobile Call Prices', 12 (4) Information Economics and Policy 301 (2000), for example). In the case of a new entrant such as H3G, with a small initial subscriber base, an increase in its own termination rate might be expected to have a negligible effect on the average F2M price. In this case, in the absence of any negative externalities, the incumbent would be indifferent to the entrant's termination rate over the range for which demand was invariant.

[25] We simplify the problem by assuming that s is independent of the agreed termination rate. Much of the literature is concerned with the effect of mobile termination rates on downstream competition to attract subscribers (with higher termination profits providing incentives to subsidize subscriber acquisition). It is straightforward to verify that allowing for this type of competitive interaction would tend to increase the agreed termination rate slightly, but not significantly alter our conclusions.

[26] We could obviously allow both π_e and π_I to depend upon the number of the entrant's subscribers with no change to the qualitative results.

[27] Because interconnection agreements are typically medium- to long-term contracts, it may make sense to follow Ofcom in modelling termination costs as long-run incremental costs. Standard BT interconnect agreements are of indefinite duration and require two year's notice to terminate, for example. See Ofcom, 'Termination Charges in the Absence of Regulation', 2002.

Because the entrant receives no income in the absence of an agreement, its status quo or disagreement payoff, denoted by Π_e^d, will be zero. The incumbent's status quo payoff, Π_I^d, will depend upon the degree to which the entrant's entry can be expected to attract new mobile subscribers, or whether the market is already 'saturated'. We consider the two polar cases of a saturated and nonsaturated mobile market in turn.

1. Saturated mobile market

If the mobile market is 'saturated', entry will generate no new mobile subscribers, so the entrant's subscribers will all have previously been subscribers to an existing 2G network. The incumbent's status quo payoff is then simply the termination profits it will receive from the entrant's future subscribers before any agreement with the entrant is reached, or,

$$\Pi_I^d = s(P - \tilde{a}_T - C_0),$$

where $\tilde{a}_T$ is the average termination rate paid to the incumbent 2G operators. The incumbent's net payoff from a termination agreement with the entrant is then

$$\Pi_I - \Pi_I^d = s(\tilde{a}_T - a_T) - \pi_I,$$

and depends only upon the entrant's expected number of subscribers and the difference in the average termination rate paid to incumbent 2G operators and the termination rate agreed with the entrant.[28] The entrant's disagreement payoff is zero. So, in the absence of any 'external' payoff factors resulting from entry into the mobile market (i.e., $\pi_I = \pi_e = 0$), the Nash bargaining solution yields the termination rate

$$a_T^* = \frac{\tilde{a}_T + c_T}{2},$$

which lies half way between the 'monopoly' termination rate $\tilde{a}_T$ and the entrant's termination costs c_T. Note that this bargaining solution will satisfy

$$\tilde{a}_T > a_T^* > c_T,$$

as long as the entrant's termination costs are less than the average 2G termination rate ($c_T < \tilde{a}_T$). Thus the entrant's termination rate will never exceed the

[28] Note that this means that even if the entrant could act as a classical monopolist and make a take-it-or-leave-it offer to the incumbent FNO, it could obtain at most $\tilde{a}_T$ in this bargaining situation.

average 2G termination rate, because agreeing to such a rate will always result in a net loss for the incumbent FNO.

If the entrant's termination costs exceed the average 2G termination rate ($c_T > \tilde{a}_T$), then no agreement is possible in the absence of direct regulatory intervention, or the external payoff factors described above, because the entrant will make negative profits from agreeing to a termination rate below its own costs. When we take account of the external payoff factors in the bargaining problem, the Nash bargaining solution then yields the termination rate

$$a_T^* = \frac{s(\tilde{a}_T + c_T) - \pi_e - \pi_I}{2s},$$

which is always less than $\tilde{a}_T$ and, hence, always less than the entrant's termination costs whenever $c_T > \tilde{a}_T$.[29] It is also frequently less than c_T even when $c_T < \tilde{a}_T$. The players' net payoffs under the Nash bargaining solution are then

$$(\Pi_I - \Pi_I^d) = \frac{s(\tilde{a}_T - c_T) + \pi_e - \pi_I}{2} = (\Pi_e - \Pi_e^d)$$

Thus (as in the simple example described above), the incumbent acquires half of the positive externality accruing from the deal to the entrant (i.e., the entrant's nontermination profits), and manages to unload half of its own negative externality onto the entrant.

The incumbent's countervailing bargaining power will hence force the entrant's termination rate below the average rate paid to the other 2G operators, and in many cases below its own termination costs. It is profitable for the entrant to agree to a rate that earns negative termination profits, because this enables it to earn profits (π_e) from providing other services to its subscribers. A totally unregulated termination agreement will share these additional profits between the entrant and the incumbent, as well as compensating the incumbent for the negative effects on its profits caused by the entrant's entry into the telephony market.

2. Nonsaturated market

We now make the opposite assumption from that of the previous section, and consider the case in which none of the entrant's subscribers previously subscribed to an existing 2G network. This implies that both bargainers' status quo payoffs will be equal to zero; that is, the incumbent suffers no loss in termination profits from incumbent 2G operators when the entrant enters

[29] In order to ensure that a mutually profitable agreement is always possible at some positive termination rate, we need to assume that $s\tilde{a}_T > \pi_I$ and $sc_T < \pi_e$.

the market. The bargaining problem then has the solution

$$a_{\mathrm{T}}^{*} = \frac{s(P - C_0 + c_{\mathrm{T}}) - \pi_{\mathrm{e}} - \pi_{\mathrm{I}}}{2s}$$

If both of the externalities π_{e} and π_{I} were equal to zero, Nash bargaining results in a termination price half way between the 'monopoly' termination rate $P - C_0$ and the entrant's termination costs c_{T}. The effect of the payoff externalities is to reduce this rate, potentially to a price below the entrant's costs, so long as its payoff from an agreement remains positive.[30] The players' net payoffs under the Nash bargaining solution in this case are

$$(\Pi_{\mathrm{I}} - \Pi_{\mathrm{I}}^{\mathrm{d}}) = \frac{s(P - C_0 - c_{\mathrm{T}}) + \pi_{\mathrm{e}} - \pi_{\mathrm{I}}}{2} = (\Pi_{\mathrm{e}} - \Pi_{\mathrm{e}}^{\mathrm{d}})$$

Again, the incumbent acquires half of the entrant's positive externality accruing from the agreement, while the entrant acquires half of the incumbent's negative externality.

Whether or not the mobile telephony market is 'saturated' for the purposes of assessing the negotiations between an incumbent FNO and an MNO is presumably what distinguishes negotiations with an established 2G operator, with a large, pre-existing subscriber base, and those with a new entrant such as H3G, with no pre-agreement subscribers at all. That is, an incumbent 2G operator brings a large termination business 'pie' to the bargaining table, from which it obtains a share of the benefits, while a new entrant brings no such pie at all, because nearly all of its future subscribers will come from existing 2G networks.[31] For the remainder of this article we consider only the saturated market case, because this would appear to be the more relevant to the case of new entry.[32]

VI. IMPATIENCE AND RISK AVERSION IN NASH BARGAINING THEORY

If there are no problems with asymmetric information and outside options are absent, the Nash bargaining solution predicts the outcome of rational bargaining. In the simple setup considered in Section V above, we assumed that the

[30] To ensure that a mutually profitable agreement is always possible at a positive termination rate, we now assume that $s(P - C_0) > \pi_{\mathrm{I}}$ and $sc_{\mathrm{T}} < \pi_{\mathrm{e}}$.

[31] It is worthwhile noting, however, that it will not be the case that an incumbent 2G operator can expect to obtain the monopoly termination rate $P - C_0$ in bilateral negotiations with the incumbent FNO; that is, it will not be in a position to behave as a classical monopolist as is typically assumed.

[32] The Competition Commission in *Vodafone, O2, Orange and T-Mobile* (2003), Chapter 6, reported mobile penetration at 81% of UK households in August 2002. Ofcom's Quarter 3, 2004, statistics show 58.4 million active mobile subscribers in the United Kingdom out of a population of approximately 60 million.

only relevant determinants of an agreement between the bargainers were their agreement and their status quo (or disagreement) payoffs. Other potentially relevant asymmetries between the bargainers, such as differing discount rates (i.e., costs of capital) or levels of risk aversion, were ignored. Even then, it was possible to predict that, in the absence of direct regulatory intervention, an agreement between the incumbent and the entrant would always result in the entrant's termination rate being no more than the average rate paid by the incumbent to the established 2G operators, and in most relevant circumstances it would be lower than this, and possibly below its own termination costs.

In order to consider how these other asymmetries may affect the bargaining situation, and the potential for the use of delay as a strategic weapon, it is necessary to apply a version of the bargaining model first studied by Ariel Rubinstein.[33] In Rubinstein's model, two bargainers alternate in making proposals on how to split some surplus until a proposal is accepted. If they did not care when they reached agreement, then it obviously would not matter whether they reached an agreement at all. It is therefore necessary to suppose that each bargainer prefers an early agreement to a later agreement on the same deal. Usually it is assumed that each bargainer discounts time at a constant rate (although the theory can accommodate a variety of other timing assumptions). Rubinstein then showed that there is a unique (subgame-perfect) equilibrium that provides a prediction of the deal on which rational bargainers would agree. This prediction approximates a generalized form of the Nash bargaining solution when the interval between successive proposals is sufficiently small.

How does the theory work in practice? As before, it is first necessary to identify a pair of status quo payoffs that are the expected income flows that each bargainer will enjoy while the negotiations are taking place. The outcome predicted by the Nash bargaining solution will then again be a pair of income flows representing a gain for both players over their payoffs at the status quo. The relative size of their gains — and hence their relative bargaining power — depends on two things: (1) how risk averse each bargainer is; and, (2) how impatient each bargainer is.

The example of bargaining over a pie considered in Section V can be used to illustrate how simple it can sometimes be to apply the theory. Accordingly, consider as before two risk-neutral bargainers who are negotiating on how to share a daily pie of size 1. Neither bargainer has an outside option, and each bargainer's status quo payoff is assumed to be zero. If one of the bargainers discounts future payoffs at a rate four times faster than the other, then the less impatient bargainer will end up with 80% of the pie and the more impatient bargainer with 20%. The reason the more impatient bargainer ends up with

[33] Chapter 5 of Binmore, above n 14, contains a simple but adequate account of the necessary theory. A more technical exposition can be found in Osborne and Rubinstein, above n 14.

less is that the less impatient bargainer can credibly threaten to delay an agreement unless the more impatient bargainer makes concessions. In a similar, but less easily explained manner, the more risk-averse of two bargainers will end up with a relatively smaller gain. In this case, the less risk-averse bargainer can credibly threaten the more risk-averse bargainer that he will make his life more risky unless he makes concessions.[34]

The effect of impatience can be incorporated into the formulation of the Nash bargaining solution by writing the generalized Nash bargaining solution using the 'split the difference' rule:

$$\Pi_1 = \Pi_1^{\mathrm{d}} + \alpha(1 - \Pi_1^{\mathrm{d}} - \Pi_2^{\mathrm{d}})$$

and

$$\Pi_2 = \Pi_2^{\mathrm{d}} + \beta(1 - \Pi_1^{\mathrm{d}} - \Pi_2^{\mathrm{d}}),$$

where Π_i is the agreement payoff of bargainer i, Π_i^{d} the disagreement payoff, and the size of the pie is 1 as in our simple example. The numbers α and β, each between zero and one, reflect the relevant asymmetries between the bargainers. If $\beta > \alpha$, Bargainer 2 has more 'bargaining power' than Bargainer 1, and obtains a correspondingly greater share of the pie. Thus, the generalized Nash bargaining solution gives each bargainer their disagreement payoff plus a fraction α or β of what is left of the pie after the players' status quo payoffs have been netted off.

A. Bargaining Over Termination Rates With Different Costs of Capital

We return to our simple model in Section V of bargaining between the entrant and the incumbent FNO, but now suppose that each company's cost of capital (i.e., the rate at which they discount future income streams) is given by r_{e} and r_{I}, respectively. There are reasons for assuming that a 3G entrant's cost of capital would exceed that of the incumbent.[35] The asymmetric Nash bargaining solution is therefore relevant, and results in an agreed termination rate of

$$a_{\mathrm{T}}^{*} = \frac{s(\alpha\tilde{a}_{\mathrm{T}} + \beta c_{\mathrm{T}}) - \beta\pi_{\mathrm{e}} - \alpha\pi_{\mathrm{I}}}{s}$$

where $\alpha = r_{\mathrm{I}}/(r_{\mathrm{e}} + r_{\mathrm{I}})$ and $\beta = r_{\mathrm{e}}/(r_{\mathrm{e}} + r_{\mathrm{I}})$.

[34] This model applies, for instance, when there is an exogenous risk that bargaining may break down permanently. See Ken Binmore, Ariel Rubinstein and Asher Wolinsky, 'The Nash Bargaining Solution in Economic Modelling' 17 RAND Journal of Economics 176 (1986).

[35] For instance, Ofcom 'Effective Competition Review: Mobile', September 2001, suggests that it is important to take into account additional project-specific risk in assessing the cost of capital for 3G investments as compared to those of established network operators.

For example, when $\pi_e = \pi_I = 0$ (no external effects), if $\alpha = 0$, so the entrant has no bargaining power, we obtain $a_T^* = c_T$. If, on the other hand, $\alpha = 1$, so the incumbent has no bargaining power, we obtain, $a_T^* = \tilde{a}_T$.[36] Because we assume that $r_e > r_I$ (i.e., the entrant's cost of capital exceeds that of the incumbent), we will have $\alpha < 1/2 < \beta$. Hence, the result of allowing for differing costs of capital or time preference in the bargaining problem is to reduce the agreed termination rate even further, and allocate more of the gains from trade to the more patient bargainer, the incumbent FNO.

VII. REGULATORY INTERVENTION

So far, we have modelled bargaining between the entrant and the incumbent in the absence of any direct regulatory intervention at the second level. Because we have been considering bargaining situations in which it has been common knowledge between the parties that a mutually profitable agreement exists, the role of an interconnectivity obligation that simply requires that the parties negotiate (but sets no time limit nor determines a price) has played no role at all in the discussion. In such circumstances, a threat to break off negotiations by either party would have no effect on the bargaining outcome.

The European Commission's 'access directive' sets out the terms on which operators may access each others networks and services.[37] National regulatory authorities are given wide latitude in how they implement this and other relevant directives. In Ireland, ComReg's interconnectivity guidelines allow either party in the negotiations to initiate an investigation of a dispute and to request ComReg to make a determination within four months. ComReg may decide not to initiate an investigation where it is satisfied that other means of resolving the dispute in a timely manner remain available to the parties.[38] Ofcom's guidelines on end-to-end connectivity, on the other hand, provide no clear dispute resolution procedure at all.[39]

As we have shown, when the market is saturated, the entrant's termination rate will never exceed the rate paid to established 2G operators, and may well be less than both this and its own termination costs, so it seems unlikely that the incumbent would be the first to request regulatory intervention,

[36] These cases correspond to the incumbent or the entrant making a take-it-or-leave-it offer, respectively.

[37] Directive No. 2002/19/EC1 of the European Parliament and of the Council of 7 March 2002 on access to, and interconnection of, electronic communications networks and associated facilities.

[38] See S. I. No. 307 of 2003, European communities (electronic communications networks and services) (framework) regulations 2003, para 31.

[39] Ofcom 'End-to-End Connectivity: Guidance Issued by the Director General of Telecommunications', 2003. In some cases Ofcom appears to suggest that it may rely on general competition law to police adherence to interconnectivity requirements by dominant network operators.

while the entrant's interest is likely to be to initiate an investigation as soon as possible. As observed in Section V, we may model further potential intervention by the regulator at the second level as an alteration of the status quo of the players in the original bargaining game. That is, if the probability that the regulator will intervene at any moment is $\rho > 0$, and the regulator would then determine a termination rate a^{R}, then the entrant's status quo payoff becomes

$$\Pi_{\mathrm{e}}^{\mathrm{d}} = \rho[s(a^{\mathrm{R}} - c_{\mathrm{T}}) + \pi_{\mathrm{e}}]$$

and the incumbent's status quo payoff becomes

$$\Pi_{\mathrm{I}}^{\mathrm{d}} = s(P - (1-\rho)\tilde{a}_{\mathrm{T}+}\rho a^{\mathrm{R}} - C_0) - \rho\pi_{\mathrm{I}}.$$

The symmetric Nash bargaining outcome yields the termination rate

$$a_{\mathrm{T}}^{*} = \frac{s[(1-\rho)(\tilde{a}_{\mathrm{T}} + c_{\mathrm{T}}) + 2\rho a^{\mathrm{R}}] - (1-\rho)\pi_{\mathrm{e}} - (1-\rho)\pi_{\mathrm{e}}}{2s}$$

Two natural candidates for a^{R} are $a^{\mathrm{R}} = \tilde{a}_{\mathrm{T}}$ or $a^{\mathrm{R}} = c_{\mathrm{T}}$. If it is viewed as highly likely, for instance, that the regulator would quickly intervene to impose a solution $a^{\mathrm{R}} = \tilde{a}_{\mathrm{T}}$, then the parties will agree on a termination rate close to, but less than, $\tilde{a}_{\mathrm{T}}$ immediately. If, on the other hand, $c_{\mathrm{T}} > \tilde{a}_{\mathrm{T}}$, as appears likely, and the regulator would impose $a^{\mathrm{R}} = c_{\mathrm{T}}$ with high probability, then the parties will agree to a rate between $\tilde{a}_{\mathrm{T}}$ and c_{T} immediately, as may have occurred in bargaining between H3G and BT in the United Kingdom, and between H3G and *eircom* in Ireland.

Thus, regulatory intervention in these cases can serve to prevent the incumbent from extracting a significant fraction of the entrant's nontermination profits π_{e} as part of a deal over termination rates. However, the fact that the entrant still receives, at best, a termination rate slightly less than the average rate of the established 2G operators, or slightly less than its own costs, could hardly be characterized as an exercise of SMP, particularly where the 2G operator's rates have already been reduced towards their incremental costs by direct or indirect regulatory intervention.

VIII. CONCLUSION

We have argued that the negotiation of fixed-to-mobile termination rates is best viewed as a problem of bilateral monopoly rather than the unfettered exercise of monopoly power, as suggested by regulatory authorities such as Ofcom and ComReg. The issue of whether a new entrant into mobile markets, such as Hutchison 3G, is likely to enjoy SMP in setting termination rates then reduces

to assessing its bargaining power when negotiating with the incumbent FNO. Neither party will have any outside option in such a negotiation. Aside from their assessment of the regulator's intentions if the negotiations are prolonged, the relative bargaining power of the parties will therefore depend on the structure of their payoffs, and how impatient or risk-averse they are. Because it appears likely that it is the entrant who is affected adversely by these determinants of bargaining power, it seems perverse to attribute SMP to new entrants in this arena. Our simple model predicts that incumbent FNOs will never agree to pay a new mobile entrant such as H3G a termination rate that exceeds that paid to existing 2G operators,[40] and in the absence of any threat of regulatory intervention, they would frequently offer (and pay) much less than this.

Experience of negotiating termination rates in a number of European countries would appear to confirm these conclusions. In the United Kingdom, BT refused to pay H3G more than the rate it was already paying to the smaller 2G network operators, despite H3G's initial demand for a higher rate.[41] In Ireland, *eircom* appears to have taken a similar approach. The regulatory authority in Sweden intervened to impose a finding of SMP on H3G, and then *increased* its termination rate over that being offered by the incumbent operator. In Austria, regulatory intervention to increase H3G's termination rate by more than 75% over the rate being offered by the incumbent FNO was quickly followed by a finding that H3G possessed SMP in this market.

If a new entrant such as H3G were able to act as an unrestrained monopolist, as claimed by both ComReg and Ofcom, then its profit-maximizing termination rates would be determined in the manner suggested by Ofcom for the 2G operators.[42] While estimates of monopoly termination rates depend sensitively on the elasticity of demand assumed, even the most conservative estimates result in termination rates that are two to three times higher than those achieved by H3G in its bilateral negotiations with FNOs. This fact alone would appear to refute the suggestion that an interconnectivity obligation on incumbent FNOs has more than a negligible effect on their ability to exercise significant countervailing bargaining power in negotiating mobile termination rates.

While an obligation to interconnect may deprive incumbent FNOs of the outside option of refusing to deal at all, all of the other determinants of bargaining power tend to favour the incumbent operators over new entrants. Given the structure of the bargainers' payoffs and other plausible asymmetries in the bargaining situation described in this paper, it appears likely

[40] At least in the saturated market case, which would appear to be the most relevant.

[41] H3G's rate in Britain now exceeds those of the incumbent 2G operators, which have been reduced by Ofcom following the Competition Commission's 2002/03 investigation.

[42] See Oftel, *Termination Charges in the Absence of Regulation*, 2002.

that an entrant's ability to obtain termination rates similar to those paid to other 2G operators rests as much upon an implicit or explicit threat of regulatory intervention as upon any putative market power it may possess in bargaining with incumbent FNOs. Indeed, in at least two recent cases it has required intervention by national regulatory authorities for H3G to achieve this outcome.

Further evidence that smaller networks face considerable resistance from incumbent FNOs in attempting to negotiate higher termination rates has also recently been provided by the German regulatory authority, RegTP. RegTP found that 53 smaller network operators (ANOs) in Germany lacked SMP in call termination because of the incumbent Deutsche Telekom's countervailing buyer power. In RegTP's view, the interconnection obligation solely prohibits a refusal to interconnect at reasonable rates, but does not oblige Deutsche Telekom to accept all demands for interconnection. Hence, it could still refuse an 'unacceptably' high call termination rate demanded by an ANO.[43]

The European Commission has responded to RegTP's finding by arguing that the obligation to purchase termination services, combined with the fact that Deutsche Telekom AG's call termination rates are regulated, deprives Deutsche Telekom 'of any bargaining tool in the form of a corresponding increase in its own tariffs when negotiating termination rates on an ANO's network'. Thus, 'the countervailing buyer power of a large operator is essentially lost if its call termination rates are regulated in the separate market for call termination on that operator's individual public telephone network'.[44]

We have already shown in this paper that these new arguments by the Commission are as ill-founded as the assertion that an interconnectivity obligation alone deprives FNO's of all of their countervailing bargaining power. The ability of an incumbent FNO to increase its own termination rate in negotiations with a smaller network has played no role in our analysis. Hence, it is not a necessary condition for incumbents to have considerable bargaining advantages in negotiating with smaller networks or new entrants, such as H3G.

In any event, if an incumbent FNO *were* able to change its own termination rate as part of a negotiation over another operator's rate, the incumbent's rate would then become part of the bargaining problem to be analysed. That is, the negotiations would then be about the determination of *reciprocal* termination rates. While we do not intend to be drawn into this area, it is worth pointing out that, in negotiating reciprocal access charges, telecoms operators will

[43] Following applications by 37 ANOs, in September 2004 RegTP decided that the ANOs could charge 25% more for call termination on their networks than DTAG's termination rate.

[44] DE/2005/0144: 'Call Termination on Individual Public Telephone Networks Provided at a Fixed Location in Germany', or the Commission's 'serious doubts' letter of 11 March 2005, European Comission, Brussels.

frequently want to agree on high rates in order to reduce downstream price competition between them (i.e., as a way to make undercutting of retail prices more costly).[45] Thus, the suggestion that incumbent FNOs would use their own termination rates as a 'bargaining tool' to reduce the termination rates of other operators is largely unsupported by the relevant economic theory. On the contrary, at least some mainstream economic models suggest that they are as likely to be used as an instrument of collusion.[46]

[45] See Mark Armstrong, 'Network Interconnection in Telecommunications', 108 (448) Economic Journal 545 (1998); Jean-Jacques Laffont, Patrick Rey and Jean Tirole, 'Network Competition: Overview and Nondiscriminatory Pricing', 29 (1) RAND Journal of Economics, 1 (1998); and Michael Carter and Julian Wright, 'Interconnection in Network Industries', 14 Review of Industrial Organization, 1 (2002).

[46] When nonlinear pricing is allowed for, these conclusions can change. See Rey and Julien above n 1, for a useful discussion.