

*“Competition Policy and
Property Rights”*

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Competition Policy and Property Rights*

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Abstract

One of the most controversial questions in current competition policy is when, if ever, should competition law require a firm with market power to share its property, notably intellectual property, with its rivals? And if supply is required, on what terms? These questions are discussed with reference to recent law cases including the EC *Microsoft* judgment of 2007 and the US *linkLine* case of 2009. The analysis focuses on whether competition law and regulation are complements or substitutes, and on incentives for investment and (sequential) innovation.

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1 Introduction

One of the most controversial general questions in current competition policy is: When, if ever, should competition law require a firm with market power to share its property with its rivals?

The answer would seem to be very rarely in the view of the Supreme Court of the United States as expressed in the 2004 *Trinko* case, which concerned whether a telecommunications network provider is required by US antitrust law to provide network access to its competitors:

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‘Firms may acquire monopoly power by establishing an infrastructure that renders them uniquely suited to serve their customers. Compelling such firms to share the source of their advantage is in some tension with the underlying purpose of antitrust law, since it may lessen the incentive for the monopolist, the rival, or both to invest in those economically beneficial facilities. Enforced sharing also requires antitrust courts to act as central planners, identifying the proper price, quantity, and other terms of dealing – a role for which they are ill-suited. Moreover, compelling negotiation between competitors may facilitate the supreme evil of antitrust: collusion’.¹

The authorities in Europe have to date been much more willing to find it contrary to competition law for a dominant firm not to supply goods and services to rivals, and, when such supplies are made, to find their pricing unlawful. Thus the European Commission in a 1993 case concerning competitors’ access rights to the port of Holyhead declared that:

‘An undertaking in a dominant position may not discriminate in favour of its own activities in a related market. The owner of an essential facility which uses its power in one market in order to protect or strengthen its position in another related market, in particular, by refusing to grant access to a competitor, or by granting access on less favourable terms than those of its own services, and thus imposing a competitive disadvantage on its competitor, infringes [the prohibition on abuse of dominance]’.²

Since then there has been a string of European ‘essential facilities’ cases involving, for example, airports, railways, clearing and settlement systems, energy infrastructure and telecommunications networks.

Still more controversial than the issue of competition law requirements to share physical infrastructure are questions about *intellectual* property rights (IPRs). The European Commission, in due course upheld by the Courts, caused consternation twenty years ago when holding, in a case called *Magill* about TV listing magazines,

¹ *Verizon Communications Inc v Law Offices of Curtis V. Trinko LLP*, 540 U.S. 398 (2004).

² Commission interim measures decision in *Sea Containers/Stena Sealink*, OJ 1994 L15/8.

that it could be an abuse of a dominant position to refuse to license information protected by copyright. In the far more important domain of computer software, refusal to supply information with IPR protection was a central question in the recent EC *Microsoft* case.

These case examples, all of which are discussed further below, illustrate that tension between competition principles and property right principles, as well as their intrinsic interest, are economic policy questions of the first order of importance. The fact that they are ultimately decided by courts makes them no less so. What then does economics have to say about them? Such questions are too large for comprehensive treatment, but in this lecture I will talk about aspects of two of the three points made by the Supreme Court in the quotation from the *Trinko* judgment above, namely those concerning investment incentives and regulation (courts as ‘central planners’), leaving aside the further point about collusion.

With recent telecommunications network access cases in mind, the next section discusses whether competition law should regulate the terms on which rivals are granted access to an incumbent firm’s established network. In particular, should it count as an unlawful abuse of market power³ for a vertically-integrated dominant firm to set its retail and wholesale (network access) prices so close to one another that even efficient competitors cannot profitably operate – a so-called ‘price squeeze’ or, equivalently, ‘margin squeeze’? The US Supreme Court’s recent answer to this question is very different from the position taken by the European Courts. In part, the trans-Atlantic difference is about deeper institutional questions: which authorities and processes are best placed to resolve access pricing issues, and does the presence of sector-specific regulation give more, or less, reason for competition law to apply?

Section 3 turns to dynamic analysis, and the question of how innovation investment incentives are affected by required sharing of intellectual property. Recent economic analysis has challenged the conventional wisdom that stronger IP rights necessarily promote innovation, especially where follow-on innovation is concerned, and in some EC cases – above all *Microsoft* – the refusal to license intellectual property has been held to breach competition law. But wide-ranging competition law duties to share intellectual property would seem undesirable. How then to limit the

³I discuss the economics of abuse of market power more generally, but with little attention to refusal to supply issues, in Vickers (2005).

circumstances in which they apply? The concluding section offers a brief summary and raises some questions about comparative institutional analysis.

2 Competition policy and network access

Questions about the competition law duties, if any, of infrastructure owners to share their property with rivals are well illustrated by a string of major recent cases about the terms on which rivals may have access to the local networks of incumbent vertically-integrated telecommunications operators. The advent of broadband technology has heightened the importance of telecommunications network access, and in contexts where incumbent telecommunications network operators themselves wish to compete in the retail market for those services. Here is a classic example where rivals' ability to compete against the incumbent is strongly dependent on the terms on which they have access to the incumbent's infrastructure. In several European markets, moreover, the incumbent until relatively recently had statutory protection from competition, and a prior history of public ownership. For these reasons telecommunications markets tend to be quite heavily regulated, and regulation is a central feature of the cases to be discussed

The US *Trinko* case of 2004, cited above, concerned allegations that New York incumbent Verizon had, contrary to its regulatory duties, supplied local network services to rival local exchange carriers on an inadequate and discriminatory basis so as to put them at a competitive disadvantage. In February 2009 the Supreme Court gave judgment in another telecommunications case, called *linkLine*,⁴ brought by Internet service providers against the Californian incumbent AT&T, where the issue was whether it can be a violation of US antitrust law for a vertically-integrated dominant firm with wholesale market power to provide inputs to a rival on terms such that there is a price squeeze between the firm's retail and wholesale prices. In neither case did any of the nine Supreme Court Justices find a violation of US antitrust law.⁵

In Europe, by contrast, the Court of First Instance (CFI) in Luxembourg in 2008 upheld a decision by the European Commission that Deutsche Telekom had abused

⁴*Pacific Bell Telephone Co v linkLine Communications Inc*, 555 U.S. __ (2009).

⁵In *Trinko* three Justices found against the plaintiff, the Law Offices of Curtis V. Trinko, not on the substance but on the grounds that as a customer it had an insufficiently direct connection to the alleged harm to bring a case.

a dominant position by operating a price squeeze against rivals, despite national regulatory approval of its charges.⁶ In April 2009, the European Court of Justice dismissed an appeal against the CFI judgment confirming a Commission finding that Wanadoo (part of France Télécom) had engaged in unlawful predatory pricing to eliminate competition in the market for high-speed internet access.⁷

Of particular interest from an economic point of view, not least because of the influence of economists Baumol and Willig, is an earlier case involving New Zealand telecommunications,⁸ which concerned the terms on which Telecom, the incumbent, should supply to its rival, Clear, access to the local networks that it monopolised. The case was appealed all the way up to the Privy Council in London, which then had ultimate jurisdiction over NZ cases, and the Law Lords gave judgment in October 1994. In the absence of specific regulation, the matter came to be adjudicated under the provision of the NZ Commerce Act of 1986 that prohibited use of a dominant position for anti-competitive purposes. Baumol and Willig testified on behalf of Telecom that it would not be ‘using’ its dominant position if it supplied access on terms that recovered the incremental cost of access *plus the loss of profit from supplying access*. This pricing principle is known as the efficient component pricing rule (ECPR) or retail-minus rule. To the criticism that the ECPR, since it says nothing about price *levels*, could lock in monopoly profits, the response was that was a matter for regulation, not competition law, which should focus on the question of competitive parity between the incumbent and rival in the contested retail activity. Their Lordships agreed, finding that the ECPR was a proper benchmark for what would happen in a competitive market, and that if there were monopoly profits, which had not been demonstrated, there were price control provisions elsewhere in the Act.

2.1 *A very simple price squeeze model*

The cases just mentioned concern questions about refusal to supply (adequate) network access, about wholesale (i.e. network access) pricing, about predatory retail pricing, and about price squeeze (or, synonymously, margin squeeze) – i.e. the relationship between retail and wholesale prices. To begin the economic assessment of

⁶ *Deutsche Telekom v Commission*, T-271/03 [2008].

⁷ *France Télécom v Commission*, T-340/03 [2007].

⁸ *Telecom Corporation of New Zealand Ltd v Clear Communications Ltd* [1995] 1 NZLR 385.

these issues it may be useful to have in mind a very simple model.

Suppose then that dominant, vertically-integrated firm M is in competition to supply retail services with downstream rivals. For maximum simplicity, assume:⁹

- that the retail services of all firms are homogeneous
- that supply of one unit of retail service requires one unit of network service (fixed coefficients)
- that firm M would make profit $\mu(p)$ as a pure monopolist, where p is the per-unit retail price (so pricing is linear)
- that M has marginal cost c per unit in the retail activity
- that M can determine, possibly subject to regulation, p and the per-unit access price a (linear pricing again)
- that the rivals constitute a price-taking fringe, whose aggregate supply $s(m)$ is therefore a strictly increasing function of the margin $m \equiv p - a$ between M's retail and access prices
- that $s(c) > 0$ so that some fringe supply is efficient.

Define $\phi(m) \equiv (c - m)s(m)$ as the profit/loss that M makes as a result of the fringe supplying $s(m)$. On each unit of fringe supply M saves retail cost c , loses retail revenue p , but receives wholesale revenue a , and so $(c - m)$ net. Therefore M's overall profit

$$\pi(p, m) = \mu(p) + \phi(m) . \tag{1}$$

Note that for all p the profit-maximising margin \hat{m} maximises $\phi(m)$ and so $\hat{m} < c$. This is akin to exploiting monopsony power in an input market. Firm M squeezes rivals to extract some of their superior efficiency, rather as in the asymmetric information model of Aghion and Bolton (1987), where exclusive contract breach terms are constructed so as to have a chance of extracting some rival efficiency advantage. However, productive efficiency, and social welfare given p , are maximised by $m = c$.

⁹Armstrong et al (1996) cover the more general case with product differentiation, variable coefficients and bypass possibilities.

The ECPR says that an access price a is not open to criticism on competition policy grounds if $m = p - a \geq c$ or equivalently if $a \leq p - c$. An interpretation given to the ECPR by Baumol, Willig and others is that it permits access pricing that covers the direct cost of supplying access to rivals plus the opportunity cost (in terms of forgone profit) from doing so. Let C be M's marginal cost of supplying a final unit to consumers – i.e. the sum of the retail marginal cost c and the direct marginal cost of access. The direct and opportunity costs of access are then $(C - c)$ and $(p - C)$ respectively, and their sum is simply $(p - c)$. In terms of the monopsony parallel mentioned above, the ECPR effectively rules out the exercise of monopsony power in the input market but is silent on the exercise of monopoly power in the output market, which other regulation may or may not address.

Note that the ‘Chicago School’ proposition that there is only one monopoly profit, and that inefficient exclusion of rivals is unlikely because it would harm firm M, does not hold in the simple model above. Indeed expression (1) shows that more-efficient rivals are a second source of profit for firm M. (In a sense, however, the inefficient exclusion arising from $m < c$ results from a shortage of instruments available to M, in particular the assumed restriction to linear prices.) Expression (1) also shows a symmetry, in this static model, between extracting consumer surplus by raising p above M's overall marginal cost C and extracting rival surplus by $m < c$.

Despite its general aim being to protect consumers, not competitors, competition law and policy towards abuse of market power tends to be much more concerned with exclusion ($m < c$ in terms of the simple model) than exploitation of consumers ($p > C$). Dynamic considerations provide one explanation for this policy focus. Thus exclusion of rivals today may result in higher consumer prices in the future. And high prices today might themselves be a reward for past innovation. Both these points are taken up later. Another possible explanation is that, where high price levels are seen to be an endemic problem, there is the alternative instrument of direct regulation.

2.2 Competition policy and regulation: complements or substitutes?

Indeed regulation in one form or another was present in all the telecommunications cases mentioned above. In the NZ and US cases, unlike the EC cases, it was a

reason not to find a violation of competition law. Thus in terms of the simple model, their Lordships in the NZ case decided that $m \geq c$, in keeping with the ECPR, was compliant with the requirements of NZ competition law, even though an access price $a < p - c$ would cause M to reduce p .¹⁰ Another part of the NZ Commerce Act could address p if necessary.¹¹

Something broadly akin to the ECPR was adopted in the *Deutsche Telekom* case. The CFI stated:

‘Having regard to the fact that [DT’s] wholesale services are thus indispensable to enabling a competitor to enter into competition with [DT] on the downstream market in retail access services, a margin squeeze between [DT’s] wholesale and retail charges will in principle hinder the growth of competition in the downstream markets. If [DT’s] retail prices are lower than its wholesale charges, or if the spread between [DT’s] wholesale and retail charges is insufficient to enable an *equally efficient competitor* to cover its product-specific costs of supplying retail access services, a potential competitor who is just as efficient as [DT] would not be able to enter the retail access services market without suffering losses.’¹²

However, this embracing of the as-efficient competitor principle is not the same as tolerating all $m \geq c$, because c is M’s *marginal* cost in the retail activity, not average total cost, and it seems likely (also from other EC case law) that product-specific fixed as well as variable costs are to be taken into account in applying the price squeeze test.

The case is of wider importance because of what it says about the relationship between competition law and regulation. DT argued that no competition law breach

¹⁰It follows from (1) that if M has the power to set p , then p varies with a according to $\frac{dp}{da} = \frac{1}{1+\mu''/\phi''}$.

¹¹A very different approach from that of their Lordships in the NZ case was adopted by the UK Competition Appeal Tribunal (CAT) in the Welsh water case *Dŵr Cymru v Albion*. The case arose from a complaint by Albion, the first new entrant into the water industry after privatisation, that the incumbent, Dŵr Cymru, was refusing to transport water for Albion through its distribution network except at a price that was excessive, discriminatory and which gave rise to a margin squeeze – i.e. allowed Albion an insufficient margin. Ofwat, the regulator, rejected the complaint in 2004 on the basis of an ECPR approach – i.e. by assessing the network access price by reference to the incumbent’s retail price less costs that it avoids by granting access. Albion appealed to the CAT, which rejected the use of the ECPR approach and ruled that Dŵr Cymru had abused its dominant position by imposing a margin squeeze.

¹²*Deutsche Telekom v Commission*, T-271/03 [2008] at paragraph 237, emphasis added.

should be found because the German regulatory authority for telecommunications, which imposed the access charges, had repeatedly examined price squeeze allegations and had not seen anti-competitive conduct. The CFI ruled in 2008 that DT could nevertheless influence its authorised charges by application to the regulator and so had sufficient scope to fix its charges so as to end or reduce the anti-competitive effects, and that the European Commission could not be bound by the view of a national regulator on the application of EC competition law. DT has appealed to the European Court of Justice.

The US Supreme Court has taken an altogether different view of such matters. In the *Trinko* case, the question was whether Verizon's alleged breach of its regulatory duty to share its network with rivals gave rise to a claim under antitrust (= competition) law. The regulatory statute, the Telecommunications Act of 1996, stated explicitly that antitrust law continued to apply, notwithstanding regulation. The Supreme Court held that, although Verizon had a *regulatory* duty to share its network with rivals, that did not give rise to an *antitrust law* duty under prevailing antitrust law standards, and traditional antitrust principles did not create a case for adding a new exception to the normal principle that there is no duty to aid rivals. Moreover, a firm with no antitrust duty to deal with its rivals had no obligation to supply an 'adequate' level of service if it did deal with them.

To arrive at this result the Court had to distinguish the facts of *Trinko* from those of the 1985 case of *Aspen Skiing* (or else explicitly over-rule *Aspen*), in which an operator of ski facilities was held to have breached antitrust law by pulling out of a joint ticketing scheme with another ski operator, Highlands.¹³ The Court considered *Aspen* to be 'at or near the outer boundary' of antitrust liability and distinguished *Trinko* on several grounds. *Aspen* had terminated long-standing voluntary dealings with Highlands, perhaps suggesting that the cessation of supply was anti-competitive, whereas Verizon had not willingly shared its property with rivals. Moreover, *Aspen* had refused to deal with Highlands even at retail prices, whereas the Verizon service at issue was not supplied at retail at all, but was only required to be supplied by regulation. The Court attached particular importance to the fact that Verizon, unlike

¹³ *Aspen Skiing Co v Aspen Highlands Skiing Corp*, 472 U.S. 585 (1985). Carlton (2001) argues on economic grounds that no antitrust violation should have been found, at least on the reasoning presented in the case.

Aspen, was subject to a regulatory structure designed to deter and remedy anti-competitive harm:

‘Where such a structure exists, the additional benefit to competition provided by antitrust enforcement will tend to be small, and it will be less plausible that the antitrust laws contemplate such additional scrutiny. Where, by contrast, “[t]here is nothing built into the regulatory scheme which performs the antitrust function”, ... the benefits of antitrust are worth its sometimes considerable disadvantages.’

With regulation present, therefore, the balance of risk as between false positives and false negatives was viewed as a factor counting against antitrust liability, and the courts were anyway seen as being much less capable than regulators at supervising the terms of duties to deal.¹⁴

The presence of regulation was the principal reason why four of the nine Supreme Court Justices in the *linkLine* case held, agreeing with the other five, that the plaintiffs could not bring a price-squeeze claim against AT&T under antitrust law. In Justice Breyer’s opinion, the plaintiffs, rather than seeking to invoke antitrust law, could have gone to the regulator and petitioned for the regulated wholesale prices to be reduced. The reasoning of the majority of five Justices was however on different lines. First, from *Trinko* it followed that the terms of wholesale access (a in the model) could not be challenged because AT&T did not have a duty under antitrust law – as distinct from regulation – to supply at wholesale at all. Second, a claim that AT&T’s retail price p violated antitrust law by virtue of being too low would have to meet the standard for predatory pricing established by the Supreme Court in the 1993 *Brooke Group* case, which requires proof that price is below an appropriate measure of cost and also that there is a ‘dangerous probability of recoupment’.¹⁵ Third, if a and p were independently lawful, their relationship to one another could not give rise to an antitrust violation. Ergo, price squeeze was not itself a breach of antitrust law,

¹⁴This is not to say that regulation generally gets things right. Caution about the application of antitrust might also be warranted if regulatory duties were seen as unduly favourable to rivals to begin with.

¹⁵*Brooke Group Ltd v Brown & Williamson Tobacco Corp*, 509 U.S. 209 (1993). A major difference between US and EC law on predatory pricing, confirmed by the European Court of Justice in its *Wanadoo* judgment of April 2009, is that in EC law ‘demonstrating that it is possible to recoup losses is not a necessary precondition for a finding of predatory pricing’.

at least in the absence of an antitrust duty to deal at wholesale. The case was sent back to the District Court for assessment of whether a predatory pricing claim can be brought instead.¹⁶

An interesting economic question is what measure of cost should be used in such an assessment of predatory pricing. In terms of the notation above, the direct marginal cost of supplying a retail unit is C . But the opportunity cost rationale for the ECPR approach to access pricing suggests that $[a - (C - c)]$ should be added, since that is the lost wholesale profit if M competes a unit of retail business away from rivals. On that view the relevant overall measure of cost is $(a + c)$. But the condition $p \geq a + c$ is just the same as $m \geq c$. The cost test element of the predatory pricing assessment on this basis would be just the same as the ECPR. The Court however stated, in effect, that if a and p are ‘independently lawful, there is no basis for imposing antitrust liability simply because’ $a \geq p$.¹⁷ This and other judicial statements suggest that opportunity cost is unlikely to be included in the relevant measure of cost for predatory pricing assessment.

It will be apparent from this discussion that the EC and US courts have viewed not only price squeeze cases very differently – the contrast between the recent cases of *Deutsche Telekom* and *linkLine* is especially striking – but also the wider relationship between antitrust and sector-specific regulation. Whereas the US Supreme Court has cautioned against the use of antitrust in regulated industries, in the UK and elsewhere in Europe the applicability of competition law in regulated industries – where, after all, a considerable proportion of dominant firms are to be found – has been seen as positively desirable, not least as a facilitator of the removal of *ex ante* regulation.

This contrast must however be seen in the context of important institutional differences as between the US and Europe. The forum for US antitrust is the courts. Some cases – for example the US *Microsoft* case discussed below – are brought by public agencies (at federal level the Justice Department or Federal Trade Commission) but most are brought by private parties. Successful plaintiffs, whose lawyers often operate on a contingency fee basis, are eligible to receive treble damages. In Europe, on the other hand, competition law decisions are taken primarily by public authorities

¹⁶Indeed the plaintiffs themselves dropped their ‘price squeeze’ claim before the case was argued before the Supreme Court, and shifted position to a predatory pricing claim.

¹⁷*linkLine* Opinion, page 15. In *Aspen*, by contrast, considerable significance was attached to Aspen’s refusal to supply Highlands even at retail price.

such as the European Commission or Office of Fair Trading in the UK. In the UK, moreover, regulators such as Ofcom and Ofgem have competition law powers (except relating to mergers) concurrently with the OFT. The competition law decisions of public authorities in Europe are subject to *appeal* to the courts – to the CFI in the case of the European Commission and to the Competition Appeal Tribunal for OFT decisions – but the European system of administrative decision subject to judicial scrutiny is very different from the US system of judicial decision-making. Private competition litigation in Europe is still comparatively rare. There is no trebling of damages, and lobbying public authorities is often favoured by private parties over pursuing litigation. Such private actions as occur in Europe are typically follow-on damages cases after a public authority has established a competition law violation, or arise out of contract or patent infringement disputes. Another important trans-Atlantic difference is that many regulated dominant firms in Europe were until quite recently state-owned monopolies.

These institutional differences have some bearing on the points made by the Supreme Court in *Trinko*. Where infrastructure is the product of years of public investment, incentive considerations may weigh less heavily against required sharing than if private risk capital has financed the assets. But as time passes after privatisation, this point loses force. Moreover, the competition rules apply generally, and are not contingent on ownership or regulatory history. As to the ‘central planners’ point, administrative authorities, albeit subject to the courts, may be somewhat less ill-suited than the courts to identify and monitor terms of required dealing, though if judicial control is to be effective, the courts are necessarily involved. Moreover, the law is the same whether a decision is made by a public authority or a case is brought by a private party, in which case the forum is the court anyway.

It is also worth noting two arguments that regulation gives more, not less, reason to apply competition law to refusal to supply cases. First, in regulated industries, unlike elsewhere, there is typically a duty to deal in the first place. Thus there is some irony in the fact that the Supreme Court found an antitrust duty to deal in the case of ski slopes but not telecommunications networks. Second, the presence of regulation is one reason why the Chicago School ‘one monopoly profit’ argument for scepticism about leverage claims may not apply. Finally, whatever may be the

position in law, there is an interesting economic question whether terms of dealing (e.g. a price squeeze) can be anti-competitively exclusionary only if a blank refusal to supply would be too.

3 Competition policy and innovation incentives

Some of the sharpest dilemmas about the intrusion of competition policy into property rights concern intellectual property – patents, copyright and business secrets. Intellectual property differs in several economic respects from physical property. One is that an important part of the justification for physical property rights is that use of physical property is rivalrous. If I eat your lunch you can't eat it too. My eating it reduces your opportunities. Intellectual 'property' is by contrast non-rivalrous. If I use your idea you can use it anyway. My using it does not limit your opportunities. The case for IP protection therefore primarily has to do with *incentives* to develop IP.¹⁸

The orthodox (and often correct) position is that stronger IPRs, including *laissez-faire* competition policy towards the exercise of IPRs, are good for innovation because they increase the value of the prize to the winner of the contest to innovate. Virtually any one-shot model of innovation will yield that result. Of course it does not follow, even in such models, that stronger IPRs are necessarily welfare-improving, not least because the strengthening of IPRs may come at the cost of greater 'static' welfare losses via greater monopoly power, as examined in the long-established literature on patent length and breadth. But intuition based on one-shot models of innovation still cautions against weakening IPRs, whether by competition law restrictions or otherwise.

Matters are much less straightforward, however, when dynamic rivalry takes the form of a *sequence* of competitions to innovate, because the factors that determine the value of one innovation – for example, whether in some circumstances it must be licensed to rivals – may influence conditions of competition for the subsequent (e.g. complementary) innovations. Such dynamic linkages can strengthen the ortho-

¹⁸But not quite entirely. While important consumer benefits would flow from Mickey Mouse being freely in the public domain, he might then be exploited in ways that tarnished his reputation to public detriment. The economic arguments are nevertheless overwhelmingly against retrospective extension of copyright protection, which obviously has zero incentive effect.

dox position if hastening the next innovation tends also to accelerate the arrival of succeeding advances. But in a number of settings the effect can be the opposite: stronger IPR protection for the next advance might blunt, or even block, subsequent innovative effort. Thus the European Commission took the view that Microsoft's refusal to supply inter-operability information to rival suppliers of server operating system software had a negative effect on innovation to the detriment of consumers.

3.1 *The front-loading effect*

To see more clearly how dynamic considerations can weaken (or strengthen) the orthodox position that strong and unconstrained IPRs are good for innovation incentives, consider three related models of R&D competition when there is sequential innovation. First, the Segal and Whinston (2007) analysis of antitrust in innovative industries focuses on policies that restrict incumbent behaviour towards new entrants. Such policies are double-edged. A potential entrant is helped by protection from the incumbent, but the incentive to displace him is at the same time diminished by reduction in the value of incumbency. Segal and Whinston's examination of the net effect of these conflicting forces emphasises the *front-loading effect*.

Specifically, in their deliberately stylized basic model where only the challenger does R&D, when the current incumbent monopolist is confronted by an innovating rival, the rival is assumed to become the incumbent monopolist after an interval of time, during which the two firms compete. Consider varying the profit split between the two firms during that duopoly phase while holding constant their joint profit. For example, if the rival had to pay a lump-sum licence fee f to the erstwhile monopolist, the level of f would affect the profit split but not joint profit. Stronger IP rights would favour a division of joint profit that favoured the original incumbent, so higher rather than lower f . But Segal and Whinston show that the innovation incentives of the challenger are greater when the incumbent has a *lower* profit share in the duopoly phase. Higher f increases the value of being a monopolist because it increases the profit of the monopolist once it is displaced in the possibly distant future, but it decreases by the same amount the nearer-term profit of an innovating challenger. Time discounting makes the near-term effect more important – hence the ‘front-loading’ tag.

Thus profit *shifts* from entrant to incumbent in the duopoly phase discourage innovation because of the front-loading effect. Insofar as it protects against undue reduction of entrant profit by incumbent behaviour, competition policy can safeguard innovation incentives. So *laissez-faire* towards the incumbent, even though that maximises the value of incumbency, does not necessarily maximise innovation incentives.

3.2 *The neck-and-neck effect*

A second and separate reason why innovation is not necessarily maximised by stronger IP rights and unconstrained market leadership has to do with the fact that R&D rivalry may be more intense when firms are neck-and-neck rather than asymmetrically placed. Following Aghion et al (2001) assume as before that there are two firms in the market and that the current profit flow π_n of a firm depends on the number n of technology ‘steps’ that it is ahead of its rival (or behind if $n < 0$).¹⁹ This formulation, in which profit depends on *relative* technology levels, is consistent with special cases of various models of cost reduction or ‘quality ladder’ competition. Suppose for simplicity that a firm cannot get more than one step ahead, perhaps because its rival then would get its previous technology for free. Let the flow cost of advancing from a level position into the lead with Poisson probability rate x be $c(x)$, and let the flow cost of catching up from behind with probability rate $y + h$ be $c(y)$. That is to say, when firms are level, expenditure at rate $c(x)$ gives rise to probability $x \cdot dt$ that an advance will be made in small time interval dt , and for a firm that is behind, expenditure at rate y gives rise to probability $(y + h)dt$ of catch-up in that small interval. So there is catch-up at probability rate $h \geq 0$ even if the follower does no R&D, and h is therefore a measure of the weakness of IPRs.

It is natural to assume that neck-and-neck product market competition is more intense, so that $2\pi_0 \leq \pi_1 + \pi_{-1}$. It follows that $x > y$, so both firms make more innovative effort when firms are level than the laggard does otherwise. Both x and y are decreasing in h , so increasing with the strength of IPRs as is conventional. But $(y + h)$ could well be increasing in h . This last fact gives rise to the possibility that weaker IPRs in the sense of higher h can promote rather than retard innovation. Let τ be the proportion of the time that firms in the industry are neck-and-neck.²⁰ In

¹⁹A more general analysis, including discussion of IP licensing, is in Acemoglu and Akcigit (2008).

²⁰In the growth model of Aghion et al (2001) there is a continuum of industries and τ is the

steady-state the probabilities of entering and exiting that state are equal, so that

$$2\tau x = (1 - \tau)(y + h) . \quad (2)$$

Moreover, the rate g at which the technology frontier advances on average is also equal to $2\tau x$, because the frontier advances only when firms are level, which is τ of the time, and when the firms are level the chance that one or other will make an advance in the next short interval of time is proportional to $2x$. From (2) it follows that

$$\frac{1}{g} = \frac{1}{2x} + \frac{1}{y + h} . \quad (3)$$

Increasing h therefore has ambiguous effects on g . In keeping with the orthodox view of IPRs, it weakens the incentive to get ahead, but it also increases the proportion of time that firms are competing neck-and-neck to advance the technological frontier. The overall effect is ambiguous. If h is not too large, then g increases with h because the increased amount of neck-and-neck competition outweighs the blunting of incentives to get ahead. But beyond a certain point, g declines with h in orthodox fashion.

Again we see that, in a sequential setting, bolstering the prize for innovating need not boost innovation. There is a composition effect – if firms compete hardest to innovate when neck-and-neck, then reducing the prize for innovating may nevertheless promote innovation if it increases the proportion of neck-and-neck competition.

3.3 *Follow-on innovation*

An entirely distinct reason why stronger IPRs might not promote innovation has to do with sequential complementary innovations – in short, follow-on innovations. This issue is highlighted in the European Commission’s recent guidance on exclusionary abuse:

“The Commission considers that consumer harm may, for instance, arise where the competitors that the dominant undertaking forecloses are, as a result of the refusal, prevented from bringing innovative goods or services to market and/or where follow-on innovation is likely to be stifled. ...

proportion of them that are neck-and-neck at a given time.

The Commission will consider claims by the dominant undertaking that a refusal to supply is necessary to allow the dominant undertaking to realise an adequate return on the investments required to develop its input business, thus generating incentives to continue to invest in the future, taking the risk of failed projects into account. The Commission will also consider claims by the dominant undertaking that its own innovation will be negatively affected by the obligation to supply, or by the structural changes in the market conditions that imposing such an obligation will bring about, including the development of follow-on innovation by competitors.”²¹

There is a substantial literature on incentives for cumulative innovation – see Scotchmer (2004, chapter 5) for a succinct review. Cumulativeness can take various forms: (i) a fundamental innovation can spawn numerous follow-on innovations; (ii) conversely, a new product may require several prior innovations as inputs; or (iii) it could be that each product is an improvement on its predecessor (as in the Segal and Whinston model discussed above). Simple models of types (i) and (iii) will be developed shortly.

The incentive problem emphasised in the influential paper by Green and Scotchmer (1995), which has two stages of innovation, is how to give enough reward to the first innovator, without whose breakthrough the follow-on innovation cannot happen, while preserving incentives for the development of the second innovation if that is efficient. Giving the first innovator sufficiently broad IP rights that the second innovation cannot be implemented without a licence from the first innovator enhances the incentive for the first innovation but dims the incentive for independent innovators to achieve the follow-on innovation. (The first innovator could attempt the second innovation too but others might well be better placed or have independent routes to it.)

This issue is explored by Bessen and Maskin (2006), but the illustrative model that follows is a much simpler model than theirs. Suppose that innovations are of two sorts – fundamental and follow-on. Fundamental innovations open up new avenues of technological progress and product improvement. Follow-on innovations are complementary to fundamental innovations. Incentives for both kinds of innovation will

²¹European Commission (2008), paragraphs 87 and 89.

depend on the terms on which fundamental innovators allow follow-on innovators to have access to their fundamental technologies.

To examine this question, assume that a particular fundamental innovation has been achieved, and suppose that there is an infinite sequence of potential follow-on innovations – or improvements – each of social net present value v . Assume that improvement $n + 1$ is possible only once innovation n has been made, so that improvements are sequential, and that the next improvement neither enhances nor diminishes the value of prior ones. Suppose again that the Poisson arrival rate x for the next innovation has flow cost $c(x)$, and that the discount rate is $r > 0$. Two firms compete to make improvements – firm 1, the fundamental innovator, and firm 2. Suppose that firm 1 gets a payoff equal to v (i.e. exactly the social value) whenever it makes an improvement to its fundamental innovation and a licence fee of λv whenever firm 2 does, while firm 2 gets $(1 - \lambda)v$ for each improvement that it makes. Thus λ is the split of value v whenever firm 2 makes an improvement.

Let x and y respectively be the symmetric Markov equilibrium strategies of firms 1 and 2. Let A and B be the value functions for the firms. Then

$$rA = (x + y\lambda)v - c(x) \quad (4)$$

and equilibrium x is simply given by

$$c'(x) = v \quad (5)$$

for all λ and y . The RHS of (4) reflects that in small time interval dt there is probability $x.dt$ of firm 1 innovating, in which case it gets v , and probability $y.dt$ of firm 2 innovating, in which case firm 1 gets λv . Likewise, for firm 2

$$rB = y(1 - \lambda)v - c(y)$$

with equilibrium y given by

$$c'(y) = (1 - \lambda)v . \quad (6)$$

In the simplest quadratic case with $c(x) = \frac{1}{2}x^2$

$$rA = \left[\frac{1}{2} + \lambda(1 - \lambda)\right]v^2 \quad (7)$$

and

$$rB = \frac{(1 - \lambda)^2 v^2}{2} .$$

The maker of the fundamental innovation would maximize its value, in this example, by pre-committing to a licence fee of $\lambda v = \frac{v}{2}$, with the result that $rA = \frac{3v^2}{4}$ and $rB = \frac{v^2}{4}$. But if negotiating *ex post* with a rival that had achieved an improvement, it would seek to impose a licence fee as close as possible to v , to extract for itself the gain from the improvement. The outcome of such negotiation is indeterminate, but in symmetric bargaining settings it would lead to a 50:50 split, namely $\lambda = \frac{1}{2}$, thus replicating the fundamental innovator's optimal pre-committed policy. Firm 2 would be in a stronger position if it could negotiate the licence fee before incurring its own R&D costs, which would lead to $\lambda < \frac{1}{2}$ unless firm 1 had all bargaining power and could pre-commit the licence fee as above.

Given the fundamental innovation, a welfare-maximising social planner would want all gains from an improvement by a rival to go to the rival, so a licence fee of zero. (*Ex post* social optimality would have each firm operating at R&D effort level z satisfying $c'(z) = v$.) Any 'tax' on improvements in the form of a positive licence fee undesirably slows down rival efforts to make improvements. On the other hand, incentives to make fundamental innovations in the first place are maximized by a licence fee equal to $\frac{v}{2}$. The welfare-maximizing licence fee to commit to *ex ante* is nevertheless lower, as it balances incentives to make improvements against incentives to make fundamental innovations.

A model so simple as this could be extended and varied in all sorts of ways. With exclusionary conduct in mind, consider the following adaptation. Suppose, in the spirit of Carlton and Waldman (2002) and Choi and Stefanadis (2001), that each time that firm 2 makes a follow-on innovation, there is probability $\delta > 0$ that firm 1's fundamental innovation will be displaced altogether. The idea here is that rival fundamental innovators have more chance of getting established when the independent firm 2, rather than firm 1, controls complementary technology. (Thus the threat to the dominance of the Windows operating system might have been greater had independent Netscape flourished.) The first-order conditions (5) and (6) do not change but (4) and (7) become

$$(r + \delta y)A = (x + y\lambda)v - c(x)$$

and

$$rA = \frac{[\frac{1}{2} + \lambda(1 - \lambda)]v^2}{1 + 2(1 - \lambda)\theta}, \quad (8)$$

where $\theta \equiv \frac{\delta v}{2r}$. If $\theta \geq 1$, firm 1 would exclude a follow-on innovation by firm 2 even if it could extract all its value. For v is then less than δ times firm 1's optimal stand-alone payoff $\frac{v^2}{2r}$. If on the other hand $\theta < 1$, then the optimal λ for firm 1 to pre-commit to is

$$\lambda(\theta) = \frac{1 + 2\theta - \sqrt{1 + 2\theta - 2\theta^2}}{2\theta} > \frac{1}{2}.$$

This reflects both a degree of exploitation of the value of follow-on innovations by firm 2 and defence of monopoly of the fundamental innovation. The latter 'defensive leverage' is not aimed at adding a second monopoly to the core monopoly but rather, consistent with the 'one monopoly profit' argument, at maintaining the core monopoly. (For the same reason, firm 1 would command a high licence fee in bargaining *ex post* if firm 2 made a follow-on innovation without the licence fee having been set in advance.) Firm 1 will want to set the licence fee higher than is socially optimal. A small reduction in λ below $\lambda(\theta)$ will have a second-order effect on A and therefore upon the reward for fundamental innovation, but positive first-order effects on others. Requiring that $\lambda = 0$ has mixed welfare effects because it substantially reduces the value of fundamental innovation.

The situation with $\lambda = 0$, or something like it, could result in two broad ways. The first is if firm 1's intellectual property rights over the fundamental innovation were narrow so that it could not block – and so could not get licence fees for – the implementation of follow-on innovation by other firms. There is indeed a strong case to be made that some important IPRs are too broad.²² Second, and the concern of this paper, is that competition law mandates licensing at low fees. Even for a believer that IPRs are often too broad, however, there is good reason for caution before taking this second step since the right to exclude is the core of property rights and should not lightly be trumped.

3.4 *The Microsoft cases*

This issue came to a head in the EC *Microsoft* case, on which the Court of First Instance gave judgment in September 2007.²³ The CFI upheld the European Commission's decision in March 2004 that Microsoft had abused a dominant position in

²²See, for example, the discussion in Bessen and Maskin (2006).

²³*Microsoft v Commission*, T-201/04 [2007]. See Vickers (2008) for a discussion of the case, from which the summary here draws, and of the parallel IBM case of the 1980s.

the worldwide market for PC operating systems (a) by refusing to supply interoperability information to rivals in the market for workgroup server operating systems, and (b) by tying Windows Media Player with the Windows client PC operating system. The focus here is on (a). The Commission did not accept that the interoperability information at issue was covered by IPRs but its decision was based on the assumption favourable to Microsoft that it was. A central issue in the case was therefore whether it was a competition law violation for a firm such as Microsoft with a dominant position not to share intellectual property with rivals.

This issue was not part of the case against Microsoft brought by the US Department of Justice in the late 1990s, on which the Court of Appeals gave judgment in 2001.²⁴ The core of the US case was that Microsoft had unlawfully maintained its operating system monopoly by various measures, in particular bundling Internet Explorer with Windows, to exclude rival browsers, notably Netscape, whose success might have provided the basis for competitive challenge to Microsoft's Windows monopoly. Although the Court of Appeals did not accept all the findings against Microsoft and quashed the break-up remedy that the lower court had approved, it upheld the central monopoly maintenance claims. Part of the *remedy* settlement concerned the disclosure of interoperability information, but non-disclosure was not an alleged violation in the US case, unlike the EC case. Indeed the US antitrust authorities, citing the paragraph from the Supreme Court's *Trinko* opinion quoted at the start of this paper, recently concluded that 'antitrust liability for mere unilateral, unconditional refusals to license patents will not play a meaningful part in the interface between patent rights and antitrust protections'.²⁵

By contrast, two (controversial) cases before *Microsoft* had established that refusal to license IP could violate EC competition law.²⁶ In *Magill*, broadcasters were required to supply copyrighted program schedules to a would-be supplier of a weekly comprehensive TV guide – a new product, not offered by the copyright owners, for which the schedule information was indispensable. In *IMS Health*, a case concerning

²⁴ *United States v Microsoft*, 253 F.3d 34 (D.C. Cir. 2001). See Rubinfeld (2004) for an account of the economics of the case.

²⁵ US Department of Justice and Federal Trade Commission (2007, page 6). They added that *conditional* refusals that harm competition are subject to antitrust liability. In aggravating circumstances such as fraud on the Patent Office, unconditional refusals could also be caught.

²⁶ *RTE and ITP v Commission*, C 241&242/91 P [1995] ('*Magill*') and *IMS Health*, C 418/01 [2004].

IP rights over the format for presenting German pharmaceutical sales data, the European Court of Justice held that, while refusal to license an IP right could not itself be abusive, there were exceptional circumstances in which the exercise of an exclusive right could be an abuse. In particular,

‘[I]n order for the refusal by an undertaking which owns a copyright to give access to a product or service indispensable for carrying on a particular business to be treated as abusive, it is sufficient that three cumulative conditions be satisfied, namely, that that refusal is preventing the emergence of a new product for which there is a potential consumer demand, that it is unjustified and such as to exclude any competition on a secondary market.’

There was much argument over the significance of these two cases, which both involved odd IP rights, in the *Microsoft* appeal. Microsoft argued that the circumstances of its refusal to supply interoperability information were well outside *IMS Health* criteria. The Commission recognised that their automatic application might be problematic and urged the Court to look at the entirety of the circumstances, and various special factors including the facts that here was a hugely important proprietary *de facto* software standard, and that the refusal involved a disruption of previous supplies (recall *Aspen*). The Commission in its decision had also taken care to consider innovation incentives and to address the ‘one monopoly profit’ argument, noting that by strengthening its dominance in the workgroup server operating systems market Microsoft reinforced its dominance in the PC operating systems. In the event, however, the Court found easily in favour of the Commission on the *IMS Health* criteria, which it interpreted surprisingly elastically, and without relying on the special factors emphasised by the Commission. For example, to meet the ‘new product’ condition it was unnecessary to identify a particular new product (like the comprehensive TV guide in *Magill*) thwarted by the refusal to supply, but sufficient merely to show limitation of technical development in terms of less incentive for competitors to innovate (and not counting effects on the dominant firm’s incentives to innovate).

The European *Microsoft* judgment has therefore left unclear when a dominant firm with IP rights must share them with rivals. Following the judgment, the answer

in Europe appears to be: by no means as exceptionally as previously thought. In some ways it is regrettable that Microsoft did not appeal to the European Court of Justice, which might usefully have clarified if not tightened the law. Microsoft meanwhile faces new allegations from the Commission that it has abused its dominant position by tying Internet Explorer to Windows, an echo of the US case a decade ago.

4 Conclusions

The question posed at the outset did not just ask when firms with market power should be required to share their property with rivals, but also when (if ever) such requirements should come from competition law. A comprehensive answer would therefore examine the comparative institutional advantages of competition law relative to other means of policy intervention, as well as the desirability or otherwise of required sharing of property. This lecture has not attempted such an answer but I hope it has shown that there is a real and important issue here. That is itself indicated by the contrasting approaches to the sharing of both network infrastructure and intellectual property rights taken by the US and EC courts in recent competition law cases. Differences in the institutions of competition law enforcement – the court-based system in the US compared with the primarily administrative system in Europe, subject to appeal to the courts – may explain some of the difference of approach, but not all.

Despite broad trans-Atlantic convergence of other elements of competition policy – mergers and anti-competitive agreements – the ocean remains wide as regards single-firm abuse of market power, with many of us floating somewhere in the middle. So, for example, the importation to Europe of the antitrust conservatism shown by the Supreme Court in *Trinko* and *linkLine* would in my view be unwelcome, at least if EC competition law is reasonably disciplined in application, not least by economics. As a general matter, regulated dominant firms in Europe have often been unduly shielded from the disciplines of both competition and competition law, while at the same time being over-regulated. The application of competition law, although far from perfect, is less prone than regulation to sector-specific capture (whether by vested or political interests), is not monopolised by the regulator, and can facilitate desirable deregulation. The fact that regulated dominant firms often have regulatory

duties to supply wholesale services to rivals may give less, not more, reason to be concerned about using competition law to ensure that such supplies are not made on anti-competitive terms, which can include price squeezes in some circumstances.

However, EC competition law is not always disciplined in application, nor adequately informed by economics, especially in relation to the analysis of abuse of dominance. The ease by which the Court of First Instance upheld the Commission's decision against Microsoft is but one illustration of this concern. It has been said that competition policy 'is a form of regulation that competes with other regulatory structures'.²⁷ Economists, working with lawyers, can help make it a more efficient competitor.

²⁷Federal Trade Commission Chairman Muris at the meeting of the International Competition Network, Naples, September 2002.

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