Journal of Information, Law and Technology

Competition Policy for Computer Software Markets

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I wish to thank Cathryn Costello, of the Law School, and Dr Francis O'Toole, of the Economics Dept., for their invaluable guidance. Suggestions from the JILT editorial team were also of particular assistance. Any errors or shortcomings are of course my own.

This is a **refereed** article published on: 2 July 2001

Citation: Hogan J, 'Competition Policy for Computer Software Markets', 2001 (2) *The Journal of Information, Law and Technology (JILT)*. <http://elj.warwick.ac.uk/jilt/01-2/hogan.html>

Abstract

Against the backdrop of the ongoing *Microsoft* antitrust litigation, this article examines issues of competition policy for computer software markets. A 'dynamic compatibility regime' is proposed. This approach would recognise that strong intellectual property protection works to provide the incentives necessary to encourage firms to engage in winner-takes-all 'standards races'. However, once a standard is established, the argument for such protection is far less convincing: quality access to the underlying technical information is likely to be indispensable for effective, ongoing competition in related, or 'downstream', markets.

Section One begins by considering the policy goal of 'maximising consumer welfare' within the context of computer software markets. There follows an analysis of the economics of network industries in general and software markets in particular. The nature of competition in software markets is examined; this leads to the conclusion that policy should encourage compatibility.

Section Two discusses the *Microsoft* case. It is argued that the approach taken by the DOJ and the Circuit Court fails to convince and that 'Raising Rivals' Costs' theory represents a means of analysing the issues that better reflects the nature of competition within the software industry. 'Raising Rivals' Costs' (RRC) involves conduct that raises costs and induces rivals to restrict their output, thereby allowing the dominant firm to exercise monopoly power. *Microsoft* illustrates that software markets are prone to RRC through technological input foreclosure, e.g. engineered incompatibility, or the denial of quality access to the interface information necessary to produce interoperable products. These 'incompatibility strategies' are examined in Section Three.

Section Three begins with an analysis of the antitrust treatment of dominant firm conduct designed to render previously interoperable products incompatible with an established standard. A focus on the complementary nature of the relationship between a dominant firm and the firms with which it competes in downstream markets is favoured. The final discussion considers whether a dynamic compatibility regime can extend beyond situations where a *change* in policy has resulted in incompatibility, to imposing a *positive* obligation on dominant firms to allow access to technical information to the extent necessary for the development of interoperable products. An argument in favour of qualifying both the term and scope of copyright protection for software is constructed.

Keywords: Antitrust, Software, Microsoft, Compatibility, Copyright.

1. The Nature of Competition in Computer Software Markets

1.1. Introduction

The guiding principle of competition policy is the maximisation of consumer welfare. This requires that 'society's resources are allocated so that consumers can satisfy their wants as fully as technological constraints permit'. Competition policy regulates the

'means' of the competitive process, not the 'ends' produced by that process: it should not attempt to decide which technology or industry structure is 'right', but instead should attempt to maximise the influence of users in determining outcomes. Shapiro argues that the fact that the 'key driver of consumer benefits in information industries is technological progress' requires that the primary goal of antitrust must be 'to promote and protect competition in the introduction of new and improved products and services'.

It has been said that competition in the computer industry is characterised by long 'eras' of stable structures and standards punctuated by 'epochs' of wrenching change, where firms engage in fierce, winner-takes-all 'standards races'. A theme of this article will be how competition policy can best encourage ongoing competition on the basis of price, quality and innovation within those eras of stable industry structures and standards.

1.2. Network Effects and Standards

Network industries are characterised by demand-side economies of scale known as 'network effects': the value a user ascribes to a particular product increases as the number of users of that product increases ('positive feedback'). This may include situations where one user's value for a good increases when another user has a compatible but non-competing good, i.e. an interoperable good. Microsoft's Windows operating system is an obvious example. In a 'virtuous cycle', as the number of Windows users increases, software developers face increased incentives (in the form of larger markets) to write Windows-compatible applications. The increased number and variety of compatible applications makes Windows more attractive, enticing further users. And increased use creates an information asset that can guide future development, allowing for added features and improved quality.

The fact that components of the Windows network (i.e. the operating system and the range of compatible applications) are interchangeable and backwardly compatible allows users to stick to the same standard over time. However, the other side of that coin is that users' sunk costs can lock them in: a move to a new standard requires co-ordination among both the users of the existing network and the suppliers of complements, which is extremely unlikely. So, 'the very demand-side economies of scale that induce the formation of a network in the first place can serve as barriers to competition against the network'. And, insofar as they facilitate recoupment, the entry barriers that network effects represent make strategies for excluding or weakening rivals more feasible.

Standards are the protocols shared by network participants, necessary for *interconnection* with users and *interoperability* with complements: the interface technology underlying the Windows operating system is an example of a standard. Once a standard exists, software manufacturers will not be able to compete unless their products are compatible with that standard.

1.3. Competition in Software Markets

The previous section demonstrated that software markets are characterised by network

effects. Another feature of software markets is that they involve very high 'first-copy' or sunk costs but very low duplication costs, i.e. firms enjoy virtually 'instant scalability'. This combination of demand-side economies of scale (network effects) and supply-side economies of scale (instant scalability) means that software markets tend to be highly concentrated.

While some commentators have argued that network effects dictate that market power may be transitory, characterised by 'serial monopoly', it seems clear that virtuous cycles are hard to stop and start, but relatively easy to maintain: the costs of advancing a standard are far less than the costs of introducing a new standard. In his *Findings of Fact*, Jackson J offers a useful summary of the nature of competition in software markets:

> 'In many cases, one of the early entrants into a new software category quickly captures the lion's share of the sales, while other products in the category are either driven out altogether or relegated to niche positions. What eventually displaces the leader is often not competition from another product within the same software category, but rather a technological advance that renders the boundaries defining the category obsolete. These events, in which categories are re-defined and leaders are superseded in the process are spoke of as 'inflection points'.
>
> The exponential growth of the Internet represents an inflection point…[I]t has fuelled the growth of server-based computing, middleware, and open-source software development. Working together, these nascent paradigms could oust the PC operating system from its position as the primary platform for applications development and the main interface between users and their computer.'

Obviously, introducing a new standard is not just about 'building a better mousetrap': apart from the obvious technical expertise, it also requires marketing and management skills and a range of complementary components. However, network industries involve a particular barrier to entry: the market may 'tip' (to monopoly) in favour of the product that achieves an early lead. Tipping is driven by consumer expectations, which will be influenced by factors such as a firm's reputation from other markets, its installed base of users and its current products - factors that will tend to favour the incumbent.

Ultimately, however, the network effects theory is ambiguous in its welfare implications: the socially cost-minimising structure may or may not be very concentrated. Melamed has noted that where 'the benefits of the new technology, compared to the existing technology, are not enough to induce consumers to pay the switching costs…it is not necessarily inefficient for the new technology to fail in the marketplace.' This is so even if consumers *individually* prefer the new (and 'better') technology:

> 'If consumers would have otherwise divided into two groups purchasing incompatible software, 'predatory' conduct that induces them all to buy Microsoft's product will in fact enhance social welfare, since all consumers will benefit from the positive network effects of using a single product…[It has been noted] that a standard-enhancing move in a network market might enhance

> efficiency on balance, even if it eliminates competition, since consumers of the standard product will benefit from increased adoption of the standard'.

Network effects make compatibility 'a critical dimension of [software] industry structure and conduct'. In a network market where products are incompatible, the positive feedback operates at the level of each product individually. It has already been noted that consumers' expectations as to sales will influence durable investment decisions such as software purchases. Under incompatibility, because these expectations are based on the sales of the individual firms in the market, they will favour the dominant firm. Compatibility, however, neutralises the dominant firm's current installed base and expected sales as sources of competitive advantage, i.e. it allows the positive feedback to operate at the level of the market as a whole:

> 'When different manufacturers' products are compatible, there is one big network, shared by current competitors and entrants. Thus, there is competition within the market in terms of price and product attributes. Because the firms share a network, network effects do not cause tipping of firms' market positions.'

Encouraging effective competition within an established standard requires that antitrust policy compels compatibility, or more particularly, that it enables the development of interoperable, or 'downstream', products. US antitrust enforcement agencies have on occasion mandated compatibility or 'open access' as a condition of approving software mergers. In the context of *Microsoft*, which falls for consideration in Section Two, a compatibility regime would require the disclosure of the APIs that hook Internet Explorer (IE) to other parts of the Windows OS, allowing competing browsers the same degree of interoperability with Windows as IE enjoys.

2. The Microsoft Case

2.1. Introduction

The *Microsoft* antitrust litigation arose out of Microsoft's response to the threat presented by the 'disruptive technology' of the Navigator-Java platform. The combination of the Navigator browser and the Java programming language was central to the 'thin client' initiative: the 'client' (computer) would feature only basic central processing components, key peripherals, an operating system and a browser; data would be stored and processed at server-level, to be retrieved by the client as needed. APIs would no longer be OS-specific but would instead be exposed by 'middleware' running on top of an OS. This cross-platform compatibility would erode the 'applications barrier to entry' and commoditise the underlying OS. Consumers would no longer have to take into account the number of applications expected to become available for a specific OS and developers would no longer have to consider which OS would become the standard among consumers.

As a monopolist in the OS market, Microsoft had a clear incentive to prevent the cross-

platform compatibility of the Navigator-Java platform. The 'browser wars' were just one element of a broader strategy aimed at preserving the OS monopoly by impeding the adoption of Navigator-Java. So, Microsoft competed head-on with Netscape in the browser market, it made Sun's Java language incompatible with aspects of Windows and it promoted a rival, Windows-specific, version of Java. However, antitrust analysis in the case thus far suffers from a fatal problem of characterisation. Jackson J portrays IE's zero-price as predatory pricing, the bundling of IE and Windows as an illegal tie-in, and the arrangements with OEMs and ISPs as instances of exclusive dealing. As an inevitable result of these characterisations, the arguments advanced under each claim are weak.

2.2. No Such Thing as a Free Browser?

Characterising Microsoft's zero-pricing of IE as predatory pricing is bound to fail, simply because there are plausible economic justifications for a zero browser price. Consider the difficulties Microsoft faced as an entrant to the browser market: Navigator 'already enjoyed a very large installed base and had become nearly synonymous with the Web in public consciousness'. It could be argued that the zero-price was an instance of penetration pricing necessary to overcome the enormous barriers to entry represented by the network effects working in Netscape's favour. Alternatively, as the marginal cost of producing an extra unit of a software product is zero, it could be argued that a rational firm can be expected to set price at marginal cost.

The Coase Theorem offers a further possible explanation for the zero-price bundling of IE: Windows is a durable good, so Microsoft can be expected to innovate by adding functionality to its OS (in the form of web-browsing capability) so as to maintain demand. Finally, a zero price for IE could be explained by analogy to the supply of free programming on broadcast TV, in which case the browser's ability to generate advertising revenues and commissions by steering Internet users to particular web-sites makes the marginal cost of distributing another unit negative.

2.3. Did Bill Gates Twist Your Arm?

To establish an illegal tie-in, Jackson J had to identify two separate products. So, he argues that 'the commercial reality is that consumers today perceive operating systems and browsers as 'separate products', for which there is separate demand.' Arguably, Microsoft's response is more convincing: the application of the 'separate consumer demand' test would 'kill innovation to the detriment of consumers by preventing firms from integrating into their products new functionality previously provided by standalone products - and hence, by definition, subject to separate consumer demand'.

The other element of an illegal tie-in is 'forcing', and the argument here is equally problematic. Consumers were simply not compelled to purchase a product they did not want: they were not charged anything for Internet Explorer and they remained free to install Navigator as their default browser:

> 'Thus, the tie of IE and Windows does not cause anticompetitive exclusion in

> the usual way, by forcing buyers to accept a product that they do not want in place of a product that they do want, because it imposes no financial or technical obstacle to using both [IE and Navigator].'

Jackson J's argument that hard-drive space is 'scarce and valuable' is difficult to accept, and the fact that IE was zero-priced when it was sold *separately* casts aspersions on his claim that 'any value to be ascribed to Internet Explorer is built into [the] single [Windows] price'. The technical integration of the browser and OS in Windows 98 is properly characterised and considered as an instance of raising rivals' costs through contrived incompatibility, but characterising it as a technological tie, Jackson J strains to find the requisite consumer harm:

> 'To the extent that browser-specific routines have been commingled with operating system routines to a greater degree than is necessary to provide any consumer benefit, Microsoft has unjustifiably jeopardised the stability and security of the operating system. Specifically, it has increased the likelihood that a browser crash will cause the entire system to crash and made it easier for malicious viruses that penetrate the system via Internet Explorer to infect non-browsing parts of the system.'

If browser prices remain competitive (i.e. at MC, or zero) it becomes difficult to identify harm to consumer welfare, and equally difficult to justify intervention.

2.4. Compaq's Self-Twisting Arm

In his *Findings of Fact* Jackson J devotes considerable space to the contractual restrictions imposed on OEMs preventing them from removing Internet Explorer from Windows. In reality, these restrictions may have been nothing more than the result of bargaining between industry players. Microsoft imposed certain restrictions on OEMs' ability to reconfigure the desktop and the start-up sequence, but the explanation that this was in order to ensure a common 'Windows experience' for all users seems plausible. And OEMs were granted discounts off their Windows royalty prices to encourage compliance. Rather than regarding this as the normal *quid pro quo* of contractual negotiations, Jackson J seems to see the OEM-restrictions and the discounts as evidence of a predatory intent:

> 'Microsoft was willing to sacrifice some goodwill and some of the value that OEMs attached to Windows in order to exclude Navigator from the crucial distribution channel. Microsoft's restrictions succeeded in raising the costs to OEMs of pre-installing and promoting Navigator. These increased costs, in turn, were in some cases significant enough to deter OEMs from pre-installing Navigator altogether.'

This misses the point completely. OEMs' costs were not raised: they were compensated for the costs of complying with the restrictions - and they could still pre-install Navigator:

> 'Microsoft's license agreements have never prohibited OEMs from pre-installing

> programs, including Navigator, on their PCs and placing icons and folders for those programs on the Windows desktop and in the 'Start' menu…Microsoft leaves enough space for an OEM to add more than forty icons to the Windows desktop.'

The following example from the *Findings of Fact* clearly demonstrates that Microsoft's arrangements with OEMs involved inducement rather than coercion. In early 1996, Compaq partnered with Netscape: Netscape seems to have offered Compaq a discount for an exclusive slot on the desktop. Insofar as the inclusion of Internet Explorer eliminated this ability to sell an exclusive to Netscape, its equilibrium price to OEMs was negative; as Netscape's product was significantly superior at that time, Microsoft would have had to make a very large positive payment (or reduce the OS price) to compensate OEMs such as Compaq. Arguably, it was more economic to engage in a short-term opportunistic contractual 'hold-up', whereby Microsoft enforced the provisions of its OEM licensing contracts and prohibited OEMs from removing any part of the Windows OS. This prevented Compaq from selling its 'browser slot' to Netscape on an exclusive basis, but while it would have had short-run wealth distribution effects it was not of any competitive significance: there was no harm to consumers, nor was there any anti-competitive exclusionary effect on Netscape - OEMs could still install Navigator and make it the default browser. In February 1997, Compaq aligned itself with Microsoft; it benefited from lower Windows license fees and a bounty for each Compaq user that signed up for Internet access, i.e. the new licence took account of the impact of the growth of the Internet on the value of the browser slots on the desktop.

Jackson J describes Microsoft's purchase of Compaq's partnership as a 'massive and multifarious' investment, but a more plausible portrayal would be that of a bargain agreed upon by two sophisticated firms. Note that in January 1999, after Netscape agreed to provide it with approximately $700,000 of free advertising, Compaq resumed pre-installation of Navigator on its Presario computers.

In the same way, a critical reading of Microsoft's dealings with ISPs suggests a pattern of inducement, not coercion. Microsoft's Appellate Brief notes the difficulties faced by the entrant to the browser market:

> 'By 1995, Netscape had formed relationships with almost all of the major ISPs, and many ISPs featured Navigator exclusively. In fact, in early 1996, no major ISP in the United States distributed IE, and few even supported IE on their service. Microsoft had difficulty persuading ISPs to distribute IE because of their existing arrangements with Netscape.'

It is perhaps not surprising that Jackson J's attempt to attribute some anti-competitive quality to Microsoft's dealings with AOL instead suggests that those dealings were nothing more than 'bargained-for exchanges of consideration':

> 'In essence, AOL contravened its natural inclination to respond to consumer demand in order to obtain the full technology, close technical support, and desktop placement offered by Microsoft.'

And there appears to be a tacit acceptance that the antitrust concern is not the OEM exclusives but rather the issue of technical integration:

> 'Although the Windows 98 OEM license does not forbid the OEM to set Navigator as the default browsing software, doing so would fail to forestall user confusion since…Windows 98 launches Internet Explorer in certain situations even if Navigator is set as the default.'

This is important: Katz and Shapiro have suggested that competition policy should distinguish between the release of a 'bundled' browser at a low or zero incremental price and instances where a dominant firm imposes incremental costs on the developers or users of rival browsers. Intervention can be justified in the second case. This approach leads to the following characterisation of the potential antitrust issues in Microsoft:

- Microsoft's OEM/ISP exclusives may have disrupted optimal distribution patterns in the browser market, artificially raising the price Netscape would have to pay to secure distribution through those channels;
- Microsoft may have withheld Windows interface information from rivals;
- Microsoft may have disadvantaged rivals by engineering incompatibility into its OS.

This sits better with the factual background to the case. The imposition of artificially higher distribution costs, the denial of quality access to necessary interface information, and engineering incompatibility with rivals' products are instances of dominant firm conduct best analysed under the theory of 'Raising Rivals' Costs'.

2.5. Raising Rivals' Costs

'Raising Rivals' Costs' (RRC) is the exclusionary exercise of market power to raise or maintain prices above the competitive level. It involves conduct that places rivals at a sufficient cost disadvantage that they are forced to restrict output, allowing the defendant firm to exercise monopoly power by increasing price. In contrast to predatory pricing (where the predator can be expected to lose money faster than its smaller victim) it may be relatively inexpensive for a dominant firm to substantially raise its rivals' costs. Nor are there any difficulties in recouping the predatory investment: a higher-cost rival will quickly reduce output, allowing the predator to raise price or market share. And as it is always better to compete against high-cost firms rather than low-cost ones, RRC strategies can be profitable without the rival's exit from the market.

Input foreclosure, whereby rivals are denied quality access to necessary inputs, is recognised as an effective means of implementing RRC strategies. The same is true of contracts with distributors: by disrupting optimal distribution patterns, a dominant firm can impose costs on its rivals. For example, Microsoft's exclusive arrangements with OEMs and ISPs may have raised Netscape's costs of distribution or reduced the size of its installed base of users, thereby raising its marginal costs across the board.

It could be countered that Netscape had equally effective counter-strategies available to it, but once a firm is forced to pay *not* to be excluded its costs have already been raised. In any case, the fact that a predator outbids its rivals for the purchase of exclusive rights does not mean that the exclusion is economically efficient: the market for exclusionary rights is a market for competition, which is a classic public good. So, even a well-functioning market will fail to yield an efficient outcome. And the incentives each party faces suggest that this type of RRC strategy may be particularly effective: while the purchaser of the exclusive rights stands to gain increased market power and additional profits, the potentially excluded rivals only gain the more competitive non-exclusion price and profits. If, however, the rivals reduce their output, they gain the benefit of a higher price on their remaining sales: essentially, the purchaser has more to gain than the rivals have to lose.

'Technological' input foreclosure by a dominant firm controlling a software standard such as Windows represents a more interesting RRC strategy than the purchase of exclusionary rights. Rivals could be denied quality access to important inputs such as the interface information necessary to produce interoperable products. It is clear that Microsoft's control of the Windows OS gives it considerable power to raise its rivals' costs in this way. 'Contrived incompatibility' represents a similar, perhaps more subtle, form of technological input foreclosure, and it seems that efforts were made to make running another browser on Windows 98 a 'jolting experience'. The passage below illustrates the possible anti-competitive effects of an incompatibility strategy; Section Three will consider how competition policy responds to such conduct.

> 'By taking control of a standard and making it proprietary, Microsoft can design the standard to reduce rather than increase interoperability. By using a standard to reduce or prevent the interoperability of Windows with other operating systems, Microsoft could create higher barriers to entry and expansion for rival operating systems because applications programs written to Windows would not work as well on those other platforms or vice versa. Similarly, few applications will be written for these other operating systems. In addition…over time, lack of interoperability with the dominant desktop operating system will become more of a handicap to rival server operating systems. These interoperability problems also apply directly to applications software markets. First, if Microsoft reduces or prevents compatibility and interoperability of rival applications with the Windows operating system, another effect would be to permit Microsoft's own applications to achieve or maintain market power. Users would find that the Microsoft programs work better with Windows…[T]his superior functioning is not due to any inherent advantages of the Microsoft product or superior skill of Microsoft programmers. Rather, it is due to the fact that the rival programmers are denied disclosure of detailed API and source code information available to Microsoft employees that these rivals need to maintain the same high degree of interoperability as the Microsoft products. Second, if Microsoft has market power in applications, it can eliminate interoperability with competing software in order to maintain market power.'

3. The Antitrust Treatment of Incompatibility Strategies

3.1. Introduction

Dominant-firm incompatibility strategies can be broadly categorised as follows:

- The denial of timely access to interface technologies, such as the Windows APIs, which are necessary to produce interoperable products.
- Contrived incompatibility, i.e. changes made to an existing standard that render previously interoperable products incompatible with the standard.

In practice, however, some overlap can be expected: for example, a technological tie-in may preclude access and interoperability.

3.2. In Defence of Incompatibility

It has been argued that an 'informal' tie-in by innovation or integration can be beneficial in that it secures for the innovator a greater degree of control over the quality of the new product than would otherwise be the case:

> 'It may be quite difficult for consumers to determine the source of any shortcoming in a new product; by definition, they will be unfamiliar with it. Yet the success of the innovation may depend on consumers' initial perceptions of quality.'

It has also been argued that in an environment where the return on investment in innovation is very uncertain a technological tie-in works to protect the innovator, allowing him to extract the exclusive benefit from his new product for some limited time, i.e. until it is reverse engineered. But all this ignores one crucial possibility: the fact that the new version of the monopolist's product succeeded in the marketplace may simply reflect the absence of any viable choice. For much the same reason, the judicial treatment of dominant firm incompatibility strategies is unsatisfying.

In *Foremost Pro Colour v Eastman Kodak* the plaintiff photofinisher alleged that Kodak's development of new products that were incompatible with existing photo-finishing equipment amounted to a technological tie: the new film format could not be processed as before, so it was necessary to purchase a package of film, chemicals and paper. The Court rejected the argument that this was *per se* unlawful, requiring instead some evidence that the innovation was motivated by a desire to compel the purchase of the entire system:

> 'The essence of a *per se* unlawful tying arrangement, however, is that it *forecloses* competition in the market for the tied product or products. The creation of technical incompatibilities, without more, does not foreclose competition; rather it increases competition by providing consumers with a choice among differing technologies, advanced and standard, and by providing

> competing manufacturers with the incentive to enter the new product market by developing similar products of advanced technology.'

The claim that contrived incompatibility 'without more' does not foreclose competition is intellectually dishonest: the antitrust issue is that contrived incompatibility raises rivals' costs, allowing the dominant firm to exercise market power.

California Computer Products v IBM (*CalComp*) involved a claim of (direct) contrived incompatibility: the plaintiff argued that IBM's changes to the design of the interface between the central processing unit (CPU) and peripherals amounted to 'technical manipulation'. The Court seemed to consider price and performance as inseparable, holding that where an innovation provides equivalent function (i.e. no improvement in performance) at a lower price the result is to make the product more attractive to buyers. As such a cost-saving step, the challenged integration could therefore be considered an improvement. This approach was echoed by the Circuit Court in the litigation arising out of the Microsoft consent decree. It was held that Windows 95 and Internet Explorer 4.0 constituted a single, integrated product if there were 'facially plausible benefits to [Microsoft's] integrated design as compared to an operating system combined with a stand-alone browser such as Netscape's Navigator'. Alluding to issues of institutional competence, the Court continued: 'The question is not whether the integration is a net plus but whether there is a plausible claim that it brings some advantage.'

To be sure, antitrust challenges to innovations must be handled with care but it is submitted that a slightly more robust approach would be preferable. Under the EU competition regime, it seems that a software company is free to make design changes 'as long as it does so objectively to improve its own product or service, and not primarily with the effect of making difficulties for its downstream competitors'. And the proportionality principle could act as a further 'limiting principle': a dominant company is not free to cause substantial inconvenience to its competitors to achieve a minimal improvement in its own product. In contrast, under the 'sole purpose' standard of the cases considered above, an antitrust plaintiff must establish that the challenged innovation is a device without *any* 'facially plausible benefits'.

3.3. The Wrong Turn

The *Foremost Pro Color* line of authority began with *Berkey Photo v Eastman Kodak*. There, it was argued that Kodak, as a monopolist in the markets for cameras and photographic film, was in a position to set industry standards and that rivals could not compete without offering similar products to Kodak's. As a result, Kodak was obliged to provide advance information to enable rival camera manufacturers to adapt their products to new film formats it planned to introduce. This argument was roundly rejected. The Court held that Kodak had no duty to provide *advance* information to its rivals in the camera market:

> 'The first firm, even a monopolist, to design a new camera format has a right to the lead time that follows from its success. The mere fact that Kodak manufactured film in the new format, so that its customers would not be offered

> worthless cameras, could not deprive it of that reward. Nor is this conclusion altered because Kodak not only participated in but dominated the film market. Kodak's ability to pioneer formats does not depend on it possessing a film monopoly. Had the firm possessed a much smaller share of the film market, it would nevertheless have been able to manufacture sufficient quantities of 110-size film…to bring the new camera to market. It is apparent, therefore, that the ability to introduce the new format without predisclosure was solely a benefit of integration and not, without more, a use of Kodak's power in the film market to gain a competitive advantage in cameras.'

This approach seems largely correct. Kodak had developed an entirely new camera - it had not altered an existing format, nor did it restrict output of existing camera formats so as to boost sales of its new camera and film. Its competitive advantage (the lead time) was a direct result of its innovation in bringing a new product to market - and it was an advantage that would inevitably be eroded as its competitors caught up. Yet in the cases that followed, these distinguishing points were effectively ignored.

Antitrust claims arising out of the introduction of entirely new technology, e.g. *Berkey Photo*, may lack one crucial element: a pre-existing complementary relationship between the plaintiff and defendant. In the next section, I will demonstrate that a rival producing interoperable products is in a complementary relationship with the dominant firm controlling the existing standard and must therefore be afforded an adequate opportunity to adapt to changes in the standard. This reflects commercial reality within software markets: the initial sponsor(s) of a standard will encourage the development of interoperable products as a means of ensuring rapid diffusion of the new standard. The likely antitrust issue is that the sponsor will subsequently 'close' the standard, either by denying its rivals quality access to necessary interface information or by engineering incompatibilities with their products.

Under the EU regime, the proportionality principle (mentioned above) represents a means of addressing such a situation. In 1984, for example, IBM ended a four-year investigation by the European Commission by agreeing to disclose in good time sufficient interface information to enable its competitors adapt their hardware and software to new IBM products. IBM's control of the industry standard placed it in a complementary relationship with its rivals, and so it had to have regard to those rivals' interests when making changes to the standard.

3.4. Caring, Sharing Dominant Firms

Returning to the incompatibility strategies mentioned above, it should be noted that both types of unilateral conduct are possible because the disadvantaged firms are in a complementary relationship with the firm controlling the standard, yet also in competition with that firm in the downstream markets in which they operate. For example, developers of word-processing software require access to Windows interface technology if they are to produce Windows-compatible products, yet they also compete with Microsoft in the market for word-processing software. Two cases support the proposition that a firm with monopoly power violates section 2 of the Sherman Act if it excludes rivals from the

monopolised market 'by restricting a complementary or collaborative relationship without an adequate business justification' - *Aspen Ski* and *Kodak*. This principal can be applied to computer software markets.

Between them, the parties in *Aspen Skiing v Aspen Highlands Skiing* controlled the four downhill skiing mountains in Aspen, Colorado; Aspen Ski controlled three of the four mountains. The firms were of course rivals, yet for years they had offered skiers a six-day 'all-Aspen' ticket, dividing the revenues according to usage. In 1978, after Highland rejected Aspen Ski's offer of a fixed percentage of revenues considerably below its historical average, the collaborative relationship was terminated. Aspen Ski marketed a multi-area weekly ticket, limited to its three mountains. Highland's share of the market declined steadily over the next four years to about one-half of its previous level. As there was no apparent efficiency justification, Highland succeeded in its antitrust action. The Supreme Court wrote:

> 'In the actual case we must decide, the monopolist did not merely reject a novel offer to participate in a cooperative venture that had been proposed by a competitor. Rather, the monopolist elected to make an important change in a pattern of distribution that had originated in a competitive market and had persisted for several years.'

Eastman Kodak v Image Technical Services concerned Kodak practices relating to parts and service for its photocopiers and micrographic equipment: essentially, Kodak discontinued its policy of selling spare parts to independent service operators (ISOs). Like *Aspen Ski*, while Kodak competed with independent ISOs in the service market, it also supplied them with the necessary parts. The plaintiff ISO successfully argued that this policy change raised its costs and allowed Kodak to monopolise the provision of service: Kodak was ordered to sell parts to ISOs at non-discriminatory prices. Note too, that the Supreme Court, denying summary judgement for Kodak, accepted that significant information and switching costs weakened the linkage between the markets for service and parts and the (competitive) equipment market, allowing Kodak to exercise market power in the downstream markets.

Some points arise from the discussion of *Aspen Ski* and *Kodak*:

- There must be a pre-existing relationship between the dominant firm and its competitor(s). Note that Posner J has interpreted *Aspen Ski* as meaning that a monopolist may violate section 2 'if it refuses to cooperate with a competitor in circumstances where some cooperation is indispensable' to effective competition. So, the duty arises where effective competition requires some cooperation among competitors.
- Each case involved a policy change resulting in harm to the dominant firm's rivals (but not necessarily the exit of its rivals).

The *Intel* litigation demonstrates the application of these principles. Intel customarily supplied 'strategic' OEMs with advance technical information and samples of prototype central processing units (CPUs) for the purpose of building Intel-compatible computers.

Digital, Compaq and Intergraph were three such OEMs, and they each had patents on certain CPU technologies (although only Digital actually competed with Intel in the CPU market). Effectively, they asserted these patents against Intel; Intel responded by cutting off the supply of advance technical information and prototypes in an attempt to force them to licence their patents on favourable terms. An FTC investigation resulted in a consent decree prohibiting Intel from withholding or threatening to withhold certain advanced technical information from a customer for reasons relating to an intellectual property dispute with that customer. Note that the OEMs were long-term Intel customers who relied on the advance technical information and product samples to design their products:

> 'Intel is free to license to whomever it wishes - or to choose not to license it (*sic*) at all. But once Intel does grant a licence, and a computer manufacturer relies on the license to design computer systems based on Intel microprocessors, Intel cannot leverage its dominant position in microprocessors to extract intellectual property grants from its customers.'

3.5. Developing A Compatibility Culture

A 'dynamic compatibility regime' involves strong intellectual property protection while a new standard is developed and advanced, with limits imposed on that protection once the standard has become established in the market. The foregoing sections considered an aspect of this: the appropriate antitrust response to an anti-competitive *change* of policy designed to reduce interoperability and thereby disadvantage firms in downstream markets. Certain duties were imposed on the dominant firm as a result of its control of the standard technology, access to which was necessary to produce interoperable products. This section will consider a more far-reaching question: is there a means of *compelling* access to copyright-protected interface information, thereby encouraging ongoing innovation within a standard and avoiding entirely the possibility of technological input foreclosure?

In theory at least, the copyright fair use doctrine allows disadvantaged firms to obtain access to necessary interface information: the doctrine permits the reverse engineering of software. In *Nintendo* and *Sega*, the reverse engineering of consoles and cartridges so as to discover interface information necessary to develop compatible games was upheld as fair use. The EC Software Directive permits reverse engineering where it is 'indispensable to obtain the information necessary to achieve the interoperability of an independently created program with other programs'. This recognition that copyright protection of functional requirements governing compatibility should not confer 'disproportionate leverage' into related markets involves an acceptance that broad copyright protection of software is not necessary to provide the appropriate innovation incentives. In reality, however, the reverse engineering of an OS such as Windows would not be practicable.

The copyright misuse doctrine represents another means of obtaining access to interface information. Put simply, this doctrine allows a defence to an infringement action if the copyright is used in a manner contrary to the public policy embodied in the copyright:

> ‘Specifically, courts can apply it with discretion, tailoring it to prevent the ‘lock-up’ of a network standard and to provide a ceiling to the level of copyright protection available in cases where there is anti-competitive conduct. At the same time, courts may refuse to apply it in situations where intellectual property rights and social welfare interests are aligned. It is far better for courts to have significant discretion than to stamp out innovation with blunt antitrust remedies or harsh limitations of intellectual property rights.’

The misuse doctrine is broader than fair use in that it can secure access to all that was previously available, not just to the functionality underlying the now-protected material. However, ‘it is on such uncertain legal grounds that courts may be reluctant to apply it’. Ultimately, it has to be recognised that the doctrines of fair use and misuse are only available as defences to infringement actions: they operate to prevent the anti-competitive enforcement of the intellectual property rights in a standard, which will often amount to a change of policy falling under the rule in *Aspen Ski* and *Kodak* (discussed above).

Patterson has suggested a more general approach, arguing that the doctrine of estoppel may imply a ‘copyleft’. Copyleft software is software that users are free to use, modify and distribute on the condition that the source code remains open; a copyleft licence requires the user to agree not to assert copyright in respect of any changes or improvements he makes, to disclose the entire source code for those changes, and to disseminate those changes subject to another copyleft licence. However, insofar as the disclosure is not limited to the information necessary for the development of interoperable (i.e. downstream) products, this approach would fail to preserve sufficient innovation incentives; more practically, it binds the licensee, not the licensor. So, Patterson proposes a modified, or reverse, copyleft: a firm is obliged to keep the specifications open as a condition of its standard being accepted by consumers who have relied on its open-source manifestations. While this approach is preferable to the copyright defences discussed above in that it involves the imposition of a positive obligation on dominant firms, it is again limited to policy changes, which can be adequately addressed under the rule in *Aspen Ski* and *Kodak*. Something more far-reaching is required.

3.6. Re-Thinking Copyright

Computer software enjoys copyright protection as a literary work. The argument for reconsidering the appropriate level of copyright protection for software flows from the particular features that distinguish computer programs from other literary works.

The expression in software is ‘hidden’: executable files depend on object code to operate, not human-readable source code. So software users are not afforded any meaningful access to a literary work as such. Indeed, the utility that a user derives from a computer program comes from its functionality, and not from any appreciation of the protected expression. Stallman has identified another distinguishing feature: the ease and desirability of modifying or customising software, which is arguably ‘one of its great advantages over older technology’.

A central element of the 'digital' or 'networked' economy is the decentralisation of the power to manipulate, copy and redistribute information. However, copyright's inherent trade-off between the interests of authors and publishers and those of society was struck long ago, at a time when individuals were not capable of copying. Consider a modern example, the US Copyright Act of 1976: the major new technology at that time was the photocopier (a means of centralised copying) and computers were only owned by large organisations. It has been argued that as a result of technological change, society's freedom to copy, modify and redistribute works is now something of real value:

> 'As long as the age of the printing press continued, copyright was painless, easy to enforce, and probably a good idea. But the age of the printing press began changing a few decades ago when things like Xerox machines and tape recorders started to be available, and more recently as computer networks have come into use the situation has changed drastically. We are now in a situation technologically more like the ancient world, where anybody who could read something could also make a copy of it that was essentially as good as the best copies anyone could make.'

This would suggest that a re-evaluation of copyright's balance between the public and private interests in literary works is appropriate, but modern legislation has tended to shift the balance further in favour of copyright holders. However, the particular features of computer programs could support an argument for qualifying the scope of copyright protection for software. For example, Stallman has proposed a three-year copyright term for computer programs, and that protection would be conditional on the deposit of the source code with some designated public body. Whether a three-year copyright term would sufficiently preserve the innovation incentives is outside the scope of this paper, but the author supports the principal of a significantly shorter term for computer software than currently applies.

Stallman also argues that the nature of software as a functional work requires that users be free to publish modified versions of programs: however, this would practically eliminate innovation incentives. It is submitted that a limited freedom to develop *interoperable* (downstream) programs would be more appropriate. Copyright protection of software standards would be subject to a positive obligation to allow access to the technical information to the extent necessary for the development by rivals in downstream markets of interoperable products. And on the expiration of the shorter term, the entire source code would be freely available: this would allow the development of *competing* products, i.e. compatible offerings in the primary (upstream) market.

It will of course be argued that the dynamic compatibility regime envisaged above would fail to preserve sufficient innovation incentives, but despite its superficial appeal this argument should not be unhesitatingly accepted. In network markets, the natural lead-time that an innovator will enjoy is transformed into a significant competitive advantage, so network effects offer considerable protection to the leading firm. It is at least arguable that a shorter copyright term would encourage drastic innovation over the incremental development of existing standards. And while innovation incentives may be reduced

initially, there would be wider dissemination of the technical information necessary for the development of compatible products: this would undoubtedly spur innovation within and around an established standard. Farrell and Katz have cautioned that compatibility may under-reward 'drastic innovation'. It is submitted that this ignores the fact that drastic innovation will *introduce* incompatibility, albeit subject to a shorter term of copyright protection (for the primary software product or standard) and an obligation to allow access to rivals to the extent necessary to develop interoperable products.

Ultimately, it should be recognised that the argument that innovation incentives are higher under incompatibility is not an argument against compatibility: rather, it is an unqualified argument in favour of monopoly. A dynamic compatibility regime does not question the link between incompatibility and innovation incentives, but it does introduce some qualifications.

4. Conclusion

This article argued for, and considered the viability of, a 'dynamic compatibility regime' as a model for competition policy within computer software markets. Such an approach recognises that intellectual property rights offer the innovation incentives that are critical to technical progress, the key driver of consumer benefits in software markets. However, once a software standard has succeeded on the market, the economic features of the software industry dictate a shift to a compatibility regime. Quality access to the information necessary to produce interoperable products will be indispensable for effective, ongoing competition.

Appropriate analytical tools exist to address a *change* in policy that renders previously interoperable products incompatible with the existing standard. But a true compatibility regime would recognise that access to the information necessary for interoperability is a pre-requisite to effective competition in the markets for interoperable software products, i.e. that there is a positive obligation on dominant firms to allow rivals access to interface information to the extent necessary to develop interoperable products. An argument in favour of qualifying the term and scope of copyright protection for software was constructed, and it is to be hoped that further discussion will follow. Ultimately, what is required is legislative intervention on an international level - yet it must be accepted that this is highly unlikely.