

Systems competition and aftermarkets: an economic analysis of Kodak.

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Antitrust analysis cannot simply assume that anticompetitive behavior is absent in aftermarkets for goods and services when the primary market is considered competitive. The US Supreme Court's analysis in *Eastman Kodak Co. v. Image Technical Services* addressed the potential for Kodak to control the aftermarket by restricting access to replacement parts for its photocopier equipment. The Court distinguished the competitive primary market from the aftermarket and considered the anticompetitive potential of aftermarkets with significant switching costs and imperfect information.

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I. Introduction

The Supreme Court's recent (1992) Kodak decision⁽¹⁾ has put the spotlight on important economic as well as legal issues. The economic issues relate to the relationship between what the Supreme Court calls "equipment markets," and "aftermarkets." In Kodak, the equipment markets were for photocopiers and micrographic equipment, and the aftermarkets involved the parts and service needed to keep these machines in good running condition.⁽²⁾ The Kodak decision has raised many questions, among both economists and lawyers, regarding aftermarkets, and especially about the circumstances under which behavior by equipment manufacturers can have anticompetitive effects in aftermarkets. The Court's ruling in Kodak also has focused attention on the role of economic theory and economic analysis in antitrust cases. We view Kodak as the Court's most recent foray into the law and economics of systems, i.e., groupings of products that work together. Kodak's "copier system" includes a Kodak copier, spare parts that fit that copier, and service for that copier.⁽³⁾ In Kodak the Court rejected the notion that competition between rival systems (interbrand competition) inevitably precludes any finding of monopoly power in derivative aftermarkets. The Court also provided guidance as to some of the factors that might enable market power to be exercised in aftermarkets, although the factors discussed by the Court by no means represent a comprehensive or particularly lucid treatment of the economics of aftermarkets. Nevertheless, the Court has raised important issues, issues that have been explored in the economics literature under the rubrics of lock-in and switching costs.⁽⁴⁾

Since the Kodak decision makes it very clear that plaintiffs are entitled to a full opportunity to conduct discovery necessary to withstand defendants' summary judgment motions, lower courts and antitrust practitioners can expect future antitrust cases involving aftermarkets to involve more discovery and more analysis than has hitherto been the case. In this article we sketch out the key economic questions and analytical steps that will arise in Kodak-style cases. Specifically, we discuss: (1) the economic concept

of an aftermarket; (2) how to assess market power in aftermarkets; (3) tying claims involving aftermarket products and services; (4) the role of intellectual property rights in aftermarkets; and (5) class certification and damages in Kodak-style cases.

We devote much of our article to assessing market power in aftermarkets. Based on the analytical steps we have identified, we suspect that market power in aftermarkets usually goes hand-in-hand with market power in equipment markets. But we recognize that this is ultimately an empirical matter that will be highly fact-dependent. Our goal is to lay out the questions an economist must explore to determine whether a firm facing equipment competition nonetheless has genuine market power in an aftermarket. For this to happen requires the confluence of several circumstances. We predict, therefore, that plaintiffs' economic arguments will prove weak in most Kodak-style cases where market power is absent in the original equipment market.

II. Background

In Kodak, independent service organizations (ISOs) brought an antitrust action against Kodak to recover for policies Kodak introduced that limited the availability to ISOs of replacement parts for copying and micrographic equipment manufactured and sold by Kodak. The ISOs alleged that Kodak had unlawfully tied the sale of service for its machines to the sale of parts, in violation of section 1 of the Sherman Act, and had unlawfully monopolized and attempted to monopolize the sale of service and parts in violation of section 2 of the Sherman Act. The district court granted summary judgment.

The Court of Appeals for the Ninth Circuit reversed and remanded, and certiorari was granted. The Supreme Court found that the ISOs had presented sufficient evidence to raise genuine issues concerning Kodak's market power in the service and parts markets, and rejected Kodak's contention that lack of market power in service and parts must be assumed when such power is absent in the equipment market. The ISOs successfully argued that aftermarkets might not be competitive, despite the presence of equipment (or interbrand) competition,

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because significant information and switching costs could confound competition in the aftermarket. Customer lock-in, high information costs, and price discrimination against locked-in customers could plausibly enable a manufacturer to elevate service prices above competitive levels. Proper market definition and the measurement of market power could not, the Supreme Court reasoned, be determined as a matter of law, but required factual inquiry.

In this article, we argue that, as a matter of economic logic, one cannot positively infer the absence of market power in aftermarkets from competitive equipment markets. The Supreme Court was therefore on firm theoretical ground in denying summary judgment, even given the high thresholds of Matsushita,⁽⁵⁾ if indeed the limited factual record presented to the Court did not render the plaintiffs' claim inherently implausible or illogical.⁽⁶⁾ Quoting the court of appeals approvingly, the Supreme Court concluded that the plaintiffs' claims cannot be rejected a priori because "market imperfections can keep economic theories about how consumers will react from mirroring reality."⁽⁷⁾

The Kodak decision has triggered a vigorous debate among economists about the costs and benefits of denying summary judgment to firms that face strong competition in "primary" markets.⁽⁸⁾ Even though such firms may have some transitory market power in their own proprietary aftermarkets, the costs of identifying and limiting that power may be substantial, and the benefits will be low if such market power is rare or typically short lived. This debate is likely to continue--economists never tire of comparing costs and benefits--but it is largely academic at this point. The key practical question now is how to assess market power in aftermarkets and how to analyze the effects of firms' aftermarket policies on competition. That is the primary focus of this article.

III. The concept of an aftermarket

Kodak may be the first occasion in which the Supreme Court has explicitly used the term "aftermarket." While not explicitly defined, the Court seems to have in mind the sale of parts and service, transactions that often take place at a point in time after the purchase of equipment. We define an "aftermarket transaction" to be any transaction with two characteristics: (1) the aftermarket product or service is used together with a primary product, and (2) the aftermarket product or service is purchased after the primary product.

Aftermarkets are not restricted to the equipment-parts-service pattern present in Kodak. The primary product may be a computer operating system such as Microsoft's MS-DOS or Windows, with aftermarkets

consisting of applications software (e.g., word processing, spreadsheet, and database software) designed to run on that operating system. Or the primary product may be a brand of word processing software such as WordPerfect, with aftermarkets for upgrades or enhancements to WordPerfect. Following the Court, however, we will refer to the primary market as the "equipment" market and the aftermarket products as "parts" and "service."⁽⁹⁾

The industrial market structures for the primary product and its aftermarkets can follow several patterns. Certainly, equipment and service markets can both be competitive (telephones, fax machines); or both can be monopolized, either by the same firm or by separate firms. It is also possible for the primary market to be competitive and the aftermarket monopolized: if a single firm were to develop a proprietary technology to service refrigerators in compliance with new environmental restrictions, that firm could conceivably monopolize the refrigerator service business, even if sales of refrigerators is competitive. The fourth logical possibility, a monopolized equipment market and a competitive aftermarket, arises if an equipment manufacturer has monopoly power and many firms service its equipment.

Aftermarkets need not be brand-specific, i.e., proprietary, as they were in Kodak. For standardized parts, one cannot talk of markets for Kodak parts, for Xerox parts, etc., but rather of markets for parts that fit all brands of machines. Likewise, if service skills are transferable from one brand of machine to another, there cannot be brand-specific service aftermarkets. Of course, market power by equipment manufacturers in aftermarkets is more likely to arise if aftermarkets are proprietary. The remainder of our discussion is restricted to proprietary aftermarkets.

Some important insights into aftermarkets can be gleaned from the recognition that the parts and service are complements to equipment in the economic sense: lowering the price of equipment raises the demand for parts and service, and vice versa. As a general rule, there are economic benefits from coordinating the sale of complementary goods, very possibly within the same firm.⁽¹⁰⁾ The basic economics of complementary goods tells us that an equipment vendor should welcome the emergence of high-quality, low-cost repair services for its machines, as this will make the machines more attractive, just as a lower price of gasoline stimulates the demand for automobiles and the availability of cheap compact disks stimulates the demand for CD players.

The temporal relationship between equipment markets and their associated aftermarkets goes beyond mere complementarity, however. Customers rarely arrange for all of their parts and service needs when they purchase a

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machine, and years can go by between a buyer's original-equipment purchase and aftermarket transactions by that same buyer. Most important for our purposes, a customer who owns one brand of machine may face high switching costs in adopting another brand, e.g., because the buyer has made investments in brand-specific skills or complementary assets.

With high switching costs, the number of users at any point in time who are using a particular brand of equipment, i.e., the installed base of equipment of that brand, is significant.⁽¹¹⁾ However, the mere fact that some consumers face high switching costs does not in and of itself imply that a firm with a large market share in an aftermarket has genuine market power.

IV. Assessing market power in aftermarkets

The Supreme Court attempted to identify circumstances where market power is possible in aftermarkets even though the equipment market is competitive. That is our focus as well; the analysis below is confined to aftermarkets associated with competitive equipment markets.

In principle, assessing market power in aftermarkets is no different from assessing market power in any other context.⁽¹²⁾ We ask whether a single entity controlling the aftermarket could profitably raise price above competitive levels.⁽¹³⁾ This question can be posed as a market-definition question--Is the aftermarket a proper antitrust market?--or as a market-power question--Does a manufacturer have market power in its proprietary aftermarkets?⁽¹⁴⁾

The new twist in looking at an aftermarket is its close connection to the equipment market that spawned it. Specifically, a manufacturer that attempts to exploit its position in aftermarkets may suffer adverse consequences in equipment markets. This implies that one cannot properly analyze aftermarkets in isolation. An aftermarket can exist as a distinct relevant antitrust market only if such ex post exploitation is profitable for a manufacturer controlling its own aftermarket. A primary reason such exploitation may not be profitable is that a manufacturer engaging in opportunism faces the risk of alienating its customers and damaging its reputation and credibility. More specifically, current aftermarket prices have a direct impact on current and future equipment sales.⁽¹⁵⁾

The Court identified switching costs and information costs as important factors in aftermarkets for complex equipment.⁽¹⁶⁾ Large switching costs make existing equipment owners more vulnerable to price increases for parts and service, and high information costs can

attenuate the link between today's aftermarket and tomorrow's new equipment sales if customers are poorly informed.

A. Switching costs

The first economic question in looking at an aftermarket is to determine whether there exists a significant group of customers who purchase in the aftermarket and face high costs of switching to other brands of equipment and thus are potentially vulnerable. If consumers' brand-switching costs are uniformly low, there can be no monopoly power in aftermarkets.

How are brand-switching costs measured? A consumer's brand-switching cost is the extra cost that would be incurred by that consumer in replacing its current equipment with equipment made by another manufacturer. These costs could include the cost of training personnel to use the new equipment, the cost of rewriting computer programming to work on a new brand of machine or a new operating system, etc.

Customers with high brand-switching costs face a genuine obstacle to selecting a new brand of equipment. As a general proposition, the maximum dollar amount by which a "locked-in" customer can be "exploited" in a proprietary aftermarket for parts and service, i.e., the maximum premium such a customer would pay over prevailing systems prices, in present-value, is exactly equal to that customer's brand-switching cost.⁽¹⁷⁾

One should not think of customer lock-in as an absolute concept; even an equipment vendor with 100% of its aftermarket cannot set aftermarket prices with impunity. Since customers differ in their switching costs, and since customers can choose how carefully to maintain their machines and when to replace them, an equipment manufacturer, even one whose customers face switching costs, will sell fewer parts and less service, the higher price is charged for parts and service. Any attempt to charge a premium for aftermarket service will induce those customers with low switching costs to replace their equipment.⁽¹⁸⁾

Customers most likely to switch brands in response to super-competitive aftermarket prices are those who have made the least brand-specific investments such as training, computer programming, etc.; those who already use multiple brands and can simply shift their mix of equipment; and those with older equipment in need of replacement in any event. Other things equal, brand-switching costs are lower in markets with rapid technological progress. If rival equipment has superior performance to installed machines, these performance

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advantages must be offset against any costs of switching. Effectively, there is a "switching benefit" in the form of the superior equipment.

A given customer's switching costs will typically change over time. As already noted, a customer with a machine in need of replacement may have low switching costs. However, in some cases brand-specific investments will last longer than a single machine, as when buyers write software to a brand-specific standard that is carried from one generation of hardware to another.

If the bulk of a firm's customers face low brand-switching costs, aftermarket power will be minimal. More generally, one must look to see if there is any significant group of customers who have high switching costs and can be discriminated against. If no such group exists, the inquiry into aftermarket power ends.

Switching costs certainly can be significant, both for low- and high-technology products. With large switching costs, the possibility of aftermarket power exists. Yet for this very reason, customers often protect themselves from exposure to ex post exploitation, and these protections can nullify aftermarket power.

B. Contractual protections for locked-in buyers

Buyers choosing a system can directly protect themselves from any ex post exploitation by obtaining contractual protections at the time they purchase equipment. These protections can take the form of extended warranty coverage, long-term service contracts, guaranteed multiple-sourcing of parts or service, or price-protection clauses for parts and service. Some protection, but less, is offered by a long-term service contract in which the manufacturer promises to charge the "generally prevailing" price for service and parts. In this case, the manufacturer is contractually prevented from discriminating against locked-in customers on service and parts prices.⁽¹⁹⁾

When customers purchase parts and service along with their equipment, they are shifting transactions from the aftermarket, where they might otherwise be in a poor bargaining position, to the primary systems market. If customers sign long-term service contracts when they purchase equipment, or if they lease equipment rather than buy it, market power in aftermarkets will be sharply limited for the simple reason that few parts and service are actually sold in the aftermarket.⁽²⁰⁾ However, a long-term contract can actually reduce the protection enjoyed by buyers, unless such a contract protects the buyer on all significant dimensions.⁽²¹⁾ In any event, buyers rarely contract for all of their aftermarket requirements when they purchase equipment.

C. Information costs and life-cycle costing

If brand-switching costs are significant and customers are not directly protected by long-term contracts, the primary reason for a manufacturer controlling its proprietary aftermarkets not to engage in installed-base opportunism is the prospect that such behavior will lead to a loss of future equipment sales. Evaluating the strength of the linkage between a firm's aftermarket terms and conditions and its future equipment sales requires an understanding of the factors that buyers consider in choosing a brand of equipment. Specifically, a key question is whether or not buyers engage in an integrated assessment of the life-cycle costs of rival brands of equipment.

Life-cycle costing requires some delineation. We define life-cycle costing as decision making in which buyers of durable goods take into account not only the original purchase price of the equipment, but also expected maintenance costs including supplies, parts, and service.⁽²²⁾ It is well known that many buyers routinely engage in such calculus, albeit with varying degrees of sophistication. Buyers of automobiles consider fuel costs, service costs, and parts costs, although their information about parts and service costs may be poor. Volume buyers in particular--such as fleet operators (e.g., rental cars, taxis)--have explicit and highly refined estimates of expected costs. Even households buying white goods take operating, service, and repair costs into account. As a consequence, producers will often make these features an explicit part of their marketing strategy (e.g., Japanese auto companies stress fuel economy; Maytag often stresses the minimal repairs owners of their product can expect). The accuracy of such information obviously varies from circumstance to circumstance, and is greater for large buyers and for big-ticket items where information costs are small relative to overall expenditures, but it is a safe generalization that in mature, established, durable-goods industries such information is readily available from equipment producers and distributors, third parties, and buyers themselves.

The Court was skeptical of the linkages between today's parts and service markets and tomorrow's equipment sales, stating that "life-cycle pricing of complex, durable equipment is difficult and costly." As an empirical matter, we do not agree. To the contrary, at least in mature markets, and often in emerging ones as well, implicit and often explicit life-cycle cost comparisons are frequently made.⁽²³⁾ Indeed, we are familiar with cases in which buyers use computer models to compare the life-cycle costs of different machines. And surely in many markets sales typically occur to repeat customers who have excellent information about and experience with the life-cycle costs of equipment. There are strong economic

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forces helping buyers to become well informed: buyers have much to save by avoiding brands with expensive aftermarket costs, and an equipment vendor with inexpensive parts and service has very strong incentives to communicate its competitive advantage to customers. Information costs are lowered when customers buy multiple machines; when consultants and other third parties help buyers compare equipment brands; when vendors provide information to customers comparing the cost of different machines; and when buyers have life-cycle experience with similar equipment. In some cases, banks or other financing entities even require an analysis of life-cycle costs before issuing a loan for the equipment, or government entities may be required to use life-cycle costing. For all of these reasons, we expect in most cases involving expensive equipment or sophisticated customers that a detailed analysis will reveal customers to be employing life-cycle costing.

Even if customers are not capable of evaluating life-cycle costs, competition in the equipment market may still protect them. Suppose that buyers naively pick the machine with the cheapest equipment price. Ignoring reputation effects in other product lines, all manufacturers will charge monopolistic parts and service prices (assuming they can control their proprietary aftermarkets). Anticipating these monopoly margins in the aftermarket, manufacturers will discount equipment to generate those aftermarket margins. This is, of course, the classic strategy of giving away the razor to sell blades at big markups, or of selling the video game hardware at or below cost in order to sell video game cartridges at large markups. So long as sellers anticipate aftermarket revenues and costs, consumers will ultimately pay a competitive price for systems, even if they are not sophisticated or well informed.

To summarize, aftermarket power is most likely to be significant if switching costs are high and long lived, if customers lack the protection of long-term contracts, and if information costs prevent most customers from engaging in life-cycle costing. Based on our experience in business strategy and antitrust, we suspect that this confluence of circumstances is relatively rare; detailed factual inquiry in post-Kodak cases will reveal whether we are correct in this assessment.

D. The economics of installed-base opportunism

We now turn to the fact pattern that we believe is common: customers have genuine switching costs, and are well informed, but do not actually sign long-term service contracts when buying equipment. Suppose, for example, buyers choose equipment based on estimates of aftermarket costs provided by sellers or based on historical

experience. This circumstance is common for sophisticated, expensive machinery purchased by businesses. In this case, an equipment manufacturer controlling its own proprietary aftermarkets may have the ability to engage in ex post exploitation of its installed base, by unexpectedly raising its parts or service prices or by degrading quality.

The key practical economic problem in this situation is to measure the cost to the manufacturer of engaging in such installed-base opportunism. How are such costs properly measured?

1. ANTITRUST OR CONTRACT CASE? Before answering this question, we pause to make an important related point that we believe has received insufficient attention in the discussion following Kodak. Specifically, there should be little or no concern about policy changes that are announced in advance of equipment sales and anticipated by buyers. Suppose an equipment vendor in a competitive market announces to its prospective customers: We retain exclusive rights to service our equipment, and we will charge you dearly for parts and service, according to the attached pricing schedule. Well-informed customers will pay no more than the competitive price for this vendor's system, so long as competition exists in the primary equipment market. Likewise, a policy restricting the sale of parts to ISOs prospectively for new machines does not constitute installed-base opportunism.⁽²⁴⁾ In our view, the discussion of market power in aftermarkets is properly restricted to policy changes that are imposed unexpectedly on a captive installed base.⁽²⁵⁾

The majority opinion does not appear to make much of the fact that Kodak's policies were largely, or entirely, imposed prospectively. However, it appears clear to us that any harm to end users that might have been caused by Kodak's policy must flow from the policy change being a "surprise." To the extent that buyers made product-specific investments around their equipment purchases, then a change in behavior by Kodak might indeed enable Kodak to extract rents from its customers' non-redeployable assets.⁽²⁶⁾

As we discuss immediately below, such behavior could be extremely short-sighted as the customer might well switch in the future, even though switching at present is too costly. Such behavior might better be viewed as a contractual violation. If Kodak's customers had a constructive contract with Kodak, then opportunistic behavior by Kodak could well represent a breach. For this reason, many economists regard Kodak as an attempt by the Court to apply antitrust law to a problem that would better be served by

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contract law, either by encouraging buyers to obtain additional contractual protections before making specific investments, or by holding sellers accountable for representations they make about aftermarket terms and conditions when selling their equipment.

2. IS EX POST EXPLOITATION PROFITABLE? By definition, customers with high switching costs are potentially vulnerable to some ex post exploitation, or opportunism, on the part of the equipment manufacturer.⁽²⁷⁾ A key economic issue in many cases will be to ascertain whether the equipment manufacturer controlling aftermarkets can profitably engage in installed-base opportunism, e.g., by raising parts or service prices above competitive levels. Ultimately, this comes down to a comparison of any extra profits earned on the locked-in buyers with any profits lost in selling to new customers.

Measuring incremental profits on locked-in customers from higher parts or service prices is a relatively straightforward pricing question. It hinges on the elasticity of demand for parts and service and the markups for parts and service. We must point out, however, that the mere presence of switching costs does not imply that the manufacturer has an incentive to raise parts or service prices. To the contrary: if parts and service prices are at their "monopoly" levels, i.e., the profit-maximizing levels facing locked-in customers, as part of the overall systems pricing, further increases in parts and service prices will lower, not raise, the manufacturer's profits.

Measuring the profits lost on new equipment sales by a firm engaging in installed-based opportunism is empirically a much more difficult matter. In principle, the calculation is straightforward: how many new system sales are lost, and what is the life-cycle profit margin on those systems? In practice, this is not an easy matter, since the answers to these questions are not tied tightly to historical data. Nonetheless, we can sketch out the major analytical steps here.

First, ex post exploitation is not a trick that the manufacturer can play over and over, unless customers are extraordinarily inept. Thus, the proper comparison is between the one-time extra profits gained from opportunistic behavior and the present value of the stream of profits earned indefinitely from refraining from opportunism. This is a general principle in the economics of reputation, as developed by Carl Shapiro.⁽²⁸⁾

Second, we agree with other commentators that the penalty for opportunistic behavior is smaller, ceteris paribus, the less equipment the firm expects to sell in the future. In the extreme case where no new equipment is

being sold, these costs could be zero. Thus, a firm is more likely, ceteris paribus, to have the incentive to engage in opportunistic behavior if that firm is exiting the market; if that firm anticipates a relatively small share of new equipment sales relative to its share of the installed base of equipment; or if that firm is selling in a sharply declining market. The ratio of expected future sales to the size of the installed base is thus an important economic variable in this analysis.

Third, the profits lost through opportunistic behavior depend upon the life-cycle margin on sales of new systems, not merely on the equipment margins, and not merely on the unit sales of equipment.

Fourth, we must stress that there is nothing confining the firm's damaged reputation and lost equipment sales to a single relevant antitrust market. A firm engaging in installed-base opportunism may well lose sales in other markets, if buyers participate in several equipment markets, or if information about the firm's behavior leaks out to buyers in other markets.

Fifth, it may be very difficult for a manufacturer to overcome a reputation for taking advantage of its locked-in customers. Some commentators have suggested that the manufacturer can neutralize a reputation for ex post exploitation by pricing its equipment below cost. This is likely to be very expensive, simply because of the distortions caused by the peculiar combination of pricing one component of the system (equipment) below cost and other components (parts and service) at monopoly levels.⁽²⁹⁾ Furthermore, a firm that has violated the trust of its customers by raising aftermarket prices will probably be suspected of engaging in other tactics, such as withdrawing support for aging models of equipment.

To summarize, the fly-by-night strategy of exploiting loyal customers is more likely to be attractive (a) in a declining market, so future sales are less important relative to the size of the installed base; (b) for a firm that is having trouble competing in the market, so it discounts the importance of future sales; (c) for products that are marginally profitable or unprofitable on a life-cycle basis, so that future sales are not likely to generate significant profits, even when viewed on a life-cycle basis; (d) for a firm with few other products whose goodwill will be hurt; or (e) for a firm in financial distress, or one with a very high cost of capital, which places unusual weight on current profits relative to future profits.

E. Competition in aftermarkets

Even customers for whom it is expensive to switch brands of equipment may have options that will limit the market

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power of the equipment manufacturer. In other words, even if proprietary aftermarkets are relevant antitrust markets, it does not automatically follow that the equipment manufacturer has market power in those markets.

Alternative sources of supply may exist, even for brand-specific parts. Several sources of parts are possible: (a) third-party manufacturers of parts may offer actual or potential competition; (b) parts may be salvaged from used machines or from equipment that has already been junked (indeed, there may be an active salvage market); (c) there may exist a gray market, whereby parts are transshipped from other parts of the world; or (d) parts from other equipment manufacturers may be substitutable at little or no cost. Clearly, any of these factors may sharply limit the ability of a parts provider to exercise monopoly profits. In addition, arbitrage may prevent the manufacturer from selling parts to end users but not to ISOs: some end users may purchase extra parts and sell them "on the street."

Likewise, the equipment manufacturer may face competition in the service aftermarket. Of course, this is precisely the competition ISOs hope to offer. In some cases, the barriers to entry into such service may be low, especially if service skills are general, and not machine- or brand-specific. On the other hand, there may be quite insurmountable barriers to entry, as when copyrighted service manuals or access to copyrighted software is required to perform service.

V. Tying claims in aftermarkets

Suppose now that a manufacturer does indeed have market power in a proprietary aftermarket. In this case, antitrust law treats the tying of service to parts rather harshly, even though economic analysis shows that the economic effects of tying are ambiguous.⁽³⁰⁾ It is well to keep in mind that a firm with a monopoly in parts can simply price the parts noncompetitively and then sell them to ISOs. Indeed, if ISOs provide superior service or have lower costs than the original equipment manufacturer, this strategy will typically be more profitable than the tie. It usually will not be rational for a manufacturer to attempt to provide service itself if the ISOs can do it better or more cheaply. The Supreme Court did not seem particularly adept at analyzing this issue, yet it remains an important one in the economic theory of tying.

In addition, of course, there are business justifications for tying. These include control of free riding, quality control, inventory management, distribution economies, and so forth. We suspect that when Kodak-type cases go to trial, such factors will often turn out to be very important.

We question, however, whether the central economic issues in post-Kodak cases will revolve around tying claims. We understand that other companies have used policies that would be hard to describe as a tie. For example, Xerox sells its repair parts to end users, who are free to use ISOs to service their machines with these parts, but does not knowingly sell parts to ISOs (except in their role as end users). Unless the courts take a very broad definition of what constitutes a tie, a refusal to deal is simply not the same as a tie, whether or not the manufacturer has market power.

VI. Intellectual property rights in aftermarkets

Consider now an aspect of aftermarkets not mentioned by the Supreme Court in Kodak. In the copier industry, as well as for many other durable products, aftermarket products and services have embedded within them intellectual property of some significance. It is common for manufacturers of machines to obtain patents on those machines, and these patents typically extend to the specific replacement parts and subassemblies in those machines. In addition, the installation of the parts often will involve propriety techniques, techniques that may be protected by trade secrets and/or copyrights. Copyrighted service manuals may be indispensable to service technicians. In addition, as more and more machines contain sophisticated electronics, repair services will increasingly involve the use of diagnostic software embedded in the machine. This software too is likely to have copyright or patent protection.

Viewing the Kodak case in this light, we see that imposing a duty on a manufacturer to sell its parts to ISOs, or to let ISOs use its copyrighted diagnostic software, is likely to diminish the value of the manufacturer's intellectual property. If parts must be sold, at what price? If the courts require sale of parts on "reasonable terms," the manufacturer's right to do as it pleases with its intellectual property has been undermined. Likewise, if the manufacturer is required to let independent service technicians use the diagnostic software built into the machine, will the licensing terms for the use of that software be regulated by the courts? The courts may find themselves enmeshed in the well-known dangers of compulsory licensing.

Ultimately, imposing a duty to deal on manufacturers who possess intellectual property can only diminish the returns to innovation and work at odds with the patent and copyright systems. As one of us has argued elsewhere, the legitimate exercise of the monopoly right afforded by intellectual property ought to be presumed efficiency enhancing.⁽³¹⁾ We expect that defendants like Kodak will be able to demonstrate substantial investment in their

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systems. Likewise, it should not be difficult to demonstrate that innovation has been the most important form of competition, in terms of customer benefits, in many equipment markets. Together, these demonstrations should alert judges and juries to the very real dangers to competition of undermining the intellectual property rights awarded to successful innovators.

VII. Damages and class certification

The special relationship between equipment markets and proprietary aftermarkets discussed above has some strong and important implications for damages in Kodak-style cases.

A. Damages with competitive equipment markets

Suppose that it has been determined that a manufacturer indeed has market power in its aftermarkets, despite a competitive primary equipment market, and that the manufacturer has monopolized its service aftermarket, e.g., by refusing to sell parts to ISOs. Who is injured and by how much?

If the policies were implemented prospectively, as was true in Kodak at least for micrographics equipment, it is hard to see how end users can claim any damages from service overcharges. As argued above, equipment competition forces a manufacturer with supercompetitive aftermarket prices to discount its equipment in order to make its offerings attractive relative to other brands.⁽³²⁾ Ultimately, removing the restrictive parts policies would shift the manufacturer's revenues to the equipment side of its business from the service side, but would have no significant effect on buyers' total cost of ownership. Hence there would be little or no damages to end users. This conclusion follows inevitably from interbrand competition.

If the policies were implemented retrospectively, the argument just given would still apply to all customers buying equipment after the policies were implemented. Only customers who already owned machines when the policy was changed would have a claim for service overcharges. Even their claims will be substantially tempered by considerations of competitive response given below. In particular, there is every reason to believe that the manufacturer would charge end users (and ISOs) more for parts if it were forced to make parts available to ISOs.⁽³³⁾ An economically accurate assessment of end-user damage claims should include upward adjustments in parts prices as an offset to any reductions in the price of service.

Finally, there is the question of which end users could legitimately make service overcharge claims. There is no

reason to believe that the manufacturer would lower its service prices across the board, even facing additional ISO competition. ISOs may have only a limited ability to expand, even in the absence of any restrictive parts policies, because of a shortage of qualified personnel, limited access to copyrighted service manuals, etc. Certain customers may strongly prefer brand-name service, or even be required to obtain brand-name service. And ISOs may not be qualified to service certain machines, such as new-model machines for which they have not received training, or for which they lack access to copyrighted diagnostic software.

For all of these reasons, broad classes of end users in post-Kodak cases will face significant obstacles to certification.

ISOs' claims of lost profits also will face significant hurdles. If the but-for world involves ISOs freely buying parts from the manufacturer, the damage analysis must recognize that the manufacturer has a strong incentive to raise the price of those parts. The analysis must also consider the other obstacles ISOs would have faced, such as limited access to diagnostic software or training, and any legitimate competitive responses of the manufacturer to any additional actual or potential competition by ISOs.

B. Competitive response

A manufacturer seeking to retain the business of servicing its own machines has many alternatives to a parts policy of the type used by Kodak. A proper damages analysis should account for a reasonable competitive response in the absence of the challenged parts policies.

Whether one adopts an economics or a business-strategy perspective, it is apparent that there are a host of alternative strategies available to manufacturers, many of which may be quite effective in certain markets. We list a few here.

1. A manufacturer could extend the length of its warranty coverage,

raising the price of its equipment to maintain competitive parity

in the primary equipment market. A longer warranty period

would reduce the amount of service business available to ISOs.

In the limit, the manufacturer could include lifetime service and

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parts with its machine.(34)

2. A manufacturer could shift from selling machines to leasing or

renting machines. Parts and service could either be included with

the lease, or brand-name service and parts could be required for

leasing customers in order to assure that the manufacturer's

machine is well maintained. This shift from selling to leasing

could be accomplished by raising the price at which machines

are sold but not changing the terms on which machines are

leased.

3. A manufacturer could simply raise the price of parts, whether

sold to ISOs, end users, or anyone. No change need be implemented

for service contracts. So long as the incremental price of

service (comparing a service contract including parts with the

price of parts alone) is at least as large as the cost of providing

that service, so there could be no legitimate claim of predatory

pricing of service.

4. A manufacturer could act to retain its service employees who are

the source of technical expertise for ISOs. These responses

include higher salaries for service technicians, limited noncompete

clauses in employment contracts, or a provision that technicians

pay the manufacturer back for their training if they leave

before a reasonable recoupment period has elapsed.

5. A manufacturer could enforce its intellectual property rights.

ISOs might well be unable to compete without infringing on the

manufacturer's intellectual property, such as the copyrighted service

manuals or diagnostic software noted above.

It appears to us that many manufacturers have quite a few entirely legitimate competitive weapons in their arsenal. For firms with secure control over their proprietary parts, therefore, we find it hard to believe that ISOs could play a major role in the servicing aftermarket, even without Kodak-style parts polices, unless their presence is welcomed by the brand-name manufacturer.(35)

VIII. Competitive strategy in a post-Kodak world

One of the recent themes in the literature on competitive strategy is that U.S. firms, to compete effectively in international markets, must understand their customers' needs and offer the quality their customers want. Successful companies are those that learned to coordinate the chain of production from customer service to R&D effectively, very possibly through vertical integration.(36)

It would be unfortunate if the Kodak decision hampered the ability of American firms to vertically integrate into service when necessary to remain close to their customers, and generally to flexibly choose their distribution strategy in competitive markets. Fortunately, we do not believe that Kodak will have any such impact. Instead, firms should, with careful antitrust advice, be able to flexibly craft their strategies in competitive markets despite Kodak. Indeed, the competitive response strategies listed above indicate the many ways in which firms can achieve their quality-control aims, their aims to remain close to customers, and their goal of recouping R&D investments with aftermarket revenues.

Further discovery in Kodak and in many other durable-goods industries will undoubtedly yield a plethora of different contractual arrangements with respect to parts and service quality. Arranged from more to less restrictive approaches, one can identify the following generic policies:

1. Full integration with a parts and service contract for the life of

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the product bundled with equipment purchase and service performed

by the manufacturer.

2. Same as (1) with service contracted out to a single independent

dealer network.

3. Parts sold to equipment owners (not to ISOs); service provision

made available but an exclusive service contract is not required

by purchaser.

4. Parts sold to both ISOs and own service network.

5. No parts or service provided; design rights to parts supplied to

all upon request; any intellectual property in parts supplied free

of charge under automatic license arrangement. While antitrust presumptions would have it that (5) is preferable to (1) from the point of view of competition, such a finding is by no means assured. If vertical integration economies are important, the competitive process is more confidently assisted if firms are free to choose their own organizational arrangements.(37)

IX. Significance of the decision

Kodak is obviously an important case. Some have argued that it is the most important antitrust case of the decade; in particular, some suggest that it indicates that antitrust analysis has moved into a new "post-Chicago" era and that Kodak represents some kind of a legal climacteric.

We shall not attempt to assess the legal significance of the decision, as this article is primarily economic in its orientation. However, in essence it appears that the Supreme Court has merely reaffirmed the basic standards for summary judgment in antitrust cases--the plaintiff's theory must be inconsistent with rational behavior by the defendant on the stipulated facts. The Court has reaffirmed that findings requiring factual determination cannot be opined simply as a matter of law.

But is the economics advanced here all that new? The Court explicitly addressed such concepts as information costs, switching costs, and lock-in. Steven Salop for one

has stated that this indicates a new "post-Chicago" era for antitrust analysis.(38) However, many economists at Chicago would no doubt be surprised to learn that information costs, switching costs, etc., are alien ideas to Chicagoans. Indeed, the late George Stigler of Chicago is favorably cited, as he ought to be, for his insights into the role of consumer information on market outcomes. Indeed, one of the key articles cited by the Nobel Prize Committee in awarding the prize to Stigler was his study of consumer information costs.(39)

The Court was simply not willing to simply assume well-informed buyers, or the absence of switching costs.(40) The Court correctly identified these as matters for a trier of fact to ascertain. However, it does not seem that this is a break with prior law, and it is certainly not a break with contemporary economic analysis.(41) True, some members of the Chicago school were frequently guilty of adopting the fiction of frictionless markets; but the founders of the school, such as Stigler, are not at all culpable. Accordingly, if Kodak is post-Chicago, it is also pre-Chicago and Chicago.

AUTHORS' NOTE: We thank Severin Borenstein, Joseph Farrell, Richard Gilbert, Thomas Jorde, Michael Katz, and Paul Klemperer for Stimulating discussions on the issues addressed in this article. Shapiro also thanks the National Science Foundation for financial support. Teece thanks the Alfred P. Sloan Foundation. (1) Eastman Kodak Company v. Image Technical Services, Inc. et al., 112 S. Ct. 2072 (1992). (2) As we discuss below, the concept of aftermarkets is not restricted to the sale of equipment, parts and service as in Kodak. (3) For a more complete discussion of systems competition, see Michael Katz & Carl Shapiro, Systems Competition and Network Effects, 8 J. Econ. Persp. (forthcoming Spring 1994). (4) See, for example, the theories developed by Joseph Farrell & Carl Shapiro, Optimal Contracts with Lock-in, 79 Am. Econ. Rev. 51 (1989) [hereinafter Optimal Contracts]; Dynamic Competition With Switching Costs, 19 Rand J. Econ. 123 (1988); and Alan Beggs & Paul Klemperer, Multi-Period Competition With Switching Costs, 60 Econometrica 60 (1992). See also the general discussion of lock-in and opportunism in Oliver Williamson, The Economic Institutions of Capitalism (1985). For an empirical assessment of switching costs and the organizational implications that flow from them, see Kirk Monteverde & David J. Teece, Supplier Switching Cost and Vertical Integration in the U.S. Automobile Industry, 13 Bell J. Econ. 206 (1982). (5) Matsushita Electric Industrial Co. v. Zenith Radio Corp., 475 U.S. 574 (1986). (6) We are far from fully informed about the factual record in Kodak on at least two important issues. In particular, Kodak's attorneys clearly feel that the record included evidence that Kodak's customers were sophisticated and well informed, and

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evidence that Kodak's policies were imposed only prospectively on new customers, not retroactively on old customers. See Daniel M. Wall, *Kodak: A Personal Perspective*, *Antitrust*, Fall/Winter 1992, at 5. (7) 112 S. Ct. 2078, quoting 903 F.2d 617. (8) Public-policy analysis of the Kodak decision involves trading off extra litigation and compliance costs (including any chilling of procompetitive behavior) vs. the deterrence of anticompetitive behavior. We suspect that the costs imposed by the Kodak decision will ultimately outweigh the benefits; time will tell. See Severin Borenstein, Jeffrey Mackie-Mason, and Janet Netz, *Exercising Market Power in Proprietary Aftermarkets* (Oct. 1992) (unpublished manuscript) for a contrary view. (9) The primary market may in fact be for the entire system of equipment, parts, and service, but we shall refer to the "equipment" market for ease of exposition. (10) There is a large economics literature exploring the benefits of coordinating the sale of complementary goods, including the literature on vertical integration, the so-called double marginalization problem, and the literature on vertical contracting. See, for example, David J. Teece, *Toward an Economic Theory of the Multiproduct Firm*, 3 *J. Econ. Behavior Organization* 39 and D. Teece et al., *Understanding Corporate Coherence: Theory & Evidence*, *J. Econ. Behavior & Organization* (1993). (11) For economic analyses of competition with installed bases, see Michael Katz & Carl Shapiro, *Technology Adoption in the Presence of Network Externalities*, 94 *J. Pol. Econ.* 822 (1986), and *Product Introduction With Network Externalities*, 40 *J. Indus. Econ.* 55 (1992); and Joseph Farrell & Garth Saloner, *Installed Base and Compatibility: Innovation, Product Preannouncements, and Predation*, 76 *Am. Econ. Rev.* 940 (1986); and Raymond Hartman & David Teece, *Product Emulation Strategies in the Presence of Reputation Effects and Network Externalities: Some Evidence from the Microcomputer Industry*, 1 *Econ. Innovation & New Technology* 157 (1990). (12) In *Kodak*, the Court defined market power as the power to force a purchaser to do something that he would not do in a competitive market, and as the ability of a single seller to raise price and restrict output. 112 S. Ct. 2080-81. (13) If the equipment market is competitive, the prices prevailing based on equipment, or systems competition naturally serve as a competitive benchmark. (14) As the Court stated in *Kodak* "Whether considered in the conceptual category of 'market definition' or 'market power,' the ultimate inquiry is the same--whether competition in the equipment market will significantly restrain power in the service and parts markets." (112 S. Ct. 2072 n.15. (15) The Court noted that if consumers assess the total systems price and engage in "accurate life cycle pricing," then service market prices will affect equipment demand and a separate market for parts and/or service is unlikely. (16) 112 S. Ct. 2085. (17) See Farrell & Shapiro, *supra* note 4, *Optimal Contracts*, for a formal analysis of lock-in

and market power. (18) See *id.* for an analysis of pricing when customers differ in their switching costs. (19) This protection is incomplete since the manufacturer might raise all parts and/or service prices and offer discounts on new equipment to attract new customers, or the manufacturer might raise the price of parts or service on models of machines no longer being sold new. (20) Here, "long-term" should include any warranty period and should be evaluated in comparison with the life of the equipment. If a piece of equipment is usually kept for 7 years, and the buyer purchases a 5-year service contract beginning after the 1-year warranty period expires, we would certainly consider the service contract "long-term." The key point is that any lock-in remaining in the seventh year will be small, since the equipment is about to be replaced, unless the buyer has made significant brand-specific investments that are transferable only to replacement equipment made by the same manufacturer. (21) This is the "Principle of Negative Protection" developed in Farrell Shapiro, *supra* note 4, *Optimal Contracts*. (22) In its purest form, life-cycle costing boils down to a single output-oriented measure: for copiers, this measure would be the cost per copy over the lifetime of the equipment, including equipment, parts, service, suppliers, and the cost of operator time. For a medical device, the measure might be the cost per patient-treatment, again taken over the lifetime of the equipment and including all costs. (23) One of the ironies of the *Kodak* case is that the markets *Kodak* competes in involve expensive equipment and what appear to be sophisticated, well-informed customers, precisely the conditions under which the Court agreed aftermarket market power is likely to be sharply limited. (24) It could be argued that ISOs might have difficulty surviving if they could only service older-model machines, due to a restrictive parts policy for newer models, and the decline in ISOs might ultimately lead to higher service prices on older machines, even if parts for those machines were readily available. While possibly true in some cases, we believe that equipment manufacturers must be given some flexibility to adjust their aftermarket policies to compete in the primary market. Otherwise, inefficient aftermarket policies may be perpetuated (hardly a desirable goal of antitrust law) and firms may refuse ever to sell parts to ISOs for fear of having to do so forever once they start (again, this lack of flexibility would ultimately injure customers, contrary to the goals of antitrust law). If antitrust really is to protect competition, not competitors, the possibility of some indirect injury to ISOs should not stand in the way of interbrand competition. ISOs have no more guarantee of survival than other firms in a competitive marketplace. (25) As pointed out in the minority opinion in *Kodak* (112s. Ct. 2095), "the restrictive parts policy, with respect to micrographics equipment at least, was not even alleged to be anything but prospective.

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" (26) Note that a firm controlling the supply of parts for its own machines may well be able to exploit its installed base simply by charging more for those parts. A consistent theory of installed-base opportunism based on monopolization of a service aftermarket must explain why the firm could extract more from its customers by controlling service than simply by controlling parts. If parts and service are used in fixed proportions, this will not be the case. (27) As we noted above, if switching costs are low, even the installed base will not tolerate supercompetitive service or parts pricing, and any attempt to set aftermarket prices above competitive levels would fail. (28) Carl Shapiro, Premium for High Quality Products as Rents to Reputation, 98 Q.J. Econ. 659 (1983). (29) Because of the inefficiencies (deadweight loss) associated with monopoly pricing in aftermarkets, a firm employing a strategy of charging monopolistic prices for parts and service and discounting its equipment to attract customers will be at a competitive disadvantage relative to firms that can credibly commit to competitive aftermarket prices. (30) If parts and service are used together in fixed proportions, the manufacturer controlling the supply of parts gains no extra ability to price discriminate by controlling service prices as well. And, even if tying does allow the manufacturer to price discriminate more effectively, this could well lead to an increase in output and greater consumer benefits. (31) See David J. Teece, Profiting From Technological Innovation, 6 Research Policy (1986), and Thomas Jorde & David J. Teece, Antitrust, Innovation, and Competitiveness (1992). (32) This is certainly true if customers are well informed. Even if they are not, however, as noted above, manufacturers will compete with equipment discounts, knowing that these uninformed customers can be later charged monopoly aftermarket prices. (33) The manufacturer may well be able to raise its parts prices without altering the total price it charges its service customers for parts and service. It is harder for the manufacturer to immunize self-service customers from any widespread increase in the price of parts, however. (34) As Justice Scalia pointed out in the minority opinion (112 S. Ct. 2095), this would in fact be a tie between equipment, parts, and service, but "it would be immune from per se scrutiny under the antitrust laws because the tying product would be equipment, a market in which (we assume) Kodak has no power to influence price or quantity." (35) Remember, in many cases manufacturers will welcome ISOs, so long as ISOs can efficiently offer good quality service. (36) See David J. Teece, Interorganizational Requirements of the Innovation Process, 10 Managerial & Decision Econ. 135 (1989), and David J. Teece, Technological Change and the Nature of the Firm, in Technological Change and Economic Theory (G. Dosi, et al., eds., 1988). (37) See Oliver Williamson, *supra* note 4. (38) Steven Salop, Exclusionary Vertical Restraints Law--Has Economics Mattered?, 83 Am. Econ. Rev. 168

(1993). (39) George Stigler, The Economics of Information, 72 J. Pol. Econ. 213 (1964). (40) Let us stress again that we are not sufficiently familiar with the factual record that was available to the Court in Kodak to know whether, in fact, Kodak established, on the basis of the limited discovery that was permitted, key facts about switching costs, information costs, or the timing of Kodak's policy changes. (41) See, for example, Carl Shapiro, The Theory of Business Strategy, 20 Rand J. Econ. 125 (1989), for a discussion of competition in the presence of switching costs, information costs, installed bases, etc.

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