

January 9, 2005:8:45 PM

## Copyright and the DMCA: Market Locks and Technological Contracts

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Copyright law has emerged as one of the flashpoints in U.S. law today. In part, technological change has driven the new centrality of copyright law: easier copying and transmission of copyrighted works has disrupted existing business models, especially for music, and works that were protected effectively by technology limitations now move around the globe in an instant. The rise of Napster, KaZaa, Aimster, Grokster and their brethren have shrunk (so far) the effective domain of copyright, and has done so in areas at the core of copyright. The content industry understandably sees copyright as under assault.

At the same time, copyright's domain has been expanding, especially in areas far removed from the traditional heart of copyright. Businesses have increasingly understood how copyright law might be used strategically to bolster their position in markets such as those for spreadsheets, garage door openers, printer toner cartridges, and replacement parts for lawn mowers and copiers. This is a use of copyright not so much as to define a property right in a work but rather instead to block entry into markets. In cases such as *Lotus*, *Southco* and *Toro* in the United States and *Magill* and *IMS Health* in the European Union courts struggle to apply copyright law to situations best under-

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stood in the framework of competition policy. Producers often try to make life tough for their competitors and in many of these situations incumbents seize upon copyright law to create entry barriers. This is copyright as market lock rather than as content lock and takes us from just copyright to the intersection of copyright and competition policy.

In part, it is this simultaneous withdrawal and expansion of copyright that has made it so contentious. But there is more. We would have these fights even if we were using U.S. copyright law, circa 1976—the date of our last full revision of copyright law—but the Digital Millennium Copyright Act of 1998 has raised the stakes considerably. The DMCA makes it illegal to circumvent technological measures that protect copyrighted works and bars, in a fashion, dealing in tools that make circumvention possible.

The DMCA validates true content locks, devices that lock content to a particular medium or that restrict the way in which content is used. That aspect of the DMCA is controversial, with the focus of the discussion typically being the question of whether content locks will encroach on traditional areas of fair use. Indeed, the DMCA itself takes that issue sufficiently seriously that it sets up a rulemaking procedure for the Librarian of Congress and the Registrar of Copyrights to exempt certain noninfringing uses from the coverage of the DMCA.<sup>1</sup>

But my focus here is not on content locks as such. Instead, the anticircumvention provisions of the DMCA validate a form of technological contracting, though a clumsy form to be sure, and the clumsiness itself puts more pressure on copyright law.

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<sup>1</sup> See 17 USC § 1201(a)(1)(C); Library of Congress, “Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies,” 65 FR 64556 (2000); Library of Congress, “Copyright Office; Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies,” 68 FR 62011 (2003).

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Think of a technological contract as a technological measure implemented by a contracting party to ensure enforcement of some of the provisions of the contract. This isn't the Holmesian vision of a contract as an option to perform or pay damages: this is a self-executing contract implemented through and constrained by technology. These technological contracts also can operate as direct market locks, as they can block entry by those who would supply products that work with the original product. Exactly how all of this works has been considered in two recent U.S. cases, the *Lexmark* case, addressing locks between printers and toner cartridges, and the *Chamberlain* case, which considers garage door openers.<sup>2</sup>

So we have market locks implemented through copyright doctrine itself and through the technological contracts awkwardly authorized by the DMCA. Life would be much easier if we could just condemn these market locks and move on, but unfortunately, we can't do that. Market locks can improve matters for everybody, certainly in theory and probably in practice. A lock between the printer and the toner cartridge increases the manufacturer's flexibility in recovering the fixed costs of creating a printing system. That means that it is possible to have lower prices for printers than would be possible absent the locks, and that may make consumers as a group better off. If the overall printing market is competitive, we shouldn't necessarily fear a situation where I have to buy new toner cartridges or refills from my original manufacturer.

If we can't condemn all market locks, can we somehow separate out legitimate and illegitimate market locks? We need to focus on the scale of entry. If we believe that entry into the

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<sup>2</sup> *Chamberlain Group Inc v Skylink Technologies Inc*, 381 F.3d 1178 (Fed Cir 2004); *Lexmark International Inc v Static Control Components Inc*, 387 F.3d 522 (6<sup>th</sup> Cir 2004).

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market that would be defined by the market lock is competitive, we shouldn't be concerned about the market lock. So if Lexmark ties cartridges to printers with a technological contract, we should ignore this if the printer market with tied cartridges is competitive.

We should be especially concerned with a market lock that increases the cost of entry for an entrant willing to enter on the same scale as the incumbent (full entry rather than partial entry in just one piece of the system). This separates the aftermarket cases—the replacement parts cases (*Kodak*, *Toro* and *Chamberlain*) and the toner cartridge case (*Lexmark*)—from *Lotus*, *IMS*, *Magill* and *Southco*. In the aftermarket cases, the market lock discourages partial entry, and partial entry can be good or bad. In a competitive market, we should expect the market to find its way to the right mix of open and closed systems. But the market lock doesn't alter entry at all by a new company willing to sell lawn mowers *and* parts or printers *and* toner cartridges. In contrast, in *Lotus*, *IMS* and *Southco*, the entrant wanted to enter precisely the same market as the incumbent, and the only question was whether the incumbent's presence increased or lowered the cost of entry. So note the separating line here, between the aftermarket partial-entry cases (*Chamberlain*, *Kodak*, *Lexmark* and *Toro*) from the full-entry cases (*Lotus*, *IMS* and *Southco*) (*Magill* is the only square peg in this system, but, to get ahead of the story for a moment, entry there was necessarily partial, as entry in the foremarket—TV broadcasting—was strictly controlled by regulation).

How does law matter for these market locks? First, law will decide whether to invalidate or invalidate these locks. We will do this through our choices in antitrust law regarding tying doctrine, though the scope of copyright doctrine and through our interpretation of the DMCA. Second, the lines we draw will change how firms seek to latch onto locks. We can run a

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system of expensive or inexpensive locks, and law will matter for the mechanics of locks and the costs created by those mechanics. In these situations, these uses of copyright and the DMCA create the risk of socially-useless resource investments simply to fit within current copyright doctrine.

### I. Framing the Issues

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As the above makes clear, I have a series of concrete cases in mind in considering market locks. I will lay those out quickly to get the facts on the table.

1. *Copier Machines and Repair Parts and Service*. Start with *Eastman Kodak Company v. Image Technical Services, Inc.*, decided by the U.S. Supreme Court in 1992.<sup>3</sup> Kodak and other companies built copiers; copiers break down, and need to be repaired. Kodak and other manufacturers stood ready to provide those services, but entrants—known as independent service operators or ISOs—jumped in to provide these services. But an ISO could repair a copier only if it had access to the necessary replacement parts, and eventually, Kodak turned off the spare parts spigot. ISOs cannibalized used copiers for spare parts, but scrounging of this sort is usually a short-term solution. For long-term help, the ISOs sued Kodak under the Sherman Act alleging, among other things, that Kodak was impermissibly tying together parts and service in the repair market (with parts as the tying good and service as the tied good).

As framed in the Supreme Court, *Kodak* addressed whether, as a matter of law, the absence of market power in the original equipment market meant that there was necessarily no market power in aftermarkets, such as those for spare parts or

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<sup>3</sup> 504 US 451 (1992).

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repair services. Kodak argued that if it ripped off customers in the aftermarket, it would pay for that behavior through reduced sales in the original equipment market, if that market was competitive (and the case was litigated on that premise).<sup>4</sup>

The case raises some juicy issues about customer behavior and the limits of human cognition, about the ability of customers to engage intelligently in life-cycle pricing, so that customers can assess not only the sticker price of the shiny new copier today but also the likely repair costs down the road (the total costs of ownership).<sup>5</sup> *Kodak* also addresses the possibility of installed-based opportunism, meaning in English, could it be profitable for Kodak to switch repair policies mid-stream, so that the lost sales to new customers from higher service prices would be dwarfed by the chance to gouge Kodak's installed base of existing customers?<sup>6</sup>

Ultimately, in a 6-3 decision, the Supreme Court concluded that the parts and service markets were a separate market from the original equipment market and antitrust liability could be evaluated in those markets independent of the extent of competition in the original equipment market.<sup>7</sup> Subsequent caselaw has modified this result somewhat in emphasizing that

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<sup>4</sup> Id at 465-66.

<sup>5</sup> Id at 473-76.

<sup>6</sup> Id at 476-77; see also Steven C. Salop, The First Principles Approach to Antitrust, *Kodak* and Antitrust at the Millennium, 68 Antitrust LJ 187 (2000-01).

<sup>7</sup> Many economists have criticized the Court's analysis in *Kodak*. See Carl Shapiro, Aftermarkets and Consumer Welfare: Making Sense of *Kodak*, 63 Antitrust LJ 483 (1994-95); Dennis W. Carlton, A General Analysis of Exclusionary Conduct and Refusals to Deal—Why *Aspen* and *Kodak* Are Misguided, 68 Antitrust LJ 659 (2000-01); Kenneth G. Elzinga & David E. Mills, Independent Service Organizations and Economic Efficiency, 39 Econ Inquiry 549 (2001).

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the holder of a patent on a replacement part need not deal with all purchasers.<sup>8</sup>

2. *More Replacement Parts.* Toro sells lawn mowers and other equipment to keep your lawn looking lean and green. It also sells replacement parts should you need to fix your lawn mower. R&R Products sold replacement parts for many lawn mower brands, including Toro. But R&R specialized: it only sold those parts that needed to be replaced frequently. If an unusual part was needed, you would need to contact the original manufacturer. To simplify sales, R&R's catalog listed Toro's part numbers and R&R's side-by-side. Toro alleged a copyright violation from the use of the part numbers. The Eighth Circuit rejected that claim on the basis that Toro's part numbers lacked sufficient originality to be copyrightable.<sup>9</sup>

3. *Software Interfaces.* In the early 1990s, Lotus 1-2-3 was the dominant spreadsheet. It quickly became the center of an ecosystem defined by third-party add-ons and user-defined macros. Consumers mastered the Lotus interface making it possible for them to move through the program quickly. Borland determined to try to unseat Lotus and spent three years developing a competing program, Quattro Pro. Borland understood that the investments made by consumers in the Lotus interface created a barrier to entry. Borland was perfectly willing to compete by developing its own interface—and it did—but Borland believed that it needed to lower the switching costs consumers would bear if they dropped Lotus for Borland. To do that, Borland included an alternative interface with Quattro

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<sup>8</sup> In re Independent Service Organizations Antitrust Litigation, 203 F3d 1322 (Fed Cir 2000).

<sup>9</sup> Toro Co v R&R Products Co, 787 F2d 1208, 1213 (8<sup>th</sup> Cir 1986).

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Pro, a “Lotus Emulation Interface.”<sup>10</sup> Lotus claimed copyright infringement and won in the district court, forcing Borland to redesign its program. On appeal, the First Circuit reversed, finding that the Lotus interface was an uncopyrightable method of operation.<sup>11</sup>

4. *Fasteners*. Southco makes latches, hinges and captive fasteners, things made to attach one thing to another. Southco uses a nine-digit numbering system to refer to its parts, so a fully-retractable captive fastener with a knurled knob style and a slotted recess style with flare-in installation (and more) is a 47-10-101-14. Southco offers a full range of such fasteners. Southco also claims copyrights in handbooks that it publishes listing the parts number and in the parts numbers themselves. Kanebridge competes with Southco in the fastener market and sells tens of thousands of different fasteners. But Southco is so dominant that Kanebridge asserted that it could not compete without being able to make reference to Southco’s parts numbers. Kanebridge created its own parts numbers for its parts, but it also issued charts matching its parts numbers with Southco’s parts numbers so that customers could easily swap a Kanebridge fastener for a Southco fastener. The U.S. Court of Appeals for the Third Circuit took two cracks at the case in considering whether the Southco part numbers were sufficiently creative to be copyright worthy, but two times wasn’t enough. On the third try, in *en banc* consideration, the Third Circuit concluded that the part numbers didn’t meet copyright’s originality requirement and also weren’t copyrightable

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<sup>10</sup> Lotus Development Corp v Borland International Inc, 49 F3d 807, 809-10 (1<sup>st</sup> Cir 1995), *aff’d* by an equally divided court, 516 US 233 (1996).

<sup>11</sup> 17 USC 102(b).

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under the short phrases regulations issued by the U.S. Copyright Office.<sup>12</sup>

5. *TV Guides*. The *Magill* case<sup>13</sup> in the European Union addressed the relationship between television broadcasting and program listings, often called TV guides. At the time of the dispute, TV viewers in Ireland received six broadcast stations from three sources: two from RTE, which had a statutory monopoly in Ireland; two from the British Broadcasting Company; and two from the Independent Broadcasting Authority. Entry into broadcast TV was strictly limited. Each broadcaster published a separate set of TV listings and local newspapers published listings for the six stations on terms set by the broadcasters. Magill sought to enter the TV guide market with the plan of providing an advance weekly listing for all six stations. Hardly the stuff of genius but a real advance over the meager offerings provided by the broadcasters themselves or their licensees. The broadcasters claimed copyrights in the program listings under their national copyright laws and therefore asserted that they had no obligation to license the listings to entrants, a position the European Union Court of Justice ultimately rejected.

6. *Garage Door Openers*. Chamberlain is a major player in the market for automated garage door openers. A system consists of a motor and chain attached to a wireless receiver and a garage door transmitter. The homeowner uses the transmitter—the clicker—to send signals to the receiver to open and close the garage door. A home owner will have one motor/chain/receiver combo but might have any number of clickers. Skylink sells a universal garage door transmitter, and uni-

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<sup>12</sup> *Southco Inc v. Kanebridge Corp*, 390 F3d 276 (3<sup>rd</sup> Cir 2004) (en banc).

<sup>13</sup> Joined Cases C-241/91 P and C-242/91 P RTE and ITP v Commission [1995] ECR I-743 (“Magil”).

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versal means that it is designed to work with all of the garage door receivers manufactured by different companies. Chamberlain sued Skylink in March, 2003 alleging eight different causes of action, including violations of patents, copyrights and the DMCA. In August, 2004, the U.S. Court of Appeals for the Federal Circuit rejected Chamberlain's claims.

7. *Toner Cartridges.* In May, 1997, Lexmark introduced a new program for toner cartridges for its printers. Under its new Prebate plan, the toner cartridge would come subject to a shrinkwrap license that restricted reuse of the cartridge. Lexmark intended the prebate cartridges to be used once and the customer wasn't supposed to refill the cartridge. Lexmark's original list price for the prebate cartridge was \$258, \$30 less than an identical unrestricted unlicensed cartridge. But customers could choose to ignore the shrinkwrap contract and they could almost certainly assume that Lexmark would not sue them for breach of contract. If the Prebate and non-Prebate cartridges were different only in their contractually allowed uses and the terms of use were not enforceable practically, many consumers would buy at \$30 off and do what they would with the cartridges.

So Lexmark added a lock-out chip, a technological contract to ensure that Prebate cartridges were not re-used with Lexmark printers in violation of the contract terms. Static Control came up with a chip the mimicked Lexmark's lock-out chip and sold its chip to firms that remanufactured toner cartridges. Lexmark in turn sued Static Control also alleging violations of the DMCA. In October, 2004, the U.S. Court of Appeals for the Sixth Circuit overturned a preliminary injunction that Lexmark had obtained in the lower court, as, on the Sixth Circuit's view, Lexmark was not likely to succeed on its DMCA claims.

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8. *Data Bricks*. IMS Health provides data on sales of German pharmaceuticals. How that data is organized turns out to matter, and IMS has copyrighted a “brick” structure used to break down the data geographically. IMS sits as a middleman between the pharmacies and the doctor’s offices and the drug companies, and its data brick structure has emerged as an industry standard. Many market participants have made complementary investments in programming and business processes that are organized around IMS’s data brick structure. A former employee of IMS started a competing firm, later acquired by NDC Health. Initially, the firm tried different data structures, but it found that customers weren’t interested in approaches that deviated from IMS’s industry standard.

The national German court issues a preliminary order barring NDC from using data structures based on IMS’s approach, as the court found that doing so violated German copyright law. In the main proceeding in the German court, the German court believed that a permanent injunction would be inappropriate if IMS’s behavior amounted to an abuse of a dominant position in violation of Article 82 of the European Union treaty. Rather than tackle those questions directly, the German court asked the European Court of First Instance to address the competition policy issues. The Court of First Instance offered a complicated multi-factor test but did conclude that there were some circumstances under which the refusal to license an “indispensable” copyright would amount to a violation of Article 82.<sup>14</sup>

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<sup>14</sup> Judgment of 29 April 2004 in Case C-418/01 IMS Health, not yet reported.

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## II. Economic Considerations

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So eight cases described quickly. Seven of these pose copyright/DMCA questions quite directly, while *Kodak* is litigated as an antitrust case, but even there, subsequent developments have re-asserted the importance of intellectual property considerations, both as to patents and copyrights. How should we think about these situations? I think that there are a series of economic issues that we need to consider. Consider four clusters of ideas: (1) contractual product degradation; (2) competitive fixed cost recovery, product differentiation and market locks; (3) the technology for building market locks; and (4) entry scale, entry barriers and switching costs.

### *A. Contractual Product Degradation*

It may be important to create differentiated products to sell to different consumers. If we have only one product, we may not be able to sell it to all of the consumers. If that is right, then we need a good mechanism for differentiating products. In some cases, the best way to do that may be to have exactly the same physical product, but to limit access to the product in some ways—through contracts or technology. Think of this as contractual product degradation. We will use a contract—a license—to create an inferior version of the product, and doing this will actually be socially useful.

To see this, try a stylized version of the cases addressing Monsanto's Roundup technology.<sup>15</sup> Monsanto has patented gene sequences that can be inserted into plant seeds. The new genes protect the crops from certain herbicides, including Monsanto's Roundup, which can then be applied generally to

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<sup>15</sup> *Monsanto Co v Ralph*, 382 F3d 1374 (Fed Cir 2004); *Monsanto Co v McFarling*, 363 F3d 1336 (Fed Cir 2004).

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kill the weeds surrounding the crops. The gene sequence continues into the next generation of seeds. Monsanto uses contracts to restrict the modified seeds to a single use and bars transfers of the seeds.<sup>16</sup> The purpose of the contract is clear: If Monsanto cannot restrict the farmer to one use, then in selling a single seed to the farmer Monsanto needs to charge the price of a lifetime supply of the seeds, even more if the farmer can sell seeds to others.

Now consider the usefulness of contractual product degradation. To see a simple version of this, imagine that it will cost \$12 to create the Roundup gene technology and after that, it can be reproduced at a marginal cost of zero. Monsanto faces two consumers for the technology. One farmer would like to use the technology in perpetuity and places a value on it of \$20. A second farmer would like to use the technology once and values it at \$5. Once a farmer has seeds, absent contractual restrictions, the farmer could produce more seeds from her existing seeds.

Assume that we believe the technology market to be competitive, so that Monsanto can recover—but can only just recover—its \$12 investment. If Monsanto sells only one product and has no way to distinguish the two farmers, it will charge a single price. At a price of \$12, it would sell only to Farmer A. Farmer B, who values the technology at only \$5, would have to do without. At a price of a hair under \$5, Monsanto could sell to both farmers, but it would only collect \$10. If we can't easily charge different prices to different consumers for the same

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<sup>16</sup> “To use the seed containing Monsanto gene technologies for planting a commercial crop only in a single season. To not supply any of this seed to any other person or entity for planting, and to not save any crop produced from this seed for replanting, or supply saved seed to anyone for replanting.” *Monsanto Co.*, 382 F3d at 1377.

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product, we cannot get the product to both farmers with only one product.

But producers can separate consumers by offering different products. In this case, that can be as simple as “degrading” the product by imposing contract restrictions on the use of the seed. Monsanto does exactly that in its actual sales; indeed, Monsanto apparently will not sell the seed free of contractual restrictions.<sup>17</sup> So have Monsanto offer a single-use version of the product and, contrary to fact, a perpetual-use version. Monsanto could set a price of \$10 for the perpetual use version, a price of \$2 for the single-use version; both farmers would get the technology and Monsanto would cover its costs.

This is a form of competitive price discrimination implemented through “artificial” product differentiation. The seed in question is the same in both cases, but the rights are different and the different right settings create multiple, socially-useful products. Put differently, this is socially-useful product degradation through contract. And enforceable contracts—whether on paper or through technology—may be by far and away the best way—from a standpoint of social efficiency—of degrading products. The alternative is for the firm to invest real resources in separating the products. Doing so could push up its production costs: it might have to have separate production lines for the inferior and superior versions of the product.

*B. Competitive Fixed Cost Recovery, Product Differentiation and Market Locks*

Try another version of the same idea, with an added twist. Contractual product degradation reflects the realities of licensed goods. We see this frequently with digital goods, where the whole field of digital rights management focuses on defin-

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<sup>17</sup> Monsanto Co, 382 F3d at 1383.

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ing slices of access to the same work. But we can do this with physical products as well, where we degrade through written contracts or technological contracts.

The *Lexmark* case described above is a good example of this. In *Lexmark*, the Sixth Circuit held that Static Control did not violate the Digital Millennium Copyright Act when it created a chip that mimicked Lexmark's locking chip. Recall that the Lexmark locking chip was intended to ensure that Lexmark's Prebate toner cartridges could not be refilled or reused by someone other than Lexmark. Lexmark continued to sell—for \$30 more—toner cartridges free of the locking chip. Customers were free to choose either cartridge.

This is an example of technological product degradation. Lexmark started with a license restriction on the use of the cartridges—contractual product degradation—but that proved ineffective so it looked for a better means of enforcement. Absent Static Control's end-run, the Lexmark lock out chip does the trick.

The *Lexmark* ruling makes it difficult for Lexmark to create differentiated products to attract different customers and, in so doing, limits the way in which the fixed costs of production can be recovered. That might not matter if all consumers were the same, but with different types of consumers, the ruling benefits high-volume consumers and hurts low-volume consumers and may make consumers as a group worse off. How we structure fixed cost recovery matters enormously for consumers. We saw a simple version of this in the Roundup hypo set out above. If Monsanto had to offer only one product at one price, it could only recover its fixed costs of production by offering the perpetual-use version of the product. That meant we excluded the farmer who only wanted to use the product once.

We can play through the same analysis of printing. To try to get at this, consider a simple framework. The Lexmark

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printing system consists of a printer, an empty toner cartridge and toner. Assume that the fixed costs of creating the system are \$10,000 and we have 100 identical consumers. Assume for simplicity that the marginal costs of production are for a printer \$50, a toner cartridge \$5 and a toner refill \$1. In selling to consumers, in a competitive market where Lexmark just recovers its costs, Lexmark needs to recover, on average, \$100 in fixed costs from each consumer.

We care where Lexmark recovers those costs. If we recover fixed costs by adding an amount to the marginal cost of one of our three objects, we will inefficiently reduce consumption of printing. People who value printing at more than the social cost of doing so still won't print. With identical consumers, we have a straightforward answer: we should recover the entire \$100 in the price for the printer and/or the toner cartridge. In the hypo at least, the printer and the toner cartridge are fungible, as you need one and only of them to print and I assume that they have the same durability. The printer is the admissions ticket to printing. Everyone who wants to print has to have one, and you can't print without one. Put differently, for those who want to print, their demand for the printer is inelastic. The price of the printer should influence whether you buy one at all, but once purchased, shouldn't influence how much you print (thinking of the printer as being indefinitely durable).

Not so with regard to toner itself, where there is effectively a fee each time you print. The price of toner will influence how much you print; the more we load up on the toner our recovery of the \$100 in fixed costs the more we inefficiently discourage printing. So build the fixed costs of the printing system into the printer, and don't nudge up toner prices above marginal cost at all.

So far the *Lexmark* decision looks pretty good. In breaking the technological link between Lexmark printers and Lexmark

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cartridges and toner, Lexmark is pushed to recovering all of the fixed costs of the system from the printer, as it can no longer count on selling toner to Lexmark printer owners. Note that the toner-only entrants will not have to recover the fixed system costs, since they don't incur them.

But as soon as consumers are different, we may make consumers worse off if we recover all of the fixed costs through the printer. An extra \$100 on top of the marginal cost of the printer may cut some consumers out of the printing market entirely. We might do better by raising toner prices slightly and reducing the price of the printer itself. But *Lexmark* makes that impossible in separating the toner purchases from the printer.

Quite plausibly, the Lexmark lockout chip is a beneficial market lock. Indeed, it is a peculiar market lock in that the customers choose to be locked in. Customers could save \$30 by buying the market-locked Prebate cartridges or could buy the lock-free cartridges and refill them to their hearts content. As the first two examples should make clear, contractual product differentiation can expand the ways in which fixed costs can be recovered and to the benefit of consumers.

The first two examples are exercises in Ramsey pricing, that is, setting prices to maximize social welfare subject to a revenue constraint. In the first two examples, I have focused on fixed cost recovery. The Roundup example indicated how product differentiation resulting from contractual product degradation could allow us to recover fixed costs in a superior way, by allowing fixed cost recovery while getting the seeds into the hands of both farmers. The Lexmark example takes another step, as it combines product degradation with a market lock, though in that case, a purely voluntary market lock. In both cases, we should think that the product degradation is welfare enhancing and we should think the same of the Lexmark market lock.

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*C. The Technology for Building Market Locks*

We should start from a position of agnosticism as to the mechanics of different market locks and then see where we should add refinements to nudge us in one direction or another. That is, if market locks are useful in some cases—and they are—we shouldn't start with a strong preference for *how* the market lock is implemented. Given the legal tools at hand—core copyright law, the DMCA and contract law—we can expect market participants to use a mix of these to implement locks. For example, Lexmark started with paper contracts, moved to technological contracts in the form of the lock-out chip, and then sought to defend those contracts under the DMCA. Lotus and Southco sought protection of their market locks under conventional copyright doctrines.

These market locks will not be perfect substitutes for each other. Lexmark started with a shrinkwrap contract and added the technological contract to make enforcement meaningful. Toro looked to copyright doctrine to protect its parts numbering system, as it couldn't bar competitors through contract, on paper or through technology, from using Toro's parts numbers. Of course, Toro could move to technological locks as to the equipment itself, and, indeed, that would get us quite close to Chamberlain's efforts with regard to replacement garage door openers.

Given current doctrine and current statutes, where we draw lines will influence how participants will try to implement their market locks, and we need to take that into account. So we might be better suited to allow Toro to assert a copyright in part numbers rather than see Toro invest in technological locks so that Toro lawn mowers will only work with Toro replacement parts. And of course it is not just Toro's investment in technology that is at stake. It is the response and counter-response that will emerge when the part-maker wannabe has to

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invest in emulation technology to substitute for the parts handshake implemented by Toro.

And we might want Toro and Southco to be able to assert copyright in simple part numbers rather than souped-up “expressive” part numbers. We should fear that we will induce inefficient investments in copyright. So we can decide that the part numbers are too short to be copyrighted or lack sufficient originality to merit copyright, as the Third Circuit ultimately ruled in *Southco*. Of course, the natural response to that by future Southcos is to make the part numbers longer and more creative—more expressive—in a Monty Pythonesque move toward establishing the Department of Interesting Part Numbers. Indeed, Southco offered up the affidavit of one Robert Bisbing to explain the creative process used in creating the Southco part numbers.

If copyright just draws a line distinguishing cases and says “over here, no copyright, but two steps to the right, copyright” incumbents will invest extra resources to get the copyright that will then serve as a market lock. A finding of fair use is much better; unlike inquiries into length or originality, there is little that the incumbent can do to alter its behavior to try to slip within the copyright system and bar use. Fair use is a mandatory access regime, a shared use regime.

Note that there is also no fear that the incumbent will change its disclosure policy in the face of requirement of allowed use by entrants. The part numbers cease to be useful if they are unknown to customers and the Lotus interface was the only part of the program that was visible to users. Disclosure of the part numbers and the interface is necessary and inevitable. That won’t hold in all situations—it isn’t true, for example, in *Magill*, where, even without copyright, the TV stations can exercise some control over the flow of the information. Inevitable creation doesn’t necessarily equal inevitable disclosure or even

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disclosure at a time certain, but in the part number cases, even with allowed fair use, we should expect both creation and disclosure to continue unchanged in any important way.

*D. Entry Scale, Entry Barriers and Switching Costs*

We should be concerned about actions that alter entry possibilities for potential competitors, but we also need to be quite precise about articulating the market in which entry changes should be evaluated. For example, in the aftermarket cases—the toner cartridges in *Lexmark*, the replacement parts in *Toro* and *Kodak*, and the garage door openers in *Chamberlain*—the actions of the incumbent influence the shape of partial entry but typically do little to create barriers for full entry. So *Lexmark*'s actions make it harder for a firm to enter the toner cartridge market or for a firm to just build printers and rely on third parties for toner cartridges. But as discussed in Section II.B., we can't be at all sure that partial entry into toner cartridges makes consumers better off, as it may force the incumbent to just allocate more of its fixed cost recovery to printers.

But the market lock in *Lexmark* and in the other aftermarket cases does nothing to alter entry conditions by a firm willing to provide all parts of the relevant system (printers and toner cartridges, original equipment and repair parts etc.). Contrast those cases with *Lotus*, *Southco* and *IMS*. In each of those cases, the actions of the incumbent, in conjunction with copyright law, makes it harder for an entrant willing to undertake full entry.

So in *Lotus*, Borland wanted to produce a competing spreadsheet and was willing to enter on the same scale as Lotus's original entry. Borland was willing to make both a calculation engine and an interface and had not instead decided to just enter the spreadsheet engine market and free-ride on the Lotus interface. But the switching costs that arose with each Lotus

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consumer's complementary investment in the interface—knowledge of the interface and the macros—created a new barrier to entry for Borland.

It isn't at all clear that there would be any antitrust action to be brought against Lotus. The Lotus spreadsheet just won and it is not an antitrust violation to succeed in the marketplace. We could, but only quite artificially, consider the Lotus spreadsheet to be two separate products, say a calculation engine and an interface and try to find refuge in antitrust's tying doctrine, but that seems quite artificial. Understanding when we have two separate products isn't easy, and the separate demand test announced in *Jefferson Parish* isn't easy to apply, especially for goods which have no natural product boundaries, such as computer software.<sup>18</sup>

But the complimentary investments made by end-users in learning the Lotus interface and writing macros that ran in Lotus created switching costs and thereby created entry barriers not faced by Lotus. This is not a claim that Lotus designed its product so as to make switching costs artificially high with the hope of foreclosing entry or in a bid to monopolize the spreadsheet market. But the entry barrier that arises from switching costs is a separate point, and the existence of that entry barrier in *Lotus* is wholly the province of law. Borland can easily implement the Lotus interface within Quattro Pro; the only question is whether the law—copyright law typically, unfair competition law occasionally—will allow it to do so.

Like *Lotus*, *Southco* is a situation where the incumbent is attempting to use copyright law to block entry or thwart compe-

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<sup>18</sup> *Jefferson Parish Hospital District No. 2 v Hyde*, 466 US 2 (1984); *United States v Microsoft Corp*, 253 F3d 34 (DC Cir 2001); Randal C. Picker, *Unbundling Scope-of-Permission Goods: When Should We Invest in Reducing Entry Barriers?* (forthcoming, *U Chi L Rev*, 2005).

tition in the overall market. Everything suggests that Kanebridge was seeking to compete at the same scale as Southco. Kanebridge was not seeking to free-ride on whatever investment Southco made in establishing parts numbers. Kanebridge established its own independent parts numbering system, but if Southco's parts numbering system had become the language of the industry—an industry standard—unless Kanebridge could provide a Southco/Kanebridge dictionary, Kanebridge faced an entry barrier. Southco didn't face that barrier when it started its business and the continued existence of that barrier is purely the province of copyright. Little seems at stake internally for copyright on the status of the part numbers or a parts number system: this isn't the spot for expressiveness and we need not fear that the numbers won't be created absent copyright. Instead, *Southco* is a case about competition policy, though you would be hard-pressed to see that in the Third Circuit's decision.

*IMS* is the last case in this grouping. Again, this is not a case of partial entry. NDS was willing to enter on the scale that *IMS* had entered, and indeed, NDS offered competing ways to organize the drugs data. Like *Lotus* and *Southco*, this is a case about switching costs and the entry barriers that can be artificially created through copyright law. Once firms made complementary investments to handshake with the *IMS* data brick structure, NDS faced a new entry barrier.

And this would be true even if we turned away from trying to get market participants to switch from the incumbent's structure and instead focused on the circumstances under which we might allow an entrant to duplicate *IMS*'s copyrighted work. So, for example, U.S. copyright law contains an independent creation defense: I don't infringe the copyright on *Hamlet* if I have never been exposed to *Hamlet* and write it on

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my own.<sup>19</sup> So we might say that NDS can enter with an identical data brick structure but it must do so through a clean-room process, and not by using former employees of IMS.

The problem with this is that there are many situations where close doesn't count. I suspect that a brick structure that was 95% compliant with IMS's wouldn't be particularly valuable. IMS can design an arbitrary standard and make it extraordinarily expensive to duplicate. Indeed, the less functional the standard is and the more expressive it is—the more arbitrary it is—the more expensive it will be to duplicate.

To say all of that slightly differently, imagine that we are trying to duplicate a code. There are only so many possibilities for a single digit code—10, of course—but as the code gets arbitrarily long, the number of possibilities grows dramatically. The incumbent can just choose one of those numbers arbitrarily at no cost, but an entrant will face high costs if it must independently re-create the incumbent's arbitrarily chosen code. Yes, independent creation would eliminate the entry barrier posed by the data brick structure, but the complexity of that structure itself may make independent creation quite expensive, and that cost itself will serve as a barrier not faced by the incumbent. Of course, the more functional the data brick structure is, the more easily an entrant could re-create it and the more we would have at stake in giving the incumbent the incentive to create a good structure in the first place. But again, as in *Lotus* and *Southco*, the entrant wasn't trying to free-ride and avoid spending resources on its own data brick structure—interface in *Lotus* and part numbers in *Southco*—but only turned to copying when the market would not abide variation.

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<sup>19</sup> See e.g. *Fogerty v MGM Group Holdings Corp*, 379 F3d 348 (6<sup>th</sup> Cir 2004).

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Take stock on how these economic considerations match up with my eight cases. *IMS*, *Lotus* and *Southco* are cases about switching costs where entrants are willing to enter at the incumbent's scale and where copyright law might prevent that entry. In the aftermarket cases—*Chamberlain*, *Kodak*, *Lexmark* and *Toro*—market locks may be useful as they may facilitate fixed cost recovery in a version of Ramsey pricing. The market locks facilitate product differentiation—product degradation through contracts—and they may allow us to spread out usefully recovery of the fixed costs over different components of the system. Again, copyright law and the DMCA matter as they control the extent to which these market locks work. Only the *Magill* case—the EU case on TV guide entry—doesn't fit easily in this framework, though in many ways, *Magill* is *sui generis*. Entry in broadcasting is highly-regulated, so there was no meaningful interaction between partial entry and full-market entry of the sort that looms so large in these other markets.

### III. Inside the DMCA

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Of my original eight cases, four were decided in 2004: *Chamberlain*, *IMS*, *Lexmark* and *Southco*. In the prior Section, I tried to provide a conceptual economic framework to consider these cases. As just exercises in law, the cases don't inhabit the same legal space. *IMS* considers the EU's abuse of dominant position law, while *Southco* is an inside look at an assortment of copyright doctrines, and the doctrines aren't new even if the particular application is. In contrast, *Chamberlain* and *Lexmark* address related legal issues and together now comprise the leading caselaw on the text of the still-young DMCA. And *Chamberlain* and *Lexmark* provide an interesting look at the

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interrelation between paper contracts and technological contracts.

*A. Chamberlain's Search for Middle Ground*

*Chamberlain* is probably best understood on the Federal Circuit's own terms. Chamberlain did not clearly impose a contractual restriction that barred its customers from using competing garage door openers with a Chamberlain system. Consumers expect to be able to mix and match products so long as the products are technically compatible. I can mix Levi jeans with Polo shirts and, while the public at large may find that unpleasant, neither maker can complain. We should put the burden on the manufacturer to make clear the way in which use is restricted, and Chamberlain didn't do that. Consumers were just mixing and matching as they expect to do so. Chamberlain looks like it is trying to change the rules midstream or to pull a fast one by trying to use the DMCA to bar compatible garage door openers, and the Federal Circuit understandably wanted no part of that.<sup>20</sup> Whatever you think about the ability of consumers to internalize aftermarket costs in making initial market decisions—one of the key issues in the Supreme Court's anti-trust analysis of these issues in *Kodak*—it would be especially hard for consumers to recognize Chamberlain's attempt at a technological market lock.

But the Federal Circuit's analysis of the inner working of the DMCA is less successful. *Chamberlain* focuses appropriately on trying to understand the relationship among Section 1201(a), 1201(b) and 1201(c) of the DMCA. Put shortly, 1201(a) addresses circumvention of technological measures that

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<sup>20</sup> Chamberlain Group, 381 F3d at 1193 ("Chamberlain reiterated and strengthened this assertion at oral argument, claiming that the DMCA overrode all pre-existing consumer expectations about the legitimate uses of products containing copyrighted embedded software").

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control *access* to a copyrighted work; 1201(b) addresses circumvention of technological measures that don't control access to the work but that control particular rights of the copyright holder, as for example, those that might bar copying the work while allowing unprotected reading of the work; and 1201(c)—and in particular 1201(c)(1)—is a “savings” clause relating to laws regarding copyright infringement.

Section 1201(a)(1)(A) sets out the basic rule that “[n]o person shall *circumvent a technological measure that effectively controls access to a work* protected under this title.” The italicized phrases are defined terms.<sup>21</sup> Another chunk of text<sup>22</sup> makes it possible for the Librarian of Congress to call off the protections of Section 1201(a)(1) if the Librarian believes that the access rule is likely to affect adversely noninfringing uses of the protected work.

It is critical to distinguish use from access. Copyright law does not create a right of access to copyrighted works. Copyright owners need not make their works available to the public. I can write love poems at night and tuck them away in my locked desk drawer and the public has no right of access to those poems. In reasonably straightforward fashion, Section 1201(a) takes that idea of the copyright owner's core right to deny access to everyone and extends that to recognize the copyright owner's right to control access through protective technological measures. The copyright owner's choices are broadened: something in between the locked drawer and public distribution, locked distribution.

Yet the Federal Circuit rejects this understanding of Section 1201(a), indeed, it believes that such a conception “borders

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<sup>21</sup> Respectively at 1201(a)(3)(A) and 1201(a)(3)(B).

<sup>22</sup> At subparagraphs (B) through (E) of Section 1201(a)(1).

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on the irrational.”<sup>23</sup> Why? The Federal Circuit quickly got to the heart of its concerns with Chamberlain’s position:

Chamberlain’s proposed construction would allow ... any copyright owner, though a combination of contractual terms and technological measures, to repeal the fair use doctrine with respect to an individual copyrighted work—or even selected copies of that copyrighted work. Again, this implication contradicts § 1201(c)(1) directly. Copyright law itself authorizes the public to make certain uses of copyrighted materials. Consumers who purchase a product containing a copy of embedded software have the inherent legal right to use that copy of the software. What the law authorizes, Chamberlain cannot revoke.<sup>24</sup>

The Federal Circuit closed this passage with a footnote addressing what role contracts might play in the analysis:

It is not clear whether a consumer who circumvents a technological measure controlling access to a copyrighted work that enable uses permitted under the Copyright Act but prohibited by contract can be subject to liability under the DMCA. Because Chamberlain did not attempt to limit its customers’ use of its product by contract, however, we do not reach this issue.<sup>25</sup>

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<sup>23</sup> Chamberlain Group, 381 F3d at 1200 (“Chamberlain’s proposed construction of § 1201(a) implies that in enacting the DMCA, Congress attempted to ‘give the public appropriate access’ to copyrighted works by allowing copyright owners to deny all access to the public. Even under the substantial deference due Congress, such a redefinition borders on the irrational.”)

<sup>24</sup> Id at 1202.

<sup>25</sup> Id at 1202 n7.

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This really is the core point. The Federal Circuit understood Chamberlain to authorize its customers to use competing garage door openers with the Chamberlain systems, and, in so doing, access whatever copyrighted software was embedded in those systems. That should have sufficed to reach the Federal Circuit's result, but instead the Federal Circuit offered up a more general framing of how to proceed under Section 1201, concluding that that section prohibited "only forms of access that bear a reasonable relationship to the protections that the Copyright Act otherwise affords copyright owners."<sup>26</sup>

It is hard to see how we get a "reasonable relationship" test out of Section 1201. Section 1201 is tricky but that doesn't mean we just get to head for the mushy middle. As described above, Section 1201(a)(1) authorizes locked distribution thereby making it possible for the copyright owner to condition access to the work. Congress feared that this new model of distribution would cut too deeply into noninfringing uses, so it protected some of those uses in the statute and authorized the Librarian of Congress to protect other uses through the anticircumvention rulemaking procedure. In both cases, the noninfringing use is facilitated by not making it a violation of the DMCA to circumvent the access control in those circumstances.

Section 1201(b) addresses a different situation, namely where a technological control protects certain rights of copyright holder (as opposed to controlling access to the work itself). While Section 1201(b) limits "trafficking" in devices to circumvent these rights control measures, it does not make it an independent violation of the DMCA for a consumer to override such a measure on her own. Note the contrast with Section 1201(a) which does bar consumers from overcoming

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<sup>26</sup> Id at 1202.

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copyright access controls. Note also that Section 1201(b) is limited to tech measures that protect the statutory rights of the copyright holder and under Section 107, absent contract, the fair use right rests with the public, and not the copyright holder. So if a consumer receives access to a work subject to a copyright control—perhaps more precisely, a copyright rights control (and again as opposed to an access control)—and that control somehow limited, say, fair use, the consumer would not violate the DMCA in overcoming the copyright control.

Section 1201(c)(1) doesn't impact this analysis much, if at all: "Nothing in this section shall affect rights, remedies, limitations, or defenses to copyright infringement, including fair use, under this title." This is a standard savings clause. Congress doesn't want the new subsequent statute to be misunderstood as having implicitly altered or repealed the law relating to copyright infringement, so it addresses that directly. But this does not mean and should not be understood to mean that all cases will play out in fact just as they would have absent the new statute. With the new statute in place, the copyright holder can engage in locked distribution of the work and use the access control to bar certain noninfringing uses of the work. It can't do that for noninfringing uses carved out of Section 1201 by Congress originally or through the anticircumvention rulemaking process, but it can do that for all others.

And, to go back to the test formulated by the Federal Circuit, there is no basis to somehow focus on "forms of access that bear a reasonable relationship" to the rights of the copyright owner. Under Section 1201(a)(1), the copyright owner can choose to implement an access control and that control is only subject to the statutory carve outs and the anticircumvention rules of the Librarian of Congress. Consumers are allowed to evade copyright rights controls under Section 1201(b) that undercut permitted noninfringing uses, but third parties can't

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help make that possible by building devices designed to do just that.

*B. Lexmark: Technological Contracts and the DMCA*

*Lexmark* pairs nicely with *Chamberlain* as it presents squarely the contract issues that the Federal Circuit could avoid in *Chamberlain*. Recall that Lexmark produced two different toner cartridges to go with its printers. One cartridge, once used, was to be returned to Lexmark for re-use or tossed away. The second cartridge could be re-used by the customer. The actual terms of the shrinkwrap contract evolved to a point of studied ambiguity as to what the customer was to do with the empty cartridge: “Following this initial use, you agree to return the empty cartridge only to Lexmark for remanufacturing and recycling.”<sup>27</sup> Is the customer agreeing to return the cartridges? Seemingly not, and indeed Lexmark’s original marketing material made clear that there was no obligation to return the cartridge. A customer could throw them away or stack them in the corner until they toppled; what a customer could not do is have them refilled by someone other than Lexmark.

When, as could be anticipated, the shrinkwrap contract was ignored by many customers, Lexmark moved to a technological contract. By embedding a lock-out chip in the to-be-returned-or-tossed cartridges, Lexmark was able to use technology to enforce the terms of the shrinkwrap contract. Or at least so it thought.

*Lexmark* is ultimately a technological contract case, where Lexmark was using the market lock—quite explicitly—to separate two markets. A technological contract is a self-executing contract: it defines the extent of use allowed by the copyright

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<sup>27</sup> *Arizona Cartridge Remanufacturers Ass’n v Lexmark International Inc*, 290 FSupp2d 1034, 1038 (ND Calif 2003).

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holder and, through the technology, ensures that the use does not extend beyond the allowed uses.<sup>28</sup> We certainly could be troubled by the terms of technological contracts: we might think certain terms to be void as against public policy, just as we do with standard contracts. And we might be nervous about these contracts precisely because they are self-executing: I get to breach a standard contract and you have to sue me to enforce your contract; not so with the technological contract.<sup>29</sup>

My point here is not to try to determine the outer boundaries of permitted technological contracting. I confess that I think that I don't think *Lexmark* is the key test case. From the outside, the printing market looks reasonably competitive and the products in question are not the stuff of life-and-death. This isn't a pacemaker subject to repossession electronically, where the pacemaker shuts off if an updated code isn't received in time. I made that case up, but *Lexmark* isn't even the electronic shut-down of rental cars—a real case—which could easily pose safety issues.<sup>30</sup>

In *Lexmark*, the Sixth Circuit overturned the preliminary injunction granted by the district court. Recall that Static Control had created a chip that mimicked Lexmark's lock out chip, and Static Control's chip made it possible for consumer to refill their Prebate cartridges from third parties. In overturning the preliminary injunction, the Sixth Circuit focused on Lexmark's

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<sup>28</sup> Cf. Dan L. Burk & Julie E. Cohen, Fair Use Infrastructure for Rights Management Systems, 15 Harv J Law Tech 41, 51 (2001) ("Since technical controls can impose conditions that formerly might have been the subject of a detailed licensing agreement, such controls might be viewed as equivalent to a sort of licensing regime.")

<sup>29</sup> See *id.* at 51-54.

<sup>30</sup> Auto Dealer Has an Offer for Drivers With Bad Credit, But There's A Catch, NY Times, Aug 30 1999.

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likelihood of success on the merits, and found little of merit in Lexmark's claims.

Again, Section 1201(a) provides that “[n]o person shall circumvent a technological measure that effectively controls access to a work protected under this title.” Lexmark printing involves two copyrighted programs, the Toner Loading Program and the Printer Engine Program. The Printer Engine Program is part of a Lexmark Printer, while the Toner Loading Program is embedded in the lock-out chip built into Lexmark's printing cartridges. The chip, with the Toner Loading Program, interacts with the printer, and if the toner cartridge and the printer do not synch appropriately, the printer won't work.

We can see problems with Lexmark's position from the getgo. The DMCA contemplated contexts in which a copyright owner would use a technological measure to control access to a copyrighted work. So I write the great electronic novel and sell it on CDs and you need a password to read the novel. Someone circumvents that scheme to read the novel and thereby violates the DMCA. Lexmark's square approach is hard to jam into the DMCA's round hole. Is Lexmark controlling access to the Printer Engine Program? Not really, and indeed, that program can be read directly from the memory chip contained in the printer, if you have the tools to do that. That program is not wrapped in some protective scheme covered by the DMCA. Access to the Toner Cartridge Program? Nope, also readable from the chip itself.

We know what Lexmark is really doing: Lexmark is trying to control how two physical devices—the printer and the toner cartridge—work together. Both might have embedded copyrighted works, as indeed they do, but Lexmark has no direct interest in controlling access to those works, though it would be happy to do so if doing so bought it protection under the DMCA.

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Put differently, Lexmark wanted to implement its original shrinkwrap contract regarding use of toner cartridges via a technological contract, and the DMCA is the best source of protection for such a contract. But you can be the best and still not be very good, and that is the situation here. Because the DMCA is directed at protecting copyrighted works and because Lexmark wasn't really trying to do that, Lexmark was going to lose.

The Sixth Circuit undertook the standard copyright drill to evaluate the copyright worthiness of the Toner Loading Program considering the intersecting copyright doctrines of originality, the idea/expression dichotomy, merger and scenes a faire. Going forward, that analysis, while interesting, isn't really where the action is at. We could always make the lockout program more expressive and if doing so changes the analysis on whether copyright has attached to a particular work, parties will spend real resources to meet whatever standard we announce.

We should not want to head in that direction, as Judge Merritt emphasized in his concurring opinion: "We should make clear that in the future companies like Lexmark cannot use the DMCA in conjunction with copyright law to create monopolies of manufactured goods for themselves just by tweaking the facts of this case: by, for example, creating a Toner Loading Program that is more complex and "creative" than the one here ... ." <sup>31</sup> Judge Merritt recognized that more creative lock-out codes would be on the way if the case was understood just to address how Lexmark failed in this particular situation. Judge Merritt feared that "tweaking" the facts of Lexmark would make it possible for manufacturers to monopolize many goods.

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<sup>31</sup> Lexmark International, 387 F.3d at 551.

But my analysis in Section II.B. makes clear that we have little basis for assuming that locks of the sort seen in *Lexmark* are problematic; indeed, these locks may improve matters for consumers as a group. It is fair to say, as the Sixth Circuit did in *Lexmark*, that the DMCA itself only narrowly implements technological contracts and that *Lexmark* was correctly seen as being outside the statute's protection. But that says nothing about the general merits of technological contracts or about the content protection approach really at the core of the DMCA.

#### IV. Conclusion

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Copyright has emerged as a pliable tool, to be bent and shaped by firms and frequently with an eye towards disadvantaging competitors through the erection of entry barriers. The easy manner in which copyright arises makes it possible for firms to get copyrights and threaten competitors with costly infringement actions. This is the use of copyright as more than just defining property rights, the use of copyright in creating market locks.

But we would paint with too broad a bush were we to condemn all of these market locks. Market locks facilitate product differentiation and that may expand the range of ways that fixed costs can be recovered in a competitive industry. This can be useful and can improve outcomes for consumers. We should think this pattern to arise most plausibly in industries with foremarkets and aftermarkets. These would include original equipment markets and repair parts, printers and toner cartridges and garage door openers and would encompass a series of important cases, including *Chamberlain*, *Kodak*, *Lexmark* and *Toro*. Market locks in these settings may appropriately limit partial entry, as when an entrant wants only to supply replacement parts. In these settings, contractual product degrada-

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tion—typically a license limiting permitted uses of the product—will make it possible to offer different products to different consumers. We should not routinely condemn market locks in these situations and should be troubled if we shape copyright law in a way that prevents these market locks from operating.

At the same time, we should be troubled by market locks that create entry barriers for an entrant willing to enter on the same scale as the incumbent, for an entrant willing to undertake full rather than partial entry. These will frequently be situations characterized by high switching costs, where the incumbent's advantage may arise from the simple fact of being first. In these cases, copyright law can make entry barriers concrete and we should be concerned if copyright law works to disadvantage full entry. This pattern matches well with cases such as *IMS*, *Lotus* and *Southco*, though courts have done reasonably well in making possible entry, even if the courts have only glimpsed the full competitive issues at stake.

Finally, the Digital Millennium Copyright Act has emerged to play a central role in these cases. Firms looking to limit use naturally move from weakly-enforceable paper contracts to self-enforcing technological contracts in the form of lock-out chips and the like. But the heart of the DMCA is technological controls for copyrighted works and the DMCA does not implement a pure regime of technological contracts. It is hardly surprising that firms in cases such as *Chamberlain* and *Lexmark* have tried to squeeze within the DMCA and no less expected that the courts have refused to expand its scope. That reluctance, though, tells us little about the real merits of technological contracting or about the true copyright protection scheme erected by the DMCA.

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