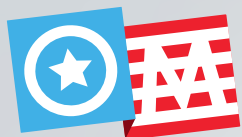


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Fixing America: Breaking Manufacturers' Aftermarket Monopoly and Restoring Consumers' Right to Repair

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OPEN MARKETS



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Executive Summary

Consumers are losing the freedom to fix their things. From cellphones to combines, from vehicles to video game consoles, manufacturers leverage a wide array of legal tactics, predatory designs, and even lawbreaking to force consumers to use the manufacturers' repair services.

Monopolizing repair allows corporations to extract additional revenue during the lifespans of their products, but this profiteering comes at a larger social cost. Repair restrictions drive up costs for consumers, increase wait times, drive out independent repair shops, produce unnecessary waste, and inhibit broader innovation and self-reliance.

Repairability was once a standard and expectation. Over time, a deadly combination of anemic antitrust enforcement and technological development have allowed manufacturers to purposefully adopt exclusionary practices and cut off the tools necessary for repair, in powerful and unprecedented ways. Fortunately, lawmakers, antitrust enforcers, and regulators have many policy mechanisms that can reopen repair markets.

In this paper, we explore the history of repair markets in the United States, the tactics that manufacturers use to restrict repair, the consequences of restricted repair markets, and the antitrust and other legal tools available to crack open cornered repair markets.

To fix our broken repair markets, lawmakers and antitrust enforcers must:

- Ensure that consumers have access to all necessary parts, manuals, and tools, as well as to diagnostic and service software to repair their products;
- Use existing antitrust doctrine and Supreme Court precedent to sue corporations that monopolize repair aftermarkets. This could include charges of unlawful tying, exclusive dealing, exclusionary design, and refusals to deal;
- Enforce the Magnuson-Moss Warranty Act to ensure that manufacturers are not illegally limiting or restricting product warranties;
- Create exemptions in both copyright and patent law that can enable consumers and independent business to repair consumer goods.

I. Introduction

Consumers are losing the freedom to fix their things. From cellphones to combines, from vehicles to video game consoles, manufacturers leverage a wide array of legal tactics, predatory designs, and even overt lawbreaking to force consumers to use the manufacturers' repair services.

Cornering repair markets is lucrative business. The U.S. market for auto collision repair alone was valued at \$33 billion in 2018.¹ Americans spent \$39 billion repairing heavy machinery such as tractors and bulldozers, and \$22 billion repairing cellphones, computers, and electronics, according to estimates from IBIS World.² Repair and aftermarket sales are a fundamental part of manufacturers' revenue streams, accounting for 10% to 40% of revenue for industrial companies.³

A deadly combination of anemic antitrust enforcement and technological developments, such as the proliferation of software and the integration of consumer products with computational capabilities, has enabled manufacturers to monopolize repair in powerful and unprecedented ways.⁴ Despite these tactics by manufacturers, a growing movement of Right to Repair activists has advocated for state-level legislation that would require manufacturers to make critical parts, tools, and software available to independent technicians and consumers. Twenty states introduced such legislation last year.⁵ Losing the ability to restrict repair significantly affects manufacturers' profits, so manufacturers have responded vigorously and spent millions in lobbying against these and other reforms aimed at guaranteeing and enabling consumers' right to repair.⁶

This profiteering and lobbying exact a substantial social and economic cost. By excluding independent parts manufacturers and technicians, manufacturers destroy otherwise attractive business opportunities, reduce product choice, and raise prices for consumers. Replacing a network of local independent repair shops and parts manufacturers with centralized repair systems also leaves some communities without repair services and decreases both community and supply chain resilience.⁷ Introducing unrepairable goods means shorter product lifespans, which harms the environment by sending more goods to landfills.

Most fundamentally, repair restrictions limit consumers' autonomy to fix and tinker with their goods as they see fit. This not only suppresses exploration,

innovation, and self-reliance, but also undermines common understandings of ownership. When consumers cannot repair, modify, or tinker with the goods they have rightfully purchased, consumers do not fully own their products.

Fair and open repair markets would allow citizens the full use of their products. When deprived of the ability to monopolize aftermarket, manufacturers would have a greater incentive to make high quality, durable products rather than products that need regular repair and force consumers to continuously purchase new products.

Fair and open repair markets would create greater opportunities for independent parts manufacturers and repair shops to participate in this vital market and better serve communities with more convenient, affordable, personalized, and timely service. Ensuring the freedom to look into the nuts and bolts of a product and access the software embedded in a product also spurs innovation, rather than stifling it.

Fortunately, lawmakers, antitrust enforcers, and regulators have many levers to open repair markets. In this paper, we explore the history of repair markets in the United States, the tactics that manufacturers use to restrict repair, and the antitrust and other legal tools available to crack open cornered repair markets.

II. History of Restricting Repair

Exploitative manufacturer tactics enabled by technological developments and anemic antitrust enforcement have dramatically restricted repair in recent decades. However, the United States did not always have restrictive repair markets. Detailing changes in manufacturers', consumers', and policymakers' approaches to repair is essential to understanding how our current restrictive and monopolistic repair environment developed, and how open markets for repair can be restored.

THE HISTORY OF OPEN AFTERMARKETS

The freedom to repair durable goods used to be an established norm in American society.⁹ Consider the history of the automobile.⁹

In his memoir, Henry Ford prioritized interchangeability and repair for cars

as not only an essential aspect of product quality but as a first principle of product design.¹⁰

We want the man who buys one of our products never to have to buy another. We never make an improvement that renders any previous model obsolete. The parts of a specific model are not only interchangeable with all other cars of that model, but they are interchangeable with similar parts on all the cars that we have turned out.

Manufacturers designed their goods to be durable, long-lasting, and repairable. Around the year 1910, wheel rims became detachable from the axle and thus enabled owners to avoid the use of expensive mechanics, which were routinely needed for even minor incidents with an automobile.¹¹ The Western Electric Model 500 telephone, the ubiquity of which rivaled the Ford Model T,¹² was, similar to previous models, explicitly designed to be durable and repairable with a product lifespan of decades.¹³

American consumers were accustomed to repairing products rather than buying new ones. For example, refrigerators were routinely repaired and passed down from one owner to the next.¹⁴ During the Great Depression, maintenance and repair were not only essential but helped people develop a sense of self-reliance.¹⁵

This emphasis on repairability was true of the earliest personal computers too. Steve Jobs designed a manual for the Apple II – the first widely successful personal computer – that was so elegant and user-friendly that competitors moved to improve the quality of their manuals to match the detail that Apple provided to consumers.¹⁶ By including a detailed manual with the product, Jobs wanted to ensure that consumers knew how to take advantage of the easily accessible parts and multiple expansion slots on the Apple II, which would ensure the longevity of the computer.¹⁷

The story was not merely a matter of socially responsible corporate actors. Antitrust law played an important role in constraining corporate discretion and promoting open and accessible repair. For example, the federal government successfully pursued antitrust litigation against the then-dominant provider of mainframe computers, IBM. A vital aspect of the subsequent consent decree agreed to in 1956 was to mandate that IBM sell at “reasonable and nondiscriminatory prices and terms ... parts and subassemblies available for use in its leased machines, repair and replacement parts and subassemblies” for the mainframe computers that IBM manufactured.¹⁸

The open and repairable design of products also enabled ordinary users to tinker with their devices. Tinkering is a fundamental aspect of innovation and invention. Tinkering allows an individual to understand how products are made and appreciate the labor that goes into creating, producing, and distributing that product.¹⁹ Tinkering can build valuable problem-solving and technical skills that otherwise might only be available through often-expensive formal education.

Most importantly, tinkering allows consumers to innovate and improve products. Some of the world's most transformative innovations were derived from tinkering. In his early career as a telegraph operator, Thomas Edison often tinkered with telegraph repeaters to try to solve the problem of sending multiple telegraph messages over a single wire.²⁰ Robert Kearns, who was blind in one eye, invented the intermittent windshield wiper to make driving in the rain easier for himself by combining three different sets of parts. Kearns eventually defeated Ford, GM, and Chrysler in a series of decades-long patent suits after they copied and stole his invention.²¹ The Wright brothers, who were bicycle repairmen, teamed up with Charlie Taylor, a "brilliant mechanic," to apply their repair knowledge and design and build the first aircraft engine for powered flight.²² During World War II, when farm equipment became scarce, John Deere provided maintenance manuals to farmers to provide them with techniques to ensure the longevity of their equipment.²³

EARLY EFFORTS TO CLOSE AFTERMARKETS

Despite Ford's commitment to producing durable and repairable cars, and to prioritizing repairability more generally,²⁴ the corporation did take steps to control who repaired their cars and how.

Ford made significant investments to create dealerships and a network of corporate-authorized repair shops through the 1910s and '20s. The corporation created this repair network out of fear that customers would patronize "independent repair shops that used 'pirate parts' not produced by Ford."²⁵ Ford made specialized tools available only to dealers and authorized repair shops. While Ford's early authorized repair network was large by some measures, especially compared to some of the limited authorized repair networks of today, the system nonetheless exhibited early manufacturer efforts to control their repair markets.²⁶

Ford and other manufacturers soon went much further. They began to purposefully make parts inconsistent from model to model, making repair

more difficult and pushing car owners to use the manufacturers' repair services and parts.

Marketers, product designers, economists, and advertisers began to educate and condition Americans to the idea that throwing away products was more desirable than repairing them.²⁷ Advertiser Justus George Frederick, who is credited with codifying the concept of planned obsolescence, stated in 1928:

We must induce people . . . to buy a greater variety of goods on the same principle that they now buy automobiles, radios and clothes, namely: buying goods not to wear out, but to trade in or discard after a short time . . . the progressive obsolescence principle . . . means buying for up-to-dateness, efficiency, and style, buying for . . . the sense of modernness rather than simply for the last ounce of use.²⁸

As such, manufacturers made intentional design changes to induce more consumption. For example, throughout the 1920s and '30s, Alfred Sloan, then-CEO of General Motors (GM), started to change the design and style of GM's vehicles annually, in part to meet new consumer demands and preferences, but also to purposefully encourage consumers to trade in their old cars for new ones – creating a form of “psychological obsolescence.”²⁹

This design tactic eventually seeped its way into other sectors of the American economy. While not explicitly restricting repair, this practice conditioned Americans to discard their products well before the end of the products' useful lifespans, dampening demand for repair.³⁰

With the foundation laid, manufacturers began to recognize that the design of their products could inhibit competition and raise the financial and logistical costs of switching brands, in order to retain their customer base and reap profits beyond the initial point of sale. Psychological obsolescence – through changes in visual design – eventually became planned obsolescence and purposeful lifespan restriction. In one of the most overt examples, General Electric, then the monopoly provider of light bulbs in the United States, joined an international cartel, known as the Phoebus cartel, to collude to reduce the lifespans of lightbulbs. The cartel succeeded in its goal, ultimately reducing the lifespan of lightbulbs from 1,800 hours to 1,205 hours.³¹ This design change drove sales of 90 million additional lightbulbs and became a boon to cartel members.³² Manufacturers today use similar predatory design tactics to make items difficult or impossible to repair.

The electrification and computerization of products eventually paved the way for manufacturers to dramatically expand repair restrictions, a trend that has continued to this day. First, electrification eliminated the ability of ordinary people and even the ability of experienced mechanics to diagnose a problem with their senses and forced them to rely on tools and diagnostic software provided by manufacturers.³³ Historian Kevin Borg stated that “the hybridization of electrical and mechanical technologies introduced new types of problems – electronic failures such as glitches, phantom codes, and bugs which could be intermittent and nearly impossible to find using conventional diagnostic methods.”³⁴ Today, manufacturers often restrict access to critical diagnostic software and other modern tools of repair, centralizing control over repair markets.

Secondly, the electrification and computerization of products and appliances substantially decreased their lifespans and introduced new modes of restricting repair. Jim Nanni, the director of appliance testing for Consumer Reports, stated that new electronics in products “introduce reliability problems that weren’t common 30 years ago.”³⁵ This includes issues with internal electronic sensors and small computing components that are less easily repaired, if not completely irreparable.³⁶

In addition to giving manufacturers more power to limit customers’ ability to repair products, electronics also introduce new vulnerabilities. In one instance, Ford and Chrysler had to recall 1.4 million vehicles because the electronics were not designed properly and could be compromised to hackers.³⁷

This debacle also illustrates a second critical turning point in the history of repair restriction: the proliferation of embedded software in everyday goods. The injection of software into consumer products is so complete and pervasive, entrepreneur Marc Andreessen stated in a well-known essay, that software is “eating the world.”³⁸ Software is now in nearly every imaginable consumer product – from Barbie dolls to doorbells to automobiles.³⁹ Some cars today contain more than 100 million lines of code to run their computerized systems.⁴⁰ Automotive engineers now term cars as nothing more than “computer[s] on wheels.”⁴¹ Inarguably, computerization improves cars in many ways. But technicians do not always have access to the codes that make these goods operate. While some code may be accessible and open source, much is closed and proprietary.

These technological advances made it easier for manufacturers to withhold and lock away tools and guides to repair. But, as illustrated above, the roots and motivations behind predatory design and monopolized repair go back

much farther. At that time, however, a combination of stronger antitrust enforcement and different social norms kept these exclusionary instincts from producing the outcomes that we see today.

III. Methods of Restricting Repair

It can be challenging to keep track of and disentangle the abundant tactics that product manufacturers use to restrict repair today. Methods span from withholding critical tools, or simply designing products that cannot be repaired, to leveraging intellectual property and contract law to criminalize or outright deter independent repair.

New technologies have strengthened or enabled restrictions on repair, though manufacturers have long engaged in varying degrees of exclusionary conduct. Consumer protection and antitrust laws explicitly outlaw many of these tactics, as this report explains in Part V. However, decades of neglected enforcement have created a vacuum allowing manufacturers to push the boundaries of the law and strengthen their hold on repair markets.

This section identifies some of the various methods that manufacturers deploy to restrict repair. Analyzing these tactics positions enforcers to better pinpoint the legal and policy solutions to reopen repair markets.

TYING OF AFTERMARKET PARTS AND SERVICE

When manufacturers force consumers to use their repair services, this can function as a bundling of distinct products and services. Manufacturers can lock consumers into repair networks by bundling the sale of replacement parts with repair services and other products.

Jennifer Larson is the CEO of Vibrant Technologies in Minnesota, which refurbishes and sells used data servers. She highlighted the connection between tying and repair restrictions in her presentation at the FTC's Nixing the Fix workshop in the summer of 2019. Larson recounted that Vibrant Technologies receives many used servers that cannot be resold without an original manufacturer support or maintenance contract, which can sometimes cost more than it does to fix and sell a machine. This discourages repairs and drives consumers to buy new products that bundle support contracts with the purchase.

In a similar vein, the voiding of warranties for using third-party repair parts or service is a form of tying.⁴² The manufacturer ties its warranty to its own aftermarket parts and repair service. Auto manufacturers and their dealers have engaged in this practice. In its comment to the FTC, the Auto Care Association included two surveys that found car dealers told one-quarter of buyers that they must use the dealership for repairs to maintain their warranties.⁴³

EXCLUSIVE DEALING OF AFTERMARKET PARTS AND SERVICE

Tactics such as refusal to sell parts or tying products to service contracts can also be interpreted as de facto exclusive dealing between the purchaser and the manufacturer. That is, these restrictive moves effectively exclude third-party service providers from repair aftermarkets, forcing consumers to buy parts and repair services exclusively from the manufacturer.

REFUSAL TO SELL ESSENTIAL TOOLS, PARTS, DIAGNOSTICS, MANUALS, AND SOFTWARE

Manufacturers increasingly refuse to sell or make available original equipment manufacturer (OEM) parts to the public or independent repair shops. Instead, users and independent repair shops must salvage used equipment and turn to markets for secondhand parts, and at times intentionally or inadvertently turn to non-OEM parts.

For example, Nintendo makes only some of its video game console parts available for third-party repair shops. Parts such as the joystick on Nintendo Switch's controller, for instance, are not made available and thus cannot be replaced, forcing consumers to buy new controllers.⁴³

Camera-maker Nikon has gone even further. In 2012, the company stopped selling its parts to unauthorized repair shops altogether. Nikon justified its conduct by saying specialized tools are now required for many camera repairs. However, Nikon makes these special tools available only to its repair technicians, so the problem is entirely of its own creation.⁴⁵

A limited or nonexistent market for OEM parts compels third-party repair shops to rely on used or lower quality parts. As one camera repair shop manager said in response to Nikon's refusal to sell parts, "My options now are China, used parts from eBay, and whatever I can salvage."⁴⁶ And when independents do turn to these alternatives, consumers can be penalized.

In one instance, when users updated to the latest operating system, Apple disabled iPhones that had installed third-party parts.⁴⁷ While this issue was remedied, one scholar described Apple's message to customers as "Do not use non-genuine Apple parts to fix your device, or else."⁴⁸

Manufacturers withhold much more than parts and tools from consumers and independent repair shops. They also may refuse to publish or sell equipment manuals and schematics, as well as diagnostic and service software that can help guide repairs and identify problems with a machine.

In the past, physical manuals were a standard accompaniment to appliances. Today, however, manufacturers often lock their manuals online behind passwords and paywalls, or they do not make them available at all.⁴⁹

As equipment becomes more computerized, software and access to device data are also important tools for looking into a device and identifying a problem. Some manufacturers withhold this software and information, as well. For instance, farmers often do not have access to manufacturers' diagnostic and service software that can identify issues and fixes in their computerized tractors. As a result, some farmers have resorted to hacking their tractors with a bootlegged, Ukrainian version of John Deere's diagnostic software, rather than waiting hours or paying hundreds of dollars to haul equipment to a dealership just to identify a glitch or install a small part.⁵⁰

Finally, consumers also need to access the firmware, or embedded software in products, to fix technical glitches once identified. But increasingly, manufacturers of machines from cars to tractors have claimed firmware and other embedded, proprietary product code is for their eyes only and refused to share it.⁵¹ Manufacturers can install "software locks" that require PINs and passcodes and that lock out consumers or unauthorized technicians from the products' software.⁵²

PREDATORY AND EXCLUSIONARY DESIGN

Repair restrictions often begin with design. Manufacturers can design products to limit third-party repairs or stop repairs entirely. Tactics span from affixing internal components with glue to introducing proprietary locks and screws that require proprietary tools.

Even worse, manufacturers increasingly design single-use products that cannot be repaired. Consumers are often not aware that they are purchasing a single-use product. Take Apple's popular AirPods. The earphones retail

for \$159 to \$249, but their internal rechargeable battery cannot be replaced without destroying their outer casing or ruining internal components.⁵³ When AirPods lose their ability to hold a charge, which can happen within the first 18 months of use, consumers have no choice but to buy “battery service” replacements from Apple, which are just new AirPods sold for roughly \$20 less than a new pair.⁵⁴

Other exclusionary design tactics include highly specialized or noninterchangeable parts. These include special nuts and bolts that require unique screw heads to open a device or machine. For example, many Apple products have proprietary pentalobe screws. When they were first introduced, independent repair shops had to reverse-engineer tools to get inside Apple devices.⁵⁵ Even when hobbyists can adapt and find workarounds, manufacturers constantly make slight changes to parts to ensure that these DIY solutions do not apply to a brand’s every product.⁵⁶

LEVERAGING COPYRIGHT LAW TO LOCK SOFTWARE AND HARDWARE

Manufacturers have claimed copyright and patent protection for their computer code and attempted to block repair technicians and consumers from accessing or altering it, which, in essence, makes repairs impossible.

Software and hardware operate everything from Barbie dolls to Buicks. However, unlike looking under the hood of a car to see how it works, mechanics cannot always hack into a mainframe to read the code that runs equipment.

Manufacturers claim that the code embedded in most consumer goods is protected by copyright. Often, manufacturers add technical obstacles to prevent access to the code or the modification of software. These obstacles are not only legal but are protected by federal law. The Digital Millennium Copyright Act (DMCA) explicitly prohibits consumers from developing or utilizing means to “avoid, bypass, remove, deactivate, or impair a technological measure, without the authority of the copyright owner,”⁵⁷ effectively criminalizing the tinkering with and modification of a product’s code and conditioning the use of all products to manufacturers’ dictated terms.⁵⁸

Manufacturers have used copyright aggressively and undermined common notions of ownership. For instance, when pressed about prohibiting farmers from repairing tractors, John Deere argued in a comment to the Copyright

Office that farmers can never actually own John Deere tractors, because farmers cannot own the software that makes their equipment run.⁵⁹ Instead, when a farmer spends upwards of \$300,000 on a new John Deere combine, John Deere contends they receive “an implied license for the life of the vehicle to operate the vehicle,” subject to “contractual limitations.”⁶⁰

Worse, manufacturers expand this copyright claim to their manuals. Typically, copyright protection does not extend to works with procedural elements and factual listings with limited forms of expression.⁶¹ However, repair and diagnostics manuals are subject to copyright, as they often contain text, flowcharts, and other graphics that satisfy the “minimal degree of creativity” requirement.⁶² Thus, manufacturers, with little effort, can restrict the accessibility and distribution of manuals, which prevents consumers and technicians from learning about their products and effectively blocks repair.⁶³

Manufacturers vigorously enforce these copyright protections for their manuals, to maintain a stranglehold over repair. For example, Tim Hicks, frustrated by not being able to find any service manuals, decided to post some online.⁶⁴ He soon received a cease-and-desist letter from a computer company whose manuals he had posted online, and he was subsequently forced to take them down.⁶⁵ Federal copyright law can impose a fine of \$150,000 per violation for illegal copyright distribution.⁶⁶ Such hefty fines, even if infrequently levied, can deter consumers from repairing and modifying their products.⁶⁷

RESTRICTIVE END USER LICENSE AGREEMENTS

Historically, manufacturers were prohibited from imposing wide-ranging restrictions on a consumer’s usage of a product, and any restrictions that did apply were restricted to the first sale of the product.⁶⁸ Subsequent sales of the product would not be bound by the restrictions imposed by the first sale.

Today, however, manufacturers also utilize what are known as End-User License Agreements (EULA). In the 1980s, IBM recognized that its practices of bundling its products and services together would impose further antitrust action.⁶⁹ In response, IBM unbundled its products and services. However, IBM established a task force to find additional legal avenues that would help the company maintain its dominance in unbundled products and services without attracting antitrust scrutiny.⁷⁰ IBM decided to leverage copyright law and contract law to impose post-sale restrictions on its customers.⁷¹ What IBM developed was the EULA.⁷²

EULAs are contracts that users must agree to before using a product or service. EULAs are also known as “click-wrap,” “shrink-wrap,” or “terms of service” agreements.⁷⁴ Primarily used with copyrighted works in relation to software, EULAs impose post-sale usage, repair, and modification restrictions on consumers.⁷⁴ They also mitigate the manufacturer’s risk by limiting liability and by choosing the most favorable state laws and can even allow the manufacturer to engage in price discrimination, which is charging different consumers different prices for the same product.⁷⁵

Consumers are inundated with EULAs for nearly every digital and software service that they use, and they routinely acquiesce to EULAs even if they are not aware of the existence of a EULA.⁷⁶ However, in addition to these agreements being thousands of words long,⁷⁷ EULAs also utilize esoteric, legalistic language to hide manufacturers’ true intentions and deter consumers from even attempting to read and understand them.⁷⁸ It is estimated that it would take upwards of 200 hours a year to thoroughly read only the privacy aspects of EULAs presented to the average consumer.⁷⁹ Given that EULAs and other contracts of adhesion are not salient to most consumers, businesses rarely, if ever, compete by offering better terms in the fine print.

EULAs grant corporations unprecedented access to monitor, manage, and restrict how consumers use their products, even going so far as to revoke ownership.⁸⁰ For example, Apple’s current Media Services Terms and Conditions states that Apple “reserves the right to change, suspend, remove, disable or impose access restrictions or limits on any External Services at any time without notice.”⁸¹ Corporations have used this unilateral authority as a matter of course. For example, when Sony found that PlayStation 3 users had been using their consoles to run other operating systems for three years, Sony issued a mandatory update that removed the ability.⁸² Sony recognized that consumers were engaging in a practice that they disagreed with and then used their EULA to unilaterally impose an unchallengeable restriction on their consumers post-sale.

Before 1996, all courts that had analyzed EULAs as shrink-wrap licenses had declared them unenforceable.⁸³ But since the 7th Circuit case *ProCD, Inc. v. Zeidenberg* in 1996, courts have routinely upheld the enforcement of these agreements, with multinational corporations being the primary beneficiary.⁸⁴ Through restrictive unilateral contracts, manufacturers have circumvented historical jurisprudence to promote repair and modification, creating, in essence, a “parallel legal system.”⁸⁵

IV. The Effects and Consequences of Restricted Repair

Monopolized repair markets produce major profits for manufacturers, but they extract substantial costs from society. They create fragile and concentrated repair markets, gouge consumers, inhibit community resilience, pollute the environment, and stifle innovation.

INCREASED COSTS TO CONSUMERS

Corporations increasingly rely on lucrative monopolized repair markets as an essential revenue stream. In the case of farm equipment, for instance, profit margins for repair can be five times higher than the margins for the sale of equipment.⁸⁶ Some corporations even bring in more revenues from repairs than from the sale of goods. The National Automobile Dealers Association found that a typical car dealer derives 48% of its profits from repairs, compared to just 26% from car sales.⁸⁷ At the manufacturer level, GM earned more profits from its aftermarket sales than from car sales in 2001.⁸⁸ In 2015, Dan Ammann, then president of GM, stated that the company's aftersales business had profit margins of more than 30%.⁸⁹

Consumers pay the price for monopolized repair markets. Americans annually spend \$3.4 billion repairing phone screens alone.⁹⁰ From 2007 to 2014, the repair and replacement of damaged iPhones cost Americans \$10.7 billion.⁹¹ High repair costs deter most consumers from repairing their phones at all, as 65% of consumers do not get their phones repaired because it is too expensive.⁹²

Similarly, a 2017 survey from the American Automobile Association (AAA) found that 33% of Americans cannot afford to pay for an unexpected car repair bill. This grim statistic is made worse by the fact that, when adjusted for inflation, the average cost of car repairs was 61% higher in 2017 than it was in 2000, according to the U.S. Bureau of Labor Statistics.⁹³ Some experts attribute this rise in cost to the growth of costly electronics increasingly embedded in cars, but the cost of standard parts is also rising, in part due to manufacturer monopolies.⁹⁴ Between 2005 and 2015, automakers doubled the number of design patents for collision parts.⁹⁵ Such actions stifle the market for generic parts, which often cost 25% to 50% less and save consumers an estimated \$1.5 billion a year.⁹⁶

Across many consumer products, the cost of a single repair is approaching half the purchase price of a new product, the threshold at which Consumer Reports recommends going back to the showroom rather than seeking repair.⁹⁷ In some cases, a tightly controlled or monopolized aftermarket means consumers pay as much for repairs as for the purchase of new products.⁹⁸

STIFLING THE REPAIR ECONOMY AND LOCAL RESILIENCY

By blocking and eliminating access to critical parts and tools, manufacturers hoard valuable market opportunities for repair. Entrepreneurs cannot start parts and service shops nor fairly compete in the repair business.⁹⁹

In addition to providing local job and business opportunities, a decentralized local repair network comprised of independent shops can provide timely and, in many cases, better service. Independent repair shops sometimes offer repairs that manufacturers will not undertake, as in the case of Josephine and Dave Billard, who were able to save vacation photos from a water-damaged phone thanks to an independent repair shop that was willing to perform a more complex repair than the Apple store was.¹⁰⁰

Or take the case of Nikon, which recently announced that it was ending its authorized repair program altogether.¹⁰¹ Consumers will have to ship their cameras to one of two warehouses in the country for access to OEM parts and Nikon's repair technicians. This introduces new wait times for repair, driving up costs and preventing professional photographers from doing their work.

Rural communities, in particular, are often located far from manufacturer-authorized repair shops or technicians. A farmer or small business owner with time-sensitive work usually cannot wait for hours or days to fix a computer, tractor, or other piece of critical equipment. Farmers often have a year's income on the line during a narrow harvest window, making immediate repair imperative.

Centralized repair systems often cannot handle sudden systemic shocks. In a 2017 episode that became known as Batterygate, Apple admitted that it deliberately slowed down older iPhones and then faced public pressure to provide consumers a discounted replacement battery. When Apple relented and steeply discounted its battery replacement program, consumers rushed to take advantage of the deal.¹⁰² However, one month into the offer period, Apple was forced to delay battery replacements due to shortages and insufficient repair services.¹⁰³ Events such as Apple's Batterygate scandal

reveal that Apple's current repair infrastructure cannot withstand a sudden spike in demand.

Even when manufacturers grant access to tools and parts, they can leverage their market power to demand extortionate and oppressive terms in exchange for this access. Apple recently made headlines when it announced that it would begin selling parts, tools, and diagnostic and service software to third-party shops as a part of an "Independent Repair Provider" program.

Apple, however, imposes several conditions that prevent independent shops from competing fairly against Apple-authorized technicians. To join, repair shops must submit to unannounced inspections at any time, even for up to five years after quitting the program; even then, Apple can "impose potentially business-destroying costs and penalties on the repair shop" for things such as copyright and patent violations (which, as stated above, can be quite broad).¹⁰⁴ Shops must also share extensive information about their business and customers. This onerous surveillance does not necessarily improve the quality of independent shops' repairs. Shops must also display "prominently" that the shop is not Apple authorized, even though they've gone through the process to become certified with Apple to complete repairs. This disclosure suggests to consumers that independent repair shops provide inferior service for Apple products.

Independent repair shops can be 30% to 50% cheaper and repair consumer products more quickly.¹⁰⁵ Excessive authorization requirements, therefore, limit a consumer's access to repair options, but also squeeze independent repair shops and impair their ability to compete fairly in aftermarkets.

RISING E-WASTE

An increase in electronic waste (e-waste) is another consequence of restricted repair and planned obsolescence, forcing consumers to continually purchase new products. E-waste encompasses a broad range of discarded goods, spanning televisions, computers, batteries, and lightbulbs.¹⁰⁶ The chemicals and substances contained within these goods are highly toxic. According to the World Health Organization, exposure to the toxic chemicals and substances in e-waste can cause irreversible damage such as low birth weight, thyroid issues, and neurological damage.¹⁰⁷

One report estimated that the world produced nearly 50 million tons of e-waste in 2018, or approximately 15 pounds per person.¹⁰⁸ The EPA reported that Americans dispose of 416,000 cellphones every day.¹⁰⁹ Affordable and

accessible repairs can increase product lifespans and recycle functioning product components, reducing the volume of goods sent to landfills. E-waste is the fastest growing waste stream in landfills.¹¹⁰

In addition to increasing product lifespans, enabling consumers to repair their products can substantially reduce the amount of e-waste in our landfills.

LESS TINKERING AND INNOVATION

We should not undervalue ownership and the ability to tinker with the products that consumers rightfully purchase. Some of America's most transformative inventions, including the airplane and lightbulb, as well as substantial product improvements such as to the windshield wiper and the telegraph, were developed by tinkerers and repair mechanics. Law professors Aaron Perzanowski and Jason Schultz, in their book *The End of Ownership*, state that ownership "unfettered by DRM [digital rights management] encourages innovation, customization, exploration, and repair ... often in ways that the original manufacturer can't or won't."¹¹¹ For example, with a combination of tinkering and clever engineering,¹¹² Compaq was able to create the first IBM-compatible personal computer. Compaq was able to create a clone of IBM's personal computer by reverse-engineering IBM's copyrighted computer BIOS, which is the software code that ensures the computer's operating system can function with the selected hardware. Compaq's actions effectively broke the dominance of IBM in the personal computer industry and introduced real competition into the manufacturing of personal computers.¹¹³

V. Antitrust and Competition Policy Toolkit

Given the vast harms caused by monopolized repair markets, policymakers and law enforcers need to take steps to promote open access to repair. Fortunately, federal and state governments, as well as private plaintiffs, have broad legal standing to challenge manufacturers' exclusionary tactics and to promote competition in aftermarkets. Perhaps more than in other areas of antitrust law, judicial precedents offer compelling support to end illegal conduct such as tying, exclusive dealing, and refusals to deal. Beyond antitrust law, manufacturers are also clearly violating consumer protection statutes by improperly violating warranties and dictating repair terms. However, there has been far too little enforcement, and manufacturers continue to tighten restrictions on repair.

One of the most important precedents for challenging repair monopolies is the Supreme Court's landmark 1992 decision in *Eastman Kodak Co. vs. Image Tech. Servs.*¹¹⁴ This ruling recognized the need to curtail manufacturers' power to monopolize aftermarkets for their own products and opened up the possibility for plaintiffs to challenge this predatory behavior. The court concluded that competition in the product market for copiers did not necessarily protect competition nor discipline manufacturer conduct in the aftermarkets for copier parts and services.¹¹⁵ Accordingly, an aftermarket for a specific product's parts or services can be a relevant market for antitrust action.

The court rejected the theoretical claim that, when shopping for durable goods, purchasers compared the lifecycle costs of products and not just the sticker prices of competing options. It stated:

For the service-market price to affect equipment demand, consumers must inform themselves of the total cost of the "package"—equipment, service, and parts—at the time of purchase; that is, consumers must engage in accurate lifecycle pricing. Lifecycle pricing of complex, durable equipment is difficult and costly. In order to arrive at an accurate price, a consumer must acquire a substantial amount of raw data and undertake sophisticated analysis. The necessary information would include data on price, quality, and availability of products needed to operate, upgrade, or enhance the initial equipment, as well as service and repair costs, including estimates of breakdown frequency, nature of repairs, price of service and parts, length of "downtime," and losses incurred from downtime.¹¹⁶

The court elevated economic facts and the real limits of human decision-making over theoretical assumptions about human behavior. In essence, the court recognized the significance of manufacturer-imposed barriers and the real-world limitations that consumers encounter when confronted with restricted markets; in other words, this ruling recognizes the antitrust liability of restrictive manufacturer practices in aftermarkets.

Using this precedent and others, antitrust enforcers must challenge the following types of exclusionary actions that manufacturers take to monopolize repair markets.

TYING

To ensure competitive aftermarkets, antitrust enforcers should challenge manufacturers' tying of parts with service. Such arrangements can be challenged under the Sherman, Clayton, and Federal Trade Commission acts.¹¹⁷ Although tying is common and not inherently exclusionary, it can be harmful. Tying is when a manufacturer uses its economic power in one market, say consumer goods, in order to force consumers to use the manufacturer's tied product – the repair of those consumer goods. Leveraging dominance in one market to sell products or services in a second market can suppress competition in the latter market, known as the tied product market.

In *Jefferson Parish Hospital District No. 2 v. Hyde*, the Supreme Court noted that "the essential characteristic of an invalid tying arrangement lies in the seller's exploitation of its control over the tying product to force the buyer into the purchase of a tied product that the buyer either did not want at all, or might have preferred to purchase elsewhere on different terms."¹¹⁸ Tying can exclude rival providers of the tied products and thereby deprive both immediate and ultimate purchasers of choice.

The Supreme Court has established a modified per se rule against tying. To trigger this per se rule, the FTC and other plaintiffs must show the existence of four elements:

1. Two separate products or services;
2. The sale of one of the products conditioned on the purchase of the other product (i.e., coercion);
3. The seller has appreciable economic power in the market for the tying product to enable it to restrain trade in the market for the tied product; and
4. A "not insubstantial" amount of commerce in the market for the tied product is foreclosed.¹¹⁹

Most courts since *Jefferson Parish* have required a market share of more than 30% as a minimum threshold to apply the per se rule.¹²⁰

The Magnuson-Moss Warranty Act (Warranty Act)¹²¹ is a federal statute that targets the tying of warranties and aftermarket parts and services.¹²² Specifically, the Warranty Act prevents manufacturers from conditioning implied and written warranties on the consumer's use of the manufacturer's services unless the manufacturer states that only specific parts will allow the device to work properly and that the waiver is in the public interest or the

services are provided to the customer without charge.¹²³ In other words, manufacturers cannot forcefully tie their services to the purchased product, unless it is free to the customer.

Warranties contingent on using certain repair services violate not only the Warranty Act but may also violate the Sherman and Clayton antitrust acts for illegal tying. Manufacturers cannot restrain trade by conditioning the value of a warranty to the purchase of another line of business, such as repair service. Such practices may also violate federal consumer protection laws against unfair and deceptive marketing claims.¹²⁴

The Warranty Act and FTC regulations also prevent manufacturers from voiding the consumer's warranty if repair service is performed by a third-party or if nongenuine, recycled, or aftermarket parts are used.¹²⁵ False statements contrary to this situation can dissuade customers from utilizing third-party repair or repairing their products themselves. However, a survey by the U.S. Public Interest Research Group (U.S. PIRG) found that 45 out of 50 home appliance companies indicated to customers that they would void the warranty if a device had "unauthorized" repair.¹²⁶

While the FTC has sent warning letters to corporations for potentially violating consumer warranty rights under the Warranty Act,¹²⁷ the FTC should vigorously enforce the statute, which explicitly prohibits manufacturers from requiring that the product they are selling only be repaired through the purchase of their services or from requiring the purchase of manufacturers' parts as a condition of the consumer's warranty.¹²⁸

EXCLUSIVE DEALING

By restricting independent parts manufacturers and service providers from market access, manufacturers can impose effective exclusivity on product owners.¹²⁹ Due to one or more exclusionary practices, customers may have no option but to go to the manufacturer or manufacturer-authorized technician for repairs. In other words, customers may have the formal right to go to independent shops and providers but lack the functional right to do so.¹³⁰

The FTC should challenge exclusive dealing using the Sherman Act. The practice can marginalize existing rivals and raise entry barriers for prospective competitors.¹³¹ In exclusive dealing cases, market foreclosure is typically the most crucial factor. In general, the degree of market foreclosure that is sufficient to violate the antitrust laws ranges from 30% to 40%.¹³²

REFUSALS TO DEAL

Product manufacturers have refused to provide parts, data, and other essential inputs to independent technicians. In other words, they have refused to deal with certain purchasers and competitors.¹³³ A monopolist's freedom to deal is subject to important qualifications.¹³⁴ Federal antitrust enforcers and private plaintiffs can challenge refusals to deal in the context of right to repair under the Sherman Act.¹³⁵

Challenging a refusal to deal requires showing market power.¹³⁶ A principal consideration when analyzing this conduct is the existence of a prior relationship.¹³⁷ A monopolist can be held liable for terminating an existing relationship, especially if it sacrificed short-term profits in the expectation of subsequent monopoly gains.¹³⁸ For instance, if a manufacturer previously sold parts to all purchasers, including independent technicians, its decision to restrict sales only to authorized service providers can be actionable under the Sherman Act. Using Section 6 rule-making authority under the FTC Act to define unfair methods of competition, the FTC can also challenge refusals to deals that cannot be challenged under present interpretations of the Sherman Act.¹³⁹

EXCLUSIONARY DESIGN

Manufacturers can redesign products in minor and major ways to limit the ability of owners and independent shops to repair products.¹⁴⁰ While redesigns can be beneficial, they can sometimes serve exclusionary ends. Specifically, exclusionary design is a modification that "either does not improve the product in any material way or offers only a small benefit, and leads to the exclusion of rivals."¹⁴¹

The FTC should challenge exclusionary design choices under the Sherman and FTC Acts.¹⁴² To overcome the presumption that design changes are benign,¹⁴³ courts have held that plaintiffs must show that a product redesign "constitutes an anticompetitive abuse or leverage of monopoly power, or a predatory or exclusionary means of attempting to monopolize the relevant market."¹⁴⁴ By restricting or blocking independent service technicians from repairing products through redesigns, manufacturers reduce customer choice and can raise prices for repair services.¹⁴⁵

Two cases show that exclusionary product redesign can violate the antitrust laws. In *New York v. Actavis plc*, the 2ND Circuit held that a branded pharmaceutical company's reformulation of a drug and withdrawal of an earlier version violated the Sherman Act.¹⁴⁶ The court reached this decision

because the manufacturer's strategy had "the dual effect of forcing patients to switch to the new version and impeding generic competition."¹⁴⁷ Similarly, in *Abbott Laboratories v. Teva Pharmaceuticals USA*, a district court concluded that a product redesign could violate the antitrust laws.¹⁴⁸ In *Abbott Laboratories*, brand drug manufacturers "responded to the threat of generic entry" into the market by changing the formulation of their drugs.¹⁴⁹ This conduct was actionable because the brand drug manufacturers sought not to improve the product, but to prevent generic formulations from weakening their market positions.¹⁵⁰

VI. Policy Solutions in Conjunction With Antitrust Enforcement

Consumers can be empowered to repair their products by implementing a series of other legal changes.

First, consumers and independent repair shops should have a right to access parts, manuals, and tools, as well as diagnostic and service software to repair lawfully purchased products.

Second, reforms to copyright and patent law can also dramatically enhance a consumer's right to repair. Courts have held that corporations cannot exploit their acquired copyright and intellectual property rights to dominate markets in a way that violates antitrust law.¹⁵¹ Thus, modifying specific aspects of patent and copyright law as they are applied in the context of repair can have enormously beneficial effects to help both consumers and independent repair shops repair goods. On copyright law specifically, the Library of Congress under Section 1201 of the DMCA has broad authority to create exceptions to copyrightable material.¹⁵² Similar to its ruling in 2015,¹⁵³ the Library of Congress can create additional exceptions for copyrighted works when used in the context of repair.

Third, Congress should create an exemption for the usage of products bearing trademarks when used for repair and prohibit manufacturers from using trademark law to prevent the usage of replacement parts.¹⁵⁴ For example, Apple places small company logos in random areas on replacements parts. Federal law states that "merchandise bearing a

counterfeit ...imported into the United States ... shall be seized.”¹⁵⁵ This effectively grants manufacturers control of aftermarket used and refurbished parts, specifically those bought from overseas and imported into the United States to be used by independent repair shops.¹⁵⁶

VII. Conclusion

Over the last century, manufacturers have purposefully restricted repair using a variety of techniques. These techniques include introducing software into their products, requiring specialized and custom tools, and restricting access to product manuals.¹⁵⁷

When manufacturers monopolize aftermarkets and restrict repair, they reduce innovation, decrease user independence, and increase product waste. These techniques ultimately seek to retain and enhance manufacturers’ market power at the expense of the consumer.

Federal and state agencies, as well as private plaintiffs, can apply antitrust laws to break corporate monopoly power over aftermarkets. The Federal Trade Commission can choose to vigorously enforce the Magnuson-Moss Warranty Act to ensure that manufacturers are not illegally limiting or restricting product warranties. Congress and the courts can also create exemptions in both copyright and patent law that can enable consumers and independent repair shops to repair consumer goods.

Manufacturers have employed an “all of the above” strategy to restrict repair. Fortunately, there are a multitude of policy solutions currently available to break monopoly power and restore the repairability of consumer products.

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⁵⁹ John Deere. Long Comment Regarding a Proposed Exemption Under 17 U.S.C. 1201(2015), https://www.copyright.gov/1201/2015/comments-032715/class%2021/John_Deere_Class21_1201_2014.pdf.

⁶⁰ *Id.*

⁶¹ *BellSouth Advertising & Pub. Corp. v. Donnelley Information Pub., Inc.*, 999 F.2d 1436, 28 U.S.P.Q.2d 1001, 146 Pub. Util. Rep. 4th (PUR) 616 (11th Cir. 1993) (holding that a telephone directory, due to the limited means of organization and construction, was not an original work and thus not copyrightable); *Lambing v. Godiva Chocolatier*, 142 F.3d 434 (6th Cir. 1998) (stating “The identification of ingredients necessary for the preparation of food is a statement of facts. There is no expressive element deserving copyright protection in each listing. Thus, recipes are functional directions for achieving a result and are excluded from copyright protection under.”) (citations omitted); *Feist Publ'ns, Inc. v. Rural Telephone Service Co.*, 499 U.S. 340, 348 (1991) (stating “[A]ll fact-scientific, historical, biographical, and news of the day ... may not be copyrighted and are part of the public domain available to every person.”) (internal quotations and citations omitted).

⁶² See *Situation Mgmt. Sys. v. ASP Consulting*, 560 F.3d 53, 61 (1st Cir. 2009) (“SMS’s creative choices in describing those processes and systems, including the works’ overall arrangement and structure, are subject to copyright protection.” (citing *Feist Publ'ns*, 499 U.S. at 350–51)). Some courts have considered fair use a potential means to utilize repair manuals. However, they typically include some overriding authority. See *Gulfstream Aero. Corp. v. Camp Sys. Int’l*, 428 F. Supp. 2d 1369 (2006) (detailing that regulations enacted by the Federal Aviation Administration, which required aircraft manufacturers to produce and distribute such maintenance manuals, proved decisive in rejecting copyright claims).

⁶³ Anjanette H. Raymond, *Pliers and Screwdrivers As Contributory Infringement Devices: Why Your Local Digital Repair Shop Might Be A Copyright Infringer, and Why We Must Stop the Craze*, 12 NW. J. TECH. & INTELL. PROP. 67, 70 (2014).

⁶⁴ *Id.* at 70–71.

⁶⁵ *Id.*

⁶⁶ 17 U.S.C. 504 (2020).

⁶⁷ Mitch Stoltz, *Collateral Damages: Why Congress Needs To Fix Copyright Law’s Civil Penalties*, ELECTRONIC FRONTIER FOUND. (July 24, 2014), <https://www.eff.org/wp/collateral-damages-why-congress-needs-fix-copyright-laws-civil-penalties>.

⁶⁸ For both patented and copyrighted works, this concept is known as the first-sale doctrine. Samuelson, *supra* note 58, at 600 n.37.

⁶⁹ W.S. Humphrey, *Software Unbundling: A Personal Perspective*, 24 IEEE ANNALS HIST. COMPUTING 59 (2002).

⁷⁰ *Id.* at 60.

⁷¹ *Id.*

⁷² Scholars credit IBM with being the first to develop and successfully propagate the usage of EULA. See

Id. at 59–60. See also PERZANOWSKI & SCHULTZ, *supra* note 37, at 62 (stating “The EULA got its start in the software industry. In the early days of computing, hardware and software were typically bundled together. Software was a means of boosting hardware sales; markets for standalone software products had yet to develop. IBM was among the first companies to unbundle its hardware and software.”).

⁷³ Rebecca K. Lively, *Microsoft Windows Vista: The Beginning or the End of End-User License Agreements As We Know Them?*, 39 ST. MARY'S L. J. 339, 342 (2007).

⁷⁴ See generally Mark A. Lemley, *Terms of Use*, 91 MINN. L. REV. 459, 460 (2006) (stating these agreements “control (or purport to control) the circumstances under which buyers of software or visitors to a public Web site can make use of that software or site.”).

⁷⁵ See generally Lively, *supra* note 73, at 346–47. See also Jean Braucher, *When Your Refrigerator Orders Groceries Online and Your Car Dials 911 After an Accident: Do We Really Need New Law for the World of Smart Goods?*, 8 WASH. U. J.L. & POL'Y 241, 253 (2002) (stating “EULA[s] [are a] way to prohibit transfer and restrict use in order to implement price discrimination[.]”).

⁷⁶ See generally Lemley, *supra* note 74; *Meyer v. Uber Technologies, Inc.*, 868 F.3d 66 (2d Cir. 2017) (note this case applies California law).

⁷⁷ Natasha Singer, *Didn't Read Those Terms of Service? Here's What You Agreed to Give Up*, N.Y. TIMES: BITS (Apr. 28, 2014 1:33 PM), <https://bits.blogs.nytimes.com/2014/04/28/didnt-read-those-terms-of-service-heres-what-you-agreed-to-give-up/>.

⁷⁸ Yannis Bakos et al., *Does Anyone Read the Fine Print? Consumer Attention to Standard-Form Contracts*, 43 J. LEGAL STUD. 35 (2014).

⁷⁹ Casey Fiesler & Amy Bruckman, *Copyright Terms in Online Creative Communities*, CHI 2014, EXTENDED ABSTRACTS ON HUM. FACTORS IN COMPUTING SYS. 2552 (2014), <https://dl.acm.org/doi/10.1145/2559206.2581294>.

⁸⁰ See e.g., Stefan Etienne, *Microsoft stops selling ebooks and will refund customers for previous purchases*, VERGE (Apr. 2, 2019 12:14 PM), <https://www.theverge.com/2019/4/2/18292177/microsoft-ebooks-refund-stops-selling-digital-books-store> (detailing when Microsoft exited the eBook industry, users who purchased books on Microsoft's platform lost access to all of their books); Michael Corkery & Jessica Silver-Greenburg, *Miss a Payment? Good Luck Moving That Car*, N.Y. TIMES: DEALBOOK (Sept. 24, 2014 9:33 PM), <https://dealbook.nytimes.com/2014/09/24/miss-a-payment-good-luck-moving-that-car/> (detailing how car dealers can utilize agreements to install software that grants them the ability to disable an owner's vehicle should they miss even one payment.).

⁸¹ This policy has been in place at least since 2013. See Michael Terasaki, *Do End User License Agreements Bind Normal People?*, 41 W. ST. U. L. REV. 467, 478 (2014).

⁸² Peter Eckersley, *Sony Steals Feature From Your PlayStation 3*, ELECTRONIC FRONTIER FOUND. (Mar. 30, 2010), <https://www.eff.org/deeplinks/2010/03/sony-steals-feature-from-your-playstation-3>.

⁸³ Lemley, *supra* note 74, at 468.

⁸⁴ 86 F.3d 1447 (7th Cir. 1996); Lively, *supra* note 73, at 351.

⁸⁵ Jason Koebler, *Corporations Use End User License Agreements to Create a Parallel Legal System*, VICE (Mar. 29, 2017), https://www.vice.com/en_us/article/wn949b/how-corporations-use-end-user-license-agreements-to-create-a-parallel-legal-system.

⁸⁶ Bushey, *supra* note 1.

⁸⁷ *Where Does the Car Dealer Make Money?*, EDMUNDS (June 13, 2019), <https://www.edmunds.com/car-buying/where-does-the-car-dealer-make-money.html>.

- ⁸⁸ See Norman Hawker, *Under Threat: Competition in the Automotive Service Aftermarket* (AM. ANTITRUST INST., Working Paper No. 08-05), https://www.antitrustinstitute.org/wp-content/uploads/2018/08/AAI-working-paper-08-05_122920081621.pdf.
- ⁸⁹ Melissa Burden, *Parts, service and accessories boost Ford, FCA, GM revenue*, DETROIT NEWS (March 23, 2017, 10:00 PM), <https://www.detroitnews.com/story/business/autos/general-motors/2017/03/23/parts-accessories-boost-ford-fca-gm-revenue/99562692/>. Other heavy industries also earn substantial percentages of their profits from aftermarket sales. See e.g., Alwyn Scott, *Boeing Takes on Peers, Partners in Bid for Replacement Parts Business*, REUTERS (Oct. 24, 2016, 1:26 AM), <https://www.reuters.com/article/us-boeing-aftermarket-analysis/boeing-takes-on-peers-partners-in-bid-for-replacement-parts-business-idUSKCN1200EX> (stating “Analysts estimate parts and services generate about \$15 billion a year, or nearly 16 percent of Boeing’s \$96 billion in annual sales.”).
- ⁹⁰ Jared Gilmour, *Americans break two smartphone screens each second, costing \$3.4 billion a year, report says*, MIAMI HERALD (Nov. 21, 2018 5:51 PM), <https://www.miamiherald.com/news/nation-world/national/article222040170.html>.
- ⁹¹ *New Study Shows Damaged iPhones Cost Americans \$10.7 Billion, \$4.8B in the Last Two Years Alone*, SQUARE TRADE (Sept. 18, 2014), <https://www.squaretrade.com/press/new-study-shows-damaged-iphones-cost-americans-10.7billion-4.8b-in-the-last-two-years-alone>.
- ⁹² Gilmour, *supra* note 90.
- ⁹³ Jim Gorzelany, *Soaring Cost of Parts Means Your Car is More Likely to be Totaled in an Accident*, FORBES (Feb. 15, 2018 2:10 PM), <https://www.forbes.com/sites/jimgorzelany/2018/02/15/the-sum-not-the-whole-is-greater-when-it-comes-to-the-skyrocketing-cost-of-car-parts/#36e1852f53df>.
- ⁹⁴ Andrew Krok, *Tech to Blame for Ever-growing Repair Costs, AAA says*, CNET (Oct. 25, 2018 11:07 AM), <https://www.cnet.com/roadshow/news/growing-repair-costs-car-tech-aaa-study/>; David Dayen, *The Infuriating Reason That Car Repairs Are So Expensive*, NEW REPUBLIC (Sept. 15, 2015), <https://newrepublic.com/article/122820/infuriating-reason-car-repairs-are-so-expensive>.
- ⁹⁵ *Disturbing Trend: Car Company Monopoly on Collision Repair Parts*, QUALITY PART COALITION (2014) [hereinafter Quality Report], http://www.keepautopartsafteraffordable.org/sites/all/themes/framework/pdf_resource/design+patents+on+collision+repair+parts_graph-2.pdf; PERZANOWSKI & SCHULTZ, *supra* note 37, at 47 (stating “IP rights holders—from publishers to carmakers—are attracted to the increased control licensing promises them. They can eliminate secondary markets like used book stores; they can reduce competition for complementary products like coffee or ink cartridges; and they can corner the market for repair and other related services.”).
- ⁹⁶ Quality Report, *supra* note 95.
- ⁹⁷ *Should you repair or replace that product?*, CONSUMER REP. (Jan. 2014), <https://www.consumerreports.org/cro/magazine/2014/02/repair-or-replace/index.htm>.
- ⁹⁸ Geoffrey A. Fowler, *We Need the Right to Repair Our Gadgets*, WALL ST. J. (Sept. 8, 2015, 3:04 PM), <https://www.wsj.com/articles/we-need-the-right-to-repair-our-gadgets-1441737868> (detailing that the cost to fix a broken TV is equivalent to purchasing a new one, whereas self-repair is \$12.).
- ⁹⁹ Hawker, *supra* note 88, at 13 (stating “An OEM can effectively deny independents access to the tools, codes and training needed to diagnose and repair problems by charging cost prohibitive rates.”).
- ¹⁰⁰ Craig Lloyd, *Independent Repair Shops Aren’t As Risky As People Think*, iFIXIT (Apr. 22, 2019), <https://www.ifixit.com/News/15931/independent-repair-shops-arent-as-risky-as-people-think>.
- ¹⁰¹ Purdy, *supra* note 46.

- ¹⁰² Sean Hollister, *Apple Apologizes for iPhone Slowdowns, Slashes Price of Battery Fix*, CNET (Dec. 28, 2017 2:26 PM), <https://www.cnet.com/news/apple-sorry-iphone-battery-slowdown-ios-update-official/>.
- ¹⁰³ James Vincent, *Apple Won't Replace Your Old iPhone 6 Plus Battery Until March Because of Short Supplies*, VERGE (Jan. 11, 2018, 11:04 AM), <https://www.theverge.com/2018/1/11/16878412/iphone-slowdown-battery-replacement-wait-times-6-plus-supply-shortage>.
- ¹⁰⁴ Maddie Stone, *Apple's Independent Repair Program Is Invasive to Shops and Their Customers, Contract Shows*, VICE (Feb. 6, 2020 8:00 AM), https://www.vice.com/en_us/article/qjdjnv/apples-independent-repair-program-is-invasive-to-shops-and-their-customers-contract-shows.
- ¹⁰⁵ Joel Kurth, *FDA May Step in, Regulate 'Wild West' of Surgical Instrument Repair Shops*, DETROIT NEWS (Nov. 16, 2016, 11:41 PM), <https://www.detroitnews.com/story/news/special-reports/2016/11/16/fda-weighs-rules-surgical-instrument-repair/94003446/>; K. Richard Douglas, *Right to Repair: Pushing for Access & Concessions*, TECHNATION (Oct. 1, 2017), <https://1technation.com/right-to-repair-pushing-for-access-concessions/>.
- ¹⁰⁶ Kristen Grant et al., *Health Consequences of Exposure to E-waste: A Systematic Review*, 1 LANCET GLOBAL HEALTH 350 (2013).
- ¹⁰⁷ *Children's Environmental Health*, WORLD HEALTH ORG., <https://www.who.int/ceh/risks/ewaste/en/> (last visited Feb. 21, 2020); Marie Noel-Brune et al., *Health Effects of Exposure to E-waste*, 1 CORRESPONDENCE 70 (2013), [https://www.thelancet.com/journals/langlo/article/PIIS2214-109X\(13\)70020-2/fulltext](https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(13)70020-2/fulltext).
- ¹⁰⁸ *Forecast of Electronic Waste Generated Worldwide from 2010 to 2018 (in million metric tons)*, STATISTA, <https://www.statista.com/statistics/499891/projection-ewaste-generation-worldwide/> (last visited Sept. 14, 2019); *Forecast of Per Capita Electronic Waste Generation Worldwide from 2010 to 2018 (in kilograms per capita)*, STATISTA, <https://www.statista.com/statistics/499904/projection-ewaste-generation-per-capita-worldwide/> (last visited Sept. 14, 2019).
- ¹⁰⁹ Charmaine Crutchfield, *Smartphone Disposal Poses Security Risks, Experts Warn*, USA TODAY (Nov. 10, 2014), <https://www.usatoday.com/story/news/nation/2014/11/10/smart-phone-security-risks/18798709/>; *Cell Phone Recycling*, AT&T (2013), https://www.att.com/Common/about_us/files/csr_2012/cell_phone_recycling.pdf.
- ¹¹⁰ *A New Circular Vision for Electronics*, WORLD ECON. FORUM 6 (Jan. 2019), http://www3.weforum.org/docs/WEF_A_New_Circular_Vision_for_Electronics.pdf; Carole Mars et al., *The Electronics Recycling Landscape*, SUSTAINABILITY CONSORTIUM 14 (May 2016), https://www.sustainabilityconsortium.org/wp-content/uploads/2017/03/TSC_Electronics_Recycling_Landscape_Report-1.pdf (stating small appliances account for 20% of e-waste, TV & home theater devices account for 14%, computers and tablets account for 18%, and mobile devices account for 17%).
- ¹¹¹ PERZANOWSKI & SCHULTZ, *supra* note 37, at 135.
- ¹¹² *Clean room design*, WIKIPEDIA, https://en.wikipedia.org/wiki/Clean_room_design (last visited Mar. 5, 2020).
- ¹¹³ MARTIN CAMPBELL-KELLY & WILLIAM ASPRARY, *COMPUTER: A HISTORY OF THE INFORMATION MACHINE* 229 (2nd ed. 2004).
- ¹¹⁴ 504 U.S. 451 (1992).
- ¹¹⁵ *Id.* at 486.
- ¹¹⁶ *Id.* at 473.
- ¹¹⁷ Section 1 of the Sherman Act applies to tying agreements involving either goods or services, while § 3 of the Clayton Act applies only to tying arrangements involving goods—not those involving services.

- See 15 U.S.C. § 14 (stating “goods, wares, merchandise, machinery, supplies, or other commodities.”).
- ¹¹⁸ 466 U.S. 2, 12 (1984) (emphasis added).
- ¹¹⁹ *Id.* (holding that tying arrangements are per se illegal by a 5-to-4 vote but unanimously concluding that the particular tying arrangement at issue was lawful); see also *Illinois Tool Works Inc. v. Independent Ink, Inc.*, 547 U.S. 28, 46 (2006) (stating that “in all cases involving a tying arrangement, the plaintiff must prove that the defendant has market power in the tying product”).
- ¹²⁰ See e.g., *Suture Express, Inc. v. Owens & Minor Distribution, Inc.*, 851 F.3d 1029, 1042 (10th Cir. 2017), cert. denied, 138 S. Ct. 146 (2017).
- ¹²¹ Magnuson-Moss Warranty-Federal Trade Commission Improvement Act, Pub. L. No. 93-637, 88 Stat. 2183 (1975) (codified at 15 U.S.C. §§ 2301–12 (2020)); see H.R. Rep. No. 93-1107, at 22–23.
- ¹²² 15 U.S.C. §§ 2301 et seq.
- ¹²³ 15 U.S.C. § 2302(c); 16 C.F.R. § 700.10.
- ¹²⁴ See generally 15 U.S.C. 1125(a) (prohibiting the use of “any ... false or misleading representation of fact ... in commercial advertising ...[that] misrepresents the nature, characteristics, qualities, or geographic origin” of goods or services); 15 U.S.C. § 45 (prohibiting the use of “unfair methods of competition” and “unfair or deceptive acts or practices”).
- ¹²⁵ Unless costs including the labor and the replacement part are provided for free under the warranty. See 15 U.S.C. § 2302(c); 16 C.F.R. § 700.10(c) (stating “No warrantor may condition the continued validity of a warranty on the use of only authorized repair service and/or authorized replacement parts for non-warranty service and maintenance (other than an article of service provided without charge under the warranty or unless the warrantor has obtained a waiver[.]”).
- ¹²⁶ Nathan Proctor, *Survey Finds 45 of 50 Companies Void Warranties for Independent Repair*, U.S. PIRG (Oct. 11, 2018), <https://uspirg.org/news/usp/survey-finds-45-50-companies-void-warranties-independent-repair>.
- ¹²⁷ Lesley Fair, *FTC Staff Sends Warranty Warnings*, FED. TRADE COMMISSION (Apr. 10, 2018 11:03 AM), <https://www.ftc.gov/news-events/blogs/business-blog/2018/04/ftc-staff-sends-warranty-warnings-ftc-staff-warns-companies-that-it-is-illegal-to-condition-warranty-coverage-on-the-use-of-specified-parts-or-services>, FED. TRADE COMMISSION (Apr. 10, 2018), <https://www.ftc.gov/news-events/press-releases/2018/04/ftc-staff-warns-companies-it-illegal-condition-warranty-coverage>.
- ¹²⁸ 15 U.S.C. 2302(c) (stating “No warrantor of a consumer product may condition his written or implied warranty of such product on the consumer's using, in connection with such product, any article or service (other than article or service provided without charge under the terms of the warranty) which is identified by brand, trade, or corporate name[.]”) (emphasis added). See also *Determann & Perens*, supra note 40, at 968 (stating “Clean Air Act manufacturers are not only prohibited from conditioning warranty claims on usage of branded products, as they are more generally under the Magnuson Moss Act, but the Clean Air Act also requires that manufacturers issue maintenance instructions that ‘shall not include any condition on the ultimate purchaser's using ... any component or service ... which is identified by brand, trade, or corporate name.’”) (citing 42 U.S.C. § 7541 (2012)).
- ¹²⁹ See generally *Tampa Elec. Co. v. Nashville Coal Co.*, 365 U.S. 320 (1961); *ZF Meritor, LLC v. Eaton Corp.*, 696 F.3d 254 (3d Cir. 2012) (“An exclusive dealing arrangement is an agreement in which a buyer agrees to purchase certain goods or services only from a particular seller for a certain period of time.”); *Allied Orthopedic Appliances Inc. v. Tyco Health Care Grp. LP*, 592 F.3d 991 (9th Cir. 2010).
- ¹³⁰ *ZF Meritor*, 696 F.3d at 270 (“[T]he law is clear that an express exclusivity requirement is not necessary because de facto exclusive dealing may be unlawful.”).

- ¹³¹ See *United States v. Dentsply Int'l, Inc.*, 399 F.3d 181, 187–96 (3d Cir. 2005) (holding that a dental product supplier violated Sherman § 2; acquisition and maintenance of substantial market power, combined with creation of high price umbrella, evidenced power to exclude through exclusive dealing arrangements that imposed limitations on dental product dealers, creating artificially high barriers to entry and limiting product choices of both dealers and laboratories), *cert. denied*, 546 U.S. 1089 (2006).
- ¹³² *E.g.*, *McWane, Inc. v. FTC*, 783 F.3d 814, 837 (11th Cir. 2015) (“Traditionally a foreclosure percentage of at least 40% has been a threshold for liability in exclusive dealing cases. . . . However, some courts have found that a lesser percentage of foreclosure is required when the defendant is a monopolist.”); *ZF Meritor*, 696 F.3d at 286 (noting that the Third Circuit had previously suggested that a 40% to 50% foreclosure rate was necessary).
- ¹³³ *Verizon Commc'ns Inc. v. Law Offices of Curtis V. Trinko*, 540 U.S. 398, 407 (2004).
- ¹³⁴ *E.g.*, *Aspen Skiing Co. v. Aspen Highlands Skiing Corp.*, 472 U.S. 585 (1985); *Trinko*, 540 U.S. at 407.
- ¹³⁵ *Monsanto Co. v. Spray-Rite Serv. Corp.*, 465 U.S. 752, *reh'g denied*, 466 U.S. 994 (1984); *Aspen Skiing*, 472 U.S. 585; *FTC v. Texaco, Inc.*, 393 U.S. 223 (1968).
- ¹³⁶ *Aspen Skiing*, 472 U.S. 585. Note the 7th Circuit Court of Appeal recently applied the rule of reason and rejected the application of the “profit sacrifice” test as a condition on refusals to deal. See *Viamedia, Inc. v. Comcast Corp.*, 951 F.3d 429, 462 (7th Cir. 2020).
- ¹³⁷ *Trinko*, 540 U.S. at 409.
- ¹³⁸ *Id.*; see *e.g.*, *Novell, Inc. v. Microsoft Corp.*, 731 F.3d 1064 (10th Cir. 2013) (explaining that the Supreme Court has held that at least two factors must be present for liability: “First, . . . there must be a preexisting voluntary and presumably profitable course of dealing between the monopolist and its rival. . . . Second, . . . the monopolist’s discontinuance of a preexisting course of dealing must ‘[suggest] a willingness to forsake short-term profits to achieve an anticompetitive end.’”).
- ¹³⁹ 15 U.S.C. § 46(g); see also *FTC v. Sperry & Hutchinson Co.*, 405 U.S. 233, 239 (1972) (stating that “unfair method of competition” may be found “even though the practice does not infringe either the letter or the spirit of the antitrust laws.”).
- ¹⁴⁰ iFixit Report, *supra* note 53 (detailing changes such as using glue instead of screws, soldering components together to inhibit repair and requiring that consumers replace the entire component instead of a specific piece.).
- ¹⁴¹ Jonathan Jacobson et al., *Predatory Innovation: An Analysis of Allied Orthopedic v. Tyco in the Context of Section 2 Jurisprudence*, 23 LOY. CONSUMER L. REV. 1, 1 (2010).
- ¹⁴² *Abbott Labs. v. Teva Pharm. USA, Inc.*, 432 F. Supp. 2d 408, 421 (D. Del. 2006) (“[b]ecause, speaking generally, innovation inflicts a natural and lawful harm on competitors, a court faces a difficult task when trying to distinguish harm that results from anticompetitive conduct from harm that results from innovative competition.”); *Allied Orthopedic*, 592 F.3d at 1000–02 (“[s]tatements of an innovator’s intent to harm a competitor through genuine product improvement are insufficient by themselves to create a jury question under Section 2.”).
- ¹⁴³ Ross D. Petty, *Antitrust and Innovation: Are Product Modifications Ever Predatory?*, 22 SUFFOLK U. L. REV. 997, 1017 (1988) (citing *Berkey Photo, Inc. v. Eastman Kodak Co.*, 603 F.2d 263, 287 (2d Cir. 1979)).
- ¹⁴⁴ *Allied Orthopedic*, 592 F.3d at 998, 1000.
- ¹⁴⁵ See *United States v. Microsoft Corp.*, 253 F.3d 34 (D.C. Cir. 2001) (affirming findings that Microsoft used various anti-competitive product design tactics to monopolize the market for Intel-compatible PC operating systems, including designing the “Add/Remove” function in Windows so that it could not be used to substitute systems viewed as a competitive threat. Microsoft prevented effective product

substitutions by “significantly reduc[ing] usage of rivals' products” and thereby “protect[ed] its own operating systems monopoly.” One instance included preventing OEMs from altering the Windows desktop [so they could not, for example, delete the Internet Explorer icon or change the initial bootup sequence that a user follows]).

¹⁴⁶ 787 F.3d 638, 659 (2d Cir. 2015).

¹⁴⁷ *Id.*

¹⁴⁸ 432 F. Supp. 2d 408 (2006).

¹⁴⁹ *Id.*

¹⁵⁰ *Id.*

¹⁵¹ *In re Independent Serv. Orgs. Antitrust Litig.*, 964 F. Supp. 1479, 1489 (quoting *Kodak*, 504 U.S. at 479 n.29) (“[a] legal advantage such as a ... copyright ... can give rise to liability if a seller exploits his dominant position in one market to expand his empire into the next[.]”) (internal quotations omitted); *Microsoft*, 253 F.3d at 63.

¹⁵² Daniel Cadia, *Fix Me: Copyright, Antitrust, and the Restriction on Independent Repairs*, 52 U.C. DAVIS L. REV. 1701, 1710 (2019).

¹⁵³ Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies, 80 Fed. Reg. 65944–64 (Oct. 28, 2015) (detailing new exemptions under Section 1201 of the Digital Millennium Copyright Act, including the ability for consumers to unlock phones and tablets, as well as modify software on cars and tractors.). See also Kyle Wiens, *We Won Copyright Exemptions for Repairing Tractors, Cars, and Tablets*, iFIXIT (Oct. 27, 2015), <https://www.ifixit.com/News/7475/repair-coalition-wins-exemptions>.

¹⁵⁴ These products are often called “gray market” goods. See *K Mart Corp. v. Cartier, Inc.*, 486 U.S. 281, 285 (1988) (“A gray-market good is a foreign-manufactured good, bearing a valid United States trademark, that is imported without the consent of the United States trademark holder.”).

¹⁵⁵ 19 U.S.C. § 1526(e).

¹⁵⁶ Jason Koebler, *DHS Seizes Aftermarket iPhone Screens From Prominent Right-to-Repair Advocate*, VICE (May 11, 2018, 4:26 PM), https://www.vice.com/en_us/article/evk4wk/dhs-seizes-iphone-screens-jessa-jones.

¹⁵⁷ iFixit Report, *supra* note 53 (detailing various product design changes such as using glue instead of screws, soldering components together to inhibit repair and requiring that consumers replace the entire component instead of a specific piece).