

THE STRATEGIC RESPONSE TO THE RIGHT TO REPAIR



BY LUYI YANG¹



¹ UC Berkeley, Haas School of Business.

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The right-to-repair movement is gaining traction around the world. It asserts that repair is a fundamental right of product ownership and calls for legislation that mandates a broader access to information, tools, and parts to facilitate independent repair. Repair advocates argue that promoting the right to repair benefits consumers and protects the environment. Critics contend that unauthorized third-party or DIY repair can constitute significant safety and security threats, let alone intellectual-property infringement. However, the economics of the right to repair has not been carefully scrutinized until recently. The latest economic research finds that the right-to-repair legislation can trigger a series of strategic responses from manufacturers in the product market, including adjustments of product prices, product durability, and business models. This implies that the right-to-repair legislation can have unintended consequences and may not always fulfill its consumer-protection or sustainability goals. These findings caution against sweeping, one-size-fits-all policies.

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I. INTRODUCTION

The “right-to-repair” movement seeks to make it easier and cheaper for consumers to fix their products by requiring manufacturers to share repair information, provide diagnostic tools, and supply service parts. This movement was born out of the growing consumer frustration that manufacturers of durable products — such as automobiles, cell phones, computers, farm equipment, and home appliances — often prevent independent repair by withholding repair manuals and schematics, using specialized tools available only to authorized technicians, and limiting the stock of spare parts. The key argument is that the right to repair should be a fundamental right that comes with product ownership: if a consumer cannot repair a product, then they do not truly own it.

The right-to-repair movement has prompted legal changes around the globe. In 2021, the European Union required manufacturers to supply spare parts for up to 10 years; France required manufacturers to label their electronic devices with a repairability index intended to inform consumers about how easily a product can be repaired. In the U.S., President Biden signed a sweeping executive order in July 2021 directing the Federal Trade Commission (“FTC”) to draft new right-to-repair regulations. The FTC issued a “Nixing the Fix” report in May 2021 by unanimous vote in response to Congress’s directive to report on anti-competitive practices related to repair markets and make recommendations on how best to address them. At the state level, Massachusetts passed the Motor Vehicle Owners’ Right to Repair Act in 2012 and made an amendment in 2020 that further mandated manufacturers with telematics systems to equip their vehicles with open access platforms. In 2022 and 2023, a series of states, including New York, Colorado, Minnesota, and California, successively passed their own versions of right-to-repair laws, covering products ranging from agricultural equipment to consumer electronics.

Repair advocates argue that the right to repair protects consumers and promotes sustainability. They maintain that such legislation will break manufacturers’ monopoly on the repair market, empowering consumers with more repair choices and thus benefiting consumers. They further contend that easier repair allows consumers to hold on to their old products longer, so they do not throw away used products and buy new ones as quickly. Prolonged product lifetimes translate into lower environmental impact as electronic waste (e-waste) and new production will both decrease.

A. Why Now?

Repair itself is not a new concept. In fact, the word “repair” traces to the Latin verb *reparare* and has always been an integral part of human history. So why has repair become a contentious issue in recent years? A key driver is that modern consumers have become increasingly reliant on a wider range of technology products, which themselves are getting increasingly more sophisticated over the years to satisfy the growing demand of consumers. This makes the task of repair increasingly difficult without the aid of manufacturers. Back in the old days, an entire household was likely to have only one landline phone and one desktop computer at best, but now each one of us may have a cell phone, a laptop, and a tablet, at the very least. Moreover, as pointed out by Grinvald & Tur-Sinai (2019),² almost all these consumer electronics nowadays have a software component or a computer chip.

This implies that (1) we are more likely to encounter product failure (because we have more technology products to begin with), making repair increasingly relevant; and (2) the idea of unscrewing the back of your microwave oven and fixing it with some simple tools becomes further removed from reality. Therefore, the tension between consumers who demand repair and manufacturers who fail to facilitate repair keeps escalating, eventually giving rise to the right-to-repair movement.

II. CURRENT DEBATE

The right-to-repair initiative is not always viewed favorably and is sometimes met with skepticism or even opposition. Some manufacturers fiercely lobby against right-to-repair bills. Even if a bill is signed into law, manufacturers may still file lawsuits against these laws, which could significantly delay the legislative process, as in the case of the 2020 amendment to Massachusetts’ Motor Vehicle Owners’ Right to Repair Act. Skeptics and opponents argue that letting unauthorized individuals without appropriate training or expertise undertake repair will pose a significant safety risk, compromise security, or even infringe upon existing copyright and patent laws that protect intellectual property. Instead, repair advocates see these counterarguments mostly as unconvincing excuses to stall the right to repair. They point out that manufacturers’ real concern is that giving consumers the right to repair will hurt company profit, both from providing repair services and from selling new products. We discuss these heavily-debated issues below.

² Leah Chan Grinvald & Ofer Tur-Sinai, *Intellectual Property Law and the Right to Repair*, 88 Fordham L. Rev. 63 (2019).

Safety. Some concerns regarding safety are not entirely groundless. A widely cited example is medical devices such as ventilators and MRI machines. One reason why medical devices are exempted from most right-to-repair legislation (like the one in Minnesota) is the potential safety risks that independent repair may pose for patients. If medical devices are not properly repaired, it may lead to misdiagnosis or even expose patients to unnecessary radiation. Hence, when patient lives are on the line, it may simply be too risky to leave it to non-experts to repair medical devices that are increasingly complex and sophisticated.

Security. Another issue is security. In the case of smartphones and laptops, access to repair tools and software systems could potentially be exploited to bypass security features and gain unauthorized access to sensitive user data. Worse still, in automotive, if individuals can easily access and modify a car's software, there could be a risk of malicious software alterations, which can have serious implications for vehicle safety and operation.

Intellectual Property ("IP"). Intellectual property and copyright are another topic of heated debate. On the one hand, existing patent and copyright laws protect intellectual property and promote innovation. On the other hand, providing repair documentation and granting access to a product's software system may inadvertently reveal trade secrets and a product's proprietary information. Such information may potentially be taken advantage of by counterfeiters, who may, in turn, threaten the business of the IP holder. This creates tension between repair advocates who call for broader access to IP-protected product information and IP holders who would like to deny such access to protect their own IP.

Industry Self-regulation. A recent trend that has received mixed responses is industry self-regulation. For example, in April 2022, Apple launched a Self-Service Repair program for the iPhone, which is designed to allow Apple device owners to do their own repairs in their homes using Apple parts, repair manuals, and tools. In January 2023, John Deere, one of the largest manufacturers of agricultural equipment, reached a Memorandum of Understanding ("MOU") with the American Farm Bureau Federation to facilitate the right to repair. While some think legislation is no longer necessary given the rise of industry self-regulation, critics accuse manufacturers of using self-regulation as a publicity stunt to pacify the public without actually being held accountable. For example, many find Apple's repair kit incredibly cumbersome to use while others deem the MOU in the farm equipment industry to be lacking in substance. Thus, without either enforcement or clarity, industry self-regulation is unlikely to be sufficient in the eyes of many repair advocates.

III. MANUFACTURERS' STRATEGIC RESPONSE: AN ECONOMIC PERSPECTIVE

Absent the safety, security, and IP concerns, the basic economic intuition of repair advocates was almost never questioned in the mainstream debate of the right to repair until our research was published in *Management Science*³. Before that, the implicit assumption was always that manufacturers would not react in the product market even if the passage of right-to-repair laws or mounting public pressure forced them to make independent repair easier. This seems implausible as it is hard to imagine a manufacturer with an economic interest not doing anything to mitigate their foreseeable profit loss from legislative enforcement. Our research challenges this assumption and finds that once manufacturers strategically respond, the right-to-repair legislation may not benefit either consumers or the environment.

A. Pricing and Product Design Response

We formulated an economic model to analyze manufacturers' pricing and product design strategies in response to the right-to-repair legislation. Our model is one of "durable goods," goods that are used repeatedly over time, such as automobiles, cell phones, computers, farm equipment, and home appliances. These are exactly the types of products the right-to-repair movement is meant to target. We capture key features of durable goods, including their performance deterioration over time, the possibility of product failure, and an active secondary market for trading used products. We also incorporate important behavioral dynamics of utility-maximizing consumers, such as the substitution between new products and used products, the choice between manufacturer repair and independent repair, and the decision of whether to be an active user. Besides, we model a profit-maximizing manufacturer' pricing, repair, and product design strategies. We track two performance measures: (1) consumer surplus, a measure of how well consumers are doing and (2) total environmental impacts over a product's life cycle, including the impact in the production phase (e.g. pollution), the impact during usage (e.g. emissions), and the impact in the disposal phase (e.g. e-waste).

There are three possibilities of manufacturers' product-price response to the right-to-repair legislation: (1) they stay put without making any adjustments, as implicitly assumed in most of the current debate; (2) manufacturers follow a margin strategy and raise new product prices to capitalize on easier repair; (3) manufacturers follow a volume strategy and cut new product prices to lure consumers into replacing instead of repairing a glitchy product.

³ Chen Jin, Luyi Yang & Cungen Zhu, *Right to Repair: Pricing, Welfare, and Environmental Implications*. *MANAGEMENT SCIENCE*. 69:2, 1017-1036 (2023).

Our model analysis shows that all three possibilities can arise and how manufacturers respond depends crucially on how much it costs to produce the product in question. In the market for products that are relatively cheap to make — for example, cell phones and microwaves — our model predicts that after a right-to-repair bill goes into effect, manufacturers will likely respond by lowering new product prices and flooding the market with cheap goods. A key concern that manufacturers have in this case is the “demand cannibalization effect” of repair. That is, with easier repair, consumers hold on to used products for a longer time and are less keen on buying new products, which implies that used products can cannibalize new product sales. To allay this demand cannibalization effect, manufacturers cut new product prices; doing so reduces the appeal of repair because consumers would rather buy a brand-new product at a low price than fix a used product. Therefore, manufacturers’ price response effectively allows them to circumvent a broader adoption of repair, defeating the purpose of right-to-repair laws. While a lower price benefits consumers, it also motivates more consumers to replace used products with new ones. The increase in new purchases translates into more new production and eventually more e-waste. As a result, the environmental impact increases.

In contrast, when production costs are high, new products inevitably come with a steep price tag, which weakens demand. To overcome this and stimulate demand, manufacturers are likely to offer free repair services to whet consumers’ appetites. This is a “value enhancement effect,” i.e. the repair service could make the products last longer and hence, increase the consumers’ valuation of the product. Since repair is offered free of charge even before the enactment of any law, the right-to-repair legislation is unlikely to make much of a difference.

In instances where production costs are intermediate, our model predicts that the outcome is a combination of the above effects. When the right-to-repair legislation is introduced, independent repair costs start to fall, and manufacturers are likely to lower the prices of their new products in order to entice customers away from the repair option (similar to what happens in the low production cost scenario). However, a continual price cut would eventually leave the profit margin too thin. If independent repair were widely available, products would have a longer lifespan, which makes them more valuable. Manufacturers would have the incentive to take advantage of that increased value; in fact, they are likely to change tack and raise new product prices while offering free repair service (similar to what happens in the high production cost scenario).

In this case, while consumers with an existing product benefit from the lower repair cost, they nevertheless have to pay a higher price upfront if they decide to purchase a new product. Therefore, consumers are likely to be less satisfied with their new purchase and will increasingly settle for used products with worse performance. As a consequence, consumers are often worse off in this case. Moreover, even though fewer consumers buy new products, an easier repair could imply that more consumers become active users. This may not be good news for the environment, especially when most of the environmental impact is generated during the use phase of a product, as in the case of cars, trucks, refrigerators, or other major appliances. With more active users comes more usage, and hence higher environmental impact. This implies that a right-to-repair bill in this scenario can create a “lose-lose-lose” situation that compromises manufacturer profit, hurts the interest of consumers, and harms the environment despite repair being made easier and more affordable.

The above analysis assumes that manufacturers respond by only changing product and repair prices but not the product design. If the product design will be adjusted along with prices, the unintended economic and environmental consequences of the right-to-repair legislation do not go away. In particular, we find that whenever manufacturers reduce new product prices, they will also make the product less durable so that consumers will have an even stronger incentive to replace their used products. Reducing product durability complements price cuts and further mitigates demand cannibalization. On the other hand, whenever manufacturers raise new product prices, they will also make the product more durable to further tap into the value enhancement effect. Doing so allows manufacturers to charge an even higher price. Therefore, consumers can still be worse off despite increased product durability.

B. Business-Model Response: Leasing vs. Selling

While our research focuses on the prevailing business model in which producers sell products to consumers, a follow-up paper⁴ examines whether the right-to repair legislation prompts producers to switch to alternative, non-ownership models such as leasing and the implications of such a business-model response. In the leasing model, consumers pay for the usage of the product, but it is producers rather than consumers who own the product and take care of repairs.

One key finding of the paper is that when the production cost is low, the right-to-repair legislation will motivate producers to adopt the leasing model. This is because leasing charges consumers on a per-use basis and mitigates the cannibalization effect of the selling model in which ownership of a used product is a disincentive for consumers to buy a new product. Nevertheless, the switch to the leasing model can be detrimental to consumers and the environment. Retaining ownership allows producers to prematurely retire perfectly functional used products

⁴ Ece Gulserliiler, Atalay Atasu & Luk N. Van Wassenhove, *Business Model Choice under Right-to-Repair: Economic and Environmental Consequences* (INSEAD Working Paper No. 2022/05/TOM, 2022).

so that they can create artificial product shortage and jack up product prices. Not only does this practice harm the interest of consumers, but it also hurts the environment as product life is intentionally cut short and more e-waste may ensue.

C. Competition

The economic analyses so far have assumed a monopolist original-equipment manufacturer. While in many durable-product markets, some manufacturers can have considerable market power, one may argue that a duopoly or an oligopoly in which a handful of manufacturers compete against each other may be a more reasonable reflection of reality. Our ongoing research builds a model of competing manufacturers who are horizontally differentiated and sheds light on how the right-to-repair legislation may change the nature of competition in the product market. While conventional wisdom contends that giving consumers the right to repair promotes competition, we find instead that the right-to-repair legislation can soften price competition in the product market by allowing competing manufacturers to charge higher product prices. This is because repair mandates can shift the focus of competition away from product prices toward repair services. In this case, although repair becomes widely available, consumers are worse off overall owing to the higher product prices. Even though manufacturers do not have an incentive to voluntarily facilitate independent repair, when compelled, they may end up earning a higher profit thanks to the softened competition. This shows that competition does not necessarily stop manufacturers from raising product prices and that the benefit of easier repair may be siphoned off by manufacturers rather than retained by consumers.

IV. CONCLUSION

The right-to-repair movement is widely considered as a pro-consumer and pro-environment initiative. The current right-to-repair debate largely focuses on safety, security, and intellectual-property issues, but beyond these considerations, few have questioned the economics of right-to-repair laws. Recent economics-based research cautions against the unintended consequences of the right-to-repair legislation and shows that such legislation may not fulfill its consumer-protection and sustainability goals when the inextricable link between repair and product markets is taken in account. Ignoring the strategic response from the product market will paint an incomplete picture. Lawmakers should take a more holistic approach to assessing the repercussions of the right-to-repair legislation. Sweeping, one-size-fits-all policies can be counterproductive.



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