

Micromanaging Technology

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This Article examines a phenomenon I call complexity profiteering, in which firms add needless complexity to extract profit without adding value. A popular proposed solution to complexity profiteering is design-specific regulations such as bans on parts pairing, bans on the sale of product features such as heated car seats by monthly subscription, or mandatory USB-C charging ports to be included on all smartphones. I argue that these solutions, which I call complexity prohibitions, often undermine the fight against complexity profiteering. Empirically, prohibitions are circumvented in the short run and become self-defeating in the long run, as iterative cycles of bans and workarounds ultimately drive regulators toward micromanaging product design. Such micromanagement expands exploitable complexities and raises consumer prices. Sequential game-theory models show how compliance costs accumulate and get passed on to consumers, disproportionately harming small firms.

Normatively, the Article challenges existing works' frequent and easy appeals to democracy. Consumers' stated preferences for repairable products contradict their revealed preferences because they overwhelmingly purchase sleeker, harder-to-repair devices. When markets already supply both repair-centric and beauty-centric designs, uniform design mandates in favor of repairability tend to impose minority preferences on a majority. Moreover, the costs of misguided design micromanagement are much higher than the costs of mistaken consumer choices. Market errors are typically narrow and quickly reversible once consumers start to buy different products. In contrast, regulations that micromanage product design and inadvertently outlaw useful designs or technologies are far-reaching, sticky, and slow to unwind.

Instead of complexity prohibitions, the Article proposes a demand-side, information-first alternative: help consumers vote with their wallets. A state-hosted Buyer Beware Platform

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(BBP), linked to products at the point of sale via QR codes, would crowdsource information and verify signals of complexity profiteering, using AI-assisted summaries to avoid information overload. Transparent, accessible information would reintroduce competitive discipline, break the cost spiral modeled in Part I, preserve consumer choice, and remain cheaper than the perpetual enforcement of design-specific rules. Where market competition is unavailable—for example, single-supplier agricultural equipment—targeted regulation remains necessary. This Article does not argue for anti-regulatory maximalism, but instead argues for regulatory pragmatism. As Part I explains, regulations narrowly tailored to specific, verifiable objectives remain effective and appropriate, and this Article’s critique is directed at complexity prohibitions specifically. I argue for information tools that harness market correction when feasible and reserve micromanagement for true edge cases.

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Introduction

To what extent can the state control technological development and consumer product design? Direct regulation of specific technological features is gaining traction as a solution to what are perceived as predatory design practices. In 2022, BMW started selling heated seats in its cars marketed in the United Kingdom for a monthly subscription fee.¹ The cars were sold with all the hardware needed for heated seats to work, but BMW put a remote software lock on that feature unless car owners paid the monthly fee.² In 2023, Polish train manufacturer Newag was revealed to have designed its Impuls trains to shut down if they are taken to repair shops not operated by Newag.³ Even if the train had no defect, its software had GPS coordinates to third-party shops and instructions to disable itself “if it spends at least 10 days in one of these workshops.”⁴ The iPhone 16’s parts are held by adhesives and five types of screws, which require seven types of screwdrivers to remove.⁵ Replacing the battery—necessitated by the fact that lithium-ion batteries “gradually

¹ Peter Valdes-Dapena, *Why BMW Is Offering Heated Seats on a Monthly Subscription*, CNN (July 14, 2022), <https://edition.cnn.com/2022/07/14/business/bmw-subscription/> [https://perma.cc/277X-UJFU].

² *Id.* (heated seats are available on BMW’s “online store and are activated remotely”).

³ Jakub Stępniewicz, Sergiusz Bazański & Michał Kowalczyk, *Dieselgate, but for Trains – Some Heavyweight Hardware Hacking*, BADCYBER (Dec. 5, 2023), <https://badcyber.com/dieselgate-but-for-trains-some-heavyweight-hardware-hacking/> [https://perma.cc/UY3C-SBRZ].

⁴ *Id.*

⁵ *iPhone 16 Battery*, APPLE, <https://support.apple.com/en-us/120642> [https://perma.cc/P2JD-D3KP] (battery secured by adhesives); *iPhone 16 Screws*, APPLE, <https://support.apple.com/en-us/120649> [https://perma.cc/3D5Z-PRQF] (top screw, crosshead screw, super screw, trilobe screw, and security screw).

lose [charge] capacity” over time⁶ —requires 20 tools,⁷ including four sold for \$115, \$190, \$216, and \$256.35 respectively on Apple’s self-service repair shop.⁸

In these examples, product manufacturers may have used technology to overcomplicate the product to extract profit without adding value for consumers—a phenomenon I call complexity profiteering. Cars and trains do not have to be connected to the internet to serve their intended purpose. But an internet connection allows firms to charge monthly fees for features that used to come for a one-time fee, such as heated seats, and to track vehicles in real time so that they can be shut down if taken to a third-party repair shop. Smartphone batteries do not have to be held with screws and adhesives, given the availability of smartphones whose batteries can be replaced by hand with no tools.⁹ But affixing smartphone batteries with screws and adhesives increases the end user’s cost and difficulty of replacement, thereby increasing the likelihood that a consumer purchases a new phone rather than

⁶ Geoffrey A. Fowler, *You’re Charging Wrong: 5 Ways to Make Gadget Batteries Last Longer*, WASH. POST (Aug. 19, 2022), <https://www.washingtonpost.com/technology/2022/08/19/battery-charging-tips/> [<https://perma.cc/QZ59-5PW8>].

⁷ Replacing the battery requires removing the back glass. The total number of tools required to remove both parts, excluding any overlaps, is 20. See *iPhone 16 Battery*, APPLE, *supra* note 5; *iPhone 16 Back Glass*, APPLE, <https://support.apple.com/en-us/120638> [<https://perma.cc/UFS5-25MF>].

⁸ *Self Service Repair*, APPLE, <https://support.apple.com/self-service-repair> [<https://perma.cc/3GUE-RDMT>] (linking to official self-service repair shop). Selecting “iPhone,” “iPhone 16,” and “Battery” in the self-service repair website shows a battery press priced at \$115.00, an adhesive de-bond fixture power supply priced at \$190, a display press priced at \$216.00, and a heated display removal fixture priced at \$256.35. See *Self Service Repair Store for Apple Products*, <https://selfservicerepair.com/en-US/order> [<https://perma.cc/9QML-LQKP>].

⁹ See *How to Replace the Battery in the Galaxy XCover Pro*, SAMSUNG, <https://www.samsung.com/uk/support/mobile-devices/how-to-replace-the-battery-in-the-galaxy-xcover-pro/> [<https://perma.cc/76R9-MH6B>] (battery replaceable with no tools); *Galaxy XCover6 Pro*, SAMSUNG, <https://www.samsung.com/us/business/mobile/phones/galaxy-xcover-pro/> [<https://perma.cc/P3BF-KCK2>] (IP68 “protect[s] from . . . complete submersion up to 5 feet for up to 30 minutes”). The iPhone 16, which secures its battery with screws and adhesives, has an IP68 rating, which the Samsung Galaxy XCover 6 Pro also has. *iPhone 16 Specs*, APPLE, <https://www.apple.com/iphone-16/specs/> [<https://perma.cc/Z5H7-W4NL>].

a new battery.

An increasingly popular response to complexity profiteering is a class of laws and regulations that I call complexity prohibitions—bans on specific design features that firms could exploit for profit. Bills in California and New York, among others, would bar the sale of car features such as heated seats by subscription.¹⁰ From February 18, 2027, smartphones sold in the European Union must have user-removable batteries.¹¹ California and New York have passed right-to-repair laws governing a wide range of consumer products,¹² which seek to address features that make “products difficult or impossible to disassemble” or restrict repairs to be “performed [only] by the manufacturers’ authorized service networks,” thus “creat[ing] barriers to independent repairs.”¹³ An even more widely applicable right-to-repair law took effect in the EU on July 30, 2024.¹⁴ A remedy sought by the U.S. antitrust suit brought against Apple in March 2024 is to prohibit core features of products such as the iPhone and Apple Watch.¹⁵ Complexity prohibitions like right-to-repair legislation and design restrictions have won support from economists and legal academics.¹⁶

¹⁰ See 2023 New York Senate Bill No. 8393 (Apr. 12, 2024); 2023 California Assembly Bill No. 473 (Feb. 6, 2023); 2023 Illinois House Bill No. 2047 (Feb. 2, 2023).

¹¹ Regulation (EU) 2023/1542 of the European Parliament and of the Council of July 12, 2023, Concerning Batteries and Waste Batteries, Amending Directive 2008/98/EC and Regulation (EU) 2019/1020 and Repealing Directive 2006/66/EC [*EU Battery Directive*], arts. 11(1), 96(2)(a), 2023 O.J. (L 191) 1, 37.

¹² N.Y. GEN. BUS. LAW § 399-nn (McKinney) (Digital Fair Repair Act); 2023 CAL. LEGIS. SERV. ch. 704 (S.B. 244); CAL. PUB. RES. CODE § 42488 (West).

¹³ FED. TRADE COMM’N, NIXING THE FIX: AN FTC REPORT TO CONGRESS ON REPAIR RESTRICTIONS 10 (May 7, 2021).

¹⁴ Council of the EU Press Release 471/24, *Circular Economy: Council Gives Final Approval to Right-to-Repair Directive* (May 30, 2024) (enactment 20 days after publication).

¹⁵ First Am. Compl. ¶ 236, United States v. Apple, No. 2:24-cv-04055-JXN-LDW [*Apple Antitrust Complaint*] (D.N.J. June 11, 2024), ECF No. 51.

¹⁶ See, e.g., AARON PERZANOWSKI, THE RIGHT TO REPAIR: RECLAIMING THE THINGS WE OWN (2022); Cesareo Contreras, *The USB-C Charging Port on the New iPhone 15 Is a Major Win for Consumers, Expert Says*, NE. GLOB. NEWS (Sept. 14, 2023) (Prof. Elettra Bietti commenting on the EU

I argue that microregulations of product design, such as complexity prohibitions, can *reduce* state control over technology, thus exacerbating the predatory design practices they aim to mitigate. In the short run, complexity prohibitions are easily circumvented because banning one complexity merely causes firms to exploit another. Mercedes-Benz responded to proposed bans on the sale of “any convenience or safety function . . . on [a] motor vehicle, including but not limited to heated seats”¹⁷ by selling faster acceleration for a monthly fee in the U.S.¹⁸ Even though EU law requires Apple to provide for free any tool needed to replace smartphone batteries,¹⁹ Apple has already designed the iPhone so that battery replacement requires a toolkit measuring “20 inches wide and 47 inches high” and weighing 79 pounds,²⁰ which would deter repair while superficially complying with the requirement to provide all necessary tools for free. In the long run, as the law bans each new complexity that firms exploit and firms circumvent each ban by finding new exploitable complexities, this regulatory whack-a-mole would lead to micromanagement of product design, overcomplicating design and defeating the point of complexity prohibitions: to *reduce* design features that firms profiteer from.

Eminent advocates of complexity prohibitions seem to

common charger directive), <https://news.northeastern.edu/2023/09/14/iphone-15-charger-eu-legislation/> [https://perma.cc/H44G-9T5F]; Cesareo Contreras, *European Regulators Are Cracking Down on Alphabet, Apple and Meta. Will That Have an Impact on How Their Products Work Around the World?*, NE. GLOB. NEWS (Mar. 28, 2024) (Prof. John Kwoka on the EU’s common charger directive), <https://news.northeastern.edu/2024/03/28/eu-antitrust-law-apple-meta/> [https://perma.cc/59HN-YC8T].

¹⁷ See 2023 N.Y. S.B. 8393 (Apr. 12, 2024).

¹⁸ *Mercedes-Benz USA Announces Performance Acceleration On-Demand Upgrade for EQE and EQS Customers*, MERCEDES-BENZ, <https://media.mbusa.com/releases/release-1abd31f58af6a0ae7f6711444305a4c7-mercedes-benz-usa-announces-performance-acceleration-on-demand-upgrade-for-eqe-and-eqs-customers> [https://perma.cc/2WX8-MX5V] (faster 0 to 60 acceleration).

¹⁹ EU Battery Directive, art. 11(1).

²⁰ SELF SERVICE REPAIR STORE, *Tool Kit Rental*, <https://www.selfservicerepair.com/en-US/tool-kit-rental> [https://perma.cc/JZT5-SJDK].

underestimate the sheer difficulty of micromanaging consumer product design. Professor Aaron Perzanowski argues that right-to-repair laws are enforceable because they “simply require [firms] to prioritize . . . familiar considerations” such as “durability and repairability.”²¹ While the dictionary definition of those words is indeed plain, a law cannot simply order firms to make a product repairable and durable because the subjectivity of those words would make compliance infeasible. There is no objectively discernible way to order Apple to make the iPhone “durable and repairable” because that would be tantamount to telling Apple to take it easy on the screws and glue—or, put differently, telling firms not to get *too* greedy. The law can only ban specific design features or order firms to take specific actions, such as banning the use of adhesives on iPhone batteries and requiring repair tools to be provided for free, many of which the law has mandated and Apple has already circumvented. As the rest of this Article shows, complexity prohibitions, despite their nascency, already appear to be failing to achieve their goals or even undermining themselves.

The inefficacy of complexity prohibitions prompts a question: Is there a cheaper and more effective solution to complexity profiteering? I propose a system to inform consumers about complexity profiteering so they can vote with their wallets against firms that engage in it. Consumers who are wary of complexity profiteering appear to have made firms desist without regulatory micromanagement of product design. BMW ended its subscription program for heated seats after about a year, citing negative market reactions.²² In the first quarter of 2024, the share of iPhones among newly activated

²¹ Aaron Perzanowski, *Consumer Perceptions of the Right to Repair*, 96 IND. L.J. 361, 389 (2021).

²² Alistair Charlton, *BMW Drops Controversial Heated Seats Subscription, to Refocus on Software Services*, FORBES (Sept. 7, 2023) (a BMW representative stating that “customer uptake” was “not high” because “[p]eople feel that they paid double”), <https://www.forbes.com/sites/alistaircharlton/2023/09/07/bmw-drops-controversial-heated-seats-subscription-to-refocus-on-software-services/?sh=34aa2d026d1d> [https://perma.cc/44J5-6868].

phones in the U.S. was 33 percent—the lowest since 2018²³—and Apple has overhauled iPhone features in apparent response to market pressure.²⁴ Even if consumers currently buy from firms that engage in complexity profiteering,²⁵ the state need not decide how many types of screws should be in an iPhone in order to steer consumers toward repairable products. Smartphones and computers with removable batteries that perform on par with iPhones²⁶ and MacBooks²⁷ are already available to consumers, meaning that consumers who do not yet use these products could buy them if only they knew about them. Put differently, regulators must at least consider whether it would be more effective to inform consumers about complexity profiteering, to restore firms' natural incentive to be afraid of losing business to competitors, before trying to micromanage and outwit firms at designing their own products. If, as the EU apparently believes, it is worth creating a website to tell consumers about how to repair products,²⁸ it is worth

²³ John Koetsier, *Apple iPhone Sales Hit 6-Year Low as Percentage of New Activations*, FORBES (Apr. 25, 2024), <https://www.forbes.com/sites/johnkoetsier/2024/04/25/apple-iphone-sales-hit-6-year-low-as-percentage-of-new-activations/> [https://perma.cc/56X3-WU4Y].

²⁴ See *infra* Section III.A.

²⁵ Cf. Michael A. Carrier, *How the Federal Trade Commission Can Use Section 5 to Strengthen the Right to Repair*, 37 BERKELEY TECH. L.J. 1145, 1165–67 (2022) (citing the iPhone as an example of “restrictions that have . . . everything to do with preventing repair”).

²⁶ See APPLE, *supra* note 9 (iPhone 16 has 6.1-inch display, 6-core CPU, 22-hour video playback, and IP68 water resistance rating for \$799); *Galaxy XCover6 Pro Specs*, SAMSUNG, <https://www.samsung.com/us/business/mobile/phones/galaxy-xcover-pro/> [https://perma.cc/P3BF-KCK2] (6.6-inch display, 8-core CPU, 20-hour video playback, IP68 water resistance, and removable battery for \$599).

²⁷ Framework Laptop 13, FRAMEWORK, <https://frame.work/products/laptop13-intel-ultra-1/configuration/new> [https://perma.cc/3MDP-42QF] (13.5-inch Intel version with 32GB memory and 1TB SSD storage selling for \$2,099); MacBook Pro, APPLE, <https://www.apple.com/macbook-pro/specs/> [https://perma.cc/HX7G-G7XN] (14-inch M4 MacBook with 24GB memory and 1TB SSD storage selling for \$1,999).

²⁸ *Common Rules Promoting the Repair of Goods*, COM(2023)0155 – C9-0117/2023 – 2023/0083(COD) [*EU Right to Repair Law*], art. 7(1) (Apr. 23, 2024), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202401799 [https://perma.cc/ZR64-DC69].

telling consumers which products are designed to thwart repair so that they do not buy them in the first place. If consumers decide not to buy iPhones after learning that the battery cannot feasibly be replaced, the state would not have to teach those consumers how to replace iPhone batteries.

This Article proceeds as follows. Part I establishes that complexity prohibitions would be ineffective in the short run and self-defeating in the long run. I use examples of products such as smartphones, cars, and charging cables, as well as enacted or proposed legislation in various U.S. jurisdictions and the EU, to show how firms would circumvent complexity prohibitions in the short run. I use a sequential game-theoretic model to show that, in the long run, repeated circumvention would lead to regulatory micromanagement of consumer product design. Such micromanagement would increase enforcement costs, which firms would pass on to consumers in the form of higher prices as they continue to profiteer from exploiting design features that are not yet banned. Thus, complexity prohibitions would have defeated their own stated objective of *eliminating* complexities that firms could exploit for profit. Because the models show that complexity prohibitions raise costs without solving the problem, Part III proposes an information-driven alternative that aims to change firm behavior by enabling better-informed consumer choices, thereby reducing distortions in consumer demand.

Unlike Part I, which examines only whether complexity prohibitions would achieve their stated goals, Part II expands the inquiry to scrutinize two normative assumptions underlying them. First, how much do consumers really want complexity prohibitions like right-to-repair laws? Many consumer surveys indicate strong support for a right to repair,²⁹ which advocates cite as a justification for uniform repairability requirements.³⁰

²⁹ See, e.g., Perzanowski, *supra* note 21, at 392 (“More than 80 percent of respondents” support right to repair); Maureen Mahoney & George Slover, *Consumer Reports Survey Finds Americans Overwhelmingly Support the Right to Repair*, CONSUMER REPORTS (Feb. 28, 2022), https://advocacy.consumerreports.org/press_release/consumer-reports-survey-finds-americans-overwhelmingly-support-the-right-to-repair [<https://perma.cc/CZT5-87AL>].

³⁰ See, e.g., Perzanowski, *supra* note 21, at 393 (“[C]onsumers should not be expected to account for [repair restrictions] in their purchasing decisions.”);

Yet, consumers' stated preferences for complexity prohibitions seem incongruent with their *revealed* preferences. Studies consistently show that the average consumer replaces electronics like phones and computers well before the end of their lifespan³¹ "while they are still functioning" for, among other reasons, "fashion"³²—which does not accord so well with the view that there is such an overwhelming demand for repairability that it must be legislated. Given the diversity of consumer preferences for repairability and the availability of products catering to varying preferences,³³ why must we legislate complexity prohibitions that would force *all* products to uniformly prioritize repairability?

Second, how would complexity prohibitions correctly identify cases of complexity profiteering? Many commentators criticize what they see as instances of complexity profiteering, but they do not explain how complexity prohibitions would objectively discern whether a design feature is intended to facilitate profiteering or to add value for consumers. For example, prominent right-to-repair advocates³⁴ decried BMW's offer of heated seats for a monthly fee as an attempt to get consumers to pay "indefinitely into the future" for cars they already bought.³⁵ This was despite the fact that the subscription

Edward Baker et al., *A Survey to Assess Public Perception of Right to Repair for Electronic Devices*, 23 ISSUES IN INFO. SYS. 268 (2022) ("[P]eople are very supportive of the Right to Repair. . . . [T]his research could be used . . . to introduce new legislation[] that will benefit the Right to Repair.").

³¹ Vijay S. Venkitachalam et al., *What, Why, and How: Surveying What Consumers Want in New Mobile Phones*, 4 IEEE CONSUMER ELECS. MAG. 54 (2015) ("[T]he average life of a smartphone is five to seven years" but "the actual duration for which a smartphone is used is much fewer.").

³² Harald Wieser & Nina Tröger, *Exploring the Inner Loops of the Circular Economy: Replacement, Repair, and Reuse of Mobile Phones in Austria*, 172 J. CLEAN. PROD. 3042, 3043 (2018).

³³ See *supra* notes 26, 27 (smartphone and laptop computer with replaceable batteries with comparable performance to iPhones and MacBooks at similar or cheaper price points).

³⁴ PERZANOWSKI, *supra* note 16, at 158, 260 (describing Louis Rossmann as a "prominent voice pushing for repair" and an "outspoken independent repair provider and advocate").

³⁵ LOUIS ROSSMANN, *BMW Charging 18/mo for Heated Seats – Cars Implementing Subscription Based Microtransactions*, at 02:08 (YouTube, Sept. 10, 2023), <https://www.youtube.com/watch?v=qJdwbWc-n7g> [<https://perma.cc/4LTJ-SXR6>].

model would save consumers money as long as they do not “subscribe for heated seats all-year round.”³⁶ The point is that even the most well-meaning and informed commentators could be wrong about whether a perceived act of complexity profiteering is in fact profiteering. When complexity prohibitions make that error by banning useful technological applications, they would ban design features that may be value-adding. In contrast, if consumers misjudge a feature as complexity profiteering, they can correct such an error much more easily by reconsidering whether to buy it when a firm offers it again later.³⁷

Of course, consumers must be aware of the options available on the market in order to leverage their buying power. Part III presents this Article’s solution to complexity profiteering: informing consumers so that they vote with their wallets. The challenge to such an information campaign is not that information on complexity profiteering is unavailable. For many of the best-known brands, consumers have put relevant information online³⁸ and the platforms hosting it have shown that they can do a serviceable job of fact-checking it. Community Notes, the fact-checking tool used by X (formerly Twitter), has been as high as 97 percent accurate³⁹ and its algorithm is open-source.⁴⁰ The most significant challenge is how to get consumers to find and act on the relevant

³⁶ Sebastian Cenizo, *BMW Suffers a Major Loss Over Heated Seat Subscription*, CARBUZZ (Sept. 8, 2023), <https://carbuzz.com/news/bmw-suffers-a-major-loss-over-heated-seat-subscription/> [https://perma.cc/JM5Y-GW9P].

³⁷ *Id.* (BMW representative stating that it will provide subscription services in the future).

³⁸ See, e.g., Joe Pompliano (@JoePompliano), X (July 12, 2022, at 9:57 AM), <https://twitter.com/JoePompliano/status/1546871470256783361> [https://perma.cc/YX8H-RSLG] (criticizing BMW’s introduction of monthly or annual subscription for heated seats as “microtransaction hell”).

³⁹ Matthew R. Allen et al., *Characteristics of X (Formerly Twitter) Community Notes Addressing COVID-19 Vaccine Misinformation*, 331 JAMA 1670, 1671 (2024) (the accuracy of Community Notes regarding vaccines for COVID-19).

⁴⁰ Note Ranking Algorithm, X, <https://communitynotes.x.com/guide/en/under-the-hood/ranking-notes> [https://perma.cc/XNT3-KJMQ].

information in this age of information overload.⁴¹

I propose a QR code on a product's packaging or its website that directs consumers to a crowdsourced website for information on whether a product is suspected of complexity profiteering at the touch of a screen. This website, which I call the Buyer Beware Platform (BBP), would resemble the EU's "Online Platform for Repair,"⁴² except that the BBP would inform people about which brands require subscriptions for heated seats or glue batteries into phones, instead of "applicable European or national repair quality standards."⁴³ Although the QR code would initially serve as a gateway to the BBP, it may not be needed given enough time. If the BBP gets a reputation for accuracy, the QR code's mere existence could be proof that a product does not engage in complexity profiteering, thus serving as a cognitive shortcut that spares people from having to look things up. Informing people about complexity profiteering would restore firms' incentive to fear their customers taking their business elsewhere, as evidenced by a nascent trend of firms promoting a *lack* of complexity profiteering, like monthly fees to remotely start a car.⁴⁴ I conclude by calling for a paradigm shift in tech law away from regulatory maximalism and toward a more pragmatic approach, which accepts that indirect, market-based solutions may, in at least some instances, provide more control over technology than direct regulation does.

I. An Anatomy of Regulatory Self-Defeat

What this Article calls complexity profiteering—using

⁴¹ See Dana Tessier, *The Needle in the Haystack: How Information Overload Is Impacting Society and Our Search for Truth*, in NAVIGATING FAKE NEWS, ALTERNATIVE FACTS, AND MISINFORMATION IN A POST-TRUTH WORLD 18, 24 (Kimiz Dalkir & Rebecca Katz eds., 2020) ("an abundance of choice makes it more difficult for consumers to make buying decisions.").

⁴² *EU Right to Repair Law*, art. 7(1).

⁴³ *Id.* art. 7(6)(a).

⁴⁴ *Introducing Bluelink+*, HYUNDAI (advertising itself as the "only automaker to give you a full suite of remote [online] services at no additional cost" which "can save you up to \$350 or more per year"), <https://www.hyundaiusa.com/us/en/bluelinkplus> [https://perma.cc/6NFC-UB8M].

technology to make a product more complex to profiteer from the complexity without adding value—may not seem novel at first sight. Complexity profiteering could be seen as a type of rent-seeking, under a very broad definition of that term.⁴⁵ Indeed, the motivation for both complexity profiteering and rent-seeking has arguably existed for as long as the profit-making motive has: to milk a moneymaking asset for all it is worth, whatever the means. But what *is* new about complexity profiteering is how the modern economy enables it to flourish and makes it difficult to counteract. The unprecedented variety and technological sophistication of contemporary consumer products, be they smartphones or home appliances connected to the internet, create a virtually inexhaustible well of complexities to be exploited for profit.⁴⁶ The variety and sophistication of consumer products also mean that firms understand and control their own products much better than consumers do⁴⁷—information asymmetry that is only likely to intensify as technology advances further.

The daunting challenge presented by complexity profiteering stands in contrast to the simplistic nature of an increasingly popular solution: ban the complexities that firms can exploit. Unfortunately, just as banning political opposition does not eliminate it, complexity prohibitions do not prevent firms from circumventing them. In fact, complexity prohibitions are self-defeating in the long run because they facilitate *more* complexity profiteering—just as banning political opposition creates more of it. When the law prohibits

⁴⁵ MICHAEL L. ROSS, *TIMBER BOOMS AND INSTITUTIONAL BREAKDOWN IN SOUTHEAST ASIA* 33 (2001) (“Rent seeking is sometimes defined as any effort by private actors to capture economic rents, in a manner that is socially unproductive.”).

⁴⁶ STACY-ANN ELVY, *A COMMERCIAL LAW OF PRIVACY AND SECURITY FOR THE INTERNET OF THINGS* 327 (2021) (“[M]any IoT companies have flooded the consumer market with . . . devices that rely on software, services, and external systems to function, . . . using their ability to innovate to retain control over us and our devices post transaction.”).

⁴⁷ See Tessier, *supra* note 41, at 24 (variety of product choices); LINDA R. SINGER, *SETTLING DISPUTES: CONFLICT RESOLUTION IN BUSINESS, FAMILIES, AND THE LEGAL SYSTEM* 86–87 (2d ed. 2018) (“Consumers may feel ignorant about the technical aspects of products or services, particularly cars [and] appliances People may be intimidated by their ignorance or feel powerless in comparison with . . . knowledgeable[] corporations”).

some complexity, firms can pick another of the countless complexities to exploit for profit. The law would then ban the second complexity, only for firms to pick yet another to exploit. As this whack-a-mole continues ad infinitum, the loopholes opened and the laws enacted to close them would cumulatively amount to regulatory micromanagement and the complication of how firms design their products. This overcomplication of the design process would create more complexities for firms to exploit, thus defeating the entire point of complexity prohibitions: to *reduce* design features that firms can exploit for profit.

Section I.A demonstrates how firms circumvent complexity prohibitions in the short run by exploiting other profit-generating features. Section I.B illustrates how, in the long run, repeated ban-and-response cycles lead to design micromanagement and regulatory whack-a-mole, thereby ultimately raising prices for consumers without successfully restraining complexity profiteering. Finally, Section I.C presents sequential game-theoretic models quantifying the cumulative costs of these prohibitions, showing how the cost of complexity prohibitions can increase quadratically over time.

A. Circumvention in the Short Run: Exploiting Regulatory Loopholes

Although BMW's attempt to charge monthly fees for heated seats was limited to certain countries,⁴⁸ public reaction was not. This is a canonical instance of complexity profiteering: monetizing a design choice that adds little consumer value by turning it into a paid feature. Buying a car was conventionally understood to mean acquiring total control over it—the right to make full use of whatever hardware that came with the car trim.⁴⁹ But BMW's new business model seemed to indicate that

⁴⁸ See Valdes-Dapena, *supra* note 1 (heated seat program offered in the United Kingdom).

⁴⁹ See, e.g., *Honda Pilot Continues the Adventure with a Host of Additions for 2004*, HONDA (Oct. 6, 2003) (“Pilot EX models with leather interior (EX-L) add heated seats” as “standard features for 2004”), available at <https://hondanews.com/en-US/releases/release-a84c40fcc288d2b111ce7c004c34c499-honda-pilot-continues-the-adventure-with-a-host-of-additions-for-2004> [<https://perma.cc/KU7E-C72U>]; *Honda Passport Improved for 2004: More Capable, More Comfortable, More Style*,

a firm could remotely lock the hardware it already handed over to customers to monetize it further, calling into question whether consumers really owned the cars they bought.⁵⁰ State legislatures in the United States soon vowed to crack down, specifically citing the example of BMW “requiring subscriptions for heated seats” despite its cars having all “necessary equipment installed at the time of purchase.”⁵¹ As of the time of writing, bills with the following language, either verbatim or with minor changes in wording that do not affect substance, had come before the legislatures of Arizona, California, Idaho, Illinois, Massachusetts, New Jersey, New York, Tennessee, Washington, and West Virginia:

(5) “Motor vehicle feature” shall mean any convenience or safety function included on the motor vehicle, including but not limited to heated seats or driver assistance, that typically is offered to a consumer as an upgrade at the time of purchase or lease of the motor vehicle.

(6) “Subscription service” shall mean a service provided on a subscription basis in exchange for a recurring payment, including, but not limited to, a weekly, monthly, or annual payment charged to and made by a consumer

(b) No manufacturer, dealer, or agent of a manufacturer or dealer shall offer to a consumer a subscription service or charge a post-purchase fee for any motor vehicle feature that:

(1) utilizes components and hardware already installed on the motor vehicle at the time of

HONDA (Oct. 4, 2023) (Black Edition has “heated rear seats”), *available at* <https://hondanews.com/en-US/honda-automobiles/releases/release-cc39196e84787a20ec3cb086fb016ecc-honda-passport-improved-for-2024-more-capable-more-comfortable-more-style> [https://perma.cc/A49F-DRBD].

⁵⁰ See Charlton, *supra* note 22 (“People feel that they paid double” for heated seats).

⁵¹ Sen. Marty Flynn, *Banning In-Car Subscriptions for Hardware Features on Motor Vehicles*, Senate Co-Sponsorship Memorandum (Mar. 21, 2023), <https://www.legis.state.pa.us/cfdocs/Legis/CSM/showMemoPublic.cfm?chamber=S&SPick=20230&cosponId=40247> [https://perma.cc/PX3V-33CA].

purchase . . . and . . . would function after activation without ongoing expense to the dealer, manufacturer, or any third-party service provider.⁵²

The subscription ban covers a far wider range of features than just heated seats. “[A]ny convenience or safety function . . . that typically is offered . . . as an upgrade at the time of purchase”⁵³ can include blind spot monitors, parking assist, traffic alert, and keyless entry, among others.⁵⁴ The bill’s broad scope can also cover features that have not even been invented yet. This may make the bill appear to be a future-proof solution to firms engaging in complexity profiteering by selling vehicle features on a subscription basis.

Unfortunately, firms appear to have defeated this ban even before it became law, by choosing a different complexity to exploit. On April 26, 2023, Mercedes-Benz announced that it would offer faster acceleration for a monthly, annual, or lump-sum payment.⁵⁵ The upgrade would “utilize[] . . . hardware already installed on the motor vehicle at the time of purchase” and would be sold for a “subscription” or a “post-purchase fee,” which the bill prohibits.⁵⁶ Nevertheless, faster acceleration would likely avoid the bill’s ban on post-purchase sales because it is unlikely to qualify as a “convenience or safety function,” such as “heated seats or driver assistance.”⁵⁷ Acceleration affects a car’s performance, not safety or

⁵² 2023 N.Y. S.B. No. 8393 (Apr. 12, 2024); *see also* 2023 Cal. Assemb. B. No. 473 (Feb. 6, 2023); 2023 Ill. H.B. No. 2047 (Feb. 2, 2023); 2024 N.J. S.B. No. 1282 (Jan. 9, 2024); 2023 Mass. S. Dkt. No. 2152 (Jan. 20, 2023); 2023 Tenn. H.B. No. 651 (Jan. 30, 2023); 2024 Idaho H.B. No. 642 (Feb. 23, 2024); 2023 W. Va. S.B. No. 462 (Jan. 24, 2023); 2024 Ariz. H.B. No. 2410 (Jan. 11, 2024); 2023 Wash. H.B. No. 2028 (Dec. 22, 2023).

⁵³ 2023 New York Senate Bill No. 8393 (Apr. 12, 2024).

⁵⁴ *See, e.g.,* Nikesh Kooverjee, *2024 Toyota Prius Prime: A Comprehensive Guide on Features, Specs, and Pricing*, TOPSPEED (Nov. 8, 2023), <https://www.topspeed.com/2024-toyota-prius-prime-overview/> [<https://perma.cc/7Q83-8YVE>].

⁵⁵ *See* MERCEDES-BENZ, *supra* note 18.

⁵⁶ *See id.* (“Customers can experience [the acceleration increase option] . . . online . . . without . . . a trip to a dealership.”); 2023 N.Y. S.B. 8393 (Apr. 12, 2024).

⁵⁷ N.Y. S.B. 8393.

convenience, in that it reduces the time needed to go from zero to sixty.⁵⁸ It is also questionable whether faster acceleration qualifies as a feature “that typically is offered to a consumer as an upgrade at the time of purchase,”⁵⁹ as acceleration is usually not offered as an upgrade.⁶⁰ Mercedes’ disclaimer that “features[] such as heated seats[] will not be offered as digital extras”⁶¹ also indicates an intent to avoid bans on subscription sales of heated seats. This Mercedes example illustrates that, in the short run, a prohibition on one exploitative complexity merely prompts firms to profit from another, leaving the root problem intact.

This example may seem to be evidence of the flaws of a specific bill only, because the loophole would not exist if the law banned *all* car features from being sold by subscription. But this example illustrates a problem with complexity prohibitions generally, because it shows the sheer difficulty of finding a Goldilocks zone between over- and underinclusive bans on specific features. If references to specific features were jettisoned to prevent circumvention, the prohibition would become so broad as to ban features consumers may want. If, on the other hand, the ban applied only to specific features to avoid overinclusion, firms would circumvent it. The difficulty of finding a workable midpoint between the two extremes is due to the fact that firms know how to exploit their own products for profit better than the state does. For the avoidance of any doubt, the observation that a firm knows its own business better than regulators do is not a political statement in the way that, for instance, “Americans know how to spend their own money better than politicians do”⁶² may be said in order to signal a particular ideological belief. Rather,

⁵⁸ See MERCEDES-BENZ, *supra* note 18 (reducing zero to sixty by 0.8 to one second).

⁵⁹ N.Y. S.B. 8393 (Apr. 12, 2024).

⁶⁰ See, e.g., Jeff Perez, *Maserati MC20 Sports Car Revealed with 621 HP and an EV Option*, MOTOR1.COM (Sept. 9, 2020) (“gas, electric, and convertible” options with fixed acceleration), <https://www.motor1.com/news/443069/maserati-mc20-sports-car/> [https://perma.cc/QC4E-KPR2].

⁶¹ See MERCEDES-BENZ, *supra* note 18.

⁶² 169 CONG. REC. H1791 (daily ed. Apr. 18, 2023) (statement of Rep. Andy Biggs).

saying that “the firm will know more about its costs and its opportunities than will the regulator”⁶³ is merely a statement of fact.

Another example of how the above-cited bill can be circumvented further illustrates how firms’ information advantage over regulators forces complexity prohibitions to be either over- or underinclusive, likely erring on the side of underinclusion, thereby enabling firms to easily circumvent them. The bill’s subscription ban only affects features that “would function after activation without ongoing expense to the dealer, manufacturer, or any third-party service provider.”⁶⁴ This exemption must exist not only in this bill, but also in any complexity prohibition. If the ban applied to features that *do* create ongoing costs, it would prohibit features that consumers may want, but firms can sell only by subscription to cover those costs: for example, Toyota sells a navigation service that claims to provide “up-to-date routes and estimated times of arrival” “through real-time updates downloaded from the cloud.”⁶⁵

It is this type of unavoidable exemption that enables firms to defeat complexity prohibitions wholesale. In 2021, Toyota announced that it would charge a monthly fee of \$8 for a feature that used to be free: the ability to start a car remotely with a key fob.⁶⁶ The remote start function “has nothing to do with an app, nor does the car or the fob communicate with any servers managed by Toyota”⁶⁷ —meaning that it utilizes hardware sold up front, does not create any ongoing cost for

⁶³ GLENN BLACKMON, INCENTIVE REGULATION AND THE REGULATION OF INCENTIVES 6 (1994) (“[A]n inevitable consequence of having a private firm responsible for production is that the firm will know more about its costs and its opportunities than will the regulator”).

⁶⁴ N.Y. S.B. 8393 (Apr. 12, 2024).

⁶⁵ *What Are the Features of Dynamic Navigation?*, TOYOTA, https://support.toyota.com/s/article/What-are-the-features-9816?language=en_US [<https://perma.cc/6SHJ-F8TU>].

⁶⁶ Tim De Chant, *Toyota Owners Have to Pay \$8/mo to Keep Using Their Key Fob for Remote Start*, ARS TECHNICA (Dec. 13, 2021), <https://arstechnica.com/cars/2021/12/toyota-owners-have-to-pay-8-mo-to-keep-using-their-key-fob-for-remote-start/> [<https://perma.cc/MQA7-KFE9>].

⁶⁷ *Id.*

Toyota, its dealers, or other third parties, and thus that it falls squarely in the definition of features that cannot be sold via subscription. But firms can easily circumvent this ban by inserting an app or server so that there *is* a nominal ongoing cost. That is what Toyota appears to have done: as of 2025, Toyota charges \$15 to \$25 monthly for a set of features including Remote Connect, which is “available through the Toyota App” and allows users to “[s]tart, lock/unlock your doors . . . using your compatible smart device.”⁶⁸ While this loophole could theoretically be closed by expanding the subscription ban to include features that do incur ongoing costs, that would likely resurrect the risk of banning features consumers might want. For example, Toyota’s online app permits an owner to lock car doors from anywhere on Earth, whereas key fobs perform the same function only within a car’s visible distance.⁶⁹ In sum, firms can circumvent complexity prohibitions in the short run simply by choosing a different complexity to exploit. That short-run evasion sets up a predictable long-run pattern wherein the regulator chases, firms adapt, and the cycle repeats. A ban on one exploitative feature can be evaded in the short run by exploiting another. The next section shows how this piecemeal circumvention, if continually countered by new bans, leads to a long-run ‘whack-a-mole’ spiral of regulatory self-defeat.

B. Self-Defeat in the Long Run: The Regulatory Whack-a-Mole Problem

Building on the short-run circumvention above, consider how regulators respond over time. The fact that firms circumvent complexity prohibitions in the short run does not stop regulators from closing each loophole as it is opened in the long run, piecemeal. The result is a regulatory treadmill in which each ban invites a nearby substitute, which then invites a new ban. This is how the European Union’s right-to-repair law would operate. Under the law, “upon the consumer’s

⁶⁸ *Audio Multimedia and Connected Services*, TOYOTA, <https://www.toyota.com/connected-services/> [https://perma.cc/KKJ5-D7JW].

⁶⁹ *See Remote Connect*, TOYOTA, <https://www.toyota.com/connected-services/remote-connect> [https://perma.cc/24KW-R2D4].

request, the manufacturer shall repair goods for which . . . repairability requirements are . . . listed in Annex II,”⁷⁰ a list that would be updated with additional “repairability requirements” in response to “regulatory developments.”⁷¹ But this regulatory whack-a-mole would fail because firms would circumvent each new complexity prohibition as it is enacted. Firms would continue to engage in complexity profiteering through a costly and circuitous process of intentionally complicating product design to circumvent the growing list of design restrictions. Ultimately, complexity prohibition becomes regulatory micromanagement of product design, which would create more complexities and defeat the original goal of *eliminating* complexities that firms can exploit.

The same circumvention dynamic appears in the consumer electronics industry—for example, smartphone repair. The idea of a right to repair gained public support as firms came under suspicion of profiteering from complexity. In 2017, Apple released software updates that intentionally slowed down old iPhone models without disclosing that fact, until users noticed.⁷² Critics accused Apple of slowing down older iPhones to “push[] users to unnecessarily buy new phones,”⁷³ a claim that led to a class action suit and its eventual settlement.⁷⁴ If Apple were indeed engaging in complexity profiteering, sabotaging older iPhones was a rather ham-handed way of doing it. Since then, Apple seems to have adopted the subtler strategy of making their products more complex for a plausibly defensible reason—such as making the iPhone more water-resistant—which also makes repair, such as battery replacement, difficult,⁷⁵ thus incentivizing consumers to buy a

⁷⁰ *EU Right to Repair Law*, art. 5(1).

⁷¹ *Id.* art. 5(9).

⁷² *In re Apple Inc. Device Performance Litig.*, 50 F.4th 769, 776 (9th Cir. 2022).

⁷³ Richard Lawler, *Apple’s iPhone ‘Batterygate’ Settlement Payments Should Start Going Out Soon*, THE VERGE (Aug. 14, 2023), <https://www.theverge.com/2023/8/14/23831939/apple-iphone-batterygate-iphone-6-7-se-battery-performance-lawsuit> [<https://perma.cc/5P6T-5BLL>].

⁷⁴ *In re Apple Inc. Device Performance Litig.*, No. 23-15416, 2023 WL 10447843, at *1 (9th Cir. Aug. 8, 2023) (*appeal voluntarily dismissed*).

⁷⁵ See ORBIT, *Sustainability Interview with John Ternus & Lisa Jackson from Apple!* (YouTube, July 6, 2023),

new product even though repairing an old one may suffice. Rising suspicions that firms were deliberately obstructing repair gave public support to the idea of a consumer's right to easily repair certain products.⁷⁶

Parts pairing is a practice often identified as giving firms plausible deniability for thwarting repair. For example, Apple has put serial numbers on a product and its various components, such as an iPhone and its battery.⁷⁷ Apple uses software to bind the serialized components to the product so that only Apple can replace any; if done without Apple's approval, "[s]wapping components between the same model [of genuine iPhones] . . . may disable certain features," such as the camera, battery health display, and Face ID.⁷⁸ Although Apple has defended parts pairing as "critical to preserving the privacy, security, and safety of iPhone,"⁷⁹ it was also true that parts pairing gave Apple a virtual monopoly on repairing iPhones, with the concomitant power to raise prices or attach other conditions so as to discourage repair.⁸⁰ On March 27,

<https://www.youtube.com/watch?v=1VQ1Oll8-7A> [<https://perma.cc/T68H-3P7Y>] (Apple's senior vice president of hardware engineering arguing that making components more easily removable may make it harder to make a product more water-resistant).

⁷⁶ See, e.g., Emanuele S. Putrino, *Tesla, Let Me Fix My Car: The Right to Repair and the Need for a Balance Between Public and Private Enforcement*, 76 OKLA. L. REV. 351, 354 (2024) (arguing that consumers perceived Tesla's car repair policies to be "nefarious schemes to discourage . . . repair and to incentivize the purchase of new vehicles").

⁷⁷ *The iPhone 14 Continues Apple's Digital Repair Lockdown*, iFIXIT (Oct. 19, 2022), <https://www.ifixit.com/News/66879/iphone-14-parts-pairing-results-apple-is-still-trying-to-monopolise-repair> [<https://perma.cc/C36R-Q2WB>].

⁷⁸ *Id.* (no battery health displayed; front camera disabled; Face ID no longer available).

⁷⁹ See *Apple to Expand Repair Options with Support for Used Genuine Parts*, APPLE, <https://www.apple.com/newsroom/2024/04/apple-to-expand-repair-options-with-support-for-used-genuine-parts/> [<https://perma.cc/9Y34-SJ2W>].

⁸⁰ See EUR. ECON. & SOC. COMM., *Opinion*, INT/1015 – EESC-2023-01158-00-00-AC-TRA-EN ¶ 4.3.3 (June 14, 2023) (Parts pairing permits only the manufacturer or its certified agents to perform repairs), <https://www.eesc.europa.eu/en/our-work/opinions-information-reports/opinions/right-repair> [<https://perma.cc/P4MT-P8TA>]; see *id.* ¶ 1.7 (discussing cases where parts pairing is "applied in order to obstruct competition in the spare parts market").

2024, Oregon enacted a law that would require firms to provide to consumers any tools or parts required for repair on fair and reasonable terms⁸¹ and ban certain uses of parts pairing.⁸² After some resistance,⁸³ Apple announced that it would relax parts pairing.⁸⁴ Apple also announced an expansion of its self-service repair program to give users “access to the same manuals, . . . parts, and tools used [by] Apple,” so users can repair Apple products themselves.⁸⁵

But the Oregon law would not force Apple to make repairs as easy as its proponents argue⁸⁶ because Apple can easily erect other barriers to repair. Replacing the battery in an iPhone 6, for example, required removing a panel held by screws and

⁸¹ 2024 Or. Laws ch. 69, § 1(1)(d), (2)(a) (S.B. 1596).

⁸² *Id.* § 1(2)(b) (banning parts pairing intended to “[p]revent or inhibit” repair); *id.* § 7 (enforcement applies to violations of the law committed on or after July 1, 2027).

⁸³ See, e.g., Or. State Sen. Janeen Sollman, *Right to Repair (SB 1596) Public Hearing*, at 1:02:55 (YouTube, Feb. 9, 2024), <https://www.youtube.com/watch?v=PwcN0rbcB8E> [<https://perma.cc/5Z32-AGF5>] (John Perry, Apple’s senior manager for secure system design, testifying against the provision banning parts pairing in Oregon’s proposed right to repair law, S.B. 1596).

⁸⁴ *Apple to Expand Repair Options with Support for Used Genuine Parts*, APPLE, <https://www.apple.com/newsroom/2024/04/apple-to-expand-repair-options-with-support-for-used-genuine-parts/> [<https://perma.cc/9Y34-SJ2W>].

⁸⁵ *Apple Expands Self Service Repair for Mac, Adds Diagnostics, and Updates System Configuration*, APPLE, <https://www.apple.com/newsroom/2024/02/apple-expands-self-service-repair-for-mac> [<https://perma.cc/5MEK-SJ42>].

⁸⁶ Lynne Terry, *Oregon Becomes Fourth State with a “Right to Repair” Law for Technology*, OREGON CAPITAL CHRONICLE (Mar. 27, 2024) (advocacy group stating that “[n]o longer can a manufacturer use anti-consumer software to prevent third party repairs”), <https://oregoncapitalchronicle.com/2024/03/27/oregon-becomes-fourth-state-with-a-right-to-repair-law-for-technology/> [<https://perma.cc/DMP6-WX9M>]; Lauren Dake, *Oregon ‘Right to Repair’ Bill Passes State Senate*, OREGON PUBLIC BROADCASTING (Feb. 20, 2024) (State Senator Janeen Sollman stating that the bill would give consumers “affordable and sustainable options” for repairing electronics), <https://www.opb.org/article/2024/02/20/oregon-right-to-repair-devices-bill/> [<https://perma.cc/VT7U-JCFS>].

clips.⁸⁷ In the iPhone 16, the equivalent part is held by screws, clips, and adhesives.⁸⁸ The tools Apple provides for replacing the battery in newer iPhones illustrate the regulatory whack-a-mole problem even further. For one thing, these tools “come[] in cases that, when stacked on top of each other, measure 20 inches wide and 47 inches high,” weighing 79 pounds.⁸⁹ For another, if the heat required to melt the adhesive is applied improperly, it can damage the battery, which is flammable.⁹⁰ Unsurprisingly, some users who tried replacing iPhone batteries commented that “Apple doesn’t want us to repair” them, and that they wanted to “abort[] the entire process before Apple ever shipped 79 pounds of equipment.”⁹¹ While the Oregon law bans parts pairing and requires manufacturers to provide repair equipment at cost, it does nothing to prevent Apple from designing its products or tools in ways that make repair infeasible in practice. Even if legislators thought to prevent such behavior, that would have effectively required the government to micromanage the myriad aspects of Apple’s product design in real time.

The prospect of having to outwit firms like Apple at their own game does not appear to have deterred the European Union, whose right-to-repair law would counter circumventions of specific requirements by adding more specific requirements. The law imposes behavioral and design

⁸⁷ *iPhone 6 Battery Replacement*, iFixIT, <https://www.ifixit.com/Guide/iPhone+6+Battery+Replacement/29363> [https://perma.cc/LF7E-YW5J].

⁸⁸ *iPhone 16 Battery Replacement*, iFixIT, available at <https://www.ifixit.com/Guide/iPhone+16+Battery+Replacement/177286> [https://perma.cc/SY9U-54L6].

⁸⁹ SELF SERVICE REPAIR STORE, *Tool Kit Rental*, <https://www.selfservicerepair.com/en-US/tool-kit-rental> [https://perma.cc/JZT5-SJDK].

⁹⁰ See *iPhone 16 Battery Replacement*, *supra* note 88; *Important Safety Information for iPhone*, APPLE, <https://support.apple.com/guide/iphone/important-safety-information-iph301fc905/ios> [https://perma.cc/Q58B-4HYP] (“An iPhone battery . . . damage . . . could cause overheating [or] fire.”).

⁹¹ Sean Hollister, *Apple Shipped Me a 79-Pound iPhone Repair Kit to Fix a 1.1-Ounce Battery*, THE VERGE (May 21, 2022), <https://www.theverge.com/2022/5/21/23079058/apple-self-service-iphone-repair-kit-hands-on> [https://perma.cc/QRU5-9GXD].

restrictions to make repairs easier. Repairs must be performed “free of charge or for a reasonable price” and, when a manufacturer performs the repair, “within a reasonable period of time from the moment” access to the product to be repaired has been obtained.⁹² Firms must provide “spare parts and tools . . . at a reasonable price that does not deter repair.”⁹³ Firms are also prohibited from using “any contractual clauses, hardware or software techniques that impede the repair of goods” such as “imped[ing] the use of original or second-hand spare parts” unless doing so would be “justified by legitimate and objective factors,”⁹⁴ which clearly refers to parts pairing and anything else that would achieve similar results. The law also states, “upon the consumer’s request, the manufacturer shall repair goods for which . . . repairability requirements are provided for . . . in Annex II,” a list that would be updated in light of “regulatory developments.”⁹⁵ This provision, the European Commission submits, would render the law “future-proof.”⁹⁶

Whether a law targets a single practice like Oregon’s parts-pairing ban or imposes a broad mandate like the EU’s right-to-repair directive, both approaches illustrate the same fundamental problem: firms can adapt product design to sidestep the intended effect. The EU right to repair law shows how complexity prohibitions can defeat themselves in the long run because firms would complicate product design to circumvent the law’s many restrictions, resulting in an increase in exploitable complexities that the law is meant to reduce. If Apple can no longer incentivize people to buy new products by *preventing* repairs, Apple could force people to perform more expensive repairs than they need—thus prompting rational consumers to ask why they shouldn’t just get a shiny new model. Apple’s MacBook Pro is designed in precisely this way. According to the manual, replacing the battery for the 14-inch,

⁹² *EU Right to Repair Law*, art. 5(2)(a), 5(2)(b).

⁹³ *Id.* art. 5(4).

⁹⁴ *Id.* art. 5(6).

⁹⁵ *Id.* art. 5(1), 5(9).

⁹⁶ EUR. COMM’N, *‘Right to Repair’: Questions & Answers* (Mar. 22, 2023), https://ec.europa.eu/commission/presscorner/detail/en/qanda_23_1795 [<https://perma.cc/XQ8F-W492>].

M3, November 2023 MacBook Pro requires replacing not only the battery, but also the keyboard, microphone, and speakers because all four components are bound to the top case and “there are no additional removal steps.”⁹⁷ The top case assembly costs \$527.12, about 33 percent of the sticker price of that MacBook Pro model.⁹⁸ Apple does not have to engage in parts pairing, ship out 79-pound toolkits, or apply glue⁹⁹ to incentivize people to forgo repair for a purchase. The EU law would likely incentivize Apple to adopt this excessive repair tactic more liberally,¹⁰⁰ thus overcomplicating product design and defeating the law’s own goal of *reducing* complexities that firms can exploit for profit.

It may seem that the EU law accounts for the excessive repair tactic, because the law prohibits “any . . . hardware . . . techniques that impede . . . repair” and requires firms to provide “spare parts . . . at a reasonable price that does not deter repair.”¹⁰¹ While “any” technique can be interpreted to include the excessive repair tactic, this provision could not, in practice, be enforced against anything but the most obvious and egregious instances of that tactic. For repair to be practical, firms must provide assemblies of parts, not each individual part: a single key in a keyboard would likely be useless to the typical consumer or third-party technician

⁹⁷ *MacBook Pro (14-inch, M3 Pro or M3 Max, Nov 2023) Top Case with Battery and Keyboard*, APPLE, <https://support.apple.com/en-us/103925> [<https://perma.cc/2QJN-HMKN>].

⁹⁸ *Choose Your New MacBook Pro*, APPLE, <https://www.apple.com/shop/buy-mac/macbook-pro/14-inch-m3> [<https://perma.cc/9E6G-P43M>] (14-inch M3 model costs \$1,599 as of Apr. 29, 2024); SELF SERVICE REPAIR STORE, *Filter by device / repair type*, <https://www.selfservicerepair.com/en-US/tool-kit-rental> [<https://perma.cc/JZT5-SJDK>]. Apple’s official self-service repair website, which shows the price of components for MacBooks, cannot be archived because access requires entering the relevant product’s serial number. A printed copy of the webpage showing the price of the top case as of April 29, 2024 is on file with the author.

⁹⁹ APPLE, *supra* note 97 (“No tools are required for this procedure”); *EU Battery Directive*, art. 11 (requiring free provision of tools required to melt any adhesives).

¹⁰⁰ Some older MacBook models permitted replacement of the battery only. See *MacBook Air (M1, 2020) Battery*, APPLE, <https://support.apple.com/en-us/100600> [<https://perma.cc/WJ9M-37VM>].

¹⁰¹ *EU Right to Repair Law*, art. 5(4), 5(6).

looking to replace a water-damaged laptop keyboard. If the EU wishes to prevent firms from providing excessively expensive assemblies of parts, it will inevitably have to draw a line past which such an assembly exceeds “a reasonable price that does not deter repair.”¹⁰² How would the EU, or indeed any other regulator, set a “reasonable” price limit for each of the countless number of products on the market, given the immutable engineering differences that may make repair inherently cheaper for some products than for others?¹⁰³ Assuming *arguendo* that regulators could accomplish such a herculean task at any one instance, how would regulators keep up with developments in all of those products in a timely manner? Complexity prohibitions cannot be saved from self-defeat by simply adding more, because complexity prohibitions require regulators to micromanage and outwit firms at their own dauntingly complex game.¹⁰⁴

One may argue that the EU does not need to set price limits for every single product before the fact. This may be because the EU could make case-by-case rulings on whether a firm’s price for repairing a product is “justified by legitimate and objective factors,”¹⁰⁵ without explaining such rulings using objectively discernible standards. Indeed, even when the EU *has* objectively discernible standards, it has defied them without providing meaningful justification for the decision. For example, even though Samsung met the numerical thresholds for a company to be regulated by the Digital Markets Act, the EU exempted Samsung because it made unspecified “justified arguments.”¹⁰⁶ Similarly, “despite not meeting the quantitative

¹⁰² *Id.* art. 5(4).

¹⁰³ MICHEL MILLOT, EMBARRASSMENT OF PRODUCT CHOICES 1: HOW TO CONSUME DIFFERENTLY 50 (2018) (“*Technological sophistication* involves more frequent failures and more complex repairs. . . . [F]or example, the cathode ray tubes found in older TV sets had an average lifespan of 10-15 years, while a flat screen TV lasts about 5 years.”).

¹⁰⁴ Deirdre K. Mulligan & Kenneth A. Bamberger, *Saving Governance-by-Design*, 106 CAL. L. REV. 697, 701 (2018) (“Agencies generally lack . . . the technical expertise . . . to consider fully the implications of embedding values in [technological] design.”).

¹⁰⁵ *EU Right to Repair Law*, art. 5(6).

¹⁰⁶ EUR. COMM’N Press Release IP/23/4328, *Digital Markets Act: Commission Designates Six Gatekeepers* (Sept. 6, 2023).

thresholds laid down by the DMA,” Apple’s iPadOS was designated as a regulated entity because, among other reasons, Apple was “predicted” to hit a key threshold “in the near future.”¹⁰⁷

Setting aside the evidently arbitrary nature of this ad hoc scheme from a jurisprudential perspective, it would still be impractical if used to enforce the EU’s right to repair law. Products such as computers or phones can take years to develop until release, and whether the cost of repair “does not deter repair”¹⁰⁸ can depend on a product’s design, as the example of the MacBook Pro shows.¹⁰⁹ Without an objectively discernible standard that enables firms to predict how regulators will react, firms may avoid developing products for the single market, fearing enforcement actions under the right to repair law. Therefore, unless the EU is willing to accept firms releasing intentionally downgraded versions of their products to avoid violations¹¹⁰ or even exiting the single market,¹¹¹ firms will likely circumvent the EU’s right to repair law by overcomplicating their product design, which would in turn force that law to defeat itself in the long run.

Even examples of complexity prohibitions touted as successes, in fact, demonstrate how they can be circumvented and make products even more complex, thereby creating additional complexities for firms to exploit. Before Apple launched the iPhone 15 in September 2023, iPhones used the proprietary Lightning cable for charging and data transfer,

¹⁰⁷ EUR. COMM’N Press Release IP/24/2363, *Commission Designates Apple’s iPadOS Under the Digital Markets Act* (Apr. 29, 2024).

¹⁰⁸ *EU Right to Repair Law*, art. 5(4).

¹⁰⁹ See *supra* notes 97–100 and accompanying text.

¹¹⁰ See Richard Waters, *The EU’s Giant Experiment in Tech Micromanagement*, FIN. TIMES (Mar. 7, 2024), <https://www.ft.com/content/03f8c8f5-a968-4060-a5b1-a62b225fb39b> [<https://perma.cc/5Z84-BNU5>] (“For Google . . . complying with the [Digital Markets Act] means downplaying some of its own ‘vertical’ search features . . . [which] for users . . . will mean an extra step in reaching a final result”).

¹¹¹ See Yunsieg P. Kim, *A Revolution Without a Cause: The Digital Markets Act and Neo-Brandeisian Antitrust*, 2023 WIS. L. REV. 1247, 1295–96 (2023) (discussing the risk of the Digital Markets Act prompting tech companies to exit the internal market).

which works only for Apple products.¹¹² In contrast, most contemporaneous non-Apple devices, regardless of brand, use the Universal Serial Bus (USB) Type C cable.¹¹³ The Lightning cable's exclusivity prevented iPhone purchasers from using spare USB-C cables that they already had lying around.¹¹⁴ Moreover, the Lightning cable that Apple included for free with a new iPhone was only three feet long, prompting many users to purchase a second, longer cable.¹¹⁵ Apple advised users to buy only from Apple or Apple-certified third parties, citing risks of device damage from charging cables sold by independent manufacturers.¹¹⁶

In October 2022, the European Union adopted a directive requiring all mobile phones sold in member states to use USB-C charging cables from December 28, 2024.¹¹⁷ According to officials, the directive would eliminate the need to “have at least three mobile phone chargers at home,”¹¹⁸ thereby creating

¹¹² See Brian X. Chen, *How to Navigate Apple's Shift from Lightning to USB-C*, N.Y. TIMES (Sept. 12, 2023), <https://www.nytimes.com/2023/09/12/technology/personaltech/apple-iphone-lightning-usb-c.html> [<https://perma.cc/S4TG-VL77>].

¹¹³ See Shreyas Sen, *What Is USB-C? An Engineer Explains This One Device Connector to Rule Them All*, PBS (Sept. 17, 2023) (USB-C is “the connector of choice for most non-Apple devices.”), <https://www.pbs.org/newshour/science/what-is-usb-c-an-engineer-explains-this-one-device-connector-to-rule-them-all> [<https://perma.cc/27HW-PZQG>].

¹¹⁴ See Chen, *supra* note 112 (“[M]ost of us already have a USB-C cable The iPhone was one of the holdouts.”).

¹¹⁵ See Angela Lashbrook, *Do Yourself a Favor and Buy That Longer Charging Cable*, MEDIUM (Feb. 19, 2020), <https://onezero.medium.com/do-yourself-a-favor-and-buy-that-longer-charging-cable-12c7680418cd#> [<https://perma.cc/YNA4-LHSN>].

¹¹⁶ See *Identify Counterfeit or Uncertified Lightning Connector Accessories*, APPLE (warning against third-party manufactured cables), <https://support.apple.com/en-us/111103> [<https://perma.cc/GYQ9-5U49>].

¹¹⁷ Council of the European Union Press Release 884/22, *Common Charger: EU Ministers Give Final Approval to One-Size-Fits-All Charging Port* (Oct. 24, 2022); Directive (EU) 2022/2380 of the European Parliament and of the Council of 23 November 2022 *Amending Directive 2014/53/EU on the Harmonisation of the Laws of the Member States Relating to the Making Available on the Market of Radio Equipment* [EU Common Charging Directive], art. 2(1), 2022 O.J. (L 315) 30, 39.

¹¹⁸ Council of the European Union Press Release 884/22, *supra* note 117.

“around €250 million of savings to consumers annually.”¹¹⁹ The directive would eventually cover not only smartphones, but also nearly all portable devices, seemingly preempting any future attempts by Apple at complexity profiteering involving charging cables: “tablets, digital cameras, handheld videogame consoles, headphones, headsets, portable speakers, e-readers, keyboards, mice, portable navigation systems, and earbuds,” and laptop computers.¹²⁰ With the iPhone 15’s adoption of USB-C cables, major press outlets declared that the European Union had “[w]on” against “the world’s most valuable company.”¹²¹ It seemed that we did away with an “outrageous and dysfunctional Apple profit-padder[],” to enjoy the “societal benefits” of “a single connective standard for all mobile devices.”¹²² This view was shared by academics, who described “the new USB-C iPhones [as] a win for consumers”¹²³ and said that it is “hard to conceive of any way in which a consumer is worse off” due to the EU’s imposition of USB-C cables.¹²⁴

Unfortunately, the EU law leaves intact many other complexities that Apple can exploit to extract even more profit than it would without the law. The EU law only forces Apple

¹¹⁹ Thierry Breton, *#StrategicAutonomics: W . . . for Waste*, LINKEDIN (Sept. 9, 2023), <https://www.linkedin.com/pulse/strategicautonomics-w-waste-thierry-breton/> [https://perma.cc/M4TX-CKR4].

¹²⁰ *Id.*

¹²¹ Ben Cohen, *He Took on the World’s Most Valuable Company—and Won*, WALL ST. J. (Oct. 3, 2023), <https://www.wsj.com/tech/apple-iphone-15-usb-c-eu-malta-4240a5b3> [https://perma.cc/H5ZJ-US2N]; see also Chris Vallance & Zoe Kleinman, *New iPhone, New Charger: Apple Bends to EU Rules*, BBC (Sept. 4, 2023), <https://www.bbc.com/news/technology-66708571> [https://perma.cc/MT5A-VN4W].

¹²² Editorial: *We’ll Back Apple Against the Chinese Any Day, But No One Will Miss That Cursed Lightning Charger*, CHI. TRIB. (Sept. 12, 2023), <https://www.chicagotribune.com/2023/09/12/editorial-well-back-apple-against-the-chinese-any-day-but-no-one-will-miss-that-cursed-lightning-charger/> [https://perma.cc/4S83-G4LT].

¹²³ Contreras, *The USB-C Charging Port*, *supra* note 16 (Prof. Elettra Bietti commenting on the EU common charger directive), <https://news.northeastern.edu/2023/09/14/iphone-15-charger-eu-legislation/> [https://perma.cc/H44G-9T5F].

¹²⁴ Contreras, *European Regulators*, *supra* note 16 (Prof. John Kwoka on the EU directive), <https://news.northeastern.edu/2024/03/28/eu-antitrust-law-apple-meta/> [https://perma.cc/59HN-YC8T].

to change the *shape* of the iPhone cable from Lightning to USB-C.¹²⁵ Nothing in the law stops Apple from limiting how fast iPhones can transfer data, regardless of the shape of the cable being used, which is what Apple did. The iPhone 15 Pro and Pro Max models use the USB 3 protocol of USB-C, which transfers data at 10 gigabits per second.¹²⁶ The base iPhone 15 and Plus models, in contrast, use the USB 2 protocol from 2000, which transfers data at 480 megabits per second, or 4.8 percent of the speed of USB 3.¹²⁷ Yet, Apple is compliant with the EU law because the *shape* of the cable socket—USB-C—is identical for all four iPhone 15 models.¹²⁸ The speed differential would be a strong incentive for iPhone buyers to spend the additional \$200 or \$300 for a Pro or Pro Max,¹²⁹ whereas the same buyers might have bought a base or Plus model and an extra Lightning cable for \$29¹³⁰ if not for the fact that the EU law seems to have caused Apple to differentiate data transfer speeds for different iPhone models.¹³¹ The EU appears to have

¹²⁵ EU Common Charging Directive, art. 1 (requiring compliance with Annex I for applicable devices by Dec. 28, 2024); *id.* Annex Ia.1.1 (“handheld mobile phones”); *id.* Annex Ia.2 (requiring devices to “be equipped with the USB Type-C receptacle, as described in the standard EN IEC 62680-1-3:2021”); BS EN IEC 62680-1-3:2021 at 34, 2.2 (defining “USB 2.0 Type-C receptacle for USB 2.0 platforms and devices”).

¹²⁶ *iPhone 15 Pro Specifications*, APPLE, <https://www.apple.com/iphone-15-pro/specs/> [<https://perma.cc/VA7F-U6QJ>].

¹²⁷ APPLE, *iPhone 15 Specifications*, <https://www.apple.com/iphone-15/specs/> [<https://perma.cc/KD4P-PWY5>]; ROBERT BRUCE THOMPSON & BARBARA FRITCHMAN THOMPSON, PC HARDWARE IN A NUTSHELL 13 (2003) (USB 2 “finalized in early 2000” with “speeds up to 480 [Mbps]”).

¹²⁸ See *supra* notes 121–27 and accompanying discussion.

¹²⁹ See Matt Elliott, *Is the Apple iPhone 15 Pro Worth It Compared to iPhone 15? Here’s Our Take*, CNET (Sept. 16, 2023) (citing the difference in data transfer speed as an advantage for the iPhone 15 Pro), <https://www.cnet.com/tech/mobile/inside-the-iphone-15-and-iphone-15-pro-heres-how-they-compare-and-which-to-buy/> [<https://perma.cc/ASN8-PYBV>].

¹³⁰ APPLE, *Lightning to USB Cable (2 m)*, <https://www.apple.com/shop/product/mw2r3am/a/usb-c-to-lightning-cable-2-m> [<https://perma.cc/3NH6-K7ZS>].

¹³¹ See Sam Rutherford, *Apple’s Switch to USB-C on the iPhone 15 Brings More Cable Confusion*, ENGADGET (Sept. 13, 2023) (Apple’s switch from Lightning to USB-C “may have been motivated more by EU regulations than a desire to increase usability”), available at <https://www.engadget.com/apples-switch-to-usb-c-on-the-iphone-15->

noticed this unintended consequence only after finalizing the law, as indicated by reports in 2023 that the EU had threatened to ban the sale of any device that limits transfer speeds and is planning to write an authoritative interpretation of the law to end evasion.¹³²

Moreover, it is unclear whether the EU law would eliminate the need to “have at least three mobile phone chargers at home”¹³³ as European officials say because, despite the change in the iPhone 15’s charging socket, only a certain type of charger may be compatible. The iPhone 15’s release was met with reports that it was “almost too hot to touch” while charging.¹³⁴ According to Apple, “larger USB-C power adapters, those above 20W [the wattage recommended by Apple for all four iPhone 15 models]” can cause overheating.¹³⁵ Even after Apple reportedly resolved the overheating issues resulting from charging through software updates, users continued to report third-party produced USB-C cables melting and burning the iPhone 15.¹³⁶

brings-more-cable-confusion-140030611.html [https://perma.cc/HP43-NVBP]; *id.* (Lightning cable provides 480 Mbps transfer speed).

¹³² Anne Schwedt, *EU-Kommission warnt Apple vor Einschränkungen bei Ladekabeln* [EU Commission Warns Apple About Restrictions on Charging Cables], *DIE ZEIT* (May 4, 2023) (quoting a letter from European Commissioner Thierry Breton to Apple obtained by Deutsche Presse-Agentur), *available at* <https://www.zeit.de/digital/mobil/2023-05/eu-kommission-apple-ladekabel-einschraenkungen-warnung> [https://perma.cc/TZ57-WB7F].

¹³³ Council of the European Union Press Release 884/22, *supra* note 117.

¹³⁴ See Anthony Cuthbertson, *iPhone 15 Overheating Issue Makes It ‘Too Hot to Touch,’ Owners Say*, *THE INDEPENDENT* (Sept. 27, 2023), <https://www.independent.co.uk/tech/iphone-15-overheating-charging-apple-b2419316.html> [https://perma.cc/54KC-ACRZ].

¹³⁵ See *supra* notes 126–27 (20 W for all iPhone 15 models); David Phelan, *Apple iPhone 15, iPhone 15 Pro Overheating Exclusive: Apple Comments*, *FORBES* (Oct. 3, 2023), <https://www.forbes.com/sites/davidphelan/2023/10/03/apple-iphone-15-iphone-15-overheating-exclusive-apple-comments-iphone-15-overheating-solution-coming> [https://perma.cc/TG49-U5SR].

¹³⁶ Patrick Holland, *A Fix Is Here: Apple Resolves iPhone 15 Pro Overheating Issues in Latest iOS 17 Update*, *CNET* (Oct. 7, 2023), <https://www.cnet.com/tech/mobile/a-fix-is-here-apple-resolves-iphone-15-pro-overheating-issues-in-latest-ios-17-update/> [https://perma.cc/8JPQ-N5TZ]; *Charging Cable Got So Hot It MELTED the Plastic, Broke Into My Phone and Burned My Finger. What Can I Do?*, *REDDIT* (r/iphone) (Dec.

None of this is to argue that all, or even most, design and behavioral regulations are futile. Unlike complexity prohibitions, regulations that are narrowly tailored to achieve a well-defined goal are not so easily defeated. For example, many states have minimum and maximum ground clearance requirements for vehicles.¹³⁷ If a car is too close to the ground, it would be damaged from debris or fixtures such as rocks or rail tracks.¹³⁸ If a car is too high from the ground, it would be unstable.¹³⁹ By imposing minimum and maximum ground clearance requirements, regulators would achieve a balance between the risks of cars taking debris damage and toppling. It would be infeasible for firms to both comply with this design regulation *and* defeat the regulators' goal because the regulation is tailored to that goal—unless firms could circumvent the laws of physics. The same holds true for behavioral regulations. A federal law prohibiting form contracts from restricting bad consumer reviews¹⁴⁰ is narrowly tailored to achieve a well-defined objective.

These regulations succeed because they target specific, verifiable objectives where compliance is binary. A vehicle either meets the ground clearance requirement or it does not, and a form contract either restricts consumer reviews or it does not. Because the regulatory goal can be stated with enough precision to make circumvention functionally impossible without violating the underlying constraint, these regulations resist the whack-a-mole dynamic that plagues complexity prohibitions.

The EU's USB-C mandate presents an instructive case. If the goal was to standardize the physical shape of charging connectors, the mandate was narrowly tailored and succeeded because the Lightning cable is gone. But the EU stated broader

24, 2023),
https://www.reddit.com/r/iphone/comments/18pqsfj/charging_cable_got_so_hot_it_melted_the_plastic/ [<https://perma.cc/Q8LN-ZPTM>].

¹³⁷ See, e.g., WASH. ADMIN. CODE § 204-10-036(1).

¹³⁸ See *Davis v. Union Pac. R.R. Co.*, 2015 WL 12532124, at *1 (S.D. Tex. May 13, 2015) (citing TEX. TRANSP. CODE § 545.255(a)(2)(B)) (certain trucks required to have “a clearance of at least nine inches, in order to safely clear a railroad crossing”).

¹³⁹ See *Branham v. Ford Motor Co.*, 701 S.E.2d 5, 11 (S.C. 2010).

¹⁴⁰ Consumer Review Fairness Act, 15 U.S.C. § 45b.

goals, including eliminating the need for multiple chargers and saving consumers an estimated €250 million annually. Measured against those broader ambitions, the mandate has struggled for the reasons discussed earlier in this Part, illustrating how the same regulation can qualify as a narrowly tailored regulation or as a complexity prohibition depending on which objective one measures it against.

The problem of complexity prohibitions is that they are not, and could not be, tailored to achieve a well-defined objective. For example, the ultimate goal of subscription bans is not really to ban the sale of *certain* features, such as heated seats, by subscription. The goal is to ban the sale of *any* feature by any method which may make “[p]eople feel that they paid double” for any part of a car.¹⁴¹ But no government can legislate the requirement “don’t be too greedy,” which forces legislators to specify which features cannot be sold by subscription and when that ban applies. Given the numerous ways in which firms can sell a certain feature by subscription while superficially staying compliant, the subscription ban could not be tailored to achieve the much broader purpose. This same problem causes right-to-repair laws to be easily defeated. The end goal of right-to-repair laws is to force products to be designed to enable repair for a “reasonable” price.¹⁴² But the subjective nature of that word and the differences in products that affect the ease of repair thwart an objectively discernible, narrow definition of that goal. This means that the actual regulations must be defined in hyperspecific terms despite their much broader goals, making easy circumvention possible.

Existing works that advocate for complexity prohibitions neglect how opaquely and broadly stated their purpose is, and hence how difficult they are to enforce. Professor Aaron Perzanowski argues that right-to-repair laws “simply require [product designers] to prioritize . . . familiar considerations” such as durability and repairability, “in order to meet clear objectives”:

Device makers would . . . resist any regulatory

¹⁴¹ Charlton, *supra* note 22.

¹⁴² EU Right to Repair Law, art. 5(2)(a).

intervention in the design process. . . . [P]roduct design is a complex exercise that requires balancing and prioritizing a range of competing, interdependent considerations. Technical constraints limit functionality; . . . consumer tastes and trends affect a range of product attributes; and legal rules . . . layer additional constraints across all these dimensions. No doubt, legal obligations . . . introduce additional complexity into the design process. But durability and reparability are hardly unknown considerations for designers. These rules simply require them to prioritize those familiar considerations in order to meet clear objectives.¹⁴³

While the dictionary definitions of repairability and durability are indeed straightforward, those ideas are not easily defined in the technical sense required for them to be legally enforceable. This is because, as discussed, “repairability” can only be legislated by banning specific features deemed to thwart repair, leaving firms free to evade the law through other repair-thwarting features that regulators failed to anticipate.

Some criticize firms that engage in legal circumvention as guilty of “malicious compliance,” defined as “[c]omplying with the letter—but not the spirit—of the law.”¹⁴⁴ But criticizing legal circumvention instead of the badly written laws that enable circumvention is like criticizing fire for killing people instead of the arsonist who started the fire. Take, for example, a business that prevents its workers from unionizing by deciding to go out of business. While preventing unionization is unethical, protesting outside the shuttered business will not make it reopen¹⁴⁵ because going out of business instead of

¹⁴³ Perzanowski, *supra* note 21, at 389.

¹⁴⁴ *Malicious Compliance with Right to Repair Laws*, REPAIR.ORG (Jan. 26, 2024), <https://www.repair.org/blog/2024/1/26/malicious-compliance-with-right-to-repair-laws> [<https://perma.cc/K74Z-XSDK>].

¹⁴⁵ Anna Spiegel, *The Wydown Closes Popular D.C. Coffee Shops Amid Union Push*, AXIOS.COM (May 15, 2024),

accepting unionization is legal.¹⁴⁶ Persuading workers to unionize on more benign terms that enable the business to stay open would be more helpful, because having collective bargaining rights with a lower-than-expected raise is better than no union, no raise, and no job. Similarly, shaming legal circumvention is less likely to end it than designing a policy with fewer loopholes. If the number of taxpayers who exploit tax code loopholes is any indication, even if legal circumvention were a sin, it would be a sin with too many offenders to punish.

In sum, the case studies in Part I, from automotive subscriptions to smartphone repair barriers to universal charger mandates, demonstrate a common pattern. Direct bans on ‘complexity’ features are consistently evaded or lead to new complications, ultimately undermining their own goals. This analysis of short-run workarounds and long-run cost escalations underscores the Article’s central claim: complexity prohibitions risk defeating themselves by prompting ever more complex design responses.

C. Sequential Game-Theory Models of Regulatory Failure

Section I.B has shown how complexity prohibitions would exacerbate complexities that firms can exploit for profit, thus raising the cost of goods to consumers. Section I.C uses sequential games to model how that increase would occur over time. The model features two players: a firm and a regulator. The firm moves first and exploits a complexity for profit, thus increasing the price of its good by a fixed amount (say, by \$100). The regulator follows and creates a complexity prohibition. This prohibition, while nullifying the firm’s previous act, would not fully reverse the price increase caused by the firm because the firm would have incurred a cost to comply with the regulation, a cost it would pass on to consumers. For example, the prohibition might reduce the price of the good (which the firm increased by \$100) by \$98, leaving a \$2 compliance cost. This process continues ad infinitum, with the firm finding a new

<https://www.axios.com/local/washington-dc/2024/05/15/wydown-closes-dc-coffee-shop-union> [<https://perma.cc/WVP4-WNZN>].

¹⁴⁶ See *Textile Workers Union of Am. v. Darlington Mfg. Co.*, 380 U.S. 263, 272 (1965).

complexity to exploit and the regulator nullifying it with a new prohibition on that complexity. As more prohibitions are enacted and defeated, the total cost of compliance, and thus the price of the good, would increase.

A pertinent question for this model is whether the marginal cost of compliance is constant or increasing. This question matters because if the cost of implementing and circumventing each new prohibition increases over time, the total compliance cost would rise at an increasing rate. This is relevant to laws like the EU's right to repair law, which adds prohibitions as firms find more complexities to exploit for profit. There is good reason to think that the cost of circumventing each new complexity prohibition would increase over time, given an immutable and fundamental nature of any complex system: "everything is connected to everything else, whether directly or indirectly," due to the difficulty of "reduc[ing] a system to its constituent parts without killing it."¹⁴⁷ Oregon's ban on parts pairing intended to "[p]revent or inhibit" repair is an example.¹⁴⁸ Even though this law bans a specific feature, it would not make firms redesign their products to be exactly the same as before, only without parts pairing. What may *seem* to be a change to one feature can in fact alter the entire product's design in significant and unanticipated ways:

The effects of changes—even small, localized, isolated changes—are not always small, localized, or isolated. How many times have you heard a statement like, "How could that have happened? I only changed one line of code." A small change, even one line of code, can affect the behavior of the rest of the system. . . . A small change can trigger an inappropriate decision, leading the program down the wrong path. A small change can cause . . . bugs that exhibit their effects a long way from their origin. Side effects of changes can . . . break . . . interacting[] or

¹⁴⁷ Liz Johnson, *Complexity Modeling and Application to Policy Research*, in HANDBOOK ON COMPLEXITY AND PUBLIC POLICY 150, 152 (Robert Geyer & Paul Cairney eds., 2015).

¹⁴⁸ 2024 Or. Laws ch. 69, § 1(2)(b) (S.B. 1596).

underlying software.¹⁴⁹

Applying this logic to complexity prohibitions, each additional ban and circumvention would become more costly because the effects of each ban would interact with the other bans, as Section I.B showed with examples of how complexity prohibitions can be circumvented over time. The rest of Section I.C presents two models, in which the cumulative compliance cost increases at a linear rate and a quadratic rate, respectively. These formal models confirm a bleak prognosis for the prohibition strategy: consumers would pay higher prices, and market competition would diminish over time, all in contravention of the policy's goals. These findings signal the necessity of a fundamentally different approach that does not trigger an endless cost spiral.

1. Constant Marginal Cost of Compliance

- Two players are involved: the firm and the regulator. The firm (Player 1) seeks to increase the global complexity and cost parameter C , which is also the price of the good. The regulator (Player 2) seeks to reduce the global complexity and cost parameter C .
- Each player moves in alternating turns. Player 1 moves first, followed by Player 2. In odd periods, Player 1 exploits a complexity that increases the cost parameter C by amount x . In even periods, Player 2 introduces a complexity prohibition that reduces the cost parameter by a positive fraction r of x , where $0 < r < 1$. r is the reduction factor.
- C_t is the global complexity and cost parameter at time period t .
 $C_1 = C_0 + x$ (where C_0 is the cost parameter at period 0).
 $C_2 = C_1 - r * x$ (reducing the increase from period 1).

Therefore, the formula generalizes to:

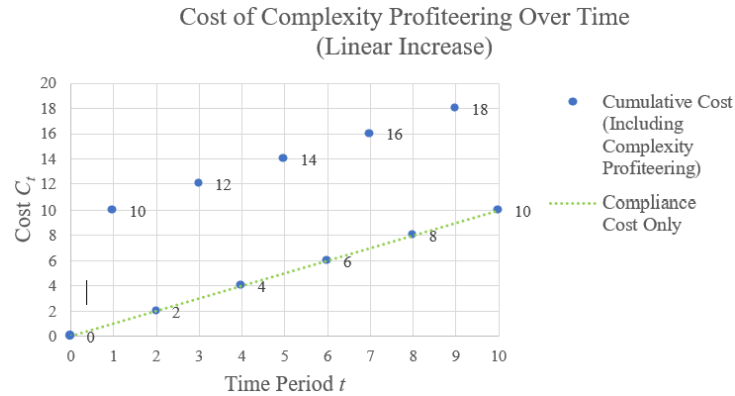
¹⁴⁹ REX BLACK, PRAGMATIC SOFTWARE TESTING: BECOMING AN EFFECTIVE AND EFFICIENT TEST PROFESSIONAL 64 (2013).

$$C_t = C_{t-1} + x \text{ for odd } t \text{ (Player 1's turn),}$$

and

$$C_t = C_{t-1} - r * x \text{ for even } t \text{ (Player 2's turn).}$$

Where $C_0 = 0$, $r = 0.8$, $x = 10$, the cumulative cost and the cost of circumventing complexity prohibitions are as follows:



2. Increasing Marginal Cost of Compliance

- In this model, the marginal cost of compliance (circumvention) increases according to the number of complexity prohibitions implemented by the regulator. This is because, as explained, complexity prohibitions would interact with one another to complicate product design.
 - o The number of complexity prohibitions implemented by the regulator is stated as $n_t = \lfloor t / 2 \rfloor$, where $\lfloor \cdot \rfloor$ is the floor function.
- The interaction term, according to which the marginal cost increases, is:

$$i_t = \alpha * (n_t - 1)$$

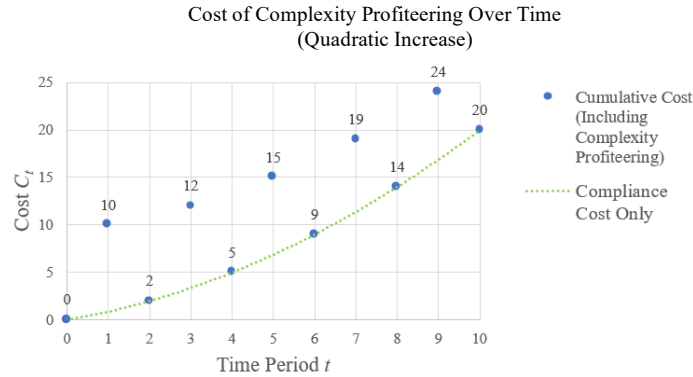
α is a constant representing the incremental cost due to interactions among the regulator's complexity prohibitions, and $(n_t - 1)$ ensures that the interaction term exists only when the regulator has implemented more than one complexity prohibition.

- The formula for C_t now becomes:
For all odd t , $C_t = C_{t-1} + x$, and
For even t ,

If $n_t > 1$, $C_t = C_{t-1} - r * x + \alpha * (n_t - 1)$

Otherwise, $C_t = C_{t-1} - r * x$

Where $C_0 = 0$, $r = 0.8$, $\alpha = 1$, $x = 10$, the cost curve is:



There are two immediate implications of the rising compliance costs of complexity prohibitions. First, rising compliance costs harm consumers by raising prices. Second, rising compliance costs would harm small firms that are less able to absorb them than their larger competitors. A long line of research has found “strong evidence of higher [compliance] costs per dollar of revenue for small businesses,” which held “across a wide range of types of requirements and types of firms.”¹⁵⁰ If compliance costs are higher for smaller firms, rising compliance costs would act as an entry barrier for them. Thus, complexity prohibitions would ironically give large firms even more market power by reducing competition, which would harm consumers in contravention of a central stated objective of complexity prohibitions: to “protect consumers from anticompetitive efforts [by firms] to limit repair”¹⁵¹ and enable consumers to “shape their consumption . . . the way they want

¹⁵⁰ Paul Sommers & Roland J. Cole, *Costs of Compliance in Small and Medium-Sized Businesses*, 6 AM. J. SMALL BUS. 25, 26 (1981); see also, e.g., Mustafa Hanefah, Mohamed Ariff & Jeyapalan Kasipillai, *Compliance Costs of Small and Medium Enterprises*, 4 J. AUSTL. TAX’N 73, 73 (2002) (“[C]ompliance costs of [small and medium enterprises in Malaysia] are substantially higher compared with the costs measured for . . . larger firms.”).

¹⁵¹ *Governor Hochul Signs the Digital Fair Repair Act into Law* (Dec. 29, 2022) (press release from the office of the Governor of New York on right-to-repair law), <https://www.governor.ny.gov/news/governor-hochul-signs-digital-fair-repair-act-law> [<https://perma.cc/D9RC-S35X>].

to and not the way they are forced to by manufacturers.”¹⁵²

Regardless of whether the cost of complexity prohibitions increases linearly or quadratically, this inquiry points to much broader implications for tech law. First, direct state regulation of specific design features does not necessarily increase state control over technology. Indeed, microregulations of design features can *reduce* state control by intensifying the phenomenon they seek to mitigate: complexity prohibitions worsen complexity profiteering by multiplying complex design features that firms can exploit. This finding is derivative of the much simpler, enduring truth that banning something does not necessarily end it. Technology develops specifically to skirt the law, even when the law expressly prohibits circumvention and permits regulators to punish what they deem to be circumvention in their sole discretion.¹⁵³ In all, complexity prohibitions are indicative of a prevailing trend in modern tech law discourse: an increasing focus on direct control over market processes resulting in regulations that are hyperspecific to the point of infeasibility.

In short, the models predict that a regulatory strategy of banning complexity results in ever-increasing consumer prices without eliminating complexity profiteering. These findings set the stage for Part III’s proposal for a market-driven information solution that seeks to break out of this costly cycle.

II. A Law Divided: Technocracy Against Democracy

Part I examined whether complexity prohibitions would achieve their stated objectives without scrutinizing the normative assumptions underlying complexity prohibitions. Part II expands the inquiry to interrogate two such

¹⁵² European Comm’n Press Release IP/24/608, *Commission Welcomes Political Agreement on New Consumer Rights for Easy and Attractive Repairs* (Feb. 2, 2024) (quoting European Commission Vice-President Věra Jourová).

¹⁵³ Regulation (EU) 2022/1925 of Sept. 14, 2022, on Contestable and Fair Markets in the Digital Sector and Amending Directives (EU) 2019/1937 and (EU) 2020/1828 (Digital Markets Act), 2022 O.J. (L 265) 1 (art. 13, anti-circumvention); Kim, *supra* note 111, at 1292–96 (arguing that Article 13 would result in circumvention or harm to consumers).

assumptions. First, how much do consumers want complexity prohibitions? Often, public approval is not necessarily the decisive factor in evaluating the soundness of public policy because most citizens lack expertise in regulatory minutiae.¹⁵⁴ But given that advocates cite public support as a core justification for complexity prohibitions,¹⁵⁵ examining the true extent of public support is warranted. Second, how would complexity prohibitions accurately identify instances of complexity profiteering? Part I assumed *arguendo* that practices which are widely considered to be complexity profiteering were indeed cases of complexity profiteering. But even the most well-credentialed experts have been wrong about the economic or societal consequences of new technology. For example, Nobel Prize-winning economist Paul Krugman predicted in 1998 that “[b]y 2005 or so, it will become clear that the Internet’s impact on the economy has been no greater than the fax machine’s”—ironically, in an article criticizing other economists for having mispredicted the consequences of new technology.¹⁵⁶ Given this possibility of error, laws that would prohibit specific technological or design features because of their future economic consequences must have mechanisms to minimize the likelihood of error and, when an error inevitably occurs, to minimize their harmful consequences.

Unfortunately, complexity prohibitions fail on both questions. On the first, the surveys cited by advocates as evidence of overwhelming support for complexity prohibitions are contradicted by consumers’ *revealed* preferences in shopping habits, casting doubt on whether complexity prohibitions reflect public or technocratic preferences. On the second, neither the complexity prohibitions nor their advocates appear to account satisfactorily for the possibility of error.

¹⁵⁴ Cf. Jennifer M. Kinsley, *Chill*, 48 LOY. U. CHI. L.J. 253, 256–57 (2016) (“The average reasonable person is likely unaware of the vast myriad of regulations on their speech.”).

¹⁵⁵ See *supra* note 29 and accompanying text.

¹⁵⁶ Paul Krugman, *Why Most Economists’ Predictions Are Wrong*, RED HERRING (1998), <http://www.redherring.com/mag/issue55/economics.html> [<https://perma.cc/3G5E-39P7>] [<https://web.archive.org/web/19980610100009/http://www.redherring.com/mag/issue55/economics.html>] [<https://perma.cc/GWL7-94F2>].

What if a feature that is widely suspected of being intended to thwart repair, for example, is actually valuable to consumers? If complexity prohibitions successfully ban the technology at issue, consumers would be permanently deprived of value-adding design features. If complexity prohibitions fail because firms circumvent them, consumers would end up paying more for that feature. Part II shows how, for these reasons, complexity prohibitions would be undemocratic and economically counterproductive.

A. Complexity Prohibitions Are Undemocratic

This section examines three reasons complexity prohibitions can be viewed as undemocratic. First, public opinion may not truly demand these rules as much as surveys suggest, due to a potential mismatch between what people say and what they actually do. Second, uniform bans risk imposing the preferences of a minority (those who prioritize repairability) on the majority of consumers who may value other product features, thus effectively overriding choices the market currently provides. Third, by replacing consumer choice with technocratic regulation, complexity prohibitions shift decision-making away from the democracy of the market and into the hands of regulators, which may be at odds with the popular will. For clarity, I use the term “democratic” in this section to mean responsiveness to the preferences of the populace (consumers) through their purchasing decisions, as opposed to ‘democratic’ in the electoral or legislative sense. In the marketplace, every dollar is a vote. If enough people want a feature, companies have an incentive to offer it. This concept of ‘market democracy’ highlights that consumers collectively have power, even in the absence of direct regulation.

Advocates’ substantial reliance on public support to justify complexity prohibitions may seem quaint at first sight. Policy recommendations in tech and consumer protection law are often based on the premise that the average person, for no fault of their own, lacks the knowledge needed to make rational decisions in those areas, and therefore that policy should

temper the average person's instinct.¹⁵⁷ But when it comes to complexity prohibitions, advocates cite strong public support as an important reason to enact them. Perzanowski cites "more than 80% of respondents" supporting the right to repair as evidence of firms "acting in ways that are inconsistent with demonstrated consumer expectations."¹⁵⁸ Consumer Reports, whose survey similarly found that 83% of respondents believe "repairability is very important" in consumer products, stated that a "majority of Americans expressed support for policies that would help ensure consumers [can] . . . repair their own products."¹⁵⁹ Nevertheless, scholars' inconsistent view of public opinion as something to be both wary of and relied upon does not mean that the public's preferences are worthless: "the fact that enough voters want [a law or regulation] is sufficient reason in a democratic society to seriously consider the proposal, at the very least."¹⁶⁰

Indeed, the problem with citing public opinion to justify complexity prohibitions is not that public opinion is worthless. The problem is that the public may not actually want complexity prohibitions to the degree that their advocates believe. A long line of economic research has shown that *stated* preferences, such as survey responses, may not "measure the preferences they attempt to measure."¹⁶¹ The extent of

¹⁵⁷ See, e.g., A. Michael Froomkin & P. Zak Colangelo, *Self-Defense Against Robots and Drones*, 48 CONN. L. REV. 1, 5 (2015) ("it will be difficult for the average person to know the capabilities of an unfamiliar robot . . ."); Donna S. Harkness, *Packaged and Sold: Subjecting Elder Law Practice to Consumer Protection Laws*, 11 J.L. & POL'Y 525, 540 (2003) ("the law may seem extremely complex . . . to the average lay person."); Julia Alpert Gladstone, *Why Patenting Information Technology and Business Methods Is Not Sound Policy: Lessons from History and Prophecies for the Future*, 25 HAMLINE L. REV. 217, 228 (2002) ("The average person is still amazed and intrigued by the capabilities of computers.").

¹⁵⁸ Perzanowski, *supra* note 21, at 392.

¹⁵⁹ Mahoney & Slover, *supra* note 29.

¹⁶⁰ Kim, *supra* note 111, at 1258.

¹⁶¹ Peter A. Diamond & Jerry A. Hausman, *Contingent Valuation: Is Some Number Better than No Number?*, 8 J. ECON. PERSP. 45, 46 (1994); see also Simona Bigerna, Carlo Andrea Bollino, Silvia Micheli & Paolo Polinori, *Revealed and Stated Preferences for CO2 Emissions Reduction: The Missing Link*, 68 RENEWABLE & SUSTAINABLE ENERGY REV. 1213 (2017) (consumers state that they are willing to pay a carbon tax, but their actual

discrepancy between stated preferences and preferences revealed by actual behavior has been quantified as being up to 41 percent.¹⁶² In cases of complexity prohibitions, such as the right to repair, consumers' stated preferences appear to diverge significantly from their revealed preferences. Studies show consistently that the average consumer replaces electronics like phones and computers well before the end of their lifespan for, among other reasons, "fashion."¹⁶³ One study found that "most products were replaced while they were still performing their main function," and 60 percent of those who replaced a product "did not even consider repairing it" before replacing it.¹⁶⁴ In other words, the polling 'mandate' is far weaker than it looks when tested against how people actually behave, thus casting doubt on the claim that there is a democratic mandate for across-the-board repairability requirements. Given that a substantial number of consumers prioritize other considerations over product longevity and repairability in their actual purchasing behavior, survey responses that merely *state* majority support for complexity prohibitions are a questionable basis to determine the popular will.

My argument is not that *no* consumer prioritizes repairability. Some clearly do, while many others prioritize considerations other than repairability. This observation relies not on surveys, but on the variety of products on the market that cater to diverse preferences. For example, Lenovo has a history of releasing laptops whose covers are made of glass, such as the Yoga C930 Glass in 2018¹⁶⁵ and the Yoga Slim 9i in

behavior indicates that they must be compensated in order to accept a carbon tax).

¹⁶² Kaat de Corte, John Cairns & Richard Grieve, *Stated Versus Revealed Preferences: An Approach to Reduce Bias*, 30 HEALTH ECON. 1095 (2021) (discrepancy between intended and actual frequency of blood donations is 41 percent for men and 30 percent for women).

¹⁶³ Wieser & Tröger, *supra* note 32.

¹⁶⁴ Lise Magnier & Ruth Mugge, *Replaced Too Soon? An Exploration of Western European Consumers' Replacement of Electronic Products*, 185 RES. CONSERV. & RECYCL. 106448 (2022).

¹⁶⁵ Mark Spoonauer, *Lenovo Yoga C930 Hands-On: Meet the New 2-in-1 King*, LAPTOPMAG (2018), <https://www.laptopmag.com/articles/lenovo-yoga-c930-specs-price> [<https://perma.cc/W7UK-RE7W>].

2025.¹⁶⁶ Lenovo promoted the C930 as having a “[p]remium aluminum craftsmanship and a unique glass cover,”¹⁶⁷ and the Slim 9i as having a “dazzling glass cover design with distinctive cat-eye jewelry texture.”¹⁶⁸ At the 2024 Mobile World Congress, Lenovo debuted proof-of-concept designs it claims would “enhance user experiences in ways never imagined,” indicating an intent to develop future products in alignment with such designs.¹⁶⁹ One such design was the “Transparent Display Laptop,” presenting “a completely borderless and see-through display experience”¹⁷⁰:



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¹⁶⁶ Jorge A. Aguilar, *The Lenovo Yoga Book 9i Has 4K Dual Touch Screens*, HOW-TO GEEK (2025), <https://www.howtogeek.com/lenovo-yoga-book-9i-4k-dual-touch-screen/> [<https://perma.cc/YM33-48HF>].

¹⁶⁷ *Yoga C930 Glass*, LENOVO, <https://www.lenovo.com/us/en/p/laptops/yoga/yoga-2-in-1-series/yoga-c930-13ikb-glass/88ygc900983> [<https://perma.cc/XHN4-Y6JP>].

¹⁶⁸ *Yoga Slim 9i*, LENOVO, <https://www.lenovo.com/us/en/p/laptops/yoga/yoga-slim-series/yoga-slim-9i-gen-10-14-inch-intel/len101y0052> [<https://perma.cc/FN2S-C9AU>].

¹⁶⁹ *Lenovo’s Cutting-Edge ThinkPad and ThinkBook Laptops Pave the Way for AI PC Innovation at MWC*, LENOVO STORYHUB, Feb. 25, 2024, available at <https://news.lenovo.com/pressroom/press-releases/lenovos-cutting-edge-thinkpad-and-thinkbook-laptops-pave-the-way-for-ai-pc-innovation-at-mwc/> [<https://perma.cc/E2N3-R2VD>].

¹⁷⁰ *Id.*

¹⁷¹ Julian Chokkattu, *Lenovo’s Project Crystal Is a Concept Laptop With a Transparent Display*, WIRED (Feb. 26, 2024), <https://www.wired.com/story/lenovo-project-crystal-transparent-laptop-mwc-2024/> [<https://perma.cc/HEE8-9MS3>].

This design, which emphasizes aesthetics, comes at the cost of durability and repairability. For example, while some users have commented that the Yoga C930 Glass “looks beautiful and [they] want it,” others have complained that “if dropped, [the glass] gets shattered completely” and “repairing the glass . . . once or twice would probably make up the price.”¹⁷² Indeed, official product documentation indicates that, were the glass to break, not only the glass but also the entire top case that houses the display would have to be replaced.¹⁷³

On the other end of the design philosophy spectrum is the Framework laptop, which, according to the manufacturer, is designed to be “easy to repair, last longer, and minimize environmental impact.”¹⁷⁴ For example, “[e]very part is replaceable with just the one tool that comes in the box.”¹⁷⁵ The laptop is modular so that replacing a battery, for instance, does not require replacing the speaker, keyboard, and the top case with it,¹⁷⁶ unlike the MacBook Pro.¹⁷⁷ However, this design philosophy comes at the cost of aesthetics. Compared to the Lenovo Yoga’s sleek, glassy appearance, the aluminum Framework laptops look bulkier, with Framework itself touting the model as available in only one color.¹⁷⁸ The firm states that “the chassis was designed to be easy to open and

¹⁷² *Difference in Price for No Reason? Lenovo Yoga C930*, TOM’S HARDWARE (Aug. 25, 2019) (consumer forum post), <https://forums.tomshardware.com/threads/difference-in-price-for-no-reason-lenovo-yoga-c930.3517129/> [<https://perma.cc/2Z8F-94XB>].

¹⁷³ *Removal and Replacement Videos – Yoga C930-13IKB (81C4, 81EQ)*, LENOVO (upper case replacement), <https://support.lenovo.com/us/en/solutions/ht509170-removal-and-replacement-videos-yoga-c930-13ikb-81c4-81eq> [<https://perma.cc/DA4M-PUVM>].

¹⁷⁴ FRAMEWORK, <https://frame.work/> [<https://perma.cc/7V5K-GQ42>].

¹⁷⁵ *Framework Laptop 13 DIY Edition (Intel Core Ultra Series 1)*, FRAMEWORK, <https://frame.work/products/laptop13-diy-intel-ultra-1/configuration/new> [<https://perma.cc/YBG2-HAH6>].

¹⁷⁶ *Battery Replacement Guide*, FRAMEWORK, <https://guides.frame.work/Guide/Battery+Replacement+Guide/85?lang=en> [<https://perma.cc/W6G7-XRTV>].

¹⁷⁷ See APPLE, *supra* note 97.

¹⁷⁸ FRAMEWORK, *Why the Framework Laptop 13 Only Comes in One Color* (YouTube, Sept. 26, 2023), <https://www.youtube.com/watch?v=PURZRHu2TOg> [<https://perma.cc/8UZP-N9DS>].

replace components” and is made of recycled aluminum without using dyes to minimize industrial waste.¹⁷⁹



The fact that the market offers both Framework and Lenovo laptops indicates genuine demand for both types of products: those that prioritize repairability at the expense of fashion, as well as those prioritizing fashion at the expense of repairability. There is no need to conduct surveys to ask how many people prioritize repairability and how many don't, because the market already meets those preferences. If consumers really do value repairability as much as right-to-repair advocates claim,¹⁸⁰ people can buy more Framework laptops and fewer laptops like the Yoga C930 Glass. But if a uniform right-to-repair law were to require *all* laptop computers to prioritize repairability and durability—as the EU's right-to-repair law would¹⁸¹—that would make all laptops look more like Framework laptops and less like Yoga laptops. This is because, as discussed, prioritizing repairability requires sacrificing other design priorities, such as fashion. Independent of whether people *should* value fashion in their purchases, complexity prohibitions like right-to-repair laws would prevent the market from serving the diverse consumer preferences it already serves in the status quo by imposing the design

¹⁷⁹ *Id.*

¹⁸⁰ See *supra* note 29 and accompanying text.

¹⁸¹ See *supra* Part I.B (discussing EU right to repair directive); see also Jared A. Mark, *Realizing A New Right: The Right to Repair at the Federal Stage*, 23 N.C. J. L. & TECH. 382, 412 (2021) (EU right to repair directive “observ[es] a right to repair in specific industries relating to home appliances. . .”).

preferences of certain consumers (or the regulator) on all products and thus all consumers. In democratic terms, it would be akin to imposing a minority preference on the majority, a result at odds with consumer choice as expressed in the marketplace. Thus, a sweeping repairability mandate would elevate the values of one group of consumers (those prioritizing longevity and repair) over those of another group (those who prefer cutting-edge design or other features).

The fact that complexity prohibitions like right-to-repair laws would impose the preferences of a few on the entire market makes them incoherent, because right-to-repair laws are presented as expressing the popular will. For illustration, consider Perzanowski's description of the Fairphone, a brand of smartphones prioritizing repairability and longevity over design aesthetics:

The Fairphone, admittedly, doesn't sport the fastest processor, the brightest screen, or the sleekest design. But it is largely indistinguishable from other fully functioning smartphones of recent vintage. All designs entail compromise. A new Apple or Samsung phone might be a few millimeters thinner or load *Among Us* a fraction of a second faster. But the Fairphone's drawbacks are a reasonable sacrifice to make in the name of vastly improved longevity and far lower repair costs. It might be tempting to dismiss the Fairphone as . . . a proof-of-concept with no real market viability. But Fairphone has sold hundreds of thousands of devices so far . . .

¹⁸²

There is no doubt that Perzanowski sincerely believes that Fairphones are superior to the new iPhone or Galaxy. He may even be correct in the academic sense, in that "vastly improved longevity and far lower repair costs" do make the Fairphone a "reasonable sacrifice" for the majority of users, regardless of whether they agree. But the point is that many people disagree.

¹⁸² PERZANOWSKI, *supra* note 16, at 247.

If sales figures are an indication of public sentiment on repairability, as Perzanowski seems to believe, many more people disagree with him than agree. The Apple or Samsung phones whose sole virtue according to Perzanowski is that they are slightly thinner and load games marginally quicker have each sold in the billions,¹⁸³ while fewer than a million Fairphones have sold.¹⁸⁴ This means that, were the law to force all smartphones on the market to prioritize repair like the Fairphone, it would be imposing the preferences of a minority. As long as that is what a right-to-repair law does, advocates like Perzanowski cannot claim that such a law would merely enact the popular will.¹⁸⁵ This is especially true when the market is already democratic in a consumer-choice sense, as it caters to any consumer preference large enough to keep a firm profitable.

In sum, the claim of complexity prohibitions to popular support is doubly contradicted. First, the claim itself—that a vast majority of the public supports them—is questionable, given the discrepancy between stated preferences for complexity prohibitions and actual buying behavior. Second, imposing the preferences of a certain group of consumers and regulators makes complexity prohibitions more technocratic than democratic, particularly because the market on which they would be imposed is already serving a diverse range of consumer preferences. Indeed, the normative case for complexity prohibitions would be more internally coherent if their claim to popular support were dropped. Advocates of complexity prohibitions could argue that consumers are wrong to buy as many unrepairable goods as they do, given the unsustainable amount of waste that such a habit undeniably

¹⁸³ Sebastian Pier, *Samsung Sold Almost 3 Billion Phones Since 2014*, PHONEARENA (May 16, 2024), https://www.phonearena.com/news/samsung-sold-almost-3-billion-phones-since-2014_id158379 [https://perma.cc/FB7D-GCF2].

¹⁸⁴ Sydney Boyo, *How the Apple iPhone Became One of the Best-Selling Products of All Time*, CNBC (Jan. 29, 2024), <https://www.cnbc.com/2024/01/27/how-the-apple-iphone-changed-the-world.html> [https://perma.cc/J898-3KU8].

¹⁸⁵ Perzanowski, *supra* note 21, at 392; *see also* Mark, *supra* note 181, at 413 (arguing that “many Americans yearn” for the kind of right to repair enshrined in EU law).

generates,¹⁸⁶ and thus that they should be forced to prioritize repairability for their own good. Such an argument would not be unprecedented. At least since Edmund Burke in the 18th century, the “trustee” model of representation has argued that “[y]our representative owes you, not his industry only, but [also] his judgment; and he betrays, instead of serving you, if he sacrifices it to your opinion.”¹⁸⁷ More recently, academics have defended regulatory paternalism with the claim that few people know what is best for themselves.¹⁸⁸ Although such a defense of complexity prohibitions could be criticized as undemocratic, it at least could not be criticized for being both undemocratic *and* incoherent. Put differently, the claim of complexity prohibitions to popular support is problematic because they may lack a true majority mandate and even counteract the choices that consumers currently enjoy. A regulatory approach that assumes consumers to be incapable of deciding for themselves effectively sidelines consumer preference in favor of bureaucratic decision-making. This tension between market choice and regulatory fiat is central to the democratic legitimacy concerns raised here.

B. Complexity Prohibitions Do Not Account for Error

“[The iPhone] isn’t really revolutionary . . . [and] will not turn any industry inside out.”

¹⁸⁶ See, e.g., Beth Ann Fiedler, *International Changes in Environmental Conditions and Their Personal Health Consequences*, in TRANSLATING NATIONAL POLICY TO IMPROVE ENVIRONMENTAL CONDITIONS IMPACTING PUBLIC HEALTH THROUGH COMMUNITY PLANNING 255, 262 (Beth Ann Fiedler ed., 2018) (“Nothing brings the problem of overconsumption in developed nations to the fore like the global problem of e-waste.”).

¹⁸⁷ EDMUND BURKE, SELECTED WRITINGS AND SPEECHES 224 (Peter J. Stanlis ed., 2009).

¹⁸⁸ See Jonathan Klick & Gregory Mitchell, *Government Regulation of Irrationality: Moral and Cognitive Hazards*, 90 MINN. L. REV. 1620, 1620–21 (2006).

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As a punishment becomes harsher, the harm of mistakenly punishing an innocent conduct or party grows correspondingly. One oft-cited reason for opposing the death penalty, for instance, is that it is irreversible.¹⁹¹ Hence, laws that would mete out serious punishment must present a way to minimize the likelihood and impact of error. Separate from their efficacy in practice, “death penalty cases offer far more opportunities and incentives for reversal than other criminal trials” to at least try to reduce the likelihood of error.¹⁹² Beyond the lone example of capital punishment, “it is a cardinal principle of Anglo-American jurisprudence that . . . better ten guilty persons should go free than one innocent person be convicted.”¹⁹³ Although not on the level of capital punishment, complexity prohibitions represent a serious and hard-to-reverse punishment, as they would ban the use of a technology or design feature as long as the relevant laws and regulations remain on the books. Because the consequence of banning certain technologies may be that the technologies in question can no longer be refined, developed, and put to good use in the future, complexity prohibitions must minimize the likelihood and impact of error—a concrete possibility, given that even some of the most renowned experts have misjudged the potential and consequences of new technology.¹⁹⁴

Complexity prohibitions, in their current form, do not account for the possibility of error. What complexity

¹⁸⁹ Tim Wu, *iPhony*, SLATE (June 29, 2007), <https://slate.com/technology/2007/06/why-the-iphone-isn-t-really-revolutionary.html> [<https://perma.cc/76EZ-B5PQ>].

¹⁹⁰ Tim Wu, COLUM. L. SCH., <https://www.law.columbia.edu/faculty/timothy-wu> [<https://perma.cc/N5GG-C98X>].

¹⁹¹ See, e.g., Lewis F. Powell, Jr., *Capital Punishment*, 102 HARV. L. REV. 1035, 1041 (1989) (“[I]t bears repeating that death is a unique punishment in that it is irreversible.”).

¹⁹² Barry Latzer & James N.G. Cauthen, *Capital Appeals Revisited*, 84 JUDICATURE 64, 70 (2000) (offering an explanation for “the high conviction reversal rate” in capital cases).

¹⁹³ *United States v. Greer*, 538 F.2d 437, 441 (D.C. Cir. 1976) (citing Blackstone).

¹⁹⁴ See, e.g., Krugman, *supra* note 156 (*the internet*); Wu, *supra* note 189 (*the iPhone*).

prohibitions do is not to evaluate if a technology or design feature presents an excessive risk of profiteering. What they do is assume that a technology or design feature is being used (or will be used) to profiteer, and permanently ban it. For example, a law banning parts pairing for smartphones¹⁹⁵ requires the belief that such a design would harm users. If there was any doubt, a permanent ban would not have been enacted. This is true of other complexity prohibitions such as the proposed ban on the sale of heated seats by subscription;¹⁹⁶ this ban would not have been proposed if there was any doubt that this sales scheme is intended to profiteer at the expense of consumers. Indeed, the most vocal commentators on BMW's ill-fated attempt to sell heated seats for a monthly fee indicated no doubt that it was intended to get consumers to pay "indefinitely into the future" for cars they already bought¹⁹⁷ and that BMW's attempt represented a "dystopia."¹⁹⁸

Although this perception may well be correct, it may also be incorrect, meaning that a law based on it could end up banning a feature that creates value for consumers. First, selling optional features on a subscription basis could save consumers money. Recall that BMW's model would involve selling everyone the same car and enabling heated seats only for those who pay the monthly fee.¹⁹⁹ This means that BMW would need to manufacture only one trim for a given car as opposed to multiple trims that come with and without heated seats, such as the 2024 Chevy Tahoe.²⁰⁰ Having to produce only one trim would make production "far cheaper," a strategy that

¹⁹⁵ See 2024 OR. LAWS ch. 69, § 1(2)(b) (S.B. 1596).

¹⁹⁶ See *supra* notes 52–54 and accompanying text.

¹⁹⁷ Rossmann, *supra* note 35.

¹⁹⁸ Matt Posky, *Driving Dystopia: BMW Sneaks Subscription Services Back Into Vehicles*, THE TRUTH ABOUT CARS (July 23, 2024), <https://www.thetruthaboutcars.com/cars/news-blog/driving-dystopia-bmw-sneaks-subscription-services-back-into-vehicles-44508289> [https://perma.cc/FVZ9-D7VL].

¹⁹⁹ Valdes-Dapena, *supra* note 1.

²⁰⁰ *Which Chevy Tahoe Trim Level Is Right for You?*, SCHUMACHER CHEVROLET CLIFTON (trims with and without heated seats), <https://www.schumacherchevroletclifton.com/new-chevy/compare-trims-chevy-tahoe-suv.htm> [https://perma.cc/U2T5-RR4H].

other carmakers appear to have adopted.²⁰¹ BMW has an incentive to pass these cost savings on to consumers, so that more consumers would consider buying BMW cars rather than more expensive models marketed by competitors. Indeed, BMW's subscription model would have offered a "lower upfront price for the car" and further potential cost savings by enabling consumers to "only pay for [a] feature [such as heated seats] when it might be needed, like in the winter."²⁰²

Second, the subscription model could have offered consumers more flexibility. A survey by the loan facilitator LendingTree found that "nearly 40% of consumers who[] purchased a vehicle" regretted it later, a reason being the "unaffordably expensive" price.²⁰³ Having to buy optional features up front would add to the price and thus the risk of regret. BMW's sales model "was intended to be one of many ways to offer flexibility to customers, who could opt in to pay for vehicle functions when it suited them, then stop paying when they were no longer wanted."²⁰⁴ This strategy of offering more flexibility is consistent with other developments in BMW cars, like the "E Ink technology" that would enable consumers to "change [a BMW's] colors on command."²⁰⁵ To be sure, it is possible that BMW's true intent is not to deliver value to consumers, but to "nickel-and-dime" them.²⁰⁶ At the very

²⁰¹ Chris Bouchard, *The Pros and Cons of a Single-Trim Vehicle Strategy*, DATAONE SOFTWARE (Nov. 17, 2015), https://vin.dataonesoftware.com/vin_basics_blog/single-trim-vehicle-strategy-pros-and-cons [<https://perma.cc/X7XF-ZEXF>].

²⁰² Valdes-Dapena, *supra* note 1; Cenizo, *supra* note 36 (showing that consumers would save money from the heated seats subscription if they subscribed "for the three coldest months of the year" and did not drive the same car for "nearly a decade.").

²⁰³ Jenn Jones, *Nearly Half Who Bought a Car in the Past Year Have Regrets*, LENDINGTREE (Jan. 24, 2022), <https://www.lendingtree.com/auto/car-regrets-survey/> [<https://perma.cc/NDN9-2AMU>].

²⁰⁴ Charlton, *supra* note 22.

²⁰⁵ Patrick George, *Check Out BMW's Color-Changing Concept Car in Action*, THE VERGE (Jan. 5, 2023), <https://www.theverge.com/2023/1/5/23540358/bmw-color-changing-car-concept-e-ink-i-vision-dee-ces> [<https://perma.cc/6MCN-N8KK>].

²⁰⁶ Josh Max, *Your New Car Isn't Yours – Automakers Increasingly Charge "Subscription Fees,"* FORBES (Jan. 2, 2025), <https://www.forbes.com/sites/joshmax/2025/01/02/your-new-car-isnt->

least, the fact that consumers did not believe BMW's claim is the fault of none but BMW, as is made clear by the saying "the customer is always right." The point is that BMW's subscription model *could* have added value for consumers, and thus that the complexity prohibitions that would ban that model could be mistaken.

The BMW heated-seat example illustrates a deeper problem with complexity prohibitions: they require the state to classify specific practices as exploitative with a certainty that the concept of complexity profiteering cannot support. Whether BMW's subscription model constituted profiteering or a consumer-friendly innovation depends on how one weighs cost savings against convenience, how one assesses the alternatives available, and what one considers a fair price for a given feature. If sophisticated commentators can reach opposite conclusions about a single, well-publicized business practice, the state cannot be expected to make such classifications definitively across the countless design choices in the modern consumer market.

This Article accordingly does not attempt to reduce complexity profiteering to a rigid operational test, because the concept's inherent subjectivity is itself the strongest argument for the market-based approach this Article proposes. Regulatory prohibitions can function only if the state first determines that a given design choice constitutes complexity profiteering. When that determination is debatable, the ban risks imposing one group's judgment on everyone, replicating the technocratic imposition that Section II.A identified in uniform repairability mandates. A market-based approach sidesteps this problem entirely. Instead of requiring the state to make that determination, it provides consumers with factual information about a product's design, such as whether a car charges monthly fees for heated seats or whether a phone requires twenty tools to replace a battery. Consumers can then decide for themselves whether those choices warrant taking their business elsewhere. Crowdsourced platforms like Community Notes already operate this way, producing reliable

yoursautomakers-increasingly-charge-subscription-fees/
[<https://perma.cc/E9WZ-SX8J>].

assessments through distributed judgment rather than rigid criteria imposed from above. A platform like the BBP would do the same, presenting information and community assessments while leaving the evaluative judgment to the individual consumer.

Of course, the market can be mistaken, just as complexity prohibitions can be. Indeed, when one is mistaken, the other is also likely to be mistaken. Assume for the sake of argument that BMW's subscription model would actually have been value-adding. Recall that negative market reaction forced BMW to abandon that model,²⁰⁷ which likely incentivized state legislatures to consider prohibiting the sale of heated seats by subscription,²⁰⁸ given that politicians respond to voters and elections have consequences.²⁰⁹ My claim is not that markets are always efficient or that regulation is always misguided. To be sure, market self-correction can be slower or weaker in industries where competition is limited: for instance, where a handful of firms enjoy monopolistic power or where consumers face high switching costs. In such cases, firms might not fear losing customers quickly, even if they degrade their products (consider how users of a dominant social network have few alternatives). However, even in these scenarios, an information-based approach can help by shining a spotlight on the problem and stirring consumer or public pressure, which can invite new entrants or prod regulators to take targeted action if truly necessary.

Rather, my argument is that, if errors are inevitable, it is preferable to have a mistaken market than mistaken laws. This is because the errors of the market in this context are far easier to correct than the errors of complexity prohibitions. Markets punish mistakes quickly through lost sales and reputational backlash; firms observe feedback and adapt in near real time.

²⁰⁷ See Charlton, *supra* note 22 ("People feel that they paid double" for heated seats).

²⁰⁸ See *supra* notes 51–52 and accompanying text.

²⁰⁹ See ANTHONY DOWNS, AN ECONOMIC THEORY OF DEMOCRACY 43 (1957) ("[Voters] often compare what government is doing with what it should be doing without referring to any other party."); *id.* at 128 ("No party . . . can survive without . . . the support of a sizeable fraction of the electorate—a support active enough to be expressed by votes in elections.").

Regulators, by contrast, learn slowly (complaints, litigation, periodic review) and change rules even more slowly—so regulatory mistakes linger. Firms also possess localized knowledge about design trade-offs that regulators necessarily infer at a distance. Particularly in fast-moving tech, these asymmetries make regulatory error unusually sticky and costly. The feedback mechanisms differ: in markets, negative feedback (declining profits, customer backlash) is direct and forces adaptation, whereas in regulatory bodies, feedback often comes through slower channels like periodic reviews, litigation, or lobbying, which are far removed from the immediate ‘vote’ of consumer choice. When a law erroneously prohibits a value-adding technology, it remains in place permanently as long as it stays on the books. Although such an error could be corrected by repealing the law, “it can be slow and difficult to repeal laws through the legislative process” in the United States due to “constitutional requirements of bicameralism and presentment” in addition to “numerous [procedurally] created ‘veto gates.’”²¹⁰ Examples of laws forcing the use of outdated technology also abound outside the U.S. The Japanese government declared only in June 2024 that it “won the war on floppy disks” by “scrapp[ing] all 1,034 regulations governing their use,” while continuing to use fax machines.²¹¹ In contrast, when consumers mistakenly boycott a good product, they can buy it again if a firm offers it again in the future.²¹² For example, when BMW tried charging monthly for heated seats, consumer outrage led the company to reverse course within about a year. The market ‘voted’ against that tactic relatively swiftly. If, instead, a law had permitted heated-seat subscriptions, but later evidence showed harm, convincing a legislature or agency to outlaw them could have taken far longer—and in the interim, many consumers would have

²¹⁰ Michael Sant’Ambrogio, *The Extra-Legislative Veto*, 102 GEO. L.J. 351, 354 (2014).

²¹¹ Scharon Harding, *Japan Wins 2-Year “War on Floppy Disks,” Kills Regulations Requiring Old Tech*, ARS TECHNICA (July 3, 2024), <https://arstechnica.com/gadgets/2024/07/japans-government-finally-exits-90s-ends-floppy-disk-use/> [<https://perma.cc/MFN3-SS66>].

²¹² Cf. Cenizo, *supra* note 36 (BMW planning to offer subscriptions again in the future).

suffered.

In short, combating predatory design practices does not require the law to ban designs that particular people deem to be predatory; consumers need only reject such practices themselves. Part III discusses what the state could do to help consumers exercise their power to vote with their wallets.

III. A Better Way: Helping People Vote with Their Wallets

As the preceding analysis demonstrated, complexity bans not only struggle to achieve their goals but also impose growing costs on consumers through higher prices. The inefficacy and high cost of complexity prohibitions discussed thus far prompt a question: Is there a more effective and less costly solution to complexity profiteering? This Part proposes a framework to inform consumers about firms that engage in complexity profiteering, so that they can vote with their wallets against such firms if they wish. With exceptions, such as when a firm has no real competitor, I argue that this solution would be cheaper and more effective than complexity prohibitions. Informing consumers is more effective because it harnesses market forces instead of fighting them, and less costly because it does not require perpetual enforcement or increasingly complex rules. When I say that informing consumers would be more effective, I am not claiming that this solution is *guaranteed* to work. Rather, the claim is that complexity prohibitions would fail, whereas informed consumers have successfully punished firms appearing to engage in complexity profiteering. A firm engages in complexity profiteering when it believes that people will continue to buy from it, even though it takes profits without adding value. As long as it has customers, a typical firm will circumvent any complexity prohibition meant to control its behavior, which is why it fails as explained in Part I. In contrast, consumers voting with their wallets against complexity profiteering undermines firms' incentive to continue in it. Among many other examples, consumers rejecting monthly fees for heated seats has forced

firms to desist.²¹³

In addition to being more effective than complexity prohibitions, helping people vote with their wallets would also be cheaper. The cost of informing consumers is the cost of devising a method that overcomes our natural reluctance to look up new information and, when we do so, does not drown us in irrelevant information.²¹⁴ But helping people vote with their wallets incurs no additional costs because it leverages natural incentives to handle the rest of the work. Complexity prohibitions would control firm behavior by trying to force firms to act *against* their incentives, by designing products to be less profitable. In contrast, people dissatisfied with firms engaging in complexity profiteering would control firm behavior by acting *on* their incentive to get the best value for money. As more people vote with their wallets, firms would act on their natural incentive to avoid their customers' ire and redirect it to competitors by advertising that they eschew complexity profiteering. Such advertising would help defray the state's costs of informing people about which firms engage in complexity profiteering. This scheme would also avoid the risk of complexity prohibitions based on the state's misperceptions of market preferences. My proposed solution to inform consumers, the Buyer Beware Platform (BBP), is a variation on a website that the EU would use to inform consumers about repair, as required by its right-to-repair law.

A. Informing Consumers Is More Effective than Complexity Prohibitions

“Apple repeatedly chooses to make its products worse for consumers to prevent competition from emerging.”²¹⁵

- U.S. Department of Justice

²¹³ Charlton, *supra* note 22.

²¹⁴ See Neil Arya, *Applications of Science-Based Decision-Making: Medicine, Environment and International Affairs*, in *PSYCHOLOGY OF DECISION MAKING IN LEGAL, HEALTH CARE, AND SCIENCE SETTINGS* 1, 33 (Gloria R. Burthold ed. 2007) (people use cognitive shortcuts called heuristics “when overloaded with information . . . or when we have little or no information.”).

²¹⁵ *Apple Antitrust Complaint* ¶ 10.

Perhaps the best way to illustrate why helping people vote with their wallets is more effective than imposing complexity prohibitions is to discuss the assumptions and justifications underlying them. Complexity profiteering is firms complicating their products to extract profit without adding value, which, from the consumer's perspective, is synonymous with making the products worse. Once people become aware that a firm is reducing value for the money they spend, they can credibly threaten to take their business to a competitor—for example, by threatening to buy a car that does not require monthly fees for heated seats.²¹⁶ If a firm refuses to capitulate to such threats, consumers can carry them out. For example, consumers could buy phones that do not require any tools to replace batteries²¹⁷ and do not display certain text messages in a different color.²¹⁸ The share of iPhones among newly activated phones in the U.S. in the first quarter of 2024 was 33 percent, the lowest since 2018.²¹⁹

Complexity prohibitions assume that firms remove their customers' power to vote with their wallets. For example, the U.S. antitrust case filed against Apple in March 2024 claims that “Apple drives iPhone users away from products and services that compete with or threaten Apple” and, by doing so, “increases the cost . . . of switching from the iPhone to another smartphone.”²²⁰ Consumers' alleged inability to choose the goods they want justifies the state forcing firms to redesign products in the way that the state thinks people want. The U.S. antitrust case against Apple seeks to ban core features

²¹⁶ See Charlton, *supra* note 22.

²¹⁷ See *supra* note 9 (Samsung Android phone requiring no tools for battery replacement).

²¹⁸ Boone Ashworth, *Android Users Can Now ‘Like’ Messages from iPhones*, WIRED (Oct. 22, 2022), <https://www.wired.com/story/android-users-can-like-iphone-messages-now/> [<https://perma.cc/36NK-5BJM>] (Android phones show Android messages and iMessages in the same color); *Apple Antitrust Complaint* at ¶ 90 (iPhones show Android texts in green and iMessage in blue).

²¹⁹ Koetsier, *supra* note 23; *Apple Loses Top Phonemaker Spot to Samsung as iPhone Shipments Drop, IDC Says*, REUTERS (Apr. 15, 2024), <https://www.reuters.com/technology/apple-loses-top-phonemaker-spot-samsung-iphone-shipments-drop-idc-says-2024-04-15/> [<https://perma.cc/M645-PJDU>].

²²⁰ *Apple Antitrust Complaint* ¶ 55.

of many of its products, such as the iPhone and Apple Watch.²²¹ The EU has forced iPhones to change their charging cable design to USB-C.²²²

This assumption that consumers cannot vote with their wallets is often unfounded. How does a manufacturer “repeatedly choos[ing] to make its products worse for consumers” somehow “prevent competition from emerging”?²²³ The correct answer is that it does not. A firm making its own products worse only *strengthens* consumers’ incentives to abandon that firm. What the U.S. describes as Apple entrenching its “smartphone monopoly”²²⁴ is in fact complexity profiteering—Apple complicating its products to extract profits without adding value, at the risk of disgruntled consumers leaving Apple. The appropriate solution to Apple’s complexity profiteering is to inform consumers so that more of them can vote with their wallets, which is demonstrably possible given that “Apple is capturing only 33% of new [U.S. smartphone] sales” in the first quarter of 2024.²²⁵ But, instead of leveraging this existing market force, the U.S. and other similarly minded regulators would micromanage how Apple designs its products because they erroneously believe that consumers cannot vote with their wallets.²²⁶ As Part I showed, complexity prohibitions would be infeasible because firms would exploit their superior knowledge of their own products and practices to circumvent them.

The examples cited by the U.S. in support of its case show that it has misperceived Apple’s complexity profiteering as entrenchment of its purported monopoly. An example is the U.S.’s claim that Apple “blocked cloud gaming apps that would have given users access to desirable apps and content without needing to pay for expensive Apple hardware because it would threaten its monopoly power.”²²⁷ Without cloud apps, users

²²¹ *Id.* ¶ 236 (requested relief including “preventing Apple from using [its] APIs to undermine cross-platform technologies like messaging, smartwatches . . . among others”).

²²² EU Common Charging Directive, art. 2(1).

²²³ *Apple Antitrust Complaint* ¶ 10.

²²⁴ *Id.*

²²⁵ See Koetsier, *supra* note 23.

²²⁶ See *supra* notes 220–22 and accompanying text; see *supra* Part I.

²²⁷ *Apple Antitrust Complaint*, ¶ 71.

must install whatever game they want to play on their own devices.²²⁸ Sophisticated programs, including many smartphone games, require expensive hardware with large data storage and high computing power.²²⁹ Cloud service providers use their own servers to store this large amount of data and do sophisticated computing so that smartphone users need only connect to company servers over the internet.²³⁰ By using these servers, cloud apps enable the use of sophisticated programs with relatively cheap hardware, regardless of brand.²³¹ “For years,” Apple required developers to distribute any game “as a stand-alone app” for the iPhone, so that iPhone users would be forced to “download cloud streaming software separately for each individual game” instead of downloading just one cloud app to play many games.²³² This is comparable to blocking Netflix so that users have to download an app for each show they want to watch. The U.S. argued that this requirement, “[u]ntil recently . . . made cloud . . . apps so unattractive to users that no developer designed one for the iPhone.”²³³

The U.S.’s claim that Apple “blocked cloud . . . apps” and made users “download cloud streaming software separately for each individual game” because not doing so “would threaten its monopoly power”²³⁴ is illogical. Making a popular service unavailable on iPhones makes users *more* likely to switch to non-Apple phones, not less. If denying cloud gaming made iPhone users “more beholden to” Apple,²³⁵ Apple would never let anyone provide cloud gaming on iOS. But Apple *has* allowed a competitor (Microsoft, no less) to provide “hundreds of games” via cloud streaming using one software on iOS since 2021²³⁶ and permitted the distribution of cloud apps via the

²²⁸ *Id.* ¶ 72.

²²⁹ *Id.* ¶ 73.

²³⁰ *Id.* ¶ 72.

²³¹ *Id.* ¶¶ 72–73.

²³² *Id.* ¶¶ 76–77.

²³³ *Id.* ¶ 77.

²³⁴ *Id.* ¶¶ 71, 77.

²³⁵ *Id.* ¶ 185.

²³⁶ Chance Miller, *Xbox Cloud Gaming Launches for iPhone and iPad in Safari with Over 100 Titles*, 9TO5MAC (June 28, 2021), <https://9to5mac.com/2021/06/28/xbox-cloud-gaming-safari-iphone-ipad->

App Store since January 2024²³⁷—facts the U.S. seems to acknowledge only by stating that Apple blocked cloud gaming “[u]ntil recently.”²³⁸ Apple forcing developers to distribute games individually through its App Store is an act of complexity profiteering because Apple collects a fee for the first one million installs of an app per year, a fee that would increase if more apps are required for the same service.²³⁹ Apple letting Microsoft—one of its most formidable competitors²⁴⁰—provide cloud games on the iOS is Apple relenting to users voting with their wallets, after years of complaints that “Apple’s excuse for denying Xbox Cloud is patently absurd.”²⁴¹ Contrary to the U.S.’s claim, the solution to Apple’s denial of cloud gaming is not to micromanage how Apple designs its various products,²⁴² but to help consumers vote with their wallets.

The U.S. also cites messaging on the iPhone as another example of Apple’s attempt to “build and maintain its monopoly power.”²⁴³ The U.S. cites Apple making “third-party messaging apps on the iPhone” and messages from

app/ (Xbox cloud gaming via the Safari browser) [<https://perma.cc/2XCC-6K9D>].

²³⁷ *Apple Introduces New Options Worldwide for Streaming Game Services and Apps That Provide Access to Mini Apps and Games*, APPLE (“Developers can now submit [one] app” for “all . . . games in their catalog”), <https://developer.apple.com/news/?id=f1v8pyay> [<https://perma.cc/EHR4-9TN7>].

²³⁸ Apple Antitrust Complaint, ¶ 77.

²³⁹ *See Commissions, Fees, and Taxes*, APPLE, <https://developer.apple.com/help/app-store-connect/distributing-apps-in-the-european-union/commissions-fees-and-taxes/> [<https://perma.cc/D3RM-XXV7>].

²⁴⁰ Aditya Soni, *Microsoft Briefly Overtakes Apple as World’s Most Valuable Company*, REUTERS (Jan. 11, 2024), <https://www.reuters.com/technology/microsoft-overtakes-apple-worlds-most-valuable-company-2024-01-11/> [<https://perma.cc/89T3-NANT>].

²⁴¹ Jason Cross, *Apple’s Excuse for Denying Xbox Cloud Gaming Is Patently Absurd*, MACWORLD (Aug. 20, 2020), <https://www.macworld.com/article/234477/apples-excuse-for-denying-xbox-cloud-gaming-is-patently-absurd.html> [<https://perma.cc/PRV4-MS2E>].

²⁴² *Apple Antitrust Complaint* ¶ 236 (“preventing Apple from using [its] APIs”).

²⁴³ *Id.* ¶ 80.

Android phones “worse . . . relative to . . . Apple’s own messaging app,” iMessage.²⁴⁴ The U.S. focuses particularly on how messages from Android phones are displayed on iMessage. iMessage applied the old SMS protocol to messages from Android²⁴⁵ and a more advanced protocol to messages from other iPhones.²⁴⁶ Therefore, when iPhones receive messages from Android phones, “the text appears . . . as a green bubble” instead of the iMessage’s default blue,²⁴⁷ “the conversation is not encrypted, videos are pixelated and grainy, and users cannot edit messages or see typing indicators.”²⁴⁸ This, the U.S. argues, “signals to users that rival smartphones are lower quality” and gives non-iPhone users “social stigma, exclusion, and blame for ‘breaking’ chats where other participants own iPhones.”²⁴⁹ In an apparent attempt to show how such tactics “make[] it more difficult to switch smartphones,”²⁵⁰ the U.S. cites an event where a user asked Apple CEO Tim Cook “whether Apple would fix iPhone-to-Android messaging,” stating that “I can’t send my mom certain videos,” to which Cook replied, “[b]uy your mom an iPhone.”²⁵¹

Messaging on iPhones is another example of complexity profiteering, which the U.S. misperceives as Apple attempting to entrench its purported smartphone monopoly. If degrading the messaging experience on Android phones and in third-party apps really helped strengthen Apple’s monopoly, Apple would never improve it. Yet, the U.S. contradicts its own argument by saying that, if Apple improved the messaging experience for non-Apple apps and phones, “the iPhone would be more valuable”²⁵² — indicating that degrading the

²⁴⁴ *Id.* ¶ 85.

²⁴⁵ See Allison Johnson, *Group Chats Between Android and iOS Might Be Getting Better — But Only for iPhones*, THE VERGE (June 7, 2023), <https://www.theverge.com/2023/6/7/23752744/android-ios-17-group-chat-imessage-edit-green-bubble> [<https://perma.cc/J3GS-2WCE>].

²⁴⁶ *Apple Antitrust Complaint* ¶ 85.

²⁴⁷ *Id.* ¶ 90.

²⁴⁸ *Id.*

²⁴⁹ *Id.* ¶ 91.

²⁵⁰ *Id.*

²⁵¹ *Id.* ¶ 92.

²⁵² *Id.* ¶ 87.

experience would *strengthen* users' incentive to abandon the iPhone. Indeed, a year after Cook apparently told an Android user that the only way to improve the messaging experience with an iPhone user was to switch to an iPhone,²⁵³ Apple decided to improve Android users' messaging experience with iPhone users. In 2023, Apple announced that iPhones would begin to apply the Rich Communication Services (RCS) protocol instead of the old SMS protocol to messages from Android smartphones.²⁵⁴ The RCS protocol would give Android users messaging iPhones "typing indicators" and "high-resolution media sharing"²⁵⁵—two of five traits of Android-to-iPhone messaging that the U.S. argued were intended to *prevent* iPhone users from switching to Android.²⁵⁶ In particular, the RCS protocol would enable Android users to send high-resolution videos to iPhones, the precise problem Cook previously said could only be fixed by switching to an iPhone.

The U.S. acknowledges Apple's adoption of RCS, but not that it would address two of the five defects in Android-to-iPhone messaging that it cited as evidence of Apple's purported smartphone monopoly. The U.S. also attempts to play down the effect of Apple's adoption of RCS by using a hypothetical that, contrary to the U.S.'s intent, illustrates the *superiority* of consumers voting with their wallets over complexity prohibitions. The U.S. argues: "the RCS standard will continue to improve over time, and if Apple does not support later versions of RCS, cross-platform messaging using RCS could soon be broken on iPhones anyway."²⁵⁷ Set aside the fact that the U.S. is citing something that has not happened to support the claim that Apple has already committed an

²⁵³ *Id.* ¶ 92.

²⁵⁴ Chance Miller, *Apple Announces that RCS Support Is Coming to iPhone Next Year*, 9To5Mac (Nov. 16, 2023), <https://9to5mac.com/2023/11/16/apple-rs-coming-to-iphone/> [<https://perma.cc/N43L-MPGL>].

²⁵⁵ Abrar Al-Heeti, *RCS on iPhones Will Make Texting Android Users Less Tedious*, CNET (Apr. 30, 2024), <https://www.cnet.com/tech/mobile/rsc-on-iphones-will-make-texting-android-users-less-tedious/> [<https://perma.cc/RA5F-ML7X>].

²⁵⁶ *Apple Antitrust Complaint* ¶ 90.

²⁵⁷ *Id.* ¶ 89.

antitrust violation.²⁵⁸ Apple defeating RCS by intentionally failing to update it is what would likely happen if RCS were imposed through complexity prohibitions. After all, that is what Apple did in response to a complexity prohibition forcing iPhones to use USB-C: Apple changed the *shape* of the iPhone 15's charging socket to USB-C, while still using the slow USB 2 protocol from 2000.²⁵⁹ In contrast, if Apple's adoption of RCS resulted from consumers voting with their wallets by threatening to abandon Apple, it would have an ongoing incentive to keep RCS up to date. Indeed, there is good reason to think that market pressure, not the Department of Justice, is responsible for forcing Apple to improve iMessage. Despite the U.S.'s argument that iMessage "helps build and maintain [Apple's] monopoly,"²⁶⁰ iMessage is only the third most popular messenger platform in the U.S. as of March 2024 behind Facebook Messenger and Instagram, and only marginally ahead of WhatsApp,²⁶¹ all of which are owned by Meta.²⁶²

B. A Cheaper and Better Solution: The Buyer Beware Platform

This Section proceeds in two parts. The first makes the comparative case for an information-based approach, and the second presents a concrete proposal to deliver that information to consumers.

1. Why Information Outperforms Complexity Prohibitions

In addition to being more effective, helping consumers vote with their wallets would also be cheaper than complexity

²⁵⁸ Cf. Kim, *supra* note 111, at 1303–05 (criticizing the EU Digital Markets Act for "punishing conduct that is not anticompetitive in the present for the reason that it *might* become anticompetitive in the future.").

²⁵⁹ See *supra* Section I.B.

²⁶⁰ *Apple Antitrust Complaint* ¶ 80.

²⁶¹ STATISTA, *Penetration of Leading Messenger Platforms in the United States as of March 2024*, <https://www.statista.com/statistics/294439/messenger-app-share-us-users/> [<https://perma.cc/SH8W-KCLX>].

²⁶² See META, *Our Technologies*, <https://about.meta.com/technologies/> [<https://perma.cc/Q5S8-MZ4C>].

prohibitions. To be sure, informing people about complex consumer goods would not be cheap in an *absolute* sense. One need not even refer to high-tech products to appreciate the challenges of informing people, even about things they have an interest in knowing. “[P]eople too often sign documents without reading them,”²⁶³ even documents that are (at least superficially) intended to inform them. For example, the terms of service for a gym may allow anyone to join online²⁶⁴ but permit cancellations only by in-person visits or certified mail, resulting in unpleasant surprises to consumers trying to cancel by phone or email.²⁶⁵ If people do not read binding documents before signing their own names, informing people about the many things they buy might be highly difficult.

But the cost of a policy must be compared to its anticipated benefits, as well as the costs and benefits of alternatives. As Part I showed, complexity prohibitions can incur ever-increasing costs that are ultimately borne by consumers in the form of higher prices without commensurate benefits, because firms have a permanent incentive to circumvent them as long as people continue to buy from them. In contrast, the benefit of informing consumers is cutting off the demand that fuels this circumvention. The benefit of such demand-side policies is recognized by none other than the EU’s right to repair law, which, ironically, focuses primarily on supply-side regulations such as complexity prohibitions.²⁶⁶ The law “lays down demand-side requirements ensuring the provision of better information on durability and repairability of goods” so that consumers can “easily compare repair services.”²⁶⁷ If, as the EU assumes, it is worth telling people where, when, and how to repair their products, then it is certainly worth telling people

²⁶³ Klint L. Bruno & Michael L. Closen, *Notaries Public and Document Signer Comprehension: A Dangerous Mirage in the Desert of Notarial Law and Practice*, 44 S.D. L. REV. 494, 534 (1999).

²⁶⁴ *Join Us*, PLANET FITNESS, <https://www.planetfitness.com/gyms/> [https://perma.cc/B3NU-U6MQ].

²⁶⁵ See Caroline Praderio, *A Man Couldn’t Cancel His Gym Membership Over the Phone — So He Wrote an Epic Breakup Letter Instead*, BUS. INSIDER (Feb. 1, 2018), <https://www.businessinsider.com/man-writes-breakup-letter-to-planet-fitness-2018-2> [https://perma.cc/8E5A-A5JD].

²⁶⁶ See *supra* notes 92–96 and accompanying text.

²⁶⁷ *EU Right to Repair Law*, Recitals 5, 10.

about which products are overengineered to extract profits by thwarting repair, so that consumers do not buy those products and do not have to learn how to repair them. If a consumer decides not to buy an iPhone because the consumer learns that its battery cannot feasibly be replaced at costs that justify the procedure,²⁶⁸ the state would not have to teach that consumer how to replace iPhone batteries. Moreover, unlike the ever-increasing compliance costs of complexity prohibitions, the costs of operating a platform that informs consumers would be mostly fixed and upfront, as they would not multiply with each new product or feature. By empowering consumers, this informative solution flips the script: firms could not simply pass on compliance costs as higher prices because consumers, armed with information, would punish exploitative designs by switching products. This would avoid the descending spiral of firms inventing new complexities to recoup profits.

Where will information work best, and where will it struggle? The BBP is most effective in markets with viable alternatives and manageable switching costs, but weaker where consumers are locked in or competition is thin. Design can mitigate these limits: (i) surface the signal at the point of decision (QR codes, browser/retailer integration) so users need not search; (ii) present a simple, standardized ‘complexity-profiteering’ score with one-click drill-downs to avoid overload; (iii) curate crowdsourced inputs with visible provenance and community vetting to maintain trust. Even if not all consumers act, a salient minority can discipline firms, especially as companies begin to advertise the absence of complexity profiteering. Of course, even when consumers absorb relevant information, not all of them may act on that information. However, even if not all consumers respond, even a segment of informed, active consumers can create pressure on firms, as evidenced by the nascent trend of companies advertising the absence of complexity profiteering in their products. Over time, this can shift market norms.

Having established the comparative advantages of an information-based approach, this Section now turns to what such an approach would look like in practice.

²⁶⁸ See *supra* notes 9, 87–91 and accompanying text.

2. Designing the Buyer Beware Platform

My proposal to inform consumers about complexity profiteering, a website I call the Buyer Beware Platform (BBP), is modeled on the EU's forthcoming website to inform consumers about the right to repair called the "European Online Platform for Repair" (OPR), which would be developed and operated by the European Commission and member states.²⁶⁹ The BBP, like the OPR, would be run by the state because informing consumers about complexity profiteering is a type of public good, at least initially.²⁷⁰ When consumers are not sufficiently aware of complexity profiteering, private firms that stand to profit from that practice would lack the incentive to call attention to it, leaving the task to the government. Once consumers become aware of complexity profiteering, firms would benefit from advertising the lack of complexity profiteering in their products, similar to how the public becoming aware of the harms of sugar incentivizes firms to advertise sugar-free soft drinks.²⁷¹ Initially, however, the government would inform consumers about complexity profiteering—just as the state has raised awareness of the harms of sugar through mandatory nutrition labels and information campaigns.²⁷²

²⁶⁹ *EU Right to Repair Law*, art. 7.

²⁷⁰ Thomas L. Eovaldi, *The Market for Consumer Product Evaluations: An Analysis and A Proposal*, 79 Nw. U. L. REV. 1235, 1248 (1984) ("The case for government subsidization of the production of consumer information begins with the realization that information about consumer products is a public good"); see also *SaferProducts.gov*, U.S. CONSUMER PRODUCT SAFETY COMM'N (providing information about product safety).

²⁷¹ See, e.g., *Zero Sugar Juice Drinks*, COCA-COLA (advertising zero-sugar lemonade as "the great taste you know and love, ZERO grams of sugar per serving"), <https://www.coca-cola.com/us/en/brands/minute-maid/zero-low-sugar-juice-drinks> [<https://perma.cc/SXK8-TF2V>].

²⁷² See, e.g., *Added Sugars on the Nutrition Facts Label*, U.S. FOOD & DRUG ADMIN. (stating that the nutrition label must stipulate the amount of sugar "added during the processing of foods"), <https://www.fda.gov/food/nutrition-facts-label/added-sugars-nutrition-facts-label> [<https://perma.cc/9LZH-XZTK>]; *Get the Facts: Sugar-Sweetened Beverages and Consumption*, U.S. CTRS. FOR DISEASE CONTROL & PREVENTION (stating that sugary-drink consumption is associated with various illnesses), <https://www.cdc.gov/nutrition/data-statistics/sugar-sweetened-beverages-intake.html> [<https://perma.cc/4838-957X>]; Yue

Having established that the BBP would be state-run, the next issue is how to advertise it and make it painless to access. While marketing the BBP may seem to be beyond regulators' concern, they should not be so quick to outsource that task because the BBP's success in informing people depends directly on their being aware of its existence and willing to use it. The EU should know this better than most, since the social media service it launched as a "privacy-friendly" rival to X, formerly Twitter, had 18 active accounts after two years.²⁷³ Indeed, the EU now appears to recognize the importance of reducing the effort consumers need to make to get information, as the EU would disseminate information on "repairability of goods *at the point of sale*," which would relieve consumers of having to find it on their own.²⁷⁴ I propose attaching a QR code to a product's website or packaging. This QR code would take consumers directly to the BBP product webpage at the touch of a screen. Firms have long used QR codes to attract customers to their websites without having to type in an address.²⁷⁵ There remains the issue of whether these QR codes should be mandatory or opt-in, but the EU could legally make them mandatory if it wished. After all, the EU's right to repair law would force firms to start entire websites providing information about repairability,²⁷⁶ and the EU's product labeling laws are famously stringent, regulating everything from "font size, letter spacing,"²⁷⁷ and the percentage of a

Huang et al., *Cost-Effectiveness of the US Food and Drug Administration Added Sugar Labeling Policy for Improving Diet and Health*, 139 CIRCULATION 2613 (2019) (projecting that the added-sugar-labeling requirement would prevent 1.2 million cases of diabetes).

²⁷³ James Titcomb, *Brussels Scraps 'Privacy-Friendly' Twitter Rival with Just 18 Active Accounts*, TELEGRAPH (Apr. 29, 2024), <https://www.telegraph.co.uk/business/2024/04/29/brussels-scraps-twitter-rival-eu-voice-18-accounts/> [<https://perma.cc/4JZC-8KAJ>].

²⁷⁴ *EU Right to Repair Law*, Recital 5 (emphasis added).

²⁷⁵ See, e.g., *How to Use a QR Code in Your Marketing Strategy*, ADOBE EXPRESS ("QR codes . . . require a simple scan or click, making it easy for customers to access your online content"), <https://www.adobe.com/express/learn/blog/qr-code-marketing> [<https://perma.cc/JD52-TBQN>].

²⁷⁶ *EU Right to Repair Law*, art. 5(5).

²⁷⁷ Regulation (EU) No 1169/2011 of the European Parliament and of the Council of 25 October 2011 on the provision of food information to

product's package surface that must be covered by mandatory labels.²⁷⁸

Making it as easy as possible to access the BBP benefits not only those who want to be informed, but also those who want to inform others. Consumers often leave online reviews warning others about cases of complexity profiteering, be they cars that require subscription fees paid to a now-bankrupt firm to open a window or the sunroof,²⁷⁹ TVs that do not work unless the owners agree to mandatory arbitration,²⁸⁰ or software that locks out customers who already paid unless they allow their data to be used to train the firm's AI.²⁸¹ Consumers also leave positive reviews of products they see as rejecting complexity profiteering, like smartphones with hand-

consumers, amending Regulations (EC) No 1924/2006 and (EC) No 1925/2006 of the European Parliament and of the Council, and repealing Commission Directive 87/250/EEC, Council Directive 90/496/EEC, Commission Directive 1999/10/EC, Directive 2000/13/EC of the European Parliament and of the Council, Commission Directives 2002/67/EC and 2008/5/EC and Commission Regulation (EC) No 608/2004, 2011 O.J. (L 304) 18, arts. 2(2)(m), 13(2) (*food labeling*).

²⁷⁸ Directive 2014/40/EU of the European Parliament and of the Council of 3 April 2014 on the approximation of the laws, regulations and administrative provisions of the Member States concerning the manufacture, presentation and sale of tobacco and related products and repealing Directive 2001/37/EC, 2014 O.J. (L 127) 1, art. 12(2) (*tobacco label*).

²⁷⁹ Tim Levin, *Fisker Ocean Owners Are Lawyering Up to Keep Their Cars Running*, INSIDEEVs (July 3, 2024), <https://insideevs.com/news/725463/fisker-ocean-owners-bankruptcy-support/> [https://perma.cc/6VWE-RBVE]; Torstein Norum Buggee, *Slik jobbes det for å sikre norske Fisker Ocean-eiere*, TEK.NO (July 4, 2024), <https://www.tek.no/nyheter/nyhet/i/VzPezd/slik-jobbes-det-for-aa-sikre-norske-fisker-ocean-eiere> [https://perma.cc/S2BB-CVYN] (remote functions require monthly fees).

²⁸⁰ Amelia Schwanke, *Your Roku TV and Streaming Stick Will Stop Working Unless You Agree to Controversial New Terms*, TECHRADAR (Mar. 6, 2024), <https://www.techradar.com/televisions/streaming-devices/your-roku-tv-and-streaming-stick-will-stop-working-unless-you-agree-to-controversial-new-terms> [https://perma.cc/U7H7-QYGT].

²⁸¹ Eli Tan, *When the Terms of Service Change to Make Way for A.I. Training*, N.Y. TIMES (June 26, 2024) (change to terms of service for Adobe software), <https://www.nytimes.com/2024/06/26/technology/terms-service-ai-training.html> [https://perma.cc/YQ4G-NBV5].

removable batteries.²⁸² By making itself easier to access, the BBP could crowdsource information about products on the market from consumers, as well as have consumers fact-check that information using crowdsourced, open-source tools like Community Notes from X,²⁸³ without needing to rely on particular entities for such a large amount of information. Indeed, a potentially crippling problem with the EU's right to repair website is that it would rely on firms to both supply that information and to disseminate it,²⁸⁴ which they would lack a meaningful incentive to do. Consumers, on the other hand, have shown interest in leaving useful reviews about instances of complexity profiteering.

Having discussed how to curate the BBP with product reviews, the next step is to make it as easy as possible for consumers to find the information they need without wading through irrelevant content. This is a particularly acute problem for the EU's right to repair website, because the sheer mass of information the EU plans to provide may be what discourages consumers from looking up information on the OPR:

[N]ational online platforms shall . . . include search functions regarding goods, location of repair services, including a map-based function, the cross-border provision of services, repair conditions, including the time needed to complete the repair, . . . , availability . . . of ancillary services, including removal, installation, and transportation, offered by repairers, and . . . European or national repair quality standards ²⁸⁵

²⁸² *Another massively underrated aspect of the Samsung Galaxy XCover 6 Pro other than the removable battery is the 4 years OS updates and 5 year security updates!*, REDDIT (July 1, 2022), https://www.reddit.com/r/Android/comments/voxctc/another_massively_underrated_aspect_of_the/ [<https://perma.cc/UZ5K-BH4V>].

²⁸³ See *supra* notes 38–39 and accompanying discussion.

²⁸⁴ *EU Right to Repair Law*, art. 5(5) (requiring manufacturers to provide information on a free website); *id.* art. 6 (requiring manufacturers to present information on “their repair services in an easily accessible, clear and comprehensible manner”).

²⁸⁵ *Id.* art. 7(6)(a).

Although the EU law does not elaborate on how the search function would work, the devil is, as usual, in the details. While people considering expensive purchases may accept some inconvenience to get information that would make those purchases worth their price, such patience would likely be finite. A classic, even hackneyed, principle of web design is that the design “must minimize the resistance of the user interface to what the user wants to use the [website] for.”²⁸⁶ This “path



of least resistance” principle, and what users do when a website flouts it, are represented by the following picture²⁸⁷:

Applying this idea to the BBP, if the search function takes too much effort to return useful information, it may drive people away. A text-based search, which government consumer information websites often use,²⁸⁸ can require precise spelling, symbols such as parentheses, and Boolean operators such as

²⁸⁶ REZA B’FAR, *MOBILE COMPUTING PRINCIPLES: DESIGNING AND DEVELOPING MOBILE APPLICATIONS WITH UML AND XML* 391 (2005).

²⁸⁷ *The Path of Least Resistance: Why Users Won’t Go Where You Tell Them*, USERTESTING, <https://www.usertesting.com/blog/why-users-wont-go-where-you-tell-them> [<https://perma.cc/6HWA-J8C2>].

²⁸⁸ See *SaferProducts.gov*, *supra* note 270.

AND, OR, or NOT to return useful results.²⁸⁹ If a text-based search is simply dumped onto too much information—the amount that the EU seems to have in mind with its repair platform—users may choose not to look anything up.

Here, AI can help find the path of least resistance. AI can summarize product reviews and identify recurring topics, so that consumers can easily navigate to the topics that interest them most, as in the following example of reviews for a Samsung smartphone on Amazon. Clicking on a topic—for

Customers say

Customers like the card slot, performance, and sturdiness of the cellular phone. They mention that it has a removable battery, SD card slot and headphone jack. They also appreciate the durable construction, and the water, dust, and shock resistance. Customers are also happy with battery, and sound quality. However, some customers have reported issues with the screen glitch. Opinions are mixed on quality and water resistance.

AI-generated from the text of customer reviews

✓ Battery

✓ Performance

✓ Sturdiness

✓ Sound quality

✓ Card slot

Quality

Water resistance

✗ Screen glitch

✓ Battery

✓ Performance

✓ Sturdiness

✓ Sound quality

✓ Card slot

Quality

Water resistance

✗ Screen glitch

18 customers mention 13 positive 5 negative

Customers like the battery of the cellular phone. They mention that the battery life is good, and charging doesn't make the phone hot. They appreciate that the phone has a replaceable 4000mah battery, a headphone jack, and a 120Hz processor.

"...At least **battery life is good**, and charging doesn't make the phone hot, and the battery is changeable...." [Read more](#)

"...ever had, very happy with all the features, 120hz refresh rate, **removable battery**, supports esim, regular micro sim, sd card, has 128gb storage, 6gb..." [Read more](#)

example, battery—shows only the reviews on that topic, with a summary²⁹⁰:

The point is not that text-based search is useless; Amazon

²⁸⁹ See KAREN MARKEY & CHERYL KNOTT, ONLINE SEARCHING: A GUIDE TO FINDING QUALITY INFORMATION EFFICIENTLY AND EFFECTIVELY 64, 70, 104 (2023) (discussing how to use spelling variations, symbols, and Boolean operators to improve search results).

²⁹⁰ *Samsung Galaxy XCover 6 Pro 5G*, AMAZON, <https://www.amazon.com/SAMSUNG-Unlocked-T-Mobile-Cellular-SM-G736UZKEXAA/dp/B0BDBSBBDX/> [<https://perma.cc/4DPN-WG4C>].

offers text-based search²⁹¹ in addition to the AI-assisted summary function. The point is that a search function, without more, would not ensure that online portals like the BBP or the EU's right-to-repair website are actually used. Text-based search functions could be augmented using AI, so that users can ask questions instead of having to search for keywords, or search for images showing particular items.²⁹² A search function without such considerations can overwhelm users with irrelevant information, driving users away. The U.S. government website SaferProducts.gov, which "[c]ollect[s] reports of harm . . . from consumers about unsafe consumer products" and "publish[es] reports of harm . . . in a searchable public database,"²⁹³ is a good example of how not to design an interface. I searched for "iPhone 6 battery," given that a putative class action for exploding iPhone 6 batteries survived a 12(b)(6) motion to dismiss.²⁹⁴ Of the first 20 search results, four concerned an iPhone 6 exploding or overheating.²⁹⁵ The rest concerned the iPhone 3GS, 4, 8, and a phone case that allegedly failed to protect an iPhone from water damage.²⁹⁶ The

²⁹¹ *Samsung Galaxy XCover 6 Pro 5G Product Reviews*, AMAZON, <https://www.amazon.com/SAMSUNG-Unlocked-T-Mobile-Cellular-SM-G736UZKEXAA/product-reviews/B0BDBSBBDX/> [<https://perma.cc/YU2J-JUSC>].

²⁹² *See Meta AI*, META (showcasing the AI assistant answering a user's query for salad dressing recipes and videos of the recipes), <https://ai.meta.com/meta-ai/> [<https://perma.cc/98C2-QEZL>].

²⁹³ *About SaferProducts.gov*, U.S. CONSUMER PRODUCT SAFETY COMM'N, <https://www.saferproducts.gov/About> [<https://perma.cc/CHU3-M3FX>].

²⁹⁴ *Franklin v. Apple Inc.*, 2022 WL 2161040 (E.D. Tex. June 15, 2022).

²⁹⁵ <https://www.saferproducts.gov/PublicSearch/Detail?ReportId=1596694> [<https://perma.cc/8F2X-9W3S>];

<https://www.saferproducts.gov/PublicSearch/Detail?ReportId=1583173>

[<https://perma.cc/X4FT-WSA4>];

<https://www.saferproducts.gov/PublicSearch/Detail?ReportId=3410218>

[<https://perma.cc/6TC9-UJQ8>];

<https://www.saferproducts.gov/PublicSearch/Detail?ReportId=1770050>

[<https://perma.cc/T48E-PEQG>].

²⁹⁶ *See*, *e.g.*,

<https://www.saferproducts.gov/PublicSearch/Detail?ReportId=1322332>

[<https://perma.cc/9B83-MEGA>] (iPhone 3GS);

<https://www.saferproducts.gov/PublicSearch/Detail?ReportId=1397383>

[<https://perma.cc/M3RH-TFS6>] (iPhone 4);

<https://www.saferproducts.gov/PublicSearch/Detail?ReportId=2951758>

[<https://perma.cc/8673-VKGF>] (iPhone 8);

screenshot below, without the precise AI-assisted sorting features discussed above, indicates the unfriendly nature of the search interface.

All Types

Advanced Search

Showing 1 - 10 of 10457 results.

Sort By: Show: Results per page:

Consumer plugged cell phone in to charger & set it on couch. Later consumer hears a loud pop &...
Incident Report | 5/13/2013 | 20130422-E4052-2147456742
Incident Description: My iphone 3gs was dead so I plugged it in to the charger and set it on the couch. An hour or so later, husband hears a loud pop and smells a foul odor. Unplugged iphone from charger, but didn't realize what had happened until my daughter brings me the phone. The battery exploded and the pressure of the explosion popped the iphone open. Had we not been in the living room when it happened, it could have caught the couch on fire. This is a serious safety issue and needs to be addressed...

84 YO consumer indicated, that the phone was in a drawer and looking in the drawer the consumer...
Incident Report | 8/31/2021 | 20210812-2B851-2147361151
Incident Description: My iPhone 6 was in a drawer. Looking in the drawer I discovered the battery had exploded. It wasn't being used, nor was it on. I was lucky, no injuries or fire. But I am deeply concerned about the safety of . Took it to local Apple store. They didn't know what happened. Didn't seemed to be very concerned either.

The Consumer stated that the cell phone battery swelled up damaging the phone...
Incident Report | 2/5/2021 | 20201231-20683-2147366955
Incident Description: iPhone 8 battery swelled up damaging the phone and almost caused a fire. The iPhone was only a little over a year old.

It is not only government-run websites that neglect accessibility. Prominent right-to-repair advocate Louis Rossmann is building a website that resembles the BBP in many ways, but without the accessibility considerations. Rossmann's website, called the Consumer Action Task Force, is a crowdsourced wiki intended "to document a new generation of consumer exploitation,"²⁹⁷ describing specific products or services which users believe are engaging in profiteering or other exploitative practices. Although this wiki offers a text-based search and an A-to-Z list of entries,²⁹⁸ it offers neither a tool to direct consumers to the website more quickly, such as QR codes, nor a tool intended to make searches easier, such as Amazon's AI-based summary of reviews. The following page concerns Adobe "advertising their

<https://www.saferproducts.gov/PublicSearch/Detail?ReportId=1684061>
 [https://perma.cc/LN9H-QPY5] (iPhone 6 phone case allegedly manufactured or retailed by Victoria's Secret).

²⁹⁷ Consumer Action Task Force, *Mission Statement*, https://web.archive.org/web/20250121002136/https://wiki.rossmanngroup.com/wiki/Mission_statement [https://perma.cc/JH6W-B2RP].

²⁹⁸ CONSUMER ACTION TASK FORCE, *All Pages*, <https://web.archive.org/web/20250404231606/https://wiki.rossmanngroup.com/wiki/Special:AllPages> [https://perma.cc/L8TR-NM6S].

products . . . as if they were [sold via] a monthly subscription,” but in practice “signing [consumers] up for a yearly subscription without [their] knowledge”²⁹⁹:

Page **Discussion** Read Edit Edit source View history Search Consumer Actio Q

Please note that all submissions to the site are subject to the wiki's licence, CC 4.0 BY-SA, as found [here](#)

Adobe Subscription

False advertising [\[edit \]](#) [\[edit source \]](#)

Adobe advertises their products on their website as if they were a monthly subscription. However, they sign you up for a yearly subscription without your knowledge.

Adobe has a 2 week free cancel policy and after that, you have to pay to cancel your Adobe subscription

They will then offer you deals to stay with Adobe longer, that way you go over their 2 week free cancel policy and have to pay to cancel.

I have so far focused only on the QR code as a means of improving access to websites such as the BBP, and have mentioned AI only in the context of making searches easier. But AI could also be used to improve access to the BBP in the near future. AI could be used to recognize a product by its image or packaging, and then to direct a user to the relevant webpage in the BBP. The advantage of using AI to direct users to the relevant BBP webpage is that it bypasses the need to attach QR codes to the numerous products on the market, whether by having companies opt into the scheme or by imposing it legally. AI has already been put to commercial use for image recognition; for example, cloud services that permit searching for pictures and videos by having AI identify the content are already available.³⁰⁰ To ensure effectiveness, the BBP would need to present information in a user-friendly, digestible way: for example, using simple ratings or icons to flag products that engage in complexity profiteering, and customizable alerts so consumers see information relevant to their purchases without having to wade through extraneous data. The platform could also prioritize the most impactful facts—for example, “This phone’s battery is glued in, making

²⁹⁹ Consumer Action Task Force, *Adobe Subscription*, https://web.archive.org/web/20250423192748/https://wiki.rossmannngroup.com/wiki/Adobe_Subscription [<https://perma.cc/J99J-M6QE>].

³⁰⁰ Shade, <https://shade.inc/> [<https://perma.cc/T78X-59DM>] (“Search your assets with natural language. . .”).

replacement costly”—to avoid overwhelming users with minutiae.

Assume that the BBP begins to successfully inform consumers about which firms are guilty of complexity profiteering and which are not, not necessarily to the point where everyone knows that Apple glues batteries into iPhones, but enough people know that firms change their baseline assumption about how well-informed consumers are. Whereas Apple could, once upon a time, commit complexity profiteering without most people noticing and ignore the few who do, the BBP informs enough people that Apple can no longer expect even technologically unsavvy customers to keep buying new iPhones every year. Once the BBP changes firms' assumptions in this way, firms themselves would accelerate the process of informing consumers by advertising their own innocence, because firms would now think that people are sufficiently informed to take their business away from firms engaging in complexity profiteering. This also means that consumers may take their business to firms that actively avoid complexity profiteering. In this state, consumers would be able to adapt their buying choices immediately in response to information, whereas regulators under a regime of complexity prohibitions would respond only after new complexities cause harm, and then with delay.

Firms that market themselves by painting their competitors as inferior, even nefarious, for engaging in complexity profiteering are using a tried-and-tested strategy. In 2013, when video games were mostly sold on physical discs, Microsoft tried to limit the use of secondhand discs for its Xbox game console. Microsoft would have required users to register newly purchased discs and authenticate them over the internet every 24 hours, so that Microsoft would know if a pre-owned disc is used.³⁰¹ This may be an example of complexity profiteering because, by limiting “re-selling, sharing, or renting” games,³⁰² Microsoft would take profit without adding

³⁰¹ Keith Stuart, *Xbox One DRM Restrictions Dropped After Gamer Outcry*, GUARDIAN (June 19, 2013), <https://www.theguardian.com/technology/2013/jun/19/xbox-one-drm-second-hand-restrictions-abandoned> [<https://perma.cc/HN6X-KY7L>].

³⁰² *Id.*

value. Sony capitalized on the “huge backlash against Microsoft” by marketing the lack of this feature in its PlayStation console. Sony made a 21-second “Official PlayStation Used Game Instructional Video” in which one person simply hands a used disc to another person,³⁰³ in an attempt to “twist[] the bad publicity knife deeper” which resulted in Microsoft renouncing its authentication policy.³⁰⁴ The strategy of advertising the lack of complexity profiteering continues in 2025, with the carmaker Hyundai advertising itself as the “only automaker to give you a full suite of remote services at no additional cost” which “can save you up to \$350 or more per year.”³⁰⁵ Helping consumers vote with their wallets does not require informing every last consumer. Solutions such as the BBP need only inform enough people about complexity profiteering so that firms themselves act on their fear of disgruntled customers taking their business elsewhere. If the BBP becomes sufficiently well-known among both firms and consumers, consumers may no longer need to use the BBP to look up any information. The mere existence of the QR code may become a cognitive shortcut indicating the lack of complexity profiteering in a product, similar to how many consumers use famous brand names as signals of high quality.³⁰⁶

Enabling consumers to vote with their wallets presents another cost saving compared to complexity prohibitions, because the latter can be based on the state’s mistaken views of what the market wants, whereas people voting with their wallets directly express the market’s preferences. Complexity prohibitions require firms to design their products in a way the state *believes* consumers want—for example, forcing iPhones

³⁰³ PLAYSTATION, *Official PlayStation Used Game Instructional Video* (YouTube, June 10, 2013), <https://www.youtube.com/watch?v=kWSIFh8ICaA> [https://perma.cc/98W3-ARTT].

³⁰⁴ Roger Cheng, *Sony Twists the Bad Publicity Knife Deeper into Microsoft*, CNET (June 10, 2013), <https://www.cnet.com/tech/gaming/sony-twists-the-bad-publicity-knife-deeper-into-microsoft/> [https://perma.cc/5YHL-736B].

³⁰⁵ See Hyundai, *supra* note 44.

³⁰⁶ Sabine Baumann, *Media Branding from an Organizational and Management-Centered Perspective*, in HANDBOOK OF MEDIA BRANDING 65, 72 (Gabriele Siegart et al. eds., 2015) (“[B]rand names afford a cognitive shortcut [for] rapid . . . purchase decisions”).

to use USB-C cables in the belief that consumers want it.³⁰⁷ But if the state is mistaken, it would force the market to offer products that consumers do not want. This possibility of misjudging market preferences exists not because regulators are inherently incompetent. Rather, this risk of error exists when *any* individual tries to predict which products the entire market “will accept or continue to use.”³⁰⁸ The history of consumer goods is replete with examples of experts, both private and state, making predictions of market preferences that were, in retrospect, egregiously wrong. Crystal Pepsi, which the company created “[a]fter months of tests and experiments” and believed would “answer[] the new consumer demand for purity,” was discontinued “after a little more than a year.”³⁰⁹ Professor Tim Wu, who has served in both state and federal governments,³¹⁰ wrote when the iPhone was first released that it would not “turn any industry inside out” and “isn’t really revolutionary.”³¹¹ The risk of error only increases as the state tries to micromanage the design of more products on the market.³¹² Here, an old investment adage is highly applicable: “over the long term, without inside information, no one can beat the market.”³¹³

As mentioned briefly at the beginning of Part III, I am not arguing that helping consumers vote with their wallets is a guaranteed silver bullet against the problem of complexity profiteering. Even if the BBP were to be implemented flawlessly, regulatory design micromanagement may be the only available solution when consumers cannot vote with their wallets. For example, John Deere produces “large equipment including tractors” and “has throttled the ability of farmers and independent repair providers . . . to repair Deere equipment”

³⁰⁷ See *supra* notes 117–24 and accompanying discussion.

³⁰⁸ U.S. DEP’T OF AGRIC., *THE YEARBOOK OF AGRICULTURE 1950–1951*, at 56 (1951).

³⁰⁹ MATT HAIG, *BRAND FAILURES: THE TRUTH ABOUT THE 100 BIGGEST BRANDING MISTAKES OF ALL TIME* 43 (2005).

³¹⁰ *Tim Wu, supra* note 190.

³¹¹ *Wu, supra* note 189.

³¹² *EU Right to Repair Law*, Annex II (listing, among others, refrigerators, welding equipment, dishwashers, vacuum cleaners, electronic displays, and mobile phones).

³¹³ ROMESH VAITLINGAM, *USING THE FINANCIAL PAGES* 55 (6th ed. 2011).

for “decades”³¹⁴ by apparently taking advantage of the company’s “dominant share of large tractor and combine sales in the United States.”³¹⁵ If no other brand is practically available, consumers could be as informed as possible but still be unable to vote against Deere with their wallets. In such cases, the only viable solution to complexity profiteering may be to regulate Deere’s products and services directly: by, for example, forcing Deere to “make available to owners of Deere [equipment] . . . any . . . [proprietary] repair resource that Deere makes available to its dealers.”³¹⁶

Sometimes, the law may create a de facto monopoly when the market does not. “[B]y 2016, over half of all the dollars in Pentagon contracting went to sole-source contracts granted without competition,” thereby allowing firms to leverage this monopoly status to prevent servicemembers from repairing equipment in the field without having to wait for a company representative.³¹⁷ While the government could artificially create competition by sourcing the same equipment from multiple suppliers, this policy has its downsides.³¹⁸ Moreover, second-sourcing equipment is often impossible. Only Lockheed Martin produces the F-35 Lightning II fighter jet, and “[a] lack of spare parts,” among other reasons, has caused only 55 percent of F-35s in the U.S. military to be mission-capable.³¹⁹ It is not an exaggeration to say that this and other similar situations may preclude market-based solutions to the difficulty of repair, such as consumers voting with their wallets. I am simply arguing that, when consumers do have genuine,

³¹⁴ Compl. ¶ 1, *FTC v. Deere & Co.*, No. 3:25-cv-50017 (N.D. Ill. Jan. 15, 2025), ECF No. 1.

³¹⁵ *Id.* ¶ 3.

³¹⁶ *Id.* at Prayer for Relief ¶ 7.

³¹⁷ David Dayen, *When Big Business Won’t Let the Troops Repair Their Equipment*, THE AMERICAN PROSPECT (Sep. 19, 2019), <https://prospect.org/power/when-big-business-wont-let-the-troops-repair-their-equipment/> [<https://perma.cc/RJ4X-S826>].

³¹⁸ See J.L. Birkler, E. Dews & J.P. Large, *Issues Associated with Second-Source Procurement Decisions*, R-3996-RC, RAND CORP. (Dec. 1990).

³¹⁹ Stephen Losey, *GAO Blasts Contractor-Led F-35 Maintenance as Costly, Slow*, DEFENSE NEWS (Sept. 22, 2023), <https://www.defensenews.com/air/2023/09/22/gao-blasts-contractor-led-f-35-maintenance-as-costly-slow/> [<https://perma.cc/6ZF9-AL3C>].

competing options, helping them choose between them may be preferable to forcing all firms to redesign their products in a way that the state believes consumers want.

Conclusion

Calls to regulate large concentrations of economic power are nothing new. The public sentiment that culminated in the Sherman Act is epitomized by the sentence, “[i]f we will not endure a king as a political power, we should not endure a king over the production, transportation, and sale of any of the necessities of life.”³²⁰ This statement, marginally more than a century old, resembles the modern case for regulating firms like Apple or Amazon for fear that they would “foreclose commerce”³²¹ or create “a super-monopoly—one firm holding multiple monopolies.”³²² But the contemporary version of the call for regulation distinguishes itself from its forebear with its increasingly strident tone. Barry Lynn, Executive Director of the Open Markets Institute, has claimed that “Amazon is monopolizing commerce in the United States.”³²³ Lina Khan, former Federal Trade Commission Chair, argues that big tech threatens democracy by making people “feel coerced in [their] day-to-day life.”³²⁴ Nobel laureate Professor Joseph Stiglitz has accused “conservatives,” “libertarians,” “right of center,” and

³²⁰ 21 CONG. REC. 2457 (1890) (statement of Sen. John Sherman).

³²¹ Nikolas Guggenberger, *Essential Platforms*, 24 STAN. TECH. L. REV. 237, 247 (2021).

³²² Alex Swerdloff, *Amazon’s Purchase of Whole Foods Could Have Massive Implications for Our Food System*, VICE (June 17, 2017) (Prof. Tim Wu commenting on Amazon’s acquisition of Whole Foods), <https://www.vice.com/en/article/qv4mzm/amazons-purchase-of-whole-foods-could-have-massive-implications-for-our-food-system> [https://perma.cc/2BH8-H2KZ].

³²³ Alex Shephard, *How Amazon Is Changing the Whole Concept of Monopoly*, THE NEW REPUBLIC (June 19, 2017), <https://newrepublic.com/article/143376/amazon-changing-whole-concept-monopoly> [https://perma.cc/L55R-R8LT].

³²⁴ *Dinner Keynote with Jonathan Kanter and Lina Khan: Transcript*, PROMARKET (May 22, 2024), <https://www.promarket.org/2024/05/22/dinner-keynote-with-jonathan-kanter-and-lina-khan-transcript> [https://perma.cc/RZH7-4GS4].

even the “center-left” of being “wedded to neoliberalism,”³²⁵ an ideology which, according to him, has “set us on the road to fascism.”³²⁶

It is easy to imagine how such strident, even zealous, rhetoric came to be. Just as many more words are written about hell than heaven, academics naturally spend much more time agonizing over unsolved problems than on congratulating themselves for already-solved problems. The harder a problem is, the deeper the agony and sharper the rhetoric. Facing what one sincerely believes is unadulterated evil, it is only natural to want to spare no coin for an exorcist so that the devil may be condemned to the deepest circle of hell from whence it came. After all, if the sole alternative to regulation is indeed fascism, why *shouldn't* we enact the most stringent regulations imaginable, while pillorying opponents of such efforts as enabling a regression to fascism?

A grave fault with this sentiment and its resulting rhetoric is that it leads to a regulation-at-all-costs mentality, which prevents the sober cost-benefit analysis needed to verify whether we indeed face the catastrophe we believe we face. Contrary to Lynn's claim, Amazon is not monopolizing commerce in the United States. “Whole Foods still control[led] just over 1 % of the grocery market” in 2022, five years after its acquisition by Amazon,³²⁷ and Amazon lost 2.6 million monthly active users in the U.S. while the Chinese online retailer Temu gained 51.4 million users between September 2022 and January 2024.³²⁸ While Google and Apple are plausibly suspected of unfair business practices, people voluntarily using Gmail and iPhones does not constitute

³²⁵ JOSEPH E. STIGLITZ, *THE ROAD TO FREEDOM: ECONOMICS AND THE GOOD SOCIETY* 18 (2024).

³²⁶ *Id.* at 290.

³²⁷ Katie Tarasov, *Amazon Bought Whole Foods Five Years Ago for \$13.7 Billion. Here's What's Changed at the High-End Grocer*, CNBC (Aug. 25, 2022), <https://www.cnbc.com/2022/08/25/how-whole-foods-has-changed-in-the-five-years-since-amazon-took-over.html> [https://perma.cc/2MQK-A6HB].

³²⁸ Sebastian Herrera, *Amazon's New Focus: Fending Off Rivals Temu and Shein*, WALL ST. J. (Mar. 21, 2024), <https://www.wsj.com/business/retail/amazons-new-focus-fending-off-rivals-temu-and-shein-5c6ac205> [https://perma.cc/A8UY-4YST].

coercion. Contrary to Stiglitz's accusation, his fellow Nobel laureates Friedrich Hayek and Milton Friedman never came close to saying that it is "inevitable that *any* set of economic restraints will . . . set[] us on the road to serfdom."³²⁹ Hayek wrote that "in no [economic] system that could be rationally defended would the state just do nothing"³³⁰ and Friedman wrote that "government [regulation of the market] is necessary to preserve our freedom."³³¹ In short, regulatory maximalism can distort our view of reality.

Were we to fall victim to such regulatory maximalism, we may resort to disproportionate solutions that are both expensive and ineffective. We may enact laws that require regulators to decide for every product which features are intended to thwart repair and which repairs would be *too* expensive,³³² when enabling consumers to vote with their wallets might have been enough to combat predatory design practices.³³³ The sequential models in Part I explain why: ban-and-circumvent raises costs without solving the problem, while demand-side pressure changes the incentives that generate predatory design in the first place. This Article is a call for a paradigm shift in tech law toward a pragmatic approach which accepts that market-based tools may, in at least some cases, provide more control over firms and technological development than direct regulation does. It should be neither controversial nor groundbreaking to say that we should avoid sacrificing life and limb for an exorcist we don't need to fight a devil that doesn't exist—particularly when the actual problem may be a garden-variety case of roaches, for which a few hundred dollars for an exterminator would have sufficed.

³²⁹ STIGLITZ, *supra* note 325, at 18 (italics added for emphasis).

³³⁰ FRIEDRICH HAYEK, THE ROAD TO SERFDOM: TEXT AND DOCUMENTS 40 (1944).

³³¹ MILTON FRIEDMAN, CAPITALISM AND FREEDOM 2 (1962).

³³² See *supra* Section I.B.

³³³ See *supra* Part III.