BETTER TOGETHER: PRIVACY REGULATION AND INNOVATION POLICY

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Industry players and opponents of privacy regulation claim broadly that privacy regulation will "stife" innovation. This Article responds by bringing together traditional theories of regulation and innovation policy, and applying them in the context of markets involving personal information.

Our analysis makes two significant contributions to the debate about privacy regulation and innovation. First, we distinguish between misaligned market demand signals and failures of appropriability. Regulation traditionally responds to misaligned market demand signals such as information asymmetries, externalities, and transaction costs, by attempting to realign perceived demand with a more socially desirable demand portfolio. Intellectual property law and innovation policy seek to address a different set of market failures, failures of appropriability, which are due, for example, to free rider problems. These mechanisms, though analytically distinct, work in parallel and in combination to determine the extent to which the market's portfolio of innovative activity is socially sub-optimal. Nonetheless, the regulatory literature, including the literature on regulation and innovation, has paid little attention to failures of appropriability. Here, we bring together regulatory responses to misaligned market demand signals and failures of appropriability to show that concerns about regulation's potentially innovation-stifling effects are often exaggerated and must be tested against the combination of the two.

Second, we consider whether blanket opposition to regulation or heightened concern about its implications for innovation is uniquely justified in the context of information privacy. Our analysis suggests that even though personal information is tied to failures of appropriability and thus carries implications of privacy regulation for innovation, this relationship cannot justify blanket opposition to privacy regulation. Furthermore, in some cases, privacy regulation designed to address misaligned market demand signals might even have the side effect of mitigating failures of appropriability that are especially likely to affect the market for personal-information-based innovation. Proposals for information privacy regulations should thus be judged on their individual merits, taking both misaligned market demand signals and failures of appropriability into account.

I. INTRODUCTION

The amount of personal information accumulated by companies has mushroomed in recent years, giving rise to calls for more stringent information privacy regulation. In the EU, such calls led to the enactment of the General Data Protection Regulation (GDPR), which came into effect earlier this year.[1] US lawmakers tend to be more skeptical about regulation than their European counterparts, at least at the federal level. As a result, the question of whether and how to regulate the commercial collection and use of personal information continues to be hotly debated. Nonetheless, while federal proposals remain stalled, some states and even cities are moving ahead with privacy regulation.[2]

Proposals for heightened privacy protections are routinely countered with general claims that privacy regulation will stifle socially valuable innovation.[3] This rhetoric is powerful and superficially convincing. It goes something like this:

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[1] *See* Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the Protection of Natural Persons with Regard to the Processing of Personal Data and on the Free Movement of Such Data, and Repealing Directive 95/46/EC (General Data Protection Regulation), 2016 O.J. (L. 119) [hereinafter GDPR]; *id.* at art. 99 ("[This Regulation] shall apply from 25 May 2018."). The EU had approved pan-European data protection rules the previous year. *See* Mark Scott, *Europe Approves Tough New Data Protection Rules*, N.Y. TIMES (Dec. 15, 2015), https://www.nytimes.com/2015/12/16/technology/eu-data-privacy.html.

[2] *See, e.g.*, 2018 Cal. Stat. ch. 55 (approved by Governor, June 28, 2018) (enacting California Consumer Privacy Act of 2018); 201 MASS. CODE REGS. § 17.03 (requiring that any entity that collects personal information of Massachusetts residents maintains comprehensive data security plans); 23 N.Y. COMP. CODES R. & REGS. tit. 23, § 500 (2017) (requiring financial institutions active in New York state to maintain comprehensive plans addressing cyber security risks); Data Collection and Protection Ordinance, CHICAGO, ILL., MUN. CODE §4-402 (2018) (providing consumers with opportunities to control personal data via informed consent to disclosure, information on use, and redress for misuse).

[3] For instance, Adam Thierer & Ryan Hagemann have argued that regulations on the collection and use of personal data in the field of driverless vehicles will lead to higher costs for start-ups and small operators, and prevent consumers from enjoying the potential benefits of innovations. *See* Adam Thierer & Ryan Hagemann, *Removing Roadblocks to Intelligent Vehicles and Driverless Cars*, 5 WAKE FOREST J.L. & POL'Y 339 (2015); *see also* The Internet Association, *Re: Request for Comments Concerning Big Data and the Consumer Privacy Bill of Rights* (Docket No. 140514424-4424-01), published Aug. 5, 2014, p. 3–4 ("At this time, any legislative proposal, to address 'big data' may result in a 'precautionary principle problem' that hinders the advancement of technologies and innovative services before they even develop."); Bob Quinn, "Privacy Regulation: Symmetry or Asymmetry?",

The information economy is the lifeblood of US economic growth. Increasingly, it runs on personal information collected and aggregated by companies as they provide us with services. The use of this information has brought us many benefits and conveniences and is the mainstay of our most successful companies. Sure, each of us might, in principle, prefer not to have our own activities tracked, but do we really want to risk stalling out the engine of our innovative economy by imposing privacy regulations?

Sweeping and over-wrought claims about the dire ramifications of regulation for innovation, jobs, and economic competitiveness are certainly not new. Environmental regulation, in particular, has long elicited similarly hyperbolic opposition from both ideological opponents and self-interested economic actors.[4] These ideological and political battles continue to play out, now most notably over climate change. In the environmental arena, however, as well as in areas such as healthcare, a much more nuanced discussion about precisely what and how to regulate competes for the floor and influences, even though it does not control, regulatory policy and design.[5] In yet other regulatory arenas, the shouting match is pretty much over, despite ongoing rear-guard actions by anti-regulatory forces.

AT&T: PUB. POL'Y BLOG (March 9, 2016, 1:51 PM), https://www.attpublicpolicy.com/privacy/privacy-regulationsymmetry-or-asymmetry/ (asserting that the FTC's framework and the Obama Administration's 2012 Consumer Privacy Bill of Rights "[are] familiar to consumers, [have] worked well for them for many years, and contributed to today's thriving, innovative, and free Internet").

[4] *See generally* Wesley A. Magat, *The Effects of Environmental Regulation on Innovation*, 43 DUKE J.L. & CONTEMP. PROBS. 4 (1979) (claiming five main types of environmental regulation reduce technology innovation when a firm invests in compliance instead of pure research and development); Henry G. Grabowski, *Estimating the Effects of Regulation on Innovation: An International Comparative Analysis of the Pharmaceutical Industry*, 21 U. CHI. J.L. & ECON. 133 (1978) (comparing U.S. to U.K. firms to analyze the relation between increased FDA regulation and pharmaceutical research and development investment). *But see* Nathan Goldschlag & Alex Tabarrok, *Is Regulation to Blame for the Decline in American Entrepreneurship?*, 33 ECON. POL'Y 5 (2018) (finding increased federal regulation is not directly responsible for economic trends in the U.S. such as a decline in business startups and increase in job reallocation); Adam B. Jaffe & Karen Palmer, *Environmental Regulation and Innovation: A Panel Data Study* (Nat'l Bureau of Econ. Research, Working Paper No. 5545, 1996) (finding regulated industries' proportion of successful patent applications were not significantly impacted by compliance costs); Shunsuke Managi, *Environmental Regulations and Technological Change in the Offshore Oil and Gas Industry*, 81 LAND ECONS. 303 (2005) (finding support for a more restrained version of the Porter hypothesis after testing the relation between environmental regulation and technological innovation of offshore oil and gas industries).

[5] *See generally* Zachary Liscow & Quentin Karpilow, *Innovation Snowballing and Climate Law*, 95 WASH. U. L. REV. 2 (2012) (discussing long-term impacts on technological innovation as a significant consideration for policymakers when drafting climate policy); David Popp, *Innovation and Climate Policy*, 2 ANN. REV. RESOURCE ECON. 275 (2010) (surveying environmental innovation literature in relation to clean energy technologies and discussing its implications on climate policy); Emi Kolawole, *Health Care Innovation: From Regulation to 'Bigger Brains'*, WASH. POST (Feb. 14, 2012), https://www.washingtonpost.com/blogs/innovations/post/how-to-keep-the-us-on-the-cutting-edge-in-health-care-innovation/2012/02/14/gIQARJurDR_blog.html?utm_term=.fda4730333ad (discussing regulatory considerations around increased use of big data in health care technology innovation).

The debate about information privacy regulation, however, is mostly stuck at the shouting match stage, despite the growing influence of personal data collection, aggregation and use in society. The information privacy regulations now on the books worldwide, including the EU's new and widely touted General Data Protection Regulation (GDPR), are nearly all based primarily on a set of Fair Information Practices (FIPs) drafted in the late 1970s and early 1980s.[6] There are several versions of the FIPs and regulations vary somewhat in which principles they adopt and how strictly they are implemented, but all are essentially cut from the same cloth, despite the introduction of new concepts such as "privacy by design."[7] With some notable exceptions, the same lack of attention to the specifics of regulatory design has afflicted the academic discourse on privacy.

There are many possible reasons for this state of affairs, including the fact that the extent and nature of present-day information privacy issues are novel and evolving. We believe that at least part of the problem is that the threat of innovation stifling seems to hold particularly strong sway in the debate about information privacy regulation, casting a spell even over constituencies that are inclined to a pro-regulatory stance. We do not mean to suggest that designing good information privacy regulation is easy. In fact, we believe it is quite hard. Nor do we believe that there are easy answers to the underlying normative questions about what sorts of flows and uses of personal information are most appropriate and beneficial to individuals and to society at large, in light of the various and competing values at play. We do believe, however, that the current emphasis on the fear that privacy regulation will stifle innovation is misguided and, to a large extent, unwarranted.

This Article thus takes on the broad assertion that information privacy regulation will stifle innovation by analyzing its underpinnings and thereby exposing some of its weaknesses. In doing so, we take as our starting point the economic view that regulation should be adopted when it is designed so that it can be reasonably expected to ameliorate market failures at sufficiently low cost, thereby improving social welfare. We ourselves hold a very broad view of the sorts of "market failures" that are appropriately targeted by regulation, encompassing essentially any way in which the market fails to produce what is socially optimal. But that particular normative view is not central to the general arguments we make here, which aim to

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[6] *See* Federal Trade Commission, *Fair Information Practice Principles* (2007) (providing five core principles of privacy protection, including notice to users, choice and consent regarding data collection and use, users' access to collected data, data security, and enforcement and redress measures). *See also* Robert Gellman, Fair Information Practices: A Basic History (Apr. 11, 2017), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2415020 (discussing the history of Fair Information Practices with a focus on the U.S.)

[7] *See* Gellman, *supra* note 6 at 28-30 (describing privacy by design as a departure from the "classic FIPs principle" of transparency). For further discussion of privacy by design measures, see Ira S. Rubenstein, *Regulating Privacy by Design*, 26 BERKELEY TECH. L.J. 1410 (2011) (analyzing the meaning of "privacy by design" in order to show how regulatory incentives might be balanced against economic costs of compliance with privacy regulations); European Union Agency for Network and Info. Sec., Privacy and Data Protection by Design Report: From Policy to Engineering (2014), https://www.enisa.europa.eu/publications/privacy-and-data-protection-by-design (providing an inventory of existing privacy by design strategies with a focus on privacy enhancing technologies).

clear some conceptual underbrush that is getting in the way of more productive discussions about the design of information privacy regulation, in which such normative choices would necessarily be debated.[8] Similarly, we take no position here about how to define social welfare or how to go about assessing a regulation's expected social impact, other than to assume that such assessment mechanisms, however imperfect, are necessary to rational policy debate.

Our goals are thus both general and limited: we analyze whether there are general reasons to expect that privacy regulations pose a uniquely serious threat to innovation that justifies blanket opposition or requires special treatment. We do not, however, respond to a superficial assertion that privacy regulation will stifle innovation with an equally superficial claim in favor of privacy regulation. Indeed, we conclude that the personal-information-based market does have special features that should be considered in regulatory design and evaluation. Our bottom line, however, is that these features only make it more urgent to move beyond blanket assertions and focus on particular regulatory proposals.

Our analysis makes two specific sorts of contributions to the debate about privacy regulation and innovation. First, we distinguish misaligned market demand signals and failures of appropriability. Misaligned market demand signals arise, for example, from externalities or information asymmetries and are the classic justifications for regulation. Failures of appropriability are due, for example, to free rider problems, have been the focus for scholarly discussions of innovation policy and intellectual property. These mechanisms, though analytically distinct, work in parallel and in combination to determine the extent to which the market's portfolio of innovative activity is socially sub-optimal. Despite this interplay, the regulatory literature, including the literature on regulation and innovation, has paid little

[8] *See generally* Matthew D. Adler, *Beyond Efficiencies and Procedure: A Welfarist Theory of Regulation*, 28 FLA. ST. U. L. REV. 241 (2000) (adopting a new theory of regulation called "Welfarism" which evaluates good regulatory outcomes by the extent to which overall well-being is maximized); Ricky Revesz, *Quantifying Regulatory Benefits*, 102 CALIF. L. REV. 1423 (2014) (discussing the federal government's role in quantifying previously unquantifiable regulatory benefits and supporting breakeven analysis as a useful technique for cost-benefit analyses of regulatory action); Eric A. Posner & Cass R. Sunstein, *Moral Commitments in Cost-Benefit Analysis*, 103 VA. L. REV. 1809 (2017) (arguing for regulatory agencies to consider moral values motivating proposed regulatory actions despite the difficulties of quantifying morality in cost-benefit analysis). For general discussion on the precautionary principle in regulatory decision-making, see INTERPRETING THE PRECAUTIONARY PRINCIPLE (Tim O'Riordan & James Cameron eds., 2013); Richard B. Stewart, *Environmental Regulatory Decision Making Under Uncertainty*, *in* 20 AN INTRODUCTION TO THE LAW AND ECONOMICS OF ENVIRONMENTAL POLICY 1, 71-126 (Timothy Swanson ed., 2002) (describing four distinct versions of the precautionary principle). For a critique of the precautionary principle, see Cass R. Sunstein, *Beyond the Precautionary Principle* (Univ. Chi. Pub. Law & Legal Theory, Olin Working Paper No. 149, 2003), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=307098 (discussing the ineffectiveness of the precautionary principle through its various regulatory applications, e.g. the Kyoto Protocol, nuclear power, pharmaceutical regulation, cloning, pesticide regulation, and genetic modification of food).

attention to failures of appropriability,[9] effectively assuming that intellectual property law operates independently to resolve them.[10] Here we bring an intellectual property scholars' perspective to bear on the question of regulation's impact on innovation. We argue that concerns about regulation's potentially innovation-stifling effects are often exaggerated, since the primary effect of well-designed regulation is to shift the market's portfolio of innovative activity in more socially desirable *directions*, rather than to reduce innovation overall. Furthermore, we argue that there is little reason to expect that regulation's impact on "innovation" is sui generis, so as to justify an anti-regulatory presumption in lieu of standard case-by-case methods of evaluating regulatory proposals.

Second, we consider whether there is something about *information privacy* that justifies a blanket opposition to regulation or heightened concern about its implications for innovation. Though personal information does have a relationship with failures of appropriability that affect the implications of privacy regulation for innovation, our analysis does not support blanket opposition to privacy regulation on that basis. To the contrary, our analysis suggests that, in some cases, privacy regulation designed to address problems with demand signals might even have the side effect of mitigating failures of appropriability that are especially likely to affect the market for personal-information-based innovation. In the end, though, proposals for information privacy regulations should be judged on their individual merits, taking both demand signal failures and appropriability failures into account.

In Part II of the Article, we define what we mean by information privacy regulation, distinguishing it from broader possible uses of the term. We next provide a similar discussion of our usage of the term "innovation." We then set the stage for our analysis with a brief review of some of the academic literature on the subject of privacy regulation and innovation, referring back to relevant treatments of regulation and innovation more generally.

In Part III, we first step back to analyze the relationship between regulation and innovation in general terms, providing a framework for our later discussion of information privacy regulation. Traditional justifications of regulation are based on market failures arising from mis-alignment between market demand signals and individual or social preferences. The innovation portfolio generated by the market reflects a combination of market demand signals with suppliers' appropriability expectations, however. Thus, failures of appropriability are also important in determining whether the innovation the market produces is in line with social welfare. Failures of appropriability are the traditional purview of intellectual property, which attempts to correct so-called "free rider" problems using market exclusivity, while employing limiting doctrines to avoid over-correction.[11]

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[9] The converse is also true: the IP and innovation policy literature mostly ignores the possibility that market demand for innovation activity might be misaligned with social welfare except in discussions of technology transfer and the relationship between IP and government-funded science.

[10] Puzzlingly, the existing literature on the interplay between regulation and innovation is largely lacking in contributions from intellectual property scholars.

[11] See generally Kenneth W. Dam, Some Economic Consideration in the Intellectual Property Protection of Software, 24 J. LEGAL STUD. 321, 322 & n.44 (1995); Frank H. Easterbrook, Intellectual

Part III then considers the potential interplay between regulation and innovation in light of these two sorts of failures. It begins by debunking several general arguments that regulation "stifles" innovation. First, the observation that a regulation decreases some sorts of innovative activity is not evidence that innovation is being "stifled" in any socially meaningful sense. Shifts in the *direction* and *distribution* of innovative activity are often precisely the point of regulation. Investors can respond by shifting between projects within a regulated sector or investing in other sectors. Second, arguments based on innovation's long-term unpredictability are not convincing rationales for maintaining the status quo: the social welfare effects of pre- and post-regulatory innovation portfolios are likely to be similarly unpredictable. Third, regulatory transaction or compliance costs are not general reasons to anticipate innovation stifling, since those costs depend on regulatory specifics and can be spread by regulatory design if desired. Finally, "innovation" in some vague sense is not a trump card outweighing all other social benefits. Of course, particular regulations might have deleterious effects on innovation that outweigh their benefits. The point is that the devil is largely in the details.

Part III next focuses on appropriability, a largely neglected side of the equation in regulatory policy discourse. Discussions of regulatory policy and intellectual property have generally proceeded in separate silos. The market's portfolio of innovative activity reflects the combined influence of demand and appropriability. This soloing thus reflects an implicit assumption that demand signal failures and appropriability failures can be addressed independently. While we agree that this separability assumption is often reasonable, it is not always correct. Part III identifies circumstances in which such indirect effects are likely to be significant. In those circumstances, a regulation designed to re-align demand signals can have unanticipated implications for innovation if its appropriability effects are not taken into account. Because intellectual property law is designed to be relatively technology-neutral, for both practical and theoretical reasons, it cannot be expected to account for the appropriability effects of particular regulations. We therefor argue

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Property is Still Property, 13 HARV. J.L. & PUB. POL'Y 108 (1990); Wendy J. Gordon, An Inquiry Into the Merits of Copyright: The Challenges of Consistency, Consent, and Encouragement Theory, 41 STAN. L. REV. 1343 (1989). But see Richard A. Epstein, Liberty versus Property? Cracks in the Foundations of Copyright Law (Univ. Chi. Cultural Pol'y Ctr., Working Paper No. 204, 2004). For the utilitarian perspective of intellectual property law, see WILLIAM M. LANDES & RICHARD A. POSNER, THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW (2003); William M. Landes & Richard A. Posner, An Economic Analysis of Copyright Law, 18 J. COMPETITION L. & ECON. 1, 13-17 (2009). But see Mark A. Lemley, Property, Intellectual Property, and Free Riding, 83 TEX. L. REV. 1031 (2005) (suggesting it is economically misguided to apply a minimizing "free riding" justification to intellectual property protection). For general discussion of legal appropriability, see Yonatan Even, Appropriability and Property, 58 AM. U. L. REV. 1417, 1429-35 (2009) (distinguishing legal and economic appropriability); J. Gregory Sidak, Dynamic Competition in Antitrust Law, 5 J. COMPETITION L. & ECON. 1, 13-17 (arguing that while high market share is an inadequate proxy for appropriability, the efficacy of legal protections like intellectual property rights is highly related to appropriability).

that, when significant interplay between demand and appropriability effects is anticipated, it should be explicitly accounted for in regulatory design.

Part IV begins to home in on the particular case of information privacy regulation. It reviews possible failures in market demand signals relating to the commercial collection, flow and use personal information. Potential sources of demand failure identified in the literature include information asymmetries, externalities and collective action problems and failures related to the nonrivalrousness of information and the effects of information aggregation. Advertising-based business models, which are prevalent in this arena, also drive wedges between consumer preferences and market demand signals. In addition, market demand fails to account for distributional and ethical concerns that might also justify regulation. Part IV also gives examples of the ways in which regulations might attempt to address these failures, emphasizing the need for creative and tailored approaches.

Part V turns to failures of appropriability in markets involving personal information. Taking intellectual property doctrine as the back-drop, we identify two likely sources of appropriability failures affecting personal information-based innovation: failures of trade secrecy's limiting doctrines and network effects. The net result of these effects will be that, far from being deterred by fear of free riding, innovative activities exploiting caches of personal information will tend to be over-compensated. Thus, all else equal, the innovative activity induced by the market will tend to be skewed toward the exploitation of personal information.

In Part VI we pull everything together. The analysis of Parts IV and V, taken together, provides good reason to believe that the unregulated market will produce a portfolio of goods, services and innovation undesirably skewed toward collecting and exploiting personal information. This prevalence of market failures justifies regulatory efforts. The demand-side analysis in Part IV raises no particular red flags about information privacy regulation's likely effects on innovation. As discussed in Part III, regulatory measures that shift the distribution of market demand for innovative activities ordinarily do not affect the appropriability of those innovations. Our analysis in Part V suggests, however, information privacy regulation is not ordinary in this sense. Appropriability is entwined with trade secret holdings of personal data in ways that can undermine the separability assumption. Depending on its specific design, information privacy regulation can sometimes affect the appropriability associated with some innovation paths. Moreover, innovations in this arena can vary widely in their appropriability, not only from one to another, but also between innovators. As a result, some approaches to information privacy regulation are likely to affect the market's portfolio of innovative activities, not only by re-aligning demand signals, but also by affecting the appropriability landscape. This is not an argument that privacy regulation is innovation-stifling; these effects depend on regulatory particulars and can go in either direction, mitigating or compounding failures of appropriability. Thus, a privacy regulation that misses the mark in correcting demand signals, might nonetheless result in a more socially beneficial portfolio of innovation because of its effects on appropriability. Of course, the

converse is also true: privacy regulations that effectively re-align demand might sometimes exacerbate appropriability failures.

The bottom line is that blanket assertions about the effects on innovation of "information privacy regulation," writ large, are simply wrong. Worse, they distract from difficult and important questions of regulatory design. While information privacy regulation can affect the appropriability of innovative activity, as well as re-aligning it with social preferences, those effects will sometimes, perhaps often, be salutary. In other words, far from "stifling" innovation, privacy regulation might improve the innovation landscape, from a social perspective. But, as we have emphasized, details matter. Careful regulatory design and evaluation of specific proposals is, if anything, even more crucial for information privacy regulation than in other regulatory arenas.

II. FRAMING THE DEBATE ABOUT PRIVACY REGULATION AND INNOVATION

While our specific views of market failures and social welfare assessment are not crucial to our general arguments, the understandings of "information privacy regulation" and of "innovation" that we bring to bear here play a significant part in our analysis. Sections A and B of this Part thus seek to make those definitions explicit. Section C discusses some of the literature that forms the backdrop for this Article.

A. Information Privacy Regulation as Regulation of Personal Information Flow

For our working definition of information privacy regulation (which we will sometimes refer to simply as "privacy regulation," in the interests of brevity), we draw on Helen Nissenbaum's contextual integrity theory of privacy.[12] Under the contextual integrity framework, privacy is achieved through maintaining personal information flows that are normatively appropriate for the context.[13] The appropriateness of a given flow of personal information depends on many factors, including the context in which the personal information is being used (medical or employment, for example); the actors that participate in the exchange and their relationships; the subject matter of the information and the identity of the person to whom it pertains; and the transmission principles that constrain the flow (such as whether the consent of either party is required).[14] Though Nissenbaum's treatment focuses on information flows, we believe that similar contextual factors determine the appropriateness of other potential regulatory targets, such as personal information collection, retention and use. Nissenbaum's theory evaluates the appropriateness of an information practice

[12] Helen Nissenbaum, PRIVACY IN CONTEXT (2009).
[13] *Id.* at 127.
[14] *Id.*

in terms of context-specific social norms, as well as the values, goals and ends of the specific context and broad moral and political factors implicated by the practice.[15]

Here we are concerned with the collection, retention, transfer and use of personal information in a commercial context. More specifically, we focus on commercial actors' collection and use, in digital form, of information pertaining to individuals, rather than, for example, the social exchange of information between peers, whether on or offline. We thus adopt the economic language of social welfare, market demand and supplier incentives for our analysis, while leaving room for a broad understanding of social welfare. Nonetheless, we adopt Nissenbaum's contextual and catholic perspective on what "information privacy" might entail.

Nissenbaum's framework is useful for analyzing the interplay between privacy regulation and innovation because, unlike traditional accounts of privacy, it does not use notions of secrecy or control as its benchmarks. Thus, it suggests, and we assume, that information privacy regulation can be used not simply to *restrict* access to personal information but also to *facilitate* access to personal information, to the extent that the increased information flow overcomes failures in market demand. For example, some scholars have claimed that individuals have an ethical obligation to share their health information for research purposes.[16] If the sharing of health information reflects a sufficiently strong social value, but voluntary contribution is plagued by collective action problems, then privacy regulation, rather than limiting access to such information, might mandate access to it for research purposes, subject to constraints on its responsible use and flow. Or, rather than mandating disclosure by everyone, privacy regulation might encourage the disclosure of medical information by forbidding researchers from re-purposing it, disclosing it outside of the research context and so forth.[17]

Equally importantly, Nissenbaum's framework does not rely on any acontextual categorization of particular types of information as "sensitive" or "private." It thus allows for the possibility, now central to information privacy concerns, that information can be aggregated to make inferences about individuals.

The take-away point is that when we speak of privacy regulation in this Article, we have in mind a very broad menu of mechanisms for constraining and redirecting the collection, retention, flow and use of personal information, rather than assuming that privacy regulation necessarily must restrict collection or provide notice and an opportunity for consent or implement some form of the Fair Information Practice

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[15] *Id.* at 181–82.

[16] John Harris, *Scientific Research is a Moral Duty*, 31 J. MED. ETHICS 242 (2005); Rosamond Rhodes, *In Defense of the Duty to Participate in Biomedical Research*, 8 AM. J. BIOETHICS 37 (2008); G. Owen Schaefer, Ezekiel J. Emanuel & Alan Wertheimer, *The Obligation to Participate in Biomedical Research*, 302 JAMA 67 (2009); Joanna Stjernschantz Forsberg, Mats G. Hansson & Stefan Eriksson, *Why Participating in (Certain) Scientific Research is a Moral Duty*, 40 J. MED. ETHICS 325 (2014); Angela Ballantyne & G. Owen Schaefer, *Consent and the Ethical Duty to Participate in Health Data Research*, __ J. MED. ETHICS __, (forthcoming 2018), available at http://jme.bmj.com/content/early/2018/01/22/medethics-2017-104550.info.

[17] *Cf.* 45 C.F.R. § 164.502 (2013) (forbidding the disclosure of certain types of information relating to personal health except in enumerated extraordinary circumstances).

principles. All of these mechanisms, and others, should be on the table when privacy regulations are designed.

B. Market Innovation in Personal-Information-Based Products and Services

Like "privacy," "innovation" has been defined in various ways for various purposes. Our usage of the term here is driven by the problem we hope to address. Because our focus is on the effects of regulations that apply to commercial actors, we concentrate on innovation induced by market forces. When we narrow our discussion to the effects of information privacy regulation, we will be concerned with innovation in personal-information-based products and services (or "PI-based products and services) as explained in further detail later in this section.

1. "Innovation"

This Article is concerned with innovation induced by market forces. While everyone agrees that "innovation" has something to do with introducing something new, there are differences in usage based on just how different (or better) "innovation" must be compared to what came before. We impose no such threshold; our usage here encompasses any novel aspects of goods and services or their production that provide some sort of competitive advantage. Our foundational assumption is that commercial actors respond to market demand signals and to the anticipated appropriability of returns in determining the level and direction of their innovative activities.[18] Usages of the term in the literature also differ by scope, ranging from narrow usages referring only to "technological" innovation to expansive usages encompassing new approaches to business, the arts, marketing (or perhaps even regulation). Here, we will generally have in mind the sorts of technological or expressive outputs that are the subject matter of patent and copyright protections, though not only those that qualify for those protections. Usages also vary in the extent to which they require market entry rather than mere "invention." Here, because we are concerned with the ex-ante

[18] We are, of course, well aware that there are many other motivations for creative and inventive activity and have written elsewhere about their importance. *See* DEAN BAKER, ARJUN JAYADEV & JOSEPH STIGLITZ, INNOVATION, INTELLECTUAL PROPERTY, AND DEVELOPMENT, 9 (2017), http://cepr.net/images/stories/reports/baker-jayadev-stiglitz-innovation-ip-development-2017-07.pdf; Christopher Buccafusco *et al.*, *Experimental Tests of Intellectual Property Laws' Creativity Thresholds*, 92 TEX. L. REV. 1921, 1922 (2014). We also know that regulations aimed at commercial actors can have collateral effects on non-commercial activities. See Andrew W. Torrance & Eric von Hippel, *The Right to Innovate* 2015 MICH. ST. L. REV. 793 (2015). We do not address these issues here because we do not believe they are the focus of the ongoing regulation/innovation debate. Some commentators have also emphasized the impact that loss of privacy might have on the creativity of the individuals whose privacy is affected. See Julie E. Cohen, *What Privacy is For* 126 HARV. L. REV. 1904 (2013). Here we do not deal explicitly with these sorts of effects on information subjects, but assume that they can, at least in principle, be taken into account in terms of consumer preferences and potential mis-alignment of those preferences with market demand signals.

assessment of regulatory impact, our focus is on innovative activity and investment that aims for market entry.

Our discussion also assumes that innovation will be most successful when many innovators can enter the market and build upon each other's work in competitive fashion. Intellectual property doctrine accords with this view. It is designed to limit exclusive rights to what is necessary to induce invention, primarily for fear of suppressing downstream and follow-on invention. The academic debate over whether monopoly or competition best fosters innovation is longstanding, however, with heavy hitters like Schumpeter and Arrow famously taking different sides. The well-known "prospect theory" of patents also argues that broad and deep exclusive rights will foster innovation. Nonetheless, the majority view among intellectual property scholars aligns with Arrow in favor of competition and that is the position we adopt in this discussion.

2. Innovation in Personal-Information-Based Goods and Services

Our discussion focuses on regulations that affect the collection, transfer and use of personal information, in the form of digital data, by commercial actors. We thus focus on "personal-information-based products and services," by which we mean those for which personal information is an important contributor to the market value of the product or service or an important component in developing it. When we refer to "innovation" in PI-based goods and services we do not include improvements that, while they may create value for consumers, result merely from employing "more" personal information in a known way. "Innovation," in our usage, must involve something new about either the way personal information is used or some other aspect of the good or service.[19] We believe this distinction is consistent with standard conceptions of innovation in popular usage and in the intellectual property and innovation policy literatures.

PI-based products and services ordinarily combine algorithms, software code and user interfaces with personal information. Personal information may be employed in several ways to create and provide such products and services. It may be employed essentially as a tool for developing novel personal information-based products and services. For example, a company might use its database of personal information to experiment with different ideas about how to provide purchase recommendations to consumers until it comes up with a novel approach. Personal information also may be used as an input to "produce" a product or service. For example, having come up with a novel approach to providing recommendations, the company might use personal information to train a machine-learning algorithm that outputs a model implementing the approach. Finally, personal information can be used in delivering the product or service to the customer. For example, the company would deliver a recommendation to a consumer by inputting her personal information

[19] We recognize that this line is not always bright. For example, the availability of "more" personal information can spark or facilitate novel uses of that information. We nonetheless think it is a conceptually meaningful distinction.

into the model and displaying the output recommendation. The first stage described evident involves "innovation" in our usage while the third does not. The second stage – using personal information to train a machine-learning model – is a bit borderline, but our position is that routinely applying well-known machine learning methods to new data is not innovation, even though it produces new models. What we mean by innovation would, however, include the development of a novel machine-learning algorithm to produce the model.

Privacy regulation of the sort that interests us here generally involves constraints on the flow of personal information: the collection, use, retention or transfer of information related to individuals. Recent social and technological developments have particularly highlighted situations in which consumers' data has been collected as a byproduct of an initial communication (intentional or otherwise) that was closely connected to a particular transaction and has been aggregated -- over time and activities for individuals or over individuals. Such byproduct uses of consumer data can take various forms in relation to products and services. For example, consumer data can be: i) used to target advertising or otherwise influence user preferences or choices; ii) used to divine consumer preferences, in the sense of market research or testing; iii) used to make decisions affecting consumers in arenas such as employment and insurance, iv) employed in the process of creating a product or service, much as an assembly line is used to produce toys (here, we have in mind, e.g. Google's use of search data to suggest search terms or the use of personal information to train a machine learning model for targeting advertising, predicting credit risk, and so forth); or v) incorporated into a product or service, much as plastic is incorporated into a toy (e.g. an advertiser is offered placements on particular individuals' Facebook pages based on an analysis of consumer data); or aggregated and sold as a product to others. Some might argue that consumer data can also be used as a tool for innovate, much like a traditional research tool. A company might, for example, use consumer data while experimenting with innovative approaches to particular tasks, such as recommender systems, or while designing a new approach to machine learning.

In principle, privacy regulation could increase the costs of certain innovation paths by constraining (or prohibiting) any of these sorts of uses. For example, constraints on data transfer could make certain innovations less profitable by raising the price of data inputs; constraints on particular data uses would deter innovation involving those uses; constraints on data collection could affect any of these uses. This range of potential effects on innovation does not seem qualitatively different from the range of effects that would be expected from typical examples of traditional regulation. Traditional regulation also sometimes raises the price of certain inputs or constrains their use, regulates manufacturing processes, constrains the sorts of products that can be sold, and so forth. Perhaps aggregated consumer data is special in some respects because it can be applied to a variety of social problems and consumer demands. Even so, aggregated data is not unique in that regard. If "data is the new oil" because of its many potential uses, we should not be surprised if it is

socially desirable to regulate some of those uses, to constrain the methods used to acquire it and so forth.

A crucial point to be made here is that privacy regulation would work to regulate different information flows in different ways. *A well-designed privacy regulation* could place restraints on certain flows while facilitating easier access and more openness of others. For example, when access to medically useful information is frustrated because of individuals' choices that do not align with social and ethical norms, privacy regulation could allow legally-safe and responsible access and use of that information. In other words, when the social costs of stifling a certain innovative path through privacy regulation are prohibitive, both individuals and society as a whole would opt for privacy regulation that supported the information flows needed for that innovative path.

C. Prior Literature

The contention that regulation will stifle innovation is hardly new; it is a trope that resurfaces regularly in response to proposals to regulate technology and has provoked a long-standing and politically contentious policy debate. The academic literature on the interplay between regulation and innovation focuses primarily on a few contexts, most notably environmental regulation. Much of this literature is empirical and outcomes depend to some extent on the methodologies and metrics for innovation that are used. The majority view, to the extent one can be gleaned from this literature, is that the net impact of regulation on innovation is likely to depend critically on regulatory design,[20] with commentators suggesting various factors that are likely to affect the outcome.

An example of the state of the art is the empirical literature focused on the well-known Porter Hypothesis, which suggests that "if properly designed, environmental regulations can lead to 'innovation offsets' that will not only improve environmental performance, but also partially—and sometimes more than fully—offset the additional cost of regulation."[21] The Porter Hypothesis has been described as having strong and weak forms: the weak form asserts that regulation often triggers innovation, especially in means of compliance, while the strong version asserts that the benefits that accrue to firms from this innovation often offset the costs they bear from regulation.[22] A recent review of empirical studies found consistent support for the weak version -- firms do respond to regulation by innovating -- but less clarity about the strong version.[23] While older studies tended to lean against it, several more recent studies, some of which took account of dynamic effects, favored it. Importantly,

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[20] *See, e.g.*, LUKE A. STEWART, THE IMPACT OF REGULATION ON INNOVATION IN THE UNITED STATES: A CROSS-INDUSTRY LITERATURE REVIEW (2010); Ambec *et al.*, 0 The Porter Hypothesis at 20: Can Environmental Regulation Enhance Innovation and Competitiveness? 1 (2013).

[21] Ambec et al, *supra* note 20, at 3-4; Michael E. Porter & Claas van der Linde, *Toward a New Conception of the Environment-Competitiveness Relationship*, 9 J. ECON. PERSP. 97 (1995).

[22] Ambec et al, *supra* note 20, at 5.

[23] Ambec et al, *supra* note 20, at 9-10.

the Porter Hypothesis and its tests do not address the net social welfare effects of regulation. Where the strong version of the Porter hypothesis holds, it is ordinarily plausible that the regulation is socially beneficial or overall (though one could imagine counter-examples). Even if the strong version does not hold, however, the regulation may be justified from a social perspective by creating social benefits to more than offset those costs.

One theoretical framework for analyzing the interplay between regulation and innovation comes from Richard Stewart's seminal 1981 article.[24] We discuss and critique Stewart's framework in some detail here[25] because it formed the basis for Tal Zarsky's 2015 paper on privacy regulation and innovation,[26] which, to our knowledge is the previous work closest to ours in its conceptual goals. Stewart's framework draws a distinction between "market innovation" and "social innovation." The article defined "market innovation" in terms of "new products and processes" that "increase productivity as measured by traditional national income accounting" or "create benefits that firms can capture through the sale of goods and services in the market." "Social innovation" was defined as "product or process innovations that create social benefits, such as cleaner air, that firms cannot directly capture through market sales." Stewart argued that regulations may adversely affect "market innovation" by imposing technical constraints, forcing firms to make expenditures to comply, creating ex ante uncertainty as to whether innovations will meet regulatory requirements, and introducing delay associated with determining whether new products and processes meet such requirements. He argued, by contrast, that "government, rather than the market, ordinarily must provide incentives for regulated firms to undertake investment necessary to generate social innovation" and critiqued command-and-control approaches to regulation for failing to successfully incentivize social innovation. The market/social innovation framework has been adopted by a number of later scholars.[27]

Tal Zarsky's 2015 article on privacy and innovation picks up Stewart's distinction between "market" and "social" innovation to assess five possible "perspectives": i) privacy enhances trust, which leads to online and virtual engagement, which leads to greater market innovation, which leads to greater social innovation; ii) privacy leads to greater creativity (enhancing human resources), which leads to greater market innovation, which leads to social innovation; iii) privacy leads to lower market barriers, which fosters competition, which leads to greater market innovation, which leads to social innovation; iv) privacy fosters market and social innovation, which leads to privacy-protective platforms; v) privacy leads to limited market innovation which leads to limited social innovation. Each of these perspectives hypothesizes a different possible relationship between privacy, "market

[24] Richard Stewart, Regulation, Innovation, and Administrative Law: A Conceptual Framework, 69 CALIF. L. REV. 1256 (1981).
[25] The bulk of Stewart's article is an extensive analysis of various factors bearing on and approaches to environmental regulatory design, which we do not discuss here.
[26] Tal Zarsky, *The Privacy—Innovation Conundrum*, 19 LEWIS & CLARK L. REV. 115 (2015).
[27] *See*, e.g., *id*.

innovation," and "social innovation" and Zarsky's article critiques them in turn. Zarsky's critiques raise a number of important issues that we pick up and discuss here and he makes many points with which we agree. Like us, he emphasizes the need for "in-depth policy discussions, examining what form of regulations must be introduced to enhance privacy , and what forms of innovation society is striving to achieve." Overall, though, Zarsky's assessment of privacy regulation is more skeptical than ours. In some places that greater skepticism appears to stem from implicit assumptions about what form privacy regulation must take. At times, we are of the view that he overstates the empirical evidence that existing privacy regulations have suppressed innovation. More important than our disagreements on these specifics however, we think Zarsky's treatment highlights problems with the attempt to distinguish "market innovation" from "social innovation," perhaps especially in the context of privacy regulation.

Though Stewart's distinction between "market innovation" and "social innovation" highlights important aspects of the relationship between innovation and regulation, we think that attempts to actually categorize innovations in this way or to judge a regulatory scheme in terms of its production of "social innovation," as Zarsky does, will be confusing and potentially misleading. As Stewart explicitly recognized, "[a] given innovation may confer both market and social benefits." This point tends to fall by the wayside in later analysis, but it is crucial because, in reality, nearly every innovation produced by market actors will have both "market" and "social" benefits.

Barring complete government subsidy, we cannot expect firms – who are creatures of the market, after all – to undertake any innovative activity unless they anticipate at least some market benefits. Thus, firms will never engage in purely "social" innovation. To induce firms to engage in this sort of innovation, a regulation must somehow create capturable benefits, thus transforming the innovation, at least in part, into a market innovation. On the flip side, while some purely market innovations may exist, the standard understanding is that innovation, by its very nature, is likely to create positive externalities or "spillovers."[28] And while intellectual property aims to allow innovators to capture enough returns to cover their costs, intellectual property rights are capped precisely so that downstream innovators (and society) can benefit from any remaining spillovers. The bottom line is that the vast majority of innovations produced by firms will create some benefits captured by firms *and* some benefits that spill over to society. Classifying them as either "market innovations" or "social innovations" is either impossible or meaningless.

[28] *See, e.g.*, Brett M. Frischmann and Mark A. Lemley, *Spillovers*, 100 COLUM. L. REV. 101 (2006); Liskow & Karpilov, "A common frame of reference for innovation scholars is what this Article calls "standard innovation spillovers," which are central to innovation policy but play little role in environmental policy. The best estimates suggest that the social returns to innovation greatly exceed their private returns. That is, because many aspects of invention are not patentable, innovators are unable to capture much of the return from their inventions. These large positive spillovers likely exist in any area of innovation. As a result, the amount of overall innovation in the economy will likely be insufficient absent government intervention."

Beyond this, the classification of innovations as "social" because they "create social benefits, such as cleaner air, that firms cannot directly capture through market sales" is inadequate if regulation is to be judged by whether the extent to which induces "social innovation" without suppressing "market innovation." The definition is problematic for several reasons. For one thing, producing "social innovation" is not the only defensible justification for regulation. Stewart's article describes the "basic justification for environmental, health, and safety regulation" as "preventing or reducing harmful spillovers or externalities such as pollution generated by producers and consumers in a market economy," while "social innovation" is essentially defined as innovation that reduces this sort of externality.

Regulations might be justified by other sorts of market failures, however, especially outside of the environmental arena. Collective action problems can hinder the achievement of positive social goals even when there are no negative externalities to counteract. Perhaps more controversially, but particularly importantly in the context of privacy regulation, regulations often aim to correcting market failures that are not naturally characterized in terms of externalities of any sort. Thus, consumer protection regulations are often designed to counteract information asymmetries and other problems that lead consumers to purchase goods and services that do not align with their actual preferences. A broader understanding of the sorts of innovation that regulation should induce is required.

Moreover, the goals of regulation can sometimes be met without any sort of "social innovation" by suppressing some sorts of innovation because of their negative externalities or other market failures. As Stewart's definition suggests, regulations often are designed to deal with negative externalities produced by market innovations. While it is certainly a societal bonus if such regulations also incentivize innovations that generate positive externalities, surely such socially positive innovation is not a requirement for a socially beneficial regulation. We will judge such a regulation primarily in terms of the way that it picks and chooses among "market innovation." A possible example from recent news reports is the 3D-printable handgun. We might decide as a society to use regulation to discourage innovations developed to improve the production of 3D-printable handguns. If we agreed on this goal, what would we consider in evaluating a specific proposal's effects on innovation? We might be concerned about collateral suppression of socially beneficial 3D printing innovations or socially beneficial innovations in gun design. But the regulation would be unlikely to fail simply because it achieved its goal by suppressing the "market innovation" associated with 3D-printable gun production or because it failed to produce any additional "social innovation."

Finally, the definition of "social innovation" in terms of benefits that firms cannot capture through market sales blurs the distinction between market failures that result from faulty demand signals and those that result from failures of appropriability related to competition among suppliers. The collective action problem that keeps citizens from pooling their money to pay for the installation of technology to improve air quality creates a mis-alignment between market demand signals and citizens' true preferences. Intellectual property law deals with another sort of market

failure entirely, caused by the possibility that a supplier who invests in developing such a technology will be undercut by market competitors who are spared the upfront investment.[29]

In the next Part, we present a framework for analyzing the interplay between regulation and innovation that takes a different approach. Rather than attempt to categorize innovations, we focus on how the market failures associated with mis-aligned demand signals and failures of appropriability affect the market's ability to induce socially beneficial innovation.

III. REGULATION AND INNOVATION: APPROACHING MARKET FAILURE FROM BOTH SIDES

The argument that regulation can "stifle" innovation is often made generically, with little analysis and in a contextual vacuum. To analyze whether (and when) to take it seriously, we start by unpacking what it might mean. We step back to consider the economic issues underlying theories of regulation and intellectual property law, which is fundamentally concerned with incentives for innovation. The social benefits ascribed to competitive markets depend on the assumption that consumer demand will induce suppliers to produce a socially beneficial portfolio of goods and services. The same assumptions underlie our reliance on markets to induce socially valuable innovation, since market investments in innovation also are premised on perceptions of consumer demand. Of course, these assumptions sometimes fail and that is where regulation[30] and intellectual property laws come in.

The portfolio of innovative activity induced by the market reflects the combined effects of two distinct forces: the market demand signals perceived by potential innovators and the extent to which those suppliers expect to be able to appropriate market returns from particular innovative activities.[31] We can describe these forces

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[29] This distinction might seem artificial, but it is not because markets solve a number of different informational and coordination problems, including not only "What do consumers want?" but also "Who will supply it?" The second question is particularly important for innovation, since it is difficult to predict in advance who will do the best job. There are, of course, non-market mechanisms for handling this issue (peer-reviewed grant funding, for example), but one reason for relying on intellectual property is that inventors identify themselves through their activities and are rewarded after the fact. Thus, while overcoming the demand-side collective action problem to collect the funds needed to pay for the clean air technology allows consumers to signal their demand, it does not tell them who should get the money. Relying on the competitive market to answer that question brings appropriability questions into play.

[30] The term "regulation" has both broad and narrow usages. Some have debated, for example, whether intellectual property should be deemed to be "regulation" or "property." Here we use "regulation" in this narrow sense, which we believe encompasses its most commonly understood meaning. Of course, regulations can be designed in many ways, some of which are sometimes called "demand-side," because they attempt to shift consumer demand, and others of which are sometimes called "supply-side" because they are targeted at suppliers. Our definition is focused on the source of the problem in socially sub-optimal perceived demand and is agnostic as to the best approach to regulatory design, which we presume will depend on specifics.

[31] There are, of course, other factors that influence the market's portfolio of innovative activities, perhaps most importantly the "state of the art" for a given technology, which affects the cost of

loosely as "what consumers are willing to pay" and "what suppliers are able to charge." If either of these forces is out of whack, markets will fail to produce socially optimal portfolios of innovative activity. Regulatory policy traditionally focuses on market failures that occur when market demand signals that are mis-aligned with individual or social preferences, while intellectual property doctrine focuses on what we call failures of appropriability, in which suppliers are able to charge either too much or too little to induce optimal investment in innovation.[32]

A. MIS-ALIGNED MARKET DEMAND SIGNALS

Reasons for mis-alignment between market demand signals and social welfare fall in roughly three categories: i) externalities and associated collective action problems; ii) failures to accurately express individual preferences because of information asymmetries, non-rational behaviors and transaction costs; and iii) mis-alignment with social values related to distributive concerns, treatment of minorities and ethical norms.[33] We describe each of these categories in a bit more detail below. As this list suggests, we take a broad view of ways in which markets can fail and a correspondingly broad view of appropriate sorts of justifications for regulation.

Our broad view of the sorts of demand problems that can justify regulation is contestable (and becomes more controversial as one goes down the list). The detailed contextual analysis that would be required to evaluate particular regulatory proposals must engage these controversies and normative debates. Our general arguments do not rely on our broad approach, however. Our general arguments require only two, in our view minimal, assumptions: First, we assume that market demand signals can fail, in that there can be a misalignment between true individual and social preferences and the demand expressed in market transactions. Second, we assume that government regulation can, at least in some instances, be designed and enacted to mitigate such misalignments. In other words, we assume that government regulation is not so hopelessly infected with public choice problems that the cure is inevitably worse than the disease.

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innovation. Neither regulation nor intellectual property affect these costs in the short run. In the long run, as recently explored by Liskow and Karpilov, there may be considerable path dependence, given that the spillovers of innovation tend to be most helpful in closely related innovation. This path dependence suggests an additional reason for attempting to align innovation incentives with social benefit.

[32] We also acknowledge that are various definitions of "demand failure," "demand-side regulation," "supply-side failure," "supply-side regulation" and the like in the economic and regulatory theory literatures. We have no quarrel with those usages, but for our purposes find it useful to parse things somewhat differently. We thus attempt to define our terms explicitly here to avoid confusion with these other usages.

[33] These categories are not entirely distinct and we do not claim they are comprehensive. They are simply illustrative.

1. Externalities and Associated Collective Action Problems

Most classically, market demand may fail to reflect social preferences because of externalities or collective action problems. These are related, but distinct issues. Externalities arise when those who are not party to an economic transaction are affected by it, either negatively or positively. Regulatory policy focuses on externalities that affect individual consumers. Environmental regulations, for example, classically address negative externality issues, such as when those living in the vicinity of a manufacturing plant are harmed by pollution, but have no market channel for expressing their preferences, since they are not customers of the plant. When negative externalities are large enough, the market will induce socially undesirable innovations. Conversely, if positive externalities are large enough, the willingness to pay expressed in the market might be insufficient to induce socially desirable innovations.

In principle, consumers affected by externalities might be able to overcome them by cooperating to pay suppliers to take them into account. For example, neighbors of a polluting factory could pay the factory to install air filters. Regulation commonly targets situations in which such cooperation does not occur or is very wasteful for various reasons including high transaction costs, consumer lack of information, strategic behavior (by either consumers or businesses) and so forth. Collective action problems are particularly likely to prevent effective responses to externalities because the affected individuals ordinarily are strangers to one another and to the business creating the externality. When negative externalities affect public goods, such as air quality, collective action problems are heightened by strategic dilemmas, because each individual has an incentive to wait for others to expend the effort required to solve the problem.

2. Distortions of Individual Preferences

Consumer purchasing behavior may also fail to reflect consumers' actual *individual* preferences, thus distorting the demand signals the market sends to suppliers. Reasons for such distortion include lack of information, cognitive biases, consumer myopia and even the declining marginal value of money. Health and safety regulation often respond to this sort of failure. Similarly, consumer protection regulation is often justified in terms of consumers' lack of information and expertise needed to assess important qualities of the products and services they buy or to evaluate the transaction terms. For example, regulations mandating labeling or other forms of information provision address this sort of issue, as do certification or licensing requirements, cooling off periods and many other approaches.

Collective action problems can also arise in circumstances that do not involve externalities whenever cooperation could reduce the transaction costs or information asymmetries associated with individual transactions; essentially, this can be the case when the measures needed to contend with these problems are at least partially non-rivalrous. In such cases, the issue is not externality -- individuals are not directly

affected by other parties' transactions. The point, instead, is that the costs of dealing with these individual issues could be reduced by spreading them. In essence, the idea is to kill two transaction cost birds with one stone.[34] If there is sufficient nonrivalry, cooperation could reduce transaction costs for each consumer enough to allow her to pursue her individual interests. Class action litigation is designed, at least in part, to overcome this sort of collective action problem, by allowing consumers to avoid duplicative costs associated with information gathering, discovery, etc.

3. Mis-alignment with Social and Ethical Values

Finally, market demand signals might fail to account for important social values relating to distributive effects, minority rights, and ethical norms. There are various reasons why markets might fail to account for such values. For one thing, these values often concern systemic effects that are not visible to individuals when they are transacting. If individuals cannot evaluate the impact of their transactions on systemic effects, their market behavior cannot express the value they place on those effects. For example, an individual consumer who values economic equality highly will find it difficult, if not impossible, to assess the distributive effects of her individual market transactions. The expression of such systemic values is also rife with collective action problems. Apart from these issues, most citizens of constitutional democracies would presumably agree that some questions (they might debate which ones) are appropriately decided by majority vote, rather than by market transactions, and that some rights (with the same caveat) are not defeasible even by majority vote. A free market for human body parts provides a good illustration: trading in human body parts has generally been deemed so morally unacceptable and likely to produce negative systemic effects that democracies have generally opted to prohibit it, despite the existence of market demand and despite controversy about its moral and systemic implications. These are the sorts of values we have in mind in this category of justifications for regulation.

B. FAILURES OF APPROPRIABILITY: WHAT SUPPLIERS CAN CHARGE

Re-aligning demand signals with social preferences is only one side of the story. Markets may fail to deliver the portfolio of goods and services that society demands if suppliers' ability to appropriate market returns varies significantly among goods and services. In such a situation, suppliers will shift production toward goods and services with relatively high appropriability and vice versa, thus distorting the market's portfolio of goods and services, even if demand signals are perfectly aligned with individual and social preferences. As a general rule, markets rely on competition to keep the appropriability landscape level.

[34] What is required is some degree of *nonrivalrousness* associated with the transaction costs. For example, certain pieces of information might be useful for many individuals in their distinct transactions with a supplier, even if the information must be deployed separately in each transaction and each individual cares only about the outcome of her own transaction.

Innovators can run into appropriability problems in competitive markets, however. In fact, appropriability failures, commonly described as "free rider problems," are the quintessential justification for intellectual property. Free rider problems arise because innovators often make upfront investments that competitors can avoid by copying. To recoup her investment through market return, an innovator needs to charge supra-competitive prices (at least for a while). If competitors can cheaply copy the innovation, however, they can afford to charge competitive prices, thereby "free riding" on the innovator's investment. To compete, innovators will be forced to lower their prices to a competitive level, but they may then be unable recoup their creative investments. Anticipating this free rider problem, potential innovators may be deterred from investing in innovative activities. When that occurs, the market's portfolio of goods and services is distorted away from innovative activity, even when there is demand for it.

Intellectual property law responds to the "free rider" problem by awarding exclusive rights to innovators, allowing them to charge supra-competitive prices during the term of IP protection. By charging supra-competitive prices, innovators can recoup their upfront investments. Moreover, since they can expect IP protection, they will no longer be deterred from innovation that responds to consumer demand. If all goes well, then, intellectual property will level out the appropriability landscape. IP exclusivity can create two sorts of social costs, however. First, it can overcompensate (or undercompensate) innovators if the length and breadth of the exclusive rights are not tailored to the innovator's upfront investment.[35] Second, exclusivity is a socially costly way to "reimburse" innovators,[36] because it restricts the innovative activities of follow-on innovators in a way that a simple re-payment would not.

Recognizing these dangers, intellectual property doctrine is designed (at least in its aspirations) to avoid awarding unnecessary exclusivity. For example, patent law's non-obviousness requirement can be understood as a mechanism to avoid awarding patents when natural first mover advantages would be sufficient to cover innovators' R&D costs.[37] Patent law's disclosure requirements cabin the restrictions on follow-on innovators. Copyright's fair use doctrine, particularly with its recent emphasis on "transformativeness," similarly limits the effects of exclusivity on

[35] It is commonly said that IP's supra-competitive prices impose socially costly deadweight losses even if they are tailored to the innovator's upfront cost. Someone presumably has to pay the costs of an innovation, however, and its consumers would seem to be the natural choice (though perhaps not only those who buy during the IP term). In any event, we focus on overly broad IP exclusivity, which is undoubtedly socially costly.

[36] Assuming, as we do, that competition, rather than monopoly, is the best driver of innovation.

[37] The nonobviousness requirement mandates that the difference between the invention and the previous innovative landscape ("prior art") is sufficient so that "a person having ordinary skill in the art to which the claimed invention pertains" would not deem it obvious. 35 U.S.C. § 103 (2012) ("A patent . . . may not be obtained . . . if the *differences* between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains.")

downstream creativity. Trade secrecy exclusivity is limited by permitting reverse engineering and independent invention.

For purposes of our discussion here, we can see IP doctrine as a mechanism for redressing certain failures of appropriability common to innovative activity. In a perfectly competitive market, the appropriability landscape is flat in the following sense: all competitors producing a given product or service face the same production costs and prices will be set to cover those costs, assuming there is sufficient consumer demand.[38] Thus, in a perfectly competitive market, the portfolio of goods and services produced by the market is determined only by the way that consumer demand relates to production costs. Without intellectual property, potential innovators do not see such a flat appropriability landscape, however, because free riding competitors can set prices too low to cover the innovator's R&D investments. Unless first mover advantages or other non-market rewards are sufficient to cover R&D investments, innovations inhabit troughs of under-compensation in the appropriability landscape. Even when consumer demand is sufficient to cover R&D costs, innovators will be unable to appropriate sufficient returns to cover them. Intellectual property doctrine is designed (again, aspirationally) to fill in those troughs through limited grants of market exclusivity, avoiding both over- and under-compensation to even out the landscape, so that market production will reflect consumer demand.

The intellectual property solution to appropriability failure has at least two important limitations. First, IP doctrine reflects an assumption that failures of appropriability affect wide swaths of goods and services in roughly the same way. It is thus designed to be neutral (for the most part) across its areas of applicability.[39] Doctrines such as patent law's "person having ordinary skill in the art," introduce some variability, but serve mostly as ways to determine whether IP exclusivity is necessary or to tailor its scope to the innovator's contribution. As a result, the exclusivity returns associated with IP awards are only roughly in line with R&D investments. Because tailoring IP awards precisely to R&D investment would be impractical and prohibitively costly, IP doctrine represents a balance between the costs and benefits of such tailoring. This means that, while IP fills in the large troughs created by free riding, the appropriability landscape inevitably remains somewhat rough, scattered with hillocks of over-compensation and hollows of under-compensation. Market innovators respond to the combination of demand signals and appropriability. A given demand portfolio highlights a particular landscape of hillocks and hollows. Regulation shifts the demand portfolio, highlighting somewhat different parts of the landscape with a somewhat different distribution of hillocks and hollows. If IP doctrine is well-designed, however, the hillocks and hollows it creates are reasonably small, and relatively uniform. Second, IP doctrine addresses only

[38] In the simplest model, price will be set at marginal cost. In the real world, production of goods and services also requires some fixed investments, which must be covered by revenue. These fixed investments ordinarily do not cause appropriability failures because they are roughly the same for all competitors.

[39] This is especially true of patent law, which applies nominally the same doctrinal rules to all technological arenas. Copyright recognizes more special cases, but nonetheless the basic rules governing scope and limitations apply to all types of "expression."

appropriability failures that are closely associated with innovation (basically, the free rider problem). If the market is affected by other sorts of appropriability failures that create regions of significant over- or under-compensation, IP will not address them.

In sum, intellectual property doctrines aim to roughly equalize appropriability along different innovative paths so that market demand and innovator ingenuity, rather than rent-seeking, determine the innovations that the market induces. intellectual property addresses a particular set of failures of appropriability that arise from the special characteristics of innovation – most importantly the "free rider problem" – by granting exclusive rights roughly designed to compensate innovators for their upfront investments. Its limiting doctrines seek to balance the social costs and benefits of exclusivity.

While the free rider problem that intellectual property is traditionally equipped to mitigate is that of free riding *by competitors*, in some contexts, innovators face the risk of free riding *by consumers.* The most important such context is broadcast media. Consumers free ride when they can take advantage of an innovation without paying for it because practicalities make it difficult or impossible for producers to identify users and demand payment. (This problem obviously affects not only the ability to recoup upfront creative investments, but the ability to collect revenue for more mundane operating costs.) Television and radio confronted just this problem, since it was essentially impossible to monitor and demand payment for consumption of content once it was broadcast into the ether. Even though copyright and patent rights apply to consumers in principle, intellectual property is often essentially unenforceable against them. Not only would IP enforcement often be difficult and expensive, but lawsuits targeted at personal uses and noncommercial infringements have proven only mildly successful, while tremendously damaging for businesses' reputation. The market-based solution that developed to address this type of supply side problem in the broadcast context was advertising-supported media: Advertisers were willing to pay in proportion to the crowd of "eyeballs" the broadcast attracted, thus providing an income stream that was roughly correlated with consumer demand for particular programming. In this sense, advertising income serves as a form of underwriting for creative investment, mitigating a failure of appropriability caused by consumer free riding.

Today, advertising's importance as a mechanism for addressing consumer free riding has substantially diminished since the emergence of cable and online content delivery mechanisms that can be metered, thus resolving the problem of making consumers pay for what the use. In the meantime, however, the advertising-based business model, particular combined with data-intensive ad targeting, has taken on a new life that is relatively unmoored from its origins as a solution to consumer free riding.

The market's portfolio of innovative activity might also be distorted by other sources of appropriability failures that are more contextual and less related to innovation per se. "Barriers to entry" are one such source of appropriability failure. "Barriers to entry," in traditional parlance, favor early entrants by imposing higher upfront costs on later market entrants. Here, we focus on natural barriers to entry,

rather than those created by anticompetitive behavior, which we leave to antitrust law.[40] One important mechanism for creating natural barriers to entry is the network effect, in which a product or service's value to each consumer depends not only on its quality, but also on the number of other consumers using it.[41] Think, for a classic example, of the telephone network, or, for a more current example, of a social media platform such as Facebook. The more users on the network, the more valuable the product is to each user and the harder it is for later entrants to offer attractive alternatives. As we will discuss in detail later, markets involving personal information are particularly likely to exhibit certain naturally-arising barriers to entry.[42]

For our purposes, barriers to entry are significant because they are an additional source of appropriability failures. Essentially, the prospect of benefitting from natural barriers to entry can create hills (or even mountains) in the appropriability landscape, making particular sorts of innovative activity overly attractive to suppliers (in relation to demand), while the need to compete with an incumbent who currently benefits from barriers to entry creates troughs in the appropriability landscape that make competitive follow-on innovation relatively less attractive, much like raising upfront costs or raising the quality bar.[43][44] In some circumstances, antitrust or competition law is used to reduce barriers to entry. When that is the case, these appropriability distortions will be modified and (one hopes) reduced.

From the perspective of a prospective innovator looking out over the appropriability landscape, it is the combination of effects that matters. While expected consumer demand is a prerequisite for market-induced innovation, the attractiveness of a given innovation path depends on whether an innovator expects to be able to recoup (or perhaps over-recoup) her investments using intellectual property, whether she anticipates taking advantage of barriers to entry such as network effects or having to overcome them, and so forth. Appropriability expectations for a given innovative activity can exhibit offsetting tendencies: the innovator may be at a disadvantage with respect to later entrants because of free riding, while at the same time benefitting from anticipated barriers to later entry,

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[40] There is a raging debate about the goals and proper role of antitrust (or, in more global terms, competition) law, which we make no attempt to engage here. *See* JONATHAN GALLOWAY ET AL., MODERN INTELLECTUAL PROPERTY LAW 20–21 (3d ed. 2010) (discussing the aims of competition law); *See, e.g.*, Philip C. Kissam, *Symposium: Antitrust Boycott Doctrine*, 69 IOWA L. REV. 1165, 1170 (1984) (discussing two primary purposes of antitrust law, one of which is to "preserv[e] opportunities for small businesses"). We also take no position on the question of how antitrust law should respond (if at all) to natural barriers to entry.

[41] *See* Mark A. Lemley & David McGowan, *Legal Implications of Network Economic Effects*, 86 CALIF. L. REV. 479, 483–84 (1998) (defining the "network effect").

[42] *See infra* part IV

[43] *See, e.g.*, J.H. Reichman, *Of Green Tulips and Legal Kudzu: Repackaging Rights in Subpantentable Innovation*, 53 VAND. L. REV. 1743, 1769 (2000) (explaining how patent law can raise the bar for follow-on innovators).

[44] See generally David L. White, Shaping Antitrust Enforcement: Greater Emphasis on Barriers to Entry, 1989 BYU L. REV. 823, 823 (1989).

such as network effects. Or appropriability failures can be compounded if over-protective intellectual property protection combines with an expectation of benefitting from barriers to entry.

In this Article, our focus is on the *interaction between regulation and innovation*, rather than on how best to design intellectual property law and competition law to deal with appropriability failures. We therefore take those areas of doctrine as given and discuss how regulation's re-alignment of demand combines with the appropriability landscape to change the market's portfolio of innovative activity.

C. REGULATION AND INNOVATION: EFFECTS OF RE-ALIGNED DEMAND

We break our consideration of the likely effects of regulation on innovation – and the extent to which regulation is likely to "stifle" innovation -- into two parts. In this section, we consider direct effects from regulation's re-alignment of demand signals. Section D considers regulation's potential effects on innovation through its interactions with appropriability failures.

1. Direct Effects of Re-Aligned Demand

The goal of regulation is to re-align the market's portfolio of demand along more socially desirable lines. Because the market's innovative activity is responsive to market demand, one obvious result of regulation is likely to be a shift in the market's portfolio of innovative activity. We first consider the impact of a regulation that is well-designed, in the sense that it shifts perceived demand closer to social preferences and does so at a cost that does not outweigh the benefits of that re-alignment. A well-designed regulation is highly likely to reduce perceived demand for – and thus dampen -- some sorts of innovative activity and increase demand for – and thus accelerate -- others.[45] Indeed, motivating innovation in socially promising directions not induced by unregulated market demand is a primary purpose of various regulatory programs, including certain types of tax deductions and tax credits.[46] For example, CAFÉ regulations decreased demand for innovations in gas-guzzling vehicles while increasing demand for innovations in energy efficient automotive technology.[47] Regulations capping emissions from coal plants presumably reduce effective demand for innovations relating to high emission plants, while increasing effective demand for low-emission technology. These effects on the *distribution* of innovative activity are likely to create winners and losers. While losers may complain that the regulation "stifles" innovation, such intended shifts are

[45] Suzanne Scotchmer, *Cap-and-Trade, Emissions Taxes, and Innovation*, 11 INNOVATION POL'Y & ECON. 29, 49 (2011) (concluding that "[a]ny regulatory policy that imposes financial burdens for emitting carbon also creates an incentive to invest in carbon-reducing technologies").
[46] *See* Jacob Nussim & Anat Sorek, *Theorizing Tax Incentives for Innovation*, 36 VA. TAX REV. 25, 34–35 (2017) (giving a brief background on the use of taxes to encourage innovation).
[47] Joseph M. Crabb & Daniel K.N. Johnson, Fueling Innovation: *The Impact of Oil Prices and CAFÉ Standards on Energy-Efficient Automotive Technology*, 31 ENERGY J. 199 (2010).

not "stifling" in any socially meaningful sense. Thus, the mere fact that a regulation dampens innovative activities is not evidence that it is "stifling" innovation – indeed, it may indicate that the regulation is working.

Moreover, as the Porter hypothesis suggests for environmental regulation, it is entirely possible that, by shifting innovative activity to more socially beneficial paths, regulation may stimulate innovation and thus economic growth over the long term. As already mentioned, the Porter hypothesis remains controversial but has received considerable empirical support.[48] Indeed, its "weak" form, which simply argues that regulation can open up new innovation paths, is strongly supported.[49] Gains in fuel efficiency motivated by the CAFÉ rules are one example of such regulation-driven innovation.[50] The development of the electric car industry is another: electric cars are becoming increasingly popular, even in the face of low gas prices, partly due to regulation at the federal level and in the nine states that have adopted zero-emission plans.[51]

Of course, innovation is path dependent, unpredictable and cumulative,[52] so one might worry that re-alignments of demand that seem like a good idea now might turn out badly in the long run. Should one refrain from regulation for fear of deterring innovation that, while appearing to have low social value now, would lead to unexpectedly high social value innovation in the future? To begin with, a regulation's potential for suppressing high social value innovation in the long run must always be weighed against the long-term social costs of the unregulated demand portfolio's mis-alignment with social value. When a regulation's expected impact on the social value of future innovation can be predicted and assessed, that impact should, of course, be considered in deciding whether and how to regulate.[53] Some of

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[48] Michael Porter, *America's Green Strategy*, 264 SCI. AM. 168 (1991). The success of the hypothesis depends significantly on the context. For empirical support of the hypothesis see, e.g., Antoine Dechezleprêtre & Misato Sato, *The Impacts of Environmental Regulations on Competitiveness*, 11 REV. ENVTL. ECON. & POL'Y 183 (2017); Yana Rubashkina, Marzio Galeotti, & Elena Verdolini, *Environmental Regulation and Competitiveness: Empirical Evidence on the Porter Hypothesis from European Manufacturing Sectors*, 83 ENERGY POL'Y 288 (2015); and Shunsuke Managi et. al., *Environmental Regulations and Technological Change in the Offshore Oil and Gas Industry: Rethinking the Porter Hypothesis*, 81 LAND ECON. 303 (2005). See also Suzanne Scotchmer, *Cap-and-Trade, Emissions Taxes, and Innovation*, 11 INNOVATION POL'Y & ECON. 29, 49 (2011) (concluding that "[a]ny regulatory policy that imposes financial burdens for emitting carbon also creates an incentive to invest in carbon-reducing technologies").

[50] *See, e.g.*, Crabb & Johnson, *supra* note 47.

[51] Farhad Manjoo, *Trump Says Regulations Impede. Perhaps Not in the Electric Car Business*, N.Y. TIMES (March 22, 2017), https://www.nytimes.com/2017/03/22/technology/electric-car-regulations-trump.html. There are many other examples of regulation-driven innovation, as we show in our discussion of COPPA and the GDPR.

[52] This is what Zachary Liscow and Quentin Karpilow have termed "Innovation Snowballing." *See* Zachary Liscow & Quentin Karpilow, *Innovation Snowballing and Climate Law*, 95 WASH. U. L. REV. 387 (2017) (citing the work of Daron Acemoglu who pioneered the economic research on innovation snowballing).

[53] For many, the approach of choice will be some version of cost-benefit analysis. *Cf.* Exec.Order No. 12,866 58 Fed. Reg. 51735 (Oct. 4, 1993). Here, we remain intentionally agnostic as to the best

our current uncertainty about the ultimate social value of pursuing particular innovative paths arises from the risk of failure. As Liskow & Karpilov have argued, this risk is path dependent and that path dependence itself increases the benefit of regulation that re-aligns innovative activity with social preferences. Finally, if the argument is that innovation is truly unpredictable and serendipitous, so that its long-term social value cannot be usefully assessed as part of our evaluation of regulatory design,[54] then the argument proves too much. Who, then, can say whether the unregulated or regulated demand portfolio will elicit the most socially beneficial innovation in the long run?

So far, we have focused on well-designed regulation. In regulation, as in many areas of life, however, there is "many a slip between cup and lip." A regulatory process can fail in many ways: by being "captured" by improper influences,[55] by incorrectly identifying failures of perceived demand, by inaccurately assessing and predicting the costs and benefits of a given regulatory design, by not considering the best design, and so forth. Sometimes the benefits of even the best practical regulatory design for addressing a particular failure may be outweighed by its costs. Vulnerabilities in regulatory processes exist notwithstanding the strength of the underlying justification for regulation, and choices of regulatory design have been a source of a years-long scholarly debate in virtually all regulatory arenas.

Badly-designed regulation could unintentionally shift demand signals in socially undesirable directions. If that happens, it might be sensible to speak of "stifling" innovation, even if the shift simply re-directs innovative activity. While this is a real concern, the mere possibility of error cannot be an automatic deal breaker when unregulated demand signals are significantly mis-aligned with social value. The lesson, instead, is that regulatory design is a serious matter, to be undertaken with care.

2. Reduction in "Total" Innovative Activity

The contention that regulation will stifle innovation is most naturally understood to mean that regulation causes the total "amount" of innovative activity to decrease. Measuring, or even defining, the "amount" of innovation that is occurring, much less how any such "amount" of innovation is affected by regulation, is notoriously difficult, both conceptually and empirically.[56] Here, we forge on

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approach to evaluating whether a particular regulation will re-align demand signals in a socially beneficial way. The point is simply that the possible long-term social value of an innovative activity should be included in the evaluation of regulatory design to the extent it is possible to do so.

[54] One way to view this distinction is through the lens of "risk" versus "uncertainty." FRANK H. KNIGHT, RISK, UNCERTAINTY AND PROFIT (1921).

[55] See, e.g., William W. Bratton & Joseph A. McCahery, *Regulatory Competition, Regulatory Capture, and Corporate Self Regulation*, 73 N.C. L. Rev. 1861 (1995).

[56] Scholarly attempts to empirically test the relationship between regulation and innovation include Avi Goldfarb & Catherine Tucker, *Privacy and Innovation*, 12 INNOVATION POL'Y & ECON. 65, 84–86 (2012).; Nathan Goldschlag & Alex Tabarrok, *Is Regulation to Blame for the Decline in American Entrepreneurship?* 33 ECON. POL'Y 5 (2018); Joseph M. Crabb & Daniel K.N. Johnson, *Fueling*

nonetheless, presuming we can find some meaningful metric for the total "amount" of innovation. We first consider whether and how well-designed regulation could decrease total innovation and then discuss how the potentially for regulatory design error affects the picture.

A regulation that is well-designed to align the demand portfolio closer to actual individual and social preferences might nonetheless result in "less" innovation overall by some metric. Possibly, the socially preferable demand portfolio is simply less geared toward innovative activity. Of course, there is widespread belief that "innovation," is socially beneficial, so perhaps this is an unlikely result of a well-designed regulation. Nonetheless, innovation is not a trump card, outweighing the value of all other uses of social resources. It is thus possible that the unregulated demand portfolio incentivizes too much innovative activity overall, from a social perspective.[57] In that situation, a well-designed regulation would reduce the total "amount" of innovation, but because such reduction brings the amount of innovative activity to a socially optimal level, it seems unreasonable to characterize the regulation as "stifling." Of course, as already discussed, a particular regulation can be badly designed. A badly-designed regulation might get the trade-offs wrong, thereby "stifling" innovation overall.

Another global argument that regulation will stifle innovation points to regulatory compliance costs or transaction costs, implying that these costs will reduce the resources available for innovation. Regulatory compliance undoubtedly does create transaction costs, which in general are wasteful and decrease the total resources available to society. Well-designed regulation would minimize such costs as much as possible and take them into account in deciding whether the regulatory game is worth the candle. But, in any event, compliance costs, whether or not minimized through regulatory design, will not necessarily reduce investments in *innovative activity* even in the regulated sector, much less overall. Reduced innovative activity in the regulated sector is likely only when i) compliance costs are borne by the regulated sector, rather than spread throughout society; and ii) are targeted so as to make innovation in that sector less attractive to investors.

Whether compliance costs are borne by the regulated sector is a matter of regulatory design. Compliance costs commonly are borne by regulated entities – sometimes for convenience and sometimes as a regulatory tool – but can, in principle, be spread through various mechanisms such as tax rebates. Even when compliance costs are concentrated on the regulated sector, they need not make *innovation* in that

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Innovation: The Impact of Oil Prices and CAFÉ Standards on Energy-Efficient Automotive Technology, 31 ENERGY J. 199 (2010).; Managi et. al., *Environmental Regulations and Technological Change in the Offshore Oil and Gas Industry: Rethinking the Porter Hypothesis*, 81 LAND ECON. 303 (2005); and many others. None, to date, has conclusively showed that regulation has generated innovation-stifling effects.

[57] The question of whether "overall" innovation is reduced depends, of course, on the metric one uses. But one possible sense is which well-designed regulation might reduce overall innovation might be to shift demand away from relatively "easy" (and thus immediately productive) innovative paths with low-hanging fruit toward more socially valuable, but more difficult (and thus less productive in the short term), paths.

sector a less attractive investment. Some compliance costs, such as the costs of some sorts of paperwork, training, monitoring and reporting, are borne by regulated entities, but not in proportion to their *innovative activity*. Such general increases in the cost of doing business might, but need not, reduce the budget for innovative activity. Money is fungible, while innovation isn't. To the extent that a particular innovative activity remains a good business proposition, investors should continue to be willing to support it. And, of course, regulation can motivate innovations aimed at reducing compliance and transaction costs.[58]

Thus, only a sub-set of compliance costs are likely to depress innovative activity in a regulated sector: those that are i) imposed on innovators in proportion to their innovative activity, ii) not avoidable by compliance innovation; and iii) not recoupable via first mover advantages or intellectual property. Intellectual property is not generally designed with regulatory compliance costs in mind (with pharmaceutical regulatory costs as a major exception),[59] so a regulation that creates *this sort of compliance costs* might, on average and depending on how large the costs are, depress overall innovative activity in a regulated sector. Even when compliance costs make innovative activity in a regulated sector less attractive, however, there is no particular reason to anticipate that there will be less innovation *overall*, since investments can be shifted from one sector to another. Indeed, oftentimes, that's the intended purpose of the regulation. Regulation can be badly designed, such as by imposing unnecessarily high compliance costs, perhaps of the sort that can depress innovative activity in the regulated sector. Even in such a case, however, the outcome seems more likely to be a shift of innovative activity, rather than an overall decrease.

In sum, the above analysis, though highly stylized, rebuts the sweeping contention that "regulation" will "stifle" innovation either through its direct effects on market demand signals or by imposing compliance costs. A regulation's likely effects on innovation depend on its details and overall stifling seems like a fairly peripheral concern. Claims about regulation-induced stifling also fail to consider the stifling effects of non-regulation in a market that is infested with various failures. Indeed, Cassandra-like and generalized hand-wringing about innovation-stifling distracts attention from more specific – and more important -- questions of regulatory design relating to the socially desirable re-direction of innovative activity.

D. THE INTERPLAY BETWEEN FAILURES OF APPROPRIABILITY AND RE-ALIGNMENT OF DEMAND

We now turn to the possible interplay between regulation's re-alignment of demand and failures of appropriability. As we have emphasized, the market's

[58] Winston Harrington, Richard D. Morgenstern, & Peter Nelson, *On the Accuracy of Regulatory Cost Estimates*, 19 J. OF POL'Y ANALYSIS & MGMT. 297, 309-10 (2000).

[59] The influence of pharmaceutical regulatory costs on patent law is both explicit (*see e.g.*, Drug Price Competition and Patent Term Restoration Act of 1984 (Hatch-Waxman Act) Pub. L. No. 98-417, 98 Stat. 1585 (1984) (codified as amended in title 21 of the U.S.C.) and, arguably, implicit in the way that various general doctrines are interpreted in that arena.

portfolio of innovative activity reflects the combination of demand signals with appropriability expectations. By re-aligning demand signals, regulation necessarily shifts the way that demand interacts with appropriability to induce the portfolio of innovation that the market ultimately produces. In essence, the regulated and unregulated demand portfolios draw innovators' attention to different parts of the appropriability landscape, which might have different terrains. In principle, the shift to a different appropriability terrain can increase or diminish the regulation's expected social benefits or leave them more or less unchanged. At the extreme, even a regulation that re-aligns demand signals perfectly with social preferences could combine with an unfavorable appropriability terrain to induce a portfolio of market innovation that is *worse* from a social perspective.

One could, in principle, argue that regulatory design should routinely try to take specific account of such variations in appropriability terrain. This seems like a fools' errand in the run-of-the-mill case. When variations in the appropriability landscape are not too large and are distributed reasonably uniformly, the parts of the appropriability landscape highlighted by regulated and unregulated demand portfolios are likely to be similarly over- and under-compensatory. As discussed above, we ordinarily rely on intellectual property doctrine to smooth out the appropriability landscape in just this way.[60] As IP doctrine has developed to balance the costs of taking account of details with the benefits of smoothing out the appropriability terrain, IP law seems the appropriate place to focus general debates about whether closer tailoring is appropriate. As a result, regulatory design can often proceed (and usually does) without paying much attention to failures of appropriability. This is true even if the regulatory design itself is imperfect: when the appropriability landscape is roughly level, mistakes in re-aligning demand are not expected to be correlated with failures of appropriability.

Moreover, there is ordinarily no reason to expect that regulation will change the market's overall balance of over- and under-compensation in any systematic or significant way. In most contexts, intellectual property will be roughly equally effective (or flawed) for both regulated and unregulated demand portfolios. This is especially likely when, regulated and unregulated innovation are of the same technological ilk, as is often the case. Consider, for example, regulations requiring child-resistant packaging for medications and household chemicals. Those

[60] Competition law arguably has a similar role with respect to barriers to entry, though this is an area of contention. *See* JAY MODRALL, A CLOSER LOOK AT COMPETITION LAW AND DATA, 5-6 (2017) ("According to the Franco/German Study, in markets for which access to a large volume or variety of data is important, the need for such data may result in entry barriers when new entrants are unable either to collect or buy access to the same kind of data. . . . On the other hand, the Franco/German Study notes (in a footnote) that big data can also reduce entry barriers, for instance when data can be used by new entrants to identify and satisfy consumer needs."); Daniel L. Rubinfeld & Michal S. Gal, *Access Barriers to Big Data*, 59 ARIZ. L REV. 339, 342 (2017); David L. White, *Shaping Antitrust Enforcement: Greater Emphasis on Barriers to Entry*, 1989 BYU L. REV. 842, 850 (1989) ("[E]ntry barriers are only one of many factors accepted by the courts in demonstration of attempted monopolization. . . . [A]ntitrust principles are most sensibly constructed when promoting conditions favorable to easy entry and exit"). To the extent that competition law succeeds in removing barriers to entry, this point also applies to it.

regulations surely shift demand for innovation away from easy-opening packaging and toward child-resistant packaging. Or suppose an environmental regulation shifts demand away from gas guzzlers and toward fuel efficient vehicles. Presumptively, easy-opening and child-resistant packaging innovations are similarly protectable with intellectual property, as are gas guzzling and fuel-efficient innovations. Any differences between the relevant appropriability landscapes are unlikely to be any more severe or systematic than the differences in appropriability that we routinely tolerate under IP doctrine. Or consider R&D tax credits, which stimulate innovative activity by reducing its cost, but do not affect the appropriability of returns from successful R&D, which is determined by standard intellectual property doctrine. In these run-of-the-mill contexts, it thus makes sense for regulators to leave appropriability questions to intellectual property (and, to some extent, competition) law. That is, in fact, the standard practice.

In some regulatory contexts, however, demand shifts are correlated significantly and systematically with appropriability failures, undercutting the separability assumption. Here we give a few relevant examples of how such correlations can have either positive (in the sense that addressing aligning demand signals with social value systematically mitigates appropriability failure) or negative (in the sense that aligning demand signals with social value systematically exacerbates appropriability failure) effects on the overall social value of market innovation.

Traditional network effects, such as those associated with telephone networks, simultaneously create value for consumers and barriers to entry that deter competitive or follow-on innovation and can lock consumers into less preferable technologies.[61] One way to mitigate appropriability failures in such contexts is to break up networks. Such an approach would simultaneously reduce the network's value to consumers. When there is this sort of negative correlation, regulatory design should account for tradeoffs between appropriability and demand. In fact, regulatory design in arenas characterized by strong network effects commonly attempts to take these tradeoffs into account explicitly, preserving network benefits for consumers as much as possible, while decreasing barriers to competitive and follow-on innovation. Regulatory approaches of this sort include technological standards, interconnection requirements and so forth.

Correlation between demand and appropriability can also produce socially desirable side effects, however. For example, an environmental regulation aimed at encouraging the use of alternative energy sources might increase market demand for solar panels and decrease demand for electricity produced by coal plants. Though the

[61] *See* SEAN HOWELL, BIG DATA AND MONOPOLIZATION 4 (2018) ("[D]ata-driven markets tend to feature strong network effects and economies of scale, which create barriers to entry that other firms may have a hard time overcoming."); JENS PRUFER & CHRISTOPH SCHOTTMULLER, COMPETING WITH BIG DATA 2, 15 (2017); Joseph Farrell, *Coordination and Lock-In: Competition with Switching Costs and Network Effects*, 3 HANDBOOK INDUS. ORG. 1967, 2034 (2007) ("[E]arly choices are powerful, able either to help coordination or to wield disproportionate influence. Thus any early lead in adoptions (whether strategic or accidental) will tend to expand rather than to dissipate. Network markets are "tippy": early instability and later lock-in.").

direct effects of this shift in demand may have been the regulation's only intended effect, its ultimate impact would also reflect systematic differences in the extent to which solar panel innovation and coal plant innovation are susceptible to appropriability failures. Thus, if supplying electricity over power lines from power plants creates barriers to entry, but supplying electricity using solar panels does not, electricity markets might become somewhat less infected with appropriability failures once the regulation is in place.

Another example from the broadcast media context discussed earlier illustrates how correlations between demand and appropriability can produce either positive or negative side effects, depending on contextual specifics and regulatory details. As discussed above, the advertising-supported business model was created at least partly in response to gaps in intellectual property law's response to customer free rider problems. While this business model addresses those free rider problems, it simultaneously creates mis-alignment between market demand for programming content and social preferences. Suppose that a regulation is designed to re-align broadcast programming content more closely with individual and social preferences by creating barriers to advertiser influence on content. The re-aligned demand portfolio will presumably be less favorable to advertisers, thus offering smaller returns on investment in content creation. The market's ultimate production of broadcast programming will reflect both the intended demand re-alignment and this appropriability side effect. The overall result of the regulation could be either socially salutary or socially detrimental. For example, if the unregulated advertising-based business model tended to over-compensate content creators for their upfront costs, the regulation might simultaneously improve the market's satisfaction of consumer and social preferences and mitigate appropriability failures – a win-win result. On the other hand, the regulation might reduce advertising revenue so much that investments in creating socially desirable content would be under-compensated – an overall social loss. Or, the result might be somewhere in between, with the overall evaluation of the regulation dependent on whether the advantages of better alignment with social preferences outweighed loss of investment in creating socially valuable content. The point is that when correlations of this sort materialize, one cannot presume separability.

It is also possible, as discussed above, that regulatory compliance costs are correlated with the intensity of innovative activity. When that is the case, regulation effectively raises the upfront cost of innovation, potentially upsetting intellectual property's effectiveness in smoothing out the appropriability landscape. Pharmaceutical regulation arguably imposes this sort of compliance costs.[62] The studies required to meet FDA safety and efficacy standards create high compliance

[62] *See* Ron A. Bouchard et al, *The Pas De Deux of Pharmaceutical Regulation and Innovation: Who's Leading Whom?*, 24 CALIF. L. REV. 1461, 1461 (2009) (arguing that "recent regulatory efforts designed to encourage the development of new and innovative drugs through the provision of strong patent and "linkage" rights, which legally tie drug patenting and drug approval, have in fact had the opposite effect."); Lacy G. Thomas, *Regulation and Firm Size: FDA Impacts on Innovation*, 21 RAND J. ECON. 497 (1990).

costs that are i) tacked on to the upfront costs of drug innovation and (arguably) ii) not accounted for by intellectual property doctrine.[63] In response to this concern, Congress enacted a complex of regulatory "fixes," including, a period of "data exclusivity."[64] During the data exclusivity period, innovators have an exclusive right to rely on the safety and efficacy data they have submitted to the FDA, preventing generic companies from "free riding" on it.[65] Pharmaceutical regulation is probably unusual in having such large innovator-specific compliance costs and there is also debate about whether patent exclusivity truly fails to cover pharmaceutical companies' investments.[66] Again the point is simply to illustrate the kinds of situations in which regulatory design and evaluation should take account of appropriability effects.

IV. PERSONAL INFORMATION AND MIS-ALIGNED MARKET DEMAND SIGNALS

Some who argue that privacy regulation will "stifle" innovation may simply be skeptical that there really are significant market failures regarding the flow and use of personal information. If these skeptics are correct, there is no justification for regulation in the first instance.[67] In this view, the so-called "privacy paradox" between consumers' self-reported positions valuing privacy and their real-world acceptance of the information disclosure practices of the products and services they use reflects the weaknesses of survey evidence. [68] The failure of a market to produce a good when consumers simply *say* they want it, but are not willing to pay for it, is not evidence of market failure.[69] Surveys elicit consumer preferences under

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[63] *See* Thomas, *supra* note 62, at 501 (finding that FDA enforcement of premarket testing significantly hurt both firms producing generic or imitative products and small firms, whereas large firms had the resources to work with the "super-experts" who would conduct the required studies by the FDA).

[64] *See* C. Scott Hemphill & Mark A. Lemley, *Earning Exclusivity: Generic Drug Incentives and the Hatch-Waxman Act*, 77 ANTITRUST L.J. 947, 947 (2011).

[65] *Id.*

[66] *See* Maxwell R. Morgan, *Regulation of Innovation Under Follow-On Biologics Legislation: FDA Exclusivity as an Efficient Incentive Mechanism*, 11 COLUM. SCI. & TECH. L. REV. 93, 97 (2010) ("There is an ongoing debate as to whether such FDA exclusivity is a necessary mechanism to prevent erosion of incentives.").

[67] Some early economic accounts of privacy took a decidedly hostile view of privacy, based on the idea that efficient markets depend on the free flow of information and that privacy was essentially a mechanism by which individuals could engage in rent-seeking based on asymmetric information. Richard Posner, *The Right of Privacy*, 12 GA. L. REV. 393 (1978) (applying the Coase theorem); Ronald Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1, 16 (1960). Note, however, that the Coase theorem applies only in a world devoid of transaction costs, an assumption that Coase himself did not take to be true.

[68] *See, e.g.*, Caleb Fuller, *How Consumers Value Digital Privacy: New Survey Evidence*, GEO. MASON U.: PROGRAM ON ECON. & PRIVACY (Feb. 20, 2018), https://pep.gmu.edu/wp-content/uploads/sites/28/2018/02/Fuller_How-Consumers-Value-Digital-Privacy.pdf.

[69] *Id.*; *see also* Robert W. Hahn & Anne Layne-Farrar, *Is More Government Regulation Needed to Promote E-Commerce*?, 35 CONN. L. REV. 195 (2002) (noting in the context of online shopping that

circumstances that do not compel them to heed the costs of their choices.[70] Outside the comfort zone of the theoretical survey, the costs of exercising a preference for non-disclosure become apparent and rational consumers may simply be unwilling to pay them.[71] Opponents of privacy regulation also point out that, when consumers do care enough about privacy to take action, the market responds. Companies respond to the demand for greater privacy protection by changing their privacy policies and opting in to other self-regulation.[72] Businesses may choose to limit their collection practices and keep consumer data secure in order to avoid negative publicity or to distinguish themselves from their competitors by their strict data policies.[73]

Clearly, we disagree with this sanguine view of the market's treatment of personal information. We do not attempt a fulsome exposition of this debate here, but simply summarize some of the sources of mis-aligned demand signals regarding personal information flow that have been identified in previous literature.[74] One need not accept all of these arguments, or agree with our broad understanding of market failure, to conclude that there is a prima facie basis for some kind of information privacy regulation. Reasons to anticipate significant mis-alignment between market demand signals and socially preferable personal information flow fall into all three of the categories identified in Part III, in addition to a category of what we call "aggregation failures" that combines aspects of the others. Overall, there are very good reasons to doubt the existence of a functioning "market" in which consumers "pay" for goods and services with personal information.[75]

Before delving into the discussion of reasons to expect market failure, we set the stage by describing just some of the ways in which businesses collect personal information. The sort of data collection that concerns us here most often occurs as a by-product of providing some sort of service. (At least, data collection is a by-product from the perspective of the individual. It is quite often the primary purpose from the business's perspective.) Sometimes the service is a means for communication (such as phone service or a social media platform) with other individuals. The business gains access to any personal information that is communicated as a side effect. Sometimes information is disclosed intentionally to a service provider for one purpose (e.g. "This is what I want to buy; here's my credit card information; please send it to me at this address."), but after collecting it, the business re-purposes it for additional uses. Sometimes the information is in some sense "created" by the service provider

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"[t]here is no evidence that any e-commerce has been deterred. Absent evidence of a significant market failure, the case for further government intervention is weak at best").

[70] *Id.*; *see also* Solveig Singleton, *Privacy Versus the First Amendment: A Skeptical Approach*, 11 FORDHAM INTELL. PROP. MEDIA & ENT. 97, 147 (2000).

[71] Id.

[72] Id.

[73] James P. Nehf, *Recognizing the Societal Value in Information Privacy*, 78 WASH L. REV. 1, 19 (2003).

[74] These categories are used for expositive clarity, though we are aware that they often overlap.

[75] Katherine J. Strandburg, *Free Fall: The Online Market's Consumer Preference Disconnect*, 2013 U. CHI. LEGAL F. 95, 107. *See also* Kenneth C. Laudon, *Markets and Privacy*, 39 COMM. ACM 92, 97 (1996) ("In a perfect world characterized by perfect information . . . In this most felicitous world of 19th-century economic thought, symmetry of information among market participants—capitalists, laborers, and consumers—is the lubricant of social and economic progress.").

by observing and analyzing the individual's behavior (e.g. webpages visited, times of heavy energy use, channels watched on the smart TV). More and more data are now collected by the "Internet of [Smart] Things" including TVs, cellphones, electric meters, Alexas, Roombas, security systems, toys and dolls. The information is often merged from different sources and can be used to infer information that individuals never intended to share, such as sexual orientation or political views.[76]

Uses of the collected data vary widely, including such things as targeting ads, coupons and discounts to evaluating creditworthiness, employability or insurance risk. Some data collectors sell their data to others, others (usually big players such as Google or Facebook) keep it for their own use. Whether or not they sell their own data, many businesses that use personal data purchase additional data to supplement what they collect themselves. Businesses also share data with the government, sometimes volunteering it, sometimes selling it and sometimes turning it over only in response to legal process. More and more often, data is aggregated, both across a given individual's activities and across many individuals to be used in some sort of predictive modeling. Privacy concerns associated with all of this data flow include identity theft and other consequences of data breach ranging from embarrassment to fraud, sexual harassment and stalking. Price discrimination is another potential issue, along with other forms of discrimination and bias (intentional and unintentional) based on factors such as race, religion, gender, genetics, health status, political views, arrest history and economic class, one's friends' characteristics or behavior, or particular lapses in judgment or "sins of the past."

With this quick reminder of the breadth of personal information collection, we now turn to our review of how market demand tends to get mis-aligned with individual and social preferences.

A. Collective Action Problems in Responding to Externalities

Information collection and use practices have been long blamed for imposing negative externalities on the subjects of the information.[77] In this section, we confine our discussion of externalities to effects on individuals that arise from *other people's* use of personal information-collecting goods and services.[78] (The affected individuals

[76] Michal Kosinski, David Stillwell, and Thore Graepel, *Private Traits and Attributes Are Predictable from Digital Records of Human Behavior*, 110 PROC. NAT'L ACAD. SCI. 5802 (2013).

[77] *Laudon, supra* note 75, at 93 (arguing that the massive scope of information collection is not justified on practical grounds and the businesses' use of the information is wasteful and inefficient); Robert W. Hahn & Anne Layne-Farrar, *The Benefits and Costs of Online Privacy Legislation* (AEI-Brookings Joint Ctr. for Regulatory Studies, Working Paper No. 01-14, 2001), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=292649; Nehf, *supra* note 73, at 79–80; Pamela Samuelson, *Privacy as Intellectual Property*?, 52 STAN. L. REV. 1125, 1132–33 (2000); PETER SWIRE & ROBERT LITAN, NONE OF YOUR BUSINESS 7–8 (Brookings Institution Press 1998).

[78] A looser understanding of externalities might also encompass effects that arise from flows of personal information that are not taken account of or anticipated by individuals in their own transactions with commercial entities. We discuss those issues in the next section relating to the market's failure to accurately reflect individual preferences.

may or may not also be users of the goods and services, who also are subject to the direct effects that we discuss in the next section.) Such externalities are likely because personal information, by its nature, often pertains to more than one individual. Today, in addition, predictive analytics models that have important consequences for individuals might be derived entirely from other people's data. Sometimes, these predictive models amount explicitly to "characteristic – if not guilt – by association," making inferences about individuals based on their family members or friends. The "Internet of Things" introduces another source of externalities when information is collected about the behavior of individuals who do not own the "smart" thing, but nevertheless interact with it (perhaps even unwittingly). Businesses that rely on collecting and using personal information benefit from these externalities and are insufficiently incentivized to account for them in their behavior: "just as factories have no reason to refrain from filling the air with pollutants, these companies will not hesitate to collect, use, and flood the market with detailed, personal information."[7980]

The emerging signaling economy creates another source of externalities. When consumers are given a menu of options about whether and what personal information to disclose, their choices can come to act as signals, especially in information asymmetry ecosystems.[81] If most individuals choose to disclose information except when they have "something to hide," businesses may begin to assume the worst about those consumers who simply have a taste for privacy or have other justifications for preferring nondisclosure (to avoid discrimination, perhaps, or to avoid leaking information to potential abusers or stalkers).[82] As a result, individuals who refuse to disclose might face new forms of economic discrimination.[83] In this sort of scenario, consumers would face a Hobson's choice between the risks of disclosure and the economic penalties of non-disclosure.

Perhaps the most important source of negative externalities for consumers is the prevalence of the advertising-based business model among personal-information-based companies, now being partly supplemented by a predictive analytics-based business model. In a traditional two-sided market, intermediaries (oftentimes referred to as "two-sided platforms") concurrently respond to the preferences of two

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[79] Dennis D. Hirsch, Protecting the Inner Environment: What Privacy Regulation Can Learn from Environmental Law, 61 GA. L. REV. 1, 28-29 (2006); see also A. Michael, Froomkin, Regulating Mass Surveillance as Privacy Pollution: Learning from Environmental Impact Statements, 2015 U. ILL. L. REV. 1713, 1729 (2015) [hereinafter "Froomkin, Regulating Mass Surveillance"].

[80] Hirsch, *supra* note 79, at 28–29. Hirsch continues to describe the failure in terms of tragedy of the commons, where collection-driven businesses "receive all the benefits of their use of personal information but share the cost (in terms of the erosion of trust) with all others who depend on individuals to provide personal information on the Web." *Id.*

[81] Scott R. Peppet, *Unraveling Privacy: The Personal Prospectus and the Threat of a Full-Disclosure Future*, 105 NW. U. L. REV. 1153, 1156 (2011).

[82] *Id.* at 1176.

[83] *Id.* For a real-life example of such effect, see Nizan Geslevich-Packin & Yafit Lev-Aretz, *On Social Credit and The Right to Be Unnetworked*, 2016 COLUM. BUS. L. REV. 339, 372-82..

groups, lowering the cost of transactions between them.[84] As one of us has demonstrated elsewhere, while the dominant advertising-supported business model shares some features with a typical two-sided market intermediary, the majority of these businesses tie advertising from a group of sellers with an "associated good" such as relevant content, search results, or social networking services.[85] And because, more often than not, the consumer is interested in the associated good, and not in the advertising, the ad-supported business model does not act simply to reduce transaction costs for the two parties, but also leads to a distorted demand signal that reflects only preferences for the "bundle", rather than disaggregated preferences for the advertising and the associated good.[86]

Essentially, consumer preferences regarding the features of these goods and services – including their personal information practices – are filtered through the preferences of advertisers. The advertising-based business model distorts demand signals because there is an unavoidable mismatch between unfiltered consumer preferences and advertisers' goals. Certainly, advertisers seek to attract eyeballs, and thus are somewhat sensitive to consumer preferences. Ultimately, however, advertisers strive to bolster sales of their own products and will support only those creative efforts that further that goal. Perhaps because advertising-supported products have been viewed as essentially free to consumers, critiques of advertising-supported media have tended to focus on (undoubtedly important) concerns with fairness and bias, rather than on the more mundane failure of advertising-supported products to accurately reflect consumer preferences *for those products*. When companies offer targeted advertising based on personal information, demand signals are likely to be skewed toward products and services that are optimized to collect personal information.

These negative externalities are associated with collective action problems. Collective action problems arise for the usual sorts of reasons that have been well-explored in other contexts.[87] These reasons include the high transaction costs of coordination between "strangers" who are not directly involved in a transaction, particular high information costs experienced by such outsiders, A critical mass problem exists whenever consumers mobilize for the sake of greater privacy

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[84] Katherine J. Strandburg, Free Fall: The Online Market's Consumer Preference Disconnect, 2013 U. CHI. LEGAL F. 95, 113.

[85] *Id*.

[86] *Id.* at 113–116. For a different example of two-sided market in the context of information privacy, see Hal R. Varian, Economic Aspects of Personal Privacy (Dec. 6, 1996) (unpublished manuscript), http://people.ischool.berkeley.edu/~hal/Papers/privacy/ (discusses a sale of a mailing list as a form of externality, noting that "[e]ven though the first two parties in the transaction—the individual who may want to buy something, and the seller who may want to sell him something—have incentives that are more or less aligned, the transaction between the original owner of the mailing list and those to whom it is sold do not have such well-aligned incentives").

[87] Mancur Olson argued that large groups sometimes induce a powerful incentive for members to free ride on the efforts of the others, because each member can only make a small contribution to the whole. MANCUR OLSON, THE LOGIC OF COLLECTIVE ACTION: PUBLIC GOODS AND THE THEORY OF GROUPS 16 (2d prtg. 1971).

protection.[88] In the privacy arena, collective action problems are exacerbated by the distortions of individual preferences discussed in the next section.

Collective action problems associated with network effects can also prevent consumers from expressing their preferences regarding platform technology and features. Network effects arise from positive externalities, in which each consumers' utility from using a certain good or service increases as additional consumers use the same good or service.[89] Goods exhibiting network effects depart from rules of supply and demand where it is the shortage of a good that increases its value.[90] The more common the use of a good with network effects, the higher its value. Network effects are common in communications industries. Many personal-information-based businesses, including social networks, such as Facebook and Twitter, demonstrate clear network effects, given that the appeal of a social network depends on the number of existing users.[91] While network effects are due to positive externalities between users, they can generate market failures in which consumers become "stuck" in sub-optimal equilibria regarding the technology or features of goods and services. In principle, users can transfer the positive externalities of network effects from one supplier to another simply by moving their business. Consumers' ability to do this in practice is undermined by a classic collective action problem: to maintain the positive externalities produced by network effects when they move to a different product or service, consumers would have to switch en masse.

In addition, the nature of online activity means that privacy policies generally are stipulated in adhesion terms, which do not leave room for individual negotiation.[92] Since offering individually negotiated terms for treatment of personal information would be impractical and costly, changes in a company's privacy policies generally apply to everyone. This situation effectively turns contract negotiation into a public good, creating a classic collective action dilemma. As long as no single individual has sufficient incentives to bear the high costs of renegotiating privacy policies, cooperation is essential. Collective action problems are heightened in the online environment, where users tend to be strangers to one another. Privacy advocacy organizations can help to overcome these collective action problems, but certainly do not eliminate them.

B. Distortions of Individual Preferences

Here we describe some of the ways in which markets may fail to reflect consumers' actual individual preferences regarding the treatment of their personal

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[88] Paul M. Schwartz, *Property, Privacy, and Personal Data*, 117 HARV. L. REV. 2055, 2079 (2004).
[89] Mark A. Lemley & David McGowan, *Legal Implications of Network Economic Effects*, 86 CALIF. L. REV. 479, 483 (1998)
[90] David Easley & Jon Kleinberg, Networks, Crowds, and Markets: Reasoning About a Highly Connected World 455 (2010)
[91] Maurice E. Stucke & Ariel Ezrachi, *When Competition Fails to Optimize Quality: A Look at Search Engines*, 18 YALE J. L. & TECH. 70, 82 (2016).
[92] Neil Weinstock Netanel, Cyberspace Self-Governance: A Skeptical View from Liberal Democratic Theory, 88 CALIF. L. REV. 395, 437–38 (2000).

data, independently (for the most part) of the externality and collective action problems Some of the issues we discuss here arise from strategic behavior on the part of businesses seeking to collect and use the information, while others are simply inherent to the nature of information, its flow and its aggregation as well as human cognitive weaknesses. The taxonomy is not critical to our point, which is simply that there are many likely sources of such failures in markets involving personal information.

1. Lack of Information, Information Asymmetries and Myopia

The efficiency and presumptive social benefit of market transactions in personal information depends on the assumption that consumers' decisions to share such information are made in fully informed conditions and thus reflect their true preferences.[93] When consumers lack significant relevant information or cannot meaningfully process the information they have, this basis for relying on the market loses much of its power. Information imbalances may stem from misrepresentation, concealment of information, or arise when information is too costly to uncover.[94] Not all information asymmetries lead to market failure – markets fail only when the information disproportion skews parties' negotiations and affects the transactions that actually occur.[95]

Here, however, access to relevant information is highly asymmetric between collectors of personal information and the subjects of that information. Companies' practices of data collection and, even more, of data use are largely opaque to consumers. Notwithstanding the existence of privacy policies purporting to inform users of information practices, consent to disclosure is largely meaningless.[96] Even to the extent information is provided in privacy policies, users face extremely high transaction costs of obtaining, reading, and understanding those notices.[97] Privacy policies are often vague, too complicated to be understood by an average user, and liable to be changed at any time, sometimes without notice.[98]

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[93] Shaun B. Spencer, *Reasonable Expectations and the Erosion of Privacy*, 39 SAN DIEGO L. REV. 843, 892 (2002)

[94] Robin Paul Malloy, Law in a Market Context: An Introduction to Market Concepts in Legal Reasoning 171–72 (2004)

[95] Paul M. Schwartz, Privacy and the Economics of Personal Health Care Information, 76 TEX. L. REV. 1, 24 (1997).

[96] James Grimmelmann, *Saving Facebook*, 94 IOWA L. REV. 1137, 1181–82 (2009); Julie E. Cohen, *Privacy, Ideology, and Technology: A Response to Jeffrey Rosen*, 89 GEO. L.J. 2029, 2041 (2001) (showing how current consent models harm users' privacy rights without offering sufficient information or true control).

[97] Katherine J. Strandburg, *Free Fall: The Online Market's Consumer Preference Disconnect*, 2013 U. CHI. LEGAL F. 95.Also, except in the rare instance when a major breach is widely reported, cybersecurity concerns are also not entirely obvious to users. *Id.* at 146 ("Information about data security comes to consumers only episodically, when breaches make news. Moreover, data breach notification tells users little or nothing about the potential for bad acts by rogue company insiders.").

[98] Id.

Companies have incentives to design privacy policies so as to discourage consumers from reading them and to obfuscate practices that consumers are likely to dislike. These incentives arise not simply for the sorts of collateral reasons common in consumer markets, e.g. companies wanting to protect themselves from liability or to obscure some undesirable features of the product. Here, the collection and use of personal information is often the major, if not the only, ultimate business objective. Companies simply do not want to respond to consumer preferences that would lessen the flow.

Even when consumers are generally mindful that information about them is being collected, they still have little idea about how much of it is retained and for how long, with whom it is shared, for what purposes it is used, and how the sharing or use affects them.[99] Thus, consumers cannot effectively assess the costs of information collection at the time of collection, and are unable to express their preferences when making information-related decisions.[100] With generally little awareness of data-sharing activities, individuals cannot appropriately estimate potential injuries and protect themselves against them.[101] Because it is difficult, and sometimes impossible, to trace harmful personal information flows to particular sources, the market often does not produce usual information about the past behavior of particular companies to inform consumer's decisions.[102]

Consumers' are also likely to have difficulty expressing their true preferences in transactions involving personal data collection because of the absence of a salient exchange transaction, or "point of purchase."[103] In common sales transactions, consumers can estimate their disutility from whatever payment they are making by relying on extensive market experience.[104] Data collection ostensibly substitutes for payments for various nominally "free" products and services. But personal information is not money. It is virtually impossible for a consumer to "price" the expected disutilities that will stem from such data collections, because they are not predetermined, and almost entirely dependent on future uses or misuses of the data.[105] User data is "credence payment" collected at intervals, and users are lacking knowledge as to most aspects of it, including, particularly, the cost over time.[106]

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[99] *Id.* at 2080.[What are these IDs referring to, if not the Strandburg piece?] *See also* Strandburg, *supra* note 42, at 143 ("[P]rivacy policies often disclose the fact that consumer information collected by one online entity is shared with other entities, without providing specifics about to whom disclosure is made, from whom information is obtained, and for what purposes information from different sources is combined.").

[100] Strandburg, *supra* note 97, at 144.

[101] James P. Nehf, Recognizing the Societal Value in Information Privacy, 78 WASH L. REV. 1, 20 (2003).

[102] *Id.* at 28. *See also* Strandburg, *supra* note 97, at 148 ("[I]t is often difficult, if not impossible, even in retrospect, to trace any particular disutility caused by data access to any particular data disclosure.").

[103] *Id.* at 150–52.

[104] *Id.*

[105] *Id.*

[106] *Id.* at 131–32 .

The effects of inadequate information and information processing capacity are exacerbated by commonly observed cognitive limitations that have been identified in the field of behavioral economics. These cognitive limitations push against the very basic assumption of market theories - that humans are rational actors making rational decisions to maximize utility in the face of uncertainty.[107] These effects can cause consumers' purchasing activity to fail to reflect their true long-term preferences. Behavioral economics suggests, for example, that human beings systematically suffer from difficulties in assessing risk.[108] Specifically, humans fail to accurately estimate the expected costs of low probability, high cost harms – often precisely the kind of disutility that data collection produces.[109] Individuals' bounded capacity for information processing and bounded rationality seem particularly likely to be at play in their assessments of transactions in which personal information is disclosed. Indeed, studies show that at the zero-price point, where information-services exchanges often take place, individuals react irrationally, overly zealous to purchase goods at zero price while ignoring potential dis-utilities.[110]

2. High Transaction Costs and Lock-in Effects

Transaction costs are pervasive, and unavoidable to some extent, in personal information (and other) markets. To the extent that transaction costs are unavoidable, and not imposed strategically by one party to a transaction, they do not result in market failures. An individual's true preferences sensibly incorporate such unavoidable costs of doing business. In some situations, however, transaction costs distort demand signals in ways that could potentially be remedied by information privacy regulation.

Currently, for example, the transaction costs incurred in understanding and agreeing to the terms of service and privacy policies of most information-collecting businesses are prohibitive, especially in light of the frequent changes to privacy policies.[111] High transaction costs also prevent consumers from negotiating for better

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[107] Melvin Aron Eisenberg, *The Limits of Cognition and the Limits of Contract*, 47 STAN. L. REV. 211, 213 (1995); Alessandro Acquisti & Jens Grossklags, *Privacy and Rationality: A Survey, in* PRIVACY AND TECHNOLOGIES OF IDENTITY: A CROSS-DISCIPLINARY CONVERSATION 15, 16 (Katherine J. Strandburg & Daniela Stan Raicu eds., 2006).

[108] Cass R. Sunstein, *The Storrs Lectures: Behavioral Economics and Paternalism*, 122 YALE L.J. 1826, 1842–52 (2013).

[109] Katherine J. Strandburg, *Free Fall: The Online Market's Consumer Preference Disconnect*, 2013 U. CHI. LEGAL F. 95, 149

[110] Kristina Shampanier, Nina Mazar, & Dan Ariely, *Zero as a Special Price: The True Value of Free Products,* 26 MARKETING SCI. 742, 743 (2007).

[111] Aleecia M. McDonald & Lorrie Faith Cranor, *The Cost of Reading Privacy Policies*, 4 I/S: J. L. & POL'Y FOR INFO. SOC'Y 543, 565–68 (2008); Daniel J. Solove, *Privacy Self-Management and the Consent Dilemma*, 126 HARV. L. REV. 1879, 1880 (2013); Jonathan A. Obar & Anne Oeldorf-Hirsch, The Biggest Lie on the Internet: Ignoring the Privacy Policies and Terms of Service Policies of Social Networking Services (Aug. 24, 2016) (unpublished manuscript), http://ssrn.com/abstract=2757465 (74% of surveyed participants failed to read agreement in which the terms stipulated the handing out their first-born child to the company); Victoria L. Schwartz, *Corporate Privacy Failures Start at the*

terms or looking for other market solutions and further exacerbate information processing problems.[112] In these circumstances, high transaction costs benefit businesses, which in turn lack market incentives to figure out ways to lower those costs and better inform consumers of risks associated with information collection and use.[113] Privacy regulation has the potential to shift the default so as to lower transaction costs, shift them onto the businesses that are best able to determine how to minimize them and thus facilitate better expression of consumer preferences in the market.

Transaction costs also contribute to lock-in effects that can inhibit consumers from expressing their preferences by shifting from one supplier, product or service to another. Some switching costs are unavoidable for products and services that involve a learning curve, but commentators have argued that transaction costs are sometimes used strategically by personal-information-based businesses to exacerbate these unavoidable switching costs.[114] Information-intensive businesses often lure people into a lock-in either by showcasing robust privacy practices[115] or by offering a "free" product/service.[116] In what some have called a "privacy lurch," services later trade privacy protection for profit making, shifting towards weaker privacy safeguards after users have already invested their time, energy, and social capital in the service,[117] making it costly for various reasons for them to switch. Alternatively, and more commonly, companies offer a nominally "free" product or service under deficient privacy terms that users do not take adequately into account for reasons already discussed. Over time, users become locked in to the product for various reasons, including the costs of recovering or recreating data that would be lost if they attempted to move to an alternative provider.[118] Some such businesses, most notably Facebook, have used their access to personal information, along with their ability to experiment with and manipulate their users' experiences, to conduct research arguably used to design their platforms to create psychological lock-in effects akin to (or perhaps equivalent to) psychological addiction.[119]

Top, 57 B.C. L. REV. 1693, 1709–10 (2016) ("[M]any corporations change privacy policies frequently, making it harder for even the most diligent consumers to keep up with all the changes to these contracts of adhesion.").

[112] Froomkin, *Regulating Mass Surveillance*, 2015 U. ILL. L. REV. 1713, 1733, 1735.

[113] Jared S. Livingston, Invasion Contracts: The Privacy Implications of Terms of Use Agreements in the Online Social Media Setting, 21 ALB. L.J. SCI. & TECH. 591, 633 (2011).

[114] Chris Jay Hoofnagle & Jan Whittington, *Free: Accounting for the Costs of the Internet's Most Popular Price,* 61 UCLA L. REV. 606, 640 (2014)

[115] Paul Ohm, *Branding Privacy*, 97 MINN. L. REV. 907, 909, 922 (2013).

[116] Hoofnagle & Whittington, *supra* note 114, at 643–44.

[117] Ohm, *supra* note 115, at 909.

[118] Hoofnagle & Whittington, *supra* note 114, at 643-44; *see also* Gabriela Zanfir, *The Right to Data Portability in the Context of the EU Data Protection Reform*, 2 INT'L DATA PRIVACY L. 149, 152 (2012).

[119] See, e.g., Hoofnagle & Whittington, *supra* note 114 at 610 ("[I]nefficiencies rise as advertising and marketing activities become increasingly intrusive, gradually changing the value exchanged by the consumer for the service. Such costs include lock-in."). The lock-in effects created by transaction costs are distinct from network effects, though both can be present in the same situation. Consider, for example, the choice between using a Mac computer and using a PC. At one time, documents created on PCs could not be easily read by Macs (and vice versa). That situation created a network effect: the

Lock-in effects can distort demand signals by obscuring consumers' true preferences. In addition to preventing suppliers from getting an accurate "read" on consumer preferences, lock-in effects create barriers to entry that can cause appropriability failures, as discussed further below.[120]

3. Collective Action Problems Related to Transaction Costs and Lock-in Effects

As already discussed in Part III, transaction costs can create collective action problems even without externalities as long as reducing the transaction costs enough to make switching attractive requires nonrivalrous measures, such as the discovery or production of information, that are too expensive for each individual to undertake independently. In the privacy arena, much of the information about company practices that individual consumers cannot afford to ferret out or process adequately is nonrivalrous, thus adding to the collective action problems associated with externalities.

C. Mis-Alignment with Social Values

Like all markets, personal-information-based markets can fail to account adequately for certain kinds of social values. Indeed, personal information flow is perhaps a classic example of this category. The collection, aggregation and use of personal information is likely to have major systemic effects on society, particularly when such information is aggregated and used in predictive fashion as discussed in the next section or when it can be used to facilitate government surveillance. These effects lead to a broader spectrum of failures relating to non-utilitarian distributive and ethical values that many, including us, believe can provide convincing justifications for regulation.[121]

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advantage of using a PC grew in proportion to the number of one's friends or colleagues who were PC users (and vice versa). For example, when one of us[119] switched careers from physics to law, she went from a context dominated by Mac users to one dominated by PC users. As a Mac user in the legal world, she felt the loss of network benefits quite keenly, but did not immediately switch to a PC. Why? Because of the transaction costs of switching from one system to the other, including buying a new computer, learning a new operating system, etc. Those transaction costs created lock-in effects that competed with network benefits of switching. (Eventually, the network benefits won out.) Nowadays, transferring files between PCs and Macs is pretty seamless; that network effect has nearly disappeared. Switching costs have also gone down as the two operating systems have become more similar, but they are still non-trivial.

[120] *Id.*; *see also* James Grimmelmann, *Saving Facebook*, 94 IOWA L. REV. 1137, 1192 (2009) ("When users can't easily carry their digital identities with them from one site to another, it's much harder for new entrants to compete with an entrenched incumbent.").

[121] See Paul M. Schwartz, *Internet Privacy and the State*, 32 CONN. L. REV. 815, 834 (2000) (arguing that privacy is essential to the creation and maintenance of both individuals and society, and without it individuals cannot adequately participate in a democratic collective); Julie E. Cohen, *Examined Lives: Informational Privacy and the Subject as Object*, 52 STAN. L. REV. 1373, 1424 (2000) (arguing

These systemic social effects are not only hard to assess at the level of individual transactions, but, as public goods, are especially susceptible to collective action problems. Privacy also invokes the sorts of ethical dilemmas that many believe should be resolved democratically, along with issues of constitutional rights (especially for disfavored minorities).

D. How Aggregation Effects Exacerbate Failures in Personal Information Markets

In this section, we discuss the particularly profound implications for market failure that stem from the way that personal information can be aggregated to infer additional personal information. Information aggregation combines and exacerbates the effects of many of the market failure mechanisms discussed in the previous three sections. The aggregative quality of information makes the market failure associated with personal information particularly resistant to consumer self-help efforts and simple fixes; taking it into account is critical to effective regulatory design.

The basic observation is that personal data, when aggregated -- across individuals, across sources and across time – becomes more than the sum of its parts. When personal data is aggregated, it can be synthesized to make inferences, create generalizations, and draw conclusions. More and more, this synthesis is performed computationally and its inputs, methodologies and outputs are kept secret by personal-information-based businesses. Many businesses also supplement the information they collect from their customers or users by aggregating it with data purchasing additional data from online markets and data brokers.[122] The aggregative qualities of personal information make it harder to fix the market failures discussed in the previous three sections.

For example, one common regulatory response to information asymmetry is information disclosure. Indeed, disclosure of company information practices, combined with an opportunity for informed consent, is a primary requirement of most privacy regulations in the U.S. and abroad.[123] Such transparency is desirable, but ultimately insufficient because of the effects of data aggregation. Even if a company informs consumers what information it collects directly and what other sources of information it uses (far more than is disclosed in the typical privacy policy), it remains extremely difficult, if not impossible, for users of personal-information-based products and services to assess the marginal disutility of any given instance of personal data collection and account for it in their market behavior. When information is aggregated (and, often, cross-referenced and "enhanced" with

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that to construct a self, individuals need personal autonomy with "insulation from outside scrutiny." This autonomy holds benefits not only to the individual but also to society), and DANIEL J. SOLOVE, UNDERSTANDING PRIVACY 92 (2008) ("Privacy protects aspects of individuality that have a high social value; it protects individuals not merely for their sake but for the sake of society.")

[122] This practice is known as "appending" or "enhancing" data. Hoofnagle & Whittington, *supra* note 114 at 646-47.

[123] *See Data Protection Laws of the World*, DLA PIPER, https://www.dlapiperdataprotection.com (last visited Sept. 9, 2018 6:08 PM).

information obtained from other sources, such as data brokers) companies can infer personal details that were not directly disclosed, often with a high level of accuracy. Without access to the algorithms that companies use to make inferences about aggregated personal data, consumers cannot predict what a business might infer about them when any given "piece" of personal information is aggregated with other data that is currently in the business's possession. Certainly, they cannot assess the inferences that a company might make by aggregating it with data that might come into the company's hands in the future. The likely consequences of agreeing, at a given time, to a particular sort of data collection are thus, at a minimum, unreasonably expensive to game out and likely unpredictable.[124] As a result, users' market behavior is highly unlikely to reflect meaningful privacy choices.[125]

If consumers evaluate information collection at its independent marginal disutility in terms of privacy loss, without accounting for aggregation effects, they are guaranteed to assign a lower value to the data than collectors, who value the information when aggregated with other data.[126] Under this valuation distortion, individuals will always agree to sell personal information at a price collectors always agree to pay, effectively generating substantial over-disclosure.[127] But taking aggregation into account in assessing marginal disutility is essentially impossible:

> "To determine marginal disutility, an Internet user must have information about how the incremental data collected in association with the particular activity changes the overall availability of information about her in the online ecosystem. Not only that, she must be able to connect that increment in available information to an increment in expected disutility. This is essentially an impossible task."[128]

Moreover, aggregation compounds the significant difficulty that consumers face in tracing privacy harms to particular businesses or particular information disclosures. Aggregation thus exacerbates the effects of cognitive myopia, making it even more unlikely that consumers will take sufficient account of potential future harms.[129]

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[124] Froomkin, *Regulating Mass Surveillance*, 2015 U. ILL. L. REV. 1713, 1732

[125] Jan Whittington & Chris Jay Hoofnagle, *Unpacking Privacy's Price*, 90 N.C. L. REV. 1327, 1359–61 (2012).

[126] A. Michael Froomkin, *The Death of Privacy?*, 52 STAN L. REV. 1461, 1503–04 (2000) [hereinafter "Froomkin, *Death of Privacy*"] That is true even if they do not know the specifics of how the information might be aggregated with other data and what will be the exact value – they still know that the value of the data is likely to increase.

[127] *Id*.

[128] Katherine J. Strandburg, *Free Fall: The Online Market's Consumer Preference Disconnect*, 2013 U. CHI. LEGAL F. 95,147–48 .

[129] *See* Froomkin, *supra* note 126 at 1502-04.,

Data aggregation also exacerbates the externalities associated with disclosing personal information, since it makes easier for a company to draw inferences and make predictions about individuals even when they have chosen not to disclose certain information to that company.[130] For example, one individual's disclosure of information about herself may be used to infer information about others in her network, who chose not to disclose that information.[131] That indirectly revealed information can then be added to profiles, either enhancing or initiating them.[132]

While businesses also confront uncertainty about the magnitude of the value they will be able to extract by collecting and aggregating personal information, they can ordinarily expect that aggregation will be worth their while, particularly because of the low cost of data collection and storage. This asymmetry of expectations gives businesses strong incentives to engage in more collection and use of personal information than consumers would prefer.[133] Indeed, many companies are incentivized to collect and retain as much personal data as possible simply because it might come in handy someday.[134] The likelihood that personal-information-based markets will fail to align with individual and social preferences is increased because business models in this sector commonly aim to use aggregated personal information for purposes that do not focus on satisfying consumer preferences. Such purposes include ad targeting, selling personal data, selling predictive models based on personal data or manipulating consumers. As the trope goes, "you're not the customer, you're the product."

Perhaps most importantly, the interconnectedness of personal information makes it essentially pointless for consumers to try to express their privacy preferences by picking and choosing among businesses based on their use of personal information. To illustrate the point, we borrow from a hypothetical example one of us has explored elsewhere:

Abby is considering whether to visit an ad-supported online travel site, such as Trip Advisor (tripadvisor.com) or to subscribe to a hypothetical paid alternative, Travel Without Tracking (TWT.com). To decide whether it is worth switching, Abby must estimate her expected disutility from TripAdvisor's data collection. … [A]fter reading the TripAdvisor privacy policy, Abby is even more eager to avoid data collection. … Before subscribing to TWT.com, though, Abby decides she should figure out how much difference paying for TWT rather than using TripAdvisor would make to the aggregate data available about her online. She thinks about the types of data

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[130] Mark MacCarthy, *New Directions in Privacy: Disclosure, Unfairness, and Externalities*, 6 I/S: J. L. & POL'Y FOR INFO. SOC'Y 425 (2011).
[131] *Id.* at 449; *see also* Nizan Geslevich-Packin & Yafit Lev-Aretz, *On Social Credit and The Right to Be Unnetworked*, 2016 COLUM. BUS. L. REV. 339.
[132] *Id.* at 449–50.
[133] Strandburg, *supra* note 128, at 150.
[134] Companies adopt some risks by doing this, since large stores of personal information are honeypots for hackers and data breaches can have some reputational cost. The ubiquity of these practices, along with the very effects discussed in the section, make it difficult for consumers to credibly threaten market punishments for such breaches however.

that could be collected from her activities on TripAdvisor, which include information about potential vacation spots, the kinds of activities that interest her, the types of hotels she is interested in, her prospective dates of travel, and so forth. She then thinks about whether that information could be collected from her online activities away from TripAdvisor. She soon realizes that most of the information is also reflected in her Google searches, visits to hotel and airline web sites, email exchanges with friends, visits to websites related to the activities that she wishes to pursue while traveling, and so forth. … She also realizes that her past visits to Tripadvisor.com have already revealed considerable information about her that will remain available in the online ecosystem even if she switches to TWT.com. She begins to think that there may be no point in paying for TWT.com if she cannot make comparable moves everywhere online. As a final check, she consults with some of her friends about TWT.com and reads some online reviews. The reviews praise TWT's no-data-collection approach and its technology. However, they agree that, at this point, TWT just cannot compete with TripAdvisor, given TripAdvisor's existing trove of user-generated travel information and active user base. The reviewers thus advise a "wait-and-see" approach. Abby's friends reinforce her feeling that switching would be futile. … Some are skeptical that TWT will even abide by its promises not to collect and exploit data for advertising purposes. "How would you even know?" one asks. … Mostly, they think, "There is no real way to avoid online data collection, so why waste the money?" In light of all of this, Abby decides not to subscribe to TWT.com. Moreover, the next time she hears about a paid alternative to one of the online products and services she uses she remembers all the time she wasted trying to figure out whether to switch to TWT and ignores it.

As this vignette illustrates, the nature of personal information collection today belies the notion that consumers can make meaningful market trade-offs based on the benefits and potential privacy costs of particular goods and services is illusory.[135] Market failures essentially leave consumers with only three real choices (and the efficacy of the third is questionable):

1. Go more or less "all in" for the online experience …
2. Withdraw significantly or completely from online activities in order to protect their privacy, or
3. Attempt to deploy drastic and time-consuming technical measures, such as encryption and Tor.[136]

Finally, we note that aggregation also heightens the likelihood that markets will fail to account for important social and ethical values. The aggregation and synthesis of personal information across many sources and for a wide variety of purposes also creates just the sorts of systemic effects, implications for economic

[135] An additional implication of trying to opt out of data collection would be the possibility of being profiled as a criminal. See Janet Vertesi, *My Experiment Opting Out of Big Data Made Me Look Like a Criminal*, TIME, May 1, 2014 at http://time.com/83200/privacy-internet-big-data-opt-out/.
[136] Strandburg, *supra* note 128, at 164–65.

distribution and potential for deleterious effects on minority groups that market transactions fail to take into account. As our hypothetical illustrates, the systemic adoption of the "free", advertising-based business model for some sorts of products and services has made it difficult, if not impossible, for either individual users or individual companies to opt for another approach.[137] Another systemic effect arises from the influence of ubiquitous personal information tracking on the technological design of the Internet and other infrastructure.[138]

In sum, there are numerous reasons to anticipate significant and widespread mis-alignment between expressed demand and individual and societal preferences regarding the collection, flow and use of personal information. The resulting market failures are likely to lead to a depressed personal information "price," to over-investment in the supply of surveillance and collection technologies, and to under-investment in privacy enhancing technologies ('PET') and technologies that improve expression of privacy preferences.[139] Most importantly for present purposes, we believe that the cumulative effect of the sources of mis-aligned demand signals discussed in this Part provide a strong prima facie justification for information privacy regulation.

V. FAILURES OF APPROPRIABILITY IN PERSONAL-INFORMATION-BASED MARKETS

Having reviewed some of the ways in which mis-aligned demand can create failures in the market for personal-information-based products and services, we now turn to failures of appropriability. We describe the sorts of failures of appropriability that are likely to arise in personal-information-based markets, taking account of the corrections provided by standard intellectual property doctrines. We argue that trade secrecy's standard limiting doctrines tend to be ineffective in personal-information-based markets, creating systematic tendencies toward excessive exclusivity and thus over-compensation for some personal-information-based innovations. In addition, data aggregation and, where present, network effects create barriers to entry for competitive alternatives or follow-on innovations. These effects result in an appropriability landscape that is systematically distorted and thus tend to induce a portfolio of market innovation that diverges from market demand signals.

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[137] *Id.* at 644. See also Strandburg, *supra* note 128, at 124 n.98.

[138] Chris Jay Hoofnagle & Jan Whittington, *Free: Accounting for the Costs of the Internet's Most Popular Price,* 61 UCLA L. REV. 606, 643 (2014).

(discussing Google's treatment of referrer headers as an example for such broader lock-in effect); *see also* Oren Bracha & Frank Pasquale, *Federal Search Commission? Access, Fairness, and Accountability in the Law of Search*, 93 CORNELL L. REV. 1149, 1182 (2008) (discussing lock in effects in the market of personalized search).

Paul M. Schwartz, *Property, Privacy, and Personal Data*, 117 HARV. L. REV. 2055, 2079 (2004).; *see also* Lital Helman, *Curated Innovation*, 49 AKRON L. REV. 695, 705 (2016) ("These technologies potentially have enormous societal values in preventing privacy harms. Yet, due to various failures in privacy-related markets, the adoption rate of these technologies is probably lower than the actual value they provide. Because the market cannot reflect the full value that these technologies generate, innovators are less likely to invest in creating such solutions, despite the societal value such products can yield.").

1. Intellectual Property-Related Failures of Appropriability in Personal-Information-Based Markets

As discussed earlier, intellectual property doctrine uses various limiting doctrines to smooth out the appropriability landscape by balancing society's interest in addressing free rider problems against its interest in encouraging competitive follow-on innovation. While personal-information-based companies also avail themselves of patent and copyright protections, they tend to rely heavily on trade secrecy regarding their collections of personal information. Certain features of personal information-based products and services combine to make it highly likely that trade secrecy's primary limiting doctrines -- independent invention and reverse engineering – tend to be ineffective in these markets.

1. Patent and Copyright Protection for PI-based Products and Services

Technical innovations implemented in personal information-driven products and services are eligible for patent protection to the same extent as other software and business method inventions. Copyright is also available for the expressive aspects of these companies' software and user interfaces.[140] Patent protection in these areas has been highly controversial, with years of debate as to whether patent protection should be available at all and, if so, what it should cover.[141] Many scholars have argued, for a variety of reasons, that patents are unnecessary for business methods and rarely necessary for software innovations.[142] The extent to which copyright should protect software, given that ideas and methods of operation are uncopyrightable, is also a recurring subject of controversy.[143][144] The upshot, at least at this juncture, is that patents remain available for software and business method inventions, but the scope of patentable inventions has been narrowed significantly by

[140] *See, e.g.*, Oracle Am., Inc. v. Google Inc., 750 F.3d 1339, 1367 (2014) (a computer interface "is entitled to copyright protection as long as the author had multiple ways to express the underlying idea").
[141] *See generally, e.g.*, Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575 (2003) (arguing that patent policy should take account of the needs of different industries); Leo J. Raskind, *The* State Street Bank *Decision: The Bad Business of Unlimited Patent Protection for Methods of Doing Business*, 10 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 61 (1999); Julia Angwin, *'Business Method' Patents, Key to Priceline, Draw Growing Protest*, WALL ST. J., Oct. 3, 2000, at B1.
[142] *See, e.g.*, Michael J. Meurer, *Business Method Patents and Patent Floods*, 8 WASH. U. J.L. & POL'Y 309 (2002) (describing economic harm caused by patent floods, in particular a current flood in business patents); Joseph H. Sommer, *Against Cyberlaw*, 15 BERKELEY TECH. L.J. 1145, 1220 (2000) (stating that business method patents are unnecessary because they have nothing to do with technology); Pamela Samuelson, Benson *Revisited: The Case Against Patent Protection for Algorithms and Other Computer Program-Related Inventions*, 39 EMORY L.J. 1025 (1990).
[143] For the definition of a copy in the digital context *see* Cartoon Network, LP v. CSC Holdings, 536 F.3d 121, 132-33 (2008) and American Broadcasting Co. v. Aereo, Inc. 134 S. Ct. 2498, 2506 (2014).
[144] *See* Richard H. Stern, *Symposium: The Future of Software Protection: The Bundle of Rights Suited to New Technology*, 47 U.PITT. L. REV. 1229, 1259 (1986) (presciently noting that patent and copyright may "refuse to protect" algorithms because they are "mere ideas").

recent Supreme Court decisions.[145] Some groups have proposed legislation aimed at over-turning some of these decisions.[146]

These are fascinating debates, but we do not engage them here. For present purposes, we simply assume that patent and copyright doctrines, though perennially contested and sometimes evolving, reflect the way in which society ordinarily trades off the competing values of incentivizing innovation, minimizing deadweight losses, and avoiding undue burdens on follow-on innovators. The software and potentially patentable inventions associated with personal-information-based business do not appear to pose unique problems for patent or copyright doctrine. We therefore assume that questions of patent and copyright doctrine can be reasonably separated from the design of information privacy regulation.

2. Trade Secrecy is Generally Over-Protective for PI-Based Products and Services

Providers of software-based products and services have long resorted to trade secrecy protection to secure exclusivity in their offerings.[147] Trade secrecy doctrine evolved mostly in state law, but similar rules and applications developed across jurisdictions.[148] Adopted by most states, the Uniform Trade Secrets Act (UTSA) expensively defines "information" that is (i) valuable, and (ii) reasonably protected as trade secret.[149] Recently, Congress enacted the first federal trade secrecy statute. The

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[145] According to Paul R. Gugliuzza, the Supreme Court "has decided a remarkable thirty-three patent cases since 2006." Paul R. Gugliuzza, *How Much Has the Supreme Court Changed Patent Law?*, 16 CHI.-KENT J. INTELL. PROP. 330, 338 (2017). *See, e.g.*, Mayo Collaborative Servs. v. Promethus Labs., Inc., 566 U.S. 66, 72–73 (2012) (prohibiting patents directed to laws of nature, natural phenomena, or abstract ideas, unless they also contain an "inventive concept"); KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 417–22 (2007) (replacing the "teaching, suggestion, or motivation requirement with a flexible analysis that makes it easier to invalidate a patent based on obviousness). Also, notably, the Court denied the opportunity to review *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, a case where the Federal Circuit invalidated a patent on a non-invasive prenatal genetic test, viewed by many in the scientific community as a major breakthrough, because the test involved a "natural law." 788 F.3d 1371, 1378 (Fed. Cir. 2015), *cert. denied*, 136 S. Ct. 2511 (2016).

[146] *See, e.g.*, Press Release, Intellectual Property Owners Association, Ipo Supports Legislation To Amend U.S. Patent Act Section 101, Jan. 31, 2017 (on file with author).

[147] *See* Peter S. Menell, *The Challenges of Reforming Intellectual Property Protection for Computer Software*, 94 COLUM. L. REV. 2644, 2652 (1994) ("The [software] industry had developed principally through trade secret protection."); Mark A. Lemley & David W. O'Brien, *Encouraging Software Reuse*, 49 STAN. L. REV. 255, 258 (1997) ("Trade secret law remained the dominant form of legal protection of software through the mid-1970s.").

[148] W. Nicholson Price II, *Regulating Secrecy*, 91 WASH. L. REV. 1769, 1776 (2016).

[149] Unif. Trade Secrets Act § 1(4), 14 U.L.A. 538 (2005). Another oft-cited definition is offered by the Restatement (Third) of Unfair Competition § 39 (1995) ("A trade secret is any information that can be used in the operation of a business or other enterprise and that is sufficiently valuable and secret to afford an actual or potential economic advantage over others.") On the federal front the Economic Espionage Act, 18 U.S.C. § 1831 (2012), and the recently enacted Defend Trade Secrets Act of 2016, Pub. L. No. 114-153, 130 Stat. 376 (codified as amended in scattered sections of 18, 28 U.S.C.) also offer trade secrecy protection.

provisions of the Defend Trade Secrets Act are similar, for present purposes, to pre-existing state trade secrecy laws. Trade secrecy has both functional and legal aspects.

Functionally, secrecy protects any information that is actually kept secret from competitors.[150] Trade secrecy law applies to a wide variety of technical and non-technical information that is economically valuable, including methods, facts, and ideas that are excluded from other intellectual property rights.[151] It provides remedies against the misappropriation of information that was subject to reasonable protections against disclosure.[152] However, trade secrecy protection evaporates once information becomes widely known in an industry. Moreover, competitors are free to obtain trade secret information through independent invention or reverse engineering.

Assuming trade secrecy survives long enough, it, like patent or copyright protection, can avert failures of appropriability arising from the free rider problem.[153] Trade secrecy protection is both broader and narrower in scope than patent protection. It is broader in its subject matter and offers a nominally unrestricted term of legal protection. Trade secrecy is narrower than patent protection, however, because competitors are permitted, both functionally and legally, to reverse engineer or independently derive the information needed to create and market a competing product or service.[154] Thus, reverse engineering and independent invention provide important limitations on trade secrecy exclusivity, helping to avoid overcompensating innovators.[155] Especially because trade secrecy is so broadly applicable and the potential term of legal protection is uncapped, the social benefits of trade secrecy protection depend crucially on the extent to which reverse engineering and independent invention are successful in this role. Reverse engineering and independent invention provide a kind of effective term limitation on trade secrecy, under the rough-and-ready theory that more difficult innovations tend to require

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[150] David S. Levine, *Secrecy and Unaccountability: Trade Secrets in Our Public Infrastructure*, 59 FLA. L. REV. 135, 145 (2007) ("At its core, trade secret law envisions a fundamental scenario: competition between private actors whose primary objective is pecuniary gain.")

[151] Michael Mattioli, *Disclosing Big Data*, 99 MINN. L. REV. 535, 550 (2014).

[152] Id.

[153] J. Jonas Anderson, *Secret Inventions*, 26 BERKELEY TECH. L.J. 917, 962 (2011) (arguing that the most efficient solution to the free rider problem lays with inventors' choice of protection scheme, whether it is patent or trade secrecy).

[154] UNIF. TRADE SECRETS ACT § 1 Cmts. 1-2 (UNIF. LAW COMM'N, amended 1985). This was also confirmed by the Supreme Court in *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 490 (1974) (pointing to independent creation and reverse engineering as the key factors in finding that trade secret was not preempted by patent law).

[155] This claim has been empirically tested in Petra Moser's seminal work: Moser used historical data from the Crystal Palace World's Fair to show that inventors rely on trade secrecy protection when secrecy is feasible. Over time, however, the decreased cost of reverse engineering has made trade secrecy less appealing to inventors, who turn to patent protection. Petra Moser, *Innovation Without Patents: Evidence from World's Fairs*, 55 J.L. & ECON. 43 (2012). A similar theory was presented in a work by Keishun Suzuki, finding that "strengthened patent protection can increase economic growth when the risk of leakage of trade secrets is high. Conversely, when the risk is low, stronger patent protection hinders growth." Keishun Suzuki, *Economic Growth Under Two Forms of Intellectual Property Rights Protection: Patents and Trade Secrets*, 115 J. ECON. 49, 50–51 (2015).

greater upfront investment and, because independent invention will take longer, will have correspondingly longer periods of market exclusivity.[156]

Unfortunately, trade secrecy protection tends to be over-compensatory for personal-information-based innovations, creating failures of appropriability inverse to the usual free rider problems. There are three basic reasons for these systematic failures of appropriability. First, and most importantly, personal information databases generally cannot be reverse engineered from the public-facing aspects of personal information-based products and services. As a result, reverse engineering tends to be ineffective in limiting trade secrecy exclusivity.[157] Second, in many cases, trade secrecy tends to be over-compensatory because there is minimal upfront investment to recoup. Upfront costs associated with technological invention or creative expression should be recoupable through standard intellectual property protections. From a free rider perspective, trade secrecy is important primarily for recouping the additional upfront costs of amassing personal information. For many personal-information-based companies, however, those costs are extremely low, since they acquire personal information as a cheap by-product of providing other products and services. For this sub-set of companies, at least, there is not much need for trade secrecy to recoup upfront investment. Finally, potential independent inventors often face higher upfront costs than first inventors in these markets, rather than the equivalent (or perhaps slightly lower) upfront investments ordinarily assumed to be required.[158] This third point results from certain sorts of barriers to entry that are common in these markets, which we describe in the next section.

Overall, then, the combination of patent, copyright and trade secrecy exclusivity is likely to over-compensate personal-information-based innovation,[159] though the extent to which this is the case will depend on the particular context. As a result, these sorts of innovations will tend to stick out from the appropriability landscape and stimulate over-investment relative to market demand signals.

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[156] The story with reverse engineering is more complicated, but if reverse engineering gets too easy inventors can always opt to apply for patent protection.

[157] As Brenda Simon and Ted Sichelman found this access barrier is exacerbated when the "data-generating invention" is patented. Brenda M. Simon & Ted Sichelman, *Data-Generating Patents*, 111 NW. U. L. REV. 377, 379 (2017) ("Unlike information about the invention itself—which is often disclosed in patented improvements on the original invention—data-generating inventions tend to produce data that can be maintained as a trade secret. Patent holders enjoy an increased ability to aggregate and analyze "big data" obtained through leveraging data-generating patents, and they can protect the results using trade secret protection. This presents unique legal and economic consequences that we contend may be socially problematic under certain conditions.").

[158] Patent law's assertion of exclusive rights against independent inventors has been critiqued on this basis. *See e.g.* Oskar Liivak, *Rethinking the Concept of Exclusion in Patent Law*, 98 GEO. L.J. 1643, 1657-74 (2010). Independent innovators might be expected to face somewhat lower upfront costs since the first innovators efforts will have demonstrated that the innovation is technically doable and paved the way for consumer adoption.

[159] See generally id.

2. HIGH ENTRY BARRIERS IN PERSONAL-INFORMATION-BASED MARKETS

Markets for PI-based products and services tend to exhibit distinctive natural barriers to entry arising out of the particular qualities of personal information – its unique association with particular individuals, its non-linear aggregation and, often, its collection as a by-product of goods or services exhibiting network effects. From the perspective of the initial innovator, these barriers to entry raise the appropriability of the innovation, relatively more attractive than it would otherwise be. From the perspective of potential follow-on innovators, these barriers raise upfront costs, making follow-on innovation relatively less attractive than it would otherwise be.

Though some have argued that the acquisition and use of big data by online firms does not create significant barriers to entry,[160] others have criticized this position, viewing data as a strategic asset that could lead to market dominance and limit later entry.[161] Daniel Rubinfeld and Michal Gal's extensive analysis of market entry barriers in big data markets, showed that such barriers can arise in all parts of the data-value chain, though the extent and importance of such barriers is context-dependent.[162] Rubinfeld and Gal rightly disagree with arguments that data collection cannot create barriers to entry because of its non-rivalry. First, data is not fungible, and costs of acquiring certain pieces of personal information can certainly be different for different companies, depending, for example on whether they acquire as a byproduct of providing a service or have to purchase it on the market. Moreover, as Rubinfeld and Gal point out, barriers to entry may also be erected on parts of the data value chain other than data gathering, or as a result of the cumulative effect of a number of low entry barriers in several parts of the data value chain.[163]

Here, moreover, we are not concerned with demonstrating that barriers to entry are large enough or of the right sort to justify action by antitrust or competition authorities. Our question is very different: we look at barriers to entry not to ascertain their effects on competition per se, but to consider whether they undermine our usual reliance on intellectual property law to take care of failures of appropriability, so that we can set aside concerns that a regulation designed to re-align the demand portfolio might unintentionally stifle socially valuable innovation.

Barriers to entry are especially likely with regard to personal-information-based regulation for three reasons: i) the value of aggregated personal information; ii) the cost advantage of acquiring it from users; and iii) the interplay between data aggregation, network effects and lock-in.

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[160] See for example Darren S. Tucker and Hill B. Wellford, *Big Mistakes Regarding Big Data* 14 Antitrust Source 6, 6 (2014).
[161] Howard A. Shelanski, *Information, Innovation, and Competition Policy for the Internet*, 161 U. PA. L. REV. 1663, 1679 (2013); Maureen K. Olhausen, Alexander P. Okuliar, *Competition, Consumer Protection, and the Right* [Approach] *to Privacy*, 80 ANTITRUST L.J. 121, 131 (2015); Tal Zarsky, *The Privacy-Innovation Conundrum*, 19 LEWIS & CLARK L. REV. 115, 135 (2015).
[162] Daniel L. Rubinfeld and Michal S. Gal, *Access Barriers to Big Data*, 59 ARI. L. REV. 339, 369 (2017).
[163] *Id*.

A. Data Aggregation and Market Value

While data aggregation may eventually reach a point of diminishing returns, there is often a wide range over which the market value of a PI-based product or service grows non-linearly as more personal information is aggregated to be used as input in creating and delivering the products or services. The value of the product or service to each consumer grows in similar fashion. The quality of search results delivered to each user, for example, may be improved by combining personal information about many individuals with information about previous searches.[164] For ad-supported businesses, the value to individual users may or may not grow as data as collected, but the value to advertisers (who are the real customers) presumably does. Until they collect enough data to reach a point of diminishing returns (which may or may not exist, depending on the product or service), first entrants who continue to acquire personal information can maintain a persistent advantage against later entrants.

B. Cost Advantage of Acquiring Personal Information from Users

A later entrant might try to overcome the advantage a first entrant acquires by aggregating its users' data by purchasing a database of personal information from a data broker. This tactic will often be ineffective, however, for two reasons. First, if the first entrant collects personal information as a byproduct of some other activity, purchasing data puts a potential competitor at a cost disadvantage, since personal information acquired from users as a side effect of providing a product or service is essentially free. Second, any advantage gained by the purchase of personal data on the open market would be ephemeral, at least up to a point of diminishing returns from aggregation, since the first entrant could leapfrog ahead by purchasing the same data and combining it with data acquired directly from users. Dominant players in personal information markets maintain their advantages by refusing to sell their databases, particularly when the personal information they have collected is distinctive from what is available from data brokers.[165] Instead, they keep the data under trade secrecy protection and offer data-based services themselves. A notable exemplifier of such practice is Facebook, that offers sophisticated ad targeting services, but does not allow paid access to its database.[166]

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[164] Mike Mathieson, *Using Behavioral Data to Improve Search*, EBAY, (Apr. 13, 2011) https://www.ebayinc.com/stories/blogs/tech/using-behavioral-data-to-improve-search/.

[165] *See* Kurt Wagner, *This is How Facebook Uses Your Data for Ad Targeting*, RECODE (Apr. 11, 2018 6:00 AM) https://www.ebayinc.com/stories/blogs/tech/using-behavioral-data-to-improve-search/ ("Selling [its trove of personal] data to advertisers would significantly decrease Facebook's value.").

[166] Facebook allowed app developers to access some of the data it collected about its users until 2014. James Vincent, *Academic Who Collected 50 Million Facebook Profiles: 'We Thought We Were Doing Something Normal'*, THE VERGE (Mar. 21, 2018, 7:39 AM) https://www.theverge.com/2018/3/21/17146342/facebook-data-scandal-cambridge-analytica-aleksandr-kogan-scapegoat.

C. Network Effects

As discussed earlier, many PI-based products and services also exhibit network effects on top of the advantages associated with data aggregation, such that the value of the product or service to each user is directly enhanced by the addition of more users.[167] Network effects are conceptually distinct from the effects of data aggregation. Thus, search engines tend to increase in value as more data is acquired, but the value to each user is not directly enhanced by the fact that others are using the same search engine. Email services and telephone systems, on the other hand, exhibit network effects as users are added even if no personal information is aggregated, simply because each user values the ability to reach more other users. Social media platforms tend to exhibit both network effects and data aggregation effects. While network effects and data aggregation effects are conceptually distinct, they are linked in practice.[168] Where both are present, they may feed back onto one another, with network affects attracting more users, who provide more personal information that can be used to enhance market value and attract yet more users and so on. Another way these two effects can compound one another is illustrated by advertising-supported social media platforms, where network effects may attract users, thus providing more aggregated data that can be used to enhance the value of targeting services offered to advertiser customers. These effects can create powerful barriers to entry because first entrants begin with more users, and thus can offer a more attractive product or service, which attracts more users whose personal information can be fed back in to further enhance the product or service. And so on. As long as this cycle continues, second comers stand no chance of competing effectively.[169]

Anticipated high entry barriers increase the anticipated appropriability of some types of personal-information-based innovation, making those innovation paths particularly attractive relative to consumer demand. Existing high entry barriers, on the other hand, have the opposite effect on the attractiveness of competing or follow-on innovation, as the next section explains.

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[167] MAURICE E. STUCKE AND ALLEN P. GRUNES, BIG DATA AND COMPETITION POLICY, 170 (2016) ("[T]he more people actively or passively contribute data, the more the company can improve the quality of its product, the more attractive the product is to other users, the more data the company has to further improve its product, which becomes more attractive to prospective users.")

[168] Daniel L. Rubinfeld and Michal S. Gal, *Access Barriers to Big Data*, 59 ARI. L. REV. 339, 377 (2017).

[169] Rubinfeld and Gal point out that there is an ongoing debate about the presence of entry barriers with respect to search: "Microsoft has argued that it faces substantial barriers to entry because it obtains an order of magnitude fewer search queries than does Google. From Microsoft's perspective, its analysis of its own queries puts it at a disadvantage. Google counters by pointing out that efficient scale can be readily achieved through the analysis of queries on Bing, suggesting that if Microsoft is disadvantaged it is due to Google's more successful algorithm or other comparative advantages, not scale. This implies that different data analytical tools can create divergent economies of scale." *Id.*at 354.

D. IMPLICATIONS FOR FOLLOW-ON INNOVATION

Barriers to entry discourage competitive and follow-on innovation by raising its expected upfront costs. When there are no network effects, data aggregation effects or similar barriers to entry, relatively small improvements or product differentiations can be enough to attract enough customers to recoup a competing or follow-on innovator's upfront creative investments. This relative ease of follow-on entry facilitates cumulative innovation over time. For PI-based products and services that are affected by these barriers to entry, successful follow-on innovation will be much harder and cumulative innovation may not occur. For example, it is not enough for a later entrant to create an improved search engine algorithm that users would prefer, *ceterus paribus*. To compete with the first entrant's search engine, the improved design must be so much better that users value the improved design, as implemented with little or no personal data, more than they value the first entrant's design "souped up" with all the personal information the first entrant has collected. Moreover, even this sort of leapfrogging innovation may be possible only if a trove of personal information was not needed as a tool for developing the improved design.[170]

Even if a second comer manages to come up with an improvement significant enough to overcome the barriers to later entry, there may be a risk of what one might call hyper free riding. Unless the second comer's follow-on design is patented or otherwise protected by intellectual property, the first entrant may be able to copy the follow-on design (using personal information if necessary) and then enhance its value using the trove of personal information already at hand. Given this situation, a second comer might simply try to sell rights to its follow-on innovation to the first entrant. Because of its market dominance, the first entrant might or might not find it profitable to bother purchasing rights to the follow-on innovation, depending on details of its business model. If it does, the business's customers might benefit from the improvement, but, if anything, the purchase will only exacerbate the barriers to further competitive innovation.

To summarize, innovation in PI-based products and services, while unlikely to be plagued by free rider problems that cannot be handled by intellectual property, will often be affected by failures of appropriability related to trade secrecy and associated barriers to entry. These failures will distort the appropriability landscape. As a result, incentives for investments in innovations that can take advantage of the low costs of acquiring personal information as a byproduct or of barriers to entry will be high relative to consumer demand. Conversely, incentives for follow-on innovations or competitive alternatives will be low relative to consumer demand.

[170] Cédric Argenton & Jens Prüfer. *Search Engine Competition with Network Externalities*, 8 J. OF COMP. L. & ECON. 73 (2012).

VI. PULLING IT ALL TOGETHER: DESIGNING INFORMATION PRIVACY REGULATION WITH INNOVATION IN MIND

In Part IV, we explained why mis-aligned demand is likely in personal-information-based markets, thus making a prima facie case for information privacy regulation. Part V explained why failures of appropriability that are not corrected by intellectual property law are also likely to occur. This Part pulls these analyses together to explore the interaction between privacy regulation and personal-information-based innovation and discuss its implications for the design of information privacy regulation.

A. INFORMATION PRIVACY REGULATION: IS THE GAME WORTH THE CANDLE?

As outlined Part IV, there are many reasons to anticipate mis-alignment between market demand signals and individual and societal preferences in the personal-information-based market. As a result, the current situation is almost certainly rife with market failures that are directing innovative activity along socially undesirable paths. We should seriously consider regulation precisely because of the importance of innovation – and its path dependence. In Part III, we argued that there are no general reasons to expect that well-designed regulation aimed a re-aligning demand with true preference will "stifle" innovation in a socially meaningful way. Any socially problematic stifling of innovation is likely to result from errors in regulatory design that either exacerbate demand misalignment or impose unnecessarily high compliance costs on innovative activity. Designing regulation to avoid these pitfalls is a contextual task that depends on a particular regulation's goals and mechanisms.

Is there any reason to anticipate that information privacy regulation will be unusually prone to regulatory design flaws, to the extent that it is best to abandon the project altogether? We see no general theoretical reasons to expect market failures associated with information privacy to be uniquely impervious to regulatory intervention. And it is much too soon to give up on the task. Unlike the design of environmental regulation, which has been the subject of substantial in-depth consideration by academics and policymakers, the detailed study of privacy regulation mechanisms and design possibilities from a social welfare perspective is in its infancy. As yet, there has been relatively little scholarly or policy attention paid to creative regulatory design. For example, the General Data Protection Regulation that has recently gone into effect in the EU is bold in its adoption of more serious penalties and its attempt at uniform applicability. Some of its provisions may turn out to be novel (depending on how they are eventually interpreted). Nevertheless, at its heart the GDPR is founded on regulatory principles and mechanisms developed before the digital age. Given the prominence of modern data aggregation as a source of market failure, this is cause for at least some skepticism about its likely effectiveness. As an example, the GDPR relies on consumer consent in ways that seem, to us at least, inadequate for addressing many of the sources of demand mis-

alignment in today's personal-information-based markets. The GDPR's uniform approach may also reflect a characteristically European valuation of privacy in relation to other individual and social values with which other societies (and particular the US) might differ. But we do not mean to single the GDPR out for criticism; in fact, we think it probably represents a step forward. US privacy regulation takes a sectoral approach, which could, in principle, allow more nuanced tailoring of privacy regulation to the needs and values of particular contexts. But US privacy laws on the generally even more out of date and more problematically reliant on consumer consent. Our point is that there is no reason to view the regulations currently in force anywhere as the be-all and end-all of information privacy regulation design. There is much more work to be done.

We also do not think that the few attempts so far to study the impact of privacy regulation on innovation empirically provide cause to abandon the enterprise. There are very few studies on the interplay between privacy regulation and innovation. These studies do not reach any uniform consensus that privacy regulation reduces innovation. They all suffer from the usual difficulties of finding metrics for innovation and controlling for external factors.[171] These studies sometimes have not distinguished *shifts* in innovative activity from *overall* decreases in innovation. A 2012 work, titled "*Privacy and Innovation*," by Avi Goldfarb and Catherine Tucker is an exception in that it took shifts in innovative direction into account. Goldfarb and Tucker showed that privacy regulations have directly affected usage and efficacy of emerging technologies in the online advertising and health care sectors.[172] As these impacts are heterogeneous across firms and products (meaning that privacy regulation could both advance and deter innovation) Goldfarb and Tucker concluded with a neutral, and in our view accurate, observation that privacy regulations directly influence the direction and rate of data-based innovation.[173] Most important, these empirical studies are unavoidably dependent on the design of currently enacted privacy regulations and cannot directly measure the effects of regulatory designs that have not been enacted.[174] It is thus difficult to use the empirical data for comparative analysis of alternative regulatory designs.

As the continuing debate about empirical support for the Porter hypothesis in the environment arena demonstrates, obtaining empirical consensus about the effects of regulation on innovation is hard. Indeed, conclusive empirical support for the presumption that patents increase innovation remains elusive. Unfortunately, the inconclusive state of the empirical evidence does not, at least in our view, justify a do-nothing response to significant policy concerns.

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[171] *See generally* Daniel F. Spulber, *Unlocking Technology: Antitrust and Innovation*, 4 J. COMPETITION L. & ECON. 915 (2008).
[172] Avi Goldfarb & Catherine Tucker, *Privacy and Innovation*, 12 INNOVATION POL'Y & ECON. 65, 84–86 (2012).
[173] *Id*.
[174] *Cf.* Mark Pettigrew et al., *Natural Experiments: An Underused Tool for Public Health?*, 119 Pub. Health 751, 756 (2005) (noting that the "naturalness" of natural experiments: their reliance on enacted policies, has the potential to introduce bias).

Here, while we make no attempt to contribute to the empirical debate about the net social impact of privacy regulation, we discuss two examples -- the US Children's Online Privacy Protection Act (COPPA),[175] and the European General Data Protection Regulation (GDPR) -- to make a simpler point: that privacy regulation can affect the direction of innovation.[176]

In 1998[?], the Federal Trade Commission ("FTC"), responding to public concern about children's privacy online, held public forums on the issue and conducted a survey of popular websites. The survey confirmed a mis-alignment between social preferences and market behavior: the majority of websites targeted to kids engaged in personal information collection without posting an adequate privacy policy.[177] To address these failures, Congress enacted the Children's Online Privacy Protection Act, which limits the collection of personally identifiable information of children under the age of thirteen and increases parental involvement in children's online activities. Since then, COPPA's rules have become an established standard for all tech innovators: most mobile apps and services are not marketed to children under thirteen,[178] but those designed to target the younger population are virtually always designed to be COPPA compliant.[179] COPPA thus re-directed innovation in online offerings for children in accordance with the social preferences reflected in the regulation. For example, Super Awesome, is a company offering kid-safe and COPPA-compliant digital functionality including authentication, social networks, and kid-safe advertising/monetization. The company is currently valued at $100 million and profitable. COPPA reflected some clear normative trade-offs that re-directed market innovation away from paths capitalizing on children's personal information. But the result was hardly a blanket stifling of online products and services for children. Instead, designers found ways to fulfill the demand for children's offerings while complying with COPPA. Recently, Facebook, whose founder has been one of the most vocal critics of COPPA, launched a COPPA-compliant messenger app for children ages 6 and up.[180] Of course, COPPA is not perfect – neither in terms of its objectives, nor in terms of its design and enforcement.[181] Some consider its scope too narrow. For example, Facebook's

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[175] Children's Online Privacy Protection Act of 1998, Pub. L. No. 105-277, 112 Stat. 2681 (codified at 15 U.S.C. §§ 6501-6506 (2012)).

[176] This point is similar to the "weak" form of the Porter hypothesis.

[177] Fed. Trade Comm'n, Privacy Online: A Report to Congress 31-32 (1998)

[178] Leaving aside the enforcement difficulties, virtually all mobile apps that do not target young audience require in their terms of service that users are over thirteen years old.

[179] *See* Sarah Perez, *Kidtech Startup SuperAwesome is Now Valued at $100+ Million and Profitable*, TECHCRUNCH (Feb. 19, 2008), https://techcrunch.com/2018/02/19/kidtech-startup-superawesome-is-now-valued-at-100-million-and-profitable/.

[180] Loren Cheng, *Introducing Messenger Kids, a New App for Families to Connect*, FACEBOOK: NEWSROOM (Dec. 4, 2017), https://newsroom.fb.com/news/2017/12/introducing-messenger-kids-a-new-app-for-families-to-connect/ (last visited Mar. 11, 2018).

[181] Many have criticized COPPA over the years. *See, e.g.*, David C. Grossman, *Blaming the Victim: How FTC Data Security Enforcement Actions Make Companies and Consumers More Vulnerable to Hackers*, 23 GEO. MASON L. REV. 1283, 1297 (2016) (noting that "some critics have argued that the parental consent requirements of COPPA are too onerous for small websites to comply with, forcing

COPPA-compliant messenger app for kids has been highly controversial for other reasons.[182] COPPA's requirements have also been criticized for being too onerous for small business or startups, whose ability to compete might be diminished.[183] The point for our purposes is that companies responded to the regulation with innovation, rather than abandoning the field.

Another interesting case study for the relationship between privacy regulation and innovation is provided by the GDPR itself. Regardless of what one thinks of its design, the GDPR is clearly a high impact privacy regulation with broad impact on all companies that process Europeans' personal information. The GDPR was approved by the EU Parliament on April 14, 2016, but did not go into effect until May 25, 2018, thus granting businesses two years to implement the necessary compliance measures.[184] Affected companies vocally complained that the GDPR would stifle innovation.[185] While it is much too early to know what the GDPR's net effects will be, it is already clear that it has induced investment in compliance-related innovation relating to both short-term compliance-facilitation and long-term compliant innovation.

Short-term compliance-facilitation obviously came first in light of the ticking clock on the GDPR's enforcement date. In what has been termed "RegTech" (as in regulation technology), businesses began to offer products and services aimed at streamlining effective compliance and economizing on compliance costs.[186] At the 2018 RegTech Summit in NYC, Leigh Feldman, global chief privacy officer at Citi, mentioned that Citi has set up a "Privacy Innovation Lab where technology people

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many restrict access to children and self-censor rather than implement a consent program"); Charlene Simmons, *Protecting Children While Silencing Them: The Children's Online Privacy Protection Act and Children's Free Speech Rights*, 12 COMM. L. & POL'Y REV. 119, 122 (2007) (discussing free-speech advocates who criticized COPPA for infringing the free speech rights of websites "by forcing them to self-censor their content"); Anita L. Allen, *Minor Distractions: Children, Privacy and E-Commerce*, 38 HOUS. L. REV. 751, 753 (2001) (claiming that COPPA has failed to advance increased parental involvement, which was one of its main objectives).

[182] Natasha Lomas, *Child Health Advocates Call for Facebook to Shutter Messenger Kids App*, TECHCRUNCH (Jan. 30, 2018), https://techcrunch.com/2018/01/30/child-health-advocates-call-for-facebook-to-shutter-messenger-kids-app/.

[183] See Melanie L. Hersh, Is COPPA a Cop Out? The Child Online Privacy Protection Act as Proof That Parents, Not Government, Should Be Protecting Children's Interests on the Internet, 28 FORDHAM URB. L.J. 1831, 1865–67 (2001); Joshua Warmund, Can COPPA Work? An Analysis of the Parental Consent Measures in the Children's Online Privacy Protection Act, 11 FORDHAM INTELL. PROP., MEDIA & ENT. L.J. 189, 212–15 (2000).

[184] GDPR PORTAL, https://www.eugdpr.org/ (last visited Mar. 11, 2018).

[185] See, e.g., Cybersecurity Industry Believes GDPR is Stifling Innovation and Could Encourage Organizations to Cover Up Security Breaches, ALIEN VAULT (July 12, 2017), https://www.alienvault.com/who-we-are/press-releases/infosecurity-europe-2017-survey-report-gdpr (highlighting findings of a survey taken of attendees at Infosecurity Europe).

[186] The term originated in financial technologies markets, but has been recently adopted to describe compliance-facilitation technologies in relation with the GDPR as well. George P. Slefo, *Three Publishers, Three Different Approaches to Consent Under GDPR*, ADAGE (May 31, 2018) http://adage.com/article/digital/gdpr-ushers-lingo-cmp-regtech/313698/ ("Obtaining consumers' consent to be tracked under GDPR has delivered. . .new pieces of jargon for marketers and publishers:. . . regtech, short for "regulation technology.")

focus on startups and how they could be layered into our privacy program."[187] California-based Segment, which provides a set of APIs that enable it to gather data about a customer from a variety of sources, has announced a new tool to simplify compliance tasks such as stopping information collection for a specific individual or removing an individual's information from the system.[188] Waymark Tech, a provider of regulatory intelligence software, launched an AI-powered tool to detect regulatory overlaps and conflicts between different regulations, including the incoming GDPR.[189] Danish startup Contractbook offers a platform for handling contracts online, which emphasizes features such as GDR-compliant consent and the proper operationalization of an archive to ensure complete deletion of personal information upon request.[190]

GDPR compliance-facilitation also appears to be appealing to investors: UK-based data analytics firm Peak, whose subscription-based product uses machine learning technologies to classify data and perform a GDPR risk assessment, has secured €1 million in funding in 2016 and €2.5 million in 2017.[191] NY-Based data protection startup BigID, which applies machine learning technology together with what it terms "identity intelligence," to find, track and de-risk troves of personal data,[192] has secured $2.1 million in funding in 2016 and $14 million in early 2018.[193] And one year-old Intello, a Software-as-a-Service optimization provider offering a tool for tracking and managing data stored in the cloud, has secured $1.3 million in seed funding.[194]

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[187] THOMSON REUTERS, THE CHALLENGES AND OPPORTUNITIES OF REGTECH 2 (Jan. 19, 2018, 4:59 PM), https://blogs.thomsonreuters.com/financial-risk/risk-management-compliance/from-mifid-ii-to-gdpr-regtech-summit-lights-the-way/.

[188] Ron Miller, *Segment Has a Plan to Help Companies Comply with GDPR Data Privacy Requests*, TECHCRUNCH (Nov. 16, 2017), https://techcrunch.com/2017/11/16/segment-has-a-plan-to-help-companies-comply-with-gdpr-data-privacy-requests/.

[189] WAYMARK TECH, http://waymark.tech/ (last visited Mar. 11, 2018).

[190] CONTRACTBOOK, https://contractbook.co/ (last visited Mar. 11, 2018); *see also* Sten Løck, *A Danish Startup Helps SMEs Get Ready for GDPR—'Data Privacy Will Be Like Organic Food,'* BUSINESS INSIDER: NORDIC (Feb. 14, 2018, 6:41 PM), https://nordic.businessinsider.com/danish-startup-contractbook-kills-printers-readies-gdpr--/ (quoting Contractbook's CEO, who compared privacy to organic food: "Initially, nobody believed in a market for these higher prized goods with an intangible added value. Now it is an established market. We expect the same for data privacy.").

[191] *We Grow Businesses Using Data, AI, and Machine Learning*, PEAK, https://peak.ai/about/ (last visited Mar. 11, 2018).

[192] *Satisfy EU GDPR Data Protection Requirements with Automation*, BIGID, https://bigid.com/eu-gdpr/ (last visited Mar. 11, 2018).

[193] Ron Miller, *BigID Pulls in $14 Million Series A to Help Identify Private Customer Data Across Big Data Stores*, TECHCRUNCH (Jan. 29, 2018), https://techcrunch.com/2018/01/29/bigid-pulls-in-14-million-series-a-to-help-identify-customer-data/.

[194] We're on a Mission to Create a More Transparent SaaS Ecosystem, INTELLO https://www.intello.io/about (last visited Mar. 11, 2018); see also Ron Miller, Intello Scores $1.3 Million Seed Round for SaaS Management Platform, TECHCRUNCH (Feb. 21, 2018), https://techcrunch.com/2018/02/21/intello-scores-1-3-million-seed-round-for-saas-management-platform/.

It is too soon to observe much about long-term redirection of innovation along GDPR-compliant paths. Already, however, startups offering privacy-protecting technologies to consumers are riding the GDPR wave of increased attention to privacy and seeing increased demand. Privitar,[195] for example, a UK startup engineering privacy protecting solutions, was founded in 2014 but has seen a massive increase in investment from $1.2 million in 2015 and $3 million in 2016 to $16 million in 2017.[196] D-ID, an Israeli startup attempting to block online facial recognition, has also received growing attention because of the GDPR, and closed out a seed round of $4 million in early 2018.[197]

In sum, we see no reason to anticipate that attempts to design information privacy regulation to mitigate mis-alignments in market demand are categorically, or even unusually, prone to fail in ways that will stifle innovation across the board. Currently enacted privacy regulations, despite their flaws have stimulated innovation aimed at reducing compliance costs, meeting consumer demand for privacy-protective technology and re-aligning innovation in line with the normative preferences expressed in privacy regulation. The above examples illustrate our general argument. Regulation and innovation constantly interact with each other: regulation aims to re-align socially suboptimal demand signals that otherwise lead to socially suboptimal innovation portfolios. Suppliers and investors react to regulation by innovating within the new boundaries or shifting their innovations to alternative paths. In this arena, as elsewhere, regulatory failures could exacerbate misalignment between the innovations induced by the combination of regulation and market demand and society's true preferences and values. These examples do not allow us to assess whether some metric for the overall "amount" of innovation was depressed. Nor can we rewind the clock to compare the innovation that we have described with the innovation that would have occurred without the regulations. Nonetheless, these examples, along with the lack of any theoretical reason to expect privacy regulation to be unusually innovation stifling, should reassure us that it is unlike that privacy regulation will create an innovation cataclysm. Moreover, the design of privacy regulation mechanisms is in its infancy. Even if current regulatory approaches raise serious concerns about innovation, it is far too early to fold up and go home. Given the many reasons to believe that unregulated markets will fail to serve individual preferences and social values, the better response is to give more serious attention to designing and evaluating specific privacy regulations.

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[195] PRIVITAR, https://www.privitar.com/ (last visited Mar. 11, 2018).

[196] *Privitar: Funding Rounds*, CRUNCHBASE, https://www.crunchbase.com/organization/privitar#section-funding-rounds (last visited Mar. 11, 2018).

[197] Paul Monckton, *New AI Tech Blinds Computer Facial Recognition Systems*, FORBES (Jan. 29, 2018, 11:22 AM), https://www.forbes.com/sites/paulmonckton/2018/01/29/d-id-defeats-facial-recognition/#6f6d6e1934b0.

B. PRIVACY REGULATION AND FAILURES OF APPROPRIABILITY: REGULATORY DESIGN CONSIDERATIONS

As discussed in Part V, the personal-information-based market is prone to systematic appropriability failures that often are not remedied by intellectual property. When these appropriability failures are correlated with individual and social preferences or with the compliance costs of a particular regulatory proposal, appropriability effects should be considered explicitly in regulatory design. To help in thinking through how these issues apply to personal information-based markets, this section applies this Article's framework of demand-realignment and appropriability failure to three hypothetical information privacy regulations.

1. First Hypothetical: Restricting Retention of Search Engine Data

Our first hypothetical regulation forbids search engine providers from retaining consumer data for more than two weeks. Assume, for purposes of illustration, that this hypothetical regulation implements true social preferences about the trade-off between the marginal improvement in personalized search results and other advantages to users that can be expected from longer-term data collection and the risks of longer data retention in terms of data breaches, advertiser manipulation, government snooping, and the like.

This regulation would effectively reduce market demand for innovation involving the exploitation of long-term search data, whether for search personalization or for ad targeting, making innovative activity aimed at making better use of short-term search data, improving presentation of search results and combining short-term data with contextual advertising more attractive. As a side effect, this regulation would reduce the appropriability of search engine innovation for dominant providers and decrease upfront costs for competitive and follow-on search engine innovation. This regulation thus appears to tap into a correlation between social preferences and appropriability failure that makes it a winner on both fronts, much like the hypothetical regulation favoring solar panels over coal plants that we discussed in Part III.

Is this analysis too glib, given the realities of the search engine business? Currently, popular search engines, such as Google, are ad-supported businesses that rely on collecting troves of personal information and using them to target advertising. Should we fear that this regulation threatens the viability of the search engine business or of search engine innovation?

We see little reason to fear that this regulation would cripple the search engine business. Unlike broadcast programming, the search engine business does not lack means to collect payment directly from users, for example through subscription or "freemium" models. Moreover, search is a highly valuable service, both socially and individually. There is no reason to expect that consumers will not be willing to pay enough for this valuable service to cover its operating costs. It is true that consumers are used, by now, to getting search services for free, and thus might protest, at least

at the transition phase, about paying for search. However, consumers are also very accustomed to – even dependent on -- using search services. As a result, if presented with the choice of paying for search engine services and not having them at all, we assume that the vast majority would be willing to pay some non-trivial price. In the highly unlikely scenario in which aggregate user willingness to pay is insufficient to cover operating costs – potentially because of positive externalities – standard regulatory solutions to externality failures, such as tax credits and subsidies, could be applied. A more serious concern is distributive – some individuals might be unable to afford the market rate for search services. But this problem is just a subset of the larger problem of disparate internet access and could be addressed similarly, for example by providing search engine access at educational institutions, libraries and in other public spaces or subsidizing access based on economic status.

Currently, of course, search engines almost universally adopt an advertising-based business model, rather than collecting payment from consumers. Would this hypothetical regulation sink the economic viability of ad-based search? Search-based advertising appears to be highly valued by advertisers, as reflected in price data. Presumably, current prices are driven partly by the value of ad-targeting services provided by ad-supported search engines using the personal information they collect. Assume for the sake of argument that the regulation's restriction of data retention makes this targeting less precise and thus reduce the prices that advertisers are willing to pay for search-based advertising. (In fact, there is at least some evidence that very recent search data is what really counts for targeting ads[198].) Even given this assumption, it seems unlikely, as an intuitive matter, that advertising revenue would drop so low that it could not cover operating costs (which are now, if anything, lower given decreased data storage needs). But suppose this intuition is wrong and the regulation does undermine the ad-based business model for search engines. In such a case we should expect one of two scenarios: Alternative, non-targeted advertising-based business models for search engines would emerge, or paid search would become common and acceptable, effectively offering a different revenue source for this market. The main point is that we don't ordinarily worry much about whether the market will manage to provide highly valuable private goods and services for which payment can be collected without high transaction costs. Such goods and services are the bread and butter of the market and search is one of them.

Perhaps the concern is instead that consumers will regret the regulation if the ad-based search business turns out not to be viable because the regulatory process did not adequately account for its possible disappearance. Given well-known behavioral biases that make "free" an irrationally sticky price point, we might well question whether consumers are likely to experience any such regret once they switch to paying for search on a simple subscription model right along with their monthly bills for telephone, electricity, gas, Internet, rent and so forth. But assume consumers really do have preference for ad-supported search. Why would this preference, along with the possibility that the regulation would sink the ad-supported business model

[198] *See* Frost Prioleau, *How Much Targeting is Too Much Targeting?*, ADEXCHANGER, (Aug. 28, 2018 4:52 PM) https://adexchanger.com/data-driven-thinking/how-much-targeting-is-too-much-targeting/.

for search engines, not have been considered in regulatory design and evaluation? Of course, regulatory design failure is always a possibility, but as we explained at the outset, we assume here that socially beneficial regulation is possible. There seems to be nothing about this particular regulation that raises red flags. If anything, given the bias already mentioned, we might worry that the regulatory design process will over-value "free" ad-supported search in comparison with paid models. [199]

Should we worry, instead, that this regulation will stifle innovation by swinging the appropriability pendulum so far back that free rider problems re-emerge? This outcome also seems unlikely. Regardless of whether users or advertisers are paying, search engine innovators can take advantage of standard intellectual property mechanisms for recouping upfront investments. The software and data that create search results are protectible by trade secrecy, copyright, and, to some extent, patents. Those protections can be leveraged into higher prices in the usual way. Compliance costs for this regulation are unlikely to add significantly to the upfront costs of innovative activity. The regulation tamps down the over-compensatory tendencies of trade secrecy in personal-information-based markets, but there is no special reason to anticipate that standard IP balancing will fail to deal with free rider issues. To the contrary, some barriers to entry are likely to persist despite this regulation. Search engines are likely to perform better when they draw on data from more users, creating network-like effects. These network-like effects create value for users without the risks associated with long-term collection and retention. On balance, society might prefer to put up with these remaining barriers to entry.

The regulation's net effects on the appropriability side thus depend on whether it lowers barriers to entry enough to induce competitive and follow-on innovation. If so, it is a win for society on both sides of the equation. But even if persistent network effects continue to dampen competitive and follow-on innovation, the regulation is likely to be a net social winner because the market's portfolio of goods, services and innovative activity will be better aligned with social value.

2. Hypothetical Two: Collection Restriction

Now let's imagine a different information privacy regulation that is designed to reduce the potential harms from data breaches by imposing restrictions on the transfer of personal information from one entity to another and cybersecurity requirements, but without enacting any limitations on data retention or use by collecting entities. Assume, in particular, that this regulation substantially restricts the sale of personal information by data brokers. Assume that this regulation is correctly designed in that it does reduce the risk of data breaches and does not introduce other sorts of mis-alignments with individual and social preferences

[199] This is not even to mention the lobbying power of companies engaged in advertising-based business models relying on personal information collection.

regarding personal information collection, flow and use.[200] This is the sort of restriction that traditional usage of the term "privacy regulation" might bring to mind, in that it simply reduces the flow of information among entities. This sort of regulation shifts the market's demand signals away from products and services that require the purchase or transfer of personal information relative to products and services that either i) do not rely on personal information or ii) rely primarily on using personal information that they collect themselves. We assume, for purposes of this hypothetical, that the resulting market demand portfolio is better aligned with individual and social preferences.

Now consider the appropriability implications of this regulation. Businesses that never relied on databases of personal information are in much the same position as before. Dominant players in markets rely on byproduct collection of personal information will now be protected by more impervious barriers to entry, however, even though the direction of their innovative activity may be affected by their inability to purchase additional data. Correspondingly, potential competitive or follow-on innovators will face even greater hurdles than before. Previously, they could have purchased personal information from data brokers and used it in developing and improving their innovative goods and services. Though not a substitute for the troves of information collected by dominant players, this information might have reduced the degree they would have had to leapfrog existing offerings to enter the market successfully.

Thus, the realignment of demand by this regulation is likely to exacerbate the failures of appropriability already affecting the personal-information-based market. The net result may be a portfolio of innovative activity that produces fewer data breaches, but also induces more innovation in goods and services that vacuum up personal information from users than is socially desirable. The negative social implications could be even more pronounced if the innovation induced by these appropriability failures aims primarily at employing personal information for more effective ad targeting and or for uses that are socially problematic for distributional or other normative reasons.

This hypothetical regulation thus exemplifies the sort of information privacy regulation that might look good from a regulatory perspective focused on market failures resulting from mis-aligned demand. When we account for correlations between consumer preferences and appropriability failures, however, the picture looks very different. The bigger picture raises red flags that should be seriously considered before adopting this hypothetical regulation.

3. Hypothetical Three: Mandated Data Sharing

Finally, and briefly, we consider a hypothetical regulation that would mandate that dominant players who collect personal information as a byproduct of providing

[200] This could be a fairly strong assumption depending on details of the "restrictions" imposed on transfers. We make the here in order to focus on the implications for innovation.

goods and services must share some part of the data they collect with other market players, perhaps at some price. This hypothetical is based on proposals in the literature.[201] These proposals rest on the assumption that data aggregation produces positive network-like effects, somewhat as described in our discussion of the search engine hypothetical. Under this assumption, the primary downside of large aggregations of personal information is that data aggregation also tends to produce barriers to entry. This sort of hypothetical regulation operates in a similar vein to regulations that attempt to preserve the positive benefits of network effects while increasing competition by regulating interconnectivity, imposing standards, and so forth. No doubt these proposals do help to level the appropriability landscape.

This approach to leveling the appropriability landscape has serious implications for personal information flow. Proponents of these proposals suggest that "privacy" can be taken care of separately at the back-end as a kind of afterthought. Juxtaposing this sort of proposal with the hypothetical "no data transfer" regulation demonstrates the fallacy of this approach. Personal-information-based markets have a wide variety of likely sources of mis-aligned demand, a tendency toward failures of appropriability. As we have seen, the very nature of personal-information-based markets is that these failures of appropriability tend to be correlated, whether for better or for worse, with individual or social preferences regarding information collection, flow, and use. The proposal to correct appropriability failures by sharing personal information of all sorts more widely among market players of all sorts seems almost designed to clash with the goal of realigning market demand with individual and social preferences about information flow and use, which tend to be highly contextual. Because correlations between preference for information flow and appropriability failures are common, it is highly unlikely that these issues will be amenable to separate or sequential regulatory design.

VII. CONCLUSION

The market's portfolio of innovative activity reflects suppliers' perceptions of market demand mixed with their expectations of appropriability. Regulation's traditional goal is to bring market demand into better alignment with individual and social preferences and values can, while intellectual property law (and, at times, competition law) aims to bring suppliers' incentives into line with those preferences by smoothing out the appropriability landscape. In many contexts, these tasks are mostly separable: regulatory design need not pay much attention to appropriability, while intellectual property doctrine assumes that market demand correctly reflects

[201] Under our definition, despite the intuitive discordance, such a regulation would qualify as an information privacy regulation because it constraints the flow of personal information. We think that looking at this hypothetical in the same framework as more obviously "privacy"-protecting regulatory designs demonstrates the value of this broad definition.

consumer preferences. Our analysis points out that this implicit assumption of separability is not always valid. Under some circumstances, correlations between preferences and appropriability failures demand attention to appropriability concerns as part of the regulatory design process. Both mis-aligned demand signals and appropriability failures are common in personal-information-based markets because of certain characteristics of personal information and common features of personal-information-based markets. Moreover, the sources of appropriability failures in these markets mean that appropriability failures are often correlated with individual and social preferences regarding personal information collection, flow and use. As a result, it is often important to take both into consideration when designing information privacy regulation because regulation can sometimes exacerbate – and sometimes alleviate – appropriability failures.

These interdependencies do not, however, provide support for blanket arguments that information privacy regulation will stifle innovation. Indeed, information privacy regulation can sometimes enhance innovation through its collateral effects on appropriability, as illustrated in the above hypotheticals. As always, the social implications of regulation depend on the particular regulatory context and on regulatory design specifics. If anything, nuanced regulatory design and evaluation is especially important for information privacy regulation. The goals of information privacy regulation will vary greatly because individual preferences and social values that define them are highly context-dependent. Simplistic associations of "privacy" with secrecy or control tend to obscure this point, which becomes obvious when one contemplates the various norms of information flow that are regularly encountered in daily life. The interplay between demand re-alignment and appropriability in personal-information-based markets adds to this complexity and variability. If anything, this interplay makes nuanced and careful regulatory design and analysis more important.