

# MARKETS FOR CONSUMER DATA: WHAT, WHY, AND WHEN?

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## ABSTRACT

Consumers supply a crucial input for the modern economy: their personal data. Yet, they have very limited control over how it is used and by which firms. When this happens, they are imperfectly compensated in return. We describe some of the inefficiencies that this status quo may create. Recently introduced legislation (e.g., the European GDPR) grants consumers control over their data, laying the legal basis upon which markets for data can flourish. In these markets, firms will compete to acquire data directly from consumers. Will these markets promote more efficient outcomes than the status quo? We discuss potential obstacles to efficiency, i.e., data externalities and consumer engagement, as well as possible remedies, such as “data unions” and “data taxes.”

# 1 Introduction

Consumer data has become an indispensable productive input of the modern economy. It fuels several multi-billion-dollar industries, including the online advertising industry and digital marketplaces. Most notably, perhaps, firms use consumers' data to learn their preferences and reach them with targeted advertisements or personalized offers. While consumer data is, for the most part, supplied by consumers themselves when they interact, for example, with digital platforms, consumers typically have minimal control over it: That is, they hardly control how, when, and by whom their data is used. Additionally, consumers are often compensated with suboptimal mechanisms, like barter: Their data is collected in exchange for a service. In the worst-case scenario, consumer data is collected without the awareness of the consumers from which this data originates (see, e.g., [Federal Trade Commission \(2014\)](#)).

This status-quo arrangement appears far from ideal and could harbor inefficiencies and market failures. For example, the status quo could stifle competition, inefficiently distort the supply of data, and fail to protect consumers from the consequences that the uncontrolled use of their data may create. Scholars have urged policymakers to promote alternative market designs as well as to increase regulation and oversight (e.g., see [Posner and Weyl \(2018\)](#), [Stigler Report \(2019\)](#), and [Seim et al. \(2022\)](#)).

The first step towards a better design of these markets is to give consumers more control over how their data is used. This is the goal of recent legislation such as, for example, the European Union's General Data Protection Regulation (GDPR). It is believed that this legislation could lay the basis for the emergence of competitive *data markets*, i.e., markets where firms would need to compete to acquire data directly from consumers—or intermediaries that act on their behalf—in exchange for economic compensation (a monetary transfer and a service).

Yet, what is a market for data, and how should we expect it to function? In this article, I discuss the inefficiencies that can arise from the status-quo arrangement described above. I then discuss how new legislation could promote the emergence of competitive data markets. When property rights are well-defined, a Coasian perspective may suggest that the aforementioned inefficiencies could be resolved by simply letting firms and consumers freely negotiate a price

for the exchange of data. I explain why, due to data externalities, this is unlikely to be the case. Finally, I discuss potential remedies and alternative market designs, such as data unions and data taxes.

This article provides a non-technical introduction to the economics literature on data markets, briefly touching on open questions and the role of policy. The article is intended for a non-academic audience. The reader who wants to gain a broader understanding of these ideas is encouraged to consult the references provided below, as well as excellent reviews of this literature, including [Acquisti, Taylor, and Wagman \(2016\)](#), [Bergemann and Bonatti \(2019\)](#), and [Goldfarb and Tucker \(2023\)](#).

## 2 The Data Economy

In this article, we use the term *consumer data* to refer to any information that relates to a specific (i.e., identified or identifiable) consumer. This notion includes data about her preferences—such as her demographic characteristics—as well as data serving an identification purpose—such as her IP address or telephone number.

In the past two decades, consumer data has become a crucial input into the modern economy. The reliance on consumer data is perhaps most striking in the multi-billion dollar industry of online advertising. In this industry, data is used by digital platforms to intermediate consumers and marketers. Platforms can offer marketers indirect access to the consumer data they have collected. This allows marketers to target consumers with unprecedented flexibility and precision. The great success of this business model, together with the decreased costs in data processing, have created incentives for firms to collect an ever-increasing amount of consumer data.

Online advertisement is hardly the only industry that heavily relies on consumer data. Online marketplaces, for example, extensively use consumer data to hone their services: Consumer data is used in pricing decisions, to determine which products to recommend to different consumers, and to inform the development of new products.

While data can be used in many ways and by many entities, this article focuses on consumer data (as opposed to, for example, machine data) used by firms (as opposed to, for example, governments). Specifically, our typical problem of interest is a firm using consumer data to generate personalized interactions with consumers. These can take the form of targeted advertisements, product recommendations, personalized pricing or discounts, etc. Of course, in general, personal data is used in many other ways, e.g., for training algorithms, for academic research, or by governments.

For the purpose of this article, we will consider three types of firms that collect and use consumer data: merchants (e.g., Nike), digital platforms (e.g., Google Search), and data brokers (e.g., Acxiom). These types of firms differ in how they collect and use consumer data. Of course, a firm could play more than one such role but distinguishing among them is conceptually useful.

- Merchants’ primary business is to sell products or services to consumers. It is not to collect and use consumer data. Yet, these firms can collect data as they organically interact with consumers, for example, by observing their activity on their website. When these merchants use consumer data, they do so to personalize their offers or to hone their products and services. For our purpose, the important aspect to remark is that merchants’ main reason for data collection is its direct use, as opposed to selling it to third parties.
- Digital platforms—e.g., Alibaba, Amazon, Facebook, Google, etc.—are intermediaries in multi-sided markets. For example, they mediate interactions between consumers and merchants. These platforms collect consumer data as they repeatedly interact with them. Consumers are attracted to these platforms by the value of the services these platforms offer, which can be substantial.<sup>1</sup> Platforms monetize the collected data by *indirectly* selling it to third parties, i.e., merchants. For example, online advertising platforms grant merchants access to consumer data by allowing them to bid on specific consumers’ characteristics.
- Finally, data brokers—e.g., Acxiom, Corelogic, Experian, Oracole, etc.—are firms whose

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<sup>1</sup>See ?\*ABEG20 for an analysis of the consumer welfare effects in the case of social media platforms.

principal business goal is to collect consumer data. They do not sell products or serve as intermediaries. The typical data broker collects consumer data from public sources, online and offline, and packages it into individual consumer profiles. Data brokers monetize this activity by selling consumer profiles to third parties, e.g. merchants. In many cases, consumers are unaware that their data is being collected and packaged by data brokers. **Federal Trade Commission (2014)** provides a detailed analysis of the data-brokerage industry.

The discussion above indicates that firms collect consumer data in two principal ways. Firms can obtain consumer data via barter—data in exchange for a service—or they can directly appropriate it without consumer knowledge and without compensation. In either case, consumers have very limited control over which data is collected, how it is used (e.g., whether it is used for advertisements or for coming up with new product ideas), how long it is stored, and whether it can be re-sold to third parties.

### **3 Inefficiency of the Status Quo**

The status quo arrangement described in the previous section seems rather peculiar. Consumers—who supply more or less directly one of the key productive inputs of the modern economy—appear to play a negligible role: They have limited control of what data is collected, how it is used, and by whom; they are imperfectly compensated when this happens; and, as a consequence, they are unable to reap the full value that their data generates for the firms that use it.

This status quo could harbor inefficiencies, i.e., it may prevent data from being efficiently supplied and used. In particular, we discuss four potential sources of inefficiency:

- *Supply Distortions.* If consumers are imperfectly compensated for the data they supply, they may end up supplying an inefficient quantity. For example, when the platform's service cannot be tailored sufficiently well to the type of consumer, the absence of a monetary transfer could lead some of them to supply too much data, and others to supply too little data. In other situations, i.e., when the platform tracks consumers' activity

to infer their willingness to pay, consumers may have incentives to distort their online behavior in order to obtain a different treatment. This friction decreases the quality of the database the platform collects potentially reducing social welfare. This distortion can lead to inefficiencies (see, also, [Taylor \(2004\)](#), [Villas-Boas \(2004\)](#), [Acquisti and Varian \(2005\)](#), and [Calzolari and Pavan \(2006\)](#)).

- *Market Power.* Efficiency requires that data should flow to firms that make the best use of it. If consumers had full control over their data, they would temporarily “rent” it to whichever firm promises them the best treatment. When a better alternative materializes, they would withdraw their data and employ it in such an alternative. Competitive forces should lead data toward firms that make the best use of it. In contrast, when consumers do not have control over who uses their data, a firm may not have the incentive to sell it to a more efficient competitor. In this situation, a first-mover who collected a large database may enjoy a competitive advantage relative to potential competitors. Such a situation can lead to positions of market power, which hinder trade and create inefficiencies (see, also, [Stigler Report \(2019\)](#)).
- *Non-Rival Data.* When data is nonrival, it can be used by many firms simultaneously. As a consequence, there could be social gains to data being used broadly across firms (especially in the presence of increasing return to scale). When firms hoard data and limit its widespread use, the market mechanism can generate inefficient data allocations, i.e. too little data is shared (see [Varian \(2009\)](#), [Jones and Tonetti \(2020\)](#), [Farboodi, Mihet, Philippon, and Veldkamp \(2019\)](#), and [Veldkamp and Chung \(Forthcoming\)](#)).
- *Unwanted Usage.* If consumers have limited control over how their data is used and by whom, they may be unable to escape the unwanted consequences that such use entails. For example, suppose a data broker sells a consumer’s data to a third-party firm, which then uses it to send unsolicited personalized offers.

## 4 Property Rights, Data Markets, and Data Externalities

A natural step towards addressing the issues discussed in the previous section is to give consumers control over their data. If consumers owned their data they could ultimately decide who uses it and how. When property rights are well-defined, a Coasian perspective may suggest that the aforementioned inefficiencies can be resolved by simply letting firms and consumers freely negotiate a price for the exchange of data. In practice, these property rights can be implemented through legislation that protects consumers' *data privacy*. **Warren and Brandeis (1890)** describe privacy as “the right to be let alone.” If a consumer does not like how, when, and by whom her data is used, she can object to it and take it back.

Along these lines, the European Union's General Data Protection Regulation (GDPR) recently introduced legislation that protects consumers' right to privacy. This represents the most consequential step in the direction of empowering consumers and giving them control over how, when, and by whom their data is used. With GDPR, EU's consumers obtained several data rights. Most notably, these rights includes (a) the right to delete the data a firm has collected about them, (b) to object to how this data is used, and (c) to transfer it to another firm. The legislation also regulates how firms should treat and store consumer data, which data can be collected, and under what conditions. The enforcement of such groundbreaking legislation comes with its own challenges. As of today, almost 5 billion US dollars in fines have been imposed on firms that did not comply with the legislation. The vast majority of these fines have been issued to large digital platforms, including Amazon, Google, Facebook, Instagram, and TikTok.<sup>2</sup>

In the United States, a growing list of States, including large ones such as California, Connecticut, Indiana, Texas, and Virginia, have passed similar laws. Today, about one out of three Americans resides in a State that has passed a dedicated data privacy law. However, a US federal law is likely to be years away.

A nascent empirical literature has started studying the effects of GDPR on firms' practices and outcomes. **Johnson (2023)** reviews this literature. This literature finds that—as can be expected—GDPR hurt firm performance by imposing costs, decreasing revenue, and thereby

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<sup>2</sup>See <https://www.enforcementtracker.com>.

hurting profitability, with stronger effects on smaller firms. Yet, relatively little is known today about GDPR’s consequences on consumers, due to inherent measurement challenges.

With legislation like GDPR, consumers gain rights that give them some control over their data. To what extent they will proactively use these rights is still to be determined (see also Section 6). However, this legislation lays the legal foundation upon which markets for consumer data can be established. In a market for data, firms will compete to acquire data from consumers. In some cases, consumers will receive monetary compensation when their data is used, on top of the service that the firm promises to offer. In theory, this compensation can be positive or negative (i.e., the consumer could have to pay the firm to access the service without having her data collected).

As of today, these markets hardly exist. Only a handful of firms have experimented with the idea of directly paying consumers for their data. None of them has reached a reasonable scale. One of the largest is perhaps the “Microsoft Rewards” program. This is a data collection program that provides monetary incentives to use Microsoft Bing, as well as other Microsoft products. When a consumer searches a query on Bing, she receives points that can be later converted into prizes.

The economics literature has recently started investigating the properties that such data markets will have. For example, should we expect these markets to solve the issues described in Section 3? Will these markets promote efficient outcomes? In a market for data, each consumer owns her data and decides which firm to sell it to, if any. In exchange, firms will offer this consumer a service (e.g., intermediation with a merchant) and a transfer (a price for the data). This literature has identified (non-pecuniary) *data externalities* that these markets may suffer from. These externalities pertain to the particular nature of the good that is traded in these markets—namely, information—and how it is used. The literature shows that when a consumer chooses to sell her data, her decision can directly affect the welfare of other consumers. It has been shown that these externalities can lead to market inefficiency. In some cases, this inefficiency can be quite severe, causing the market to unravel. Below, we briefly describe two of such externalities:



- *Externality originating from the nature of data.* The first externality originates from the fact that the data of different consumers tends to be correlated. To appreciate the consequences of this, let us consider a simple example. Consider two consumers, A and B, who are friends with each other. Suppose that the income of people who are friends tends to be positively correlated. In such a case, if Consumer A sells her financial data to a firm, this firm learns not only Consumer A’s income, but it can also learn something about Consumer B’s income. Consumer A’s decision to sell can (indirectly) affect Consumer B’s in several ways. First, if Consumer B has an intrinsic preference for privacy, she is hurt by the fact that the firm knows more than she would like. Second, the firm could use this additional knowledge about her income for price discrimination. Third, upon learning about Consumer B’s income via Consumer A, the firm will have a lower willingness to pay for Consumer B’s data: Were Consumer B to decide to sell her data, she would now receive a lower compensation. Recent work by [Choi, Jeon, and Kim \(2019\)](#), [Acemoglu, Makhdoumi, Malekian, and Ozdaglar \(2022\)](#), [Ichihashi \(2021\)](#), [Bergemann, Bonatti, and Gan \(2022a\)](#) explore this externality and shows it can lead to inefficiencies in different settings, with and without competition between firms.
- *Externality originating from how data is used.* Regardless of whether consumers’ data is correlated, [Galperti, Levkun, and Perego \(2023a\)](#) show that another kind of externality can arise when the firm that acquires the data is a digital platform, like Google and Amazon. In their role as information intermediaries, these platforms provide merchants access to consumer data (see Section 2). By their nature, however, these platforms rarely find it optimal to reveal all that they know to the merchants. Instead, it is often optimal to withhold some information from them.<sup>3</sup> When this happens, the platform pools together consumers with different characteristics and only reveals to the merchant which one of

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<sup>3</sup>For example, if a platform runs a second-price ad auction, it faces a tradeoff: more information improves the efficiency of the allocation but creates higher information rents for the merchants. As a consequence, it is optimal to withhold some information from the merchants (see [Bergemann, Heumann, Morris, Sorokin, and Winter \(2022b\)](#)). Relatedly, Google’s “quality score” effectively pools the queries of different consumers to increase competition among advertisers (see, e.g., [Sayedi, Jerath, and Srinivasan \(2014\)](#)); Uber can sometimes withhold riders’ destinations from drivers, so as to increase riders’ welfare.

such pools a consumer belongs to. The exact composition of the pool determines what a merchant knows about the consumer and, thus, the price it sets (or bids) for such a consumer. When a consumer sells her data to the platform, this decision affects the composition of the platform's pools. In turn, this affects the behavior of the merchant, which in turn, affects the payoff of all other consumers in the pool. In other words, when a consumer sells her data to the platform, she creates an externality on other consumers. Recent work by Galperti, Levkun, and Perego (2023a) and Galperti, Liu, and Perego (2023b) explores this externality and shows it can lead an otherwise perfectly competitive market for data to fail.

To clarify the nature of this externality, it is useful to consider the following analogy. A school (i.e., the platform) needs to persuade employers (i.e., merchants) to hire its students (i.e., consumers). Suppose that the school policy is to provide employers with no information about the students' GPAs upon graduation (i.e., information withholding). The employers know that, on average, the school's students have a GPA of 3.5 and, thus, make a congruent salary offer to each one of them. Now suppose a new student whose GPA is 3 (resp. 4) joins the school (i.e., an additional consumer sells her data to the intermediary). While the employers won't be able to tell this student apart from the rest, their belief about the average GPA will be lower (resp. higher) and so will their salary offers. Thus, the decision of the additional student to join the school creates an externality (positive or negative) on all other students. Crucially, this externality is enabled by the fact that the school withholds some information from the employers. Moreover, note that this externality is present even if ex-ante students' GPAs are uncorrelated.

## 5 Possible Remedies and Open Questions

The previous section illustrated that data markets can suffer from data externalities, which can lead to market failures. Does it imply that regulators should not promote the emergence of markets for data? The answer is negative, for at least two reasons.

First, it is important to note that an inefficient data market could still lead to outcomes that are

more desirable than a status quo in which consumers are expropriated. Most of the literature so far has focused on identifying inefficiencies in data markets. The comparison between these “imperfect” market designs needs to be further explored.

Second, markets with externalities are a fact of life. Their inefficiencies can be addressed, or at least reduced, with regulation. Below, I discuss three possible kinds of interventions that have just started to be analyzed by economics literature and will require more work in the future.

- *Data Unions*. At the heart of the externalities discussed in Section 4 is the fact that consumers can fail to coordinate. If consumers could coordinate their decisions to sell or not their data, and perhaps redistribute the compensations they receive when they do, the externalities would be reduced if not eliminated. A *data union* addresses this coordination failure.<sup>4</sup> In a data union, consumers voluntarily relinquish their data to the union, which manages their data on their behalf. The union has a fiduciary duty to the consumers, it monetizes their data (following pre-existing agreements with such consumers), and then redistributes back to them the net proceeds from the sale. Galperti, Liu, and Perego (2023b) show that the union solves the coordination problem and guarantees that the data market is efficient. The literature on this institution is, however, still thin, and more research is needed in this direction (see early discussions in Posner and Weyl (2018), Seim et al. (2022)).
- *Increased Competition*. Antitrust activity in the coming years may lead to increased competition among digital platforms (e.g., search-sponsored advertisements and online marketplaces). It is natural to wonder whether competition is likely to resolve the problems discussed in Section 4. The current evidence points to the direction that even perfectly competitive markets for data will suffer from the externalities discussed above (see Acemoglu, Makhdoumi, Malekian, and Ozdaglar (2022) and Galperti, Liu, and Perego (2023b)).

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<sup>4</sup>A data union would also address the issue that individual consumers lack bargaining power vis a vis a large monopolistic platform.

- *Personalized Data Prices and Taxes.* An economy with externalities can be efficient if markets are sufficiently complete (Arrow (1969)). This requires the price system to be sufficiently rich. Galperti, Liu, and Perego (2023b) show that if data prices depend not just on the type of data that is being traded but also on its intended use, a competitive data market is efficient. Interestingly, the GDPR recognizes the importance of determining how data is intended to be used *before* it is traded: “The specific purposes for which personal data are processed should be [...] determined at the time of the collection” (Regulation 2016/679 (39)). Finally, taxes can be used to partially decentralize efficient allocations without the need for unrealistically rich price systems. A data tax would help consumers internalize the external effect that their decision creates.

## 6 The Role of Consumers and Firms

In practice, giving consumers control will be useful only insofar as they care about their privacy. It is therefore natural to ask the question: Do consumers even care about their privacy? And if they do not, why should the policymakers?

A nascent empirical literature, both in economics and marketing, has started to tackle this question. An influential paper by Athey, Catalini, and Tucker (2017) found that consumers’ *intrinsic* value for privacy is low. In the context of a lab experiment administered to undergraduate students, the paper finds that, while students say they care about their privacy, they are willing to relinquish their data for a negligible monetary amount (a slice of pizza). Similarly, Lin (2022) finds that, on average, consumers’ intrinsic value for privacy is small. She also finds a substantial heterogeneity in demographics and type of data and that the valuations of consumers at the right tail of the distribution often exceed the firm’s valuation of individual consumer data. Collis, Moehring, Sen, and Acquisti (2023) finds that low valuations belong to demographic groups that are traditionally associated with low levels of digital literacy.

While this research area is very active and with many open questions, what lessons can we draw from these early findings as they pertain to the discussion of the previous sections?

First, it is important to understand that the inefficiencies discussed in Section 3 do not hinge on the fact that consumers actually care about their privacy (e.g., think of the discussion about market power). In fact, even if consumers did not intrinsically care about their privacy, they could still respond to monetary incentives (e.g., being paid by a competing firm to transfer their data). Moreover, despite not valuing their privacy in an intrinsic way, consumers could still care about the *instrumental* effects that giving up their data may entail. Second, the value consumers assign to their privacy and their involvement in controlling their data is likely to increase over time, as consumers become more aware of the importance that data plays in our economy. The idea is that, as the quantity of collected data increases over time, the risk of potential misuse grows larger and so will consumer awareness. Relatedly, Collis, Moehring, Sen, and Acquisti (2023) study that consumers' privacy values significantly increase when they become informed about how their data is used and monetized.

Finally, how do firms react in a world where consumers' privacy concerns are heightened? After all, if privacy is truly in demand, a competitive market should supply it, regardless of whether or not consumers have control over their data. Firms could gain market share by differentiating away from competitors and embracing business models that are more privacy-conscious. These business models may be less remunerative in the short term but could be a viable niche strategy attracting a subset of consumers. So far, evidence of this has been scarce. Most notably, perhaps, Apple has made consumer data privacy a core feature of many of its products and introduced features such as privacy labels (information), app tracking transparency (third-party cookies), and private relay (private browsing). Google has also announced that it will revisit its policies surrounding the third-party use of consumer data. Finally, smaller firms have tried to make privacy a differentiation factor. For example, Google's competitors Brave (Internet browser) and DuckDuckGo (search engine) have built software that minimizes data collection and how it is monetized. The extent to which these entry strategies will be successful in the future is still to be determined.

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