

ARE DATA SUBJECTS INVESTORS?  
Forthcoming in *Berkeley Business Law Journal*

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ABSTRACT

This article explores the status of data subjects in the era of data capitalism. A data subject is a person whose personal data is being collected, held, or processed by data collectors or processors (e.g., Amazon, Google, or Facebook). Data-driven companies rely on data subjects offering personal information for training algorithms for services. We maintain that it is time to seriously investigate whether data subjects can be considered as investors. First, we preview our thesis, followed by a functional definition of an investor. Then, we develop our argument that data subjects are better understood as investors rather than consumers or labor providers by examining the balance sheet impact of a data contribution to the data firm and the existing legal regime requiring data subjects to retain an ownership interest in their data even after it has been transferred to the data firm.

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<sup>¶</sup>This paper has benefited from seminar participants at Carnegie Mellon's Privacy Seminar, Finance Brown Meeting, and Georgetown Institute for the Study of Markets and Ethics. We are grateful to Kirsten Martin, Norman Sadeh, Thomas Ruchti, Duane Seppi, Brent Glover, Lars-Alexander Kuehn, Pietro Bonaldi, Jason Brennan and John Hasnas.

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## INTRODUCTION

This paper explores the status of data subjects in the era of data capitalism.<sup>1</sup> A data subject is a person whose personal data is being collected, held, or processed by data collectors or processors (e.g., Amazon, Google, or Facebook).<sup>2</sup> Data-driven companies rely on data subjects offering personal information for training algorithms for services.<sup>3</sup> In this article, we maintain that it is time to seriously investigate whether data subjects can be considered as investors. In what follows, first, we preview our thesis and follow with a functional definition of an investor. Then, we develop our argument that data subjects are better understood as investors rather than consumers or labor providers, by examining the balance sheet impact of data contribution to the data firm and the existing legal regime requiring data subjects to retain an ownership interest in their data even after it has been transferred to the data firm.

### I. ARE DATA SUBJECTS CONSUMERS, WORKERS, OR INVESTORS?

How should we characterize the relationship between data subjects and firms that collect and process their data? The interpretation of the world around us significantly influences our lives and institutional arrangements. Take, for instance, the idea that shareholders of a

<sup>1</sup>See *Fuel of the Economy: Data Is Giving Rise to a New Economy*, THE ECONOMIST (May 6, 2017), <https://www.economist.com/briefing/2017/05/06/data-is-giving-rise-to-a-new-economy>; Anita Pratap, *The Era of Data Capitalism*, THE WEEK, Mar. 5, 2017.

<sup>2</sup>We follow the definitions in the European Union's General Data Protection Regulation (GDPR), Article 4. "Personal data means any information relating to an identified or identifiable natural person ('data subject'); an identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person."

<sup>3</sup>See Stacy-Ann Elvy, *Paying for Privacy and the Personal Data Economy*, 117 COLUM. L. REV. 1369 (2017); Mara Paun, Bruce Schneier, *DATA and GOLIATH: THE HIDDEN BATTLES TO COLLECT YOUR DATA AND CONTROL YOUR WORLD*. Norton, 2015.

corporation own the corporation and that the managers of the corporation are their agents.<sup>4</sup> This idea is not the only possible interpretation of the relationship between the corporation, its managers, and its shareholders.<sup>5</sup> Nevertheless, the proliferation of this view has led to significant institutional changes, including the passage of new regulations that attempt to better align the incentives of a corporation's managers with those of its shareholders. In the dawning era of data capitalism, the characterization of the relationship between data subjects and data firms may have a similar impact.

According to the conventional view, data subjects are consumers who do not have any meaningful rights to their data once they transfer it to the firm. Within this view, data subjects have a consumer relationship with the data firm, in which they allow data firms to collect information about them in exchange for a service. Such a view is analogous to a nineteenth century case in the U.S. in which an entrepreneur was granted full property rights to manure that was abandoned by horse-drawn wagons because the entrepreneur enhanced the value of the manure through the application of his labor.<sup>6</sup> Within such a view, data processors such as Google and Facebook are the rightful owners of data because they apply their labor to convert raw materials of data—some form of un-processed information about the data subject's online activity that, like abandoned manure, is useless to data subjects—and thus greatly enhance the data's value.

But many are not satisfied with the view that data is like manure. For instance, Eric A. Posner and E. Glen Weyl—a Chicago law professor and an economist at Microsoft—offer a thought-provoking perspective in their book, *Radical Markets*:

The powerhouse of the digital economy, firms like Facebook, Google and Microsoft, exploit the lack of public understanding of AI and ML to collect for free the data we all leave behind in our online interactions. This is the source of the record profits that make them the most valuable companies in the world. Facebook, for example, pays out only 1% of its value each year to workers (programmers) because it gets the rest of its work for free from us!

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<sup>4</sup>MILTON FRIEDMAN, *CAPITALISM and FREEDOM* (University of Chicago Press, 2009); Henry Hansmann & Ugo Mattei, *The Functions of Trust Law: a comparative legal and economic analysis*, 73 NYU L Rev. 434 (1998).

<sup>5</sup>Margaret M. Blair & Lynn A. Stout, *A Team Production Theory of Corporate Law*, 24 J. CORP. L. 751 (1998); *Stakeholders: A new perspective on corporate governance* 25, no. 3 CALIF MANAGEMENT REV. 88–106 (1983); Oliver Hart & Luigi Zingales, *Serving Shareholders Doesn't Mean Putting Profit Above All Else*, 12 HARV. BUS. REV. 2–6 (2017); Eric W. Orts, *Beyond Shareholders: Interpreting corporate constituency statutes*, 61 GEO. WASH. L. REV. 14 (1992); Alan Strudler, *What to Do with Corporate Wealth*, 25 no. 1 J. POL. PHIL. 108–126 (2017).

<sup>6</sup>*Haslem v. Lockwood*, 37 CONN. 500 (1871); CMU's Block Center for Technology and Society, *Data Subjects and Manure Entrepreneurs: When it comes to how your data is being used to drive the technologies of the future, you have a seat at the table. It's just been empty*, MEDIUM, (November 2019), <https://medium.com/@CMUBlockCenter/data-subjects-and-manure-entrepreneurs-e3bc61cef7eb>.

Data subjects'	Conventional view	Data as Labor	Data as Investment
Status	Consumer	Workers	Investors
Activity	Disclose data for services	Sell data as labor	Provide data as capital
Due claim	Good service	Fair compensation	Financial security

Table 1: Comparison of the three views

In contrast, Walmart pays out of 40% of its value in wages. People's role as data producers is not fairly used or properly compensated.<sup>7</sup>

This message from the two authors attempts to alter the way corporate America sees and treats data subjects by challenging the conventional view. The message is so powerful that it has turned into a social movement known as “Data as Labor” (DaL), with more than one hundred chapters forming around the world within a year. DaL gives a real option to young generations who enthusiastically inquire about and radically act to develop an ethical governance structure of the digital economy. We agree with the position that “[m]ost people do not realize the extent to which their labor—as data producers—powers the digital economy”<sup>8</sup> so, “ROD [return on data]—the relationship between the data price consumers pay and the benefits they receive—is unknown.”<sup>9</sup> Nonetheless, in this article, we want to point out that DaL is missing something—a perspective that we believe can better help understand the legitimate claims that data subjects can make on firms that collect and process their data.

In this article, we offer a distinctive view, which we call “Data as Investment”(DaI), that most people who offer personal information to firms are better understood as investors, even if they can also be considered as workers or consumers. (See Table 1).

Since our thesis is radical and we are the first to defend it, we expect resistance. Our aim is modest here. We aim to show that DaI is a coherent idea and that it is not far-fetched to defend that data subjects, at least under some circumstances, are entitled to certain rights that are afforded to investors. In particular, we aim to explain that data subjects' contributions to a firm often meet the major objective conditions necessary to be considered (data) investors, as shareholders meet similar conditions to be (financial) investors. Therefore, data subjects as investors may deserve several rights, such as control

<sup>7</sup>Eric A. Posner & E. Glen Weyl, *Radical Markets: Uprooting capitalism and democracy for a just society* 209 (PRINCETON U. PRESS (2018); See also Imanol Arrieta Ibarra et al., *Should We Treat Data as Labor? Moving Beyond 'Free'*, (December 27, 2017). Am. Econ. Ass'n. Papers & Proc. 1, no. 1 (2017).

<sup>8</sup>Posner & Weyl, *Radical Markets: Uprooting capitalism and democracy for a just society*.

<sup>9</sup>Noam Kolt, *Return on Data*, YALE L. & POL'Y. REV, Forthcoming.

and information rights.<sup>10</sup> It is a separate question which rights to grant to different kinds of investors, and we do not fully discuss the question here.

We want to be clear up front about the distinction between saying that data subjects are *better understood* as investors and that data subjects *are* investors. Our view claims that data subjects are better understood as investors because they meet the *objective* condition for being an investor. A data subject is entitled to claim the rights associated with being an investor because she qualifies as an investor in an objective sense, regardless of her *subjective* mental condition. Some might argue that data subjects are not investors because they lack the necessary *subjective* condition of being an investor. In usual financial transactions, the investor commits capital and becomes fully aware of the financial security received in the transaction (with varying levels of due diligence, depending on the regulatory framework for the transaction). However, in current data transactions, data subjects typically do not subjectively recognize that they meet the objective condition for being an investor. We fully concede this point. Our claim is that, regardless of whether or not data subjects are actually investors, they are better understood as investors because they meet the objective condition for being investors. Furthermore, the lack of the subjective condition is not something that is particular to the issue of classifying someone as an investor. The classification of other groups of a firm's stakeholders does not depend on a subjective recognition of the classification either. For instance, the classification of a labor provider as an employee rather than an independent contractor is not a matter of the labor provider's subjective recognition of her classification. Instead, the law classifies labor providers based on a test that looks mostly at objective factors. In other words, we determine whether or not someone is an employee of a firm based on the extent to which someone is justified in claiming to be an employee, not the extent to which someone actually believes herself to be an employee. Lastly, our thesis is reformative rather than simply descriptive. Even if it were the case that data subjects are currently seen as sellers of data rather than investors, our claim is that we *should* see them as investors.

Before moving on to the main argument, allow us to clarify our thesis again. By arguing that data subjects are better understood as investors, we do not deny that they can be simultaneously consumers, workers, or members of some other stakeholder group. Data subjects as consumers (or workers) might deserve proper consumer (or labor) rights and relevant protection.<sup>11</sup> Our thesis attempts to move beyond consumerism and labor theory to address problems concerning the data economy by positing that data subjects should have *additional* rights as investors. Neither do we deny that other stakeholder groups might also be considered investors in a broad sense. Other stakeholder groups may have

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<sup>10</sup>Julian Velasco, *The Fundamental Rights of the Shareholder*, 40 UC DAVIS L. REV. 407 (2006).

<sup>11</sup>Kirsten Martin & Katie Shilton, *Why Experience Matters to Privacy: How context-based experience moderates consumer privacy expectations for mobile applications*, 67 no.8 J. ASSOC. INFO. SCI. & TECH. 1871–1882 (2016).

a special claim to a firm's assets in ways that parallel the claims that data subjects have on a data processing or collecting firm. Nevertheless, we focus on data subjects because there is no denying that data subjects' initial and continuous support (e.g., allowing firms to collect and process personal information) significantly affects firms' business success. Realistically speaking, those who provide capital have power within a capitalist system. Offering a new paradigm—that data subjects provide important capital to a central mode of production within the data economy—can radically change how society should treat data subjects.

In what follows, first, we offer a functional definition of an investor of a firm as *someone who is justified in receiving a financial security from the firm in exchange for a resource contribution*. Second, we propose to understand data subjects as investors of a firm by analyzing the impact of a data subject's data contribution to the firm on the firm's balance sheet and the type of financial security that the data subject is justified in receiving based on the type of data that she contributes. Third, we argue that data subjects meet the objective condition of being investors in the firm because they retain a property interest in their data even after it is transferred to the firm.

## II. DEFINING INVESTORS

First, we need to define what we mean by “investor.” In general, and within the view that the firm is a “nexus for contractors/patrons,” it is hard to distinguish suppliers, customers, and investors.<sup>12</sup> Employees and suppliers as providers of labor and goods, and bank or venture capital as a supplier of capital are similar. All these groups are usually “owed money.” There are also others who do not have a contractual relationship with the firm but are nevertheless “owed money.” Take, for example, those who win a legal judgment against the firm and are thus “owed money.” Which groups should be considered as investors of the firm?

We propose a broad definition of an investor as *anyone who is justified in receiving a financial security from the firm in exchange for a resource contribution*. Like the term “investor,” there is some ambiguity in the definition of a “financial security.”<sup>13</sup> Nevertheless, it suffices for our purposes to define a financial security as a bundle of rights to the firm's

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<sup>12</sup>HENRY HANSMANN, *THE OWNERSHIP OF ENTERPRISE* (Harvard University Press, 2000/1996).

<sup>13</sup>The U.S. Securities and Exchange Commission recently confronted the definition of financial security during the 2017-2018 wave of cryptocurrency “Initial Coin Offerings.” The SEC has jurisdiction over anything that is defined by the Securities Exchange Act of 1934 as a security, including “any note, stock, treasury stock, bond,... investment contract,... or, in general, any instrument commonly known as a ‘security’.” See 15 U.S.C. § 7811(14). In the course of ruling that certain coin offerings can constitute a security, the SEC distinguished between “utility tokens,” which are akin to pre-paid goods and services such as airline miles or a reward t-shirt offered on a crowdfunding site, and “financial tokens,” which have many properties that look like financial assets such as stocks or bonds. A similar distinction is helpful here as we argue that the data

assets that can be characterized along four dimensions: (1) Cash-flow, (2) Control, (3) Information, and (4) Resale/Liquidity rights. For individual securities, the characteristics of these dimensions are shaped by a mix of contracts, regulation, and practice. For example, a stock or equity financial security has cash flow rights that are residual. An equity share is a claim on profits after expenses and other capital providers are paid. Equity has broad control rights over the decisions of the firm. In practice, the exercise of the control rights is via proportional voting for a board of directors.<sup>14</sup> Shareholders receive annual financial statements (and for public companies, a host of SEC filings). Finally, in most public companies, transferring ownership is a simple and frequent transaction.<sup>15</sup>

In a similar fashion, we can describe the (typical) features of a debt financial security such as a bond or bank loan. Debt contracts are a schedule of contracted cash flows. Similarly, debt contract control rights are fairly narrow and specific, similar to a covenant that bounds inventory. Conditions of bankruptcy highlight that, like equity, cash flow and control rights are contingent. Debt contracts typically require periodic information. Finally, debt contracts are often assignable so they can be sold.<sup>16</sup>

However, the rights associated with a financial security can also be quite limited. Consider employee stock options, a common occurrence in many start-up companies. The cash flow rights are contingent on the option being exercised and so effectively contingent on the value of the underlying equity. The options might also be contingent on a vesting schedule tied to employment. The control rights are also nil until after the options are converted to stock. Information rights are often limited (particularly in a private company). Finally, employee stock options are typically not transferable and cannot be sold (i.e., “locked up”). Nevertheless, an employee stock option is a financial security because it gives to the option-holder a bundle of rights to the firm’s assets, and the holder of an employee stock option is an investor because her claim is justified in light of her provision of labor to the firm.

Such a broad definition may seem unworkable for some. The common-sense understanding of investing entails a resource contribution with an expectation of profits. For instance, Warren Buffett defines investing as “forgoing consumption now in order to have the ability to consume more at a later date.”<sup>17</sup> Similarly, the legal definition of an invest-

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subject should receive a financial security. See <https://www.nasdaq.com/article/what-is-an-ico-cm830484> for a brief background.

<sup>14</sup>In large public companies, the ability of shareholders to exercise their control rights—corporate governance—is an active area of research and practice. See Andrei Shleifer & Robert W. Vishny, *A Survey of Corporate Governance*, 52 no. 2 J. FIN. 737–783 (1997).

<sup>15</sup>The annual volume of transactions on the NYSE is trillions of dollars—close to the magnitude of the GDP of the US economy. <https://www.fxcm.com/insights/new-york-stock-exchange-nyse/>.

<sup>16</sup>Collateralized Debt Obligations and Asset Backed Securities are examples of debt contract assignments.

<sup>17</sup>See <http://www.berkshirehathaway.com/letters/2011ltr.pdf>

ment contract requires a capital contribution into a common enterprise with a reasonable expectation of profits derived from the entrepreneurial or managerial efforts of others.<sup>18</sup>

However, such a narrow definition places too much emphasis on the subjective condition of being an investor and thus does not allow for the consideration of what justifies one's rights and obligations as an investor. For instance, imagine someone who inherits a modest amount of money and uses it to purchase a cheap house as her primary residence in a neglected neighborhood. Also suppose that she were fully ignorant of the principles of finance and real-estate investing and that her intention was simply to eliminate paying rent. Lastly, suppose that, a few years later, the government enacts legislation that grants a specific tax credit to real-estate investors. A definition that emphasizes the subjective conditions for investors would bar her from attempting to claim the tax credit because she did not meet the subjective condition. But it would be arbitrary to employ such a definition to bar her claim without considering *why* such a definition *should* be used. A justifiable reason for defining an investor for the purposes of the tax credit should consider relevant reasons such as the purpose for which the tax credit was created, moral issues related to fairness and justice, etc. Our definition of an investor makes room for such concerns. Our claim is that data subjects are justified in claiming that they are investors because they are justified in receiving a financial security from the firm in exchange for their data.

### III. THE BALANCE SHEET IMPACT

To explain our claim that data subjects are justified in receiving a financial security from the firm in exchange for their data, we begin by developing an understanding of the relationship between a firm and its capital investors through the balance sheet impact of a capital investment. The balance sheet in this context serves two purposes; it provides a standard foundation on how investment is handled practically. Based on this understanding, we build a case for data subjects as investors by replicating the balance sheet impact of a capital investment.

We use standard accounting definitions such as assets, liabilities, and equity based on Generally Accepted Accounting Principles (GAAP, Statement of Financial Accounting Concepts [SFAC] No. 6).

- **Assets:** A property with probable *future economic benefits* that is presently obtained or controlled by an entity, as a result of past transactions or events.
- **Liabilities:** A property with probable *future sacrifice of economic benefits*, due to present obligations of an entity, as a result of past transactions or events.
- **Equity:** The residual interest in the assets after deducting liabilities.

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<sup>18</sup>Reves v. Ernst & Young, 494 U.S. 56, 64 (1990).



In addition to these definitions, we also make references to two rules that form the foundation of the double-entry accounting system. The first rule states that all transactions must be recorded and reflected in the accounting statement (i.e., the balance sheet) of all parties involved. The second rule, known as the balance sheet equation, states that an individual entity's assets always equal its liabilities plus equities.

We start by examining the impact of a capital investment to a firm and its capital investor's balance sheets over time. Capital (cash, physical asset, etc.) is an asset simply because it can be used to generate future economic benefits. When a firm acquires capital from a capital investor, this transaction must be reflected in both the firm and the investor's balance sheet, due to the first general rule. In addition, assuming no changes to the firm's other assets, this transaction must result in a corresponding increase in liabilities or equity (or both) sides of its balance sheet based on the second general rule (the balance sheet equation).

We consider how a firm's balance sheet changes over two periods,  $t = 1$  and  $t = 2$ , under a capital investment transaction. At  $t = 1$ , the capital investor provides capital to the firm and receives either a debt-like financial security and/or an equity-like financial security in exchange. We will assume that the firm also owns some existing assets that are 100% equity financed. Between  $t = 1$  and  $t = 2$ , the firm generates cash flow using its original asset and the additional investment. At  $t = 2$ , the capital investor can lay claim to the firm's assets tied to the financial security received in  $t = 1$ .

To make this setting more concrete, suppose that at  $t = 1$ , the capital investor provided \$1MM in exchange for a bond maturing in  $t = 2$  (a debt financial security), and another \$1MM in exchange for common stocks (an equity financial security) simultaneously. Figure 1(a) illustrates the firm's balance sheet at  $t = 1$ . The firm operates between  $t = 1$  and  $t = 2$ , and generates some amount of cash flow, which is reflected in  $t = 2$  as some change in its total assets (this can be positive, zero, or negative). Over the same time interval, the bond accrues interest. Figure 1(b) illustrates the firm's balance sheet at  $t = 2$ .

We can clearly identify the assets that the capital investor can lay claim to at  $t = 2$ . The capital investor in this example first claims the assets tied to the \$1MM corresponding to the bond principal and the assets tied to the accrued interest. In addition, the capital investor in this example can then claim the assets tied to the \$1MM common stock investment at  $t=1$ , and the corresponding share of retained earnings, which is

$$(\Delta \text{assets} - \text{accrued interest}) \times \frac{\$1\text{MM common stock}}{\$1\text{MM common stock} + \text{existing equity}}.$$

The maturity of the bond results in an asset outflow for the firm that was already scheduled at  $t = 1$ . The common stock investment does not result in a scheduled asset outflow for the firm. However, the firm surrenders a portion of the change in the residual asset value (after servicing the debt obligation) to the equity investor.

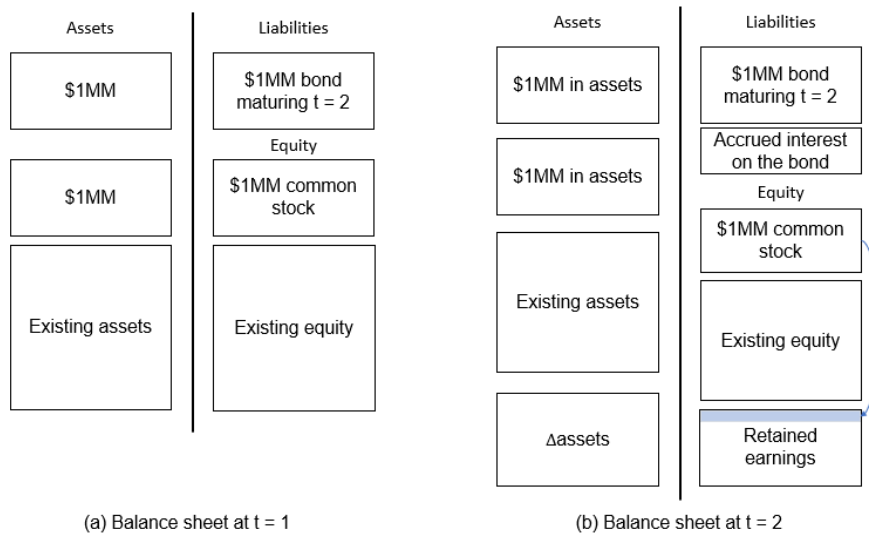


Figure 1: The balance sheet impact of capital investments

Generalizing from this example, we can characterize a debt-like financial security and an equity-like financial security that are involved in capital investment transactions. A debt-like financial security is defined primarily by a scheduled asset outflow to the capital investor, including some guarantee on the principal. This represents a probable future sacrifice of economic benefits for the firm and is therefore classified as a liability on the balance sheet. Products such as bank deposits or utility tokens such as travel mileage also fall under the category of a debt-like financial security and are treated as liabilities. On the other hand, an equity-like financial security can be defined by its lack of debt-like property (equity = assets – liability). An equity-like financial security does not involve a scheduled asset outflow to the financial investor, and there is no guarantee on the principal. A common stock would fall under this category.

We have defined the relationship between a firm and its capital investors with the balance sheet impact as the basis. A firm receives an asset from the capital investor and offers a financial security. The financial security is necessary because the balance sheet requires a liability entry or an equity entry to balance the asset increase.

The relationship between a firm and its data subjects would work in exactly the same fashion. An asset is defined as a resource that can generate future economic benefits. Data is an asset simply because it can be used to generate future economic benefits. When a firm acquires data from a data subject, this transaction must be reflected in both the firm's and the data subject's balance sheet, due to the first general rule. In addition, assuming no changes to the firm's other assets, this transaction must result in a corresponding increase

in liabilities or equity (or both) side of its balance sheet based on second general rule (the balance sheet equation).

If a firm that can use data for future economic benefits is required to classify data as an asset once it receives the data from the data subject, then the firm needs to balance its financial statement through a corresponding entry in its liability or in its equity. If the firm classifies this as a liability, then the data subject should have received a debt-like financial security in exchange for the data. If the firm classifies this as an equity, then the data subject should have received an equity-like financial security in exchange for the data. In the next sections, we show that as long as we accept the notion that data is an asset, it must follow that the data subject is entitled to receive a financial security of some form in exchange for data.

#### IV. THE PARALLEL IN THE BALANCE SHEET

In this section, we propose that the nature of the financial security (debt-like or equity-like) that the data subject should receive depends on whether the data transferred is personally identifiable data (PII, or for short, identity data) or non-identifiable data. To clarify, identity data is any data that can be associated with an individual data subject that the subject can rightfully maintain a claim to in the future. Non-identity data is economically valuable data that does not have to be associated with an individual data subject.<sup>19</sup> For example, suppose that John Doe living in Palo Alto opened an Amazon account and ordered a copy of *Le Morte d'Arthur* on February 8, 2019 at 7pm. In this case, John Doe's identity and his address would be considered identity data, whereas the fact that someone in Palo Alto ordered a copy of *Le Morte d'Arthur* on February 8, 2019 at 7pm is non-identity data.

Specifically, we argue that data subjects should receive a debt-like financial security in exchange for identity data, whereas data subjects should receive an equity-like financial security in exchange for non-identity data. In the world of data capitalism (or the "analytics age"), data subjects provide not only their identity information, but also a constant stream of non-identity information that is valuable to firms whenever there is an interaction between the two parties.<sup>20</sup> We maintain that data subjects are entitled to an

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<sup>19</sup>It is a thorny question to specify the boundaries of "personally identifiable data." To answer it, we would need to join the contested debates about the legitimate scope of the "privacy zone," which would be beyond the scope of this article. It suffices to say that companies are interested in collecting and processing a variety of identity data that are within the scope of the privacy zone. See HERMAN T. TAVANI, "Informational privacy: Concepts, theories, and controversies," *THE HANDBOOK OF INFORMATION AND COMPUTER ETHICS*, 2008.

<sup>20</sup>Examples of these non-identity data include interactions with the technology firm's websites, or click-stream data. See Alan L. Montgomery et al., *Modeling Online Browsing and Path Analysis Using Click-stream Data*, 23 no. 4 *MARKETING SCI.* (2004). Examples of these non-identity data include interactions with the technology firm's websites, or click-stream data.

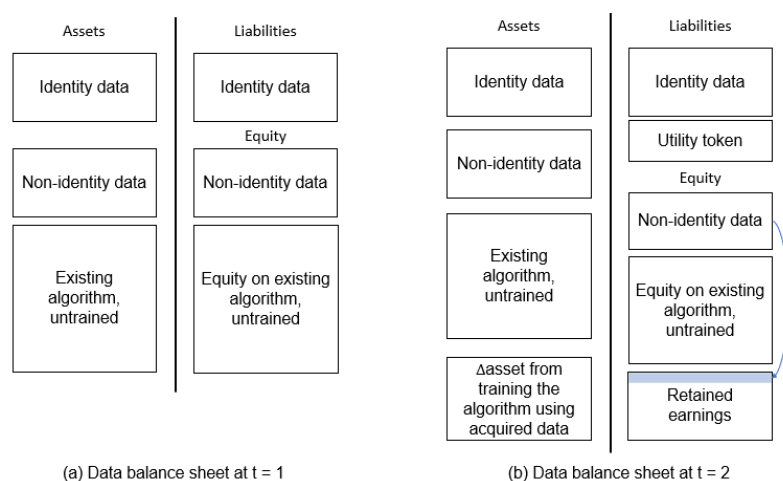


Figure 2: The data balance sheet impact of data investments

equity-like financial security in exchange for their non-identity data, given the parallels that can be drawn between the contribution of data subjects to a firm's balance sheet and that of financial investors.

In making the parallel between financial investors and data subjects, we consider how a firm's data balance sheet changes over two periods:  $t = 1$  and  $t = 2$ . At  $t = 1$ , the data subject can provide personal data to the firm and receive a debt-like financial security and/or provide non-personal data to the firm and receive an equity-like financial security in exchange. We will assume that the firm also owns some existing algorithm that is 100% equity financed but untrained on any data. Between  $t = 1$  and  $t = 2$ , the firm increases the value of its algorithm by training it on the new data acquired from the data subject. At  $t = 2$ , the data subject can lay claim to the firm's assets tied to the financial security received in  $t = 1$ . Figure 2(a) and 2(b) illustrate the firm's data balance sheet at  $t = 1$  and  $t = 2$ , respectively.

At  $t = 2$ , the data subject can first lay claim to the debt principal and accrued interest. The principal is the original data, and accrued interest is the utility token (e.g., access to a product or service) in the case of data investments. We assign a utility token to the role of accrued interest, because interest is a liability and so are utility tokens. Other assets can also be used as an interest payment on the identity data, but utility tokens seem to be used most often in practice. At the same time, the non-identity data can be used to lay claim to a portion of the increase in the total asset value from having more data. This would be the case if the data is used to generate business analytic insights or to improve the performance of existing algorithms. In Figure 2, we consider the case where the firm improves the economic value of its machine learning algorithm by training on real data acquired from

the data subject (machine learning algorithms by definition improve performance when given more data). This results in an increase in the overall asset, and the data subject can claim the assets tied to the non-identity data, and the corresponding share of data retained earnings, which is

$$(\Delta \text{assets} - \text{utility token}) \times \frac{\text{non-identity data}}{\text{non-identity data} + \text{existing algorithm}}.$$

Note that, similar to the case of capital investment, there is a potential scheduled outflow of data assets in terms of identity data or utility tokens. These items are therefore classified as liabilities, but these items are best treated as a bank deposit and accrued interest on those deposits rather than as a bond. Any remaining assets after liabilities are subtracted correspond to equities by the accounting definition, and the non-identity data provided by the data subject represents a claim on a portion of the residual asset value of the firm.

We clarify that the financial security considered in the case of the data investor at this point is debt-like and equity-like and not necessarily a full debt or equity. In the latter case, we can imagine a financial security that is similar to that of an employee stock option in which the cash flow right is contingent on certain conditions such as exercise or a vesting period. How much of cash flow rights, control rights, information rights, and resale rights should belong to the data subject is an important question about practical implementation that we wish to tackle in future works. However, we emphasize at this point that unless we have a good reason to use a double-standard, data subjects should be entitled to receive some form of financial security in exchange for their data and provide a guideline for data balance sheet accounting.

We conclude this section with three examples based on how major technology companies acquire and process data, and how these activities should correspond to an exchange of debt- versus equity-like financial security with the data subjects. We also include a fourth example to explain why regular consumers do not qualify investors despite a similar balance sheet impact.

#### **Example 1: Amazon**

Amazon acquires data on a customer's name, address, and order for a product. Amazon is obligated to provide fulfillment service in exchange for these data. It must also maintain this data and delete it from its database upon the customer's request. Thus, Amazon should issue a debt-like financial security (e.g., the data principal and the utility token for Amazon's fulfillment network) in exchange for the customer's data acquired by his or her opening an Amazon account and placing an order.

At the same time, Amazon acquires non-identity data in terms of the customer's location, time of order, and the product ordered. This information is economically valuable to Amazon even if the data is ultimately anonymized, because Amazon can use its algorithms

to generate economic value by streamlining its supply chain in the future (e.g., lowering logistics costs by achieving better demand forecast and inventory placement within its fulfillment network).<sup>21</sup> Thus, Amazon should issue an equity-like financial security in exchange for the economically valuable non-identity data asset obtained from the data subject.

### **Example 2: Facebook**

Facebook acquires data representing personal identity from a user when he or she creates an account. Once Facebook acquires this data, it is now obligated to provide the user with access to its social network platform. It is also obligated to maintain the personal identity data securely and remove it upon the user's request. Thus, Facebook should issue a debt-like financial security (e.g., the principal and the utility token for the Facebook platform) in exchange for the personal identity data used to open the Facebook account.

At the same time, Facebook acquires non-identity data in terms of the user's interactions with the content on the social network. This information is valuable to Facebook even if the data is completely anonymized, because Facebook can generate economic value by improving its algorithms using this data (e.g., improving its News Feed algorithm) or generating data analytics insights that can be sold to advertisers.<sup>22</sup> Thus, Facebook should issue an equity-like financial security in exchange for the economically valuable non-identity data asset obtained from the data subject.

### **Example 3: Google**

Suppose that an individual submits a search query to Google on a public computer. Google acquires data on the search query, but there is no identity data. Google is technically not obligated to respond to this search query by returning links that best match the keywords. Google is also not required to maintain confidentiality on the specific keywords submitted. Therefore, Google does not need to issue a debt-like financial security in exchange for this search query data.

However, Google should still issue an equity-like financial security in exchange for this search query data. The information on the keywords used in the search query is an economically valuable non-identity data to Google even if it is fully anonymized. For example, Google can use the data on the popularity of a specific search query keywords to

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<sup>21</sup>This paper demonstrates how anonymized past order data can be used to improve fulfillment decisions in e-commerce to lower operational costs. Jason Acimovic & Stephen C. Graves, *Making Better Fulfillment Decisions on the Fly in an Online Retail Environment*, 17 no. 1 MANUFACTURING & SERV. OPERATIONS MGMT. (2014).

<sup>22</sup>This paper demonstrates how anonymized Facebook usage data can be used to generate insights on how to improve social media engagement. Dokyun Lee, Kartik Hosanagar, & Harikesh S. Nair, *Advertising Content & Consumer Engagement on Social Media: evidence from Facebook*, 64 no. 1 MGMT. SCI. 5105–5131 (2018).

optimize the pricing on its ad-exchange platform.<sup>23</sup> The individual submitting the search query to Google is entitled to receive an equity-like financial security, even if that entitlement is ultimately forfeited.

## V. WHO OWNS DATA?

A crucial premise in our proposal is that data subjects retain some property interest in their data even after they contribute the data to the data firm. Consider, for example, someone who walks into a coffee shop that is advertising a 2 dollar cup of coffee and hands the barista a 20 dollar bill. If it were the case that the act of receiving a cup of coffee from the barista extinguish the customer's property interest in the 20 dollar bill, she would not be justified in receiving 18 dollars as change. She would be justified in receiving change only if she retained some property interest in the 20 dollar bill that she transferred over to the barista. In the same way, the data subject is justified in receiving a financial security from the data firm only if she retains some property interest in her data even after the data is transferred over to the data firm. Otherwise, the balance sheet argument might simply imply that booking the data as an asset ought to increase the equity stake for the firm's shareholders.

For the sake of argument, we are willing to grant that a data subject has intentionally transferred her personal data to the data firm to collect, hold, and/or process. Even so, determining whether or not a data subject retains some property interest in the data that she transfers to the firm cannot be settled by pointing to the mere facts such as a change in possession, an exchange of goods/services, or subjective intentions of at least one of the parties to the exchange.[CITE] Continuing from the example given above, the mere fact that the money is now in the possession of the barista does not extinguish the customer's property interest in the money that she transferred to the barista. Neither would it be sufficient to claim that the customer has given up the entirety of her property interest in the money merely because the barista handed her a cup of coffee or because the barista honestly thought that the person had intended the remainder of the cash to constitute a generous tip. Instead, the determinative issue is whether or not she actually has a property interest in the money as a matter of description and/or she should have a property interest in the money as a matter of morality. Similarly, the issue that requires attention is whether or not the data subject actually has some property interest in her personal data even after she transfers it to the data firm.

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<sup>23</sup>This paper illustrates how Google uses anonymized search keyword auction data to improve its ad auction process, leading to a 3-6% improvement in its ad exchange revenue. Negin Golrezaei et al., *Boosted Second Price Auctions: Revenue optimization for heterogeneous bidders*, Available at SSRN 3016465, 2017

There is much legal and philosophical controversy over what the concept of property actually entails. “[E]veryone knows what [property] is, but no one can define it.”<sup>24</sup> It might seem as if property refers to “exclusive control over something—to be able to use it as one wishes, to sell it, give it away, leave it idle, or destroy it.”<sup>25</sup> But careful scrutiny quickly unravels such a common sense understanding of property. Take, for instance, someone who sets up a trust, commits to funding it with his own money according to a specified schedule, and then conveys the trust to a trustee for the benefit of a charitable organization. Who is the owner of the trust, let alone the money committed to the trust? In such an instance, it can be helpful to think of property not as a unitary concept but rather a bundle of rights that can vary according to the context.<sup>26</sup> The rights within the bundle can be divided and apportioned in a myriad of ways.<sup>27</sup> And in instances like the trust, it can be more helpful to think about the property interests that each person has to the trust—and thus the “particular limited rights each of the co-owners has with respect to the thing”<sup>28</sup>—rather than attempting to identify the “true” owner of the trust. And given that our argument centers around the conditions under which the data subject is entitled to receive a financial security in exchange for her data, we will refer to the idea of “property” and “ownership” interchangeably to refer to a set of cash-flow, control, information, and liquidity rights that individuals have with respect to their data.

Given the definition of property above, we contend that, at least as a matter of property rights, the relationship between data subjects, data firms, and personal data is more akin to the trust rather than a typical sale. A simple transaction involving the exchange of coffee for money might involve both parties alienating the entirety of their property claim to the things being exchanged. Once I give my money to the barista, I might transfer to the corporation for whom the barista works the entirety of my property claim to the agreed-upon price of the coffee, and the corporation might similarly transfer to me the entirety of its property claim to the cup of coffee. On the other hand, we contend that it is more accurate to view data subjects as alienating only certain aspects of their property rights to their data while retaining other aspects rather than to view data subjects as alienating their property interests in their personal data entirely to the data firm.

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<sup>24</sup>Abraham Bell & Gideon Parchomovsky, *A Theory of Property*, 90 *Cornell L. REV.* 435 (2004).

<sup>25</sup>Thomas C. Grey, *The Disintegration of Property*, 22 *Nomos* 69 (1980).

<sup>26</sup>A.M. Honoré, “Ownership,” in *OXFORD ESSAYS IN JURISPRUDENCE*. (A.W. Guest ed., 1961).

<sup>27</sup>Considerable controversy concerns whether or not there is an identifiable bundle of rights that constitute the idea of property or ownership. Whereas some argue that some stable bundle of rights underlies the idea of property, others argue that the very idea of property is meaningless. Our argument does not depend on the resolution of such a debate because there is no controversy about the fact that there are multiple rights associated with a common sense understanding of property and that these rights can be divided and apportioned in a myriad of ways.

<sup>28</sup>See Grey, *supra* note 25.



As a descriptive matter, modern property rights are primarily determined by law. And although legal regimes are still attempting to catch up to a world in which data is becoming increasingly more valuable, a significant body of laws already grants data subjects property rights to their data even after they consent to transfer the data to the control of data processing firms. The right to receive cash-flow is largely a matter of contract, and, as a result, data subjects already have the right to demand financial compensation in exchange for transferring their data to data firms, even if they do not exercise such a right. And the data subjects' right to information about how the data firm is using and will use their data is already protected by most modern privacy regimes in the world. Furthermore, newer legal regimes go further to protect other property rights of the data subject. Take, for instance, the "right to be forgotten" under the EU's General Data Protection Regulation (GDPR). Such a right implies that users have the right to control their data even after the user transfers the data to the data firm. Or consider the California Consumer Privacy Act (CCPA), which grants data subjects the right to opt-out of the sale of their personal information to third parties. Such an opt-out right implies that data subjects have some liquidity right in their data even after they transfer their data to the data firm, because it gives data subjects the right to allow the data firm to sell their data to third parties. Although these regulations are too new to reliably predict how the various exceptions and the possibility of contractual provisions might limit such rights, there is no doubt that these laws recognize that data subjects ought to have at least *some* property rights to their data after they transfer the data to data firms.

One might argue that such rights granted to data subjects are not property rights. For some, a property right to something refers to the right to dictate the terms of its transfer.<sup>29</sup> Given that the rights to be forgotten or opt-out of the sale of one's information are mandated by law, the data subject would not have a right to dictate the terms of transferring such rights at all. Such rights might be better classified as privacy rights rather than property rights, some might argue. However, such an objection does not conflict with our position. For instance, some resist the characterization of privacy rights as a form of property by arguing that such a paradigm would undermine the goal of promoting information privacy and deeper-held values such as self-governance and integrity.<sup>30</sup> But those same scholars resist such a characterization because they either affirm the importance of privacy<sup>31</sup> or recognize that one might own one's self and the information related to one's self.<sup>32</sup> From such perspectives, users might be required to grant data firms access to their data while retaining all relevant rights that they might have over the data. In such a world,

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<sup>29</sup>Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One view of the cathedral*, 85 no. 6 HARVARD L. REV. 1089–1128 (1972).

<sup>30</sup>Carole Pateman, *Self-ownership and Property in the Person: Democratization and a tale of two concepts*, 10 no. 1 J. POL. PHIL. 20–53 (2002).

<sup>31</sup>Samuelson, *Privacy as intellectual property*.

<sup>32</sup>Pateman, *Self-ownership and Property in the Person: Democratization and a tale of two concepts.*"

data subjects would be operating within a paradigm in which they act as lenders or depositors of their data to the data firm. And within such a world, data subjects should demand robust control and information rights over their data while also retaining all potential liquidity/resale rights. This state of affairs is entirely consistent with our position.

Furthermore, regardless of how contracts between data subjects and data firms might limit the legal rights that are protected by newer data privacy legislation, there is nothing in online consent forms or privacy policies that suggests that data firms are granted *complete* rights to user data on their platforms. If it were so, a company like Facebook would have the right to exclude users from accessing their own personal information, which is currently not the case. Instead, online consent forms and data firm privacy policies typically specify the rights that data firms have to user data. Even when such rights are quite broad, they do not give *exclusive* rights to user data to data firms. Thus, the rights that are not specified within such agreements are retained by users, regardless of how one characterizes such rights. As a result, it is descriptively *more* accurate to characterize the typical data transaction as one in which data subjects *allow* firms to access and use their *own* personal data, as a patient allows a surgeon to touch her body during a surgery, than it is to characterize it as a transaction in which the data subject *sells* her data to the data firm. Just as it would not make any sense to say that a patient who consents to a surgeon having access to her own body somehow transfers the full set of rights that she has over her own body to the surgeon, it does not make sense to say that the data subject transfers the full set of rights that she has to her data to the data firm. Whether or not such rights are characterized as property or privacy rights does not change the fact that data subjects retain certain rights associated with control, information, and liquidity over their data even while it is within the possession of the data firm.

Of course, we are not claiming that data subjects retain *all* of their rights to their personal data nor that data firms do not gain *any* rights to user data. Data firms put significant efforts into data collection processing, and a significant amount of user data is the result of the firm's observation of the data subject rather than any transfer between the subject and the firm. In most cases, the value of a user's data is the result of a combination of the efforts of the data firm and data subject who either provides information to the firm or consents to being observed. As a result, after the data is processed, it is often technically difficult to pinpoint which part of the firm's data is the result of a contribution of a particular data subject. However, regardless of what may be the actual extent of the data users' rights to their data, what is clear is that data users have *some* rights to their data. And even if it were the case that the data firms' efforts were significantly larger than the data subjects' contributions, data subjects would still be justified in receiving a financial security from the firm for similar reasons that a holder of a single share of stock in a firm has a financial security in the firm, however small it might be.

## VI. WHAT DIFFERENTIATES DATA SUBJECTS FROM CONSUMERS?

For some, the discussion above might seem to suggest that there is no meaningful difference between viewing data subjects as consumers and viewing them as investors. Data subjects, one might argue, are not any different from other providers of capital or labor inputs for the data firm, including consumers who transfer capital to the firm in exchange for the firm's good or service. From this perspective, whether or not the data subject is justified in receiving a financial security from the firm is simply a matter of bargaining within the market. Just as a labor provider or a supplier might be able to negotiate an equity stake in the firm as part of their contractual arrangement, data subjects are able to do the same. The fact that data subjects do not currently receive a financial security from the firm might be merely a function of data subjects being willing to transfer their data to data firms in exchange for access to the various services provided to the data subjects by the data firm. From this perspective, our position that data subjects should be considered investors would be akin to the position that a customer at a coffee shop should be considered as an investor because she would be justified in receiving a financial security from the shop if she had sufficient bargaining power.

To a certain extent, we agree with such a perspective. The very idea of a financial security is flexible, given that it encompasses a wide range of potential cash-flow, control, information, and liquidity rights. As a result, in addition to the fact that various patrons of the firm might be able to bargain for an equity stake in the firm, even a relatively unimportant patron might also have a financial security in the firm. The simple right of being owed a small amount of money in exchange for services provided to the firm is sufficient to qualify as a financial security and thus qualify the service provider as an investor.

However, there are important differences between various classes of patrons of a firm that depend on the default and mandatory rules associated with their contractual relationship. Default rules are rules that govern the rights and obligations of private parties unless they contract for an alternate arrangement, whereas mandatory rules are rules that do not allow for an alternate arrangement. For instance, Delaware law imposes a fiduciary duty of care and loyalty on the directors of a corporation. However, courts in Delaware are also increasingly allowing corporations and their directors to opt-out of liability for the breach of such duties through contractual arrangements. As a result, the rule that governs the fiduciary duty of corporate directors in Delaware is a default rule, where the fiduciary duty is imposed by the law only if the directors and corporations do not contract for an alternate arrangement. On the other hand, California courts also impose fiduciary duties on corporate directors but do not permit the parties to arrange for a waiver of such duties. As a result, the rule that governs the fiduciary duty of corporate directors in California is a mandatory rule.

Various providers of inputs to a firm can be distinguished by the differences in the mixture of default and mandatory rules that govern their relationship. Ordinary providers of goods, for instance, are governed mostly by default rules that allow for a significant amount of flexibility for their contractual arrangements. A contract that involves the exchange of a good for a financial security, for instance, might impose a default rule in which the provider of the good transfers all of the provider's property interests in the good to the recipient in exchange for compensation. Providers of labor, on the other hand, are governed by a more robust set of mandatory rules that govern working conditions, collective bargaining, etc. An employment contract, for instance, cannot waive the protections of a federal law that requires the employer to provide a safe working environment for the employee.

Our contention is that the rights of data subjects to their data is already governed by a sufficient set of mandatory rules that distinguish them from consumers. For instance, firms with publicly-traded securities in the US are governed under a variety of mandatory rules that require disclosure of financial information to investors. There is a similar parallel for data subjects. Various legal and regulatory regimes require firms in possession of user data to disclose information on what types of information they possess and how they use that information to their users upon request. On the other hand, the typical consumer who transfers some money to the firm in exchange for a good or a service has no mandatory or default right to receive information about how the money is then used by the firm. Once the exchange occurs, the money belongs entirely to the firm. As a result, a consumer who might have an interest in knowing how a fried chicken sandwich chain spends its proceeds can only attempt to convince the firm to voluntarily disclose relevant information. Given such distinctions, there is sufficient basis to distinguish data subjects from consumers. In fact, the robust set of mandatory rules that govern data subjects makes them look more like shareholders and other providers of financial capital than even ordinary suppliers and other patrons.

## VII. IS THIS WHOLE IDEA FEASIBLE?

A fully developed discussion of the feasibility of our proposal is beyond the capacity of this paper. We recognize that practically realizing our proposal will require overcoming several technical and regulatory hurdles. But these challenges are not insurmountable. Take, for example, the digital sale of stocks, which has made buying and selling stocks much easier than in the past. Or consider the development and implementation of various sustainability indices (e.g., the Dow Jones Sustainability Indices). Such efforts faced similar regulatory and technological challenges that were eventually overcome. There is no reason to think that recognizing the investor status of data subjects would be any different.

Consider, for example, the technical challenges of recognizing the financial claims of data users. Implementing an equity-like claim for investors will, for a data-intensive company like Facebook or Amazon, be complicated. Even if the aggregate value of the data-equity claim is small, it still would involve millions (billions) of individual claims. Fortunately, these challenges do not seem insurmountable because the technology challenges in managing the claims are very similar to those that arise in managing user data. For example, adding my small data-equity claim to a user's existing Facebook profile may be cumbersome but is hardly daunting for Facebook (the company). In general, for companies that manage a user-data base, tracking our suggested data-equity claim is analogous to implementing a reward program like airline miles.

Perhaps a more nettlesome implementation issue is maintaining anonymity and privacy. How would data firms record and account for data collected without user accounts? Forcing companies to collect more data would certainly be an unintended and unwanted consequence. While this problem is also hard, we are also hopeful there are clever solutions. Technology like the "do not track" or the "basic attention token" cryptocurrency hint at technology that might enable recording the user's claim to a data equity security in a way that is anonymous from the company collecting data. However, we leave that discussion to a future paper that explores this cryptography challenge.

A new financial security will obviously pose challenges to existing financial regulation as well. But regulators are not unfamiliar with adapting regulation to new technologies. For example, we mentioned earlier the U.S. Securities and Exchange Commission's (SEC) adaptation of regulation for new "cryptocurrencies." The Financial Accounting Standards Board (FASB) maintains an Emerging Issues Task Force to address reporting requirements from changing technologies. Similarly, the Jumpstart Our Business Startups Act of 2012 adapted regulations to facilitate new "crowd funding" technology that facilitates micro-investments in new companies (e.g., Kickstarter, Lending Loop).

Another challenge would be to consider how the new data-equity claims might be traded, if they were traded as well. But even here, experience suggests that financial market innovation will be up to the task. For example, note the remarkable decline in the trading costs (brokerage fees) for trading stock to near zero. Alternatively, consider new assets like Bitcoin and the now huge ecosystem of (perhaps far from perfect) exchanges. A growing body of research attempts to develop a technically feasible way to monetize and trade data.<sup>33</sup>

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<sup>33</sup> Amirata Ghorbani & James Zou, *Data Shapley: Equitable valuation of data for machine learning*, arXiv preprint arXiv:1904.02868, 2019; Ruoxi Jia et al., *Efficient task-specific data valuation for nearest neighbor algorithms*, 12, no. 11 PROC. of the VLDB ENDOWMENT 1610–1623 (2019); Ramesh Raskar et al., *Data Markets to support AI for All: Pricing, Valuation and Governance*, arXiv preprint arXiv:1905.06462, 2019; Ali Dorri, Salil S. Kanhere, & Raja Jurdak, *Blockchain in Internet of Things: challenges and solutions*, arXiv preprint arXiv:1608.05187, 2016; Guy Zyskind, Oz Nathan, et al., *Decentralizing Privacy: Using blockchain to protect personal data*, in 2015 IEEE Security and Privacy Workshops (IEEE, 2015), 180–184;

Some investors' rights can be granted without trading or monetizing data. Information and control rights can be granted without monetization at all. Through shareholders' annual meetings or white papers, shareholders enjoy the information right. A board has a duty to explain how the company has used the shareholders' investment. Likewise, if our argument is plausible, data investors should have a right to understand how their data investment is used by a company. Shareholders' right to control is basically a voting right in practice. So, in real life, shareholders' right to control is more like a right to influence. Likewise, we can imagine a data investors' annual meeting where data subjects could exercise their voting power on how to govern data management and, by doing so, could influence the board's decision about how to use the data investment.

Does this mean that data subjects are corporate owners? Investors may simultaneously be owners, but not always. In a major view, ownership, functionally defined as the sum of rights to control and to residual earnings, can be given to any patron group in theory, and in practice is given to shareholders because doing so minimizes transaction costs in various senses.<sup>34</sup> So, in conventional business organizations, shareholders are investors and owners in the so-called "nexus-of-contracts" paradigm. But consider venture capital, which perfectly meets the conditions necessary to be an investor. Venture capital's rights are contingent upon the investee's performance. The venture capital may obtain, for instance, board control, if the firm's performance falls below the threshold upon which the venture capital and the firm agreed. But if the firm's performance improves above the threshold, the entrepreneur may retain board control. In sum, being an investor is distinct from being an owner. Thus, arguing that data subjects are investors is not the same thing as arguing that they are owners of a firm. What rights must be granted to data investors is another issue that deserves in-depth analysis.

#### CONCLUDING REMARKS

In this paper, we have imagined a new possibility. And we analytically showed that it is not just a possibility, but a reality. Unless there is a strong reason to override the principle, "No double standards (or Fair treatment)," data investors are entitled to claim that they are investors. Most data subjects do not meet the subjective condition because there is a lack of transparency about what contribution data subjects make to companies. Companies might want to refuse to make the contribution transparent. But justice demands that data subjects be aware of their contributions, claim their entitlements, and be treated as investors.

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See also OECD's survey on methodologies to measure monetary value of personal data: C. Reimbsbach-Kounatze, T. Reynolds, & P. Strykowski, *Exploring the Economics of Personal Data—a survey of methodologies for measuring monetary value*, 2013.

<sup>34</sup>Henry Hansmann et al., *Ownership and Organizational Form*, 891 HANDBOOK ORGANIZ. ECON. (2013).