Essays – *peer-reviewed*
https://doi.org/10.6092/issn.1971-8853/11746

Sociologica. V.14 N.3 (2020)
ISSN 1971-8853

Platform Works as Stack Economization: Cryptocurrency Markets and Exchanges in Perspective

Koray Caliskan*

Submitted: November 5, 2020 – Revised version: January 7, 2021
Accepted: January 7, 2021 – Published: January 29, 2021

Abstract

What is an economic platform? I address this question by focusing on the case of cryptocurrency exchange platforms. The research draws on interviews with platform actors, fieldwork in one exchange, and computational text analysis of the terms of service of all cryptocurrency exchanges in the world. I argue that cryptocurrency exchange platforms go beyond market processes by fulfilling a variety of functions including banking, infrastructure development, gift-giving, barter, money making, payment system operation, software production, security providing, and centralized extra-blockchain accounting. I propose the concept of "stack" to describe such a process of socio-digital economization that takes place in these data money exchanges. Demonstrating that it is inadequate to describe platforms as mere digital infrastructures, devices, places or markets, I argue that cryptocurrency exchange platforms can best be understood as economization stacks that weave multiple layers and types of interaction, and facilitate an empirically observable range of variegated economic activities.

Keywords: Cryptocurrency; Blockchain; Money; Market; Platform.

Acknowledgements

I owe a debt of gratitude to David Stark, Gözde Güran, Donald MacKenzie, Vincent Lépinay, Burak Arıkan, Vassily Pigounides, Janet Roitman, Adam Hayes, Aaron Fry, and colleagues in Platform Economies Research Network (PERN) at The New School for their comments and criticisms. Thanks are also due to Sevde Ünal for her research assistance, Luis Marin for editorial help, and Nina Macaraig for copy-editing. I would also like to recognize İlker Birbil for our substantive research collaboration and the two reviewers whose critique and suggestions made this paper a better one.

* School of Design Strategies, Parsons School of Design, The New School, New York City (USA);
koraycaliskan@newschool.edu; https://orcid.org/0000-0001-9876-9405

1 Introduction and Literatures

The first decade of the twenty-first century marked a curious double movement. As markets collapsed with an extraordinary velocity, we witnessed the simultaneous emergence of the most varied money and most rapidly emerging market form in history. In the decade following the 2007–2008 financial breakdown, 30,677 new cryptocurrency markets emerged across the world. As of October 2020, 7,307 cryptocurrencies — or, better put, *data monies*[1] — are exchanged around the clock, under the digital roof of 339 centralized exchange platforms. These platforms have no closing or opening time, and they enjoy a market cap of more than one trillion USD, an economy larger than the GDP of 92% of the countries in the world as of January 2021. This marks an unprecedented expansion of markets in recent economic history.

As these new markets and institutions begin to dot the landscape of our planet, early approaches to cryptocurrencies and their blockchains have gravitated towards mobilizing a discourse of revolution, a fundamentally new economic future that does not need formal institutions. This was a rupture talk about cryptocurrencies, a style of popular and scientific thought in need of observing a categorical break from the past (Hecht, 2002).

A popular book on cryptocurrencies has announced a blockchain revolution to the world: For the Tapscotts, blockchains are providing "the new digital economy" with optimal solutions addressing problems of trust without the need for intermediaries such as formal markets, accounting institutions, and states (Tapscott & Tapscott, 2016). Such a rupture talk has entailed an investment in mobilizing a public sentiment about data monies' advantages and necessity. There also exist equally popular negative sentiments about cryptocurrencies. One has called Bitcoin "a greater fool's gold" (*The Guardian*, 2018).

Academic literature has taken yet another way. Social studies of cryptocurrencies have shown that these currencies have been displaying characteristics in rapport with a preceding understanding of money as process, produced and maintained by social relations amid political institutions (Dodd, 2018; Rella, 2020). Contesting the exaggerated notion of economic rupture, researchers have demonstrated the political qualities of "trustless" blockchains, things designed to be extra-political in essence (DuPont, 2019), the oligopolistic tendencies of mining pools (Swartz, 2017), the ways in which new institutions were mushrooming around cryptocurrencies (Nelms et al., 2018), and how blockchain communities build social institutions to make them active in the first place (Crandall, 2019; Thieser, 2019).

Researchers drawing on micro-economic assumptions have also seen a continuity and, therefore, and used old ways of approaching this new type of money and platform by studying cryptocurrency trading (Kyriazis, 2019; Urquhart, 2016), financial assetization and pricing (Giudici & Abu-Hashish, 2019), price volatility (Katsiampa, 2017: Katsiampa et al., 2019), and trading regulations (Corbet et al., 2019).

Such a burgeoning literature, in part made possible by the abundance of data concerning data monies and the ease of finding them, has emerged with an ironic twist. Despite the fact that it is common knowledge that price manipulations are rampant in these markets, many researchers have not shied away from drawing on data collected by a handful of webpages that

1. This paper understands blockchains as actor-network assemblages that facilitate the imagining and transfer of economic value, by digitally representing this value as a *right to move data* securely. Drawing on the materiality of financializing the right to send data, data monies are made in ways that are historically and categorically different from paper or metal monies, or their fiat digital representations. For a detailed discussion and definitions, see Caliskan, 2020; for the raw data of white papers corpus text and R code, see Caliskan & Birbil (2020).

do not filter out wash-trading.[2] A great majority of papers written on data money markets and their prices is based on historical market price data from CoinMarketCap.com, one of the most popular market information websites for data monies. Yet, as has been shown by the Blockchain Transparency Institute, many of these webpages have been hiding the extent of wash-trading in data money exchanges. It has been shown that, until 2018, at least 7 of the top 10 exchanges carried out wash trading (BTI, 2018).

Even though such manipulative practices are now mostly factored out,[3] there is further evidence that the nature of market prices' realization on the ground should be studied, and not taken for granted as mere data. Researchers who draw on posted prices to understand markets operate on the assumption that there is no essential difference between data monies and pork bellies, when it comes to studying their markets. Both are things that people want, with their utilities subjectively defined. As a result, their prices can be analyzed to make sense of their markets.

A heterodox literature informed by socio-technical market research has already demonstrated the problems with approaching markets by simply looking at their prices. Social studies of price, worth, and value have exposed the socio-political and cultural context of attaching monetary value to things in concrete settings (Alexander & Alexander, 1991; Helgesson & Muniesa, 2013; Güran, 2020; Guyer, 2004; Stark, 2009; Velthuis, 2003). Scholars have shown that pricing is an instrument of market power and that it should not be taken for granted as a mere signal or neutral data to analyze the very markets that they make (Caliskan, 2005; 2007; 2009; Geismar, 2001; Pigounidès, 2020; Uzzi & Lancaster, 2004). Seemingly neutral formulas in "calculating" prices have always been inversion tools, representing the power of market actors who write those formulas more than displaying the neutrality of the market price itself (Lépinay, 2007; MacKenzie, 2006).

The need to move beyond prices to understand markets has been further underlined by a variety of socio-technical approaches to markets that call for a more dynamic and multi-variable study of markets. Researchers have demonstrated that trading infrastructures (Star, 1999), the very nature of the commodity (Mitchell, 2011), their legal context (Riles, 2004), metrological systems of measurement (Mallard, 1998), the social and political organizations of market actors (Uzzi, 1996), and discourses and techno-scientific knowledge (Grabher & König, 2017) contributed to marketization processes on the ground. These are not processes that happen *before* the market, giving markets a condition of possibility. They constitute concrete market-making, and they are endogenous to working markets, not exogenous factors such as an external scaffold encircling an imagined real thing.

Despite such a *glasnost* in market research, I argue that cryptocurrency markets present a fundamental challenge to our understanding of contemporary markets. These markets operate on digital platforms which go beyond marketization that facilitates exchanging as the main activity. It is not only market objects that are supplied and demanded, but their very markets, too. Furthermore, frequently defining themselves as "exchange platforms," these new markets organize their economization infrastructure to function simultaneously as *mints* that make data monies, *banks* that lend money for trading and charge various forms of interest rate, *vaults* and *security* institutions that present their clients with safe deposit locations, *insurance*

2. Wash-trading is a market manipulation practice whereby the same legal person, acting simultaneously as buyer and seller, transfers the ownership of an underlying asset between two accounts that she/he controls in order to produce misleading activity in the market.

3. According to the 2020 report of BTI, "only 31% of the CMC top 25 is being wash-traded compared to over 90% just 1 year ago" (BTI, 2020, p. 1).

agents that sell insurance against digital theft, *data centers* that sell and process information, *clearing houses* for various transactions, *accounting agencies* that bring together double-entry book keeping with blockchain accounting, and, in a few cases, even as *courthouses* that run arbitration cases. For instance, Coinbase, one of the largest cryptocurrency exchanges in the world, with 35 million users in more than 100 countries, describes itself as "a wallet, an exchange, and a set of tools for merchants, all built on the same platform."[4] (Coinbase, 2020).

Almost any exchange in the world has ancillary business formations, such as information marketing, built around their primary objective of facilitating trade. However, for most of the data money exchange platforms, non-trading activities are not ancillary, but among core economic engagements and sources of revenue. What, then, is a platform? How to describe cryptocurrency exchange platforms that have more functions now than a mere trading?

Economic platformization started in the commodities. The earliest work on platforms focused on industrial organization, describing the qualities of industrial commodities that can be redesigned and remarketed from a new perspective (Wheelwright & Clark, 1992). Qualifying the "architecture of the product," and not the ground on which its production and exchange were carried out, these early studies have illustrated how "platform products" drew on a modular manufacturing principle that brought together various core and ancillary components. SONY's Walkman were among those platform products whose parts lend themselves to be used in other platform products (Sanderson & Uzumeri, 1995; Ulrich, 1995).

The new century came with digitizing everything, including products and the networks of their production and exchange. IBM's innovative product planning strategy was based on not curbing competition, but instead inducing cooperation with other companies by encouraging non-IBM elements to be used on IBM "platforms" (Flurry & Vicknair, 2001). Following public debates on the unprecedented experiences of IBM, scholars from management studies, economics, and law moved their attention from industrial products to digital platforms

Seeing economic platforms such as Amazon as "intermediation markets," Caillaud and Jullien (2001) have located the network effects of platforms without calling them platforms. Their choice was the term "cybermediary." It was not picked up. Wright, however, located economic platforms that entail exchange relations as *markets* that "involve two distinct types of users, each of whom obtains value from interacting with users of the opposite type. In these markets, platforms cater to both types of users in a way that allows them to influence the extent to which cross-user externalities are internalized" (Wright, 2003, p. 1). Rochet and Tirole have also approached exchange platforms as markets and proposed a model of platform competition with two-sided markets (Rochet & Tirole, 2003; 2006). For them, "a market with network externalities is a two-sided market if platforms can effectively cross-subsidize between different categories of end users that are parties to a transaction" (Rochet & Tirole, 2003, p. 1017–1018).

Enlarging the scope of analysis from market exchange to other modes of economization, researchers and platform designers have approached platforms as a *technology* of intermediation between different economic actors (Evans & Schmalensee, 2005) and as coordination *devices* deployed in network markets with effects (Ambrus & Argenziano, 2004), and as multisided digital *frameworks* that shape the terms on which participants interact with one another (Gawer,

4. The multiplication and intersectionality of these platform works empirically supports the call for a rapprochement between platform studies and infrastructure studies (Plantin et al., 2018). Furthermore, Jane Guyer's new iteration of platforms could also be interpreted in association with stack economization, an exercise that deserves writing of a new paper (Guyer, 2016). Of course, one should not forget that seemingly non-platform companies such as Walmart are being platformized with a great speed, seeking for us to rethink their social universe anew (Reich & Bearman, 2018).

2009). Drawing on these approaches, researchers have even developed tests to locate the nature of the two-sidedness of markets as economic platforms (Filistrucchi et al., 2012).

An influential OECD symposium that brought together expert delegations from twenty countries reached a consensus about seeing platforms as *firms* that operate two-sided markets with three elements: (1) the presence of two kinds of economic actors who rely on the platform to receive or send whatever they demand or supply; (2) the presence of indirect network externalities coming out of this economic relationship; and (3) the existence of a non-neutral price structure that depends on the decision of the platform owner (OECD, 2009).

Yet, such a proliferation of research concerning platforms tends not to locate the historical specificity and empirical novelty of exchange platforms, instead leans towards flattening their rich universe. It does so by seeing them as mere markets and thus giving a second life to an already shallow and empirically unfounded neoclassical notion of the market, this time in the study of economic platforms as two- or multi-sided markets.

Contributing to the literature that calls for deploying a dynamic perspective in the study of platforms (Bernards & Campbell-Verduyn, 2019; Langley & Leyshon, 2016; Westermeier, 2020), this paper argues that it is insufficient to see platforms as mere markets, let alone multi- or two-sided. The multi-purpose and dynamic universe of platforms exceeds marketization relations and mobilizes a series of business opportunities that can best be understood as *stack economization*, making it possible for platform actors to move beyond market making in pursuing diverse modes of economization from barter to money-making within a single frame. Theoretically, the paper draws on and expands the research program on economization and marketization (Caliskan & Callon, 2009; 2010). "Stack" is a term that computer science has borrowed from the world of kitchens. Referring to the stacking of data layers vertically, like plates standing on top of each other, the term describes the arrangement of multiple layers of representations — in this instance, data — in relation to each other. In this way, one layer supplies an ancillary ground for another to stand upon, while at the same time building a coherent framework of interoperation.

Economization refers to "the assembly and qualification of actions, devices and analytical/practical descriptions as 'economic' by social scientists and market actors" (Caliskan & Callon, 2009, p. 369). Calling for a move from a study of "the economy" as a mature, systemic object that claims to be independent of its qualifications, the economization program has called for locating the imagining of "the economy" itself in a study of economization that incorporate various modalities from exchange and production, barter and gift, and their hybrids, all taking place in association with certain socio-technical agencement or assemblage clusters.

Marketization, as a mode of economization, refers to the making and maintenance of sociotechnical agencements that (1) organize the conception, production, and trading of objects of exchange; (2) arrange constituents that deploy the rules, devices, infrastructures, representations, as well as the competencies and skills embodied in economic actors; and (3) construct a space of power struggles (Caliskan & Callon, 2010, p. 3). Associated with Actor-Network Theory, such a definition, instead of being a *theory* of markets, presents itself as an approach or a set of rules of thumb to analyze marketization.

This paper argues that the marketization program *cannot* account for organized cryptocurrency exchanges. An empirical analysis of these exchanges, their operations, and an ethnographic study of one the largest exchange platforms suggest that only a part of economic practices taking place in these markets can be captured by the concept of marketization. These exchanges harbor economic practices that exceed the marketization practices defined above. How to address this perplexing situation of new "markets" that go beyond being markets?

One possibility is to look at platformization as stacking. Bratton's work on stacked economic geographies has introduced the possibility of imagining computer sciences' technical term "stack" to the sociological imagery in an innovative way. For Bratton, a new socio-digital geography is emerging, with new possibilities of economic and political engagement. Calling this "new megastructure" the Stack (*sic.*), Bratton has theorized the *place* of interaction instead of the *process* of encounter itself and argued that this megastructure is also a platform (Bratton, 2015, p. xvii). He defines "the Stack" as "a planetary-scale computing system," "a megaarchitecture for how we divide up the world into sovereign spaces," "informed by the multilayered structure of software protocol stacks in which network technologies operate within a modular and interdependent vertical order" (Bratton, 2015, p. xvii).

This innovative spatial approach is theoretically similar to equating an exchange relationship with its building, the geography where it happens. Social geographical approaches to economic relations have many advantages, and Bratton's socio-digital rendering of the stack has informed both our understanding of the geographies of platformization and our potential to imagine interventions to contain their negative consequences. However, the quantitative and qualitative data I collected and analyzed on cryptocurrency exchanges suggest that what is being stacked is not a *place or geography* of encounter, but a *relationship* of economization. Furthermore, I did not observe any spatial formation in these economization relations which occurs in a unitary place one can describe with a "the" and a capital S, nor a larger reality like "the Stack," to which the platforms I studied belong. Much like economists locate "the Economy" as the totality of everything economic and use performative interventions to design it and make it happen, Bratton approaches fluid and non-systemic socio-economic processes as if they had a systemic and objective unitary framework, infrastructure or place. Such a perspective may be misleading from a scientific point of view, even though productive from a performative, political and strategically essentialist perspective.

Avoiding objectifying tendencies to see platformization as "the Stack," I argue that cryptocurrency exchange platforms entail the building of socio-digital spaces, the designing of instruments, and the imagining of new digital materialities that make possible stack economization. Stack Economization is a *research tool* with which I propose to study the rich universe of platform economies, not to explain or represent the totality of their practices or the nature of their host geography.

The research draws on three empirical engagements with cryptocurrency markets. First, I carried out fieldwork in a centralized cryptocurrency exchange I call X. I also visited a variety of other exchanges. None of these platforms gave me permission to use their real names. Second, I carried out unrecorded and recorded interviews with 74 persons working in or with those exchanges. No one except two gave me permission to record these interviews. Third, I studied the workings of 339 exchanges that operate more than 22,707 markets. 88 of these exchanges were small and operating on very limited trading pairs of cryptocurrencies. Most active exchanges — to be more exact, 251 of them — had terms of service that defined their operation and objectives. As Schwarz has argued in the case of Facebook, these terms-of-use documents not only describe the conditions of using platforms, but also replace the contractual terms with "quasi-constitutional governing documents" (2019, p. 132). I closely studied the top twenty exchanges' terms of service, interviewed a few of their writers, and skimmed through the rest. However, I carried out a computational text analysis of all 251 terms of service, carrying 99.99% of the cryptocurrency exchange volume in the world.[5]

5. To download the raw data of all of these terms-of-use documents and the R code, see Birbil & Caliskan (2020).

The paper opens with a microscopic look at the X Exchange, one of the largest platforms in the world. Here we see how its employees understand the world of this singular exchange. I discuss their priorities, the ways in which these exchange platforms understand the work they carry out, the worlds they occupy, and the actors they recognize. Following this microscopic approach, I step back and take a general look at the larger universe of exchanges globally, analyzing not only how these exchanges work, but also how their actors imagine a future of hyper-digitalized economies.[6]

2 Inside the X Exchange

Data money markets have been the most difficult markets to study for me. I have developed friendships and acquaintances in various trading circles over the last two decades, as I have studied commodity and sustainable energy markets; yet, it took nine months to be accepted into a cryptocurrency exchange building, so as to observe and interview its employees.

Teaching cryptocurrencies helped. A student had told me that he wanted to take my class because his best friend was "totally into Bitcoin." It turned out that his friend wanted to meet me and audit a lecture. Following his visit, we met over coffee, and I asked him whether I could visit the cryptocurrency exchange for which he worked. He reached out to his supervisor, who then reached out to her manager, who wrote to "compliance," and compliance sent me an email with a contract attached. After having been denied by thirteen exchanges, the fourteenth accepted me into its global headquarters following an arduous contractual process that took two months. I could not use the exchange name, or take photographs, and I had to be accompanied by a human relations (HR) representative during my fieldwork which had to be "short."

I had already started to learn about these exchanges before being admitted to one of them. I accepted, signed the agreement, and entered — at least, in theory and on paper. In order to actually enter the building, my picture was taken, twice — first downstairs at the reception, then just before entering the offices on the upper floors, where I had to sign another digital contract on a tablet. They were kind and friendly, accepting to give me a copy of the contracts that I had signed. To my surprise, as I wrote my fieldnotes at night, I figured out that these contracts did *not* have any clause about taking photographs. Needless to write, I had not had time to read them as I entered. They were more liberal than their signatories interpreted. It was the HR representative who had politely asked me to keep my cellular phone in my pocket, not the contract.

There were around 200 mostly young employees scattered across multiple floors. The exchange looked like an endless train of cubicles and did not have a particular look or interior design that could be identified as that of a cryptocurrency exchange. Perhaps the only detail that could remind someone of the office's identity was tangible: printed photographs of the logo of X-Coin (the pseudonym I use for the data money that X Exchange makes with the help of its private close-accounting blockchain).[7] Similar to many other technology companies in Silicon Valley in California, this one also offered free coffee, cookies, and lunch at almost all times. One quiet room was designated for "reading and research," with an expensive-looking armchair and a designer lamp next to it. In that room, there hung on the wall a reproduction of

6. This paper focuses on centralized data money markets. I exclude decentralized exchanges for two reasons: First, when I started my research in 2018, these exchanges were displaying a minuscule trading volume when compared to centralized exchanges. Second, their platform qualities, objectives, and offered services are limited when compared to centralized exchanges.

7. For an analysis and explanation of blockchain taxonomy and its evolution, see Caliskan (2020).

a Monet painting and no poster or sign of any cryptocurrency. One of my informants referred to it as "the empty room": "No one really goes there. Who would like to read at work?"

Unlike others who study data money communities, I did not meet anyone with dreams or utopias about blockchains, or the future, or anything else. The employees were quite unattached to their job, although "an excitement about Bitcoin" was referred to by a number of informants as the first reason for looking for a job in the data money sector. "We are running an exchange platform, just like any other market," a coder with an MBA said. When I questioned his "everything is the same" approach to the historical digitalization of everything and asked him whether there was no change at all, he drew two intersecting Venn diagrams on the yellow legal pad he was carrying with him, pointing at their intersection with his index finger, and said: "This is new." I saw many people carrying pads and notebooks, in addition to laptops and tablets, in their hands, as they walked around the enormous open office space of the exchange.

I had expected the exchange to be filled with computers from floor to ceiling and employees in very casual dress; yet, it was visually dominated by windows (tangible ones with glasses), desks, and human bodies, dressed mostly in formal business attire. Women, as well as people of color, were a significant minority. The computers, still many of them with multiple screens attached to single desktops, disappeared within this huge blue- and black-dominated hall that smelled of coffee, carpeting, and air-conditioning. As I continued to observe the place, I began to realize that it was like a locomotive pulling the entire operation globally. There were at least five other, smaller offices around the world, data centers in the US, Europe, and Asia. There were coders working all around the world, either in their offices or homes, from Mumbai to Sao Paulo; a digital security sub-contractor in Switzerland; and designers in London and New York City, who attached highly edited pictures and photographs to invisible codes for marketing purposes.

I completed my research in March 2020, just before COVID-19 brought human bodies to a standstill, re-distributing this globally already scattered business operation. I continued to interact with the people I had met in the exchange during the pandemic. Our conversations centered around the notion of money. For many of them, a cryptocurrency was "digital cash," "electronic money," "money that lives in a computer," "a store of value with no central authority." Yet, when I asked about the nature of the data money that their exchange was making, many accepted that it was legally centralized and drawing on traditional double-entry bookkeeping. One accountant in charge of blockchain accounting defined the money they were offering as a "common language to describe value":

> – What do you mean by language and value, what is in a cryptocurrency?
> – It's like all other values. A social agreement. Not very different from other monies. We make this one with data. But blockchain does the accounting.
> – But your money is accounted differently, in your own books.
> – Yes, if you want to withdraw your Bitcoin, then we register it on Bitcoin blockchain. If you keep it here, it is technically ours.
> – So, you have a twin accounting system.
> – Correct... We are not a money market only. We're a platform. Here, we make money to exchange it. In the real world, monies are made to buy things. We make cryptocurrencies to make money.

His point about accounting has been the case with almost all data money exchange platforms. When one buys a Bitcoin and keeps it in their books, one does not "get" it. To "with-

draw" it, as exchanges call it with a banking term, one needs to pay a fee, another source of income for these platforms. These platforms are not mere marketization places, as the informant above summarizes. They are places of making monies, accounting systems, services, and many other economization practices.

> – But fiat monies are bought and sold for making money too. How is yours different?
> – Yes, then we're not very different either, I guess.

They were different and, at the same time, not different. For the vice-president of the company, cryptocurrency is the only money that "people can control. Dollars and Euros are controlled by states and the rich. Bitcoin does not need a central agency."

> – You run a centralized exchange here, don't you?
> – But we don't make Bitcoin, we operate a platform. It brings sellers and buyers together. We help people trade monies.
> – But the only way to get a Bitcoin without buying it is mining, now only open to rich investors. Where is the people here?
> – They are here in our platform. They can buy it here. They don't have to mine it if they don't have money to invest in mining.

Such a shift from "people" to "platform" emerged frequently during my interviews. The conversation would start with the terms "trustless," "no intermediary," "stateless," and "decentralized," and end by accepting the explosion of new intermediaries, the exchanges' requirements to report crypto assets to the states, and the institutional linking of fiat currencies and data monies.

One informant compared oil and Bitcoin to explain what they do in X:

> Oil is money too. It runs through pipes. When there is an accident, it spills. Our money runs through cables, is stored and secured. In reality, it is a piece of data. You send it, you receive it. It's unique, can't be double-spent or replicated. One may think it's the same gas wherever you buy it from. It's not. I fill my car's tank from, say, Shell, but not from a gas station with a strange name. I trust Shell oil. It's the same. People trust us in buying their Bitcoin, Ether has gas, too, you know (he laughs). You buy your Bitcoin from us, you sleep well at night. It's our Bitcoin, not *a* Bitcoin. That's why you pay us money to keep it here."[8]

This self-description draws on two important conclusions. Unlike many, he was not employing digital/material rupture talk, instead alluding to the digimaterial infrastructure that cryptocurrency exchanges build and on which they operate. Second, he made visible the relationship between platforms and markets. In markets, one is more concerned about the quality of the product; by contrast, on a platform, one is concerned about the quality of the platform from which one buys the product or services. Buyers choose platforms first, then comes the product. What is different is not data money, but the platform that moves, keeps, and trades it.

8. For an interesting comparison of oil and data, see Couldry & Mejias (2018).

> – Why should I choose your platform, but not the other?
> – If you want to withdraw your Bitcoin or Ether, you get it faster from us because we pay more transaction fees compared to others. We're safe. Providing you with vault services, cold wallets etc. If you want to trade in volumes larger then you have, we lend you crypto money. It is not just a market. It is a whole world here.
> – What other things are done in this whole world?
> – We have teams for everything. Product development, project management, software development, quality, insurance, infrastructure, customer support, compliance, research, admin, office maintenance, cyber-security, arbitration, outside counsels, tens of third-party vendors, design, HR, you know, like a regular company.

This "whole world" was indeed like a regular company making and maintaining an exchange platform bringing together buyers and sellers. In all marketization relations, we observe five main practices, all of which can be located in the market side of data money exchanges: (1) pacifying goods, (2) marketizing agencies, (3) exchange encounter design, (4) price realization, and (5) managing trade politics (Caliskan & Callon, 2010, p. 5): In X Exchange, too, the employees control the overflows of the materiality of their exchange objects (pacifying); they build institutional capacity to facilitate trade (marketizing agencement); they design the modalities of encounter (encounter design); they craft various forms of price making, setting, and pricing prostheses production (price realization); and finally they manage the everyday politics of trade by a variety of instruments (trading politics). However, the expression "the whole world" refers to the fact that X Exchange goes beyond marketization and introduces a new series of economization practices that we do not see in non-platform marketization. Furthermore, these practices were only a part of the general infrastructure on which the exchange was drawing. Since the entire system is data-dependent, it had to be based on a chain of data centers. When I asked about where these were located, the human resources representative interrupted me: I was not allowed to ask this question due to its sensitive nature. As I got ready to question its sensitivity, my informant said that the locations of the data centers were common knowledge, as they were posted on their website.

There is, of course, an entire universe of exchange platforms, many of them with an even higher trading volume and with more markets than X Exchange. To include them in the picture, we need to enlarge the scope of our analysis to take a general look at their operations and the relations they manage.

3 Global Data Money Markets

When it emerged in 2008, Bitcoin was worthless in terms of USD and remained so until March 2010, in part as result of the absence of an intermediary to exchange it. In 2010, the first data money exchange market, the now defunct bitcoinmarket.com emerged. The value of Bitcoin began to pick up. It would exceed 41,404 USD in a decade.

The emergence of Ethereum in 2018 marked the second turning point for data money markets in the world. As of 2019, 88% of top 100 cryptocurrencies in terms of market cap were Ethereum-based (Caliskan, 2020). Proving to be a big bang for cryptocurrencies, Ethereum had a structural impact on market emergence. Of the 339 exchanges in the world, half emerged after Ethereum. The year 2018 also marked a jump in market expansion since 36% of all data money markets emerged in that year alone.

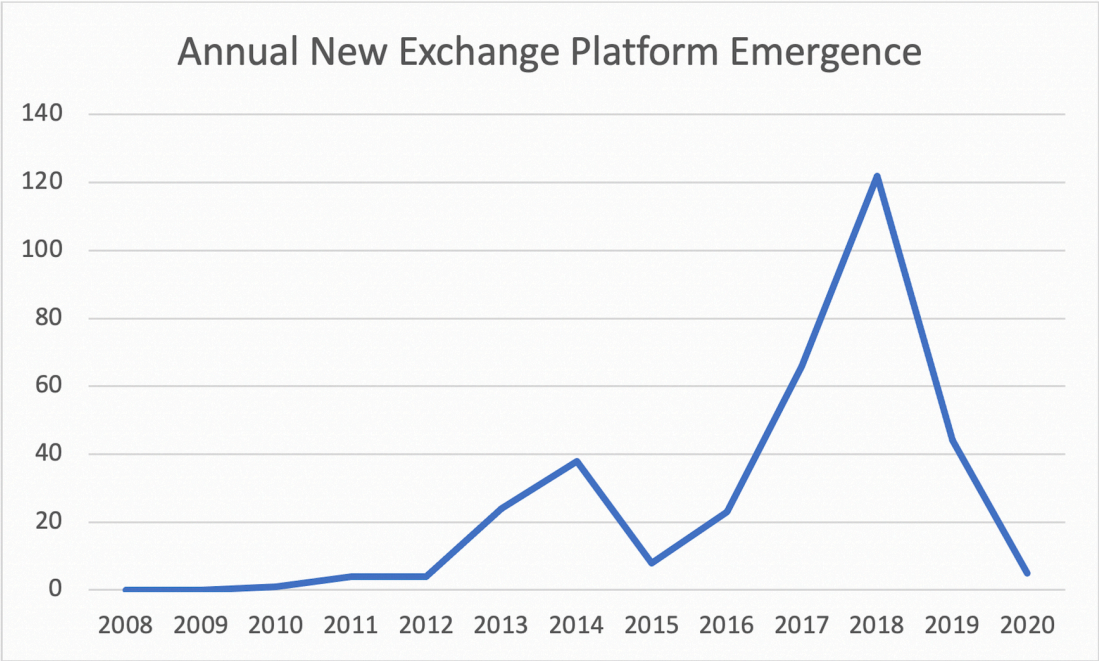

Figure 1: Frequency of New Exchanges Emerging Annually[9]

Where are these markets located? Singapore (36), UK (25), South Korea (21), Estonia (17), Hong Kong (17), USA (15), and Turkey (12) host 57% of the data money exchanges I focus in this paper. The geographical location of these markets is important for legal reasons. Yet, the geographical place of where the *components* of these platforms operate is an entirely different question. As we have seen above, X exchange drew on a multiplicity of locations in the world to maintain its platform. The legal place is only one of the locations in the socio-digital geographies of platform production and maintenance. Furthermore, once one enters the platform, the "place" of interaction occurs at another level in stack economization. This is why it would be insufficient to approach these markets from the vantage point of space only; unlike many conventional exchanges, they show little pride in their physical buildings and even make a conscious effort to hide the offices where they are located.

Traders often use their material physical space to describe how their markets work, usually by employing a narrative that belongs to Adam Smith, rather than their own.[10] They would also take visitors around the building they inhabit, inviting visitors or researchers to associate their trade with the place where it happens. I believe that, in part, this is the reason behind the problematic equation of the marketization process with the material infrastructures that facilitate it. In X (or any of the other 338 exchanges), there is no pit, no center, no building, in many, not even a headquarter, where one can see the moment of buying and selling. The employees of the exchange call their place a platform.

It is practically impossible to carry out conventional fieldwork in all of these platform exchanges and the larger universe that they create, because studying derived geographies such as the "global" is only possible by conducting research on their processes of derivation, an ap-

9. 2020 data represent the frequency through October 10, 2020.

10. For a discussion of how regional and local traders describe their marketization processes, see Caliskan (2011).

proach I have used to study the making of global commodity markets and their prices (Caliskan, 2009; 2011).[11] With the help of computational text analysis, however, we can take a bird's-eye view of these thousands of markets, by focusing on the terms of service that describe and analyze the world they create with their own words.

These cryptocurrency platforms, frequently presenting themselves as trustless systems, require their users to sign these terms of service contracts to give access in the first place. Our age seems to take Durkheim's observation on the non-contractual basis of contracts one step further: Platform works stand on the contractual basis of trustless systems.

Referred to as "terms of service," "terms of use," "terms and conditions," or simply "terms," a long contract is required to be signed by the users of all data money exchanges. There exists no exchange with a substantive trading volume that at the same time does not impose a terms of service contract on its users. Of the 339 exchanges operating more than 22,707 markets as of 7 July 2020, 251 exchanges, representing 99.99% of all world trade in data monies, require users to sign a contract.

The 251 exchange platforms on which I focus in this paper operate thousands of markets, based on trading one pair of data vs paper money exchange. In other words, if a client buys 1 Bitcoin from X Exchange by wiring them Euros from their bank account, they are active in one market — that is, the BTC-EURO market — only located in X Exchange. A client can "shop" for other exchanges, for there are at least 250 more exchanges with a BTC-EURO market active 24/7.

As of 7 July 2020, these exchanges traded 5,695 data monies. Bringing together all terms of service for computational analysis produces a single document with almost 1.5 million words that would fit onto 3,232 US legal size pages. On average, a cryptocurrency exchange contract contains 5,754 words, or around half of the length of this article.

A close reading of the terms of use of the top-twenty exchanges of which X Exchange is a part,[12] and a computational text analysis of all 251 platforms opens a limited yet general window in their workings. All top-twenty exchanges define themselves as a "platform," but use also other terms such as "marketplace," "exchange platform," "a world," and "ecosystem." The top exchange in our list states:

> Binance refers to an ecosystem comprising Binance websites (whose domain names include but are not limited to https://www.binance.com), mobile applications, clients, applets and other applications that are developed to offer Binance Services, and includes independently-operated platforms, websites and clients within the ecosystem (e.g. Binance's Open Platform, Binance Launchpad, Binance Labs, Binance Charity, Binance DEX, Binance X, JEX, Trust Wallet, and fiat gateways). In case of any inconsistency between relevant terms of use of the above platforms and the contents of these Terms, the respective applicable terms of such platforms shall prevail (Binance, 2020, p. 1).

"Binance" claims to be above a multiple-platform operation, seeing itself above platforms, or an "ecosystem" made up of websites. Yet, for the purposes of this legal contract, the ecosys-

11. For derivatives and derivation, see Guyer (2004); Lépinay (2011).

12. The top-twenty exchanges in terms of monthly trading volume are the following: (from the largest to the smallest as of July 7, 2020): Binance, Coinbase, Upbit, Bitstamp, Gate.io, Bitfinex, Liquid, Kraken, Poloniex, Bitflyer, Bithumb, Coinone, Bittrex, Gemini, Bitso, Paribu, Zaif, BTC Markets, Indodax, and ItBit. On the same date, these exchanges carried around 9% of all cryptocurrency exchange platform trading in the world.

tem itself is seen as one big platform that provides clients with services and presents a market as only one element.

Following the main definitions, many of these exchange platforms ask the user's residence and locate themselves in the national jurisdiction of that particular user, accepting thus nation-states' boundaries to define their operations, even for free accounts:

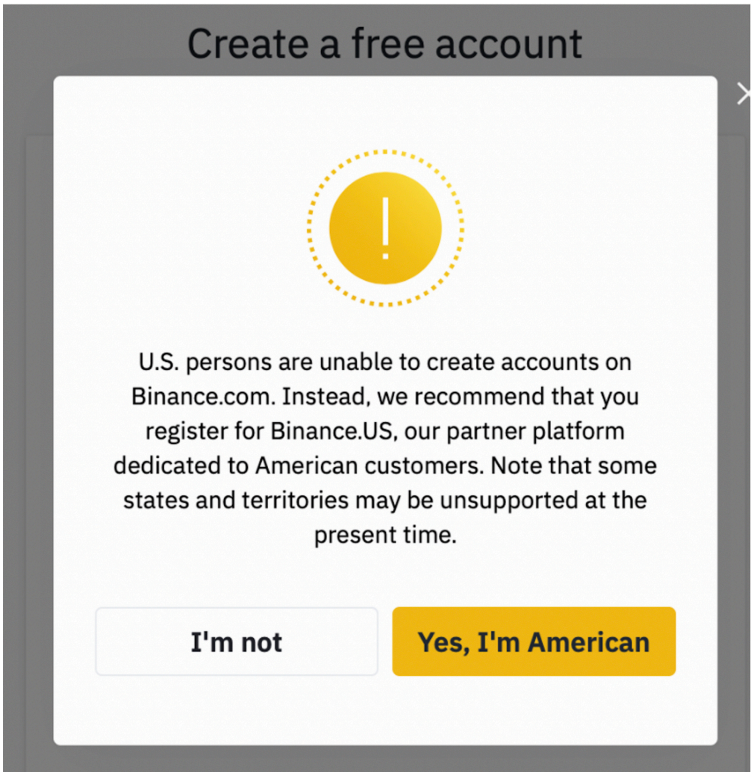

Figure 2: A Cryptocurrency Exchange Platform's Locating of Geography

The agency is as important as the place. These exchanges require the user of their services to be humans or limited liability companies hiring humans to trade on their behalf. Bots, spiders, automatic devices, algorithms, or digital-manual instruments meant to trade in or bypass platform infrastructure are not allowed.

Once users are accepted onto the platform, they can choose any of the services offered in these hundreds of exchanges. Buying and selling of data monies for fiat currencies take the central place in these exchanges which maintain completely digitalized order books. Matching buy and sell orders according to a chosen algorithm, exchanges facilitate trade much like any other commodity exchange. Unlike cotton or barley, however, the "technical quality" of the data money bought is universally the same, although the security of holding on to it and keeping it changes from platform to platform (MacKenzie, 2019). As my informant from X Exchange said, their Bitcoin was "different" because they were different.

Similar to commodity exchanges that operate on warehouse receipts, crypto-exchanges also operate on transferring the ownership of data monies by using digital representations of their ownership, instead of transferring the data money itself. If a client buys cotton, no one necessarily ships cotton to the place where the client will open its bales. Rather, the client owns the receipt that represents the commodity. In crypto-exchange trading, when a client buys 1 Bitcoin, the exchange registers that data money on the client's internal account and does not

register it as that of the particular client on the Bitcoin Blockchain. It remains as a custodial asset within the exchange, and the exchange uses it for its own trading and money market considerations. If a client wants to get a hold of it and sell it in another exchange, then the client will have to "withdraw" it from where the client buys it and pays a withdrawal fee, a substantial amount if this operation is repeated often. Depending on the exchange, it is not uncommon having to wait for a few days before the client can see it registered under their name. Platforms prefer to keep data monies in their secure data centers that are not connected to the internet, and can use them whenever they want. As long as they have a hold of these data monies, stack economization on their platforms can be richer and more lucrative in terms of fees or prices for their services.

There are five types of fees in data money exchanges: the spot transaction fee, interest rate, futures transaction fee, deposit fee (which is usually zero), and the withdrawal fee. Whenever a client moves data monies, the platform charges fees for moving data from one place to another. The more users move data, the more money and services move, and the more money the platform makes. Users belong to various types. In most of these platforms there is a minimum amount of data money one should keep, always represented in terms of fiat currency such as USD and Euros. The fees decrease as the account size increases. If a user chooses to buy a lump sum of data money, the price is negotiated outside the platform, and the data monies they buy are handled away from the order books, unless the buyer and seller decide otherwise. Someone buying 2 million USD worth of Bitcoin would not buy it from X Exchange webpage. The owners of X would arrange a special deal over the counter.

In addition to fees, exchanges will also impose an interest rate, if a user chooses to borrow data money to trade it. There are two forms of borrowing: The first consists of an authorization to trade on margins, for example, ten times the user's account balance, as long as their position remains within a range defined by the exchange. Margin trading draws on data monies borrowed from a cryptocurrency exchange and assetizing them by means of a loan that is extended to the user from the same exchange, replicating any other margin trading practice in non-crypto markets. The amount one can lose in these margin trades cannot exceed the original data money one keeps as a custodial asset. The second way of borrowing is similar to contemporary banking, with an interest rate, but this time imposed as a percentage of the data money one borrows. This emergent form of borrowing, without a systemized and legal framework, may entail multiple data monies, including the one that the exchange itself produces.

Almost all exchanges either issue their own monies or have plans to do so. X Exchange's X Coin is not a successful data money. It is worth almost nothing in comparison to Bitcoin or USD, and it is not used by third parties. But there are many other successful data monies minted by cryptocurrency exchanges, usually carrying the name of the exchange whence they originate, such as Binance Coin, trading for around 41 USD as of January 2021. Issued on the Ethereum blockchain, Binance Coin enjoys special consideration on the Binance platform. If a client uses Binance Coin for their transactions, they pay less in fees when compared to holding on to other data monies. Platforms offer special treatment not only to customers with a higher balance, but also to users who draw on the host platform's data monies, thus incentivizing the use of their own currencies. Those incentives, fees, gift tokens, other payment vehicles, and the above-mentioned services are all defined and explained in the rich world of the terms of service.

A computational text analysis of terms of services shows that the most frequently used words fall into three frequency categories: The first category with terms that are used more than 8,500 times are "user," "services," "account," and "information." It should not be surprising to see such a distribution, because these documents define the "users" of platforms and

receive their "information" to hold them "accountable" for the "services" that these exchanges monetize. The second group of frequencies, clustered around 4,500-8,500 instances, help us better understand the focus of these exchange platforms. These terms are "digital," "company," "agreement," "website," "platform," "service," "transaction," and "terms," ordered from the least to the most cited within that range.[13] This string of terms can even be read as a full sentence in itself. In a close reading of these texts, one sees very clearly how these "digital companies" ask their users for their "agreement" to log in a "website" for "platform services" that entail "transactions."

It is important to note that these "digital" companies do not shift all economic activity from material to digital; rather, they hybridize economization relations by rematerializing and digitizing. Empirically speaking, data money platforms draw on rematerialized spaces of encounter and do not operate along a material/digital divide. Successful economic stacking in part relies on this dynamic hybridity. There exist two kinds of materiality that are deployed in cryptocurrency exchanges. The first type is a *tangible materiality* associated with infrastructure works and networks of machines, such as cables, signal systems, antennas, and computer hardware.[14] *Intangible materialities* draw on observable orders. These orders are produced and maintained, in part or entirely, by representational tools such as data or algorithms produce.[15] The terms of service I analyzed give much space to imagining and constructing a space to mobilize a process of entanglement and disentanglement between rights, data, and money. Monetizing the right to send data depends on such simultaneous deployment of tangible and intangible materialities as representational orders.

Such representational orders are built with an invisible consequence in mind. As these platforms operate on a derivative representational order, they *undermine* open accounting public blockchains such as that of Bitcoin. Instead of registering transfer of ownership of data monies on blockchains, these exchanges mobilize an in-house accounting system to keep track of ownership rights. They register data monies under a user's name only if a particular user decides to "withdraw" her assets from the exchange.

13. I chose not to count "services" and "service" together, because when used plural, it meant the general economic functions, yet when used singular it alluded to the specific nature of economic function in focus. Yet even if they were stemmed, the result of the analysis would not display a categorical change.

14. For an analysis of these materialities and their agency in socio-economic relations, see MacKenzie, 2009.

15. For a discussion of data as representation and the materialities associated with these data, see Dourish (2017).

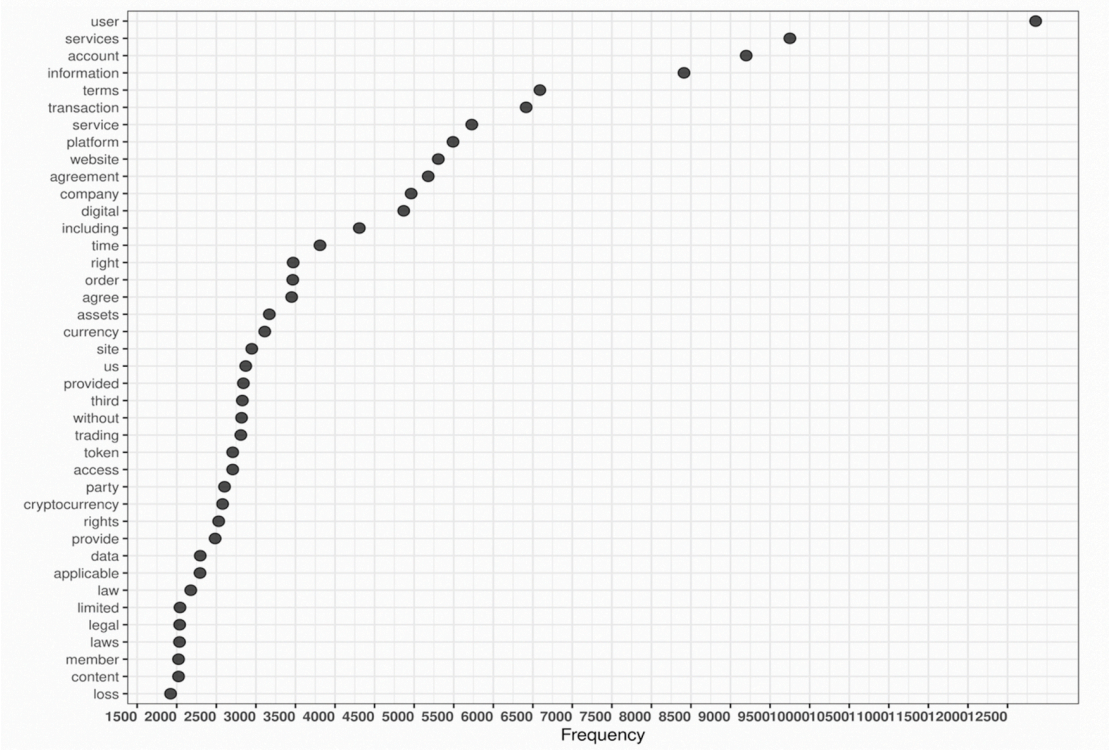

Figure 3: Frequency of Words Used in Terms of Service Agreements

Centralized data money exchanges serve as vehicles of dollarization and conventional accounting for two reasons: First, the USD has become the main asset in representing the comparative value of cryptocurrencies, thus opening new economic avenues for the USD to be deployed in trading. Second, by bypassing blockchains as distributed accounting systems and using exchanges' own double-entry centralized and private book-keeping, data money markets contribute to the undermining of open accounting and public blockchains like that of Bitcoin. As visible in Figure 4, which is based on the platform registered vs blockchain-network-registered Bitcoin trades between 23 January 2018 and 22 January 2019, the percentage of Bitcoin transactions that is registered in the Bitcoin Blockchain is declining. In the near future, it may become negligible, making blockchains a simple tool of final confirmation in trading data monies, instead of being *the* main institution of their distributed accounting.

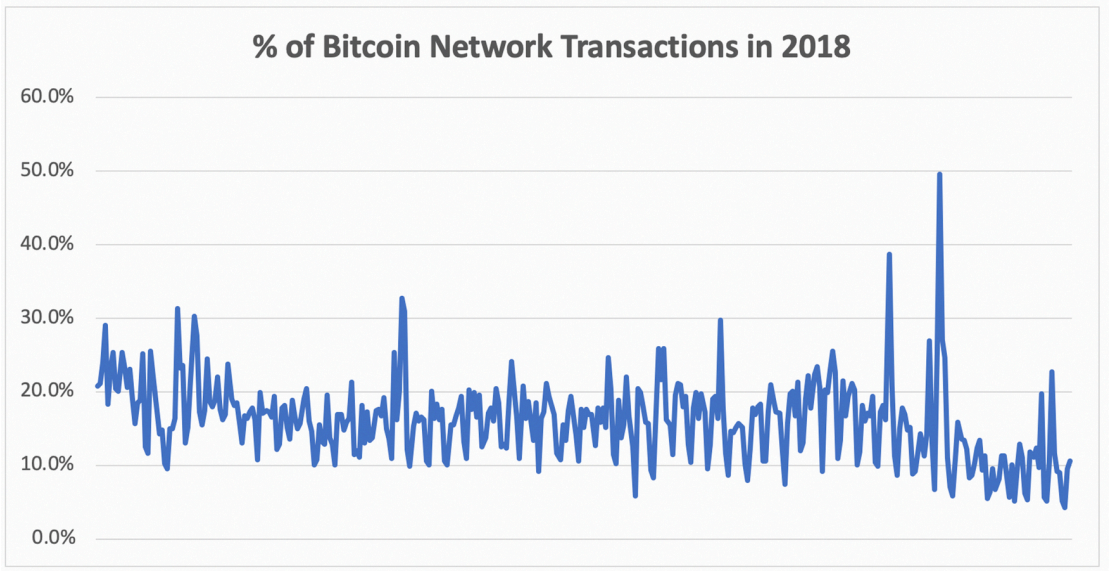

Figure 4: Data Money Markets undermining of Blockchains[16]

The unsupervised frequencies of the terms within the terms of service documents show much, even though they have a double limit. First, one encounters an obvious list of terms. It should not be surprising to see "account," "service," "rights," or "users" as the most frequently occurring terms. Second, these unsupervised frequencies do not give us a chance to control for a specific perspective in approaching the data. We can address this challenge by deploying a social science dictionary as a lens to approach the same data, by counting the appearance of social scientific concepts that are used in terms of service agreements. With 1,800 entries supported by a comprehensive bibliography, Calhoun's is the most helpful dictionary in three ways (Calhoun, 2002). It is a popular dictionary that represents the attention of social science students and researchers. Second, the dictionary is supported by a robust bibliographical study. Finally, moving beyond disciplinary considerations, its intended transdisciplinary focus makes it possible for researchers to control for the social scientific attention that these terms of service pay to imagining and regulating the world they inhabit.[17]

16. The source for total Bitcoin trading volume in centralized exchanges is http://www.CoinMarketCap.com, whereas the network registered daily volume data source is https://www.blockchain.com/charts/estimated-transaction-volume-usd. The two sets were calculated to match USD equivalence of BTC in each day's 24-hour trading price average. CoinMarketCap data were downloaded after their filtering out of possible wash-trading practices from their data sets.

17. Core social scientific categories are stemmed to represent the terms of service documents' foci. For example, finance and financial were plotted together. Note that "i.d." in the dictionary is a Freudian concept, not the identification number in terms of service documents. Finally, "representation" in terms of service documents refers to the legal status of acting in the name of another legal person, thus bearing a more limited meaning than it is used in the social sciences.

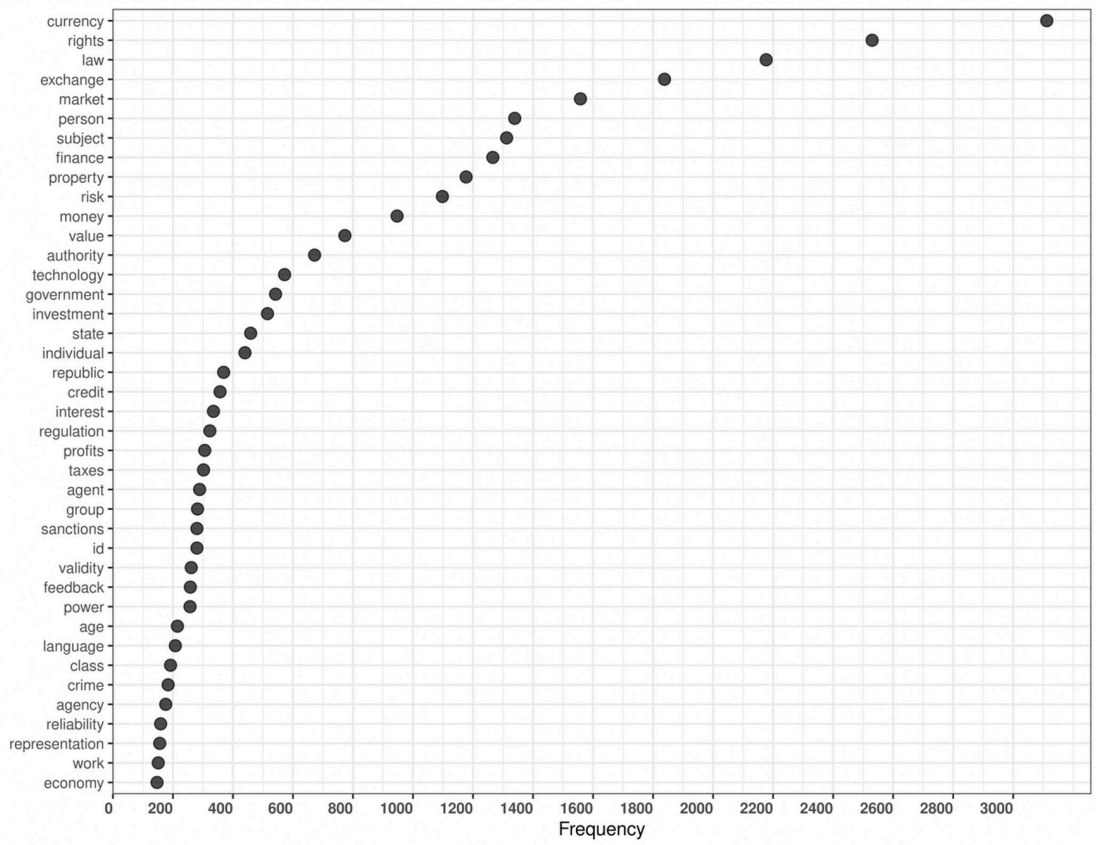

Figure 5: Frequency of Social Science Concepts in Terms of Service Agreements

Similar to the unsupervised analysis of general terms, social scientific concepts are also clustered around three groups. The most frequently used terms are "currency," "rights," "law," "exchange," and "market." Used between 1,500 and 3,200 times, these concepts sit at the center of the social scientific concepts that these exchanges deploy to describe themselves and to govern the economic world they inhabit. The obvious frequency of these words, which pop up on virtually every page of these documents, attests to the fact that data monies are marketized by exchanging the right to send data among users, by drawing on exchange as the framework for organizing these relations.

What is more telling in this cluster is the absence of the two essential terms in relation to which these exchanges emerge in the first place. A comparison between Figures 3 and 5 makes this absence visible. "Platform," the central concept basically referring to everything that happens in a data money exchange, does not occur even as the least frequent term in Figure 5, for it does not exist in one of the most popular social science dictionaries. If it were there, with a usage of 5,750, it would be *the* most frequently used term, almost ten times more than "blockchain" (538 times), the second crucial term that also lacks an entry in the social science dictionary.

In these terms of service, "platform" refers to the place where every exchange activity takes place. "Ecosystem" (330 times) is also used, but usually in preambles, and never as a legal term that these exchange platforms deploy to regulate their relations with users. "Place," "website," "webpage," and "marketplace" are also used to refer to the place of exchange activities, yet less frequently, without legal entanglement, and as colloquially as these texts allow in their bodies. It is safe to argue that "platform" is the term that these exchanges use to describe, show,

and regulate their economic activities. However, much like in the context of other exchanges around the world, it would be erroneous and incomplete to either equate economization with the place where it occurs, or to accept how market architects describe themselves as *the* main description of exchange practices. This is because these descriptions are, among other things, simultaneous investments in making more money in these exchanges.

As is empirically clear now, platforms go beyond being mere markets that bring together supply and demand. This is not because markets cannot be defined only in reference to supply and demand, as a massive and heterodox literature has already shown, but because platforms make possible and harbor economic practices that go beyond marketization, such as money-making (Binance Coin, X Coin), infrastructure development (markets built within markets), banking (loan and interest rate servicing), accounting (double-entry book-keeping and blockchain), barter (among various data monies), gifting (issuing gift data monies for new users), and many other and intersecting modalities of economization that are all stacked and deployed together on a platform.

I argue that Stack Economization describes the dynamism and multiplicity of economic practices that take place on platforms better than any other available concept. It refers to the stacked nature of the multiplicity of economization practices that either draw on or make possible each other as architectures or infrastructures. The exchange (Binance) is infrastructural to a specific market (ETH-USD), which is infrastructural to futures in ETH, whose trading makes possible margin trading. Furthermore, depending on the user, the ground of activity can be an architecture or an infrastructure.

Stack Economization does not *explain* how a data money exchange platform works. It defines platforms to theoretically prepare a ground to understand, register, and analyze the multiplicity of their specific economization processes. Seeing platforms as two- or multi-sided markets (Rochet & Tirole, 2003), or technologies (Evans & Schmalensee, 2005), or mega-infrastructural places (Bratton, 2015) fails to account for the dynamism and multiplicity of these economization practices.[18] These approaches choose to describe platforms based on the tools they use (technological devices), the limited practices that they mobilize (trade), or the place where they are located (the Stack) and imagine an objective systemic unity in what they call "the platform." Platform is neither a place, nor a bounded object. It is an economization process.

Looking at terms of service of data money markets from the perspective of social science dictionary also makes visible how platform-makers control overflows. The second group of concepts, used between 400 and 1,500 times in these documents, are "person," "subject," "finance," "property," "risk," "money," "value," and "authority." These terms create a legal opportunity structure to govern data monies' transfer and valuation by controlling the risks associated with financial volatility and fraud. Non-humans, except for registered limited liability companies, and unauthorized algorithms are not permitted to be actors on these platforms. Without being a human subject, one cannot use these socio-digital platforms.

4 Conclusion

Despite the frequency of studies concerning cryptocurrency markets and data money prices, there exists only scant literature on how these markets work on the ground. There has been

18. For a fruitful discussion of how the literature sees platforms as markets, infrastructures, and ecosystems, see Grabher & König (2020).

a tendency to bypass fieldwork in exchanges by drawing on anecdotal experience or the theoretical premises of the very empirical developments under study. This propensity has been criticized for its acceptance of the plans and motivations of actors as practices, not beginning with empirical observation of how actors mobilize economization practices in the first place (Garrod, 2019; Jones, 2018). This paper has addressed this gap in that it has empirically analyzed global cryptocurrency markets and exchange platforms simultaneously from within and above, by pursuing a two-tiered research strategy.

The first tier rests on ethnographic research at X Exchange and presents an introductory analysis of how a data money exchange platform works from within. I have described how exchange actors see what they do in their everyday practice. These "transparent" places that mobilize "trustless" systems had weak trust towards scientists, as I was asked to sign a multiplicity of legal documents, had my movements monitored, was not permitted to photograph the offices, and had to have HR experts accompany me during my research. Still, one also has to consider that X Exchange has been one of the most respected exchanges in the world, never having been associated with wash-trading or illegitimate economic practices. This very exchange is now helping to set the data money trading standards in the world.

A detailed look into the workings of X Exchange has shown us that market actors do not operate along a digital/material divide. For them, data have a materiality that is distributed among tangible and intangible properties. Their job is to build new architectures by using or drawing on these materialities. Data money making counts among these practices. Describing the everyday practices in a data money exchange, the paper's ethnographical attendance has rendered visible the actors' own understanding of the exchange. This discussion has illustrated how exchanges go beyond marketization relations and constitute, as one X Exchange actor called it, "a whole world."

Enlarging the scope of analysis to include all other data money markets has required giving up the analytical power of ethnography and interviews, and to employ a computational analysis with a wider scope in order to take a brief look into their "whole world." The first precondition to enter these economic places is to sign a legal document that frames the way in which exchanges see and describe what they do: terms of service agreements. This paper has focused on 251 exchanges by analyzing, among other things, their terms of service. A two-step computational text analysis of these documents' corpus has facilitated a consideration of their priorities and definitions. As a first step, I have looked at the unsupervised frequencies of all terms, whereas the second step has employed a social scientific lens so as to discover which social scientific concepts are used the most.

First, terms of service texts describe their exchanges as "platform," one of the most frequently used words in the unsupervised frequency analysis (Figure 3), although completely absent in the dictionary analysis (Figure 5). This is, in part, because the social sciences are still working on making visible and understanding platforms. If "platform" were considered a social scientific concept in that particular dictionary, it would be by far *the* most frequently used social scientific concept in Figure 5. These exchanges see themselves as platforms that present a variety of products and services to their users, such as futures and spot trading, decentralized market entry, vaulting, banking, infrastructuring, data gathering and interpreting, security provisioning, non-blockchain accounting, and so on. The multiplicity of these platform economic practices marks a historically specific and empirically observable economization modality, which I call Stack Economization.

As part of a design challenge to visualize platform economization in cryptocurrency exchanges, I worked with two designers, Lauren Stobierski and Stephen Johnson. Reading this

paper and discussing with me how cryptocurrency platforms work, they designed Figure 6, visualizing the dynamism and multiplicity of economic practices that take place at X Exchange. In this figure, we can see how platform economic practices entail a variation of economization practices. Such multi-functionality is constructed as a result of the material opportunities that gave birth to the possibility of stacking economic relations in the socio-digital universe of data things. On such platforms with multi-layered market infrastructure, one can use a bank to borrow money to trade, receive and give gifts, buy Ethereum with USD, barter Bitcoin with X Coin, shop for security services, subscribe to a trading algorithm, and use their arbitration services. Furthermore, they are all instituted on platform infrastructure that connect all these modes of economization with data streams that are further economized by whoever controls the platform. This visualization not only captures the modular and multi-functional nature of a cryptocurrency platform that goes beyond being a mere multi-sided market, device or infrastructural geography, but also shows how various parts work with and relate to each other.

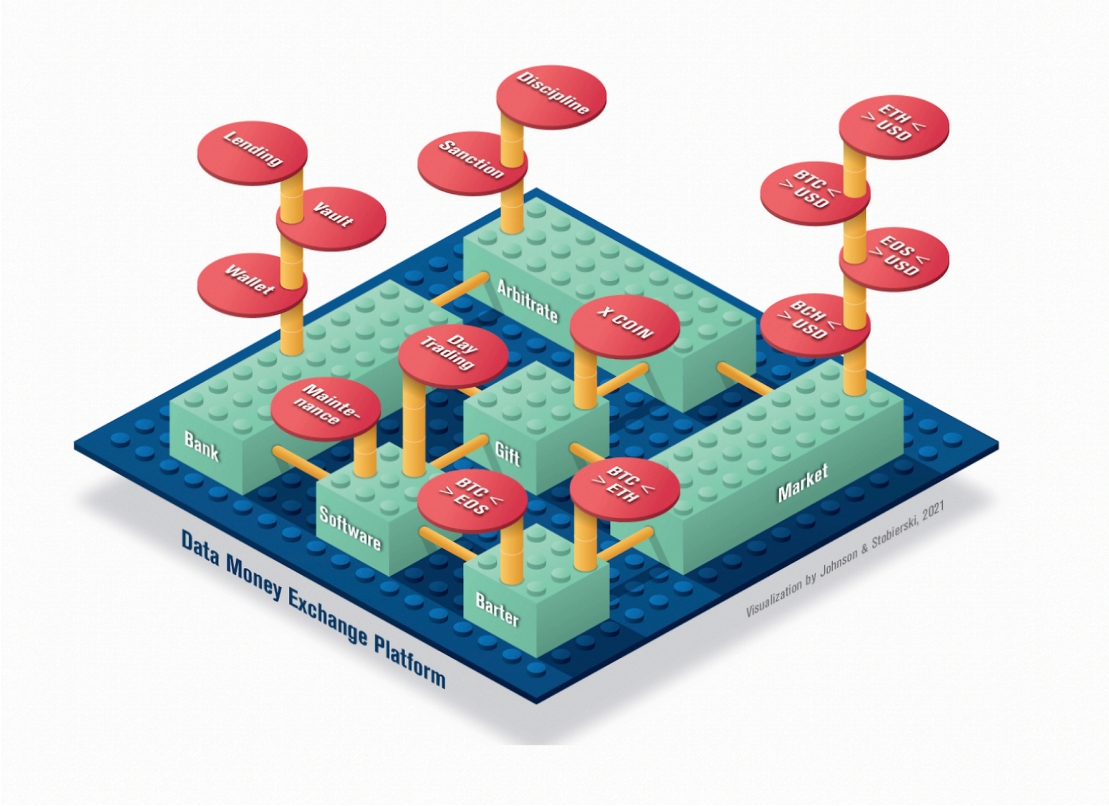

Figure 6: Visualization of Stack Economization in a Cryptocurrency Exchange Platform

One may argue that platforms can still be seen as mere two-sided markets, for it is true that markets are never just "markets:" Conventional organized exchanges, such as spot and derivative markets, also entail a multiplicity of functions, yet we still call them markets. However, their multi-functionality remains within marketization limits and never constitutes separate domains of practice that encircle the commodity exchange itself. On platforms, such as data money exchanges, we observe a *categorical* multiplication of economization modes and their deployment, not a mere variation of marketization. In the entire world, there exists no commodity market with its own mint.

A strand of research has been describing platforms as a new kind of market. For Rochet

and Tirole, platforms are two-sided markets that negotiate network externalities in specific ways. For others, the platform is a multisided *framework* (Gawer, 2009), a *technology* of matchmaking intermediation (Dijck et al., 2018; Evans & Schmalensee, 2005), a coordination *device* facilitating trades with certain new economic effects (Ambrus & Argenziano, 2004), or a new *infrastructural* business *model* (Srnicek & De Sutter, 2017). For yet another group of scholars, the platform draws on the use of data, algorithms, and computing as new tools of production (Wark, 2019), or as a new capitalist accumulation form centered on data extraction (Zuboff, 2015). And finally, the platform is a system, an economic system, an ecosystem that qualifies, basically, everything happening in it (Jacobides et al., 2018). In many other approaches, platforms are discussed simultaneously as markets, ecosystems, and infrastructures with intersectional functionalities (Kapoor, 2018; Shipilov & Gawer, 2020), or a reprogrammable system: "If you can program it, then it's a platform. If you can't, then it's not" (Andreessen, 2007, quoted in Bogost & Monfort, 2009, p. 4).

My empirical research on data money markets has shown that the actors who use, make, and maintain these exchanges describe them as platforms that incorporate technologies of intermediation in a digital-material space, which they call platform, market, or ecosystem. Most of the above social scientific approaches are accurate in using the concepts also used by economic actors to describe platform universes. However, considering platforms *only* as markets, technologies, systems, devices, infrastructures, frameworks or places would not represent the ways in which actors mobilize, carry out, and maintain platform works in data money exchanges. If studied as stack economization processes, however, the geography, devices, performativities, practices, agencies and technologies of platforms can be studied thoroughly and in relation to each other. As this empirical study has demonstrated, platforms go beyond marketization practices and can be seen as stacked economization processes. One should be careful, however, not to confuse conceptualization with explanation and analysis. Stack Economization is a concept we can use to explain the workings and maintenance of platforms. It cannot be used to stand in for analysis. In other words, we need to better understand the stacked nature of economization in platforms, not describe the platform with yet another concept, for a platform is a platform. Actors call it thus.

This paper has avoided identifying the process of stack economization with the geography it makes and takes place. Places of interaction have an infrastructural effect on economization relations of which they are a part, but they cannot replace their very description. A home is not a mere house. The findings of the paper do not support a conclusion that data money markets are either a part of the stack-like systemic formation or contribute to its unfolding. Theoretically speaking, imagining static objects (such as the economy, the nation, the stack, and the social) seems to do a disservice to a relational description of dynamic processes such as marketization and economization. Furthermore, this paper has indicated that what is being stacked in data money exchanges is not *the place* of encounter, but *a process* of economization.

Approaching platforms as stack economization processes has two advantages. First. it makes it possible to isolate layers of economic interaction in their enframed platform universe. By this way, we can study the making and deployment of platforms' technical operations by focusing on their infrastructure, performativities, agencies and devices, instead of focusing on one as *the* factor and then discuss platforms with reference to it. Platforms, as shown in this paper, are not mere markets of buying this and selling that, with network effects in an ecosystem. By approaching platforms as stack economization, we can isolate the consequences of these "network" effects. We cannot carry out such an analysis by imagining an externally appropriated *endogenous* effect, but by focusing on concrete practices that can undermine economiza-

tion practices *exogenous* to the platform under consideration. For example, here I have shown that an endogenous development that fosters cryptocurrency usage in centralized data money markets has been undermining blockchains themselves, while at the same time contributing to the dollarization of economic relations.

Second, approaching platforms as stack economization processes may inform a more nuanced research agenda that can isolate specific threads and functions of platform works and study their consequences. Such a perspective has the potential to inform social policy more effectively. For example, centralized data money platforms that allow for data money to fiat currency trading are introducing decentralized data money platforms which can be bridged in one platform. Thus, these platforms are advancing the stacking of economization in order to give actors tools to avoid public accounting systems, by punching holes in taxation and money transfer considerations. This development calls for serious and urgent questions about accountability and legitimacy. Referring to the mutually supporting and enabling platform-based exchange, production, barter and representation processes that are qualified by their makers and observers as economic, Stack Economization also helps us to imagine more effective economic policy and intervention tools for platform economies.

References

Alexander, J., & Alexander, P. (1991). What's a Fair Price? Price Setting and Trading Partnership in Javanese Markets. *Man*, *26*(3), 493–512. https://doi.org/10.2307/2803879

Ambrus, A., & Argenziano, R. (2004). *Network Markets and Consumer Coordination*. CESifo, Working Paper No. 1317. https://www.cesifo.org/en/publikationen/2004/working-paper/network-markets-and-consumer-coordination

Andreessen, M. (2007). *Analyzing the Facebook Platform, Three Weeks in*. [Blog post]. Retrieved from https://web.archive.org/web/20071002070223/http://blog.pmarca.com/2007/06/analyzing_the_f.html

Bernards, N., & Campbell-Verduyn, M. (2019). Understanding Technological Change in Global Finance through Infrastructures. *Review of International Political Economy*, *26*(5), 773–789. https://policyreview.info/concepts/platformisation

Binance. (2020). Terms of Use. Retrieved from https://accounts.binance.com/en/terms

Birbil, S.I., & Caliskan, K. (2020). *Terms of Service Agreements of 251 Cryptocurrency Exchanges Representing 99.99% of Centralized Data Money Transactions*. Retrieved from GitHub repository at: https://github.com/sibirbil/TermsofService

Bogost, I., & Montfort, N. (2009). Platform Studies: Frequently Questioned Answers. *UC Irvine Plenaries: Digital Arts and Culture*. Retrieved from https://escholarship.org/uc/item/01rok9br

Bratton, B.H. (2015). *The Stack: On Software and Sovereignty*. Cambridge: MIT Press.

BTI. (2018). *Market Surveillance Report*. https://www.bti.live/report-august2018

BTI. (2020). *2020 Market Data Integrity Report*. https://btiverified.com/crypto-market-data-report-2020/

Caillaud, B., & Jullien, B. (2001). Competing Cybermediaries. *European Economic Review*, *45*(4–6), 797–808. https://doi.org/10.1016/S0014-2921(01)00123-4

Calhoun, C. (2002). *Dictionary of the Social Sciences*. New York: Oxford University Press. https://doi.org/10.1093/acref/9780195123715.001.0001

Caliskan, K. (2005). *Making a Global Commodity: The Production of Markets and Cotton in Egypt, Turkey, and the United States*. [Doctoral Dissertation, New York University].

Caliskan, K. (2007). Price as a Market Device: Cotton Trading in Izmir Mercantile Exchange. *Sociological Review*, *55*(2), 241–260. https://doi.org/10.1111/j.1467-954X.2007.00738.x

Caliskan, K. (2009). The Meaning of Price in World Markets. *Journal of Cultural Economy*, *2*(3), 239–268. https://doi.org/10.1080/17530350903345462

Caliskan, K. (2011). *Market Threads: How Cotton Farmers and Traders Create a Global Commodity*. Princeton: Princeton University Press.

Caliskan, K. (2020). Data Money: The Socio-Technical Infrastructure of Cryptocurrency Blockchains. *Economy and Society*, *49*(4), 540–561. https://doi.org/10.1080/03085147.2020.1774258

Caliskan, K., & Callon, M. (2009). Economization, Part 1: Shifting Attention from the Economy Towards Processes of Economization. *Economy and Society*, *38*(3), 369–398. https://doi.org/10.1080/03085140903020580

Caliskan, K., & Callon, M. (2010). Economization, Part 2: A Research Programme for the Study of Markets. *Economy and Society*, *39*(1), 1–32. https://doi.org/10.1080/03085140903424519

Caliskan, K., & Birbil, S.I. (2020). *White Papers of Top 100 Cryptocurrencies and Their Blockchains*. [Text Corpus and R Code]. https://github.com/sibirbil/DataMoney

Coinbase. (2020). *Mission*. https://www.coinbase.com/mission

Corbet, S., Eraslan, V., Lucey, B., & Sensoy, A. (2019). The Effectiveness of Technical Trading Rules in Cryptocurrency Markets. *Finance Research Letters*, *31*, 32–37. https://doi.org/10.1016/j.frl.2019.04.027

Couldry, N., & Mejias, U.A. (2018). Data Colonialism: Rethinking Big Data's Relation to the Contemporary Subject. *Television & New Media*, *20*(4), 336–349. https://doi.org/10.1177/1527476418796632

Crandall, J. (2019). Blockchains and the "Chains of Empire": Contextualizing Blockchain, Cryptocurrency, and Neoliberalism in Puerto Rico. *The Journal of the Design Studies Forum*, *11*(3), 279–300. https://doi.org/10.1080/17547075.2019.1673989

Dijck, J.v., Poell, T., & Waal, M.d. (2018). *The Platform Society*. Oxford: Oxford University Press.

Dodd, N. (2018). The Social Life of Bitcoin. *Theory, Culture & Society*, *35*(3), 35–56. https://doi.org/10.1177/0263276417746464

Dourish, P. (2017). *The Stuff of Bits: An Essay on the Materialities of Information*. Cambridge: The MIT Press.

DuPont, Q. (2019). *Cryptocurrencies and Blockchains*. Cambridge: Polity.

Evans, D.S., & Schmalensee, R. (2005). *The Industrial Organization of Markets with Two-sided Platforms*. NBER Working Paper, No. 11603. http://dx.doi.org/10.3386/w11603

Filistrucchi, L., Geradin, D., & van Damme, E.E.C. (2012). *Identifying Two-Sided Markets*. TILEC Discussion Paper, No. 2012-008. http://dx.doi.org/10.2139/ssrn.2008661

Flurry, G., & Vicknair, W. (2001). The IBM Application Framework for E-Business. *IBM Systems Journal*, *40*(1), 8–24. https://doi.org/10.1147/sj.401.0008

Garrod, J.Z. (2019). On the Property of Blockchains: Comments on an Emerging Literature. *Economy & Society*, *48*(4), 602–623. https://doi.org/10.1080/03085147.2019.1678316

Gawer, A. (Ed.) (2009). *Platforms, Markets, and Innovation*. Cheltenham: Edward Elgar.

Geismar, H. (2001). What's in a Price? An Ethnography of Tribal Art at Auction. *Journal of Material Culture*, *6*(1), 25–47. https://doi.org/10.1177/135918350100600102

Giudici, P., & Abu-Hashish, I. (2019). What Determines Bitcoin Exchange Prices? A Network VAR Approach. *Finance Research Letters*, *28*, 309–318. https://doi.org/10.1016/j.frl.2018.05.013

Grabher, G., & König, J. (2017). Performing Network Theory? Reflexive Relationship Management on Social Network Sites. In B. Hollstein, W. Matiaske, & K.U. Schnapp (Eds.), *Networked Governance: New Research Perspectives* (pp. 121–140). Cham: Springer. https://doi.org/10.1007/978-3-319-50386-8

Grabher, G., & König, J. (2020). Disruption, Embedded. A Polanyian Framing of the Platform Economy. *Sociologica*, *14*(1). https://doi.org/10.6092/issn.1971-8853/10443

Guyer, J.I. (2004). *Marginal Gains: Monetary Transactions in Atlantic Africa*. Chicago: University of Chicago Press.

Guyer, J.I. (2016). *Legacies, Logics, Logistics: Essays in the Anthropology of the Platform Economy*. Chicago: The University of Chicago Press.

Güran, G. (2020). *Brokers of Order: How Money Moves in Wartime Syria*. (Doctoral Dissertation). Princeton University, Princeton.

Hecht, G. (2002). Rupture-Talk in the Nuclear Age: Conjugating Colonial Power in Africa. *Social Studies of Science*, *32*(5–6), 691–727. https://doi.org/10.1177/0306312702032005004

Helgesson, C.-F., & Muniesa, F. (2013). For What It's Worth: An Introduction to Valuation Studies. *Valuation Studies*, *1*(1), 1–10. https://doi.org/10.3384/vs.2001-5992.13111

Jacobides, M.G., Cennamo, C., & Gawer, A. (2018). Towards a Theory of Ecosystems. *Strategic Management Journal*, *39*(8), 2255–2276. https://doi.org/10.1002/smj.2904

Jones, K.A. (2018). *Toward a Political Sociology of Blockchain*. Unpublished M.A. Thesis. Queen's University Kingston, Ontario, Canada.

Kapoor, R. (2018). Ecosystems: Broadening the Locus of Value Creation. *Journal of Organization Design*, *7*(1), 12. https://doi.org/10.1186/s41469-018-0035-4

Katsiampa, P. (2017). Volatility Estimation for Bitcoin: A Comparison of GARCH Models. *Economics Letters*, *158*, 3–6. https://doi.org/10.1016/j.econlet.2017.06.023

Katsiampa, P., Corbet, S., & Lucey, B. (2019). High Frequency Volatility Co-Movements in Cryptocurrency Markets. *Journal of International Financial Markets, Institutions and Money*, *62*, 35–52. https://doi.org/10.1016/j.intfin.2019.05.003

Kyriazis, N.A. (2019). A Survey on Efficiency and Profitable Trading Opportunities in Cryptocurrency Markets. *Journal of Risk Financial Management*, *12*, 1–17. https://doi.org/10.3390/jrfm12020067

Langley, P., & Leyshon, A. (2016). Platform Capitalism: The Intermediation and Capitalization of Digital Economic Circulation. *Finance and Society*, *3*(1), 11–31. https://doi.org/10.2218/finsoc.v3i1.1936

Lépinay, V.A. (2007). Decoding Finance: Articulation and Liquidity Around a Trading Room. In D. MacKenzie, F. Muniesa, & L. Siu (Eds.), *Do Economists Make Markets? On the Performativity of Economics* (pp. 87–127). Princeton: Princeton University Press.

Lépinay, V.A. (2011). *Codes of Finance: Engineering Derivatives in a Global Bank*. Princeton: Princeton University Press.

MacKenzie, D. (2006). *An Engine, not a Camera: Financial Models Shape Markets*. Cambridge: MIT Press.

MacKenzie, D. (2009). *Material Markets: How Economic Agents are Constructed*. Oxford: Oxford University Press.

MacKenzie, D (2019). Pick a Nonce and Try a Hash. *London Review of Books*, *41*(8), 35–38. https://www.lrb.co.uk/the-paper/v41/no8/donald-mackenzie/pick-a-nonce-and-try-a-hash

Mallard, A. (1998). Compare, Standardize and Settle Agreement: On Some Usual Metrological Problems. *Social Studies of Science*, *28*(4), 571–601. https://doi.org/10.1177/030631298028004003

Mitchell, T. (2011). *Carbon Democracy: Political Power in the Age of Oil*. London: Verso.

Nelms, T.C., Maurer, B., Swartz, L., & Mainwaring, S. (2018). Social Payments: Innovation, Trust, Bitcoin, and the Sharing Economy. *Theory, Culture and Society*, *35*(3), 13–33. https://doi.org/10.1177/0263276417746466

OECD. (2009). *Two-Sided Markets*. https://www.oecd.org/daf/competition/44445730.pdf

Pigounidès, V. (2020). Predicting Prices, Persuading Users: Price Recommendations and the Rhetorical Logic of Algorithms. *Research in Economic Anthropology*, *40*, 71–89. https://doi.org/10.1108/S0190-128120200000040003

Plantin, J., Lagoze, C., Edwards, P.N., Sandvig, C. (2018) Infrastructure Studies Meet Platform Studies in the Age of Google and Facebook. *New Media & Society*, *20*(1), 293–310. https://doi.org/10.1177/1461444816661553

Reich, A., & Bearman, P. (2018). *Working for Respect: Community and Conflict in Walmart*. New York: Columbia University Press.

Rella, L. (2020). Steps towards an Ecology of Money Infrastructures: Materiality and Cultures of Ripple. *Journal of Cultural Economy*, *13*(2), 236–249. https://doi.org/10.1080/17530350.2020.1711532

Riles, A. (2004). Property as Legal Knowledge: Means and Ends. *The Journal of the Royal Anthropological Institute*, *10*(4), 775–795. https://doi.org/10.1111/j.14679655.2004.00211.x

Rochet, J., & Tirole, J. (2003). Platform Competition in Two-Sided Markets. *Journal of the European Economic Association*, *1*(4), 990–1029. https://doi.org/10.1162/154247603322493212

Rochet, J., & Tirole, J. (2006). Two-Sided Markets: A Progress Report. *The RAND Journal of Economics*, *37*(3), 645–667. https://doi.org/10.1111/j.1756-2171.2006.tb00036.x

Sanderson, S., & Uzumeri, M. (1995). Managing Product Families: The Case of the Sony Walkman. *Research Policy*, *24*(5), 761–782. https://doi.org/10.1016/0048-7333(94)00797-B

Schwarz, O. (2019). Facebook Rules: Structures of Governance in Digital Capitalism and the Control of Generalized Social Capital. *Theory, Culture & Society*, *36*(4), 117–141. https://doi.org/10.1177/0263276419826249

Shipilov, A., & Gawer, A. (2020). Integrating Research on Interorganizational Networks and Ecosystems. *Academy of Management Annals*, *14*(1), 92–121. https://doi.org/10.5465/annals.2018.0121

Srnicek, N., & De Sutter, L. (2017). *Platform Capitalism*. Malden: Polity.

Star, S.L. (1999). The Ethnography of Infrastructure. *American Behavioral Scientist*, *43*(3), 377–391. https://doi.org/10.1177/00027649921955326

Stark, D. (2009). *The Sense of Dissonance: Accounts of Worth in Economic Life*. Princeton: Princeton University Press.

Swartz, L. (2017). Blockchain Dreams: Imagining Techno-Economic Alternatives After Bitcoin. In M. Castells (Ed.), *Is Another Economy Possible? Culture and Economy in a Time of Crisis* (pp. 82–105). Cambridge: Polity.

Tapscott, D., & Tapscott, A. (2016). *Blockchain Revolution: How the Technology Behind Bitcoin is Changing Money, Business, and the World*. New York: Portfolio/Penguin.

The Guardian. (2018). The Guardian view on cryptocurrencies: A greater fool's gold (7 January 2019). Retrieved from https://www.theguardian.com/commentisfree/2018/jan/07/the-guardian-view-on-cryptocurrencies-a-greater-fools-gold

Thieser, A. (2019). *These Roses Don't Think About Each Other Either: Competition, Collaboration and Utopianism in a Blockchain Community*. Unpublished Article.

Ulrich, K.T. (1995). The Role of Product Architecture in the Manufacturing Firm. *Research Policy*, *24*(3), 419–440. http://dx.doi.org/10.1016/0048-7333(94)00775-3

Urquhart, A. (2016). The Inefficiency of Bitcoin. *Economics Letters*, *148*, 80–82. https://doi.org/10.1016/j.econlet.2016.09.019

Uzzi, B. (1996). The Sources and Consequences of Embeddedness for the Economic Performance of Organizations: The Network Effect. *American Sociological Review*, *61*(4), 674–698. https://doi.org/10.2307/2096399

Uzzi, B., & Lancaster, R. (2004). Embeddedness and Price Formation in the Corporate Law Market. *American Sociological Review*, *69*(3), 319–344. https://doi.org/10.1177/000312240406900301

Velthuis, O. (2003). Symbolic Meanings of Prices: Constructing the Value of Contemporary Art in Amsterdam and New York Galleries. *Theory and Society*, *32*(2), 181–215. https://doi.org/10.1023/A:1023995520369

Wark, M. (2019). *Capital is Dead*. London: Verso.

Westermeier, C. (2020). Money is Data: The Platformization of Financial Transactions. *Information, Communication & Society*, *23*(14), 2047–2063. https://doi.org/10.1080/1369118X.2020.1770833

Wheelwright, S.C., & Clark, K.B. (1992). Creating Project Plans to Focus Product Development. *Harvard Business Review*, *70*(2), 67–83. https://hbr.org/1992/03/creating-project-plans-to-focus-product-development

Wright, J. (2003). *One-Sided Logic in Two-Sided Markets*. http://dx.doi.org/10.2139/ssrn.459362

Zuboff, S. (2015). Big Other: Surveillance Capitalism and the Prospects of an Information Civilization. *Journal of Information Technology*, *30*(1), 75–89. http://dx.doi.org/10.1057/jit.2015.5

Koray Caliskan: School of Design Strategies, Parsons School of Design, The New School, New York City (USA)
https://orcid.org/0000-0001-9876-9405
koraycaliskan@newschool.edu; https://www.newschool.edu/parsons/faculty/Koray-Caliskan/
Koray Caliskan is Associate Professor of Strategic Design and Management at Parsons School of Design, The New School, New York (USA). He is Associate Editor of the *Journal of Cultural Economy*. He received his Ph.D. from New York University and was awarded the Malcolm Kerr Social Science Award from MESA. His book *Market Threads: How Cotton Farmers and Traders Create a Global Commodity* (Princeton University Press, 2010) focused on global commodity markets and relations of economization.