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Circulating value: convergences of datafication, financialization, and urbanization

Julia R. Wagner

Correspondence: juwagner@clarku.
edu
Graduate School of Geography,
Clark University, 950 Main Street,
Worcester, MA 01610, USA

Abstract

Much scholarship has revealed the interrelationships of urbanization and financialization of cities in the past half century. However, these twin processes are modulating with the advent and application of digital platforms towards the production and experience of urban life. This paper demonstrates how the datafication process of platform urbanism and smart city projects is deeply intertwined with processes of financialization and urbanization. Though materially distinct, these processes converge over a shared purpose to instigate and accelerate the circulation of value in capitalist urban production. This paper examines the urban character of digital economic circulation and the increasingly financialized datafication of urban infrastructures. In foregrounding the circulation of value, datafication both conditions and is conditioned by financialization and urbanization.

Keywords: Datafication, Urbanization, Financialization, Platform urbanism, Smart city

Science highlights

- Datafication is a capitalist process of circulation and accumulation, operating through an ensemble of data extraction technologies.
- Datafication is co-generative of urbanization and financialization acting complementarily to these processes.
- Datafication can be studied using the same analytical tools used to study financialization and urbanization.

Policy and practice recommendations

- Capitalist datafication yields particular urban outcomes, oriented towards capital circulation and accumulation.
- Data production and therefore data content are not neutral; attention to the logics of data production should inform use.

- Expanding access to data property may result in alternative processes of financialization and urbanization.

Introduction

Given the growing ubiquity and economic salience of algorithmically-enabled devices and digital platforms, data occupy an increasingly prevalent role in daily life, and as such, have inspired widespread academic inquiry. Data-driven goods, services, and means of production now structure some of the world's largest companies including Amazon, Uber, and IBM. Srnicek (2017) argues that "capital has turned to data" as an engine of economic growth, spurring what he terms "platform capitalism" (p. 6). Not only are data now central to production, the production of data is central to political economy. Datafication is a term that signals changes in the data production process and the growing integration of data into contemporary socio-technical landscapes. Datafication joins a raft of cultural and political-economic concepts generated to explain capitalism's dynamic forms.

Data ubiquity follows technological advancements in collection, processing, and analysis and increased market valuation as demonstrated by data-driven firms' profits; however, these observations do not readily explain how changes to data production and valuation influence and are influenced by broader trends in production, consumption, and social reproduction in capitalist political economy. To this end, I attempt to expand an understanding of datafication by comparing this process to two other predominant processes in contemporary capitalism: urbanization and financialization. I suggest that analysis of how these processes complement each other may aid cultural and political economists to better understand the impact of datafication as a capitalist process.

In this review, I embark on a course of analytic triangulation, to compare the apparent logics and outcomes of datafication with financialization and urbanization. Each of these processes precedes capitalism (see Mattern 2017; Scott and Storper 2015; Fourcade and Healy 2017) but, nevertheless, take on specific forms under capitalism and are descriptive of the predominant forms of capitalism today. The prevalence of datafication is the result of public and private efforts to develop digital technologies towards meaningful applications. Digital technologies promise urban sustainability transition offering new capacities for socio-technical coordination (United Nations 2015). Yet, digital technologies, like all infrastructures, are developed and deployed in and through inherently socio-political processes and are, therefore, deeply political (Appel et al. 2018). I interrogate how data is entwined in urbanization and financialization and how finance capital and urban life condition datafication. With this analysis, I do not wish to integrate these processes into a grand theory of contemporary capitalism, but suggest that comparison can yield useful analytic insights about datafication and its role in capitalist value circulation and accumulation in specific contexts. Comparison with financialization and urbanization temporalizes and materializes the forms through which datafication conveys value, highlighting how data production shapes and is shaped by capitalist conventions of value distribution. Ultimately, I argue that datafication is neither resultant from nor replicative of urbanization nor financialization, but rather a long co-generative, related process that has recently seen acceleration and proliferation through advancements in digital technologies. Digital advancements, insofar as they mark a powerful means of social transformation, must be interrogated as both

historically contingent and inherently political. New digital technologies mediate the circulation of value in and through urban space, revising value creation and distribution and demanding new approaches to governance.

Contouring datafication

Datafication is, most simply, the process of using technologies to record and archive information about socially relevant action. Today, datafication is indicative of how digital devices (e.g. smart phones) and platforms (e.g. Amazon, Facebook) capture and process 'big data,' though data production has pre-digital antecedents. Present-day datafication highlights the novel changes to data production facilitated by new technologies and how those transformations have expanded the motives and implications of data production. Present-day datafication is descriptive of the collection of data to represent things that did not require data representation in the past as well as the new valuation of data in political economic processes.

Datafication is multiply defined by characteristics of expansion, acceleration, and accumulation. Increased data production is enabled by an ensemble of data extraction technologies such as smart devices and digital platforms positioned in public and private spaces, material and digital. The expansion of data production today is legitimized by the desirability of data-dependent goods and services (van Dijck 2014). The process has an accelerating tendency, characterized by the "data-imperative" or the need to always accumulate more data for the continued functioning of algorithms (Fourcade and Healy 2017). Datafication's 'driving logic' of perpetual data circulation and accumulation derives from data's valuation in capitalist political economy (Sadowski 2019). These operative logics all drive material outcomes, represented by the increasing mediation of life through digital technologies. Datafication is both the extraction of data from 'new' sources and creation of demand for that data through the proliferation of digital technologies.

Despite advancements in the conceptualization of datafication, the term remains exceedingly abstract, likely stemming from data's intangible qualities, where much of data's 'work' seemingly occurs in the digital sphere. Where all analytic devices require some degree of abstraction, I argue that datafication could benefit from spatial and temporal contouring through consideration of dataficaton's co-constitution with processes of urbanization and financialization. I will proceed with a review of existing literature through four analytic lenses: the financialization of data, the datafication of finance, the datafication of the urban, and the urbanization of data. This course is not without abstractions and exclusions of its own and is further complicated by the fact that neither urbanization nor financialization is a settled term (see Christophers 2015; Brenner 2013). Nevertheless, I argue that comparing these processes helps to concretize the forms by which datafication unevenly distributes value in capitalist contexts. Understanding these dimensions has implications for the "neutral" deployment of digital technologies towards intentional sustainability transitions.

Urbanization and financialization are fundamentally contested concepts, descriptive of multiple social dimensions and deployed in an array of analyses. By urbanization, I mean the ongoing process and pattern of land settlement, produced in tension with intra- and extra-urban relations and significantly molded by "firms seeking locations for production and households seeking living space" (Scott and Storper 2015, p. 8). This

definition draws attention to the material and built qualities of human settlement, without essentializing one morphology, as well as the shifting social relations that condition them, without dictating the form of those relations. Harvey (1989) describes how capitalist crisis impacts urbanization when overproduction prompts capital to 'switch' from investment in the manufacturing circuit to real estate, suggesting that capitalist value circulation creates distinctive material and social effects. Following Krippner (2005), I refer to financialization as the historic process by which finance capital has become a more prevalent form of investment, even within productive sectors, enforcing a pattern of accumulation where profits are increasingly wrought from monetary manipulation rather than traditional manufacturing activities (see also Arrighi 1994). This trend produces a glut of finance capital in search of assets from which to extract rent, prompting the production of new asset classes. The interrelationships between financialization and urbanization is well-worn, though I highlight that within capitalist political economic contexts, both are descriptive of the social processes that ensue when capital switches from traditional production to other forms of value accumulation. In the following sections, I discuss how financialization and urbanization overlap with and complement datafication.

Datafication and financialization

Historical materialist studies point to how the historical glut of finance capital has led to a particular development of technology firms and the asset-ization of data-driven goods and services. According to Srnicek (2017), the centrality of data-driven, digital platform business models in "platform capitalism," is the result of historical transformations in the investment of capital away from a declining manufacturing sector and towards financial assets. Srnicek argues that platform capitalism is representative of a "technology boom" akin to the housing and finance booms of the past where "surplus capital is seeking higher rates of return in a low interest rate environment" and where those low interest rates have "depressed the returns on traditional financial investments" (p. 86). The historical conditions that gave rise to financialization have also proved integral to the shaping of datafication practices today, in which the tech industry, flush with venture and finance capital, has developed data production technologies oriented towards profitable ends. Srnicek's argument offers historical context as to why finance expanded into the digital sector and prompts reflection on the ways that finance capital valorizes through the digital platforms it funds.

The digital platform is a data-driven technology and business model that performs like a financial intermediary, articulating for investors how their data-assets will yield income. Platform business models warrant capital investment by linking user exchanges on the digital platform to "wider processes of capitalization" through the coordination of network effects (Langley and Leyshon 2017, p. 25). Platform firms frame the social and economic interactions facilitated by the platform as services, allowing them to extract monetary or data payment (rent) from users as a charge for access. Consider the Uber platform: two users, a driver, in need of income and possessing the capacity to work and a rider in need of transportation and possessing expendable income connect via the Uber smartphone app. Uber's data-driven algorithms and digital app interface structure the interaction between the driver and the rider. As payment for this mediating service, Uber takes a monetary cut of the fare and collects ride data, which the firm

uses to enhance its data-driven product and sells as data-insights. Sadowski (2020) has termed this dynamic of extracting rent, "the Internet of landlords" where "Uber isn't a taxi company; it's a platform that offers transportation-as-a-service" and then charges rent for use of its platform service (p. 567). The ability of digital platform technologies to facilitate the use of data-as-a-service towards the extraction of rent mirrors how financial services operate and allows tech firms to translate how their data-driven products perform as financial assets.

Data also contribute to the making of other financial assets. Datafication has facilitated the financing of a number of assets from housing (Fields 2019) to personal credit (Hurley and Adebayo 2017). Here, data provide informational context to secure the likelihood that an asset will perform as predicted. Data have long influenced financial logics, but data ubiquity has ushered in a "new era of data collection and analysis" (Fourcade and Healy 2017, p. 11) increasing the depth of data's influence. The intensification of the interrelationship between datafication and finance capital is demonstrated by the chorus of devices that comprise the 'smart' home. Smart home devices such as Amazon's Alexa and network-integrated utilities (e.g. the Nest thermostat) and appliances (e.g. the Samsung smart refrigerator) now inform the FIRE sector (finance, insurance, and real estate), where household information is monetized and integrated into the management of assets and risk (Maalsen and Sadowski 2019). Adding 'smart' data extraction capacities to everyday objects alters their standing as financial assets where datafication seeks to add value-generating capacity to assets that would otherwise depreciate over time. Alternatively, the data captured by smart technologies may divert investment away from places or people represented as 'risky.' Increasingly finance deploys new and newly-integrated sources of data towards the transformation of objects and social relations into financial assets.

Attention to the financialization of data draws into focus the historical dimensions of capitalist production that have conditioned the mutual expansion of finance and data economies. Capitalist financialization and the movement of capital away from the productive sector and into non-traditional assets was pivotal to the early and ongoing financing of technology firms and their products. As such, these financialization logics and outcomes are deeply embedded in the cultures of big tech firms, impacting their data capture technologies and data itself. This deeply intertwined relationship continues today where novel business models, such as the data-driven digital platform, are developed to secure returns on financial investments. Meanwhile, datafication enables the complex mechanisms and calculations that secure the creation of financial assets. Notably, the expansion of datafication does not appear to expand financialization into new sectors so much as modify calculations about certain types of assets in established sectors, such as real estate or personal loans. Nevertheless, datafication is put to use as a predictive technology for finance capital where the increased acceleration and scope of big data alters the predictive parameters of financial investment. Far from siloed branches of distinctive economies, datafication and financialization are mutually reinforcing and complementary capitalist processes. Data play an instrumental role in the expansion and augmentation of finance and finance in the historical constitution of privatized datafication. As such, urbanists should assess platform technologies not only for their functionality in daily life but on the interests of their corporate stakeholders and

the platform's capacity to facilitate the creation of assets, circulate money capital, and secure investments.

Datafication and urbanization

Datafication is a predominant condition of capitalist urban production today, where data increasingly inform individual and collective urban decision-making and mediate urban interactions. This relationship is not 'new' in that non-digital forms of information have long mediated urban production (Mattern 2017); nevertheless, contemporary research focuses on how new data-driven technologies articulate novel forms of urban interaction and grapples with the logics of datafication in urban material and political environments. Datafication of the urban is largely enacted through two types of data extraction apparatuses: the networked Internet of Things (IoT) and the digital platform.

Smart city research of the last decade follows the development of the IoT, a network of smart devices--cameras, transponders, actuators, and sensors--that produce large volumes of data (Kitchin 2014). According to smart city logic, data are analyzed to "improve city services and create new services, engage citizens, foster sustainability and resilience, solve urban issues, and stimulate innovation and grow the local economy" (Kitchin et al. 2016, p. 93–4). However, the "actually existing" smart city is a manifestation of political and technological orders, deeply embedded in existing urban systems and politics (Shelton et al. 2015). In these articulations, big data mediate, modulate, and augment existing power structures even as these same powers dictate the capture of big data via control over sensing technologies. While 'data-driven' projects seek to de-politicize planning decisions, existing literature describes how these processes can (re)produce inequities in urban built environment (Safransky 2020). Not only does data alter planning outcomes, they reconfigure the urban subject through novel systems of control, enrolling them into the production of urban data through distinctive modes of 'participation' (Gabrys 2014; Vanolo 2014). Data integration into urban processes yields substantive material and social impact.

Platform urbanism has been described as a "mode of urbanization that is deeply shaped by the conditions and affordances of platforms" (Barns 2019, p. 3). The convergence of platform products and urban spatial infrastructures and practices pitches the economic relations of the proprietary digital platform into urban life (Barns 2020). Barns describes how datafication in platform urbanism is a kind of "steering tactic," borrowed from the logics of the platform-as-business, to generate greater usership and "expand the range and remit of the platform ecosystem" (p. 116). The platform utilizes data and "many to many" web architectures to facilitate complex material interactions through digital interfaces. Consider Deliveroo, which coordinates three users (restaurants, delivery professionals, and consumers) via its platform interface. Consumers transact with the restaurants through Deliveroo's digital interface, initiating as cascade of data-driven logistics, coordinated across several actors, resulting in the food delivery. The platform is not merely a neutral space where different actors and objects meet, but a coordinating regime powered by data; thus, the platform proffers a "reorganization of urban operations" by the "novel technologies of coordination that can reterritorialize those already existing" (Richardson 2020, p. 460). Though platform technologies emerged from an open, participatory Internet culture, these technologies are

increasingly developed and enclosed by private firms (Barns 2020; Srnicek 2017). Therefore, private firms deploy data to catalyze the logistical organization of people and materials in extensive and emergent spatial-temporal arrangements towards profitable ends.

Datafication does not simply mediate modes of urbanization, but is (re)produced in the same urban contexts that it informs. In other words, datafication alters urban landscapes by fueling platforms in the orchestration of "flexible spatial arrangements" of objects and people (Richardson 2020), but those same arrangements serve as the sites for the ongoing extraction of datasets. In digital platform ecosystems, data production and consumption are remarkably recursive. The issue here is not so much that the thickness of data production in urban areas somehow skews big data's representation towards 'the urban,' but that data production is conditioned by the very urban built environments that it informs.

The design logics of proprietary digital platforms are meaningful in shaping circular data production. Platform etymology suggests an open and collaborative sensibility (Gillespie 2010); however, the proprietary platform logic is "open, yet closed," welcoming productive uses, but guarding the data outputs of those uses (Barns 2020, p. 139). Proprietary platforms enact a "recombinatory urban governance" where data capture is decentralized and incentivized while data capture and capitalization is centralized and proprietary (ibid., p. 131). While data are often deployed towards defining urban problems, in platform urbanism, more datafication is often the solution, where platform data outputs are re-integrated into the platform code. Not only does the platform firm make its outputs "necessary" by using them as inputs in the ongoing function of the platform, it profits from the use of these data.

Data production is deeply informed by the urban spaces and social interactions that urban data represent. Consideration of how data are 'urbanized,' reflects how data production is dependent on the social and material relations produced within particular forms of land use. What is important here is that the same places influenced by data serve as the site of data production itself, a feedback loop that draws attention to the ways that data production both mediates and is mediated by material contexts. As such, data production is deeply imbricated in the physical and social interactions made possible by particular forms of platform urbanization in the material world.

Complex convergences

Accounting for the ways that datafication is imbricated with urbanization and financialization highlights how datafication perpetuates capitalist dynamics. Proprietary processes of datafication often complement or enhance processes of financialization and urbanization by informing and securing new paths for capital circulation and accumulation. Additionally, the histories, trajectories, and materialities of data production are embedded in worlds conditioned by financialization and urbanization. These processes overlap in particular contexts to perpetuate capitalist dynamics through novel outcomes. In her study about the conjuring of single-family rental housing (SFR) as an asset after the 2008 financial crisis, Fields (2019) demonstrates how data-driven technologies were deployed by national real estate management firms in the financialization of SFR's. An ensemble of property technologies--digital devices and platform interfaces—and the people enrolled to use them secured SFR's for institutional financial

investment, prompting significant implications for housing ownership and management in the United States. Data, Fields argues, were made valuable as an input in the logistical infrastructures of global property management and finance regimes and likewise secured value in SFR's by mobilizing human activities in the digital and material space. The circulatory logics of datafication then, are rendered not merely through the networking of data within the digital sphere, but in the continuous assembling and re-assembling of human activity and material objects in time and space and oriented towards value production, accumulation, and redistribution. Field's case highlights how datafication converges with other social processes to perpetuate capitalist dynamics while creating specific contextual outcomes.

Datafication, urbanization, and financialization are complementary and mutually constituted processes. I have described how analysis of the financialization of data has underpinned the proprietary data technologies that characterize datafication today. Likewise, attention to the datafication of finance, demonstrates how data facilitate the production of new financial assets and calculation mechanisms. Datafication likewise informs the decisions and practices shaping urban production, with notable influence over urban infrastructure planning and development and the practices and interactions structuring urban mobilities and markets. However, data production is not merely intangible but deeply embedded in social and material relations and space; therefore, forms of urbanization also condition data production. These three processes are descriptive of distinctive relations and materialities, yet they share underlying logics of capitalist valuation, circulation, and accumulation. Further, the imperatives and outcomes of these processes are increasingly intertwined.

New digital technologies present the capacity to set value in motion while vesting control over accumulation in the hands of predominantly private corporations. Datafication's imbrication in capitalist co-processes denote the affordances of data, devices, and platforms to rearrange the spatial distribution of production and social reproduction and redistribute the circulation of money towards the benefit of the corporations that *control* the digital conditions of daily life. Given compelling evidence that datafication moves in and through capitalist urbanism and financial capitalism, control over digital technologies and their capacity to arrange social action and extract value highlights the growing relevance of digital rentiers in shaping capitalism today. The long-term material and social implications of this configuration remain to be seen, though the monopolization of big tech firms alongside the growing precarity of tech users, despite technological advancements, suggests that capitalist datafication may amass profits and power to actors with control over the organizing capacities of digital technologies while dis-associating them from the responsibility of the effects. A focus on the datafication's capacities to circulate value in and through financialization and urbanization underscores the importance of careful digital governance strategies over data access and use to guide the relations and outcomes of datafication towards more equitable and just social transformation.

Abbreviations
IoT: Internet of Things; SFR: Single-family rental

Declarations

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