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# The Internet of Landlords: Digital Platforms and New Mechanisms of Rentier Capitalism

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**Abstract:** Digital platforms are a nearly ubiquitous form of intermediary and infrastructure in society. By positioning platforms in the geographical political economy/ecology literature, this paper provides a critical analysis of platforms as a dominant form of rentier in contemporary capitalism. In doing so, I extend this work on rent theory beyond applications to land and nature so that it also includes platforms and data. I argue that the rapid rise of the "X-as-a-service" business model across nearly all sectors of the economy is creating rentier relations by another name. This model is premised on the platform latching onto and inserting itself into the production, circulation, or consumption process, thus creating opportunities to capture value. To better understand the operations and implications of platforms, I outline three key mechanisms: data extraction, digital enclosure, and capital convergence.

**Keywords:** digital platforms, rentier capitalism, rent extraction, data collection, internet of things, digital enclosure

## Introduction

Digital platforms—as a nearly ubiquitous "socio-technical intermediary and business arrangement" (Langley and Leyshon 2017:11)—are now a defining feature of contemporary capitalism.

In the decade since the Global Financial Crash, new platform giants like Airbnb and Uber (founded in 2008 and 2009, respectively) have burst onto the scene, while older behemoths like Amazon and Alphabet (née Google) have acquired unprecedented levels of power and wealth. What has been a hard decade for people and economies around the world, has been boom times for the tech sector, with the digital platform as the flagship for this new model of capitalism (Srnicek 2017). This relative prosperity is clear when we consider how the platform has overtaken other more established sectors. According to the 2019 Digital Economy Report from the UN Conference on Trade and Development, which analyses the "platformization" of the global economy, the "shift is even more remarkable when measured in terms of market capitalization" (UNCTAD 2019:17). As Figure 1 shows, in 2009 companies in the technology and consumer services sector, which includes digital platforms, made up only 16% of the top 20 companies by market capitalisation. In 2018, that number surged to 56%. "Four of the top 10 firms in 2018 did

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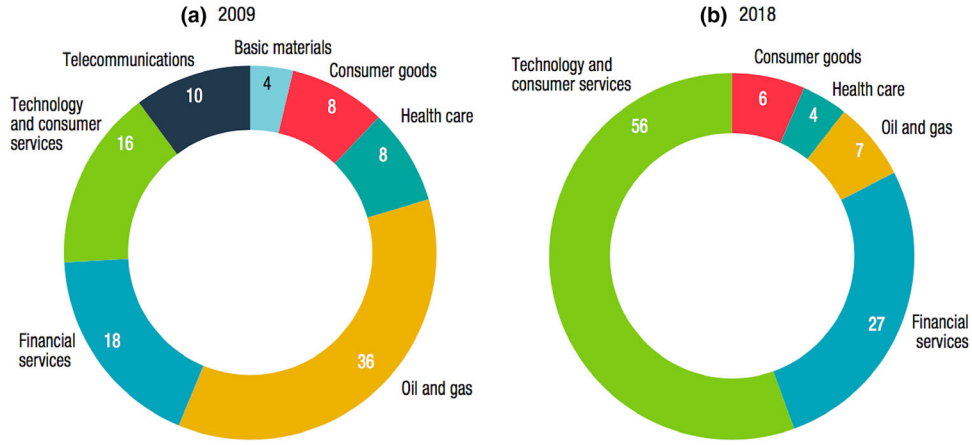


**Figure 1:** Top 20 companies in the world by market capitalisation (per cent) and by sector, 2009 versus 2018 (source: UNCTAD 2019:18) [Colour figure can be viewed at wileyonlinelibrary.com]

not even feature among the top 100 in 2009: Amazon, Alibaba, Facebook and Tencent" (UNCTAD 2019:18).

Corporations built on platforms—or transforming to become platforms—now sit at the top of the global economy. As *The Economist* (2017) notes, "[i]ndustrial giants such as GE and Siemens now sell themselves as data firms", because the richest, fastest-growing companies now operate platforms, not factories. To be aphoristic, based on these sectoral shifts the Great Recession could be relabelled the Great Disruption.

Platform capitalism is on a clear trajectory toward dominance. Or, depending on the metric used, it has already achieved dominance—which only increases the pressure to continue growing, accumulating, and subsuming competitors to maintain the top position. It is worth noting that the financial services sector also saw significant growth, from 18% to 27% in terms of market capitalisation, during the decade following a crisis brought about by the chicanery of financial institutions. The dual growth of platforms and finance illustrates the fact that, as political economists and geographers have argued, contemporary capitalism is "increasingly underpinned by rentiership or the appropriation of value through ownership and control rights" (Birch 2020:3; Harvey 2010). Such work tends to focus on financialisation. However, I aim to push this analysis further by showing how platforms have succeeded—perhaps to a degree that even surpasses the financial sector—at devising new ways to capture value and control property.

This paper aims to advance and synthesise two (re)emerging themes in the critical analysis of contemporary capitalism: platform studies and rent theory. The first contribution provides an original theorisation of platforms as a form of rentier by positioning platforms within the geographic political economy/ecology literature on landlords, rent, and enclosure. The second contribution furthers what can be seen as a new wave, or at least a revitalisation, of research on Marxist theorisation of rent and value (Bigger and Robertson 2017; Kay and Kenney-Lazar 2017;

Purcell et al. 2019; Slater 2017) by extending this analysis beyond applications to land and nature so that it also includes platforms and data. Overall, both aims are motivated by reaching a better understanding of what Mezzadra and Neilson (2015:1) have called the "operations of capital", or "the material aspects of capital's intervention in specific situations and their wider articulation into systemic patterns". This framework informs my description in the fourth section of the mechanisms of rentier platforms. If, as the economic shift and trends show, the platform model has become dominant, then more work is needed about how these operations and relations manifest today and how they connect to ongoing dynamics of capitalist development.

This is not the first piece to argue that platforms operate as rentiers; though, there have not been many others and none I'm aware of that do so in the way presented here. The strongest, most consistent case I have come across thus far is in the 2018 UNCTAD report, *Power, Platforms and the Free Trade Delusion*, which condemns the way in which "big business has responded" to the neoliberal co-optation of "an interconnected digital world" by "turning the mining and processing of data into a rent-seeking cornucopia" (UNCTAD 2018:1). In this case, the UNCTAD report relies on a definition of rent-seeking from public choice theory. That is, "firms seek to boost profitability" and capture value—rather than create value through production—by manipulating and taking advantage of the social and political system (UNCTAD 2018:vii). These rent-seeking strategies include, on the one hand, "intensifying international competition between workers and between Governments to reduce labour and tax costs", and on the other hand, eliminating competition by "crushing or buying up competitors to build up market dominance" (UNCTAD 2018:vii).

I take this argument in a different direction by considering more than just neoclassical conceptions of "rent-seeking" and focusing instead on other forms of rent extraction and "unchecked corporate rentierism" by digital platforms (UNCTAD 2018:xiv). I call this technological expansion and empowerment of rentier capitalism the "Internet of Landlords". In doing so I'm referring to the broad category of technology called the Internet of Things—based on embedding objects with sensors, software, and connectivity—which is materially essential for the new sources of rent, new infrastructures of rentier relations, and new mechanisms of extraction and enclosure that I explore here. I don't intend to say the Internet of Things is necessarily or deterministically rentier in nature, but rather that these characteristics are central to the currently existing techno-economic arrangement.

This paper proceeds as follows. The second section starts by briefly outlining the types of platforms that exist and their role as intermediaries. It then lays the foundation for my argument by reviewing scholarship on rent theory, building on classical work, but paying particular attention to recent currents of research coming out of geographic political economy and political ecology. The third section takes this analysis further by explaining how digital platforms have emerged as a ubiquitous rentier that endeavours to insert itself into spaces, things, and interactions—especially ones that were not previously subject to rentier relations—in order to control access and capture value. The fourth section then provides a

framework for the operations of rentier platforms by identifying three key mechanisms: data extraction, digital enclosure, and capital convergence. The paper concludes with suggestions for further research at the intersection of digital platforms and radical geographies.

## Platforming Rent Theory

Recent scholarship has laid the groundwork for critically analysing the features of platforms, the types of platforms, and the place of specific platforms in people's lives (Barns 2019; Leszczynski 2019; Plantin et al. 2018). Srnicek's (2017:49) work on platform capitalism has parsed out the "emerging platform landscape" by providing a useful categorisation of five types of digital platforms. First are *advertising* platforms like Google and Facebook that sell ads based on captured and analysed user data. Second are *cloud* platforms like AWS and Salesforce that own hardware and software infrastructures that are then rented to other organisations. Third are *industrial* platforms like GE that "transform traditional manufacturing into internet-connected processes that lower the cost of production and transform goods into services" (Srnicek 2017:49). Fourth are *product* platforms like Spotify, which collect fees from people accessing and using goods the platform owns. Fifth are *lean* platforms like Uber and Airbnb that generate profit by minimising their ownership of assets and overhead costs, while providing a service built on the users' assets. This platform landscape is sprawling, with new entrants every day. "These analytical divisions can, and often do, run together within any one firm" (Srnicek 2017:49). Importantly for this article, most of these platform types are variants on supplying technology and/or creating services, and then controlling access and collecting rent. My analysis focuses on this underlying economic dynamic.

These various platforms have become both important infrastructures and intermediaries in society insofar as they are found everywhere, support other activities, connect different people for various reasons, and reside in the background of everyday life (Plantin et al. 2018; Richardson 2019). Beyond providing their users with new communication networks and the convenience of on-demand services, platforms are the business model and machinery for the "intermediation and capitalisation of digital economic circulation" (Langley and Leyshon 2017:11). By reducing transaction costs—the keyword is *frictionless* interfaces—digital platforms seek to "automate market exchanges and mediate social action", while also making "existing arrangements" more digitalised, datafied, and trackable (Schwarz 2017:377).

This role of platforms as infrastructure and intermediary is where I make the analytical connection to rentierism. Rentiers are defined by their "ownership of the access to a condition of production" (Felli 2014:269) and their ability to derive income (rent) from access to assets. The function of platforms—as crystallised in the above quote by Langley and Leyshon (2017:11)—is similar to the way "landed property mediates the production and circulation of surplus value" (Kerr 1996:67). In other words, landlords and platforms both possess similar positions of mediation, powers of access, purposes of extraction—enough so that I argue we should define them as rentiers. I will expand on this analysis of rentier

platforms in the next sections of the paper, but first I review scholarship on rent that forms the foundation for my argument. With regard to this section's title, I mean "platforming rent theory" in two senses. I put rent theory on a platform by elevating its utility for the study of contemporary capitalism. And I bring rent theory to bear on the study of digital platforms.

Over the last few decades, many key contributions to this literature have provided in-depth descriptions of how the political economy of rent and landed property has developed from Ricardo (2004) and Marx (1993) up to Harvey (1982) (e.g. Christophers 2016; Haila 1988; Kerr 1996). Rather than provide another full recounting, I will greatly simplify three major theses of this classical analysis: (1) landed property is not itself a source of value creation (Christophers 2010); (2) rent is a redistribution of value from labour's wages and capital's profits to the landlord's pockets (Neocosmos 1986); and (3) it is for these reasons that the landlord class is denounced as unproductive "parasites" and "usurers in land" who, by owning and controlling property, latch onto the circuits of capital and consumption (Marx 1993:1023). Much of the cutting-edge work that I now turn my attention to follows from those three theses.

There has been a recent wave of strong research on questions of value and rent in contemporary capitalism from scholars working within or adjacent to the field of political ecology. This makes sense considering the materialist approach taken to issues such as the governance of land, distribution of resources, and interconnection of social, environmental, and technological systems (Andreucci et al. 2017; Loftus 2009; Monstadt 2009). More specifically, much of this work has focused on understanding the multiplicity of ways that nature and/or conservation are (becoming) thoroughly financialised (Bryant 2018; Dempsey and Suarez 2016; Sullivan 2013). To be clear, in this paper I don't intend to offer a political ecology of platforms, but rather an analysis that is in concert with the approaches and concerns of political ecology.

This literature has shown how the old story of treating land as a financial asset is being updated through the application of new systems of rent extraction and property management in order to maximise both profit from and power over the entire value chain (Dempsey and Bigger 2018). Kay (2018) likens this to a "hostile takeover of nature" along the lines of Wall Street corporate raiders. This provocative analogy aptly illustrates the attitude that these firms have toward accumulating wealth by any means necessary. Importantly, the firms at the vanguard of financialisation are focused on creating and implementing methods for "rent-seeking", as Kay (2018:178) explains, "no new wealth is being created in this process". The logic is to turn everything and every place into a financial asset. That logic does not always unfold successfully—indeed, attempts to make markets and profits do fail spectacularly[1]—but the ongoing mission to achieve these aims is a powerful motivation. This strategy of assetisation is not only limited to real estate, but rather has become "a principal component of financialisation and an important material mechanism driving neoliberalisation" (Ward and Swyngedouw 2018:1078).

Of course, this is not a new mission or logic for capital. But what is new are the complex technologies that have been designed to extend and empower capital's

abilities of assetisation, extraction, and enclosure. These technologies take on different forms but work together as a constellation that keeps systems of value capture in motion. They include, but are not limited to: digital technologies like the data-driven, networked, and algorithmic systems that comprise so-called "smart" things (Sadowski 2020); legal technologies like intellectual property rights used to construct and control (im)material assets out of cognitive and biological substrate (Birch 2017; Zeller 2007); and financial technologies like derivatives, bonds, and risk indexes designed for the purpose of abstracting, valuing, and exchanging anything (Christophers 2018; Rosenman 2019). These various types of technologies overlap and intersect; the separations I make here are purely analytical.

Kay and Kenney-Lazar (2017:301, emphasis added) point out that the "*creation of value* is always linked with material transformations and the creation of new materialities". It should also be noted that the *capture of value* is linked with material transformations. In this case, the digital-legal-financial technologies of data mining, software licenses, and automated asset management that are employed to create and enforce new materialities of rentier platforms.

Ward and Aalbers (2016:1780) conclude their overview of rent theory by asserting that we should "take the categories of rent beyond land in the analysis of capitalism increasingly reliant on flows of rentier income". Indeed, they explicitly recognise that the analysis of digital platforms is among the "challenges" that need to be addressed by contemporary rent theory (Ward and Aalbers 2016:1780). Responding to this call, the rest of the paper details how and why platforms are an especially consequential case of "the penetration of rent extraction mechanisms into new spheres of social reproduction and everyday life" (Purcell et al. 2019:10).

## Extraction-as-a-Service

The surge of companies that describe themselves as "Uber-for-X" or "X-as-a-service"—whether start-ups in search of funding or incumbents looking to rebrand—are creating rentier relations by another name. Instead of commanding payment from the use of landed property, these new rentiers capture revenue from the use of digital platforms. Instead of capitalising on real estate and controlling access to buildings, these new rentiers are gatekeepers to the Internet and owners of software applications. Instead of relying solely on money as a stand-in for value, these new rentiers also treat data as a source of value—if not fetishise data as valuable in itself (Sadowski 2019). This section will outline the fundamentals of rentier platforms and foreshadow the mechanisms of their operation that the next section details in more depth.

The main strategy of these rentiers is to turn social interactions and economic transactions into "services" that takes place on their platform. These platforms see themselves as simply service providers. Uber isn't a taxi company; it's a platform that offers transportation-as-a-service. WeWork doesn't lease offices and meeting rooms; it's a platform that offers "space-as-a-service" (Morozov 2017). Jeff Bezos (2006) even called Amazon Mechanical Turk, the micro-work platform started by his company, "humans-as-a-service". Aligned with Silicon Valley ideological

commitment to efficiency, platforms pitch their services as a way of turning idle resources into maximally productive assets and unlocking the value of latent space in existing places. In other words, Airbnb turns the unused bedroom into a productive asset that generates rents, while Uber turns the empty car seat into a productive asset that generates fares. This X-as-a-service rental model follows the shift toward assetisation that Birch (2015:122) defined as "the transformation of things into resources which generate income without a sale".

There are interesting parallels between the methods of rentier platforms and the "voodoo economics" of property value and financial capital (Christophers 2010). The economists and investors profiled by Christophers (2010:99) attempt to use financial "mystification" to conjure value by turning real estate assets "from dead or dormant into 'live capital'" and by "realising value that is perceived to be 'in' but not yet 'of' property". The rentier platforms, in their attempt to activate value in and extract rents from what they deem to be unproductive or uncommodified assets, are performing their own version of voodoo economics updated for the digital age. The general acceptance of this X-as-a-service framing and the process of "transforming traditional goods into rentable services" (UNCTAD 2019:45) are key to the broader agenda of continually capturing value from these assets and activities.

Ultimately, the rentier model hinges on the platform becoming a (necessary) intermediary in the production, circulation, or consumption process. The platform's owner, due to their control over access to the "condition or means of production", can then "exact a tribute" from all economic activity that includes their property (Harvey 2006:73). However, this is not to say that platforms only generate income from rent. As Christophers (2019:6) notes, "[g]eneralizing, we can state: rent is typically part of a rentier's income rather than its totality". Thus, in arguing that platforms should be defined as rentiers, I mean to show that rentierism is a significant and central feature of how platforms operate and derive income.

So, what kind of rents do platforms extract? I answer this question by referring to the useful typology of rent provided by Ward and Aalbers (2016). Synthesising classical and "modern" work, they lucidly describe two differential forms and two monopoly forms of rent. Differential rent type 1 (DR1) refers to when the landlord claims value that arises from some competitively advantageous, inherent feature of the property, such as fertile soil or waterfront view. Differential rent type 2 (DR2) arises from "increases in productivity as a result of investment on the land", such as construction and maintenance (Ward and Aalbers 2016:1764). Monopoly rent refers to when there is "impairment of competition due to some natural feature", such as limited supply of a fine wine from a particular vineyard. Absolute rent arises when the rentiers themselves create and enforce, rather than only take advantage of, the monopolistic conditions. Based on this typology, I argue platforms extract DR2 with the aim of extracting absolute rent.

We can see how platforms collect DR2 by drawing a (good but imperfect) analogy with commercial real estate, rather than residential real estate. Don't think of the platform as the landlord who owns a rental home. Think of it as the owner of a shopping mall who invests in property in order to facilitate productive activity.

For every good and service exchanged in the shops. For every social interaction between people meeting at the mall. For every person who just browses and walks around. The mall's owner takes their cut of the value generated. Whether that value is money added to the price of everything or data about human behaviours and preferences. After all, to use the Silicon Valley jargon, what is a mall if not a capitalist "ecosystem". And indeed, many if not most of our daily activities —as well as the core operations of governments, businesses, and universities— wholly take place within the "ecosystem" of private platforms. By investing in the construction and maintenance of property, which "mediates the production and circulation of surplus value", the rentier platforms capture part of that value (Kerr 1996:67).

In addition to consumer services, many governments, businesses, universities, and other organisations now rent access to core infrastructure like software applications and cloud storage from platforms. This supplies the platforms with a continual source of revenue, while also solidifying their critical position in the economy and society. Indeed, some of the most lucrative, most dominant platforms like Amazon or Microsoft have essentially become Too Big to Fail monopolies (Khan 2017). For example, Amazon's main profit engine is its cloud computing arm Amazon Web Services, which works with clients both big and small, from the CIA to Netflix (Bensinger 2016). If AWS were to go down, it would take much of the Internet down with it. In cases where AWS has momentarily crashed, the disruption affected scores of other business and government agencies. Monopoly—or at least the aspiration of monopoly and the aggressive tactics to achieve monopoly—is a built-in feature of the platform model (Pollman and Barry 2017; Srnicek forthcoming). The Internet of Landlords, like the Internet of Things, is simultaneously distributed and centralised. It spreads rentier relations far and wide, at different scales and intensities, while also concentrating control over the system and value captured from the system in a small number of large hands. Thus, the mega-platforms like Amazon have succeeded in following the rentier logic to its most extreme: by gaining a monopolistic position as proprietors of essential services, they have the power to extract absolute rents from the use of its platform.

While the socio-technical modes of operation are novel, this new wave of rentierism is not disconnected from its roots in lords and landed property. Indeed, it is not surprising that prominent critics of digital platforms often compare the Internet's economy to a system of neo-feudalism (Morozov 2016). We are said to be virtual vassals tilling the data farms and paying tribute to the lords of the platforms that we rely upon for services (if not sustenance). Astra Taylor (2009) called this process "serfing the Net", while Cory Doctorow (2015) argued that, due to the erosion of personal property rights, "we are headed for a long age of … [information technology]-powered feudalism".

These criticisms of digital platforms are well taken. However, whether implicitly or explicitly, they also label the platform model as a socio-economic relation that is somehow outside of capitalism—or, an aberration of capitalism (cf. Zuboff 2019)—when in fact it is an outgrowth of capitalism. Instead of relying on the feudal comparison, as if platforms are a retrograde return to a pre-capitalist time,

critical analysis must recognise that rentier platforms are fully products—and perhaps the perfect encapsulation—of capitalism. Rather than a disruption or regression, platforms represent an evolution and expansion of rentierism.

## Mechanisms of Rentier Platforms

This section aims, to a degree, to offer a corollary of the "operations of capital" framework by analysing the mechanisms of rentier platforms. As noted in the introduction, Mezzadra and Neilson's (2015:1) framework focuses on "the material aspects of capital's intervention in specific situations and their wider articulation into systemic patterns". They structure their framework by exploring three "strategic conduits of analysis to unearth key logics and trends"—extraction, logistics, and finance (Mezzadra and Neilson 2015:1). I echo their structure and build on their analysis by outlining three key mechanisms of rentier platforms: data extraction, digital enclosure, and capital convergence.

Whereas the previous section established the groundwork for such an analysis of rentier platforms, my aim now is to provide more detail about the specific socio-technical systems (e.g. data technologies, software licenses) and relations (e.g. value, access) that constitute rentier platforms. I choose the term "mechanisms" intentionally. In their influential article, "a theory of access", Ribot and Peluso (2003:159) explain that they use the term "mechanisms" as shorthand for "the means, processes, and relations by which actors are enabled to gain, control, and maintain access to resources". I adopt this same shorthand meaning in my own usage.

### *Data Extraction*

Drawing close analogies with natural resource exploitation—notably, a major source of rents for the owners of resource rights—data mining is now seen as one of the "frontiers of extraction" in contemporary capitalism (Mezzadra and Neilson 2017; Thatcher et al. 2016). Indeed, the metaphor of data as the "new oil" is inescapable. The cover of a recent issue of *The Economist* (2017) makes the metaphor literal: Above an illustration of offshore oil platforms labelled with the names of major digital platforms like Facebook, Google, and Uber, the headline reads "The World's Most Valuable Resource".

While the metaphor of data as oil is somewhat incoherent at best (Martinez 2019) and a shield for extractive regimes at worst (Sadowski 2019), it does come in handy as a comparison between the relative performance of two extractive sectors. If we recall the shifts in market capitalisation by top global companies, as illustrated in Figure 1, then we can see that technology services like platforms—in other words, the business model designed to maximise the extraction of data—have overtaken the oil and gas industry during the last decade. While the tech sector jumped from 16% to 56% of market capitalisation, oil and gas plummeted from 36% to 7%. Thus, the most significant way that data are the new oil is in terms of which type of extraction now dominates the economy.

There is a growing body of literature in the new field of critical data studies focusing on questions related to the mechanisms for extracting data: how is it extracted, who are the extractors, and from where/whom is it extracted? For example, relevant work has investigated the operations and implications of specific corporate sectors such as the shadowy, multi-billion-dollar data broker industry (Crain 2018; Roderick 2014). It has detailed the political economic imperatives that compel increasingly more organisations—from rentier platforms to police departments and everything in between—"to capture all data, from all sources, by any means possible" (Sadowski 2019:1) and are "powerfully equipped with the tools to enact … [this imperative]" (Fourcade and Healy 2017:13). And it has analysed the historical relations of inequity and exploitation that are deeply embedded in these modern systems of extraction, such as the accumulation by dispossession of "data colonialism" (Thatcher et al. 2016) and the appropriation and sovereignty struggles of "data grabbing" (Fraser 2019).

This literature has detailed crucial dimensions of the massive systems of datafication that power the "digital economy"—which now encompasses, to some degree, essentially every sector of contemporary capitalism. However, comparatively little attention has tackled the thorny questions at the intersection of data studies and value/rent theory (e.g. Srnicek forthcoming; UNCTAD 2019). While an in-depth theorisation is beyond the scope of this paper, I outline two key considerations for understanding the relationship between data and value.

First, platforms collect monetary rent and data rent; we must consider both to fully understand rentier platforms. The 2018 UNCTAD report on platforms and power succinctly explains that the data are the lifeblood of platforms:

> Using a combination of strengthened property rights, first-mover advantages, market power and other uncompetitive practices, these platforms control and use digitized data to organize and mediate transactions between the various actors, and have the capability of expanding the size of such ecosystems in a circular, feedback-driven process. (UNCTAD 2018:vi)

Whether directed at capturing data rents, ground rents, or natural resource rents (Christophers 2019), there are structural similarities in these different mechanisms of extraction. That is not to say these money rents and data rents are equivalent or interchangeable. When data are valorised, it is done in so many different ways other than just by exchanging them into money (see Sadowski 2019). If we only look at the monetary rents captured by platforms—e.g. as a percentage of the economic exchanges they mediate—then we miss much of what's going on. Especially when analysing platforms that bring in little revenue and net huge losses, yet are given massive valuations and are acquired for equally large sums. As a former Amazon executive wrote in his business manual for the Internet of Things: "The data is the business model" (Rossman 2016:96).

Second, to paraphrase Bigger and Robertson (2017), the value of data is uncertain; the valuation of data is complex. Data demonstrate two broad points about the nature of value and systems of valuation: (1) value is the product of contingent socio-technical relationship; and (2) "[v]alue is found, affirmed, realized, or destroyed through ongoing social performances of comparison and measure"

(Bigger and Robertson 2017:71). With regards to point (1), data mining is a misleading name; a more apt term would be data manufacturing. Both the object (data) and the process (datafication)—and thus the value that is generated and captured—are the result of human labour distributed across "an entirely new value chain" that has developed around the acquisition, storage, analysis, and valuation of data (UNCTAD 2019:29). Rentier platforms are coordinators and benefactors of this entire value chain, arguably to a level that is unlike and unmatched by any other industry. Ownership of data is important, but "what matters more are the control, access and rights over the data" (UNCTAD 2019:32). By possessing and exploiting these power, digital platforms are able to appropriate the value of data.

With regards to point two, there is a driving certainty about the necessity of data, but there is also a deep uncertainty about the valuation of data. That is, how and when its value might be known and realised. The practice of acquiring data first—indeed, of designing things for the primary purpose of data extraction—and then (hopefully) figuring out how to valorise it later is now normal for organisations following the platform model (Fourcade and Healy 2017). This was crystallised at a public talk by Andrew Ng (2017), an artificial intelligence researcher who has held top positions at platforms like Google, Baidu, and Coursera: "At large companies, sometimes we launch products not for the revenue, but for the data. We actually do that quite often … and we monetize the data through a different product". Their belief in data's value is certain but the process of data valuation is vague. For those designing and running platforms, the conditions needed to convert data into money may never arrive, but this uncertainty does not stop their cycle of extraction nor does it dampen their perceived value of data.

## *Digital Enclosure*

Through widespread application of the X-as-a-service model, platforms have now been able to expand rentier relations in ways that enclose everyday things. The key technology of enclosure is the software license, which allows the new rentiers to claim ownership over the software embedded in, and data emanating from, increasingly more physical things that we use in our daily lives (Perzanowski and Schultz 2016). Thanks to the Internet of Things, many mundane, formerly analogue, objects like coffee makers and toothbrushes are now equipped with software, sensors, and network connections. What used to be an upgraded "smart" version of some product is becoming the default way that technologies are designed and sold (Sadowski 2020). The software is integral to the thing's function, the sensors collect data about how the thing is used, and the WiFi connects the thing to the manufacturer's or a third-party's platform so that data can be downloaded and uploaded.

Critically, when you buy a smart thing you only own the physical object, the digital software is licensed—which means leased or rented. This mixture of legal and digital technologies provides the holder of the license with continual access—in the sense that Ribot and Peluso (2003:153) theorise access as a "bundle of

powers"—to the object. This access grants powers like remote control over the object and data collection from the object (and the people, animals, and environments it interacts with). In effect, by integrating objects into the Internet of Things, companies are able to enact a form of micro-enclosure in which they retain ownership over the digital part of a physical thing—and all the rights and powers that entails—even after you purchase it. The difference between owning and licensing the embedded software can be greatly important, especially when the software is critical to the thing's very function. We can see the history of enclosure repeating itself, but now instead of building fences and demanding rent for access to landed property, these new rentiers install software and capture value from the use of physical objects. In other words, platforms enact "the violence of asserting property rights or class position" (Ward and Aalbers 2016:1762) through new mechanisms of enclosure applied to new spaces, things, and relationship.

Considering the context of enclosure, it seems appropriate that one of the best illustrations of this mechanism, and the serious issues it raises, stems from agriculture. Farm machinery manufacturers like John Deere and General Motors have argued, in 2015 hearings with the US Copyright Office, that they maintain copyright over the software in each vehicle. "It is our position the software in the vehicle is licensed by the owner of the vehicle", said GM attorney Harry Lightsey (Bigelow 2015). By only licensing the software, John Deere and GM—and the many other manufacturers who have followed suit—are able to prevent independent garages and hobbyist gearheads from repairing or modifying the electronic components of the car (Alvarez León 2019). There are clear economic advantages for manufacturers if they can shut out everybody except "authorized service providers" from working on vehicles (Koebler 2018). By reconfiguring the idea of ownership, manufacturers maintain an unusual amount of control over critical parts of the car. They can continue to extract rents from vehicles in the form of exorbitant charges to "authorize" repairs and data collected about when, where, and how the machine is used. Thus, even after spending $100,000 to buy a tractor, what you own is a big hunk of metal and rubber; you are only renting the software needed to actually operate the vehicle.

These mechanisms of digital enclosure enforce an asymmetrical power dynamic that benefits the firms that draw up the contractual terms. Rather than being unqualified owners of personal property, we become renters at the mercy of software licenses that transfer legal rights to rentiers (Perzanowski and Schultz 2016). They are called licensing agreements, but they are designed for acquiescence (Birch 2016). Whether it's a land title or a software license, the asset holder has essentially all the power to control property, extract rents, and restrict access. "The nightmare scenario", reports journalist Jason Koelber (2017), "and a fear I heard expressed over and over again in talking with farmers, is that John Deere could remotely shut down a tractor and there wouldn't be anything a farmer could do about it". This case of farm machinery is only unusual in degree, not in type. Here manufacturers are literally reclaiming the means of production—plus grabbing a valuable resource: data—away from farmers (Fraser 2019). But these

same forms of digital enclosure are also applied to all the things we use that are equipped with software—which is, increasingly, everything.

Thanks to platforms and software, now companies don't even need to own land or physical property to institute new, yet familiar, mechanisms of rentier capitalism and value capture. Whether it's spatial enclosure or digital enclosure, the landlord/platform deploys their power of ownership to exercise control over, and extract rent from, those who access, use, or even just interact with their property. A major difference, however, is that digital enclosure provides an insidious way to smuggle the rentier platform's ownership claim into things and places that are otherwise owned by somebody else. Often without people being aware of the existence or extent of this dual ownership. To draw an analogy, it would be like if you bought a home, but unbeknownst to you the previous landlord continued to own the kitchen and you didn't find out until they repossessed your kitchen for trying to do repairs or remodel without their permission. Oh, and this whole time they've also been monitoring and recording how you've been using the kitchen. And considering the rise of "smart homes" this analogy might not be so far-fetched (Maalsen and Sadowski 2019).

## *Capital Convergence*

When thinking of direct contact between landed property and platforms—the old and new face of rentier capitalism—what might come to mind are the clashes between Airbnb and hotels.

However, there are also important alliances of solidarity and support between these two representatives of the rentier class. The emerging geographical literature on platforms has predominantly focused on the ways in which platforms are playing a growing role in (1) the exchange of real estate as a commodity and (2) the management of real estate as a financial asset. Put differently, we can see a convergence of two types of capital: venture capital in the form of investing in digital platforms and real estate capital in the form of investing in landed property. The convergence of these capital flows—and the intersection of the interests that drive these investments—is an important mechanism for empowering both platforms and financiers. This incipient area has been explored via two recent but significant concepts: "platform real estate" (Shaw 2018) and "the automated landlord" (Fields 2019).

In terms of commodity exchange, Shaw (2018:2) maps out the new, but already sprawling and cash flush, "real estate/financial/technology complex". The interplay of finance and technology "provides a backdrop for the material coming-together of real estate's old 'organization men' from the financial offices of Mayfair or the City of London with a newer breed of entrepreneurial technologist-hacker" (Shaw 2018:2–3). Under the umbrella term PropTech (or property technology), these platforms are clustered around providing services aimed at different aspects and actors in the real estate sector, including financial investors, home insurers, property management, share housing, and other residential and commercial markets. While Shaw focuses mostly on the UK and European markets, Rogers (2017) explains how platform real estate has gone global by, for

example, facilitating the investment of Chinese capital into Australian cities. The services provided by these platforms—mediating social relations, translating cultural difference, and automating market processes—are designed to make real estate investment and inter-city capital circulation as frictionless as possible (Dal Maso et al. 2019). Real estate is a particularly illiquid and immobile asset class; however, platforms aim to break these constraints by turning real estate into a free moving "digital, global commodity" (Rogers 2016:23)—while also taking their cut by mediating these capital flows and exchanges (see Gotham 2009; Newman 2009).

In terms of asset management, Fields (2019) explains the operations of platforms that have been purpose built to intensify the value capture from rental properties. Landlords can now rely on a range of platforms that outsource and automate most tasks related to property management, such as handling maintenance requests, collecting rent payments, and evicting tenants. Importantly, these platforms have not been created for small individual landlords who might own a handful of rental properties, but rather their development is driven by the needs of large institutional landlords who own a portfolio of rent-based assets (Fields 2018). The unique challenges faced by these "global corporate landlords" (Beswick et al. 2016)—or, private equity firms that securitise the rental income from thousands of rental properties that are geographically dispersed—has given rise to "the automated landlord" (Fields 2019). In addition to managing the day-to-day tasks of building maintenance and tenant interactions, platforms now allow for data about the status of properties, tenants, and rent payments to be tracked and analysed so that targeted interventions can be made in order to maintain "smooth flow of rental income from tenants to capital markets" (Fields 2019:16). While tenants might be able to convince their local landlord to let them slide on rent for a couple weeks, there is little room to argue with an automated landlord that has a technological and financial imperative to collect rent on time, every time.

## Conclusion

By building on approaches that study platforms as infrastructural intermediaries in everyday life and positioning digital platforms within the political economy/ecology literature on rent(ierism), this article has provided a critical analysis of platforms as a dominant form of rentier in contemporary capitalism. I have sought to extend the recent wave of theoretical work beyond applications to land and nature so that it also includes platforms and data. In doing so, I argue that the rapid rise of the "X-as-a-service" business model across nearly all sectors of the economy is creating rentier relations by another name. This model relies on the platform latching onto and inserting itself into the production, circulation, or consumption process, thus becoming a (necessary) intermediary. The platform, due to its control over access to the "condition or means of production", can then capture rents from all economic activity it mediates (Harvey 2006:73). However, rather than seeing the operations of these platforms as a disruption of what exists (as techno-boosters frame it) or regression to a feudal era (as critics frame

it), they should be understood more as an evolution and expansion of rentier capitalism.

To better understand their operations and implications, I outlined three key mechanisms of rentier platforms: data extraction, digital enclosure, and capital convergence. For extraction, I expounded on the metaphors of mining and oil that are often applied to data. I then raised two key issues related to the value and valuation of data. Point one: platforms collect monetary rent and data rent; we must consider both to fully understand rentier platforms. Point two: the belief in data's value is certain but the process of data valuation is vague. For enclosure, I explained how the software license is now a key technology for controlling access over and collecting rents from, increasingly, anything and everything. Using the case of farm machinery, I illustrated how platforms don't even need to own land or physical property to institute new, yet familiar, mechanisms of rentier capitalism and value capture. Last, for capital convergence, I used two recent concepts of "platform real estate" (Shaw 2018) and "the automated landlord" (Fields 2019) to explore how digital platforms and real estate are combining in ways that have major implications for the exchange and management of property. And in ways that are solidifying the position as an urban phenomenon and their power in urban environments.

There is still much room for further research on rentier platforms. I offer three possible avenues for research on different aspects of their mechanisms and implications: political, economic, and spatial. First, there has been much attention to the ways in which platforms challenge regulation and change policies to better suit their own goals of expansion and extraction (Ferreri and Sanyal 2018; Pollman and Barry 2017). There is even indication that some especially powerful platforms are beginning to take on powers of governance in cities (see the case of Sidewalk Labs and Toronto [Goodman and Powles 2019]). Moreover, investigative reporting has revealed that executives from Amazon and Google have extremely influential, secretive relationships with the US Department of Defense (Bandler et al. 2019). Future research could develop a better understanding of the emerging politics of platforms by analysing platforms through scholarship on the rentier state. This would help emphasise and elucidate the close partnerships between the platform and the state.

Second, recent work has begun studying how platforms construct markets for certain services in certain places (Richardson 2019), but future research could develop a better understanding of these modes of intermediation by closely studying the "engineer-economists" who design and maintain complex markets (see Özden-Schilling [2016] on electricity markets). Compared to other research on the economics of platform, this type of research would focus on different actors, places, and processes that are critical to the platforms' operations.

Third, while I have been largely concerned here with how platforms capture value and control access, further research could focus more intently on the ways in which platforms also produce spaces for extraction and enclosure. In other words, following from Lefebvre (1991:129), if we understand platforms as a contemporary "milieu of accumulation, of growth, of commodities, of money, of

capital", then we should examine how they undertake the production of (productive) space-time.

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## Note

[1] Thanks to a reviewer for raising this important point that failure is endemic to these processes.

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