Black Box or Hidden Abode? The Expansion and Exposure of Platform Work Managerialism

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Abstract

This Special Issue holds that managerialism is not an abstract, trans-historical category (Eagleton-Pierce and Knafo 2019), and this article argues that neither is it hidden within an impenetrable black box. An important new form of managerialism is being revealed which is specific to what Moore and Joyce argue to be a very observable, and also widely contested, platform management model (PMM). Marx's "hidden abode" is a more appropriate metaphor than a black box, thus, given empirically demonstrable cases of control and resistance. Drawing on insights from labor process theory, the article reveals how control methods are at work, and transversally, how platform managerialism generates considerable levels of worker and union resistance. Despite its seeming inevitability and invincibility, platform managerialism is *as knowable* and *as contestable*, indeed, *as contested*, as other forms.

Introduction

As outlined in the introduction to this Special Issue, managerialism has been a driving theme in business and policy research, organizational studies and public administration. International Political Economy (IPE) has dealt with issues in work, labor markets, migration, trade unions and employability, which are all related to larger structural and institutional questions of managerialism. However, managerialism is a theme that has not been fully developed in IPE and has become almost interchangeable with new public management or restricted to views on public/private partnerships, rather than viewed as sets of ideational

and institutional forms which are not static, homogeneous, nor trans-historical (Eagleton-Pierce and Knafo 2019, this volume). Therefore, managerialism should be viewed as having temporal specificity, while also subject to ruptures, but nevertheless influential on day-to-day practices of managers. In short, the role of the firm and the political economy of ideational and institutional forms of managerialism directly influence working lives, which is what is primarily at stake.

This article argues that a significant and influential new form of managerialism is rapidly emerging in the contemporary context of neoliberalism, associated with the expansion of platform-based economic activity and associated work that allows this economy to exist, which is controlled by specific management practices. From its epicenter in Silicon Valley, and closely linked to the all-conquering tech sector boom of the decade following the global financial crisis starting in 2008, and aided by the 'Davos Consensus' (Sharma and Soederburg, 2019, this volume), platform-based multinational firms have expanded with astonishing speed. Companies that were founded only a few years ago now command multi-billion-dollar valuations. Platforms companies such as Uber, Lyft and Instacart have becomes household names. "Uberize" is now a verb with dictionary and Wikipedia listings. Platforms and the "gig economy" are the stuff of primetime news and op-ed journalism generated by online business and tech commentators.[1] This article considers the implications for IPE understandings of the rapid growth of the platform economy and how people work within it, and the implications for a new form of managerialism that it introduces.

To theorize these arguments, a Marxian-influenced labor process theory (LPT) is applied (Thompson 1990; Thompson and Smith 2010; Littler 1982). LPT is based in Marx's labor process thesis (1867/2015, 1973/1993) [i] and provides a critical conceptual tool to discuss this emerging phenomenon. LPT research, largely used in critical business and management schools of thought, looks at control forms of management, but recognizes that resistance is part and parcel of any employment relationship. So LPT holds true that labor takes many forms, but capitalist employers face the 'problem' of the indeterminacy of labor in all its forms. That is, capitalists purchase from workers not a set amount of concrete labor, but their more general ability to labor, or workers' labor power. A key issue for managers, as post-Fordism gave way to the knowledge-based economy and now, platform capitalism (Srnicek 2017), remains how to translate workers' general capacity for work into a specified, quantified amount of labor. In this sense, managerialism does indeed represent a form of "class struggle from above" (Baglioni, Campling, and Hanlon, 2019, this volume). Having got workers into the factory and, more recently, into offices, cars and homes, managers aim to establish control over what workers actually do; that is, the tasks carried out, the order of tasks, how each task is conducted, as well as the speed of work, and to find ways to make the allegedly concrete aspects of labor something that can be abstracted into numbers, metrics, profiles and predictions. Managers still need to establish a degree of control over the labor process, and over the workers engaged in it. Yet, the key insight of LPT is that management is never able to fully eliminate the resistance of workers to whatever form of managerialism is in place. Platform work occurs temporally beyond the factory and within

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the 'new economy' outlined by the Autonomist Marxists; yet, building on the arguments of Bohm and Land (2012), the analysis of control *and* resistance is fundamental to understanding how an increasingly dominant form of managerialism is emerging.

To make these arguments, the article first discusses labor platforms as a site of economic activity which has fostered a form of managerialism the current authors identify as the *platform management model* (PMM). The PMM diverges from typically understood managerialisms within IPE. Indeed, the unification of ownership and control is evident, despite e.g. platform taxi drivers' alleged self-employed status. After outlining specific control methods within the PMM, we critique the often-seen technologically deterministic argument that platforms reside in a black box, which is a concept from cybernetics; and the Foucauldian discussions of an electronic panopticon; where a PMM discloses the social relations of production within the workings of platforms. In doing so, we enter what Marx called the hidden abode of production within capitalism. The article then turns to empirical evidence of arising resistance to platform managerialism in the streets, offices, factories and warehouses, both grassroots and union-led. The discussion starts with a look at the emerging form of managerialism emerging from the global expansion of platform work.

Platform managerialism

Today, very real and growing concerns are emerging in the proliferation of platform-based work globally. Langley and Leyshon (2017) warn that the consolidation of a 'platform business model' (2017) urgently requires problematization, not least because of already evident 'degradation of work' (2007). Digitalized work in the platform-based labor market creates conditions of alienation and precarity and very real risks of psychosocial and physical violence and harassment (Moore 2018b). The present article contributes to recent IPE literature by acknowledging Langley and Leyshon's recommendation that the arena of platform labour 'requires the most urgent attention' (2017).

Platforms

Given its recent origins, rapid development, and diverse forms, the definition of a 'platform' is not settled. For some, platform has a technical definition, referring to the architecture of computer systems: "digital platforms are complicated mixtures of software, hardware, operations, and networks ... [that] provide a set of shared techniques, technologies, and interfaces to a broad set of users" (Kenney and Zysman 2016: 64), like mobile operating systems iOS or Android. Others prefer political economy approaches, seeing platforms as "a powerful new type of firm" (Srnicek 2017: 42), operating a business model based on processing a new type of raw material: data (also see Cole 2017). Others subscribe to the view of platforms as market enabling parties to contact one another for the purposes of economic transactions (Codagnone et al. 2016). Rather surprisingly, Kenney and Zysman also offer a second "looser definition", describing platforms as "a set of digital frameworks for social and marketplace interactions" (2016: 65).

Each approach captures particular aspects of platforms, not none are entirely satisfactory. Amazon and Uber cannot be described as the same new type of firm, despite the undeniable fact that both process large amounts of data, any more than the common use of steam engines made 19th century mines, textiles, and railways one type of firm. Describing platforms as markets or neutral facilitators, omits the very significant degree to which platforms direct and regulate the economic activity they mediate (Donovan et al. 2016). Attempting to specify platforms in technical terms omits important aspects of their social and economic conditions. Consequently, a flexible, non-technical definition of platform work as *paid work mediated via an online platform* allows us to identify an evolving model of managerialism which lies in its management of work. Platforms are simply, thus, the *apps or websites that mediate online economic activity*, including paid work. The term "mediate" captures the important active role played by platforms in regulating the economic activity they mediate. Thus, *labor platforms*, which mediate the performance of paid work for such firms as Uber, Upwork and Amazon Mechanical Turk (Farrell and Greig 2016), and explicit responses to the emerging managerialism and accompanying PMM performed by *platform workers*, form the principal concerns for this article.

Platform work

Platform work, as noted previously, is highly varied, but two broad types have been identified (De Stefano 2016; Forde et al. 2017; Huws 2017). The first involves work that is carried out and/or delivered entirely online; often termed 'crowdwork' (De Stefano, 2016) or 'online platform work' (Forde et al. 2017). Examples include design, translation and other creative work delivered via platforms such as Upwork or Fiverr, as well as unskilled online 'clickwork' like labelling photographs, transcribing short video clips, or cleaning data, via e.g. Amazon Mechanical Turk or CrowdFlower. The second type involves work carried out in person, at the time and place where the service is provided often known as 'work on demand via apps' (De Stefano, 2016), or 'offline platform work' (Forde et al. 2017; Huws et al. 2017). Examples include taxi or delivery services run by Uber, Deliveroo or Instacart; domestic chores or cleaning via platforms such as TaskRabbit or Helpling; or dog-walking via DogBuddy or Rover.

Several aspects of platform work have attracted attention. One strand of research has attempted to estimate the scale and likely growth of the platform economy (Kenney & Zysman 2016; Manyika et al. 2016; PWC 2016), and the size and composition of the platform workforce (Florisson and Mandl 2018; Farrell and Greig 2016; Katz & Krueger 2016, 2018). Another major theme is the experience of platform work for those who do it, including rates of pay, hours and conditions of work (Berg, 2016; Brawley & Pury 2016; Broughton et al. 2018; Saba et al. 2018); global aspects of platform work (Ahmed et al. 2016; Graham, Lehdonvirta, et al. 2017; Hunt & Machingura 2016; Kasera et al. 2016; Wood et al. 2018); and gender and other (in)equality impacts of platform work, including the often problematic operation of ratings systems (Calo & Rosenblat 2017; Cook et al. 2018; Piasna & Drahokoupil 2017; Rosenblat et al. 2017; Schor & Attwood-Charles 2017; van Doorn 2017). There has also been considerable policy-oriented research, looking at controversies around the employment status of platform workers (Moore 2018a, b; Cherry 2016; De Stefano 2016; Prassl & Risak 2016), and implications of reduced access to employment and social

protections (Choudary 2018; Fabo et al. 2017; Harris and Krueger 2015; Todoli Signes 2017). Finally, there is a growing literature examining emerging forms of platform worker resistance and organization (Chen 2017; Johnston and Land-Kazlauskas 2018; Laplante & Silberman 2016; Tassinari and Maccarrone 2017; Vandaele 2018; Whiting et al. 2017).

To date, there has been no sustained effort to synthesize a general model of the emerging managerialism of platform work, but an indication of the dynamism of platforms is found in the speed with which they have spread from their epicenter in Silicon Valley to encircle the globe. Online platform workers are competing for work in a genuinely global labor market (Berg 2016; Wood et al. 2018). The spread of platforms for taxi and other delivery services has also seen similar conditions. Go-Jek drivers in Indonesia experience high rates of "super-exploitation" (Marini, as cited in Nastiti 2017: 2), where minimum acceptance rates, enforced by the platform, see drivers forced to accept rates of pay as low as USD 0.07 to USD 0.14 per kilometer for motorcycle taxis, which is not sufficient for daily living expenses. Thus, drivers rely on the daily bonus that is only available if drivers have met minimum requirements. In India, there is a noted lack of transparency in rating systems and allocation of work. Auto-rickshaw drivers in India have begun to use ride-hailing apps which has led to a loss of autonomy for no apparent gain in economic terms (Ahmed et al. 2016). Similarly, a small study in Namibia identifies that the algorithmically enforced Western model of taxi services has led to a reduction of drivers' autonomy and control and resentment at surveillance by the platform; again, for no economic advantage (Kasera, O'Neill and Bidwell 2016).

Platform management model (PMM)

It is in this context that a specific model capturing the distinctive contribution of platforms in the development of a specific and new managerialism can be identified. While labor platforms mediate a huge diversity of types of work – from taxi-driving to web design to dog-walking, and more – it is possible to identify a series of common practices shared across different types of platform.

The identification of a PMM involves:
>   - algorithmic allocation of work
>   - use of digital tracking and monitoring technologies to enforce and control pace and standard of work
>   - integration of customer ratings into performance management systems
>   - engagement of labor on self-employed or independent contractor status
>   - use of exclusivity clauses in platform worker contracts
>   - legal and regulatory arbitrage concerning terms of workforce engagement and regulation of services provision
>   - requirement for workers to wear platform-branded uniforms and to use platform-branded equipment
>   - setting of prices for services provided
>   - setting of pay rates for work conducted

- extraction of commission on every transaction mediated by the platform, usually between 10-30%

Platforms do not necessarily utilize all of these methods, but the PMM represents a menu of managerial techniques, from which platforms select a portfolio according to contextual requirements. For instance, Amazon Mechanical Turk and Upwork permit parties to determine payment levels for services provided. Others, notably, Uber, set the terms of the trade in their entirety. Some last mile delivery companies and couriers use app-based technologies to allocate tasks to individual drivers and to monitor their work, but do not use algorithms for work-planning purposes (Faragher 2017). General trends are also discernable. For instance, exclusivity clauses were previously common (Aloisi 2014) but have declined in part due to increased regulatory attention following exposés of poor employment practices in platform work (European Commission 2017; Taylor 2017). The benefit of a flexible PMM definition is that it captures variation within the developing spectrum of platform managerialism, rather than attempting to force diversity into excessively narrow categories.

The notion of PMM as a composite form is also helpful for understanding the diffusion of platform managerialism into other areas. Although there is little systematic research, there is evidence to suggest that the use of customer ratings is spreading well beyond the platform economy (Gandini 2018). Certainly, the use of company websites and apps for workflow allocation and control and the practice of remote working via an internet connection are both firmly established well beyond the platform economy (Huws 2017). In this sense, there is overlap between PMM and related digitally-enabled work management practices. The emergence of platforms entails a coming together of several trends in the management of work over recent decades including the merging of computer and communications technologies, standardization of tasks, and the migration online of traditional work agencies (ibid.). Once a critical mass was reached, platforms coalesced, and a new form of managerialism is expanding rapidly. So, what is this platform managerialism?

Platform managerialism

In relation to established IPE understandings of managerialism, platforms pose interesting questions in two areas in particular. First, platforms challenge assumptions that managerialism enshrines a straightforward drive towards "ordering, rationality and control" (Eagleton-Pierce and Knafo 2019, this volume). Platforms, as is widely recognized, require practices that set out deliberately to disrupt. Of course, impetus to "move fast and break things" informs post-Fordist business models and managerial practices. The disruptive aspect of platforms underlines Eagleton-Pierce and Knafo's (ibid.) warning that managerialism should not be treated as a homogenous, trans-historical phenomenon. As Marx (1973: 414) claimed, "capital exists and can only exist as many capitals". Competitive relations between capitals implies that the emergence of new forms of managerialism may occur as breaks and ruptures, and not always as a gradual and steady evolution.

The second apparent divergence of PMM from established views of managerialism lies in platforms' unification, to some extent at least, of ownership and control. Very commonly,

platform companies are startups and founders are closely involved in their day-to-day running. Travis Kalanick built Uber after his own image, driven *not* by professionalized managerial standards, but by his desire, as he said, to "ride around like a pimp" (Shontell 2014). Of course, successful platform companies aim at eventual flotation, and the introduction of more established managerial methods may lead to shifts in management style. Witness the replacement, at Uber, of Kalanick by Dara Khosrowshahi, former CEO of Expedia Group (Hook and Kuchler 2017). Yet, despite a change of leadership style, all the essential components of PMM remain securely in place at Uber. To date, platform managerialism and its associated PMM remain an emergent and unfinished phenomenon. PMM has already made a significant impact, namely, control of labor and management of work. These issues are now addressed.

Control within the 'black box'

Far from being neutral 'market' facilitators, platforms exhibit highly active agency and control. Owners of platforms 'have a clear stake in attracting and retaining clients' (Donovan et al. 2016: 4) and consequently exert strong control over the brand, policing standards of service-provision by selecting (and deselecting) workers, controlling the client-worker relationship through the use of often lengthy contracts, and commonly deploying customer-rating systems to enforce specific work practices. Platform workers complain that unfair ratings reduce earnings (Berg 2016; Gandini 2018). Platform workers feel coerced into accepting abusive, threatening or dangerous situations (Moore 2018b; Raval and Dourish 2016), or participating in potentially criminal activity for fear of adverse ratings (Huws et al. 2017). Algorithmic platform management systems, far from making decisions in a neutral way, reproduce discriminatory biases via the integration of customer ratings, effectively outsourcing performance management functions to members of the public in place of trained managers working under equalities management systems (Rosenblat et al. 2017).

Control over those who carry out platform work is further enhanced by the almost ubiquitous practice of classification of workers as (bogus) self-employed, depriving them of basic employment and social protections. Taken together, then, the combination of rating systems and self-employment contracts tips balances of power within the employment relationship in favor of the platforms. Nevertheless, while the spread of platforms continues apace, issues remain about how best to conceptualize these developments. A significant revival of technological determinism is seen in accounts of the rise of platforms and their integration into systems of management (Howcroft and Taylor 2014). A recent version of this trend is the view that digital technology, especially in the form of algorithms, creates an inscrutable "black box" that obscures the true nature of and decision-making processes of management, and places workers in a categorically weaker position relative to management compared with workers in non-platform situations (see Chen 2017; Chen et al., 2015; Collier et al., 2017; Degryse 2016; Lee et al. 2015; Rosenblat and Stark 2016; Scholz 2016). Algorithms used within platforms are seen to obscure the role of labor in production, rendering it invisible (Bergvall-Kåreborn and Howcroft 2014; Cherry 2016; ILO, 2017; Silberman and Irani 2016). As Bücher (2016: 83) summarizes: "the concept of the black box has become a commonplace for all the things we (seemingly) cannot know". However, this analysis is problematic theoretically and empirically.

Conceptually, a black box metaphor can be traced to early cybernetics in Ashby (1956) who envisions computerized devices making impartial business decisions in place of faulty human decision-making. Ashby worked in clinical psychiatry, and his notion of the black box was a direct analogy to the physical workings of the human brain where inputs and outputs could be known, but the internal workings were *unknowable*. More recently, it has been claimed that algorithms represent "a profound epistemic problem" (Bücher 2016: 85). However, the transfer of a cybernetic metaphor into the realm of employment and managerialism presents serious problems. Building on Pasquale's point that black boxes can be and often are intentionally constructed to veil business workings obscured by the 'knowledge problem' (2018), we argue that an uncritical black box view of platforms is a theoretical misunderstanding of the place of technology in the social relations of work under capitalism (cf. Bücher 2016). Furthermore, an empirical failure to register considerable available evidence hides the fact that in practice, platform workers have a fairly clear view of how platforms operate; leading to abundant examples of platforms facing worker resistance and contestation.

An uncritical black box analysis in the terrain of work and employment also misconstrues the nature of relations between workers and managers. While it is certainly the case that platform algorithms obscure some aspects of day-to-day decisions, other aspects are not hidden at all. Platforms set the rules for how much work is required for a certain amount of pay and keep a record of how much work is done by individual workers, and how much pay received. Platform workers complain that these calculations can be unfair and mysterious, with little right of appeal (Gandini 2018; Rosenblat and Stark 2016). Viewed historically, however, low pay, wages theft, and arbitrary and unfair treatment at the hands of harsh managers are hardly unusual features of work at the bottom end of the labor market (for a brief historical overview, see Davis 2018). The technology of modern gig work is new, but other features such as casualization and a preference for piecework payment systems date from the earliest days of capitalist employment relations (Stanford 2017). Platform workers know how much work they have done and how much they have been paid.

Most importantly, however, the uncritical black box metaphor fails entirely to grasp that employment, as a social relation, is a two-way relationship, not a one-way control mechanism. As a result, employment fundamentally represents a trade, an exchange of work for pay, despite the huge inequality of social and economic power between the parties. The "wage-effort bargain" (Baldamus 1961) at the heart of the employment relationship is a key issue in LPT accounts, where employers and managers acting on their behalf always require something more than obedience from their workforce: they require effort, and some degree of loyalty or commitment, even if only a small one, to the tasks they are required to perform. For this reason, *control* by employers always invites *resistance* from workers (Thompson 1990; Thompson and Smith 2010). Management systems break down as workers figure out where the pressure points are and levels and effectiveness of resistance increase. Each new system arrives confident in its ability to solve the problem of control. This claim accompanied the advent of Taylorism (Rose 1988), human relations (Child 2012), human resource management (Guest 1991) and lean production (Stewart et al.

2009). Yet in each case, the problem of worker resistance returned. Hyman described successive management systems as "different routes to partial failure" (1987: 30).

Technological determinism or Foucauldian panopticon

The tendency toward technological determinism evident in black box account of platforms persistently downplays the importance of the social relations of employment for understanding the operation of different forms of managerialism in practice. Similar problems were apparent in technologically determinist accounts of management systems in call centers, which emerged on a large scale during the 1990s. In these accounts, excessive focus on their characteristic technology, the merging of IT with automated telephony systems, was associated with claims that call centers comprised an "electronic panopticon" (Sewell and Wilkinson 1993) in which worker resistance was made impossible because workers could not escape observation by managers. Such claims, based on a particular reading of Foucault (Bain and Taylor 2000), appeared plausible due to the novelty of the technology. However, as with the black box view, such accounts uncritically transpose a metaphor from another field onto the terrain of work management. In the case of call centers, Foucault's metaphor of the panopticon was transposed from a carceral setting to the workplace (ibid.). Where the panopticon describes a one-way relationship of discipline, the employment relationship remains a two-way relationship.

In addition, "electronic panopticon" accounts of call center managerialism lacked empirical support, assuming control was universal and overlooking plenty of evidence that workers' resistance persisted in call centers. Call-center workers innovated new forms of resistance alongside the introductions of technology associated managerialism (Mulholland 2004; Taylor and Bain 2001, 2003, 2004). Black box accounts of platform managerialism share the empirical weakness of their predecessors, where an excessive focus on technology that is given a determining role, misleads researchers into downplaying evidence of worker resistance, if not ignoring it entirely. Here, LPT is a useful corrective, warning us to go beyond managerialism's own claims about its efficacy, to examine more carefully how such systems work in practice.

Marx's study of the early factory system and the notion of the 'hidden abode' (Marx 1867/2015) provides a better approach to these issues than the black box. Marx, confronted with the mysteries of the production of profit, pictures the encounter in the labor market between the capitalist and the worker, 'the owner of money and the owner of labor-power'. Marx does not leave his analysis in 'this noisy sphere where everything takes place … in full view of everyone' (ibid.) but refuses to stop at the factory gates, preferring to follow the capitalist and the worker 'into the hidden abode of production' (ibid.). The next section outlines how black box myths surrounding platform economy work can be countered by following Marx's approach, and detailing actual resistance to rapidly expanding PMM.

Into the hidden abode

Entering the hidden abode of platform work, this section outlines both primary and secondary evidence of worker resistance in platform managerialism. Each gives insight into emerging processes whereby the managerialism of control has engendered forms of worker resistance at three different levels. First, worker resistance at the *granular* level of the day-to-day contestation of aspects of PMM is revealed. Evidence shows that, far from being the determining factor, when challenged by workers' resistance, technology is transformed into a site of contestation, its operation potentially subject to modification as a result. Second, resistance to PMM at the level of organized collective resistance in the form of newly emergent grassroots trade unions is identified. These examples indicate the capacity of innovative forms of collective worker organization to disrupt the operation of PMM. Third, established national trade unions responses are shown. Taken together, this shows that PMM do not reside in an inscrutable black box.

Grass-roots resistance

-In the streets

The most abundant evidence of platform worker resistance is by ride-hailing app drivers and delivery-service riders. Deliveroo food-delivery riders have taken strike action in a number of European cities (Tassinari and Maccarrone 2017; Waters and Woodcock 2017). Riders at Foodora in Vienna organized to establish a works council (Vida 2017). Bicycle couriers in London organized and gained pay-rises in the order of 20-30 per cent (IWGB 2019). When it comes to drivers for ride-hailing platforms, there is now a well-established pattern of legal challenges to the self-employment classification. In London, two Uber drivers successfully challenged their classification as self-employed, in a case where the judge commented that:

> …it is, in our opinion, unreal to deny that Uber is in business as a supplier of transportation services. Simple common sense argues to the contrary … The notion that Uber in London is a mosaic of 30,000 small businesses linked by a common "platform" is to our minds faintly ridiculous. In each case, the "business" consists of a man with a car seeking to make a living by driving it. (Cotterill 2016)

The judge found no difficulty in correctly identifying the nature of Uber's business, nor the contribution to it of the allegedly 'invisible' labor of 30,000 London drivers.

There have also been numerous strikes and protests involving taxi-app drivers and food delivery workers around the world, in Nairobi (Mbugua and Kubwa 2018) and Johannesburg in Africa (Mabuza 2018); Mumbai, India (Ghosh 2018;) East London (Cant and Hughes 2018), Glasgow (Murphy 2018); Leeds (Lavery 2018); Chicago (McTavish, 2018); San Jose; Costa Rica (Tico Times 2018); and several cities in Australia (RSDU 2018). Taxi-app drivers have successfully lobbied for greater regulation of platforms, such as the introduction of a minimum wage and limits on driver numbers in New York (Brooks 2018).

Resistance from taxi-app drivers has also developed in more unexpected and novel ways such as online discussion and information websites used by Uber and other taxi app drivers. These result not just in mutual support networks and the passing of advice on how to increase earnings but also disrupt the flow of information through Uber's algorithmic management system (Ravenelle 2017). Driver forums are centers for collective efforts by drivers to assess changes to platform algorithms to maximize earnings (Perea 2018). Meanwhile, in China, drivers for taxi app Didi Chuxing have deployed packages of software

enabling them to refuse jobs allocated by the platform without incurring the usual algorithmic penalties. Drivers were observed to be using up to six smartphones simultaneously to identify the most lucrative jobs (Chen 2017).

-In Offices

a) Quantified Workplace

Data-collection technologies have rapidly become incorporated into office workplace wellness and productivity schemes (Nield 2014; Jiff and Willis Towers Watson 2017). The so-called Quantified Workplace corporate wellness experiment held at a real estate company in Rotterdam[2] from 2015 – 2016 involved FitBits to monitor steps, heartrate and sleep; RescueTime, to track productivity and other activities when working on a computer; and asked participants to 'lifelog', or to answer a workday email that asked about subjective productivity and stress levels. Author Moore was funded by the British Academy/Leverhulme to interview and run surveys with workers to identify how the project impacted them.

Workers expressed that they were happy for their managers to obtain any and all personal data at the beginning of the project, but by the end, began to wonder why it was being collected. Workers reported a simultaneous rise in workloads and current author Moore argued that the tracking experiment could have been introduced not only to encourage physical and mental wellbeing, but to measure affective labor going into stress management and to predict worker collapse (Moore 2018d). These workers were not unionized and did not organize against nor dispute the project, but over 75% of participants abandoned it altogether.[ii] The project was also investigated by the local data protection authority and currently many of the practices seen would not be permitted due to the General Data Protection Regulation rolled out in May 2018.

b) Housing authority

In another case study carried out by author Joyce from 2012 - 2013, frontline workers for a London Borough Housing Authority were asked to use a new software designed to standardize personalized workloads[3] which could have led to deskilling and the removal of autonomy. However, Unison shop stewards were able to demand changes were introduced into the software package saving employee discretion.

To achieve this, stewards coordinated a campaign that highlighted the problems of the new work requirements for sending letters to tenants which resulted in increased time process cases, and the poor service standards represented by standardized, proforma letters. As a result, senior housing and IT managers agreed to customize the software package by the addition of 'cancel' buttons at every stage where the software prompted a proforma letter. Thus, workers retained autonomy, a degree of personal control over work, and successfully resisted deskilling.

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[2] These findings taken from research published in Moore (2018b).
[3] This evidence drawn from research published as Joyce (2016).

In Factories and Warehouses

Tracking technologies have been integrated to increase productivity and aid with rationalization in distribution centers. For example, Tesco made a 9-million-dollar investment into warehouse tracking technologies adopted in 300 locations. In one location, warehouse workers who gather products from 87 aisles of three-story shelves, a fairly large armband tracks workers' movements, allocates jobs and forecasts a completion time, quantifying actions around the floor's 9.6 miles of shelving and 111 loading bays. A 2.8-inch display gives analytical feedback, verifying order and 'nudging a worker whose order is short' (Rawlinson 2013) who receive a score of 100 if tasks are completed on time, and 200 if activities are finished in half the time required. One worker reported 'the guys who made the scores were sweating buckets and throwing stuff all over the place' (2013). Workers are at risk of being penalized if they do not record toilet breaks on devices. This investment was designed around efficiency and lean production and was reported to have led to reducing the need for full time workers by 18 per cent (Wilson 2013).

One warehouse operative in another location gave a clandestine account to author Moore of being provided with hand-worn scanners which were meant to 'prevent mistakes' and to 'help workers perform better' based on personalized meetings with management (Moore 2018b). While devices tracked mistakes, they also recorded breaks, and meetings were never offered. Soon it transpired that data from tracking devices were used to determine which workers would be dismissed. The interviewee entered the manager's office during a nightshift, which is a resistance form called sabotage. She found spreadsheets showing such data, which did not reflect the firing decisions. This brings into question reliability of explicit management methods. The worker explained that 'we are aware that the tracking might be used to put pressure on us to work faster, and it might be used to sack people. But lots of us feel that we don't care anymore. Because physically we just can't do any more'.

In another study, Unite shop stewards in a UK car plant devised effective means of resistance to digital monitoring and control of workflow; specifically, digital tracking of forklift truck drivers in the main stores area.[4] As part of the lean production and just-in-time management systems in place, inventories were significantly reduced and inventory control became a major focus of managerial attention. Radio frequency devices (RFID) were fitted to all fork trucks, linked to a tagging system for components, such that fork truck drivers were tracked throughout their shift – giving management detailed information of every pickup and drop-off, including locations of each, parts delivered, and time taken.

In theory, then, such detailed surveillance of workers should give management virtually complete control. However, drivers and shop stewards soon became experts, and used information from the tracking system to challenge a reduction of staffing levels by showing that it had led to problems with the delivery of components to the production line. As a result, managers agreed to reorganize the stores a second time and increase the number of drivers. In a second example, this steward provided detailed information to stewards in the assembly unit, showing that another proposal by managers to reduce labor on the production line would add significantly to delivery time for components. As a result,

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[4] Evidence gathered by Joyce (2016).

managers concerned with targets for lean production dropped their proposal, and the stewards were able to defend existing labor levels. In both these cases, then, stewards were able to utilize aspects of management's digitally enabled control systems in order to successfully challenge managerial prerogatives.

Trade union-led resistance

Independent Workers Union of Great Britain (IWGB)

Another significant response to digitalized work in the gig economy is seen in the emergence of new grassroots unions and union branches, including for example, the Independent Workers Union of Great Britain (IWGB) in the UK (quotes from interviews with current authors). One trade unionist indicated that:

> So far, we have won three major pay rises of 20-30% at London's big three courier companies; CitySprint, eCourier and Absolutely Couriers. We also won at Gophr, a small app company, but they recently backed out of the agreement. We are also in the process of challenging our [independent contractor] status in the courts at four of the big courier companies. We've also had limited success with the Deliveroo strike in August. Although we didn't manage to stop the new pay structure coming in, we helped the workers escalate their strike, created loads of positive publicity and helped to shine a big light on the gig economy and exposed the contradictions inherent in it - which are all present in the courier industry as well, obviously.

This IWGB trade unionist indicated that it is very difficult to unionize gig economy drivers and riders because they are on the move constantly and work is scattered across large areas and noted that 'if we can't get legislation to force companies to let unions in from the off, which is highly likely, then unions need to try harder'. Unions can often have negative attitudes which can serve to prevent action, she indicated. She related that she often hears big unions complaining about anti-trade union legislation, lack of participation and blames the government for why they are not winning. In her mind,

> …this is the wrong attitude and is a recipe for inaction and is defeatist. If this is the attitude, of course nothing will happen and of course you won't convince anyone to take action.

FAU Berlin (FAUB)

FAU Berlin is an independent organization without formal union status but doing similar work that mostly represents migrant workers and gig workers. In particular, they have organized food delivery riders. Activists have used both campaigning and organizing strategies and are now in the phase of formalizing their requests for the two main companies hiring riders: Deliveroo and Foodora. Current author Moore held interviews with FAUB representatives from the media division and with FAUB activist Anna, who has worked as a rider for Foodora. Anna shared the ways in which Foodora carries out management practices that intentionally remove accountability and support systems for riders. The company has computerized management practices by using email to disseminate changes to company policy, removing layers of accountability. There are few sources of human contact, the first is a Rider Captain who is responsible for zones of workers. The Captain

organizes WhatsApp groups and uses this to remind riders of policy changes, but also actively organizes extracurricular activities as one kind of team building. The Captain, however, has no authority or explicit management responsibility outside these activities. Some Rider Captains have become politicized and have organized meetings and protests against the company using WhatsApp likewise which has facilitated campaigning and organizing.

In terms of campaigning work, FAUB has taken direct action against delivery companies including organizing protests outside headquarters including stacking broken bicycle parts outside and keeping tight links to the media who have publicized some of the worst practices of these companies which has proven to work to damage companies' reputations. Some successes have been recorded including forcing Delivery Hero to take Foodora off the stock market by organizing protests in front of the headquarters the day before. Investors are put off by bad reputation and this is one of the techniques FAUB has successfully used in campaigning.

IG Metall

IG Metall (the German Metalworkers' Union), the Austrian Chamber of Labor, the Austrian Trade Union Confederation, and the Swedish white-collar union Unionen, joined forces to create a website called Fair Crowd Work in response to the rise in digitalized work. This website gathers information about issues that concern platform-based work and publishes ratings of working conditions on labor platforms from surveys carried out with workers. IG Metall is also carrying out Bezirksleitung NRW, Projekt: 'Arbeit 2020 in NRW' or Better Work 2020. For this program, union representatives have met with 30 companies implementing Industrie 4.0 locally, and will meet with up to 50 more, across Germany (as of October 2017). IG Metall North Rhine Westfalia has been working on this initiative with two other unions, the NGG NRW, IG BCE Nordrhein and the umbrella union, DGB NRW. Findings showed that worker councils and workers had been left out of discussions leading to Industrie 4.0 practices.

An IG Metall trade unionist involved in implementing Arbeit 2020 explained the way Industrie 4.0 works, where businesses implement intensified:

1) Interconnectedness/level of integration; and

2) Level of self-monitoring: whether technology itself gives specific rules to do work/is automized, or employees are free to make their own decisions.

This trade unionist indicated that technology has begun to 'work for itself'. So, along the lines of the 'internet of things' revolution, products communicate directly amongst themselves, meaning that the amount of influence that workers can have is reduced. New digital and ergonomic systems and products such as HoloLens or google glasses are marketed as worker assistants, but may create a high risk of workplace stress, IG Metall trade unionists stressed. Companies must look at this closely and discuss it frankly with those who are inventing, as well as being asked to use, Industrie 4.0 technologies. The

Arbeit 2020 project has shown that many companies do not provide the time and space for projects to become integrated and for workers to adapt.

IG Metall colleagues indicated that 'you can't simply create a new technology without creating new circumstances i.e. reorganization and developing employees' qualifications. It is necessary that people take part in what is going on'. A further issue is the requirement to be able to use several types of systems with little support for doing so. Trade unionists stressed that no one really knows what the longer-term impact of these technologies will be on workers, but the signs of emerging risks of are worrying and more must be done in response.

ver.di

German trade unions have been perhaps the most active in responding to digitalized work. One trade unionist of ver.di, the German United Services Labor Union, outlined an initiative this union offers for technically self-employed workers working in the gig economy, called 'mediafon'. The service is like a hotline, used mostly in media, culture, education and IT freelance workers. ver.di members are linked to workers who telephone the line, offering help with aspects of workplace issues such as contracts, social security, authors' rights, self-branding and marketing and health and safety.

In all of these ways, trade unions have taken action to counter the worst impacts of platform work. What has not been sufficiently addressed in responses to the rise in the risks outlined here is on the issue of collective bargaining. The first ever collective agreement for the platform economy has been signed in Denmark between Hilfr, a Danish platform for cleaning in private homes, and Fagligt, Faelles, Forbung (3F) (United Federation of Danish Workers), the largest Danish trade union. The collective agreement was signed by the founders of Hilfr and Tina Møller Madsen, group chairman for 3F cleaning and services in Copenhagen. The new collective agreement entered force in August 2018 and guarantees sick pay, holiday allowance and a pension contribution for people who work on the Hilfr platform. Uber has been regulated in such cities as London, Berlin and Buenos Aires due to employment tribunals. Trade unions thus have worked to defend platform-based workers in the context of the new platform managerialism and its associated PMM.

Some conclusions

In the face of new workplace technological integration and the PMM that they enable, the uncritical black box approach does not go far enough to expose intentionality in management practices. At a time when judges at the EU and UK level can see quite clearly that Uber is in fact a transport company, not a tech firm (Khan and Ram 2017), and that its operations depend upon the labor of workers who drive cars for a living (Cotterill 2016), it would seem we are approaching, alongside the attitude of Marx, the inside corridors of the hidden abode where we can detail what lies within.

Building on a rich tradition of careful investigation of what actually happens when and where work is carried out, exposing the control and resistance evident in the consolidation of a PMM allows researchers to identify fresh attempts to resolve old problems that have been addressed in IPE and develop a better-informed discussion about managerialism within this discipline and as is encapsulated in this Special Issue. As LPT researchers outside the IPE arena already demonstrated, the electronic panopticon view of technologically organized workplaces is highly problematic because it does not recognize the extensive forms of resistance emerging. While the internal workings of algorithms may remain mysterious to many workers, the reality of the social relations of production they deal with is very clear to those on the receiving end. As ever in the world of work, it is not necessary to know how the machine works to know if you are getting a raw deal when it comes to pay day, or when you have to deal with a bullying manager or keep up with an ever-increasing pace of work. One only has to explore the 'hidden abode' and uncap the 'black box', to identify how the employment relationship within capitalism continues.

Thus, a striking feature of the evidence presented above is the sheer variety of forms of resistance that have emerged in different contexts, with responses at individual level, in non-union workplaces, among grassroots union activists, and in union head offices. A notable feature is the speed with which new forms of resistance are emerging. Shop stewards at a London local authority were able to gain changes to a software package within months of its introduction. The Didi Chuxing app was launched in 2016, and taxi service drivers quickly began to adopt algorithmic forms of resistance in response to algorithmic forms of management. On a global scale, researchers are finding resistance from transport app drivers and riders almost everywhere they look. Union head offices and international unions are starting to develop health and safety approaches and bargaining agendas around data issues. Of course, it is a common experience that there can be a significant disconnect between unions' official organizing policy and developments on the ground (Simms et al. 2013). Indeed, it is into such spaces that new grassroots union organization can emerge.

The power of capital remains dominant, of course, entrenched by three decades of neoliberalism. The fundamental insight of LPT as outlined in this article is that the indeterminacy of labor entails a dual process of both control and resistance. The need of capital to continually reorganize production, though at an uneven tempo, requires that labor cannot be based on an always predictable or one-way employment relationship. Despite the hype around platforms and their associated firms and work transformations, the spread of platform managerialism is likely to lead different manifestations of failure to succeed on both sides of the struggle, even if the particular failures will vary, not least because of ongoing worker resistances, which extinguish the supposed smoky veil of a black box and allow us to enter the hidden abode. The task of research within IPE is to continue to uncloak these trends and remain vigilant and critical as they unfold.

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[i] Labor process is a concept originating in Marx's *Capital* Volume I, Section I where he wrote that 'the elementary factors of the labor-process are 1, the personal activity of man, *i.e.*, work itself, 2, the subject of that work, and 3, its instruments' (1867/2015: 127). While labor 'effects an alteration' in the material worked on, the product absorbs the appearance of the final product. Therefore, the product is a 'use-value', and 'the process disappears in the product'. As a use-value, the product is 'nature's material adapted by a change of form to the wants of man'. In that sense, labor is materialized (but not necessarily 'seen'). Indeed, the movement of labor becomes something fixed in the product. The labor process then is the process whereby the capitalist attempts, for 'efficiency' reasons, to make sure there is no 'unnecessary waste of raw material' and 'the means of production are used with intelligence', where labor power is a commodity purchased by the capitalist and absorbed into the product. Thompson and others look at this process as one of control and indicate that resistance inevitably emerges, thus the 'control and resistance' framework that their modelling relies on. LPT in particular became interested in how technology becomes the 'instrument of labor', which Marx calls a 'thing, or a complex of things, which the laborer interposes between himself and the subject of his labor, and which serves as the conductor of his activity' (1867/2015). Earlier work, i.e. the *Grundrisse*, showed Marx views technologies as being utilized to invisibilize labor power and labor agency in the production process. In that sense, the 'man/product relation gives way to the machine/product relation and jobs and tasks are treated as the residuum of the machine/product link' (Davis and Taylor, 1972: 12, 300-1, cited in Littler, 1982: 22).

[ii] See Moore (2018a) for a detailed account of other initiatives to collect data about workers' physical health at work as a way to enhance productivity and rising resistance (Moore 2018c). Striking education workers in West Virginia went on strike in part over employer plans to introduce a requirement for staff to download a tracking app onto their phones to collect data on their levels of physical activity (Gaffney 2018).