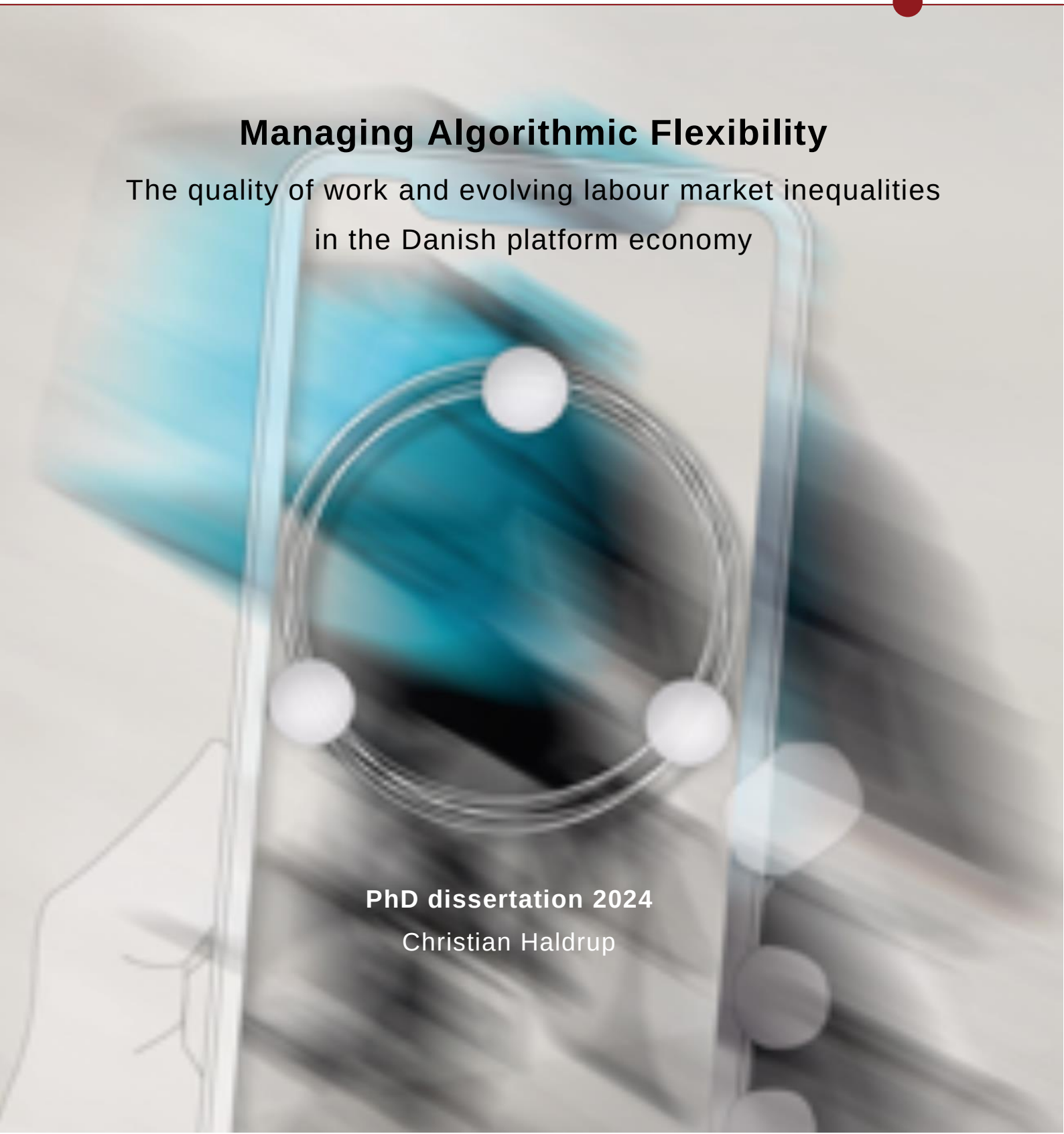
UNIVERSITY OF COPENHAGEN
FACULTY OF SOCIAL SCIENCES
DEPARTMENT OF SOCIOLOGY

Managing Algorithmic Flexibility

The quality of work and evolving labour market inequalities in the Danish platform economy



PhD dissertation 2024

Christian Haldrup

Department of Sociology, University of Copenhagen
Supervisor: Anna Ilsøe
Assessment committee: Inge Kryger Pedersen, Bertil Rolandsson, Ivana Pais
Front page illustration: Helen Holmdal Petersen

UNIVERSITY OF COPENHAGEN
FACULTY OF SOCIAL SCIENCES
DEPARTMENT OF SOCIOLOGY

Managing Algorithmic Flexibility

The quality of work and evolving labour market inequalities in the Danish platform economy

PhD dissertation 2024

Christian Haldrup

Supervisor: Anna Ilsøe

Submitted on: 29. February 2024

Forord

Denne ph.d.-afhandling er stykke for stykke blevet udfærdiget mellem 2021 og 2024, men har egentlig haft et lidt længere tilløb. Selvom jeg havde svoret, at jeg aldrig mere skulle vende tilbage til universitetet, så fik en uformel snak til en reception på et termisk varmeværk uden for Reykjavik i april 2019 med min senere vejleder Anna Ilsøe mig efterhånden på bedre tanker.

Afhandlingen har det særpræg, at den udgør en delmængde af forskningsprojektet "Den digitale økonomi på arbejde" på FAOS, Sociologisk Institut, KU. Derfor skal jeg naturligvis starte ud med at takke både Anna og Trine Pernille Larsen for deres initiativ til projektet og deres engagement med at lede og følge det til dørs. Herunder skal der lyde en tak til begge for løbende faglig sparring om artiklerne, og en særlig tak til Anna for vejledningen og de muligheder jeg har fået ud i den akademiske verden. Dertil en tak til ph.d.-programleder Bente Halkier for hjælpsomheden med stort og småt undervejs.

Nu er universitetsverdenen ikke ligefrem notorisk kendt for et godt arbejdsmiljø, og meget kunne da også være bedre. Men her på Sociologisk Institut er der alligevel mange søde, kloge og sjove mennesker som jeg gerne vil sende en tak til. Det gælder også gode kollegaer på FAOS midt i en ellers ret så tumultarisk periode for centeret. Mest af alt vil jeg dog gerne takke de unge forskere på SI og i særdeleshed ph.d.-gruppen for at berige hverdagen med lige dele bordfodbold, morgenmad, fredagsøl og sociologisk refleksivitet. Også tak til "gæsteforskere" Ida, Amanda og Jonas som jeg har delt ph.d.-kontor med i tre år. Tak til jer for mange hyggelige og gakkede øjeblikke imellem og imens vi har siddet på hver vores stol og arbejdet! Alt dette er uvurderligt.

Min største tak skal dog gå til sidstnævnte fra ph.d.-kontoret, min samarbejdspartner på projektet Jonas Hulgård Kristiansen. Godt gået! At vi to deler det samme temperament – hvilket vel udgør selve kimen til vores gode relation – står vores håndtering af en ret så desperat situation i køen til sikkerhedskontrollen i Schiphol lufthavnen i sommeren 2022 som et mindeværdigt eksempel på.

Den anden og fjerde artikel i denne afhandling udgør et anerkendende nik til vores fælles anstrengelser ud i at undersøge platformsøkonomien, og jeg vil i den forbindelse opfordre interesserede læsere af mit arbejde til også at vende blikket mod Jonas' ph.d.-afhandling.

Afslutningsvis vil jeg gerne takke familie, venner og band for opbakning og adspredelse. Endelig vil jeg takke dig Thea. Nu har du jo kun overværet mine sidste krampetrækninger med at afslutte det her projekt. Men alligevel – af hjertet tak for at give mig så mange gode grunde til også i slutspurten at bruge tid på vigtigere ting end akademiske grublerier.

Selve ph.d.-stipendiet er finansieret med projektmidler fra VELUX-fonden. Tusind tak for det. Lad os håbe på, at man også i fremtiden bygger huse med skråtage.

Contents

PART I

INTRODUCTION TO THE DISSERTATION

1. Introduction

> People always find loop-holes. Most of it is harmless because I think the time is so that Wolt is a child or a teenager, and hasn't matured enough that whatever is occurring now is very new to them.

This quote originates from some of the final data collected for this dissertation, where I interviewed Sandor, a courier sharing his experiences with app-mediated work at the food delivery platform Wolt. Sandor responded to me asking about him and his fellow couriers' attempts to exploit the platform app's algorithmic management system used for accessing food delivery orders and for economic compensation. Referring to loopholes and portraying Wolt as a teenager, Sandor touched upon two much-debated aspects of the working conditions in the so-called platform economy. First, he referred to a group of workers acting autonomously on the platform. This, for instance, involved couriers delaying the delivery of an order they had already collected from a restaurant to see if additional orders nearby would show up in the app to secure additional payments for conducting multiple orders. Secondly, he personified the platform Wolt as an immature teenager – an entrepreneurial mind yet to understand the responsibilities that accompany adulthood fully. According to Sandor, the platform was mainly occupied with expanding the business and developing the digital foundations of the business model rather than looking after the couriers on the street.

Our conversation evolved into more profound considerations on the changing nature of contemporary working lives, mainly rooted in his own experiences and with glimpses into his parents' working lives. Having worked at Wolt as a self-employed courier for several years, Sandor had developed a personalised work routine, driving around different parts of Copenhagen with food orders loaded in the backseat of his car. As self-employed, Sandor valued the loose attachment to the platform, the absence of fixed working schedules and the autonomous feeling of following his own rhythm, by logging in and out of the platform app as he pleased. This allowed him to adjust his working hours in accordance with other activities, well aware that taking time off and not

working would temporarily leave him without any income. When going through his own career path, Sandor could only recall a mere three months of waged employment; the rest of his working life was marked by various forms of self-employment. As such, Sandor's labour market biography reflected a somewhat different reality than the working routines of his parent's generation. Recalling these routines, Sandor pictured his parents in a long line of factory workers commuting to work each morning, and after clocking in, they would stare 'into their boss' face 12 hours a day'.

This collective daily workflow, characterised by clearly defined roles and authoritative employer-employee relationships in a past industrial era, is far from the rather unstructured work setting described by Sandor in the quote one generation later. However, the quote also encapsulates Sandor's own ambivalence with life as a platform worker. Despite valuing the absence of an omnipresent employer from his parents' era, Sandor characterised the work as a 'dead end' with earnings acquired at the expense of many unsocial working hours. Further, he expressed concerns about the limited intervention from Wolt. Characterising the working environment on the streets as the 'Wild West', he observed a myriad of activities taking place, with different couriers in constant flux, entering and leaving the platform. This included instances such as elderly individuals engaging in deliveries for a few hours a week for exercise alongside undocumented migrants persistently navigating the streets day and night. As he increasingly experienced a negative public attitude towards the platform, Sandor questioned the durability of this unstructured work setting for himself, his fellow couriers, and the platform.

1.1 Focus of the dissertation

The allegory above provides some concrete insights into the working conditions in the much-debated platform economy, as seen through the lens of a food delivery courier. Taking an outsider perspective, one might observe that not only the platform – as expressed in the opening quote – but also the workers act as bewildered teenagers: In both scenarios, it seems that the platforms

and the workers prioritise their own economic interests and only have a vague idea of what each other are doing in this digitally mediated work setting. This fluid working setting starkly contrasts conventional workplaces, where tasks are closely coordinated in time and space between managers and workers and where workers adhere to fixed schedules and wage standards (De Stefano et al., 2021; Todolí-Signes, 2017).

Within the context of the platform economy, a much-contested theme central to this dissertation's focus – is how the working conditions and the quality of work unfold in these emerging business models (Gundert & Leschke, 2023; ILO, 2018). This theme relates to the platforms' distinct organisational structure and approaches for empirically assessing the quality of work on these platforms. Below, I delve into these aspects to introduce my overall research question and focus of the dissertation.

Digital labour platforms – a contested research field

Much public and academic attention has been given to the working conditions at platforms in recent years and their implications for the future of work (De Ruyter et al., 2022; Wilkinson & Barry, 2020). Despite a limited scope, where 1-4 % of the workforces in Denmark and different EU countries have worked on platforms (Ilsøe & Larsen, 2020; Piasna et al., 2022b; Sutela & Pärnänen, 2018), the platform economy reflect larger trends of digitalisation and deregulation on the labour market (De Ruyter et al., 2022; Wilkinson & Barry, 2020).

On the one hand, the platforms have been recognised for providing flexible working opportunities by offering easy access to tasks (i.e. gigs) and earnings through a digital infrastructure that eliminates human supervision (Burtch et al., 2018; Doorn, 2020; Marsden, 2011). This autonomy and flexibility allow workers to combine platform work with various activities and income sources (ibid). On the other hand, the platforms have faced criticism for combining self-employment with novel algorithmic management systems (AM) as a novel way to cut employer-related costs on management (Möhlmann et al., 2021; Moore & Newsome, 2018; Webster & Masikane, 2023).

Further, apart from using AM for automating economic transactions, the platforms have been accused of de facto acting as employers by imposing subtle forms of control mechanisms on the workers through AM practices such as rating systems (Bögenhold et al., 2017; Stark & Pais, 2021; Vallas & Schor, 2020). This allows them to operate within a legal grey zone, complicating the classification of workers as either employed or self-employed (Cesko & Soes, 2020; Dieuaide & Azaïs, 2020). Consequently, this unclear relationship between platforms and workers leaves the latter without wage and working time standards and social protection measures in the form of pensions, paid holidays and sick leave (ibid).

Recent trends of collective agreements, worker mobilisation and policy initiatives suggest a maturation process taking place for regulating the platform economy with respect to both companies and workers (Dor & Webster, 2023; Ilsøe & Larsen, 2022; Rosin, 2022; Tassinari & Maccarrone, 2020). However, unresolved matters persist related to the quality of work, with platforms continuously stressing the importance of flexibility in their business models, while social partners such as unions criticise the unregulated working conditions on these platforms (Hießl, 2022; Schor & Vallas, 2021).

Empirical problem: the quality of platform work

Based on the outlined controversies, debates have centred on how to study the quality of work empirically and systematically at the platforms (e.g. see reviews such as Gundert & Leschke, 2023; ILO, 2018). The quality of work (or job quality) is a multidimensional concept that encompasses both objectivist measures, such as those stated in employment contracts (e.g. working hours, wages, social protection) and subjectivist measures related to job satisfaction (e.g. autonomy) (Clark, 2015; Gallie, 2017; Holman, 2013). While some attention has been given to subjectivist measures (Jabagi et al., 2019; Kim et al., 2018), empirical research has especially focused on objectivist measures of earnings and working hours (Goods et al., 2019; Myhill et al., 2021; Wood et al., 2019). This is due to the task-based nature of platform work, which lacks minimum

standards for earnings and working hours, where workers consequently bear associated economic risks with fluctuating demands and task availability (Grégoire, 2017; Pulignano et al., 2023; Urzì Brancati et al., 2020).

Therefore, the platforms have faced criticism for their role in enhancing inequalities and contributing to ongoing trends of labour market deregulation (Rubery & Piasna, 2017; Schor et al., 2020). In particular, platforms' loosely structured working conditions may attract workers with few other job alternatives that are more vulnerable to changing demands and conditions for accessing work set by algorithmic management systems of the platforms (Cano et al., 2021; Griesbach et al., 2019; van Doorn, 2020; Wood et al., 2019). This has led to many studies drawing conclusions about low quality of work in the form of limited earnings at the expense of many working hours ((Moore & Newsome, 2018; Pulignano et al., 2023; Wood et al., 2019).

However, a central empirical challenge persists in examining the quality of work in an unregulated setting marked by a constant inflow and outflow of activity. This calls for other approaches for studying working activity on the platforms. While much-existing research relies on cross-sectional data sources such as surveys and interviews to analyse different facets of work quality (Heiland, 2022b; Kuhn & Maleki, 2017; Piasna et al., 2022; Schor et al., 2020; Urzì Brancati et al., 2020; Wu et al., 2022), there is a growing trend towards examining digital traces of worker activity data obtained from the platforms (Cui et al., 2022; Drahokoupil & Piasna, 2019; Kässi & Lehdonvirta, 2018a; Pigatto et al., 2017; Teutloff et al., 2023). In this regard, longitudinal population data, also known as panel data, appears highly relevant when studying the quality of work in the form of earnings and working time, as it allows to follow the working paths of individuals over time (Abbott, 1995; Heckman & Singer, 2008).

Research question

With this dissertation, I contribute to the ongoing debates surrounding the quality of work and inequalities in digital organisational structures, represented by digital labour platforms, with substantial empirical and theoretical insights. Through four research articles that examine the Danish platform economy as an empirical case, the dissertation employs quantitative and qualitative methods and distinct analytical approaches that revolve around the overall two-folded research question:

1) How do inequalities in the quality of work unfold at digital labour platforms, and 2) what structural conditions, both within the platform and in the broader labour market, explain these inequalities?

With this question, I apply a longitudinal (1) and relational (2) focus for studying the quality of work and inequalities in the platform economy.

First, concerning the longitudinal focus, this dissertation rests on a central empirical premise that studying the quality of work over time with a longitudinal perspective is vital for analysing inequalities in digital labour markets (Abbott, 1995; Heckman & Singer, 2008). Further, the dissertation addresses an ongoing challenge in the literature related to difficulties with accessing data from platforms. More specifically, the dissertation utilises data from a total population of platform workers in Denmark provided by the large food delivery platform Wolt. This data set provides unique insights into platform workers' diverse labour market activity, including distinct working time patterns. Additionally, the dissertation includes panel data from national registers on platform workers' engagement with the broader labour market.

Second, with the relational focus, I qualitatively examine the management practices and agency exercised by the two actors operating and working within this organisational structure: Platform management and workers. By combining qualitative and quantitative data sources, these perspectives provide potential explanations for the structural conditions that give rise to inequalities

within the platform setting and related challenges associated with establishing employment relationships in the platform economy. Throughout this introduction and the individual research articles, I continuously touch on these aspects.

Research articles and structure of the dissertation

The four research articles that constitute the main body of this dissertation all address different aspects of the overall research question and separately engage with different debates within the platform economy related to my longitudinal and relational focus.

Article 1 focuses on the company level and qualitatively examines the platforms' organisational structure and approaches for managing digitally mediated workplaces. *Article 2* serves as the focal point of the dissertation and utilises unique working time data series to analyse differences and inequalities among platform worker segments (i.e. groups). *Article 3* shifts the focus to the worker level and investigates strategies applied by workers towards the platform's algorithmic management system to optimise their hourly earnings and the quality of work (i.e. gig quality). *Article 4*, primarily authored by my colleague Jonas Hulgård Kristiansen, focuses on platform workers' labour market activity outside the platform. This article provides a supplementary perspective to the three other articles.

The remaining introductory part of this dissertation follows this structure. In the next second section, I introduce the dissertation's theoretical background, including key concepts relevant to each of the four research articles. In the third section, I discuss the methods and data utilised in the four articles. In the fourth section, I present the findings of the four articles, draw conclusions about the overall research question across the four articles, and discuss limitations and the implications for future research. After this, the four research articles follow.

2. Theoretical background

In this section, I lay out the theoretical background of the dissertation. Initially, I introduce key characteristics of digital labour platforms and the Danish labour market, which form the studied empirical context. Following this, I situate the platforms' organisational structure within macro perspectives from the sociology of work and introduce related meso-theories on management, agency and segmentation, which are included separately in the four articles. The specific analytical operationalisations of these theories and related sub-concepts are contained within the four research articles.

2.1 Platform characteristics

The working conditions at digital labour platforms relate to decade-long discussions on technological transformations and changing employment relations in the labour market (De Ruyter & Brown, 2022; Grabher & König, 2020). As a point of reference, this brief excerpt that describes a "structureless" labour market" in 1940's California provides some perspective:

> Agriculture in California is peculiarly well suited to accommodate and employ usefully labor of almost any description. The market is without any structure of job rights or preferences. Not only are unions virtually nonexistent, but there is literally no relationship between employer and employee upon which any claims to recurrent employment might be built. To the employer the harvest hand is anonymous; he has not even a social security number for identification (Fisher, 1951)

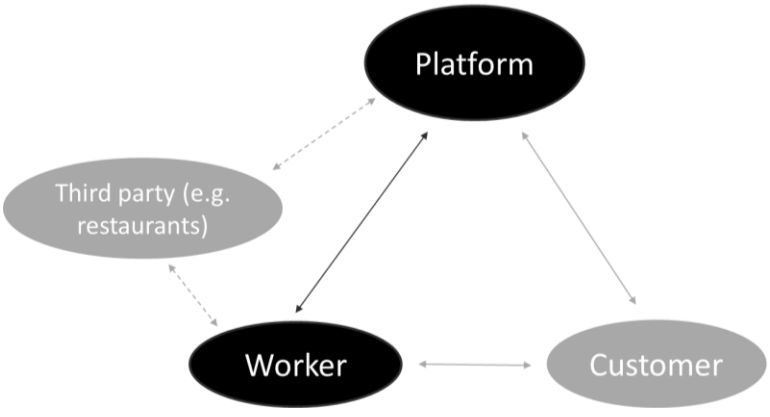
Fisher's (1951) example has been cited in several instances (see, for instance, Peck (1996) to reflect that unregulated work and unclear employment relations are no new phenomenon within the world of work. At first hand, striking similarities emerge between this scenario and the loosely defined employment arrangements, with no physical workspace shared by the company and workers. Apart from resembling employment relations of the past, some recent studies suggest that

platforms share many similarities with temporary agencies in facilitating an organisational structure for matching short-term labour demands (Meijerink & Arets, 2021; Potocka-Sionek, 2020). However, as noted in the work of Meijerink & Arets (2021), from where I ground my definition, the platforms differ by facilitating a digital infrastructure that replaces the human managers matching demand and supply at temp agencies. This infrastructure enables automated and swift transactions of products and labour between clients and customers (Vallas & Schor, 2020). Further, rather than being paid for short-term labour by a specific workplace, the platforms compensate workers for individual tasks (Meijerink & Arets, 2021). In other words, it is a specific digital feature that delineates platforms from other organisational forms and spaces of labour (Grabher & König, 2020).

Digital labour platforms: A definition

My definition of digital labour platforms builds on the works of Duggan et al. (2020) and Vallas & Schor (2020), where the digital infrastructure of the platform constitutes the focal point of interaction among several actors, as illustrated in Figure 1.

Figure 1. Digital infrastructure of labour platforms (platform and worker levels highlighted)



In Figure 1, I have highlighted the company and the worker link, which reflects my relational focus within the platform infrastructure (Vallas & Schor, 2020). In general, the digital infrastruc-

ture forms a number of sequential transactions taking place in a demand-supply chain where customers request tasks or services through the platform app (1), workers accept tasks (2), and workers complete the requested task for economic compensation (3). Additionally, although most platforms essentially form a triangular structure, third-party actors such as restaurants in the context of food delivery may also be integrated into platform infrastructure between steps 1) and 2) with customers ordering food from restaurants that are connected to the app (Duggan et al., 2020). Within these digital and/or physical links between the interacting parties, the remote connection between the platform and the workers becomes pivotal. Therefore, the platforms' digital infrastructure serves as an important prerequisite for establishing loose working arrangements that allow for varying levels of working activity in these settings (Choudary, 2018).

Types of platforms

Apart from these overall characteristics, working conditions vary according to the industry in which the platforms operate and the specific tasks and services they facilitate (Kalleberg & Dunn, 2016). These context-specific variations are reflected in the dissertation's four articles, highlighting differences between platform companies and workers within parameters such as management, access to work and autonomy (Immonen, 2023; Williams et al., 2021; Wood et al., 2019). Further, these relate to the longitudinal focus of this dissertation, as daily and weekly demands and the length of tasks vary between industries, which differentiates the intensity of working activity (Cui et al., 2022; Cullen & Farronato, 2021). Table 1 illustrates some critical distinctions among selected labour platforms, including the three platforms analysed in this dissertation. Wolt, Hilfr, and Voocali are included in the first article, while articles 2 and 3 solely focus on Wolt. Article 4 samples platform workers across different platforms.

Table 1. Types of digital labour platforms

Type	**Skill level**	**Tasks**		**Industry**	**Examples**
		Duration	*Location*		
Gig	Low	Short	On-site	Food delivery	Wolt, Just Eat, Foodora
				Cleaning	Happy Helper, Hilfr,
				Handy services	HandyHand, Shouter
Freelance	High	Long	Remote/ on-site	Interpretation	Voocali
				Consultancy	Worksome, Upwork

Inspired by (Ilsøe & Larsen, 2022; Kalleberg & Dunn, 2016)

In Table 1, the platforms are categorised into two main subcategories: The first consists of gig platforms characterised by low-skill requirements and tasks conducted in physical locations, with marginal entry barriers for accessing tasks and earnings (Kalleberg & Dunn, 2016). These platforms operate within highly volatile service industries with daily and seasonal changes in demands causing fluctuating earnings and working time with many unsocial working hours (Piasna, 2020). Notable differences within this category include working time arrangements and models for compensating workers, with some platforms being covered by collective agreements (i.e. Just Eat and Hilfr, see section 2.2) (Ilsøe & Larsen, 2022). In contrast, freelance platforms demand high skill levels for specialised tasks such as interpretation or consultancy (e.g. web design and copywriting) (Kuhn & Maleki, 2017; Rolandsson et al., 2019). This results in a higher entry barrier and typically higher wages. Freelance platforms often offer higher autonomy compared to gig work forms due to the relatively high specialisation of task specialisation, although self-branding and reputation is crucial for freelance workers to attract clients (Gandini, 2016; Yoganarasimhan, 2013)

It is important to note that Table 1 does not encompass all categories and types of digital platforms. Among these, “crowd” or “click” work platforms facilitating low-skilled remote microtasks are not present in Denmark but are widespread in the Global South (Howcroft et al., 2019;

Rani & Furrer, 2020). In addition, transportation platforms like Uber do not operate in Denmark (Ilsøe & Larsen, 2021b). Furthermore, so-called "capital platforms" differ from digital labour platforms by mediating the rental of private properties such as flats and cars (i.e. AirBnB and GoMore) (Maffie, 2020).

Algorithmic management

Another important key component related to the platform infrastructure, which I frequently refer to in this dissertation, is algorithmic management (AM) (Baiocco et al., 2022). The concept reflects an evaluative infrastructure the platform applies for automated decision-making to smoothen transactions, partly or fully replacing human management functions (Duggan et al., 2020; Kornberger et al., 2017; Stark & Pais, 2021). With AM, the platforms automatically monitor the user activity of the interacting peers to optimise matching customer preferences for specific services and skills with the available labour supply (i.e., workers) (Möhlmann et al., 2021). Often depicted as a "black box" (Burke, 2019) due to its opaque nature, the concept is widely contested in the literature, both in terms of its unclear denotations, characteristics and impact on workers, as platforms tend to keep the specific functionalities and strategic purposes of this management tool a business secret (Jarrahi et al., 2021; Stark & Pais, 2021). Despite this ambiguity, typical AM features highlighted in the literature comprise 1) matching tasks with workers, 2) compensating workers, 3) evaluating their performances through rating systems and 4) disciplining workers through economic enticements to increase productivity (Kellogg et al., 2020; Möhlmann et al., 2021). Further, some AM features involve human intervention, such as support staff correcting system irregularities reported by workers (Duggan et al., 2020). Depending on the intensity of the AM system's features, workers may be granted some autonomy in task selection and tasks or face greater platform control to maintain ratings or access to tasks (Pulignano et al., 2023). In this dissertation's research focus, AM's significance lies concerning the agency-structure ambivalences in balancing managerial control and worker autonomy in the platform's organisational

structure. Further, AM interacts with the longitudinal focus, as AM is a central mechanism for managing supply and demand, causing variations in task access within the platform setting (Heiland, 2022b).

2.2 The Danish context

Regarding my relational focus on the company and worker level, Denmark is interesting as an empirical context for analysing the ongoing issues regulating the inequalities affiliated with platform work. The Danish and Nordic labour market models build on long-standing traditions for regulating working conditions based on voluntarism from employer and employee organisations, representing companies and workers, respectively (Due & Madsen, 2008). Within the industrial relations literature, the voluntarist approach refers to representatives from the two parties negotiating collective agreements at sector and company levels (Flanders, 1974). However, as the platforms' business models are typically based on self-employment, they fall outside the scope of this regulatory framework (Jacqueson, 2021). Therefore, the focus of this dissertation brings in new perspectives for qualifying ongoing discussions on how to address working conditions at platforms in relation to the Danish labour market model.

With a collective agreement coverage rate of around 80 % and union density of approximately 65 %, Denmark is a successful example of voluntarist models for labour market regulation (Arnholtz & Navrbjerg, 2020). Due to these arrangements, the Danish state mainly plays a supporting role in regulating working conditions. Notably, it provides a social security net with rather generous access to social benefits in case of unemployment, which, however, to a lesser extent, covers foreigners and notable individuals outside the EU (Bredgaard & Madsen, 2018). Collective agreements have traditionally targeted standard employment, such as 37-hour open-ended contracts with fixed wage levels (Larsen et al., 2019). At companies without collective agreements, wage

setting is market-driven and solely a responsibility of the individual employer and employee (ibid.).

The platforms' entry into the labour market during the 2010s coincides with decreasing union membership and increases in less regulated non-standard forms of employment in the Danish labour market (Rasmussen et al., 2021). For instance, marginal part-time employment, defined as working less than 15 hours per week, has been on the rise, especially within non-standard work arrangements, which accounted for one-third of the total workforce as of 2019 (Larsen et al., 2019). In recent decades, collective agreements for balancing flexible employment conditions with levels of social protection have become increasingly present in the Danish labour market, extending to a few digital labour platforms in recent years (Ilsøe & Larsen, 2021a). In the platform economy, the most contested themes include working time flexibility, tax reporting and social protection, which has led to disputes between the platforms and social partners representing workers (Ilsøe & Larsen, 2022).

Platform and worker representatives' positions

In the individual papers, I address more specific IR-related issues and features of the Danish labour market model in the Danish and European platform economy (e.g. self-employment, management, working time, earnings), including recent collective agreements and legislative initiatives at national and EU level (Ilsøe & Larsen, 2022; Jacqueson, 2021; Rosin, 2022). However, I find it relevant to initially touch upon some recent trends that include work by colleagues Anna Ilsøe and Trine P. Larsen (2022) and others for understanding the conflicting positions of platforms and unions in Denmark for regulating platform work. These positions relate to two differing forms of organisational justification regimes conceptualised by Boltanski and Chiapello (2005), emphasising control and security against autonomy and flexibility, respectively, which I introduce in the next section.

Relevant examples from Figure 1 in section 2.1 of platforms without collective agreements include Wolt, Foodora and Happy Helper. Despite continuous negations with the union 3F, Wolt and Foodora have not been able to settle terms for establishing collective agreements. As such, these platforms have continued to operate with self-employed food couriers in their current business models (Detailwatch, 2023)[i]. Wolt and Foodora tend to justify their utilisation of self-employed couriers by emphasising the importance of working time flexibility for adapting to fluctuating demands in the sector (Ilsøe & Larsen, 2022; Ilsøe & Söderqvist, 2023). Further, Wolt, Foodora, but also Happy Helper often highlight flexibility as a preference among workers for using platform work mainly as a supplementary income alongside hobbies, small businesses, and educational pursuits (Marenco, 2024; Happy Helper 2024).[ii] Conversely, 3F criticises the platforms for avoiding participation in established collective agreements by prioritising business interests over employer responsibilities. Furthermore, 3F has accused Wolt of undermining workers' perceived autonomy by subtly using managerial practices to control workers (Ilsøe & Söderqvist, 2023).

In other examples, which counts Hilfr and Just Eat, and previously also a freelance agreement at the platform Voocali, the parties have been able to settle on terms that balance aspects of working time and earnings flexibly with security in the form of minimum working hours, wage floors and social protection measures (Ilsøe, 2020; Ilsøe & Söderqvist, 2023). Just Eat and Hilfr both justify these agreements through a social ethos to improve working conditions within their respective industries, which Ilsøe & Söderqvist (2023) also highlight as a competitive strategy for accommodating critiques of unregulated working conditions in the sectors (ibid.).

2.3 Platform inequalities

To set the scene for the overall theoretical concepts of the four articles, I situate the organisational structure of digital labour platforms with perspectives from the sociology of work. Here, I follow

a fundamental premise within organisational theory that organisations, namely capitalist enterprises, play a pivotal role in generating and regulating social inequalities through the working conditions they facilitate (Grint & Nixon, 2015). My primary reference point is Boltanski and Chiapello's (2005) seminal work, 'The New Spirit of Capitalism', which I find relevant for my research focus, as it presents an ideal typological framework for considering the contested working conditions at platforms.

Organisational spirits of capitalism

Building on Weber's concept of 'the spirit of capitalism', Boltanski and Chiapello posit that different organisational 'spirits' have prevailed in capitalist regimes of organisation across various historical epochs (Boltanski & Chiapello, 2005 [1995]). Moreover, building on a pragmatist approach, Boltanski and Chiapello argue that any capitalist enterprise needs to justify its business model of profit accumulation in order to meet 'everyday' critiques of social and economic inequalities arising from workers and other labour market actors (Boltanski & Chiapello, 2005:20-27). Their analysis outlines two capitalist regimes in Western societies: an early/mid-20th century industrial spirit emphasising control and security and a late 20th-century post-industrial spirit emphasising autonomy and flexibility. These contrasting "ethoses" reflect evolving ethical positions within capitalism, which in turn shape organisational dynamics and inequalities in different ways (Boltanski & Chiapello, 2005:311).

Boltanski and Chiapello's portrayal of industrial capitalism draws inspiration from Weber's examination of this early capitalist regime (Boltanski & Chiapello, 2005:7-18). Weber depicts this organisational structure as an authoritarian hierarchy characterised by clearly defined roles and functions: Each production unit operates within formalised managerial procedures, where hiring and advancement opportunities are determined by specific skill requirements (Weber, 2022 [1921]:63-103). While Weber at the time stresses the stringent control over labour processes and

limited autonomy for workers within the industrial regime (Weber 2022:87), Boltanski and Chiapello highlight the gradual incorporation of a 'social' ethos during the mid-20th century providing predictability and security for justifying this system (Boltanski & Chiapello, 2005:20-27). Boltanski and Chiapello argue that this ethos was utilised to accommodate critiques of inequalities caused by the economic exploitation of workers and the alienating effects of limited autonomy and uniform work procedures (ibid.). Boltanski and Chiapello stress the rise of welfare states and increased union power as practical 'social' measures to counter these organisational inequalities (ibid).

Boltanski and Chiapello propose that an 'artistic' critique drives the development of capitalist organisations from the 1960s onward due to technological advancements, global competition, and individualisation trends in the workforce (Boltanski & Chiapello, 2005). This critique calls for greater worker autonomy and creativity, challenging the rigidity of the industrial regime's formal hierarchies and skill requirements (Boltanski & Chiapello, 2005:104). According to Boltanski and Chiapello, the post-industrial regime prioritises flexible organisational structures to remain competitive in a continuously changing market. However, with this shift away from formal management hierarchies, Boltanski and Chiapello argue that internal self-control replaces external control, increasing workers' responsibility for succeeding within these rather loose organisational structures (Boltanski & Chiapello, 2005:103-120). Additionally, Boltanski and Chiapello emphasise the growing significance of educational credentials and networks in a project-oriented labour market, moving away from traditional open-ended employment contracts with clearly defined skill requirements (Boltanski & Chiapello, 2005:119-121).

In a more recent sociological perspective complementing Boltanski and Chiapello's work, Hartmut Rosa uses the concept of societal acceleration to analyse how capitalist competitive logics increase the speed of life in contemporary society (Rosa, 2010). In a context of work, Rosa discusses the concept by considering the ways digitalisation intensifies the availability of products

and services, consequently increasing customers' expectations for accessing products and services at any time (Rosa, 2014:4). According to Rosa, these acceleration processes prompt companies to increase further their organisational flexibility to accommodate rapid changes in demands (ibid.). In line with the rupturing of employment relationships in the post-industrial regime, Rosa stresses the increasing significance of individual discipline and time management for performance efficiency (Rosa, 2014:48).

The platform organisation

Considering the outlined developments and redirecting the attention to the platforms, I argue that the organisational structure of platforms based on loosely defined work arrangements (i.e. self-employment) and digital infrastructure (i.e. algorithmic management) reflect an additional layer of organisational flexibility. This is reflected in a gradual accelerating process of workplace detachment ranging from employment in industrial capitalism to projects in post-industrial capitalism to tasks in the platform economy (Boltanski & Chiapello, 2005; Rosa, 2014; Vallas & Schor, 2020).

However, while platforms' extensive use of self-employed work arrangements mirror aspects of the post-industrial regime, the concept of algorithmic management in its digitalised form echoes aspects of the controlling measures prevalent in the industrial regime (Boltanski & Chiapello, 2005; Rosa, 2014). Further, as reflected, inequalities articulate differently within the two organisational regimes outlined (Boltanski & Chiapello, 2005). In the industrial regime, inequalities arise through stringent organisational control, which devaluates autonomy and the quality of work at a collective level by confining workers to specific workflows (ibid). In the post-industrial regime, lowering control increases worker autonomy, where the quality of work rests on individual resources and self-discipline, which generates inequalities based on social differences in skills and social networks (ibid.; Rosa, 2014).

Departing from these macro perspectives from the sociology of work, the meso-theoretical approaches in the four articles for analysing inequalities in the quality of work at the platforms revolve around discussions of this organisational structure-agency ambivalence, which is prevalent within the platform literature (Anwar & Graham, 2020; Griesbach et al., 2019): This involves the extent to which inequalities in the quality of work are caused by organisational (algorithmic) control exerted by platforms versus organisational autonomy resulting in differences between groups of workers – and how inequalities genuinely manifest from these structures (Grint & Nixon, 2015).

Therefore, for my relational focus, I examine organisational features regarding management (i.e. control) at the platform level and agency (i.e. autonomy) exercised at the worker level. Concerning the longitudinal focus, I address the specific characteristics of inequalities (i.e. segmentation) emerging from the organisational structure of platforms.

2.4 Management

Article 1 focuses on the company level and engages with the parts of the platform literature that analyses the role of algorithmic management (AM) in platform organisations, including discussions on the intensity of its use and for which specific management purposes companies apply the tool (Kellogg et al., 2020; Möhlmann et al., 2021).

I ground the article's focus within the IR sub-discipline of Strategic Human Resource Management (STRM) literature (Benassi & Kornelakis, 2020; Cappelli & Keller, 2013; Paauwe & Boon, 2018). This tradition focuses on the organisational potentials and challenges for companies basing their business models on a temporarily employed workforce (ibid). According to SHRM, "numerical" and "functional" flexibility remain crucial for companies using a temporary workforce to adjust the volume and composition of the workforce (Cappelli & Neumark, 2004; Kalleberg,

2003). At platforms, numerical flexibility has especially been considered relevant for gig platforms operating with low-skilled, easy-replaceable tasks in volatile industries with changing demands (Heiland, 2022b; Piasna, 2020). On the other hand, functional flexibility has been considered critical for freelance companies to match specialised skills with customer demands (Jabagi et al., 2019; Kalleberg, 2003). As suggested in the platform literature, regulating the numerical flexibility to changing demands with algorithmic management concerns adjusting the number of workers allowed to enter the platform according to the available pool of tasks (Meijerink et al., 2021). Regarding functional flexibility, the platforms may set specific skills requirements for workers to enter the platform and build rating and reputation systems for customer evaluations of individual worker profiles (Yoganarasimhan, 2013).

As part of analysing how platforms handle numerical and functional flexibility (Cappelli & Neumark, 2004; Kalleberg, 2001), the article diverges from the existing AM literature by building a framework combining algorithmic management literature with labour law literature (Kellogg et al., 2020; J. Kristiansen, 2020). With this framework, the article analyses which managerial prerogatives the platforms exercise through algorithmic management and instances where more traditional management forms are employed (Edwards, 1979; Kellogg et al., 2020). I consider the potential of this framework to rest on an analytical standpoint that does not presume AM to be an omnipresent controlling phenomenon, as suggested in some empirical studies (Griesbach et al., 2019; Veen et al., 2020). Instead, the approach opens up the possibility of considering managerial flaws that afford unintended autonomy to workers (Meijerink & Keegan, 2019; Paauwe & Boon, 2018).

2.5 Agency

Turning to the worker level, I discuss the extent of worker autonomy within the platform framework (Gregory, 2021; Wood et al., 2019) in articles 3 and 4. This relates to how workers exercise

their agency by applying strategies and practices to increase earnings and handling individualised risk of platform work (Barratt et al., 2020; Franke et al., 2023). With this focus, I address agency both at the micro-level (article 3) related to workers engagement with the platform structure and the macro-level (article 4 via Dagdeviren & Donoghue (2019)) by focusing on platform workers' labour market activity outside the platform.

My point of departure for examining these aspects rests on Archer's critical realist and 'morphogenic' perspective on agency (Archer, 2005; 2010). The morphogenetic perspective acknowledges the ongoing interactions between emerging social structures and the actors' engagement within them and potential of shaping them over time (Archer, 2010). I find the analytical potential in Archer's work relevant due to this reciprocal engagement between structures and actors.

In the case of article 3, Archer's perspective allows for considering platform workers' engagement with the platform structure, including the AM systems features such as task distribution, rating and compensation that set the terms for the platform workers' framework of engagement and potentials for improvising within this structure (Baiocco et al., 2022; Möhlmann et al., 2021). Regarding article 4, the broader labour market reflects a structure of potential job opportunities, which the workers may explore to mitigate the risks of self-employment by seeking employment opportunities alongside platform work (Dagdeviren & Donoghue, 2019).

Archer's agency perspective also acknowledges individuals' differentiated engagement with structures, wherein inequalities between individuals lead them to exercise their agency in various ways based on their socioeconomic background (Archer, 2005). Concerning both articles 3 and 4, this aligns with existing research suggesting that platform workers utilise platform work differently depending on their access to additional income sources and employment opportunities in the broader labour market (Piasna & Drahokoupil, 2021; Schor et al., 2020). As such, in contrast to other studies, I consider the strength of this perspective to open for acknowledging differing levels of worker engagement within the same platform structure (Franke et al., 2023; Galière, 2020).

2.6 Segmentation

In article 2, to analyse the inequalities arising from platform activity, I address the segmented labour market (SLM) approach (Doeringer & Piore, 1971; Reich et al., 1973).

Epistemologically, the SLM approach departs from neoclassical economic approaches that emphasise rational preferences of actors as decisive for how individuals and organisations position themselves in the labour market (Taubman & Wachter, 1986). Instead, the SLM approach draws from various analytical traditions that analyse how working conditions at the workplace and broader societal conditions (e.g. educational institutions) contribute to labour market inequalities (Kalleberg & Sorensen, 1979). The SLM approach is rooted in dualism, consisting of a regulated primary sector and a less regulated secondary sector on the broader labour market (Atkinson, 1987; Doeringer & Piore, 1971). These sectors, comprising labour market insiders and outsiders, encompass subsets of workers with varying wage levels, working hours, skills and sociodemographic characteristics (Doeringer & Piore, 1971; Peck, 1989). Due to these differences, these two segments tend to have high internal cohesion but correspondingly high divergence between segments, resulting in limited labour market mobility (Ibid.). At the workplace level, Atkinson (1987) has developed a theory of the 'the flexible firm', which to a certain extent aligns with the concept of labour market dualism (Doeringer & Piore, 1971). The basic model of this theory distinguishes between a small 'core' and a large 'periphery' workforce within companies (Atkinson, 1987). The former typically relates to specialised in-house workers (e.g. software developers at platforms), and the latter to low-skilled and loosely attached platform workers performing tasks (ibid).

Despite continuous developments of the SLM approach (e.g. Grimshaw et al., 2017; Rubery, 2007), one central analytical challenge in applying this framework within a platform context is that it has typically been applied to working conditions (e.g. wages, working hours) stated in employment contracts (ibid). Therefore, the novelty of article 2 lies in its utilisation of the SLM approach combined with a longitudinal perspective to analyse fluctuations in working hours over

time to consider the character of worker inequalities manifesting within the platform setting. Additionally, the SLM concepts of primary and secondary labour markets and core/periphery allow for considering characteristics of the heterogeneity of the workforce composition at platforms as suggested in recent research (Kristiansen et al., 2022; Piasna & Drahokoupil, 2021), including for instance part- and full-time use, workers with Danish and foreign background etc.

Theoretical reflections from the articles

The theories applied within the individual articles diverge somewhat from other analytical traditions used to analyse platform inequalities. For instance, the Marxist-inspired tradition of labour process theory (Burawoy, 2012) has found widespread use in studies of platform work (e.g. Gandini, 2019; Heiland, 2021; Pulignano et al., 2023; Veen et al., 2020). These studies underscore the exploitive nature of the platforms' business models, highlighting algorithmic management as a tool for controlling and commodifying a self-employed workforce to maximise economic output (ibid). Further, this approach also questions whether the platforms are interested in building sustainable employment relationships or prefer having a scattered and heterogeneous workforce of workers using the platform on a short-term basis (ibid). Collectively, these perspectives may point to certain analytical limitations in the outlined theoretical strands of my articles for overlooking fundamental power asymmetries on the platform (Frenken & Fuenfschilling, 2021; Pulignano et al., 2023).

However, while I acknowledge these critiques, I argue that the strength of my approach lies in providing complementary analytical perspectives that do not necessarily overemphasise the role of structure while still acknowledging its impact on worker agency. As such, I consider the theories of the four articles closely related to the outlined macro perspectives from the sociology of work (Grint & Nixon, 2015). In line with these theories, Boltanski and Chiapello emphasise how organisational spirits impact individuals' working conditions and attitudes by emphasising various levels of control and autonomy (Boltanski & Chiapello, 2005). As seen with the management-

related theories in Article 1, this framework considers how a platform may control workers in some instances while providing autonomy in others (Benassi & Kornelakis, 2020; Kellogg et al., 2020; J. Kristiansen, 2020). Further, Boltanski acknowledges the 'everyday' critique from individuals on organisational structures, which may eventually cause a regime to rupture by gradually transforming its dominant spirit (Boltanski & Chiapello, 2005). I consider this perspective to resemble Archer's morphogenetic approach, which states that structure precedes agency but also that the agent, depending on its resources, possesses a transformative power on these structures (Archer, 2005). Finally, the segmented labour market framework for article 2 stresses that inequalities may both be a product of working conditions at the workplace and come from social differences from the broader society, which reflects how inequalities may both stem from control and deregulation as seen within the two regimes (Boltanski & Chiapello, 2005; Grimshaw et al., 2017).

In this regard, the theories I utilise suggest a somewhat reciprocal relationship between the platform organisation and the worker level that may reflect specific imbalances in this relationship and between groups of individuals engaging within the setting, resulting in variations in the quality of work and inequalities on the platform.

3. Methodology

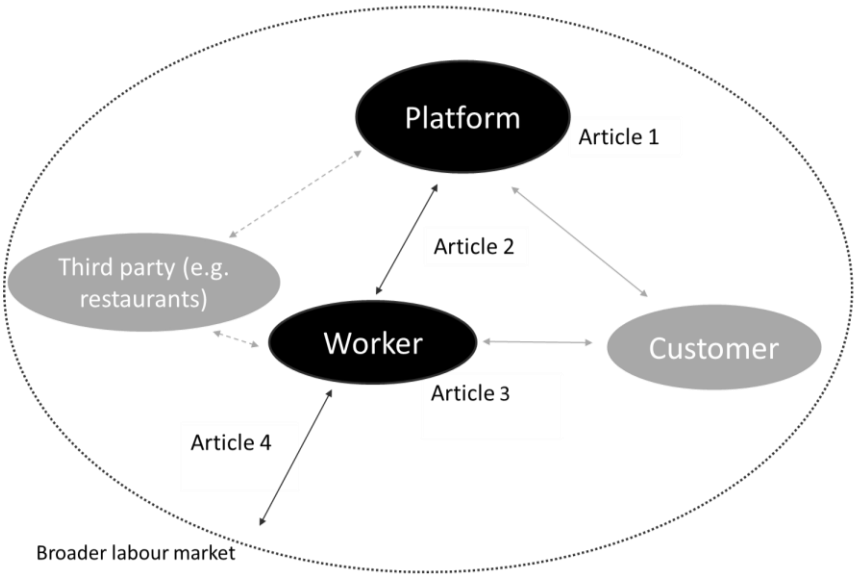
In the following section, I unfold the dissertation's methodology. In this part, I mainly touch on the overall characteristics of the methods related to data collection, ethical considerations, and analytical potentials and limitations. In contrast, other specifications of the studied data and methods for analysis are unfolded in the individual articles.

Research strategy

My motivation for using quantitative and qualitative methods for studying working conditions in a platform setting rests on my analytical focus on assessing the quality of work over time (quantitatively) and understanding relational dynamics producing inequalities (qualitatively) within the triangular structure of the platform. While the findings and conclusions of this dissertation acknowledge the complementary perspectives gained from employing diverse methods and data sources, my research strategy does not adhere to an integrated and systematically conducted mixed methods study (Bryman, 2007). Instead, the articles of this dissertation reflect a reciprocal heuristic approach, as discussed by Abbott (2004), wherein findings and theoretical insights from studies inform and stimulate each other, leading to new dimensions of exploration and analysis.

Figure 2 illustrates how the articles address different analytical focuses within the triangular structure of the platform.

Figure 2: The four articles within the triangular platform structure



As touched upon, article 1 concerns the company level, article 2 focuses on working activity on the platform, article 3 examines the worker's perspective, and article 4 analyses worker activity on the broader labour market. While articles 1, 2 and 3 have been conducted chronologically and

focus on different facets of the platform setting, article 4 has been conducted alongside the other three.

Methods and data

As I touch upon in the following sections, the methods and data sources addressed in the four studies address specific accessibility issues for researching working conditions in the gig economy. Table 2 presents a general overview of the methods and data used for the four articles.

Table 2: Methods and data in the four articles

Article	**Analytical level**	**Methods**	**Data**		
			Properties	*Type*	*Unit of analysis*
1	Company	Qualitative	Reported	Interviews and desk research	Platform management
2	Platform activity	Quantitative	Activity	Company registers	Working time series at the individual level
3	Worker	Qualitative	Reported	Interviews	Food delivery couriers
4	Worker	Quantitative	Activity	Survey and national registers	Multiple job holders (including platform workers)

In Table 2, articles 1 and 3 include qualitative methods consisting of interviews and desk research. I use these types of reported data for the relational focus for studying the two actors within the platform setting: the platform management and workers represented by food delivery couriers (Aspers & Corte, 2019). Articles 2 and 4 consist of quantitative methods with longitudinal qualities and include registers and survey data of working activity (Connelly et al., 2016) inside (article 2) and outside the platform (article 4). It should be noted that all data sources have been treated by the University of Copenhagen's guidelines for data storage in a project-specific safe drive that

complies with GDPR regulations and has only been accessible to the authors mentioned in the four articles (Voss et al., 2017).

3.1 Qualitative methods

Given the hierarchical organisational structure of platforms, researching both the company and the worker level holds specific potential for analysing resembling and conflicting views related to working conditions and digital features (i.e. algorithmic management) within the platform environment (Antin et al., 2015). However, gaining access to platforms presents certain difficulties due to their status as highly contested settings with varying degrees of sensitivity (Cunliffe & Alcadipani, 2016; Schor et al., 2020).

Accessing the platform setting

Access to the company level was established before collecting data for this dissertation, as the co-authors involved in previous research had already approached the platforms and conducted interviews that were also used for this article. Ongoing encounters with platform managers have allowed us to establish a trusting relationship (Cunliffe & Alcadipani, 2016). However, our interactions with the management level rested on balancing the managers' scepticism with responding to critical questions frequently asked in the media while also addressing themes related to ongoing debates on platform work (Traianou, 2014). Interestingly, the managers showed a keen interest in sharing and justifying their views on the potentials and challenges of platform work, including their role in the broader labour market (Dundon & Ryan, 2010). Notably, the issues with managing a remote workforce emerged as a theme during the meetings, leading us to seek the managers' consent for using interview notes from these discussions for analytical purposes (Traianou, 2014). We decided to keep the analytical focus of this study at a strategic management level, which we

considered vital for understanding the platforms' considerations on work organisation. The limited availability of the managers also played a part in this, with data exchange being another central and time-consuming agenda for platform management (Drew, 2014). Therefore, we did not pursue further management-related insights, such as observational or "digital" go-along studies of the platform support level, to study daily interactions between the platform level and workers (Jørgensen, 2016).

For approaching the worker level in article 3, findings derived from activity data used in article 2, where I identified variations in the working time of Wolt courier, raised questions on couriers' differencing engagement with platform work. During this process, I considered different types of qualitative approaches, including autoethnography by driving as a courier myself or go-along interviews from following different couriers on the road to gain insights on, for instance, physical challenges and embodied interactions with the platform algorithm (Heiland, 2022b; Kusenbach, 2003; Spry, 2001). I decided to solely prioritise interviewing couriers, partly due to fieldwork activities being highly time-consuming. Further, having researched platform work for more than two years during this part of the data collection, the interviews with the couriers reflected my familiarity with the terminology used by the couriers and the algorithmic system they were interacting with on the platform app.

In contrast to the company level, the couriers conducted orders in an open and public setting, and my main ethical concern was approaching couriers while they were working (Lofland et al., 2022). Therefore, I spent numerous afternoons and evenings biking on the streets of Copenhagen to get familiar with their mobility patterns (Spradley, 1979). Based on these experiences, I learned that approaching couriers waiting to pick up orders at a restaurant was feasible (Tracy, 2019). However, many couriers instantly refused my interview requests, being busy maximising their active hours conducting orders (Pulignano et al., 2023). Although I had a fair amount of success with this strategy, some of the most vulnerable couriers with limited English skills and with migrant backgrounds appeared particularly hesitant to participate in interviews and often requested

payment, which I was not allowed to offer them (Head, 2009; van Doorn et al., 2022). This eventually left me with limited insights into these workers (Groger et al., 1999). Most interviews took place at the street level, in cafés, at my workplace or online to accommodate the courier's preferences and offer them a comfortable space for sharing their thoughts (Vogl, 2013). All interviews lasted 1-2 hours and provided similar levels of depth despite the different settings (Small & Calarco, 2022). I asked for the courier's consent during recruitment and before the interviews started (Traianou, 2014).

Cases and sampling

Table 3 presents an overview of the managers and platform workers I recruited for the two qualitative articles.

Table 3: Qualitative data sources

Article	**Analytical strategy**	**Sampling**	**Number of interviews**	**Desk research**
1	Management practices	Platforms	12 (3-5 with each platform)	Complementary
3	Worker strategies	Food delivery couriers	10 (13 initially)	Secondary

As seen in Table 3, I used a maximum variation sampling strategy in both studies (Flyvbjerg, 2006). This sampling allowed me to compare cases with various characteristics to identify differences and common patterns in the data, assess existing analytical concepts empirically within the literature, such as algorithmic management, and develop theoretical concepts to strengthen the analytical generalisability of findings (Halkier, 2011).

For interviewing managers, I selected three platforms from separate industries (food delivery, cleaning, interpretation) that facilitated services for digitally mediated transactions between workers and customers with varying working arrangements (i.e. self-employed and employed) (Meijerink & Keegan, 2019; Stefano & Taes, 2021). As the first article in the dissertation, the maximum variation strategy initially helped me broaden the scope to understand similarities and differences in platforms' management practices for organising the workforce (Benassi & Kornelakis, 2020).

Compared to article 1, article 3 shifted focus to interviewing couriers on a single platform, as I wanted to elaborate on worker segments I identified in article 2. Using these segments as 'sensitive concepts', I wanted to delve into the reasons for the various levels of couriers' working time activity and refine these segments (Blumer, 2017 [1954]). However, as I was approaching the end of this project, I had to prioritise, which reflects my limited number of interviews with these workers. Therefore, I could not complement the findings from article 2 (Hennink & Kaiser, 2022). Instead, I decided to change my strategy and end the recruitment process to focus on a smaller sample and analyse findings on worker strategies towards the AM system, which I found relevant to complement the perspectives from the management level in article 1.

In addition to interviews, I conducted desk research, mainly on information from the platforms' websites and publicly available documents (Wach & Ward, 2013). Namely, the less structured interviews with the platform managers were characterised by somewhat fractured discussions regarding management practices (Drew, 2014). Therefore, I used desk research as a complementary source alongside the data interviews to thoroughly delineate the management practices on the platform. The discursive nature of the desk research from the platform resembled the platform managers' way of framing working conditions and justifying their management responsibilities (Wach & Ward, 2013). Given the lengthier interviews with food couriers (1-2 hours), I employed desk research as a secondary source to map aspects of the algorithmic management features used

by the workers, such as task distribution and compensation. Considering the manager's and platform workers' differing attitudes towards AM features, I cross-checked the information from the desk research with the couriers' statements and previous research on the platform (Kusk & Bossen, 2022).

Analytical generalisability and limitations

In conducting and analysing the management level and interviews with platform workers, I used the abduction principles outlined by Brandt & Timmermans (2021) by drawing on and revising existing theory through surprising findings. By examining the two levels of employment relations in the platform setting, the interviews, for instance, allowed me to assess the "black box" of algorithmic management (AM) empirically from two different strategic perspectives (Heiland, 2022a). In addition, the digital distance, with limited interaction between the platform management and the workers, also provided interesting diverging perspectives on the AM system. For instance, the workers had their interpretations of the platform management's strategies and intentions, particularly regarding adjustments to the AM systems compensation model, which sometimes diverged from the managers' perceptions (Antin et al., 2015).

The context-sensitive nature of digital labour platforms, with the digital infrastructure being the only common denominator, raises questions about the transferability of findings from one platform to another (Maxwell & Chmiel, 2014). This applies to both the platform and the worker levels and concerns variations within industries (e.g. food delivery and interpretation) and working arrangements (employment and self-employment) with high or low skill requirements (Kalleberg & Dunn, 2016; Meijerink & Keegan, 2019). Furthermore, the intensity of, for instance, algorithmic management may vary within the same types of platforms (e.g. food delivery), and finally, the platforms operate in different institutional settings with, for instance, different regulative frameworks between countries (Pulignano et al., 2023).

The main limitation of article 1 is the potentially limited depth that may be missing from a rather loose approach to interviewing combined with the limited availability of managers (Small & Calarco, 2022). Article 3 includes some contextual concerns, as food delivery couriers operate within spatial settings that may vary between cities (Heiland, 2022b). For instance, Copenhagen is flat and compact, with comparably short delivery distances and well-developed biking lanes. Further, as this article analyses a single platform, the generalisation of worker strategies toward the AM system on this platform may only be partly transferable to other platforms, although aspects of these strategies have been identified elsewhere (Franke et al., 2023; Kusk Gjetting et al., 2022). The main limitation relates to the change of strategy during my data collection process with interviewing couriers, where the limited number of interviews may miss out on analytical variation grounded in background characteristics such as working hours, earnings and background characteristics (e.g. nationality and gender) (Urzì Brancati et al., 2020).

3.2 Quantitative methods

The quantitative data I used for the second and the fourth articles of the dissertation rests on an aim to explore working activity related to platform work – inside and outside the platform setting, respectively. The articles represent two different paths for addressing the empirical gap in analysing the working conditions of platform workers over time.

Accessing longitudinal data inside the platform

Accessing data on platforms based on digital intermediation relates in a broader sense to ongoing discussions on the potential of studying social activity online from digital sources such as webpages and apps (Lazer et al., 2021). Social online data contain the overall potential of being able to catch digital traces of activity from total population samples, including, for instance, unregistered migrants and other vulnerable groups of workers that are difficult to approach – as reflected in my recruitment of platform workers in article 3 (Athique, 2018; van Doorn et al.,

2022). However, as these data types are often used for business purposes and not designed for scientific use, they are affiliated with various potentials and limitations concerning reliability and validity (Hargittai, 2020; Munger, 2019). The considerations I had with the co-authors of article 2 for accessing data from platforms rested on two separate strategies, as seen in the table below.

Table 4. Strategies for accessing activity data on the platform

Strategy	**Procedure**	**Potentials**	**Challenges**	**Ethical considerations**
Data extraction	Scraping, crawling and mining methods	Independent data access	Inconsistent data monitoring	Permission from platforms and GDPR
Data exchange	Reaching an agreement with platforms	Consistent data monitoring	Dependent data access	Conflict of interest

Data extraction

The first strategy involved acquiring the data ourselves, as seen in recent studies through automated scraping, crawling and mining methods (Kässi & Lehdonvirta, 2018b; Stephany et al., 2022). In short, these methods collect data by traversing layers of web pages, for instance, to statistically analyse the number of tasks available on a platform or to identify keywords used in worker profiles through natural language processing techniques (ibid). The potential of this strategy lies in accessing the data independently, bypassing platforms, and increasing reliability through systematically established procedures for data mining (Munger, 2019). The main challenge relates to the quality of the data, which may be difficult to monitor, as continuous developments on web pages may lead to data breaches and the loss of previously available information (Munksgaard et al., 2016). Additionally, the companies may not allow data mining from their web pages without explicit permission, and ensuring the anonymity of individuals involved in the data monitoring raises ethical concerns, particularly for start-up platforms with a limited scope and low sample sizes (Lazer et al., 2021).

Data exchange

The second strategy we ultimately used for article 2 involves accessing data via data exchange with the platforms. In recent years, some studies have successfully negotiated agreements with platforms for data sharing (Hall & Krueger, 2018; Teutloff et al., 2023). The main potential of this strategy addresses the limitations of the former strategy, as data provided by the platforms is continuously monitored within the platform's databases, thereby reducing concerns regarding inconsistent data quality. The main challenge of this strategy is ensuring reliability, as platforms out of business interests may alter or aggregate the data prior to the exchange, as suggested in a study of Uber drivers in the US (Berg & Johnston, 2019). This necessitates preceding with care, including establishing legal measures and avoiding conflicts of interest with the companies (Athique, 2018).

To begin with, we explored the possibilities within both strategies. My colleague Jonas Hulgård Kristiansen and I implemented measures to scrape a few smaller platform pages without restrictions as test cases, confirming potential issues related to low sample sizes from smaller platforms. Simultaneously, engaged in dialogue regarding data exchange with the platforms approached for interviews in article 1. Eventually, we opted for the second strategy on data exchange with platforms, partly out of concerns about data quality and replicability, as we especially wanted to study working conditions longitudinally (Munksgaard et al., 2016). However, availability also played a role in this process, as the owners of the smaller start-up platforms worked part-time, had limited resources, and lacked separate HR departments (i.e., in-house data analysts) to facilitate data exchange.

We successfully reached an agreement with the large food delivery platform Wolt. We made several arrangements, including implanting a non-disclosure agreement (NDA) to ensure research independence, accessibility and data storage, among other factors. We maintained a continuous dialogue with the platform to obtain data at the individual level, including earnings, working

hours, and demographics. As part of the data exchange process and to comply with GDPR standards, couriers' identification numbers were encrypted to enhance anonymisation (Lazer et al., 2021). However, this approach restricted us to study the platform context in isolation, as this made us unable to link these data with national registers for synergetic insights between the platform and the broader labour market.

Accessing longitudinal data outside the platform

A different and more indirect way of studying platform workers' working activity and bridging the isolated and hardly accessible platform context relates to tracing their interaction with the broader labour market. One way to address this issue is to identify platform workers in surveys and link their identification numbers with various activity data and fully anonymised background information stored in national registers to provide a longitudinal layer of analysis (e.g. Kreiner et al., 2013; Petrovski et al., 2017). As seen in Table 5, national register data is collected and monitored consistently for administrative purposes and with research as a secondary aim within a regulated framework (ibid). As such, the national registers provide access to a more extended period, numerous variables for analysis of activity over time and background variables with higher data quality compared to the company data (ibid).

Table 5. Strategy for assessing activity data outside the platform

Strategy	**Procedure**	**Potentials**	**Challenges**	**Ethical considerations**
Combining surveys and registers	Linking survey data to national registers	Regulated and formalised monitoring	Broad population sample	Minor due to exclusive access and legal framework

The cross-sectional nature of survey data also comes with certain points of attention from a longitudinal perspective, as survey data provides an overall snapshot of the respondents' affiliation

with platform work. The survey data we decided to use for article 4 included workers who stated they had conducted platform work in 2017 and 2019 in the Danish part of the European Labor Force Survey (LFS). The survey was distributed to a representative sample of the Danish working-age (18-65) population, where respondents could declare whether they had conducted platform work within the last 12 months. Therefore, the platform workers sampled in this survey did not declare how much (i.e., a few hours or full-time) they had worked or at which type of platform (gig work, freelance) they had worked. Compared to the platform context studied in article 4, the survey data used for article 2 left us with a more general population of platform workers, with a tendency towards an affiliation with the broader labour market rather than relying on platform work as the main source of income.

Population samples

Table 6 presents an overview of the panel data acquired by the platform for article 2 and the register data used for article 4. Both data sets include data at the individual level but contain two different populations, which provide different analytical potentials and limitations.

Table 6. Panel data sets

Article	**Analytical strategy**	**Sampling**			
		Panel data	**Population**	**Sample**	**Size**
2	Platform segmentation	Company registers	Food delivery couriers	Single platform	Total population
4	Multiple job holding	Survey + national registers	Platform workers and multiple job holders	Danish labour force	Representative sample

The single study in article 2 examined working activity unfolding within one platform. The total population provides comparable insights between groups of workers (i.e. segmentation) with very

different levels of engagement and background characteristics on the platform, including individuals with very low and very high activity. Further, the platform shares typical characteristics of gig work platforms (self-employment, task-based earnings, low skill requirements) with the potential to generalise findings to similar gig work platforms (Kalleberg & Dunn, 2016). However, studying an isolated platform setting makes the analytical context very specific (Lazer et al., 2021). For instance, the intensity of algorithmic management, the specific wage model (i.e. earnings per task and bonuses) and workforce composition (i.e. Danish versus foreign background) at different platforms may slightly decrease the generalisability with food delivery platforms in other countries.

The broader sample of platform workers in the second article allowed us to move beyond the isolated platform context and gain insights about platform workers' work activity (i.e. multiple job holding) to engage with the labour market mobility of platform workers theoretically (Campion et al., 2020). However, the sample size for this study was increased beyond platform workers due to a low number of respondents who had indicated conducting platform work in the survey, reflecting the relatively low extent of platform work in Denmark (Ilsøe & Larsen, 2020). Therefore, the analytical potential of this sample rests on comparing the differences of platform workers as a subgroup with other multiple jobholders in the labour market. However, this also limits the potential for generalisability with other studies analysing the labour market characteristics of platform workers.

Longitudinal data qualities and background information

Table 7 presents the variables used for analysis in the two articles using working time and/or income, reflecting our critical indicators for studying the quality of work from a longitudinal perspective.

Table 7. Variables in the two panel data sets

Article	**Panel data**	**Variables**			
		Dependent (longitudinal)			**Independent**
		Indicator	*Frequency*	*Period*	
2	Company registers	Working time (online hours)	Weekly	Six years (2017-2023)	Nationality Tax registration
4	Survey + national registers	Working time (hours per week) Income (quartiles)	Monthly	36 months (Two years before and one year after LFS)	Several (e.g. demographic, job type, industry)

As seen in Table 7, for article 2, the platform provided working time series in the form of the couriers' online hours. We managed to get the working time series on an aggregated weekly basis to increase the reliability of the initially provided monthly series, providing us with more detailed insights into platform workers' fluctuating working activity (Lazer et al., 2021). The working time series combined with a total population sample left us with a solid indicator for examining activity differences in the composition of the workforce volume of platforms (Hargittai, 2020). However, the platform decided only to provide income data at a general level (i.e. not individual), which was insufficient for analysis. As such, we could not assess how different working hours manifested in high or low earnings, which decreased our prospects for analysing the quality of work on the platform.

The demographic data came with certain theoretical potentials, including how the working time patterns of platform workers relate to different national backgrounds. However, the demographic data had limited quality (discussed thoroughly in article 2). Along with the absence of income data, this limited the possibilities for theory development, such as how platform workers' dependency on platform work (supplementary or main income) relates to their activity on the platform (Schor et al., 2020).

In comparison, article 4 allowed us to examine both the working hours and income, although separately, every month to consider labour market mobility patterns of the platform workers and other types of multiple job holders. Further, the rich demographic material provided a solid analytical basis for theoretical insights into these workers' profiles and employment biographies.

Sequence analysis

In articles 2 and 4, sequence analysis served as the primary analytical tool for examining the longitudinal data. Sequence analysis was initially developed by Abbott (1995) to offer a descriptive and process-oriented approach to understanding social phenomena. This approach differs from regression analysis, which uses cross-sectional data that emphasises causality between specific variables within single time points (Gauthier et al., 2010). Instead, sequence analysis considers the interconnectivity of events taking place over time and has often been used to systematically analyse individuals' longer or shorter life courses (Aisenbrey & Fasang, 2017; Liao et al., 2022).

To name an example in the context of platform work, this could define a “career path” for a food courier, starting from sporadic weekly deliveries and then transitioning to part-time before becoming a full-time worker on the platform. This approach views the entire trajectory of working hour categories as the outcome (Abbott, 1995). This micro-level level of analysis can further be enhanced with clustering tools such as optimal matching analysis (OMA) to identify recurring patterns of individuals and pool their activity to reduce analytical complexity and build theoretically informed typologies (Abbott & Tsay, 2000). At the macro-level, sequence analysis holds the potential for analysing, for example, organisational changes impacting the activity of agents (Abbott, 1995; Liao et al., 2022). In a platform context, this relates to the interaction between structures (i.e. the platform) and agents (i.e. couriers) when certain events take place (e.g. changes in demands on the platform).

For article 2, sequence analysis proved very valuable at the micro-level to analyse the consistency and developments of individuals working time patterns categorised into five different working time states (i.e. from no activity to full-time) and cluster activity into worker segments on the platform through additional programming tools in R. This type of analysis allowed for describing their working activity at two levels, including their activity level (weekly working hours) and the duration of their activity (number of weeks on the platform), eventually revealing three platform segments (Grimshaw et al., 2017).

In Article 4, the limited sample size made sequence analysis useful for analysing working activity at the micro-level of the three subgroups of multiple jobholders and their labour market activity beyond the platform focusing on working time and earnings.

For the macro level, the findings provided some theoretical insights. Results from article 4 revealed increases in wages and working hours over time among platform workers in article 4, which indicated labour market agency among these workers (Dagdeviren & Donoghue, 2019). In article 2, consistent working time patterns of the three segments similarly may suggest that the workers drive their working activity own point of departure on the labour market (supply) and are not subject to the platform structure forcing them to work a certain amount of hours (demand) (Rubery, 2007). However, the low quality of background data constrained this type of analysis. Further, the platform only provided us with overall information on exogenous events (COVID-19) and modifications in the platform structure (e.g. adjustments in earnings models) as possible mechanisms affecting working conditions on the platform.

Reflections on the used methodology

Concerning the dissertation's overall research design, I consider a few points to stand out. First, the different limitations in the data sources reflect the challenges in accessing platform data, which relate to approaching actors in the field and accessing activity data. Second, in light of these limitations, one may criticise the methodological breadth of my approach for only scratching the

surface of analysing longitudinal and relational dimensions of platform work. For instance, a multi-methods qualitative approach for exclusively researching the platform workers' perspective could have provided a more grounded understanding of the quality of work and inequalities playing out at the worker level. However, the obstacles encountered in data acquisition also highlight the relevance of combining qualitative and quantitative methods to gain complementary insights into the structural conditions forming the working conditions and the agency and worker activity exercised within this framework.

4. Findings and discussion

In this final section of the dissertation, I present the findings from the individual studies before concluding the complementary insights gained from the four articles. I end the section by suggesting how future research could address some of the methodological limitations of this dissertation.

4.1 Individual articles

Article 1 analytically addresses the organisation of work at three platforms: Wolt (food delivery), Hilfr (cleaning) and Voocali (interpretation). Grounded in a strategic HRM approach, it builds an analytical framework inspired by the algorithmic management (AM) and labour law literature for assessing the platforms' management practices. The article finds that the platforms mainly use AM for economic enticements (Wolt) to make the workers stay longer on the platform and control (Hilfr and Voocali) for evaluating worker performances through rating systems. However, the platforms tend to rely on bureaucratic measures for hiring (i.e. inspecting documents) and dismissals (i.e. human managers' assessment of violation of rules of conduct) of workers. In other in-

stances, management is absent, as the digitally mediated setting complicates the platforms' possibilities for controlling the work process, such as whether workers comply with health and safety rules. Further, the platforms sometimes delegate management responsibilities to the customers, such as at Hilfr, where customers are responsible for providing workers with chemicals for cleaning. Based on these findings, the article highlights the inherent problems in the platforms' work organisation for retaining workers due to the limited control due to the distant and digitalised interaction with workers.

Article 2 departs from article 1 by examining working activity within the platform setting. It utilises the working time data series (2017-2022) of a total population of platform couriers (N = 20,090) provided by the food delivery platform Wolt. The article applies the segmented labour market (SLM) approach by considering variations in the weekly working hours of couriers as a proxy for segmentation on the platform over time, along with a sequence analysis of cluster patterns of working activity. The results reveal three distinct segments of workers consisting of 1) Dabblers working few hours and part-time for a few months, 2) Temporaries working part-time for several months, and 3) Regulars working part-time and full-time for a year or longer. Interestingly, the results show that the working activity within all three segments tends to be stable over time, which suggests that the workers find a steady level of activity on the platform. Regarding the workforce composition of platforms, foreigners are notably present among regulars, suggesting that these stable full-time insiders on the platform may be labour market outsiders with limited employment opportunities outside the platform. As such, the platform setting points to labour market inequalities among workers reflected in their varying working activities.

Article 3 takes the workers' perspective and maintains the focus on the platform Wolt to explore how platform workers exercise their agency within the platform and analyse their quality of work (i.e. gig quality) with regard to hourly earnings. The article builds an agency-grounded framework based on Archer (2002). Through interviews with ten food delivery couriers, identify four strategies which the workers apply towards the AM system: 1) flowing, where the couriers accept all

incoming orders offered by the AM system 2) fishing, where couriers select between incoming orders 3) squatting, where couriers commute to the same restaurant and 4) hacking, where the couriers exploit unintended errors in the AM system for instance to gain additional orders for extra earnings. The article finds no specific relationship between the couriers' strategies and their acquired earnings, which instead appears to rely on informal skills obtained from working on the platform, such as knowledge of the cityscape (e.g. shortcuts), working at peak hours, etc. Further, the findings suggest that couriers using the platform for supplementary income are less affected by aspects such as platform adjustments for instance the compensation model of the AM system, leaving them with lower levels of risk when sticking to a specific strategy. This tends to affect couriers more profoundly when they depend on income from the platform, suggesting that these conditions constrain their exercised agency, reflecting inequalities among couriers with respect to both their autonomy and earnings on the platform.

Article 4 shifts the focus to platform workers engaged with labour market activity outside the platform and provides a perspective on how workers engage with platform work for multiple job holding. With an analytical framework grounded in agency theory and a longitudinal perspective using sequence analysis, the article samples platform workers and compares their income and working hours with other types of multiple jobholders. The article focuses on whether workers engage with multiple job holding to shoulder the risks related to platform work (i.e. adaptive agency) or to pursue other career opportunities such as job shifts (i.e. transformative agency). The results show that the patterns in the labour market biographies of platform workers reflect that they tend to rely on various income sources to shoulder the risk from platform work, reflecting adaptive agency. However, as a substantial share of platform workers engaging in multiple job-holding hold well-paying primary jobs, this suggests transformative agency among this subgroup enabling them to test platform work as an additional income source or alternative career path. As such, the findings highlight that platform workers tend to exercise more labour market agency

than suggested in other studies, as their activity reflects that they can shoulder the risks affiliated with platform work.

4.2 Conclusions

Evolving platform inequalities

The dissertation's most significant empirical and theoretical contribution points to the relevance of studying working conditions unfolding in digital labour markets with a longitudinal perspective. The gains from using quantitative activity data from both inside and outside the platform reveal – in a purely empirical sense – the variances in the uses of platform work, both for part-time and full-time purposes. These findings add to the literature (Piasna & Drahokoupil, 2021; Schor et al., 2020) by highlighting the diverse use of the platforms. Notably, the identification of three distinct platform worker segments in article 2 (Dabblers, Temporaries and Regulars) constitutes the main empirical contribution of the dissertation.

In relation to inequalities, I consider the third segment of Regulars to be the most interesting of the three, as it constitutes a relatively small but significant proportion of part- and full-time workers (around 20% of all couriers) on the platform. Workers in this segment often have foreign backgrounds and account for the majority of working hours on the platform (around 60 % of all hours), a proportion that tends to increase over time as the demands for orders increase (Cullen & Farronato, 2021). As noted in article 2, when considering Atkinson's (1987) flexible form model, Regulars form a 'core' segment of loosely attached platform workers, while Dabblers make up the 'periphery' in this context.

This type of workforce composition illustrates how inequalities evolve within an unregulated platform structure: Rather than hiring a large group of unskilled workers, the low entry barrier combined with fully flexible working schedules enable individuals to work sporadically and extensively on the platform. Consequently, the platform capitalises on a smaller group of part-

time- and full-time workers that covers a significant proportion of the platform's labour demand. Some of these workers, possibly due to their foreign background, may have restricted access to welfare services and few other job alternatives and, therefore, rely on the platform as their primary occupational activity (Martinsen, 2020; van Doorn et al., 2022). On the contrary, workers using the platform sporadically (Dabblers making up 57 % of all couriers) or for part-time work (Temporaries making up 23 % of all couriers) fill in the remaining gaps in demands, accounting for the remaining 40 % of all working hours. Additional insights from article 4 suggest that platform workers with access to other income sources can mitigate the risk associated with platform work by having a basic income, allowing them to engage in platform work on a non-committal basis (Dagdeviren & Donoghue, 2019). The significant variations in the platform workers' hourly earnings in article 3 provide qualitative examples of how workers with and without access to other income sources interact differently with the platform's algorithmic management system (Schor et al., 2020).

Managing algorithmic flexibility

Further theoretical perspectives of the dissertation point to some structural conditions leading to differences in the quality of work, ultimately causing inequalities on the platform. Firstly, the management framework (Benassi & Kornelakis, 2020; Kellogg et al., 2020; J. Kristiansen, 2020) of article 1 reveals some interesting findings regarding discussions of the working conditions facilitated by platforms. With these findings, I suggest – in contrast to some studies considering AM to be a very omnipresent and suppressing structure (e.g. Griesbach et al., 2019; Veen et al., 2020) – that platforms apply AM and traditional management practices to a limited extent, and struggle to direct and retain their workers effectively (Kellogg et al., 2020). Therefore, the findings from this theoretical perspective reveal organisational dilemmas of managing a flexible work setting remotely, which relates to the structure-agency ambivalence in the two outlined organisational structures of capitalism (Boltanski & Chiapello, 2005). Depending on

their interests in building long-term employment relations, the platforms may increase their digital interference on the platform for increased worker control. However, this comes with the risk of compromising the worker's autonomy, potentially decreasing the workers' engagement with conducting platform work (ibid.).

Building upon the insights from article 1, my agency-centred focus on article 3 suggests that the platform provides the interviewed couriers with an open framework within which they can utilise the AM system in diverse ways. However, as I suggest in this article, due to the absence of minimum wages, the gig quality (i.e. the quality of work) becomes individualised. Thus, my adoption of an agency-centred approach underscores the significance of self-control in the absence of external control, as reflected in the post-industrial capitalist regime (Boltanski & Chiapello, 2005) and Rosa's (2014) emphasis on efficient time management as a ruling principle of an accelerating society. However, the limited transparency of the AM system and the couriers' varying success with applying their strategies towards the AM system suggest some challenges with navigating the continuous stream of digital information to maximise the output from platform work (Rosa, 2014).

Rounding off: Maturing teenagers?

Even though the platform economy is still in its nascent phase, with many platforms struggling to establish themselves on the labour market, recent developments in Denmark and the EU indicate that the platform economy is entering a new phase, where the platforms increasingly recognise their employer responsibilities. In Denmark, this is seen with the collective agreement at Hilfr and Just Eat (Ilsøe & Larsen, 2022). Similarly, processes of maturation are also seen among platform workers, where gig workers increasingly mobilise physically and through social media and organise across different regions (Bulut & Yeşilyurt, 2023; Hau & Savage, 2022; Howson et al., 2020; Woodcock & Cant, 2022).

At the EU level, a proposed directive contains a presumption rule that may result in many platforms becoming employers (*The European Commission,* 2021). Further, the directive addresses measures to increase the limited transparency of algorithmic features and adjustments implemented by platforms; a concern also raised among some of the couriers I interviewed for this dissertation (ibid.). However, at the time of writing, due to disagreements between member states, it is unclear which form this directive will have if eventually adopted (Euractivity, 2024)[iii].

Considering these recent developments and what this dissertation has uncovered, I reckon the time may be ripe for the platforms to rethink their employer responsibilities. As noted, the platforms tend to frame platform work as a supplementary income source that offers autonomy and opportunities for balancing platform work with other pursuits such as projects, hobbies and educational activities (Ilsøe & Söderqvist, 2023; Marenco, 2024). As illustrated by the example of the courier Sandor in the introduction, this portrayal may hold for a certain proportion of platform workers (Schor et al., 2020). However, the platforms' limited measures for handling the workforce composition and the resulting working activities evolving within this structure tell a somewhat different story: It reveals a platform to some extent relying on a smaller group of foreign full-time workers to meet labour demands. This possesses a challenge for the platforms in justifying their current business model.

Nevertheless, managing an organisation with digital distance remains an unresolved issue, as reflected by a manager at Hilfr, who reported only having spurious contact with their employed cleaners. This perspective was echoed at the worker level, with couriers who expressed frustration with their difficulties in reaching the platform management beyond basic support services. As noted by Hartmut Rosa, building employment relationships takes time and effort: 'It is one thing to exchange data or information with a colleague or client, quite another thing to establish a relationship' (Rosa, 2014:58). In other words. At the same time, it is indeed possible to establish formal employer-employee relationships, but doing so without any physical contact between the platform and the workers is challenging. Recently, Randall Collins has pointed to the negative

consequences of social distancing and digital contact during the COVID-19 pandemic, highlighting the importance of physical face-to-face encounters for building trust and solidarity (Collins, 2020). Therefore, regardless of regulating employment conditions, efforts to establish some level of human presence between the company and the workers may help breach the digital barrier and resolve some issues related to the digital distance.

4.3 Limitations and implications for future research

The platform infrastructure

While this dissertation focuses exclusively on the company and worker level, it is important to note another central actor in the platform's infrastructure – the customer – but occasionally also third-party actors such as restaurants within food delivery (Chetan Panse et al., 2019; Cui et al., 2022). An illustrative example of this occurred in 2023, when dozens of restaurants in Aalborg, Denmark, coordinated a boycott against Wolt, protesting against alleged high commission fees for being connected to the platform[iv]. This incident highlights ongoing discussions regarding restaurants' growing reliance on platform exposure and how it affects revenue (Raj et al., 2023). Further, my interviews with couriers reflected dissatisfaction with specific restaurants, which they tended to avoid. Therefore, future studies should address the restaurants' role in the platform economy, including their reliance on the platform infrastructure and whether they apply certain strategies for handling platform orders (ibid.).

In the case of the customers, the findings from article 1 show that the platform tends to delegate management responsibilities to the customers, as, for instance, reflected in the rating systems at Hilfr and Voocali, where customers evaluate worker performances. In relation to this, I refer to my colleague Jonas Hulgård Kristiansen's recent work on the customers' role as labour market actors and in the platform economy, which complements this dissertation's findings (Kristiansen, 2024).

With regards to the company level, more systematic knowledge, both qualitatively and quantitatively, is needed to understand how platform expansion (e.g. increasing the customer base) and continuous adjustments to the AM system affect worker autonomy and gig quality (Immonen, 2023; Meijerink et al., 2021).

The quality of work and the ongoing problem of data access

As touched upon in the methodology section, the inherent limitations of the quantitative data sources I used reflect the ongoing challenges with data access. Given my difficulties in recruiting couriers from migrant and female backgrounds, I propose further perspectives to focus on the experiences of marginalised platform workers (van Doorn et al., 2022). Ethnographic studies could be highly relevant for mapping the informal economic activities taking place beneath the 'platform surface' as an unintended consequence of the platform structure. For example, my interviews with couriers revealed that trading worker profiles has become a valuable currency, granting undocumented migrants' access to labour opportunities.

Further, I advocate for renewed attempts to access quantitative activity data to systematically analyse the quality of platform work, as recently suggested in a review by Gundert and Leschke (2023). Namely, I stress the need to access data from low-skilled gig work platforms, especially for studying the relationship between working time and working hours longitudinally. While longitudinal data on working time and earnings separately provide valuable insights, a central limitation of article 2 is the absence of worker earnings and low demographic data quality. I consider the relationship between working hours and earnings, for instance, earnings per hour, combined with background variables, to be vital for understanding the quality of work and the socioeconomic backgrounds of workers in digital labour markets. A recent ruling from the Danish tax authorities declaring the couriers at Wolt employees within tax law opens the possibility of studying earnings on this platform via national registers[v].

Finally, as features from platforms' business models (i.e. AM) are increasingly present within other types of business (e.g. Curchod et al., 2020), I suggest future studies move beyond this boundary and analyse platform work as one source of worker income among many other informal and formal working activities.

References

Abbott, A. (1995). Sequence Analysis: New Methods for Old Ideas. *Annual Review of Sociology*, *21*, 93–113.

Abbott, A. D. (2004). *Methods of discovery Heuristics for the Social Sciences*.

Abbott, A., & Tsay, A. (2000). Sequence Analysis and Optimal Matching Methods in Sociology: Review and Prospect. *Sociological Methods & Research*, *29*(1), 3–33. https://doi.org/10.1177/0049124100029001001

Aisenbrey, S., & Fasang, A. (2017). The Interplay of Work and Family Trajectories over the Life Course: Germany and the United States in Comparison. *American Journal of Sociology*, *122*(5), 1448–1484. https://doi.org/10.1086/691128

Antin, T. M., Constantine, N. A., & Hunt, G. (2015). Conflicting discourses in qualitative research: The search for divergent data within cases. *Field Methods*, *27*(3), 211–222.

Anwar, M. A., & Graham, M. (2020). Hidden transcripts of the gig economy: Labour agency and the new art of resistance among African gig workers. *Environment and Planning A: Economy and Space*, *52*(7), 1269–1291. https://doi.org/10.1177/0308518X19894584

Archer, M. S. (2005). Structure, Culture and Agency. In M. D. Jacobs & N. W. Hanrahan (Eds.), *The Blackwell companion to the Sociology of Culture* (pp. 17–34). Blackwell.

Archer, M. S. (2010). Morphogenesis versus structuration: On combining structure and action1. *The British Journal of Sociology*, *61*(s1), 225–252. https://doi.org/10.1111/j.1468-4446.2009.01245.x

Arnholtz, J., & Navrbjerg, S. E. (2020). *Lønmodtageres faglige organisering 2000-2018*. Forskningscenter for Arbejdsmarkeds-og Organisationsstudier, Sociologisk ….

Aspers, P., & Corte, U. (2019). What is Qualitative in Qualitative Research. *Qualitative Sociology*, *42*(2), 139–160. https://doi.org/10.1007/s11133-019-9413-7

Athique, A. (2018). The dynamics and potentials of big data for audience research. *Media, Culture Society*, *40*(1), 59–74.

Atkinson, J. H. (1987). Flexibility or Fragmentation?: The United Kingdom Labour Market in the Eighties. *Labour and Society : A Quarterly Journal of the International Institute for Labour Studies*, *12*(1), 87–105.

Baiocco, S., Macias, E., Rani, U., & Pesole, A. (2022). *The Algorithmic Management of Work and its Implications in Different Contexts*.

Barratt, T., Goods, C., & Veen, A. (2020). 'I'm my own boss…': Active intermediation and 'entrepreneurial' worker agency in the Australian gig-economy. *Environment and Planning A: Economy and Space*, *52*(8), 1643–1661. https://doi.org/10.1177/0308518X20914346

Benassi, C., & Kornelakis, A. J. (2020). How Do Employers Choose between Types of Contingent Work? Costs, Control, and Institutional Toying. *ILR Review*, 0019793920944910.

Berg, J., & Johnston, H. (2019). Too good to be true? A comment on Hall and Krueger's analysis of the labor market for Uber's driver-partners. *ILR Review*, *72*(1), 39–68.

Blumer, H. (2017). What is wrong with social theory? In *Sociological methods* (pp. 84–96). Routledge.

Bögenhold, D., Klinglmair, R., & Kandutsch, F. (2017). Solo-Self-Employment, human capital and hybrid labour in the gig economy. *Форсайт*, *11*(4 (eng)).

Boltanski, L., & Chiapello, E. (2005). *The New Spirit of Capitalism*. Verso.

Brandt, P., & Timmermans, S. (2021). Abductive Logic of Inquiry for Quantitative Research in the Digital Age. *Sociological Science*, *8*, 191–210. https://doi.org/10.15195/v8.a10

Bredgaard, T., & Madsen, P. K. (2018). Farewell flexicurity? Danish flexicurity and the crisis. *Transfer: European Review of Labour and Research*, *24*(4), 375–386.

Bryman, A. (2007). Barriers to Integrating Quantitative and Qualitative Research. *Journal of Mixed Methods Research*, *1*(1), 8–22. https://doi.org/10.1177/2345678906290531

Bulut, E., & Yeşilyurt, A. (2023). Delivery workers' visibility struggles: Weapons of the gig, (extra)ordinary social media, and strikes. *Convergence*, 13548565231188415. https://doi.org/10.1177/13548565231188415

Burawoy, M. (2012). *Manufacturing Consent: Changes in the Labor Process Under Monopoly Capitalism*. University of Chicago Press.

Burke, A. (2019). Occluded algorithms. *Big Data & Society*, *6*(2), 2053951719858743. https://doi.org/10.1177/2053951719858743

Burtch, G., Carnahan, S., & Greenwood, B. N. (2018). Can You Gig It? An Empirical Examination of the Gig Economy and Entrepreneurial Activity. *Management Science*, *64*(12), 5497–5520. https://doi.org/10.1287/mnsc.2017.2916

Campion, E. D., Caza, B. B., & Moss, S. E. (2020). Multiple jobholding: An integrative systematic review and future research agenda. *Journal of Management*, *46*(1), 165–191.

Cano, M. R., Espelt, R., & Morell, M. F. (2021). Flexibility and freedom for whom? Precarity, freedom and flexibility in on-demand food delivery. *Work Organisation, Labour & Globalisation*, *15*, 46–68. https://doi.org/10.13169/workorgalaboglob.15.1.0046

Cappelli, P., & Keller, J. R. (2013). Classifying work in the new economy. *Academy of Management Review*, *38*(4), 575–596.

Cappelli, P., & Neumark, D. (2004). External Churning and Internal Flexibility: Evidence on the Functional Flexibility and Core-Periphery Hypotheses. *Industrial Relations: A Journal of Economy and Society*, *43*(1), 148–182. https://doi.org/10.1111/j.0019-8676.2004.00322.x

Cesko, J., & Soes, K. (2020). *Blurring the Boundaries Between Being an Employee and Self-employed—An EU Competition Law Analysis of the Employment Status of Wolt Couriers* (SSRN Scholarly Paper ID 3705203). Social Science Research Network. https://papers.ssrn.com/abstract=3705203

Chetan Panse, D. S. R., Sharma, A., & Dorji, N. (2019). Understanding consumer behaviour towards utilization of online food delivery platforms. *Journal of Theoretical and Applied Information Technology*, *97*, 16.

Choudary, S. P. (2018). *The architecture of digital labour platforms: Policy recommendations on platform design for worker well-being*. 55.

Clark, A. (2015). What makes a good job? Job quality and job satisfaction. *IZA World of Labor*. https://doi.org/10.15185/izawol.215

Collins, R. (2020). Social distancing as a critical test of the micro-sociology of solidarity. *American Journal of Cultural Sociology*, *8*(3), 477–497. https://doi.org/10.1057/s41290-020-00120-z

Connelly, R., Playford, C. J., Gayle, V., & Dibben, C. (2016). The role of administrative data in the big data revolution in social science research. *Social Science Research*, *59*, 1–12.

Cui, R., Zhang, W., & Zheng, Z. (2022). *Market Thickness and Delivery Efficiency in Food Delivery Platforms*.

Cullen, Z., & Farronato, C. (2021). Outsourcing Tasks Online: Matching Supply and Demand on Peer-to-Peer Internet Platforms. *Management Science*, *67*(7), 3985–4003. https://doi.org/10.1287/mnsc.2020.3730

Cunliffe, A. L., & Alcadipani, R. (2016). The Politics of Access in Fieldwork: Immersion, Backstage Dramas, and Deception. *Organizational Research Methods*, *19*(4), 535–561. https://doi.org/10.1177/1094428116639134

Curchod, C., Patriotta, G., Cohen, L., & Neysen, N. (2020). Working for an Algorithm: Power Asymmetries and Agency in Online Work Settings. *Administrative Science Quarterly*, *65*(3), 644–676. https://doi.org/10.1177/0001839219867024

Dagdeviren, H., & Donoghue, M. (2019). Resilience, Agency and Coping with Hardship: Evidence from Europe during the Great Recession. *Journal of Social Policy*, *48*(3), 547–567. https://doi.org/10.1017/S0047279418000624

De Ruyter, A., & Brown, M. (2022). The Gig Economy and The Future of Work. In *Newcastle upon Tyne: Agenda Publishing, 192 pp,£ 15.00 'The Future of Work and Employment'Adrian Wilkinson and Michael Barry (Eds),.* Agenda Publishing.

De Stefano, Valerio, Durri, Ilda, Stylogiannis, Charalampos, & Wouters, Mathias. (2021). Platform work and the employment relationship. *ILO Working Paper*, *27*.

Dieuaide, P., & Azaïs, C. (2020). Platforms of Work, Labour, and Employment Relationship: The Grey Zones of a Digital Governance. *Frontiers in Sociology*, *5*, 2. https://doi.org/10.3389/fsoc.2020.00002

Doeringer, P. B., & Piore, M. J. (1971). *Low-Income Employment and the Disadvantaged Labour Force, and Qualitative Analysis of Wolker Instability in the Low-Income Labour Market*. Internal Labour Markets and Manpower Analysis. Lexington, MA: DC Heath.

Doorn, N. van. (2020). Stepping Stone or Dead End? The Ambiguities of Platform-Mediated Domestic Work under Conditions of Austerity. Comparative Landscapes of Austerity and the Gig Economy: New York and Berlin. In *Working in the Context of Austerity* (pp. 49–70). Bristol University Press. https://bristoluniversitypressdigital.com/display/book/9781529208689/ch003.xml

Dor, L., & Webster, E. (2023). Divided Workers, Divided Struggles: Entrenching Dualisation and the Struggle for Equalisation in South Africa's Manufacturing Sector. In *Recasting Workers' Power* (1st ed., pp. 72–100). Bristol University Press. https://doi.org/10.2307/jj.4953559.9

Drahokoupil, J., & Piasna, A. (2019). Work in the Platform Economy: Deliveroo Riders in Belgium and the SMart Arrangement. *SSRN Electronic Journal*. https://www.academia.edu/52595799/Work_in_the_Platform_Economy_Deliveroo_Riders_in_Belgium_and_the_SMart_Arrangement

Drew, H. (2014). Overcoming Barriers: Qualitative Interviews With German Elites. *Electronic Journal of Business Research Methods*, *12*(2), Article 2.

Due, J., & Madsen, J. S. (2008). The Danish model of industrial relations: Erosion or renewal? *Journal of Industrial Relations*, *50*(3), 513–529.

Duggan, J., Sherman, U., Carbery, R., & McDonnell, A. (2020). Algorithmic management and app-work in the gig economy: A research agenda for employment relations and HRM. *Human Resource Management Journal*, *30*(1), 114–132. https://doi.org/10.1111/1748-8583.12258

Dundon, T., & Ryan, P. (2010). Interviewing Reluctant Respondents: Strikes, Henchmen, and Gaelic Games. *Organizational Research Methods*, *13*(3), 562–581. https://doi.org/10.1177/1094428109335571

Edwards, R. (1979). *Contested Terrain: The Transformation of the Workplace in the Twentieth Century*. Basic Books.

Fisher, L. H. (1951). The Harvest Labor Market in California. *The Quarterly Journal of Economics*, *65*(4), 463–491. https://doi.org/10.2307/1882576

Flanders, A. D. (1974). The Tradition of Voluntarism*. *British Journal of Industrial Relations*, *12*(3), 352–370. https://doi.org/10.1111/j.1467-8543.1974.tb00012.x

Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative Inquiry*, *12*(2), 219–245.

Franke, M., Pulignano, V., & Marà, C. (2023). Workers' contentions over unpaid labour time in food delivery and domestic work platforms in Belgium. *Work in the Global Economy*, *3*(1), 6–30.

Frenken, K., & Fuenfschilling, L. (2021). The Rise of Online Platforms and the Triumph of the Corporation. *Sociologica*, *14*(3), 101–113. https://doi.org/10.6092/issn.1971-8853/11715

Galière, S. (2020). When food-delivery platform workers consent to algorithmic management: A Foucauldian perspective. *New Technology, Work and Employment, 35*(3), 357–370. https://doi.org/10.1111/ntwe.12177

Gallie, D. (2017). The Quality of Work in a Changing Labour Market. *Social Policy & Administration, 51*(2), 226–243. https://doi.org/10.1111/spol.12285

Gandini, A. (2016). Digital work: Self-branding and social capital in the freelance knowledge economy. *Marketing Theory, 16*(1), 123–141. https://doi.org/10.1177/1470593115607942

Gandini, A. (2019). Labour process theory and the gig economy. *Human Relations, 72*(6), 1039–1056. https://doi.org/10.1177/0018726718790002

Gauthier, J.-A., Widmer, E. D., Bucher, P., & Notredame, C. (2010). Multichannel Sequence Analysis Applied to Social Science Data. *Sociological Methodology, 40*(1), 1–38. https://doi.org/10.1111/j.1467-9531.2010.01227.x

Goods, C., Veen, A., & Barratt, T. (2019). "Is your gig any good?" Analysing job quality in the Australian platform-based food-delivery sector. *Journal of Industrial Relations, 61*(4), 502–527. https://doi.org/10.1177/0022185618817069

Grabher, G., & König, J. (2020). Disruption, Embedded. A Polanyian Framing of the Platform Economy. *Sociologica, 14*(1), 95–118. https://doi.org/10.6092/issn.1971-8853/10443

Grégoire, D. (2017). Delivering for FoodTech: At your own risk. *HesaMag,(16),* 17–21.

Gregory, K. (2021). 'My Life Is More Valuable Than This': Understanding Risk among On-Demand Food Couriers in Edinburgh. *Work, Employment and Society, 35*(2), 316–331. https://doi.org/10.1177/0950017020969593

Griesbach, K., Reich, A., Elliott-Negri, L., & Milkman, R. (2019). Algorithmic Control in Platform Food Delivery Work. *Socius: Sociological Research for a Dynamic World, 5*, 237802311987004. https://doi.org/10.1177/2378023119870041

Grimshaw, D., Fagan, C., Hebson, G., & Tavora, I. (2017). A new labour market segmentation approach for analysing inequalities: Introduction and overview. In *Making work more equal*. Manchester University Press.

Grint, K., & Nixon, D. (2015). *The Sociology of Work* (4th ed.). Polity.

Groger, L., Mayberry, P. S., & Straker, J. K. (1999). What we didn't learn because of who would not talk to us. *Qualitative Health Research*, *9*(6), 829–835.

Gundert, S., & Leschke, J. (2023). Challenges and potentials of evaluating platform work against established job-quality measures. *Economic and Industrial Democracy*, 0143831X231199891. https://doi.org/10.1177/0143831X231199891

Halkier, B. (2011). Methodological Practicalities in Analytical Generalization. *Qualitative Inquiry*, *17*(9), 787–797. https://doi.org/10.1177/1077800411423194

Hall, J. V., & Krueger, A. B. (2018). An analysis of the labor market for Uber's driver-partners in the United States. *ILR Review, 71*(3), 705–732.

Hargittai, E. (2020). Potential Biases in Big Data: Omitted Voices on Social Media. *Social Science Computer Review*, *38*(1), 10–24. https://doi.org/10.1177/0894439318788322

Hau, M. F., & Savage, O. G. (2022). Building coalitions on Facebook:'social media unionism'among Danish bike couriers. *New Technology, Work and Employment*.

Head, E. (2009). The ethics and implications of paying participants in qualitative research. *International Journal of Social Research Methodology*, *12*(4), 335–344. https://doi.org/10.1080/13645570802246724

Heckman, J., & Singer, B. S. (2008). *Longitudinal analysis of labor market data*. Cambridge University Press.

Heiland, H. (2021). Controlling space, controlling labour? Contested space in food delivery gig work. *New Technology, Work and Employment*, *36*(1), 1–16. https://doi.org/10.1111/ntwe.12183

Heiland, H. (2022a). Black Box Power: Zones of Uncertainty in Algorithmic Management. *Digital Platforms and Algorithmic Subjectivities*, *24*, 75.

Heiland, H. (2022b). Neither timeless, nor placeless: Control of food delivery gig work via place-based working time regimes. *Human Relations*, *75*(9), 1824–1848. https://doi.org/10.1177/00187267211025283

Hennink, M., & Kaiser, B. N. (2022). Sample sizes for saturation in qualitative research: A systematic review of empirical tests. *Social Science & Medicine*, *292*, 114523. https://doi.org/10.1016/j.socscimed.2021.114523

Hießl, C. (2022). *Case Law on the Classification of Platform Workers: Cross-European Comparative Analysis and Tentative Conclusions* (SSRN Scholarly Paper 3839603). https://doi.org/10.2139/ssrn.3839603

Holman, D. (2013). Job types and job quality in Europe. *Human Relations*, *66*(4), 475–502.

Howcroft, D., Bergvall-Kåreborn, B. %J W., & Society. (2019). *A typology of crowdwork platforms*. *33*(1), 21–38.

Howson, K., Ustek-Spilda, F., Grohmann, R., Salem, N., Carelli, R., Abs, D., Salvagni, J., Graham, M., Balbornoz, M. B., Chavez, H., Arriagada, A., & Bonhomme, M. (2020). 'Just because you don't see your boss, doesn't mean you don't have a boss': Covid-19 and Gig Worker Strikes across Latin America. *International Union Rights*, *27*(3), 20–28.

ILO. (2018). *Job quality in the platform economy* (pp. 1–7). Global Commission on the Future of Work.

Ilsøe, A. (2020). The Hilfr agreement. *Negotiating the Platform Economy in Denmark. FAOS Research Paper, 176*.

Ilsøe, A., & Larsen, T. P. (Eds.). (2021a). *Non-standard work in the Nordics: Troubled waters under the still surface*. Nordisk Ministerråd. http://urn.kb.se/resolve?urn=urn:nbn:se:norden:org:diva-7209

Ilsøe, A., & Larsen, T. P. (2021b). Why do labour platforms negotiate? Platform strategies in tax-based welfare states. *Economic and Industrial Democracy*, 0143831X211056974. https://doi.org/10.1177/0143831X211056974

Ilsøe, A., & Larsen, T. P. (2022, June 29). *Digitale arbejdsmarkeder—Fra jobs til opgaver*. Djøf Forlag. https://www.djoef-forlag.dk/digitale-arbejdsmarkeder

Ilsøe, A., & Söderqvist, C. F. (2023). Will there be a Nordic model in the platform economy? Evasive and integrative platform strategies in Denmark and Sweden. *Regulation & Governance*, *17*(3), 608–626. https://doi.org/10.1111/rego.12465

Immonen, J. (2023). HRM models of online labor platforms: Strategies of market and corporate logics. *Frontiers in Sociology*, *7*. https://doi.org/10.3389/fsoc.2022.980301

Jabagi, N., Croteau, A.-M., Audebrand, L. K., & Marsan, J. (2019). Gig-workers' motivation: Thinking beyond carrots and sticks. *Journal of Managerial Psychology*, *34*(4), 192–213. https://doi.org/10.1108/JMP-06-2018-0255

Jacqueson, C. (2021). Platform work, social protection and flexicurity in Denmark. *International Social Security Review*, *74*(3–4), 39–59. https://doi.org/10.1111/issr.12277

Jarrahi, M. H., Newlands, G., Lee, M. K., Wolf, C. T., Kinder, E., & Sutherland, W. (2021). Algorithmic management in a work context. *Big Data & Society*, *8*(2), 20539517211020332. https://doi.org/10.1177/20539517211020332

Jørgensen, K. M. (2016). The media go-along: Researching mobilities with media at hand. *MedieKultur: Journal of Media and Communication Research*, *32*(60), Article 60. https://doi.org/10.7146/mediekultur.v32i60.22429

Kalleberg, A. L. (2001). Organizing Flexibility: The Flexible Firm in a New Century. *British Journal of Industrial Relations*, *39*(4), 479–504. https://doi.org/10.1111/1467-8543.00211

Kalleberg, A. L. (2003). Flexible Firms and Labor Market Segmentation: Effects of Workplace Restructuring on Jobs and Workers. *Work and Occupations*, *30*(2), 154–175. https://doi.org/10.1177/0730888403251683

Kalleberg, A. L., & Dunn, M. (2016). Good Jobs, Bad Jobs in the gig economy. *Perspectives on Work*, 10–14.

Kalleberg, A. L., & Sorensen, A. B. (1979). The Sociology of Labor Markets. *Annual Review of Sociology*, *5*, 351–379.

Kässi, O., & Lehdonvirta, V. (2018a). Online labour index: Measuring the online gig economy for policy and research. *Technological Forecasting and Social Change*, *137*, 241–248. https://doi.org/10.1016/j.techfore.2018.07.056

Kässi, O., & Lehdonvirta, V. (2018b). Online labour index: Measuring the online gig economy for policy and research. *Technological Forecasting Social Change*, *137*, 241–248.

Kellogg, K. C., Valentine, M. A., & Christin, A. (2020). Algorithms at Work: The New Contested Terrain of Control. *Academy of Management Annals*, *14*(1), 366–410. https://doi.org/10.5465/annals.2018.0174

Kim, S., Marquis, E., Alahmad, R., Pierce, C. S., & Robert Jr, L. P. (2018). *The Impacts of Platform Quality on Gig Workers' Autonomy and Job Satisfaction*. Companion of the 2018 ACM Conference on Computer Supported Cooperative Work and Social Computing.

Kornberger, M., Pflueger, D., & Mouritsen, J. (2017). Evaluative infrastructures: Accounting for platform organization. *Accounting, Organizations Society*, *60*, 79–95.

Kreiner, C. T., Lassen, D. D., & Leth-Petersen, S. (2013). *Measuring the Accuracy of Survey Responses using Administrative Register Data: Evidence from Denmark* (Working Paper 19539). National Bureau of Economic Research. https://doi.org/10.3386/w19539

Kristiansen, J. (2020). *Ansættelsesret (1. Udg.)*. Djøf Forlag. https://www.jurabibliotek.dk/view/book/9788771984798/9788771984798.xml

Kristiansen, J. H., Larsen, T. P., & Ilsøe, A. (2022). Hybrid Work Patterns: A Latent Class Analysis of Platform Workers in Denmark. *Nordic Journal of Working Life Studies*. https://doi.org/10.18291/njwls.133721

Kristiansen, J. H. (2024). Valuing the Nordic Model: A Survey Experiment on Consumer Preferences and Employment Relations in the Gig Economy. Working paper (unpublished).

Kuhn, K. M., & Maleki, A. (2017). Micro-entrepreneurs, Dependent Contractors, and Instaserfs: Understanding Online Labor Platform Workforces. Academy of Management Perspectives, 31(3), 183–200. https://doi.org/10.5465/amp.2015.0111

Kusenbach, M. (2003). Street Phenomenology: The Go-Along as Ethnographic Research Tool. Ethnography, 4(3), 455–485. https://doi.org/10.1177/146613810343007

Kusk Gjetting, K., Duus Terkelsen, K., Scott Hansen, S., & Floros, K. (2022). Det usynlige menneske i platformsarbejde—En kvalitativ undersøgelse af algoritmisk ledelse. Tidsskrift for Arbejdsliv, 24(3), 28–42.

Kusk, K., & Bossen, C. (2022). Working with Wolt: An Ethnographic Study of Lenient Algorithmic Management on a Food Delivery Platform. *Proceedings of the ACM on Human-Computer Interaction*, *6*(GROUP), 4:1-4:22. https://doi.org/10.1145/3492823

Larsen, T., Ilsøe, A., & Felbo-Kolding, J. (2019). Part-time work in Danish private services: A (mis) match between wage flexibility and living hours. *Dualisation of Part-Time Work*, 133–158.

Lazer, D., Hargittai, E., Freelon, D., Gonzalez-Bailon, S., Munger, K., Ognyanova, K., & Radford, J. (2021). Meaningful measures of human society in the twenty-first century. *Nature*, *595*(7866), 189–196. https://doi.org/10.1038/s41586-021-03660-7

Liao, T. F., Bolano, D., Brzinsky-Fay, C., Cornwell, B., Fasang, A. E., Helske, S., Piccarreta, R., Raab, M., Ritschard, G., Struffolino, E., & Studer, M. (2022). Sequence analysis: Its past, present, and future. *Social Science Research*, *107*, 102772. https://doi.org/10.1016/j.ssresearch.2022.102772

Lofland, J., Snow, D., Anderson, L., & Lofland, L. H. (2022). *Analyzing social settings: A guide to qualitative observation and analysis*. Waveland Press.

Maffie, M. D. (2020). Are we 'sharing' or 'gig-ing'? A classification system for online platforms. *Industrial Relations Journal*, *51*(6), 536–555. https://doi.org/10.1111/irj.12312

Marenco, M. (2024). Platform work meets flexicurity: A comparison between Danish and Dutch social partners' responses to the question of platform workers' contract classification.

European Journal of Industrial Relations, 09596801231223175. https://doi.org/10.1177/09596801231223175

Marsden, D. (2011). *Employment in the Lean Years: Policy and Prospects for the Next Decade*. Oxford University Press.

Martinsen, D. S. (2020). Migrants' Access to Social Protection in Denmark. In J.-M. Lafleur & D. Vintila (Eds.), *Migration and Social Protection in Europe and Beyond (Volume 1): Comparing Access to Welfare Entitlements* (pp. 123–135). Springer International Publishing. https://doi.org/10.1007/978-3-030-51241-5_8

Maxwell, J. A., & Chmiel, M. (2014). Generalization in and from qualitative analysis. *The SAGE Handbook of Qualitative Data Analysis*, *7*(37), 540–553.

Meijerink, J., & Arets, M. (2021). Online labor platforms versus temp agencies: What are the differences? *Strategic HR Review*, *20*(4), 119–124. https://doi.org/10.1108/SHR-12-2020-0098

Meijerink, J., & Keegan, A. (2019). Conceptualizing human resource management in the gig economy: Toward a platform ecosystem perspective. *Journal of Managerial Psychology*, *34*(4), 214–232. https://doi.org/10.1108/JMP-07-2018-0277

Meijerink, J., Keegan, A., & Bondarouk, T. (2021). Having their cake and eating it too? Online labor platforms and human resource management as a case of institutional complexity. *The International Journal of Human Resource Management*, *32*(19), 4016–4052. https://doi.org/10.1080/09585192.2020.1867616

Möhlmann, M., Zalmanson, L., Henfridsson, O., & Gregory, R. W. (2021). Algorithmic Management of Work on Online Labor Platforms: When Matching Meets Control. *MIS Quarterly*, *45*(4), 1999–2022. https://doi.org/10.25300/MISQ/2021/15333

Moore, S., & Newsome, K. (2018). Paying for Free Delivery: Dependent Self-Employment as a Measure of Precarity in Parcel Delivery. *Work, Employment and Society*, *32*. https://doi.org/10.1177/0950017018755664

Munger, K. (2019). The Limited Value of Non-Replicable Field Experiments in Contexts With Low Temporal Validity. *Social Media + Society*, *5*(3), 2056305119859294. https://doi.org/10.1177/2056305119859294

Munksgaard, R., Demant, J., & Branwen, G. (2016). A replication and methodological critique of the study "Evaluating drug trafficking on the Tor Network." *International Journal of Drug Policy*, *35*, 92–96.

Myhill, K., Richards, J., & Sang, K. (2021). Job quality, fair work and gig work: The lived experience of gig workers. *The International Journal of Human Resource Management*, 1–26. https://doi.org/10.1080/09585192.2020.1867612

Paauwe, J., & Boon, C. (2018). Strategic HRM: A critical review. In *Human Resource Management* (2nd ed.). Routledge.

Peck, J. (1996). *Work-place: The Social Regulation of Labor Markets*. Guilford Press.

Peck, J. A. (1989). Labour Market Segmentation Theory. *Labour and Industry*, *2*(1), 119–144. https://doi.org/10.1080/10301763.1989.10669066

Petrovski, E., Dencker-Larsen, S., & Holm, A. (2017). The Effect of Volunteer Work on Employability: A Study with Danish Survey and Administrative Register Data. *European Sociological Review*, *33*(3), 349–367. https://doi.org/10.1093/esr/jcx050

Piasna, A. (2020). Standards of Good Work in the Organisation of Working Time: Fragmentation and the Intensification of Work Across Sectors and OccupationsDate submitted: September 9, 2018Revised version accepted after double-blind review: August 13, 2019. *Mrev Management Revue*, *31*(2), 259–284.

Piasna, A., & Drahokoupil, J. (2021). Flexibility unbound: Understanding the heterogeneity of preferences among food delivery platform workers. *Socio-Economic Review*, *19*(4), 1397–1419. https://doi.org/10.1093/ser/mwab029

Piasna, A., Zwysen, W., & Drahokoupil, J. (2022). *The Platform Economy in Europe: Results from the Second ETUI Internet and Platform Work Survey (IPWS)* (SSRN Scholarly Paper 4042629). https://doi.org/10.2139/ssrn.4042629

Pigatto, G., Machado, J. G. de C. F., Negreti, A. dos S., & Machado, L. M. (2017). Have you chosen your request? Analysis of online food delivery companies in Brazil. *British Food Journal*, *119*(3), 639–657. https://doi.org/10.1108/BFJ-05-2016-0207

Potocka-Sionek, N. (2020). The Changing Nature of Labour Intermediation. Do Algorithms Re-define Temporary Agency Work? In J. Wratny & A. Ludera-Ruszel (Eds.), *News Forms of Employment* (pp. 169–190). Springer Fachmedien Wiesbaden. https://doi.org/10.1007/978-3-658-28511-1_10

Proposal for a Directive of The European Parliament and The Council on Improving Working Conditions in Platform Work (2021).

Pulignano, V., Grimshaw, D., Domecka, M., & Vermeerbergen, L. (2023). Why does unpaid labour vary among digital labour platforms? Exploring socio-technical platform regimes of worker autonomy. *Human Relations*, 00187267231179901. https://doi.org/10.1177/00187267231179901

Raj, M., Sundararajan, A., & You, C. (2023). *COVID-19 and Digital Resilience: Evidence from Uber Eats* (SSRN Scholarly Paper 3625638). https://doi.org/10.2139/ssrn.3625638

Rani, U., & Furrer, M. (2020). Digital labour platforms and new forms of flexible work in developing countries: Algorithmic management of work and workers. *Competition Change*, 1–24.

Rasmussen, S., Larsen, T. P., Ilsøe, A., Madsen, P. K., & Bach, E. S. (2021). Non-standard work in Denmark. In *Non-standard work in the Nordics. Troubled waters under the still surface: Report from The future of work: Opportunities and Challenges for the Nordic Models* (pp. 73–84). Nordic Council of Ministers.

Reich, M., Gordon, D. M., & Edwards, R. C. (1973). A Theory of Labor Market Segmentation. *The American Economic Review*, *63*(2), 359–365.

Rolandsson, B., Saloniemi, A., & Saari, T. (2019). Platform work performed by a qualified work force–the case of technical translators. *Nordic Future of Work, Brief*, *10*.

Rosa, H. (2010). *High-speed society: Social acceleration, power, and modernity*. Penn State Press.

Rosa, H. (2014). From Work-Life to Work-Age Balance? Acceleration, Alienation, and Appropriation at the Workplace. In C. Korunka & P. Hoonakker (Eds.), *The Impact of ICT on Quality of Working Life* (pp. 43–61). Springer Netherlands. https://doi.org/10.1007/978-94-017-8854-0_4

Rosin, A. (2022). Towards a European Employment Status: The EU Proposal for a Directive on Improving Working Conditions in Platform Work. *Industrial Law Journal*, *51*(2), 478–493. https://doi.org/10.1093/indlaw/dwac011

Rubery, J. (2007). Developing segmentation theory: A thirty year perspective. *Économies et Sociétés, 28 (6)*. https://research.manchester.ac.uk/en/publications/developing-segmentation-theory-a-thirty-year-perspective

Rubery, J., & Piasna, A. (2017). Labour market segmentation and deregulation of employment protection in the EU. *Myths of Employment Deregulation: How It Neither Creates Jobs Nor Reduces Labour Market Segmentation. Brussels: ETUI*, 43–60.

Schor, J. B., Attwood-Charles, W., Cansoy, M., Ladegaard, I., & Wengronowitz, R. (2020). Dependence and precarity in the platform economy. *Theory Society*, *49*(5), 833–861.

Schor, J. B., & Vallas, S. P. (2021). The Sharing Economy: Rhetoric and Reality. *Annual Review of Sociology*, *47*(1), 369–389. https://doi.org/10.1146/annurev-soc-082620-031411

Small, M. L., & Calarco, J. M. (2022). *Qualitative Literacy: A Guide to Evaluating Ethnographic and Interview Research*.

Spradley, J. P. (1979). *The ethnographic interview*. Waveland Press.

Spry, T. (2001). Performing Autoethnography: An Embodied Methodological Praxis. *Qualitative Inquiry*, *7*(6), 706–732. https://doi.org/10.1177/107780040100700605

Stark, D., & Pais, I. (2021). Algorithmic Management in the Platform Economy. *Sociologica*, *14*(3), 47–72. https://doi.org/10.6092/issn.1971-8853/12221

Stefano, V. D., & Taes, S. (2021). *Algorithmic management and collective bargaining*. 16.

Stephany, F., Neuhäuser, L., Stoehr, N., Darius, P., Teutloff, O., & Braesemann, F. (2022). The CoRisk-Index: A data-mining approach to identify industry-specific risk perceptions related to Covid-19. *Humanities and Social Sciences Communications*, *9*(1), Article 1. https://doi.org/10.1057/s41599-022-01039-1

Tanggaard, L. (2008). Objections in Research Interviewing. *International Journal of Qualitative Methods*, *7*(3), 15–29. https://doi.org/10.1177/160940690800700302

Tassinari, A., & Maccarrone, V. (2020). Riders on the Storm: Workplace Solidarity among Gig Economy Couriers in Italy and the UK. *Work, Employment and Society*, *34*(1), 35–54. https://doi.org/10.1177/0950017019862954

Taubman, P., & Wachter, M. L. (1986). Chapter 21 Segmented labor markets. In *Handbook of Labor Economics* (Vol. 2, pp. 1183–1217). Elsevier. https://doi.org/10.1016/S1573-4463(86)02011-4

Teutloff, O., Stenzhorn, E., & Kässi, O. (2023). *Skills, Job Application Behavior and the Gender Wage Gap: Evidence from Online Freelancing* (SSRN Scholarly Paper 4631160). https://doi.org/10.2139/ssrn.4631160

Todolí-Signes, A. (2017). The 'gig economy': Employee, self-employed or the need for a special employment regulation? *Transfer: European Review of Labour and Research*, *23*(2), 193–205.

Tracy, S. J. (2019). *Qualitative research methods: Collecting evidence, crafting analysis, communicating impact*. John Wiley & Sons.

Traianou, A. (2014). The centrality of ethics in qualitative research. *The Oxford Handbook of Qualitative Research*, *1*, 62–77.

Urzì Brancati, M. C., Pesole, A., & Fernandez-Macias, E. (2020). *New evidence on platform workers in Europe: Results from the second COLLEEM survey* (JRC Working Paper JRC118570). Joint Research Centre (Seville site). https://econpapers.repec.org/paper/iptiptwpa/jrc118570.htm

Vallas, S., & Schor, J. B. (2020). What do platforms do? Understanding the gig economy. *Annual Review of Sociology*, *46*, 273–294.

van Doorn, N. (2020). Stepping Stone or Dead End? The Ambiguities of Platform-Mediated Domestic Work under Conditions of Austerity. Comparative Landscapes of Austerity and the Gig Economy: New York and Berlin. In *Working in the Context of Austerity: Challenges and Struggles*.

van Doorn, N., Ferrari, F., & Graham, M. (2022). Migration and Migrant Labour in the Gig Economy: An Intervention. *Work, Employment and Society*, 09500170221096581. https://doi.org/10.1177/09500170221096581

Veen, A., Barratt, T., & Goods, C. (2020). Platform-Capital's 'App-etite' for Control: A Labour Process Analysis of Food-Delivery Work in Australia. *Work, Employment and Society*, *34*(3), 388–406. https://doi.org/10.1177/0950017019836911

Vogl, S. (2013). Telephone Versus Face-to-Face Interviews: Mode Effect on Semistructured Interviews with Children. *Sociological Methodology*, *43*(1), 133–177. https://doi.org/10.1177/0081175012465967

Voss, A., Lvov, I., & Thomson, S. D. (2017). Data storage, curation and preservation. *The SAGE Handbook of Social Media Research Methods*, 161–176.

Wach, E., & Ward, R. (2013). *Learning about qualitative document analysis*.

Weber, M. (2022). *Udvalgte tekster: Bind 2*. Gyldendal A/S. [Extracts from Weber (1921). Economy and Society].

Webster, E., & Masikane, F. (2023). Authoritarian Algorithmic Management: The Double-edged Sword of the Gig Economies. In *Recasting Workers' Power* (pp. 101–124). Bristol University Press. https://bristoluniversitypressdigital.com/display/book/9781529218817/ch005.xml

Williams, P., McDonald, P., & Mayes, R. (2021). Recruitment in the gig economy: Attraction and selection on digital platforms. *The International Journal of Human Resource Management*, *32*(19), 4136–4162. https://doi.org/10.1080/09585192.2020.1867613

Wood, A. J., Graham, M., Lehdonvirta, V., & Hjorth, I. (2019). Good Gig, Bad Gig: Autonomy and Algorithmic Control in the Global Gig Economy. *Work Employ Soc*, *33*(1), 56–75. https://doi.org/10.1177/0950017018785616

Woodcock, J., & Cant, C. (2022). Platform Worker Organising at Deliveroo in the UK: From Wildcat Strikes to Building Power. *Journal of Labor and Society*, *25*(2), 220–236. https://doi.org/10.1163/24714607-bja10050

Wu, P. F., Zheng, R., Zhao, Y., & Li, Y. (2022). Happy riders are all alike? Ambivalent subjective experience and mental well-being of food-delivery platform workers in China. *New Technology, Work & Employment*, *37*(3), 425–444. https://doi.org/10.1111/ntwe.12243

Yoganarasimhan, H. (2013). The Value of Reputation in an Online Freelance Marketplace. *Marketing Science*, *32*(6), 860–891. https://doi.org/10.1287/mks

---

[i] Just Eat Wants a "level playing field" in the industry – https://detailwatch.dk/nyheder/ecommerce/article15836360.ece. 25.05.2023. Accessed 28.02.2024.
[ii] About Happy Helper – https://happyhelper.dk/Om-Happy_Helper. Accessed 28.02.2024.
[iii] Is the platform work directive dead? – https://www.euractiv.com/section/gig-economy/news/is-the-platform-work-directive-dead/. Accessed 28.02.2024.
[iv] Takeaway restaurants close for Wolt in Aalborg – https://nordjyske.dk/nyheder/23-utilfredse-takeaway-steder-lukker-for-wolt-i-aalborg-vi-er-ved-at-kaste-op/3454817. Accessed 28.02.2024.
[v] Tax authorities takes decision on Wolt – https://www.berlingske.dk/virksomheder/myndighed-koerer-wolt-haardt-over-skaebneafgoerelse-saetter-punktum. Accessed 28.02.2024.

PART II

RESEARCH ARTICLES

With or without algorithms

Managing the self-employed in the Danish platform economy

Christian Haldrup, Anna Ilsøe and Trine P. Larsen

Accepted for publication in Conen W. and Reuter E. (ed.): Research Handbook on Self-Employment and Public Policy. Edward Elgar Publishing Limited, UK.

Abstract

Digital labour platforms, including their management practices and extensive reliance on the self-employed, have attracted much attention, though usually from a worker rather than an employer perspective. This chapter contributes to the platform literature by exploring how platforms utilise algorithmic and traditional management practices, and for which purposes. We draw on illustrative in-depth case studies of three different labour platforms operating in Denmark. Analytically, we seek inspiration from the literature on algorithmic management and labour law. We find that labour platforms rely on algorithmic management practices for some management purposes such as economic enticements or control. The platforms also rely on traditional management practices to supplement the algorithms as well as for specific purposes, including recruitment and dismissal of workers. However, they often struggle to control work processes and retain their self-employed workers on account of the loose ties between the digital platform and the self-employed workers as well as certain management responsibilities being delegated to individual workers or customers.

Keywords: Digital labour platforms, algorithmic management, traditional management, self-employment

1. Introduction

It is a question of who is responsible – us or the customers. I have very little control with our cleaners during working hours and that is the great freedom in the platform economy. But this also makes it difficult to follow up (Manager, Hilfr, cleaning platform).

Digital labour platforms such as Uber, which coordinate tasks between customers and workers through an app-based digital infrastructure, have recently sparked much academic and political debate[vi, vii], particularly on the question of employer responsibilities (Vallas and Schor, 2020). A central concern in these debates is that many platforms operate with the self-employed as their main workforce in order to curb the costs of wages, social benefits and management, thus abrogating responsibilities and shifting economic risks to the workers in order to scale their business and gain a competitive edge (Steinberger, 2018; Benassi and Kornelakis, 2020).

Therefore, many platforms do not consider themselves employers in a traditional sense and often do without both traditional management practices relating to bureaucratic and technical control measures, and the presence of human managers (Prassl, 2018; Edwards, 1979). Ample research shows that management on digital labour platforms often takes a different shape: managers rely on algorithms informed by ratings and customer behaviour as important tools to remotely distribute work tasks and monitor the performance of platform workers through algorithm-based decision-making systems (Adams-Prassl, 2019; Möhlmann et al., 2021). However, how the management of self-employed workers on platforms genuinely unfolds in practice remains unclear and less researched (Duggan et al., 2020; Meijerink et al., 2021).

This chapter addresses this literature gap and offers a fresh perspective on the management of self-employed workers in the platform economy, including the challenges and possibilities management may entail from an employer/platform perspective. Our main research question is:

How do digital labour platforms utilise algorithmic and traditional management practices when managing self-employed workers – and why?

We approach our research questions through illustrative in-depth case studies of three digital labour platforms, Wolt, Hilfr and Voocali, which all operate in Denmark but facilitate very different services. Wolt and Hilfr, a food delivery and a cleaning platform, respectively, facilitate *gig work*: low-skilled, on-site, short-duration tasks. Voocali, a platform for interpretation services, facilitates *freelance work*: high-skilled, on-site/remote, long-duration tasks. We focus on the management of the mainly self-employed platform workers conducting the tasks facilitated by the platforms (i.e. food delivery, cleaning and interpretation tasks), which, for instance, exclude in-house support workers and software developers. Most self-employed platform workers are so-called solo self-employed, as platforms typically facilitate tasks that workers perform individually (Bögenhold et al., 2017). Apart from a small proportion of employed platform workers at Hilfr, we include various subcategories of the self-employed, such as solo, bogus and genuinely self-employed, to capture the diversity of self-employed platform workers in our analysis (Arum and Müller, 2009). Danish legislation, on the other hand, differentiates between only two distinct categories with respect to individual employment status: employed or self-employed (Kristiansen, 2020).

Analytically, we draw on concepts from the literature on algorithmic management and labour law to capture and discuss management practices in the specific platform business models. From this analysis, we develop two tentative hypotheses: (1) In line with the literature, we expect the platforms to mainly use algorithmic management practices for *instructions*, *working time* and *control*. (2) We posit that the platforms utilise traditional management practices for *hiring*, *dismissals* and *rules of conduct*. Our analysis thereby contributes to the discussions of management on labour platforms, which we relate to the EU's proposed directive on platform work in the discussion of our findings.

The chapter is structured as follows: First, we develop an analytical framework that draws from the literature on algorithmic management and labour law. Second, we present our methodology

and interview data, and then analyse the management practices in use in our three case studies. Lastly, we discuss and compare our findings and draw main conclusions.

2. Managing the self-employed – a platform perspective

Literature review and key concepts

Within the platform literature, the business models of labour platforms have been conceptualised with respect to two core features: algorithmic management and self-employment (Duggan et al., 2020). Whereas formal management–employee relations tend to be limited within the platform economy because platform workers typically are treated as self-employed, labour platforms do often incorporate traditional human resource management (HRM) practices in their business models, primarily because they are vulnerable to recruitment and worker retention issues (Meijerink and Keegan, 2019; Ilsøe and Larsen, 2021). These practices vary significantly between platforms according to the type of services and tasks they mediate and the skill levels of platform workers (Jabagi et al., 2019).

However, the existing research rarely considers how and why platforms utilise algorithmic management and traditional management practices, or the opportunities and implications these practices have for the platforms (Benassi and Kornelakis, 2020; Ilsøe and Larsen, 2021). To analyse these management practices, we draw on the concepts of algorithmic management and managerial prerogatives from labour law, from which we advance two tentative hypotheses regarding platforms' use of these practices (Kellogg et al., 2020; Kristiansen, 2020).

Algorithmic management

Within the platform literature, algorithmic management is considered a key feature in the business models of digital labour platforms, separating them from other types of labour-intensive businesses (Stefano and Taes, 2021). Algorithmic management is typically conceptualised as a data-

driven "evaluative infrastructure" and increasingly AI-based system used for automated decision-making to optimise work processes and the productivity of platform workers (Kornberger et al., 2017; Adams-Prassl, 2019). It has been suggested that platforms use algorithms for three management purposes, typically reflected in three concepts derived from traditional management theory: *direction*, *evaluation* and *discipline* (Edwards, 1979; Kellogg et al., 2020). First, platforms use algorithms to direct platform workers by restricting and recommending how to perform the work. Second, labour platforms use algorithms to evaluate workers by reviewing their profiles and performance through app activity and customer ratings. Third, platforms use algorithms to discipline workers by nudging and adding elements of "gamification" to the app design that reward high-performing workers and replace low-performing workers (Rosenblat and Stark, 2016). However, some studies emphasise that platforms in many situations are unable to inspect and control worker behaviour, which opens the question of to what extent workers genuinely comply with the algorithms (Galière, 2020). Thus, the data-driven and quantitative nature of algorithms as tools to replace traditional management functions may vary between platforms and only relate to certain aspects of the work process that can be managed and measured with app data (Baiocco et al., 2022; Kusk and Bossen, 2022).

Traditional management

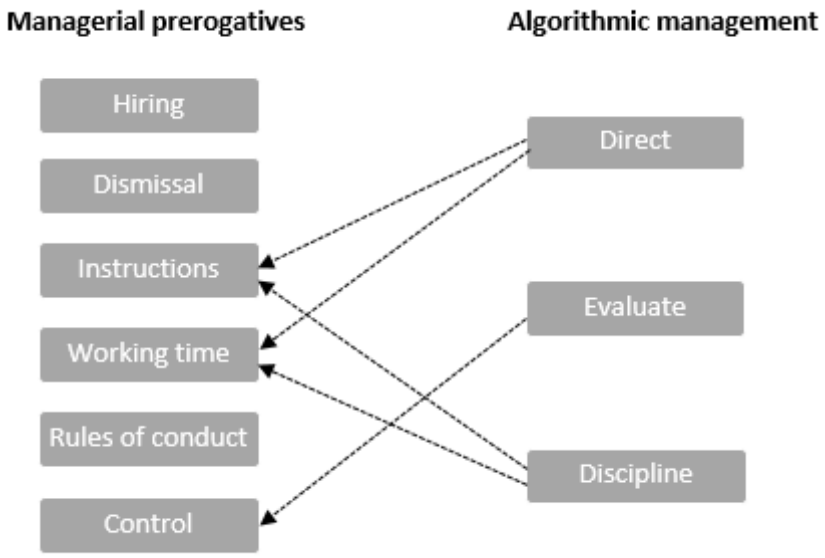
The three concepts outlined by Kellogg and colleagues – direction, evaluation and discipline – reflect how platforms use algorithmic management to handle the work processes of platform workers. However, as suggested in much literature on contingent work, key managerial decisions also involve how platforms can adjust their self-employed workforce to shifting work functions and changing economic cycles in terms of their size (numerical flexibility) and composition (functional flexibility) (Atkinson, 1987; Cappelli and Neumark, 2004; Benassi and Kornelakis, 2020). We thus find it helpful to expand our analytical framework on management to include concepts other than the three aspects suggested in the literature on algorithmic management. In doing so,

we draw on the six managerial prerogatives from Danish labour law that cover distinct management responsibilities in the traditional employer–employee relationship (Kristiansen, 2020). These prerogatives are the (a) hiring of employees, (b) dismissal of employees, (c) issuing of instructions for the execution of work, (d) determination of working time, (e) issuing of rules of conduct and (f) imposition of control measures.

The first two prerogatives concern the employer's management of the size and composition of the workforce (numerical and functional flexibility), the two subsequent relate to the employer's right to direct and organise work, and the last two deal with rules for worker behaviour and evaluation (Benassi and Kornelakis, 2020; Kristiansen, 2020). For the purposes of this chapter, we do not engage in the discussion on the legal employment status of platform workers, but instead use these managerial prerogatives as heuristic tools to inform our analysis of the potential variations in the use of algorithmic and traditional managerial practices across distinct types of labour platforms.

Interestingly, and in accordance with Kellogg and colleagues (2020), some of the prerogatives share similarities with the aforementioned concepts from the algorithmic management literature (see Table 1 for a conceptual overview). Platforms use algorithms to direct and discipline workers by distributing tasks, recommending when to work and using economic incentives to reward, for example, those who work during peak hours. As such, both concepts correspond to issuing instructions for the execution of work and working time (Rosenblat and Stark, 2016; Kellogg et al., 2020; Kristiansen, 2020). Likewise, algorithms are used to evaluate the workers, which corresponds to control measures, because platforms use ranking systems to monitor work performance (ibid.). However, Kellogg and colleagues (2020) do not address how algorithmic management relates to hiring, dismissals and rules of conduct. These prerogatives may be dominated by traditional management practices because the platforms need to comply with bureaucratic rules and formalised procedures for hiring workers (Edwards, 1979). Similarly, platform managers may need to examine specific situations when considering appropriate worker behaviour in order to make decisions on whether to remove individual worker profiles from the platform (ibid.).

Figure 2: Managerial prerogatives and algorithmic management practices



Source: Inspired by conceptualizations developed by Kristiansen et al. 2020 and Kellogg et al. 2020.

Tentative hypotheses

Following our brief literature review, we developed two tentative hypotheses as to when platforms use algorithmic and traditional management practices, respectively:

(1) We expect platforms to use algorithmic management practices for *instructions, working time* and *control* to handle work processes on the platform.

(2) We posit that the platforms use traditional management practices for *hiring, dismissal* and *rules of conduct* to adjust the size and composition of the workforce (numerical and functional flexibility), and to examine whether worker behaviour is in conflict with rules of conduct.

3. Cases, methods and analytical approach

Our subjects of analysis are three digital labour platforms operating in Denmark: Wolt, Hilfr and Voocali. While other competing labour platforms operate in these markets, we have chosen these

three platforms for reasons of maximum variation because they differ substantively with regard to important parameters (George and Bennett, 2005). These parameters are platform size, business model and working arrangements, as well as the services that the platforms facilitate and the industry in which they operate (food delivery/transportation, cleaning or interpretation). As such, these platform case studies represent variations allowing us to conduct in-depth studies of approaches to managing platform workers in different platform businesses (Flyvbjerg, 2006). All three labour platforms operate in industries that in different ways are characterised by less favourable working conditions in Denmark. The cleaning industry is characterised by weak collective agreement coverage and a high level of undeclared work (especially in the subsector of private household cleaning), combined with labour-intensive, low-wage work and a high share of non-standard work, notably marginal part-time work (Larsen and Mailand, 2018). Both the transportation and interpreting industries struggle with low pay and fluctuating working hours despite relatively high collective bargaining coverage (Larsen and Ilsøe, 2022). Further, both the cleaning industry and the delivery/transportation industry are dominated by low-skilled workers, while young people with a foreign background are overrepresented within all three industries (ibid.).

The first case, Wolt, is a large and fast-growing platform that facilitates food deliveries by the self-employed, primarily for individual customers. Up to this point, Wolt and the Danish unions have been unable to settle the terms of a collective agreement for couriers working on the platform (Ilsøe et al., 2020). The second case, Hilfr, is a medium-sized platform that facilitates cleaning in private homes. Hilfr is covered by a collective agreement and offers the opportunity to work either as a self-employed "Freelance Hilfr" or as an employed "Super Hilfr" (Ilsøe and Larsen, 2021). The third platform, Voocali, is a smaller start-up platform that facilitates interpretation services, primarily for public institutions. Voocali facilitates work for interpreters as self-employed freelancers on the platform; between 2018 and 2020, it offered a freelance agreement specifying a

minimum wage and other features such as automated tax reporting (Ilsøe and Larsen, 2022). However, this agreement was withdrawn following a verdict by the Danish competition authorities (Konkurrencerådet, 2020).

In all three cases, we interviewed platform managers – who were either CEOs, founders or part of platform management – because we consider them to be key informants for analysing the platforms' approaches to management. Between 2018 and 2021, we conducted a total of twelve interviews with different platform managers (five with Wolt, four with Hilfr and three with Voocali), which we documented with extensive notes and anonymised. The interview data was complemented with desk research on platform webpages, relevant collective agreements and policy documents. Information from the platform webpages was used to cross-check the statements of managers in interviews, and to identify management practices that were not emphasised by the interviewed managers. For the interviews, we used a loosely structured interview guide that focused on the managers' perspectives and understanding of different management practices on the platform, including algorithmic management practices such as rating and task distribution systems (Möhlmann et al., 2021). Moreover, the interviews also included questions about specific platform characteristics, such as the type of industry and business model. We used our analytical framework to code and analyse the interviews and desk researchwith respect to the platform's use of algorithmic and traditional management practices, which were then contextualised with the six concepts for managerial prerogatives identified in the labour law literature. One limitation is that our findings exclusively reflect the perspective of the platform companies, so that our analysis may not address all aspects of the management practices taking place on the platforms. For example, out of concerns about competition, platform management may decide to withhold various aspects of these practices.

In our analytical approach to the case studies, we begin by briefly describing each platform's history and recent development. We then analyse specific management practices on each of the

three platforms. In the analysis, we differ between algorithmic management practices and traditional management practices, and use the six managerial prerogatives to guide our analysis. This approach allows us to compare for which purposes platforms are managing by algorithms or by traditional managerial practices, and to what extent the platforms utilise these practices in the triangular structure of the platform. Before presenting the case analyses, we provide an overview of self-employment in the Danish platform economy.

4. Analysis

4.1 Self-employment in the Danish platform economy

While there has been much debate about the employment status of self-employed platform workers in Denmark and Europe, the Danish platform economy remains small in size, with around 1% of all employed people in Denmark having worked by means of labour platforms in 2019 (Löhr, 2020; Ilsøe and Larsen, 2020; Jacqueson, 2021). The findings are similar to those found for other Western contexts, with a share of 2% in the European Union and 2.5% in the United States reporting platform work (Urzì Brancati et al., 2020; Piasna et al., 2022). The majority of platform workers in Denmark has a relatively small income from online work (less than €3,300 per year before taxes), and many rely on platform work as an income supplement rather than as their main source of income (Ilsøe and Larsen, 2020). Around 8% of the workforce is self-employed in Denmark, which is comparatively low in the European context, although the share of solo self-employed is increasing in the country (Mailand and Larsen, 2018).

Self-employed workers in Denmark can earn up to €6,600 per year before they are required to register as self-employed with a VAT number. Due to Danish competition laws, the self-employed in Denmark cannot set hourly minimum wages through collective bargaining (Due et al., 2017. This restriction was underlined in 2020, when the Danish competition authorities issued a verdict involving the two cleaning platforms Hilfr and Happy Helper, specifying that minimum wages

for the self-employed are not in line with the competition laws. The newly adopted guidelines by the European Commission may overturn this ruling, as these guidelines allow certain groups of solo self-employed workers to reach collective agreements without being in conflict with EU and Danish competition laws (Konkurrencerådet, 2020). Registered self-employed are eligible to sign up for certain unemployment insurance funds as well as publicly funded benefits such as maternity leave and sickness benefits (Mailand and Larsen, 2018). However, few platform workers in Denmark are required to register as self-employed, as only a limited number of workers earn more than the €6,600 threshold (Ilsøe and Larsen, 2020). In consequence, they are not eligible for the same benefits as the registered self-employed. Moreover, even if they are registered as self-employed, many platform workers may struggle to qualify for social benefits due to their relatively small earnings (Mailand and Larsen, 2018).

4.2. Wolt

Wolt was established as a food delivery platform in Finland in 2014. Since then, Wolt has expanded to more than 129 different cities in 23 countries.[viii] In 2021, the platform began offering delivery of other products such as groceries, and merged with the American food delivery platform DoorDash, increasing their total market share.[ix] Wolt entered the Danish market in 2017 and operates in 16 different Danish cities with approximately 4,000 couriers on the platform.[x] Wolt is the second-largest platform for food deliveries in Denmark, surpassed only by Just Eat, which was the first Danish platform for food delivery and continues to have the largest market share. Based on an app design, Wolt builds its business model on partnerships with restaurants and "courier partners" (i.e. self-employed freelancers), with the latter delivering the orders to the customers.[xi] Payment of couriers is based on a competitive model: couriers receive a base fee of €4.70 for each delivery, which is topped up with a number of potential bonuses. Average hourly earnings are estimated to range from €21 to €25 per hour (or €8 per task) according to the Wolt

managers interviewed, and other research corroborates these figures (Larsen et al., 2022; Ilsøe and Larsen, 2021).

Management practices

Although the growing platform has a consistently high total number of active couriers, Wolt managers explained that their business model results in a "coming and going" culture on the platform. Many of the self-employed couriers use the platform on a short-term basis and tend to "shop around" on different platforms. For instance, couriers have the option to cancel an order at Wolt and simultaneously accept a gig on a competing platform offering higher earnings. While the managers consider this employment arrangement to be beneficial for the couriers because it offers flexibility, they also stress the need to make use of management practices to retain couriers on the platform.

Wolt's use of algorithmic management practices is described in an "Algorithmic Transparency Report" available on its website, and mainly involves measures to optimise the efficiency of deliveries and to offer economic incentives to couriers.[xii] The report states that the algorithm distributes tasks to available couriers on the basis of a combination of the courier's vehicle type and the courier's distance to the restaurant locations from which customers order. For example, Wolt nudges couriers by means of algorithms on the app to work during peak hours by offering additional bonuses for completing orders in the evenings and on weekends. The algorithm is also designed to offer couriers distance bonuses and bonuses for large orders, including "bundled tasks," which gives couriers the option to pick up orders for several customers before delivering the food. In addition, couriers can contact Wolt's support team to clarify information provided by the app such as the correct address for a delivery or information about "hotspot areas" with many orders.

The previous examples reflect how Wolt seeks to influence *working time* and provide *instructions* on how to optimise deliveries, in that it makes use of algorithmic management practices to *direct*

and *discipline* the couriers' performance on the platform (Kellogg et al., 2020; Kristiansen, 2020). However, Wolt's information about its use of algorithms suggests that they do not function as *control* measures to *evaluate* the performance of couriers (ibid.). Wolt states that couriers are neither ranked directly by customers nor sanctioned if they reject or cancel a task offered by the app or fail to complete deliveries within an estimated time frame. Findings from an ethnographic study of Wolt couriers in Denmark support this claim (Kusk and Bossen, 2022).

The traditional management practices at Wolt are reflected in their formal recruitment procedures as well as their standards for courier behaviour and termination of contracts, which relate to the prerogatives of *hiring, rules of conduct* and *dismissals*, respectively (Kristiansen, 2020). For example, on its website Wolt lists a number of requirements when individuals apply for registration as a potential courier on the platform, including an ID, permission to work, ownership of a smartphone, access to a vehicle and acceptance of a "partnership agreement." In addition, national authorities require potential couriers to use a thermal bag and to acquire a license for handling food deliveries.[xiii] Wolt further conducts a brief application check before allowing applicants to start work as couriers on the platform.[xiv] As for rules of conduct, the Wolt website lists a number of examples of how to comply with the partnership agreement.[xv] For example, couriers are expected to act appropriately towards customers and to comply with the requirements set by national authorities. In the event couriers violate these standards, Wolt may decide to remove their profiles, an action corresponding to the prerogative of dismissals. Wolt also states that courier profiles cannot be removed on account of poor courier performance because customers rate different aspects of their service experience, such as the restaurant's food, the app's delivery time estimates and the courier's handling of the food. Customer ratings are reported directly to Wolt's support team, which may decide to follow up if the customer had a bad service experience.[xvi] For instance, if the courier damaged a product during delivery, Wolt may reduce earnings from the task completed.[xvii] Apart from these traditional management practices, Wolt provides guidelines but does not describe any further procedures on its website for controlling work processes. On the basis of

the website information, it seems Wolt does not check whether the self-employed couriers adhere to these guidelines, such as reporting for taxes or complying with hygienic standards with respect to their thermal bag.[xviii]

4.3 Hilfr

A Danish-owned labour platform established in 2017, Hilfr facilitates cleaning in private homes.[xix] The company has more than 2,000 customers and is the second-largest platform in Denmark for mediating cleaning services in private homes (the cleaning platform Happy Helper has the largest market share).[xx] Currently, more than 270 cleaners across all major Danish cities are using Hilfr. Some of the cleaners on Hilfr are employees covered by a collective agreement (Super Hilfrs), whereas others are self-employed (Freelance Hilfrs). The Hilfr managers estimate that Freelance Hilfrs and Super Hilfrs make up 75% and 25% of the workforce, respectively. However, around two thirds of the total cleaning tasks are conducted by Super Hilfrs. Under Hilfr's hourly wage system, the employed Super Hilfrs receive a minimum hourly wage of €19, along with accruing rights to pensions, paid holiday and sick pay. Super Hilfrs can also set their hourly wage higher than the collectively agreed wage floor. Freelance Hilfrs are not entitled to a minimum wage, but are estimated to earn an average €17 per hour, which is topped up by a "welfare supplement" of €3 per hour.

Management practices

In the interviews, the Hilfr managers note that their platform's two types of employment relations give them a competitive edge: the platform attracts self-employed cleaners by offering them the benefits if they work as a Super Hilfr, which include management standards such as automated tax reporting. However, Hilfr managers also point to factors contributing to recruitment and retention challenges on the platform: in general, cleaning is considered a low-status industry, and

cleaners tend to shop around between different platforms. Likewise, new Super Hilfrs often struggle to establish themselves on the platform with a higher hourly wage because they lack profile reviews and ratings. In response, Hilfr managers use various supportive measures to retain cleaners and customers on the platform. At the same time, the managers stress that the company is a start-up with limited managerial resources for managing and supporting the cleaners.

With respect to algorithmic management, Hilfr managers indicate that rating systems on the platforms are used to assess both the cleaner's performance and the cleaner's experience with the customers. Ratings are based on an average of different parameters. For instance, the customer's rating of the cleaner's performance includes parameters such as thoroughness and punctuality. The managers also state that ratings from customers are used to highlight the best-performing profiles on the platform. This practice suggests that Hilfr relies on algorithmic management practices to control worker performance by using rating systems to *evaluate* individual cleaners (Kellogg et al., 2020). Apart from these practices, Hilfr does not in the interviews or on the website touch upon further measures that relate to algorithmic management.

The majority of Hilfr's management practices are traditional measures such as recruitment standards and practices for the termination of cleaners, as well as different guidelines related to the cleaning service, which correspond to the prerogatives of *hiring*, *dismissals* and *rules of conduct* (Kristiansen, 2020). Regarding the first, Hilfr requires cleaners to provide basic information, including ID, geographical area, available hours and a profile picture, in order to be eligible to work on the platform.[xxi] In terms of *dismissals*, the Hilfr managers interviewed report that they occasionally terminate odd-looking profiles with suspicious content or false information. Super Hilfrs are via the collective agreement entitled to two weeks' notice if management intends to remove their profile from the platform.[xxii] On the company website, Hilfr management also provides general guidelines on profile management, hourly wage setting, the collective agreement, cleaning standards and how to manage customer relations (the latter corresponds to *rules of conduct*).[xxiii]

In addition, customers and cleaners can contact Hilfr's support team to get help and settle various issues.

Because Hilfr mainly operates with guidelines related to the work process, the company deliberately delegates substantial aspects of management to the customers and cleaners, namely, those involving the prerogatives of *instructions, working time* and *control* (Kristiansen, 2020). For example, Hilfr encourages its cleaners to come to an agreement with the customers on the specific cleaning tasks and also states that it is the customer's responsibility to provide the necessary cleaning equipment to the cleaners.[xxiv] Furthermore, both Freelance Hilfrs and Super Hilfrs are responsible for entering their available hours in the profile calendar. Likewise, on its website, Hilfr specifies that disputes between cleaners and customers are to be resolved in the first instance by the two parties, before requesting Hilfr's support team to intervene.[xxv] Because of the high level of autonomy on the platform for both Freelance and Super Hilfrs, the managers state that they are unable to control important aspects of the cleaners' work processes, such as whether cleaning chemicals provided by customers adhere to statutory health and safety regulations. Another example is how Hilfr management encourages cleaners to work for a flat hourly wage for all types of cleaning tasks. This pricing is encouraged because Hilfr managers consider consistent and transparent price-setting attractive to new customers. However, according to the managers, customers often book the same cleaners on a continual basis; as such, the two parties tend to agree on specific conditions, including hourly payment. These arrangements result in cleaners receiving hourly wages that differ according to the individual customer.

4.4 Voocali

Established in 2017 as a Danish-owned labour platform, Voocali facilitates interpretation services primarily for public institutions and organisations. Currently, the company has around 100 cus-

tomers and 150 interpreters affiliated with the platform. Voocali has had 500 interpretation transactions since January 2019, of which 80% required physical attendance. Voocali has an hourly wage system, with interpreters receiving an hourly minimum wage of €54. Voocali is one of several interpretation service platforms operating in Denmark.

Management practices

In the interviews, Voocali managers express that their platform design is attractive for interpreters and organisations (i.e. customers) because it helps facilitate interpretation services by reducing administrative costs for both parties. In addition, the managers highlight the possibility of greater worker autonomy when working as a self-employed person on the platform instead of being employed at an interpretation agency. However, like their Hilfr counterparts, Voocali managers experience retention and recruitment challenges on the platform. According to Voocali, the industry has a tarnished reputation; for this reason, many interpreters consider it a stepping stone to other jobs. Hence, Voocali relies on a core group of loyal interpreters, and yet Voocali managers express difficulties in finding qualified interpreters owing to the limited scale of the platform. The company requires interpreters who work in different languages and dialects and who have interpretation experience in specific areas (e.g. integration, health, employment services). In addition, Voocali managers indicate that being a small start-up company with limited resources makes it difficult for them to keep the promise of reduced administrative costs for customers and workers. For instance, Voocali reports the interpreters' taxes manually because they have not yet managed to automate this service. As such, Voocali management is mainly concerned with developing management practices related to the platform design in order to attract potential interpreters to the platform.

Voocali primarily relies on algorithmic management practices related to the prerogative of *control* (Kristiansen, 2020). Like Hilfr, Voocali evaluates the interpreters' performance by displaying profile ratings on the app (Kellogg et al., 2020). The Voocali collective agreement indicates that

ratings on the platform are used to evaluate worker performances, and that positive profile reviews increase the number of potential tasks for the individual interpreters.[xxvi] In addition, Voocali managers note that automated data management is used indirectly for economic incentives to attract interpreters and customers to the platform. For example, data management can calculate the interpreter's transport expenses, automate attendance subsidies included in the interpretation service, and provide for data portability, which enables interpreters to transfer ratings from other platforms. Although these features do not explicitly *direct* the performance of interpreters, Voocali managers contend that they increase the interpreters' hourly earnings by lowering the amount of time they spend on administrative tasks – which may serve to *discipline* interpreters as they perform their assignments (Kellogg et al., 2020).

Like Wolt and Hilfr, Voocali relies on traditional management practices for the prerogatives of *hiring*, *dismissal* and *rules of conduct* (Edwards, 1979; Kristiansen, 2020). In the case of hiring, Voocali operates, unlike the two other platforms, with a high entry barrier, reflecting the highly skilled nature of interpretation services. Voocali management is more directly involved in the recruitment process than are the other platforms, where documentation of skills and education plays less of a role. Voocali's website lists a number of requirements for eligibility to work as an interpreter on the platform.[xxvii] Apart from being a fluent speaker of the languages in question, aspiring interpreters must be certified by national authorities and have a relevant education or complete a professional interpreter program in the Danish educational system to qualify for work through the platform. With respect to *dismissals*, the Voocali managers interviewed state that they occasionally remove worker profiles, notably when interpreters provide misleading information about their interpretation skills. As for *rules of conduct*, Voocali's website declares that interpreters are expected to comply with the ethical procedures outlined by the Danish Association of Certified Translators and Interpreters, among them the duties of confidentiality and incorruptibility, the avoidance of conflicts of interest, and loyalty to the customer.[xxviii]

With respect to *instructions*, Voocali provides general tips on good interpretation practices and how to arrange interpretations in the most convenient way.[xxix] Otherwise, Voocali's management practices reflect how interpreters and customers are largely responsible for directing the work process of the interpretation service. For instance, although Voocali sets the hourly wages, the Voocali managers interviewed stress that it is up to clients and interpreters to negotiate conditions for different interpretation services. While in principle self-employed interpreters are in charge of controlling their working time, Voocali managers mention that most interpretations take place early in the day, when public authorities typically prefer to have consultations with citizens with special needs, including interpretation. In this way, customers decide de facto at what time of day interpreters perform interpretation services.

5. Discussion

Algorithmic management

Our in-depth analyses of the three platforms Wolt, Hilfr and Voocali indicate that algorithmic management on labour platforms has a less omnipresent and a more complex character than suggested in much of the algorithmic management literature (Rosenblat and Stark, 2016; Frenken and Fuenfschilling, 2021). In line with our first tentative hypothesis, on all three platforms algorithmic management practices are used for the three managerial prerogatives of *instructions for the execution of work*, *working time* and *control*, though, it appears, in quite different ways (Benassi and Kornelakis, 2020; Kristiansen, 2020). Wolt uses algorithmic management practices for *directive* and *disciplining* purposes, for example to distribute tasks and nudge couriers to complete larger gigs and to work at peak hours, thus influencing the execution of work and the working time (Kellogg et al., 2020). These aspects also reflect the competitive wage model used at Wolt (Jabagi et al., 2019). Voocali also indirectly uses algorithmic management as a tool by automating certain administrative obligations for their interpreters in order to increase their hourly wages. Human intervention seems to go hand in hand with the use of these algorithms, as reflected

in the use of support workers at Wolt and manual tax reporting at Voocali. In the case of control, Hilfr and Voocali employ algorithmic management practices by using rating systems to evaluate work performance through quantitative means (Baiocco et al., 2022).

Traditional management

As anticipated in our second hypothesis, all three platforms fulfil the managerial prerogatives of *hiring, dismissal* and *rules of conduct* solely through traditional management practices (Edwards, 1979). There are formal and often bureaucratic processes for recruitment, with low barriers for entry at Wolt and Hilfr, and high skill levels required at Voocali. At Hilfr and Voocali, confidential worker–customer relations play a significant role because customers often request the same cleaners and interpreters. As such, work functions and skills are critical concerns for both Hilfr and Voocali, but typically for different reasons: Voocali is a platform requiring high skill levels, whereas Hilfr focuses on work functions and skills because of the nature of the work tasks (Jabagi et al., 2019). Furthermore, all three platforms rely on human decision-making to assess whether workers violate behavioural rules or provide false information on their profiles (Edwards, 1979). Thus, the three platforms rely on traditional management practices to adjust the size and composition of their workforce and to examine worker behaviour, thereby managing beyond algorithms when handling their *numerical* and *functional* flexibility in self-employment arrangements (Cappelli and Neumark, 2004; Benassi and Kornelakis, 2020). According to our findings, Kellogg and colleagues' conceptual framework of algorithmic management should be expanded to include these aspects when considering the extent of algorithmic management on platforms. This adjustment would offer insights into the role of traditional management on platforms as well as the dynamics between algorithmic and traditional management (Kellogg et al., 2020).

Delegated management responsibilities

Our findings also point to examples of management practices being delegated to customers and workers; as a result, the platforms rely on neither algorithmic nor traditional management practices for some managerial prerogatives. For example, with respect to *instructions,* interpreters at Voocali seem to be responsible for their own work process, which may be due to the highly skilled nature of the work (Jabagi et al., 2019). In the case of *working time,* customers at Voocali seem to have the final say owing to various organisational constraints, whereas cleaners can have substantial influence on planning their schedule at Hilfr (ibid.). With respect to *control*, all three platforms rely on customer reports (in addition to ratings at Hilfr and Voocali), but they also appear unable to control certain aspects. Examples include health and safety measures at work as well as job satisfaction, as seen with the lack of inspection of the couriers' thermal bag at Wolt, or of the cleaning chemicals at Hilfr. At Voocali, self-employed interpreters are solely responsible for maintaining and developing their interpreter skills and thus their quality of service and employability. In these different contexts, the combination of the relaxed self-employed working arrangement, the distribution of management responsibilities to others and the digital space of the platform amplifies the distance between the platform and the workers (Galière, 2020; Kusk and Bossen, 2022). Our findings suggest that all three platforms are concerned to varying degrees with establishing measures to develop long-term employment relationships with some of their platform workers – these findings differ slightly from those of other platform research. However, these attempts are challenged by the lack of control of worker performance and productivity in several situations (Meijerink and Keegan, 2019; Duggan et al., 2020).

Policy implications

Our three case platforms as well as other labour platforms may also need to reconsider their use of different management practices in the future. Recently, the European Commission proposed a

Directive for Improving the Working Conditions in Platform Work. The proposed directive includes a presumption rule on platforms' employment relationships that may lead to platforms being presumed to be employers if they fulfil two of five listed parameters, which largely echo the managerial prerogatives used in our analysis (e.g. instructions, rules of conduct, control) (Kristiansen, 2020; European Commission, 2021). However, our findings also suggest that the platforms tend to delegate management tasks such as working time and control to individual workers and customers, so that some platforms may evade the presumption rule if the directive is adopted in its current form. In addition to the proposed directive, the European Commission suggested a number of guidelines allowing for collective bargaining for the solo self-employed in certain situations – including solo self-employed platform workers (European Commission, 2022). These guidelines were adopted in September 2022 and will make it easier for labour platforms like Hilfr and Voocali to negotiate collective agreements.

The proposed directive also outlines principles for the platforms' use of algorithmic management practices, which apply to both employees and the self-employed operating by means of the platforms, which is unique in both the EU and the Danish context as labour law typically applies only to employees (European Commission, 2021). The different aspects of algorithmic management listed in the directive (e.g. evaluation, access to work tasks, control of working time) echo many of the concepts advanced by Kellogg and colleagues (2020). The proposed directive also addresses a number of principles related to transparency, including platform workers' rights to written information about the functioning of, and eventual changes to, the automated decision-making systems used by labour platforms to allocate work tasks, ratings, bonuses and so forth. Labour platforms are also requested to continuously evaluate and inspect their automated systems to prevent discriminatory practices, and to develop and secure rights to information and consultation (European Commission, 2021). Some of these principles touch upon traditional management tools (human inspection, written documentation, information and consultation rights) and point to the

close interplay between algorithmic and traditional management that is often overlooked within much of the platform literature.

6. Conclusion

In this chapter, we have analysed how and for what purposes digital labour platforms make use of algorithmic and traditional management practices when they manage a workforce of mainly self-employed platform workers. The findings from our three in-depth case studies suggest that the platforms to some extent rely on algorithmic management practices for economic incentives and control measures (Duggan et al., 2020). The platforms supplement these practices with human intervention, and in other cases they rely exclusively on traditional management practices for recruitment purposes and the inspection and sanctioning of worker behaviour (Edwards, 1979; Meijerink and Keegan, 2019). Furthermore, the platforms appear to delegate certain management responsibilities, such as control or instructions, to workers or customers.

As such, the findings suggest that algorithmic management is less intensive on these three platforms and takes a much more complex form than suggested in much of the platform literature (Kellogg et al., 2020; Frenken and Fuenfschilling, 2021). Due to the remote relations between the platform and the worker, along with the delegation of management responsibilities, they continue to experience challenges with controlling aspects of the working arrangements (Duggan et al., 2020). In the light of the EU's recently proposed directive on platform work as well as the recently adopted guidelines that allow for collective bargaining for certain groups of the solo self-employed, including platform workers, these issues may with time have important implications for the platforms' various business models and different approaches to managing their workers on the platform (European Commission, 2021; European Commission, 2022).

References

Adams-Prassl, J. (2019). 'What if your boss was an algorithm?' *Comp. Lab. L. Pol'y J.*, *41*, 123–146.

Arum, R. and Müller, W. (2009). *The Reemergence of Self-Employment - A Comparative Study of Self-Employment Dynamics and Social Inequality*. Princeton University Press.

Atkinson, J.H. (1987). 'Flexibility or Fragmentation? The United Kingdom Labour Market in the Eighties', *Labour and Society : A Quarterly Journal of the International Institute for Labour Studies*, 12(1), pp. 87–105.

Baiocco, S., Macias, S., Rani U., and Pesole, A. (2022). 'The Algorithmic Management of Work and its Implications in Different Contexts'.

Benassi, C. and Kornelakis, A.J. (2020). 'How Do Employers Choose between Types of Contingent Work? Costs, Control, and Institutional Toying', *ILR Review*, 715-739.

Bögenhold, D., Klinglmair, R. and Kandutsch, F. (2017). 'Solo-Self-Employment, human capital and hybrid labour in the gig economy', *Форсайт*, 11(4 (eng))

Cappelli, P. and Neumark, D. (2004). 'External Churning and Internal Flexibility'. *Industrial Relations: A Journal of Economy and Society*, *43*(1), 148–182.

Due, J., Madsen, J.S. and Jensen, C.S. (2017) 'The Danish Industrial Relations Model', in *European Social Policy and the Nordic Countries*. Routledge, pp. 37–76.

Duggan, J., Sherman, U., Carbery, R. and McDonnell, A. (2020). 'Algorithmic management and app-work in the gig economy'. *Human Resource Management Journal*, *30*(1), 114–132.

Edwards, R. (1979). *Contested Terrain: The Transformation of the Workplace in the Twentieth Century*. New York: Basic Books.

European Commission (2021). 'Proposal for a Directive of The European Parliament and The Council on Improving Working Conditions in Platform Work'. Brussels, 9.12.2021, *COM(2021) 762 final*, 2021/0414 (COD).

European Commission (2022). 'Guidelines on collective agreements by solo self-employed'. Brussels, 29.09.2022, *IP/22/5796*.

Flyvbjerg, B. (2006). 'Five misunderstandings about case-study research', *Qualitative inquiry*, 12(2), pp. 219–245.

Frenken, K. and Fuenfschilling, L. (2021). 'The Rise of Online Platforms and the Triumph of the Corporation'. *Sociologica*, *14*(3), 101–113.

Galière, S. (2020). 'When food-delivery platform workers consent to algorithmic management'. *New Technology, Work and Employment*, *35*(3), 357–370.

George, A.L. and Bennett, A. (2005). *Case Studies and Theory Development in the Social Sciences*. MIT Press.

Ilsøe, A., Jesnes, K. and Hotvedt, M. (2020). 'Social partner responses in the Nordic platform economy'. *Platform Work in the Nordic Models. TemaNord Report*.

Ilsøe, A. and Larsen, T.P. (2020) 'Digital platforms at work: Champagne or cocktail of risks?' in *The Impact of the Sharing Economy on Business and Society*. Routledge, pp. 1–20.

Ilsøe, A. and Larsen, T. P. (2021). *Why do platforms negotiate?* Economic and Industrial Democracy, 1–19.

Ilsøe, A. and Larsen, T.P. (2022) *Digitale arbejdsmarkeder - Fra jobs til opgaver [Digital labour markets – From jobs to tasks]*, *Djøf Forlag*.

Jabagi, N., Croteau, A.-M., Audebrand, L. K. and Marsan, J. (2019). 'Gig-workers' motivation: thinking beyond carrots and sticks'. *Journal of Managerial Psychology*, *34*(4), 192–213.

Jacqueson, C. (2021). 'Platform work, social protection and flexicurity in Denmark'. *International Social Security Review*, *74*(3–4), 39–59.

Kellogg, K. C., Valentine, M. A. and Christin, A. (2020). 'Algorithms at Work: The New Contested Terrain of Control'. *Academy of Management Annals*, *14*(1), 366–410.

Konkurrencerådet [The Danish Competition Authority] (2020). 'Minimumspriser på Hilfrs platform [Minimum prices on the Hilfr platform]'.

Kornberger, M., Pflueger, D. and Mouritsen, J. (2017). 'Evaluative infrastructures: Accounting for platform organization', *Accounting, Organizations Society*, 60, pp. 79–95.

Kristiansen, J. (2020). *Ansættelsesret [Employment Law]*. *Djøf Forlag*.

Kusk, K. and Bossen, C. (2022). 'Working with Wolt: An Ethnographic Study of Lenient Algorithmic Management on a Food Delivery Platform'. *Proceedings of the ACM on Human-Computer Interaction, 6*(GROUP), 4:1-4:22.

Larsen, T.P. and Ilsøe, A. (2022). 'Varieties of organised decentralisation across sectors in Denmark: A company perspective', *Industrial Relations Journal*, 53(4), pp. 368–389.

Larsen, T. P. and Mailand, M. (2018). 'Lifting wages and conditions of atypical employees in Denmark'. *Industrial Relations Journal*, *49*(2), 88–108.

Löhr, S.M.P. (2020). 'Hvordan skal gig-work behandles i arbejds- og skatteretlig henseende?' ["How should gig work be considered in terms of labour and tax law?"], *University of Copenhagen Fiscal Relations Law*, 2, pp. 1–35.

Mailand, M. and Larsen, T.P. (2018). *Hybrid work: Social protection of atypical employment in Denmark*. WSI Study.

Meijerink, J. and Keegan, A. (2019). 'Conceptualizing human resource management in the gig economy'. *Journal of Managerial Psychology*, *34*(4), 214–232.

Meijerink, J., Keegan, A. and Bondarouk, T. (2021). 'Online labor platforms and human resource management as a case of institutional complexity'. *The International Journal of Human Resource Management, 32*(19), 4016–4052.

Möhlmann, M., Zalmanson, L., Henfridsson, O. and Gregory, R. W. (2021). 'Algorithmic Management of Work on Online Labor Platforms': When Matching Meets Control. *MIS Quarterly, 45*(4), 1999–2022.

Piasna, A., Zwysen, W. and Drahokoupil, J. (2022). 'The platform economy in Europe: results from the second ETUI Internet and Platform Work Survey (IPWS)', *ETUI Research Paper-Working Paper*.

Prassl, J. (2018). *Humans as a Service: The Promise and Perils of Work in the Gig Economy*. Oxford University Press.

Rosenblat, A. and Stark, L. (2016). 'Algorithmic labor and information asymmetries'. *International Journal of Communication (Online)*, 3758–3785.

Stefano, V.D. and Taes, S. (2021). 'Algorithmic management and collective bargaining', p. 16.

Steinberger, B. (2018). 'Redefining "Employee" in the Gig Economy'. *Fordham Journal of Corporate & Financial Law*, *23*(2), 577.

Urzì Brancati, M. C., Pesole, A. and Fernandez-Macias, E. (2020). *New evidence on platform workers in Europe*. Joint Research Centre.

Vallas, S. and Schor, J.B. (2020). 'What do platforms do? Understanding the gig economy', *Annual Review of Sociology*, 46, pp. 273–294.The flexible platform firm

---

[vi] European Parliament (2021, September 16). Fair and equal social protection for riders, drivers and other platform workers – https://www.europarl.europa.eu/news/en/press-room/20210910I

[vii] DutchNews.nl (2021, September 22). Appeals court finds Helpling cleaners are temporary workers. – https://www.dutchnews.nl/news/2021/09/appeals-court-finds-helpling-cleaners-are-temporary-workers/

[viii] About – https://wolt.com/da/about

[ix] Wolt joins forces with DoorDash - https://blog.wolt.com/hq/2021/11/09/wolt-joins-forces-with-doordash/

[x] Wolt – interview

[xi] https://wolt.com/da/about

[xii] Algorithmic Transparency Report – https://explore.wolt.com/da/dnk/transparency

[xiii] Transport af fødevarer [Transportation of foods, The Danish Veterinary and Food Administration] – https://www.foedevarestyrelsen.dk/Selvbetjening/Vejledninger/Hygiejnevejledning/Sider/30--Transport-af-foedevarer.aspx

[xiv] How to get started – https://woltpartner.dk/how-to-get-started

[xv] Being a Wolt Partner – https://likeaboss.nu/faq/

[xvi] Algorithmic Transparency Report – https://explore.wolt.com/en/dnk/transparency

[xvii] Tips and tricks – https://likeaboss.nu/faq/

[xviii] Gear and vehicle types – https://likeaboss.nu/faq/

[xix] Hilfr – Interview

[xx] Happy Helper – https://happyhelper.dk/

[xxi] Oprettelse af din profil [Creating your profile] – https://faq.hilfr.dk/da/livet-som-hilfr-14-oprettelse-af-din-profil/

[xxii] See the Hilfr agreement: file:///C:/Users/vgw691/AppData/Local/Temp/Hilfr%20collective%20agreement%202018.pdf

[xxiii] Hvad indeholder en typisk rengøringsopgave? [What does a typical cleaning task involve?]– https://faq.hilfr.dk/da/

[xxiv] Ibid.

[xxv] Min rengøring var ikke tilfredsstillende, hvad kan jeg gøre? [My cleaning was not satisfactory – what to do?]– https://faq.hilfr.dk/da/

[xxvi] Aftale mellem Voocali og HK Privat [Agreement between Voocali and HK Private] https://www.hk.dk/-/media/images/om-hk/sektorer/privat/hkprivat/pdf/2018/aftale_hkprivat_voocali.pdf?la=da&hash=AB8DE80C8F62F1D3C50552E58C59A25E336B6F78
[xxvii] Ny tolk [New interpreter] – https://voocali.com/fagtolk/
[xxviii] Etiske regler [Ethical guidelines] https://translatorforeningen.dk/certificerede-translatoerer-og-tolke/etiske-regler-og-faglige-forpligtelser/
[xxix] Support – https://voocali.com/support/

The flexible platform firm

Segmentation of working time in the gig economy

Christian Haldrup, Anna Ilsøe, Trine P. Larsen, Jonas Hulgård Kristiansen and

Jakob Johan Demant

Submitted to the journal New Technology Work and Employment.

Abstract

The re-organisation of work via digital labour platforms has introduced fully flexible work schedules in courier services such as food delivery. However, little is known about the working activity and related inequalities evolving on such platforms. This article examines the working time patterns of food couriers (N = 20,090), supplemented by demographic characteristics on the leading Danish food delivery platform Wolt over six years (2017-2022). The article combines a longitudinal research design with the segmented labour market approach (SLM). It identifies three segments of platform workers: *Dabblers* (part-time and few hours over a few months*)*, *Temporaries* (part-time over several months) and *Regulars* (long part-time and full-time for around a year). The discussion suggests that the platform's core workers (Regulars) share characteristics with labour market outsiders, and the periphery (Dabblers) with insiders. This reflects reverse dynamics of the workforce composition at platforms compared to Atkinson's (1987) conceptualisation of the flexible firm.

Keywords: digital labour platforms, gig economy, food delivery, working time, longitudinal platform data, segmented labour markets, core-periphery, the flexible firm

1. Introduction

Historically, the introduction of new work organisations has led to a flexibilisation of working hours at private and public workplaces (Haipeter, 2020; Marginson & Sisson, 2006). Over the last decades, the digitalisation of work has refocused attention on working time flexibility, including its ties to business innovation and work pattern shifts at the societal level (Wilkinson & Barry, 2020). Digital labour platforms are often highlighted among the most far-reaching examples of these trends as they enable digitally mediated transactions of tasks and services along with loosely defined self-employed working arrangements (Vallas & Schor, 2020). This is especially pronounced at so-called "click work" (e.g. online product testing) and "gig work" platforms (e.g. cleaning or courier services) that facilitate tasks of shorter duration with low skill requirements (Kalleberg & Dunn, 2016).

The literature on platform work questions whether these novel work arrangements primarily benefit the platforms but at the expense of platform workers, who merely adapt their availability and work patterns to fluctuating demands and conditions set by the platforms (Griesbach et al., 2019; Moore & Newsome, 2018). Moreover, recent studies suggest that these patterns might differ among various platform workers, suggesting signs of segmentation (Kristiansen et al., 2022; Piasna & Drahokoupil, 2021). These groups (i.e. segments) vary in terms of their social backgrounds, income levels, and access to job opportunities, all of which influence their reliance on and use of the platforms (ibid.). However, the literature scarcely delves into how individual working time patterns unfold *over time* on the platform, where flexible work arrangements and fluctuations in demands may change the working hours of the workers every week (Heiland, 2022). As such, working time flexibility is vital in continuously adapting workloads to demand and allowing workers to utilise these platforms with other activities, such as part-time jobs (Kuhn & Maleki, 2017; Vallas & Schor, 2020).

This article utilises a novel longitudinal research design to answer the two-folded research question:

What developments do we observe in individual working time trajectories on a gig work platform? And secondly, what processes of segmentation unfold on these types of platforms?

We examine working time developments over six years on a selected gig work platform using sequence analysis and the segmented labour market approach (SLM) to inform our analysis and interpret our results. Our locus of analysis is individual working time series shared by Wolt, a large food delivery platform operating in Denmark, consisting of all active couriers during 2017-2022 (N = 20090), supplemented with selected demographic characteristics of these couriers and interviews with platform managers.

Our study makes three relevant contributions. First, we identify three distinct working time segments among platform workers and classify them as *Dabblers*, *Temporaries* and *Regulars*. These groups display stable time patterns that vary according to the number of weekly hours and weeks spent on the platform, ranging from sporadic short-term engagement to persistent long-term activity. Secondly, we apply the segmented labour market approach (SLM) as an analytical framework to analyse working time as a critical indicator for platform segmentation (Doeringer & Piore, 1971; Grimshaw et al., 2017; Peck, 1989). We use this framework to discuss the potential of using working time for analysing segmentation in highly flexible work settings by relating the work patterns of the three segments to critical concepts in the SLM literature, including Atkinson's' (1987) model of the flexible firm. Lastly, we develop a longitudinal research design and apply sequence analysis on the platform data to investigate how working conditions develop over time (Abbott, 1995; Heckman & Singer, 2008). We discuss how this research design may contribute to qualifying ongoing discussions on approaching inequalities and regulation in the gig economy.

In the following, we review existing literature on platform work, working time and the Danish labour market before developing our analytical framework with inspiration from SLM theory. We then present the research design, methodology and data used. In the results section, we present

our empirical findings, including the three identified working time segments, followed by a discussion inspired by SLM theory. The article concludes by discussing the implications and limitations of our findings.

2. Literature review and empirical background

Working time flexibility at food delivery platforms

Gig work platforms constitute a subset of the total platform economy, which up to this point remains limited in size: 1 % of all employed in Denmark compared to 1% in Finland, 2% in Sweden, and 2-4% in the European Union have performed work on various platforms (Ilsøe et al., 2021; Piasna et al., 2022; Sutela & Pärnänen, 2018). Despite the limited scope, food delivery platforms have been researched extensively due to their rapid expansion during the COVID-19 pandemic (Cui et al., 2022; Rani & Dhir, 2020). Gig work platforms have gained particular attention for using self-employed working arrangements in combination with novel algorithmic management practices to automate management-related costs (Griesbach et al., 2019; Moore & Newsome, 2018). Some studies consider these practices to be tools for profit maximising that leave workers with high economic risk and limited autonomy (ibid.). Other findings highlight that many workers use these platforms as a supplementary income source and value the temporal flexibility by deciding when to work and to take time off from the platform (Galière, 2020; Goods et al., 2019). Such studies suggest that the couriers may learn to cope with the platforms' algorithmic features (ibid). These strands of literature also relate to how platform conditions and the workers' background characteristics shape couriers' working time patterns (Moore & Newsome, 2018; Urzì Brancati et al., 2020).

In the case of food delivery platforms, demands have daily and seasonal fluctuations, as orders are, for instance, high in the evening and during bad weather but low in the morning and during the summer season (Cui et al., 2022; Cullen & Farronato, 2021). Therefore, certain parts of the

literature focus on the ways platforms seek to adapt the courier supply and their number of working hours to handle market volatility and retention (Heiland, 2022; Williams et al., 2021). For example, some platforms utilise algorithmic management systems to sanction couriers that reject a certain number of orders or offer bonuses for couriers working at peak hours or delivering orders over longer distances (Griesbach et al., 2019). Other studies point to how shifts and task allocation systems regulate the number of active couriers by making them compete for the pool of available orders (Heiland, 2022; Williams et al., 2021). Empirical studies on the couriers' background characteristics highlight different indicators that foster different forms of activity on the platform (Piasna et al., 2022; Urzì Brancati et al., 2020). Among these, the literature often stresses that the couriers' access to additional income sources is decisive for their working time, as existing income may allow them to use platform work as a supplement by working part-time during selected peak hours (Kuhn & Maleki, 2017). Research further considers nationality to be a significant indicator of labour market inequalities between couriers: many migrants use platform work as their primary source of income due to visa restrictions, lack of language skills and few other job alternatives (Goods et al., 2019; van Doorn et al., 2022). Educational background, age and gender are also indicators that may influence the couriers' activity on the platforms (Cook et al., 2021; Piasna & Drahokoupil, 2021). Apart from these indicators and the platform features mentioned above, the platforms operate in specific institutional contexts.

Platform work at the Danish labour market

Along with its Nordic counterparts, Denmark is known for a voluntarist approach to labour market regulation, especially within working time, wages and social protection, reflected in a high coverage rate of collective agreements and union density (four out of five and two out of three employees, respectively) (Arnholtz & Navrbjerg, 2020). As part of this, the working time in employment contracts is negotiated locally at most workplaces, even within highly centralised sector-

level agreements (Larsen et al., 2019). While collective agreements have mainly applied to standard full-time employment contracts (i.e. open-ended 37 weekly hours with high wages and progression), we also see examples of collective agreements targeting non-standard work (Ilsøe & Larsen, 2021). Examples of non-standard work include fixed-term or zero-hour contracts and dependent solo self-employed, generally characterised by high levels of flexibility and lower security levels than standard employment (Rasmussen et al., 2021). However, the rapid increase of marginal part-time work (i.e. less than 15 hours per week), notably within non-standard work (one-third of the total workforce as of 2019), has also tested the viability of the Danish industrial relations model (Larsen et al., 2019). Non-standard work in the Nordics is mainly found within private service sectors, including cleaning, retail, hotel, restaurants and transportation, where most gig platform workers operate (Ilsøe & Larsen, 2021). In these sectors, the working time remains critical for employers and employees due to market volatility, price competition and labour-intensive work, which results in irregular and unsocial hours in the evening or on weekends (ibid.). On the one hand, the flexibility of non-standard work may thus be preferable to employers in the service sector and also attract workers such as students who prefer part-time jobs and unsocial hours (Ilsøe, 2016). On the other hand, the high employee turnover in the sector makes employers vulnerable to retention (ibid.). Further, due to the various eligibility criteria, employees risk low pay and may struggle to acquire sufficient working hours and qualify for social protection (Larsen et al., 2019).

Related issues on working hours, earnings and social protection in the Danish platform economy have led to divergent responses from platform owners and social partners but also novel examples of worker mobilisation and collective agreements, notably within the cleaning and food delivery sectors (Hau & Savage, 2022; Ilsøe & Larsen, 2022). Recent collective agreements within the platform economy often aim to balance the different interests of the platforms, workers and unions, reflected in minimum wage requirements and social protection standards with varying degrees of working time flexibility and economic risk (ibid.). For example, a sector-level agreement

covering food delivery was signed in 2021 by the trade union 3F Transportation and the employer's organisations - The Danish Chamber of Commerce- and has been implemented by the platform Just Eat/Take Away (Ilsøe & Söderqvist, 2023). This agreement most significantly introduces a minimum floor of working hours (minimum 8 hours per week), along with an hourly minimum wage floor (124 DKK) and an unsocial hours allowance wage (ibid.). However, in various other instances, including at Wolt, disagreements, primarily related to working time flexibility, have prevented social partners and platforms from reaching a mutually acceptable agreement (Ilsøe & Larsen, 2022).

2.1 Analytical framework: Segmented labour markets

Our adoption of the SLM approach seeks inspiration from the concept of labour market segmentation, which refers to inequalities that emerge over time among subgroups of workers in terms of different working conditions, background characteristics and access to jobs and industries (Atkinson, 1987; Doeringer & Piore, 1971; Peck, 1989). While the SLM approach draws on various analytical traditions, our analytical framework applies central SLM concepts, including *primary and secondary labour markets, the flexible firm* along with *demand-* and *supply-driven* segmentation with a specific focus on working time as our used key indicator to illustrate labour market segmentation on platforms (Grimshaw et al., 2017; Rubery, 2007; Taubman & Wachter, 1986).

The SLM approach builds on the notion of dual labour markets, which Doeringer and Piore (1971) divide into a primary sector with working conditions resembling standard employment and a secondary sector that relates to atypical work arrangements with low external mobility between the two sectors (Doeringer & Piore, 1971). The primary sector is characterised by formal employment contracts, higher wages, and stable working hours, dominated by highly skilled workers (Cappelli & Keller, 2013; Osterman, 1975). In contrast, the secondary sector comprises workers with temporary contracts, lower wages, and fluctuating working hours, often including young women and

migrant workers (Osterman, 1975; Silberman et al., 2007). At the company level, Atkinson (1987) draws on a similar distinction when applying the concept of a *flexible firm*. This concept considers the workforce composition of these types of companies to consist of a smaller *core* (i.e. primary) of specialised and permanent full-time workers and a larger *periphery* (i.e. secondary) of temporary workers with a loose attachment to the workplace (Atkinson, 1987). The SLM literature further puts weight on *demand* and *supply* mechanisms as two types of driving forces that cause labour market segmentation (Doeringer & Piore, 1971; Peck, 1989). The demand side focuses on employers' demand for labour and skills functions as aspects that form labour market divisions (Sengenberger, 1981). Demand mechanisms are thus grounded in employer strategies for balancing labour costs, such as investing in worker productivity by increasing wages and working time flexibility to attract and retain workers in times of high demands and correspondingly decreasing these aspects when demands are low (ibid.) On the other hand, the supply-side relates to structures of social reproduction in the labour supply that divides the workforce into segments based on socioeconomic characteristics such as ethnicity and educational background (Rubery, 2007).

Operationalisation: Working time as an indicator of labour market segmentation

In the context of gig work platforms characterised by task-based and self-employed working arrangements, the absence of employment contracts – which often constitute the leading indicator of SLM studies – necessitates a novel way of operationalising the SLM approach (Cappelli & Keller, 2013; Grimshaw et al., 2017; Kalleberg & Dunn, 2016). Therefore, we focus on working time as a critical indicator of segmentation among platform workers (ibid). Adopting the SLM approach in this novel way allows us to consider how working time reflects different uses of the highly flexible platform setting.

Additionally, we relate variations in the working time patterns of the segments to core-periphery dynamics of the flexible firm as outlined in the SLM literature (Atkinson, 1987). As part of this,

we discuss how the platform worker segments interact with primary and secondary sector dynamics in the broader labour market (Doeringer & Piore, 1971). Furthermore, we engage with the platform literature to consider possible demand- and supply-driven segmentation dynamics on the platform (Grimshaw et al., 2017; Rubery, 2007). We address the demand and supply side by relating working time patterns to changes in demands on the platform and demographic characteristics of platform workers (Cullen & Farronato, 2021; Grimshaw et al., 2017; Urzì Brancati et al., 2020).

3. Methodology: Working time series

Data strategy and case description

The methodological approach used to analyse working time on the studied platform is inspired by existing empirical research on platform work (Piasna & Drahokoupil, 2021; Urzì Brancati et al., 2020). Unlike many platform studies using cross-sectional data to analyse working conditions, we took a longitudinal approach to examine variations and developments over time (Heckman & Singer, 2008). This approach enabled the identification of potential segments based on distinct working time patterns. In addition, the data strategy aimed to gain insights from digitally recorded traces of worker activity to study worker behaviour rather than relying on reported attitudes from surveys and interviews (Lazer et al., 2021). We decided to use data provided by a platform, as it has proven difficult to replicate digital data series obtained from online platforms with data scraping and mining techniques due to the constant flow of online activity and changes in platform design (Munksgaard et al., 2016). Eventually, we reached an agreement and settled the terms for data exchange with Wolt, a large food delivery platform operating in Denmark and several (25) other countries worldwide, which merged with the American platform DoorDash in 2022. This platform reflects critical characteristics of gig work platforms, including on-site and low-skilled tasks of short duration along with the use of self-employment work arrangements, piece-rate earn-

ings and algorithmic management practices (Kalleberg & Dunn, 2016). Additionally, we considered food delivery platforms' significant expansion in recent years an essential prerequisite for understanding how the working time unfolds over time in the gig economy (Rani & Dhir, 2020). Figure 1 draws on the provided platform data from Wolt and illustrates these trends in the total number of weekly online hours for couriers on the platform from 2017 to 2022.

Figure 1. Online hours 2017-2022 (weekly summarised)

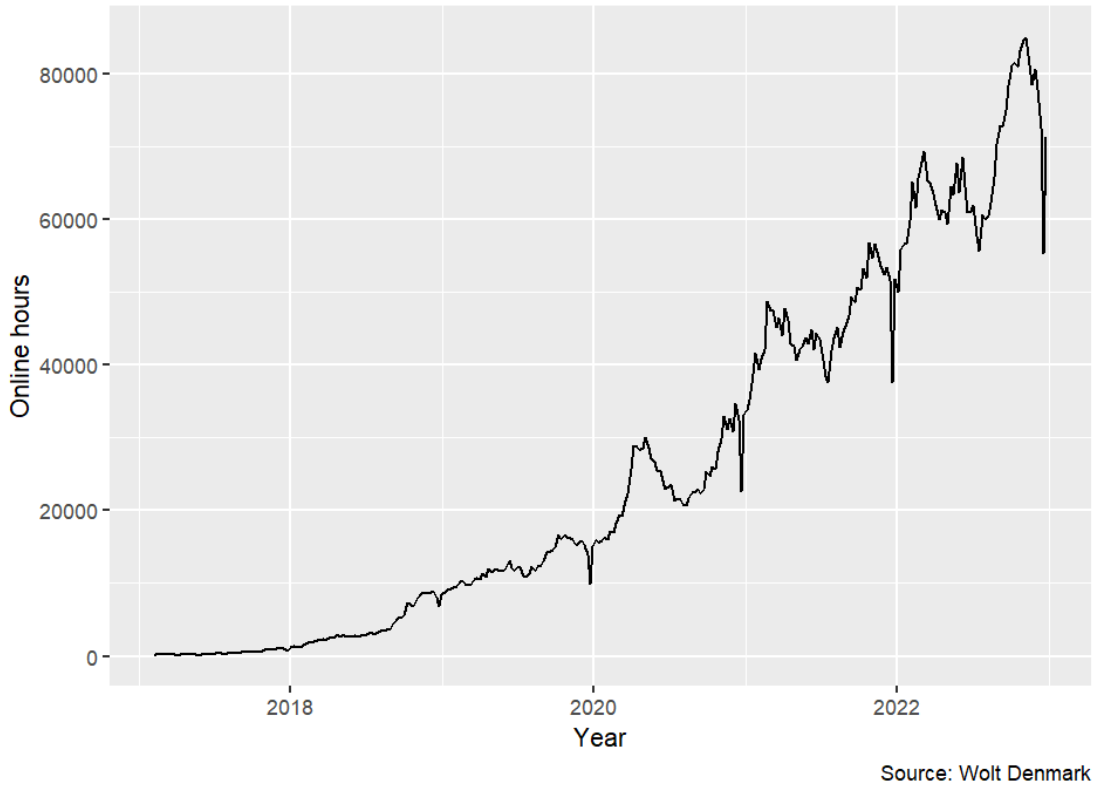


Figure 1 illustrates that the online hours on the platform increased significantly from March 2020 onwards. This trend likely relates to a heightened demand for food deliveries, indicating platform expansion. The increase occurred during a period characterised by the COVID-19 pandemic hitting most European countries, including Denmark, where the Danish government subsequently started introducing national lockdowns. Despite the lifting of COVID-19-related restrictions by the Danish government and global inflation rates from 2022 onwards that could potentially lower demands for food deliveries, the expansion trends on the platform seemed to continue throughout 2022, as seen with the overall increase in the total number of online hours.

Longitudinal platform data

Figure 1 is based on the working time activity of all couriers registered at Wolt from 2017-2022 (N = 20,090), which constitutes the fundamental part of the data used for this study. As part of our data strategy, we requested that the platform provided data at the individual level of the couriers' weekly summarised online hours. This includes the hours couriers are logged on the platform app, including time spent conducting orders and unpaid time waiting for incoming or delayed restaurant orders (Pulignano et al., 2022). The weekly online hours gave us an indicator for studying heterogeneity and fluctuations in working time over time with a representative database of a total population of couriers (Piasna et al., 2022).

Demographic data

Inspired by the literature, we further requested background characteristics of the couriers, including nationality, tax registration form, age and gender, to analyse supply-driven mechanisms of segmentation (Peck, 1989; Urzì Brancati et al., 2020). Unfortunately, the data quality on gender and age was deficient, with large proportions of missing values (i.e. more than 50 % for each variable), suggesting that the platform did not link the courier data to background information from national registers via the couriers' Danish ID numbers. Instead, the low data quality might reflect that the demographic data is derived from the courier profiles, where this information is self-reported and optional. Consequently, we omitted these variables as we considered them inadequate for analysis. Data quality was relatively high on nationality and tax registration form for 2021 and 2022, which allowed for analysis of some demographic characteristics and indications of labour market inequalities between the couriers (Peck, 1989). We grouped nationality into three categories (Danish, EU/EEA and third countries (i.e. non-EU/ESS). This indicator points to certain labour market inequalities between couriers, as reflected in empirical research, where migrants have fewer job opportunities outside the platform and, thus, are more likely to rely on

platform work (van Doorn et al., 2022). The tax registration form indicates whether couriers report taxes as B-income or are VAT-registered as sole proprietorships. VAT registration as a company is mandatory in Denmark if annual earnings as a self-employed exceed €6,600. This indicates the couriers' employment status, as couriers with VAT registration would be less likely to have wage-earner employment outside the platform than those without VAT registration (Kuhn & Maleki, 2017). It should be noted that this variable states the couriers' status at the specific time when Wolt delivered the data and thus provides a snapshot of this type of information.

Reliability

Data provided by a platform company left us with certain methodological risks (Aliosi et al., 2020). For instance, a study based on data from Uber in the US has been criticised due to the lack of transparency in the data provided by the platform (Berg & Johnston, 2019). To address this potential issue, we established a Non-Disclosure Agreement (NDA) before the data exchange, which was verified by the legal departments of Wolt and the University of Copenhagen (UCPH). The NDA was drawn up by the Tech Transfer Office at UCPH, and comments were received from Wolt and all participating researchers. It specifies conditions for the data exchange, including accessibility and research independence. We settled our specifications about the data (i.e. individual level, online hours, and demographics) as part of the NDA. While we could not verify the accuracy of this data, specific observations support that the platform delivered the data in a raw format and was not edited to align with company policies (Lazer et al., 2021). For instance, the working time series includes numerous instances of individual couriers exceeding 100 weekly online hours. These outlier cases could be linked to some couriers being logged on the platform even after concluding their work or to couriers sharing the same profile. In any case, we regard courier activity indicating unusually high workloads as not aligning with platform companies' general interests in publicly promoting favourable working conditions, which increases the likelihood that Wolt did not alter the working time series before the data exchange.

Analytical strategy: Sequence analysis of working time trajectories

As part of analysing working time segmentation on the platform, we employed sequence analysis as conceptualised by Abbott (1995). Until now, sequence analysis has been widely used to analyse career paths of non-standard employment (Berglund et al., 2021; Ojala et al., 2018). Sequence analysis allowed us to examine a comprehensive amount of longitudinal observations and study developments in parallel activity courses over time, represented as trajectories (Abbott, 1995). In our case study, this included the online hours trajectories of the couriers from 2017-2022. Using visualisation tools in R, we clustered courier trajectories based on their weekly distribution of online hours during the six years (Gabadinho et al., 2011). These clusters served as a foundation to examine differences in working time patterns as indicators of segmentation processes on the platform (Grimshaw et al., 2017).

The process that led to our clustering of courier trajectories included several analytical steps with the R package TraMineR. (Gabadinho et al., 2011). We started out grouping the continuous 'online hours' variable into six working time states (i.e. categories) as illustrated in Table 1. These states reflect the unique activity patterns of individuals, including how they transition between different numbers of online hours on a weekly basis.

Table 1. Working time states (weekly online hours) in courier trajectories

Working time states	Full-time	Long part-time	Short part-time	Few hours	Inactive	Not on platform
Weekly online hours	+30	15-30	5-15	<5	0	-

The working time states were partly inspired by categories developed by the OECD, including "Full-time", "Long part-time", and "Short part-time" (OECD, 2021). Further, we included "Few hours" as an additional state since a notable share of workers spend less than five hours per week on platform work, according to previous studies (Piasna et al., 2022). Finally, "Inactive" includes

weekly states on the platform without notable activity (i.e. less than two weekly hours). In contrast, "Not on the platform" refers to couriers who are not yet or no longer present on the platform.

The initial phase of the analysis suggested a high continuity in the transition rates of the individual trajectories, which refer to the probability of transitioning to the same or neighbouring state (e.g. full-time → long part-time) the following week (table A1, appendix). This supported our decision to cluster trajectories based on different working time patterns by using optimal matching (OM) with transition rates as a measure for substitution costs between state sequences (table A2, appendix) (Lesnard, 2006). As seen in Table 2, the cost of substituting full-time (+30 hours) with few hours (<5) between courier A and B in week four would be higher compared to the costs of substituting the neighbouring states of long part-time (15-30) and short part-time (5-15) in week 3.

Table 2. Example of state distributions for two courier trajectories

Week	1	2	3	4	5	6	7	8	9	10
Courier A	5-15	15-30	15-30	+30	+30	+30	+30	+30	+30	+30
Courier B	0	<5	5-15	<5	0	-	-	-	-	-

To test the robustness of our modelling, we also generated sequences based on the dynamic Hamming (DH) method and manually adjusted substitution costs for individual states (Lesnard, 2006). However, this resulted in less coherent cluster boundaries. We used hierarchical agglomerative clustering and Ward's distance to test homogeneity within clusters and to determine the optimal number of clusters for our analysis (ibid.) (Figures 5 and 6, appendix). Informed by the tests and empirical and theoretical considerations, we chose a model with three clusters to illustrate three working time segments.

We decided to structure the analysis using sequence clusters, representing individual years due to the substantial variation in online hours between years (figure 1). Therefore, the sequences display all trajectories starting in a week within a calendar year (e.g., the first week of February 2020)

and one year ahead (52 weeks), covering the years 2017 to 2021. Further, we let all trajectories start simultaneously (week 0) to compare longitudinal trends using descriptive statistics such as number of transitions, trajectories and online hours. For 2022, trajectories were projected six months ahead (26 weeks) up to July, as our data ends in December 2022. The cluster of 2022 is primarily used for demographic analysis and comparison of trends with other years.

4. Results: Processes of working time segmentation

Based on sequence outputs with clustered working time patterns, the following results reflect our main findings of three working time segments. Along with descriptive statistics derived from the outputs, we unfold common traits in the working time characteristics of the three segments. Figure 2 below displays the sequence outputs of 2020, a reference year for our results, as the cluster patterns appear similar in other years. We draw on figures A5-A19 in the appendix for sequence outputs in other years and descriptive statistics.

Figure 2. Three segments with weekly working time state distributions (2020, n = 4116)

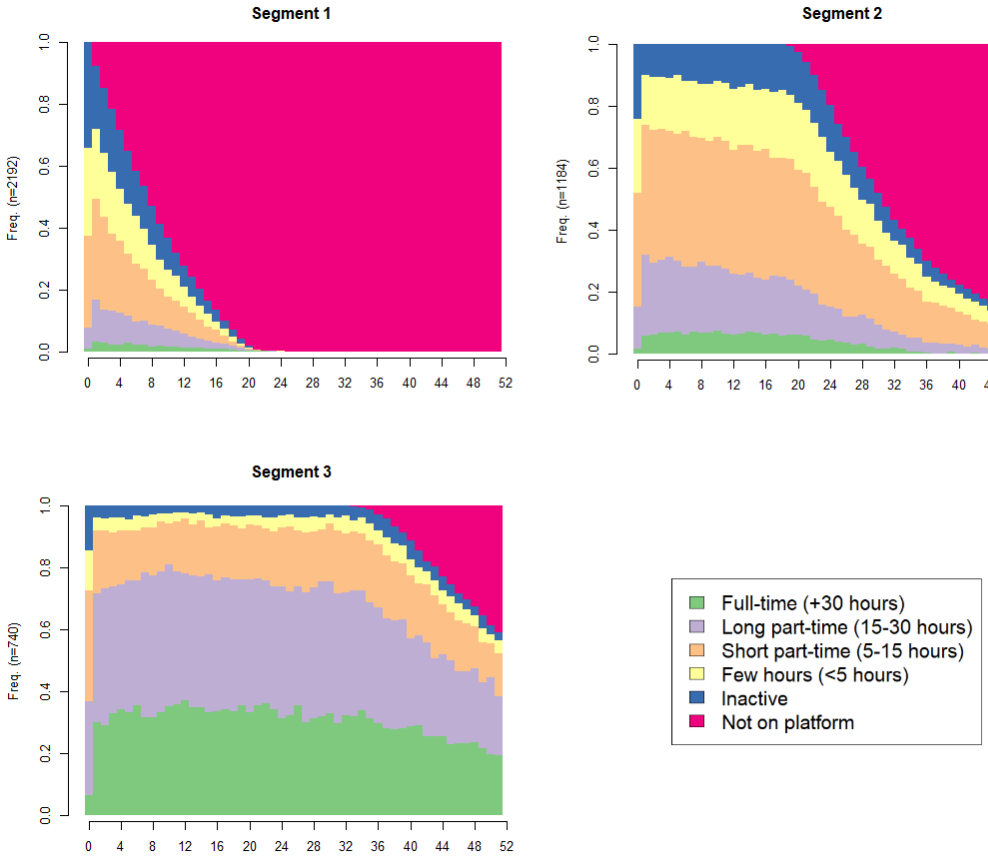


Figure 2 plots the segments based on their weekly distribution of working time states (i.e., weekly online hours). The colour scheme displays different patterns of working time activity, where the y-axis plots the activity distribution in all trajectories, while the working time states of the trajectories appear every week along the x-axis (such as green for full-time). The pink colour in the trajectories refers to working time states, where the couriers are no longer present on the platform, which indicates the length of individual trajectories (i.e. number of weeks active).

Longitudinal trends: Trajectory stability and segment continuity

As seen in Figure 2, the three segments (1-3) differ when considering their working time patterns on the platform along the two parameters: 1) The central working time states (i.e. weekly online hours) and 2) the length of trajectories in the segments (i.e. time spent on platform). However,

specific trends are also present in the trajectories across the three segments. As illustrated in Figure 2, all three segments have a relatively stable distribution of online hours over time that decreases when "Not on the platform" starts dominating the working time state distributions. This reflects that the couriers stay within the same working time patterns after a few weeks of activity on the platform. As part of this, the online hour activity in the segments appears to be concentrated within one central working time state and two secondary working time states. The primary states of segment 1 (Dabblers) are short part-time (5-15) with few hours (<5) and inactive (0) as secondary states. Short part-time is also the primary state for segment 2 (Temporaries), with long part-time (15-30) and few hours as secondary states. The primary state of segment 3 (Regulars) is long part-time (full-time in 2021) with full-time (+30) and short part-time as secondary states. When excluding working time states where couriers are not on the platform, the trajectories in segment 1, on average, have its working time states concentrated in 82.8 % of the three most active working time states in the cluster, which is the case for 80.1 % and 91.2 % of segment 2 and 3, respectively.

We find similar stable trends in the other years (figures A5-A12, appendix) despite significant variations in online hours and the share of couriers on the platform (figures 1 and 2). This is further reflected in the relative proportion of total trajectories, online hours and working time state distributions throughout the six years (figures A15-A19, appendix). These trends are mainly seen in segment 1, where N/A, on average, makes up the large majority each year, with the remaining working time states only changing slightly within the six years. In the case of segments 2 and 3, variations in the distribution of trajectories, online hours, and working time state distributions appear to some extent in 2018 and 2019. In the case of segment 3, we further see that the average time spent in full-time and long part-time increases from 2020 onwards, corresponding with the rapid increase of online hours on the platform that year. However, we see high consistency in the segments during the six years overall.

Working time segmentation

The observations in the working time trajectories leave us with three segments of couriers on the platform. These three segments appear in each studied year, indicating stability and continuity. Their main characteristics are summarised in Table 3 and further described below, referencing figures A13-A19 in the appendix. To categorise the segments, we assign them distinct names that we suggest capture their specific working time activity (i.e. number of weekly hours and trajectory length).

Table 3. Three segments of couriers (summarised 2017-2022)

	Trajectory length	**Primary working time state**	**Share of online hours***	**Share of couriers***	**Nationality****			**VAT-registered****
					DK	**EU/ EAA**	**Third Country**	
1. Dabblers	Short	Short part-time	13 %	57 %	31 %	20 %	15 %	6 %
2. Temporaries	Medium	Short part-time	27 %	23 %	25 %	35 %	28 %	31 %
3. Regulars	Long	Long part-time	60 %	20 %	19 %	40 %	40 %	73 %

** Total 2017-2021, **Average of 2021-2022 (N/A 2021 and 2022: Dabblers 22 %, 45 %; Temporaries 7 %, 15 %; Regulars 0 %, 1 %.*

(1) Dabblers (segment 1) are groups of couriers with limited activity on the platform. The name suggests this segment's loose affiliation with the platform. These couriers work short part-time (5-15 hours) or a few weekly hours (<5) for a short period before eventually leaving the platform. This segment's average length of trajectories ranges from 7.4 to 10.4 weeks in any given year. Dabblers are characterised by mainly being off the platform, accounting for 79% to 86.9% of their working time states (i.e. weekly online hours) each year. However, when active on the platform, Dabblers spend most of their time in short part-time (5-15 hours), which comprise 4.0-7.3 % of their activity annually. Additionally, 3.8-4.4 % of their annual activity lies within a few hours

(<5), and 2.5% to 4.9% is "inactive". These trends are evident in the total share of online hours among Dabblers, which ranges from 11 to 17 % over this five-year period, which is the lowest among the three segments. Nevertheless, Dabblers constitute the largest group of couriers in the five years by accounting for 53 % to 59 % of all couriers over the five years. Regarding demographic characteristics, Dabblers include the largest share of couriers registered with a Danish background (31 % average) but with a substantial proportion of missing values (N/A) for both years. As most couriers from the two other segments register their nationality in their profiles, the relatively high missing values for Dabblers would reflect their lower engagement on the platform with limited profile information. Additionally, only 4-8 % of Dabblers registered as self-employed in 2021 and 2022, which suggests that most of these couriers earn less than DKK 50,000 annually from the platform.

2) Temporaries (segment 2) represent a group of moderately active couriers on the platform. We use this name to emphasise that this segment works mainly part-time (5-15 hours) on the platform and often temporarily. Unlike Dabblers, Temporaries tend to stay significantly longer on the platform, with average trajectory lengths of 28.6 to 42 weeks in individual years. Temporaries allocate most of their active hours in short part-time (5-15 hours), accounting for 18.5% to 34% of their annual activity. This is followed by 7.7% to 19.7% of their activity in few hours (<5) and 7.8% to 19.7% in long part-time (15-30 hours). Their share of total platform hours ranges from 16% to 37% annually, much larger than Dabblers. However, unlike Dabblers, Temporaries represent a relatively smaller segment on the platform, comprising 16-29 % of all couriers in each of the six years. Regarding nationality, Temporaries have a relatively even distribution of couriers from Denmark, EU/EAA and third countries, with around 30 % in each group. Temporaries are more likely than Dabblers to have their own company, with 25-36 % of Temporaries being VAT-registered in 2021 and 2022.

3) *Regulars (segment 3)* are highly active couriers on the platform who often work long part-time (15-30 hours) or full-time (+30 hours) and stay longer on the platform, which suggests regularity.

Their trajectories span from an average of 38.5 to 51.5 weeks on the platform, indicating that some Regulars have been active there for over a year. Compared to Dabblers and Temporaries, Regulars have a more even distribution of working time states on the platform. However, the share of Regulars with many weekly working hours is significantly higher than that of Dabblers and Temporaries. Long part-time work (15-30 hours) constitutes 25.3% to 37.4% of their annual activity, while 20.3 – 32.3 % of the activity is spent in full-time (+30). Short part-time (5-15) varies from 17.7-35 % of the activity for the different years. Although the Regulars and Temporaries represent a smaller group among the platform couriers, accounting for 17-25 % of all couriers each year, they perform the majority (50-67 %) of online hours annually. Moreover, Regulars are further characterised by a high share of couriers from both EU/EAA (38-42 %) and third countries (39-42 %), but with the lowest proportion of Danish couriers (16-22 %). Compared to Dabblers and Temporaries, Regulars are more likely to be VAT registered (58-87 %) and thus have their own business and work as self-employed.

5. Discussion

The flexible platform firm

The working time patterns of our three identified segments reveal key insights regarding core-periphery dynamics and labour market dualism at gig work platforms, which deviate from existing frameworks (Atkinson, 1987; Doeringer & Piore, 1971). Regulars could be considered core workers due to the many working hours over time within the existing flexible firm model. However, the large proportion of foreigners in the segment share characteristics with labour market outsiders in the secondary sector (Rubery, 2007). As indicated in existing research, the secondary sector is typically dominated by workers with predominantly foreign backgrounds, who have few employment opportunities and limited access to welfare services (Silberman et al., 2007). Therefore, they often pursue job opportunities in easily accessible, low-skilled jobs such as gig work platforms (van Doorn et al., 2022). Likewise, Dabblers can be considered periphery workers on the

platform due to their low levels of engagement with short part-time or few weekly working hours over a few months (Atkinson, 1987). At the same time, a substantial part of workers in this segment, notably those with Danish backgrounds, may share characteristics with labour market insiders in the primary sector who have access to other job opportunities outside the platform (Rubery, 2007). Therefore, we propose that the core-periphery model unfolds inside-out at the gig work platforms compared to Atkinson's (1987) conceptualisation of the flexible firm. Within the existing SLM framework, the full-time employed and specialised core workers belong to the regulated primary sector of the labour market (Atkinson, 1987; Doeringer & Piore, 1971). Correspondingly, the loosely attached and low-skilled periphery workers belong to the less regulated secondary sector (ibid). We argue that the platform's core may dominantly consist of labour market outsiders from the secondary sector. In contrast, a significant proportion of the platform periphery stems from labour market insiders in the primary sector. These dynamics in highly flexible work settings illustrated by the working time patterns over time at our studied platform have not yet been considered in the SLM literature. Future studies of inequalities within digital labour markets may benefit from taking similar longitudinal perspectives to grasp the interplay between new types of workplaces and the broader societal context (Heckman & Singer, 2008).

Platform segmentation: demand- or supply-driven?

As shown in our analysis, the three segments remain relatively stable over time under different conditions on the platform, as the number of active couriers and the total number of hours vary significantly between years. Therefore, platform developments do not appear to have altered the three segments' general composition and working time patterns.

Specific demand- and supply mechanisms may influence some segmentation trends on the platform, as outlined in existing research (Grimshaw et al., 2017). For instance, findings indicate that platforms are inclined to meet increasing demands by introducing measures such as extended opening hours and wage bonuses that would make some couriers work additional hours on the

platform (Cullen & Farronato, 2021; Heiland, 2022; Sengenberger, 1981). The increase in long part-time and full-time activity for Regulars from 2020 onwards could reflect a process of demand-driven segmentation, where Regulars increase their presence further on the platform (Cui et al., 2022; Doeringer & Piore, 1971). However, given the consistent presence of segments on the platform, this could instead point to processes of supply-driven segmentation shaping these segments (Peck, 1989). This calls for further research into the socioeconomic positions of platform workers, as they may enter and work on the platform based on various needs that result in different levels of weekly working hours (Rubery, 2007). Empirical research indicates that many students and workers with foreign backgrounds turn to platform work as their supplementary or main income, often due to challenges finding stable employment elsewhere (Piasna & Drahokoupil, 2021; van Doorn et al., 2022). However, future studies are needed to analyse the interplay between demand- and supply mechanisms forming, for instance, the working time patterns in various platform contexts (Grimshaw et al., 2017).

Policy implications

The three segments identified also relate to ongoing political debates on regulating the most contested aspects of the platform economy (Schmidt-Kessen et al., 2020). A specific EU directive has been proposed to improve the most contested aspects of platform work, including the employment status of platform workers along with algorithmic management, data transparency, health and safety, collective bargaining and worker representation (European Commission, 2021). In the case of the latter, a presumption rule (chapter 2, article 4) may lead to many platform workers being classified as employees if the platforms fulfil several specified parameters. The directive may thus secure minimum labour standards for wages, working time and social protection for workers active on different platforms (Rosin, 2022). However, these standards may not necessarily comply with all interests of the different segments of platform workers (Kristiansen et al., 2022; Piasna & Drahokoupil, 2021). For instance, the most vulnerable workers with few other

options for traditional employment stand to benefit from the directive. However, research suggests that most platform workers often work supplementary hours on a temporary basis (e.g. Temporaries), where some may favour flexibility over social protection by remaining self-employed on the platform. These perspectives further relate to recent research on platform workers' representation and mobilisation (Hau & Savage, 2022; Tassinari & Maccarrone, 2020). While these studies highlight the potential of mobilising platform workers in novel ways (e.g. online), they also point to the difficulties in organising more significant groups of platform workers due to their various levels of engagement (ibid). Our identification of three distinct working time segments suggests that future research and initiatives should consider the varying levels of working activity, which calls for a differentiated approach to mobilising platform workers. Recent collective agreements and organising practices in the Nordics and the EU attempt to address the dissimilar interests of platform workers, including the possibility of being either employed or self-employment on the platform (Cini et al., 2022; Ilsøe & Söderqvist, 2023). However, as digital labour platforms are still establishing themselves in the labour market, the sustainability of these agreements still needs to stand the test of time (ibid).

6. Conclusions

While extensive research has explored working conditions at gig work and food delivery platforms in recent years, there are few examples of research on the developments in working conditions over time due to researchers' limited accessibility to longitudinal data from the platforms (Kässi & Lehdonvirta, 2018). This article bridges this research gap by utilising digitally derived working time series of a total population of couriers (N = 20090) from Wolt, a large food delivery platform operating in Denmark.

Inspired by the segmented labour market (SLM) (Doeringer & Piore, 1971; Peck, 1989), our analysis introduces a novel use of working time as a critical indicator for platform segmentation and

reveals three segments of couriers – Dabblers, Temporaries and Regulars – with consistent working time patterns on the platform. Dabblers are typically only active on the platform for a few months and tend to work short part-time (5-15 hours) or a few hours (less than 5 hours per week). Temporaries work mainly short part-time over several months on the platform, and Regulars work long part-time (15-30 hours) or full-time (+30 hours) over approximately a year. Workers with foreign backgrounds are notably prevalent among Temporaries and Regulars.

We argue that the flexible platform firm represents the inverse of Atkinson's (1987) flexible firm concept: Regulars may, as core platform workers, operate on the less regulated secondary sector of the traditional job market, while Dabblers, as peripheral platform workers might have better prospects in the primary sector of the traditional job market (Atkinson, 1987; Doeringer & Piore, 1971). These dynamics have not yet been considered within the existing SLM literature, and we highlight the significance of a longitudinal approach in understanding how worker inequalities manifest in digital labour markets.

Limitations and future studies

This study has different limitations which further studies should address. First, as mentioned, we could not assess the accuracy of the weekly summarised online hours or the low data quality of the demographic data (age, gender, nationality, VAT registration) provided by the platform. Our platform data may also contain calculation errors, although we would expect errors to be consistent across the data. Secondly, our demographic data is limited to two variables and two years (2021 and 2022), which calls for including additional demographic characteristics to analyse demand-supply dynamics (Peck, 1989). Thirdly, our study calls for further research into how the platform worker segments distribute their working hours during the week (e.g. peak hours, weekends, etc.) and how platforms rely on different types of working patterns for functional and numerical flexibility (Atkinson, 1987; Marginson & Sisson, 2006). Additionally, comparative re-

search across various digital labour platforms is necessary to assess the prevalence of the segments in different sectors and institutional settings (Cui et al., 2022; Grimshaw et al., 2017). Finally, it could be interesting to explore how the working time patterns of the three platform segments compare to other non-standard work settings in similar industries (Larsen et al., 2019).

References

Abbott, A. (1995). Sequence Analysis: New Methods for Old Ideas. *Annual Review of Sociology*, *21*, 93–113.

Aliosi, A., Altenried, M., & Anwar Mohammad Amir. (2020). *Open Letter and Principles for Ethical Research on the Gig Economy*.

Arnholtz, J., & Navrbjerg, S. E. (2020). *Lønmodtageres faglige organisering 2000-2018*. Forskningscenter for Arbejdsmarkeds-og Organisationsstudier, Sociologisk ….

Atkinson, J. H. (1987). Flexibility or Fragmentation?: The United Kingdom Labour Market in the Eighties. *Labour and Society : A Quarterly Journal of the International Institute for Labour Studies*, *12*(1), 87–105.

Berg, J., & Johnston, H. (2019). Too good to be true? A comment on Hall and Krueger's analysis of the labor market for Uber's driver-partners. *ILR Review*, *72*(1), 39–68.

Berglund, T., Nielsen, R. A., Reichenberg, O., & Svalund, J. (2021). Temporary Contracts, Employment Trajectories and Dualisation: A Comparison of Norway and Sweden. *Work, Employment and Society*, 09500170211031466. https://doi.org/10.1177/09500170211031466

Cappelli, P., & Keller, J. R. (2013). Classifying work in the new economy. *Academy of Management Review*, *38*(4), 575–596.

Cini, L., Maccarrone, V., & Tassinari, A. (2022). With or without U(nions)? Understanding the diversity of gig workers' organizing practices in Italy and the UK. *European Journal of Industrial Relations*, *28*(3), 341–362. https://doi.org/10.1177/09596801211052531

Cook, C., Diamond, R., Hall, J. V., List, J. A., & Oyer, P. (2021). The Gender Earnings Gap in the Gig Economy: Evidence from over a Million Rideshare Drivers. *The Review of Economic Studies*, *88*(5), 2210–2238. https://doi.org/10.1093/restud/rdaa081

Cui, R., Zhang, W., & Zheng, Z. (2022). *Market Thickness and Delivery Efficiency in Food Delivery Platforms*.

Cullen, Z., & Farronato, C. (2021). Outsourcing Tasks Online: Matching Supply and Demand on Peer-to-Peer Internet Platforms. *Management Science*, *67*(7), 3985–4003. https://doi.org/10.1287/mnsc.2020.3730

Doeringer, P. B., & Piore, M. J. (1971). *Low-Income Employment and the Disadvantaged Labour Force, and Qualitative Analysis of Wolker Instability in the Low-Income Labour Market*. Internal Labour Markets and Manpower Analysis. Lexington, MA: DC Heath.

Gabadinho, A., Ritschard, G., Müller, N. S., & Studer, M. (2011). Analyzing and Visualizing State Sequences in *R* with TraMineR. *Journal of Statistical Software*, *40*(4). https://doi.org/10.18637/jss.v040.i04

Galière, S. (2020). When food-delivery platform workers consent to algorithmic management: A Foucauldian perspective. *New Technology, Work and Employment*, *35*(3), 357–370. https://doi.org/10.1111/ntwe.12177

Goods, C., Veen, A., & Barratt, T. (2019). "Is your gig any good?" Analysing job quality in the Australian platform-based food-delivery sector. *Journal of Industrial Relations*, *61*(4), 502–527. https://doi.org/10.1177/0022185618817069

Griesbach, K., Reich, A., Elliott-Negri, L., & Milkman, R. (2019). Algorithmic Control in Platform Food Delivery Work. *Socius: Sociological Research for a Dynamic World*, *5*, 237802311987004. https://doi.org/10.1177/2378023119870041

Grimshaw, D., Fagan, C., Hebson, G., & Tavora, I. (2017). A new labour market segmentation approach for analysing inequalities: Introduction and overview. In *Making work more equal*. Manchester University Press.

Haipeter, T. (2020). Digitalisation, unions and participation: The German case of 'industry 4.0.' *Industrial Relations Journal*, *51*(3), 242–260. https://doi.org/10.1111/irj.12291

Hau, M. F., & Savage, O. G. (2022). Building coalitions on Facebook:'social media unionism'among Danish bike couriers. *New Technology, Work and Employment*.

Heckman, J., & Singer, B. S. (2008). *Longitudinal analysis of labor market data*. Cambridge University Press.

Heiland, H. (2022). Neither timeless, nor placeless: Control of food delivery gig work via place-based working time regimes. *Human Relations*, *75*(9), 1824–1848. https://doi.org/10.1177/00187267211025283

Ilsøe, A. (2016). From living wage to living hours – the Nordic version of the working poor. *Labour & Industry: A Journal of the Social and Economic Relations of Work*, *26*, 40–57. https://doi.org/10.1080/10301763.2016.1152534

Ilsøe, A., & Larsen, T. P. (Eds.). (2021). *Non-standard work in the Nordics: Troubled waters under the still surface*. Nordisk Ministerråd. http://urn.kb.se/resolve?urn=urn:nbn:se:norden:org:diva-7209

Ilsøe, A., & Larsen, T. P. (2022, June 29). *Digitale arbejdsmarkeder—Fra jobs til opgaver*. Djøf Forlag. https://www.djoef-forlag.dk/digitale-arbejdsmarkeder

Ilsøe, A., Larsen, T. P., & Bach, E. S. (2021). Multiple jobholding in the digital platform economy: Signs of segmentation. *Transfer: European Review of Labour Research*, 1–18.

Ilsøe, A., & Söderqvist, C. F. (2023). Will there be a Nordic model in the platform economy? Evasive and integrative platform strategies in Denmark and Sweden. *Regulation & Governance*, *17*(3), 608–626. https://doi.org/10.1111/rego.12465

Kalleberg, A. L., & Dunn, M. (2016). Good Jobs, Bad Jobs in the gig economy. *Perspectives on Work*, 10–14.

Kässi, O., & Lehdonvirta, V. (2018). Online labour index: Measuring the online gig economy for policy and research. *Technological Forecasting Social Change*, *137*, 241–248.

Kristiansen, J. H., Larsen, T. P., & Ilsøe, A. (2022). Hybrid Work Patterns: A Latent Class Analysis of Platform Workers in Denmark. *Nordic Journal of Working Life Studies*. https://doi.org/10.18291/njwls.133721

Kuhn, K. M., & Maleki, A. (2017). Micro-entrepreneurs, Dependent Contractors, and Instaserfs: Understanding Online Labor Platform Workforces. *Academy of Management Perspectives*, *31*(3), 183–200. https://doi.org/10.5465/amp.2015.0111

Larsen, T., Ilsøe, A., & Felbo-Kolding, J. (2019). Part-time work in Danish private services: A (mis) match between wage flexibility and living hours. *Dualisation of Part-Time Work*, 133–158.

Larsen, T. P., Ilsøe, A., & Felbo-Kolding, J. (2019). Part-time work in Danish private services: A (mis)match between wage flexibility and living hours. In H. Nicolaisen, H. C. Kavli, & R. S. Jensen (Eds.), *Dualisation of Part-Time Work* (1st ed., pp. 133–158). Bristol University Press. https://doi.org/10.2307/j.ctvjnrth2.12

Lazer, D., Hargittai, E., Freelon, D., Gonzalez-Bailon, S., Munger, K., Ognyanova, K., & Radford, J. (2021). Meaningful measures of human society in the twenty-first century. *Nature*, *595*(7866), 189–196. https://doi.org/10.1038/s41586-021-03660-7

Lesnard, L. (2006). *Optimal Matching and Social Sciences*. https://halshs.archives-ouvertes.fr/halshs-00008122

Marginson, P., & Sisson, K. (2006). Working Time Patterns: Confirming the Significance of the Sector. In P. Marginson & K. Sisson (Eds.), *European Integration and Industrial Relations: Multi-Level Governance in the Making* (pp. 271–288). Palgrave Macmillan UK. https://doi.org/10.1057/9780230504103_10

Moore, S., & Newsome, K. (2018). Paying for Free Delivery: Dependent Self-Employment as a Measure of Precarity in Parcel Delivery. *Work, Employment and Society*, *32*. https://doi.org/10.1177/0950017018755664

Munksgaard, R., Demant, J., & Branwen, G. (2016). A replication and methodological critique of the study "Evaluating drug trafficking on the Tor Network." *International Journal of Drug Policy*, *35*, 92–96.

Nätti, J., & Nergaard, K. (2019). Dualisation or normalisation of part-time work in the Nordic countries: Work insecurity and mobility over time. In *Dualisation of Part-Time Work* (pp. 217–242). Policy Press.

Ojala, S., Nätti, J., & Lipiäinen, L. (2018). Types of Temporary Employment: An 8-Year Follow-Up of Labour Market Attachment. *Social Indicators Research*, *138*(1), 141–163. https://doi.org/10.1007/s11205-017-1648-7

Osterman, P. (1975). An Empirical Study of Labor Market Segmentation. *Industrial and Labor Relations Review*, *28*(4), 508–523. https://doi.org/10.2307/2521648

Peck, J. A. (1989). Labour Market Segmentation Theory. *Labour and Industry*, *2*(1), 119–144. https://doi.org/10.1080/10301763.1989.10669066

Piasna, A., & Drahokoupil, J. (2021). Flexibility unbound: Understanding the heterogeneity of preferences among food delivery platform workers. *Socio-Economic Review*, *19*(4), 1397–1419. https://doi.org/10.1093/ser/mwab029

Piasna, A., Zwysen, W., & Drahokoupil, J. (2022). The platform economy in Europe: Results from the second ETUI Internet and Platform Work Survey (IPWS). *ETUI Research Paper-Working Paper*.

Pulignano, V., Piasna, A., Domecka, M., Muszyński, K., & Vermeerbergen, L. (2022). *Does it Pay to Work? Unpaid Labour in the Platform Economy* (SSRN Scholarly Paper 4013358). https://doi.org/10.2139/ssrn.4013358

Rani, U., & Dhir, R. K. (2020). Platform Work and the COVID-19 Pandemic. *The Indian Journal of Labour Economics*, *63*(1), 163–171. https://doi.org/10.1007/s41027-020-00273-y

Rasmussen, S., Larsen, T. P., Ilsøe, A., Madsen, P. K., & Bach, E. S. (2021). Non-standard work in Denmark. In *Non-standard work in the Nordics. Troubled waters under the still*

surface: Report from The future of work: Opportunities and Challenges for the Nordic Models (pp. 73–84). Nordic Council of Ministers.

Rosin, A. (2022). Towards a European Employment Status: The EU Proposal for a Directive on Improving Working Conditions in Platform Work. *Industrial Law Journal*, *51*(2), 478–493. https://doi.org/10.1093/indlaw/dwac011

Rubery, J. (2007). Developing segmentation theory: A thirty year perspective. *Économies et Sociétés*, *28 (6)*. https://research.manchester.ac.uk/en/publications/developing-segmentation-theory-a-thirty-year-perspective

Schmidt-Kessen, M. J., Bergqvist, C., Jacqueson, C., Lind, Y., & Huffman, M. (2020). *"I'll call my Union", said the driver—Collective bargaining of Gig Workers under EU Competition Rules* (SSRN Scholarly Paper ID 3744177). Social Science Research Network. https://papers.ssrn.com/abstract=3744177

Sengenberger, W. (1981). Labour market segmentation and the business cycle. *The Dynamics of Labour Market Segmentation*, *2*, 243.

Silberman, R., Alba, R., & Fournier, I. (2007). Segmented assimilation in France? Discrimination in the labour market against the second generation. *Ethnic and Racial Studies*, *30*(1), 1–27. https://doi.org/10.1080/01419870601006488

Sutela, H., & Pärnänen, A. (2018). Platform jobs. *Helsinki: Statistics Finland*.

Tassinari, A., & Maccarrone, V. (2020). Riders on the Storm: Workplace Solidarity among Gig Economy Couriers in Italy and the UK. *Work, Employment and Society*, *34*(1), 35–54. https://doi.org/10.1177/0950017019862954

Taubman, P., & Wachter, M. L. (1986). Chapter 21 Segmented labor markets. In *Handbook of Labor Economics* (Vol. 2, pp. 1183–1217). Elsevier. https://doi.org/10.1016/S1573-4463(86)02011-4

Urzì Brancati, M. C., Pesole, A., & Fernandez-Macias, E. (2020). *New evidence on platform workers in Europe: Results from the second COLLEEM survey* (JRC Working Paper

JRC118570). Joint Research Centre (Seville site). https://econpapers.repec.org/paper/iptiptwpa/jrc118570.htm

Vallas, S., & Schor, J. B. (2020). What do platforms do? Understanding the gig economy. *Annual Review of Sociology*, *46*, 273–294.

van Doorn, N., Ferrari, F., & Graham, M. (2022). Migration and Migrant Labour in the Gig Economy: An Intervention. *Work, Employment and Society*, 09500170221096581. https://doi.org/10.1177/09500170221096581

Wilkinson, A., & Barry, M. (2020). *The Future of Work and Employment*. Edward Elgar Publishing. https://doi.org/10.4337/9781786438256

Williams, P., McDonald, P., & Mayes, R. (2021). Recruitment in the gig economy: Attraction and selection on digital platforms. *The International Journal of Human Resource Management*, *32*(19), 4136–4162. https://doi.org/10.1080/09585192.2020.1867613

Appendix

Figure A1. Total weekly number of active couriers 2017-2022

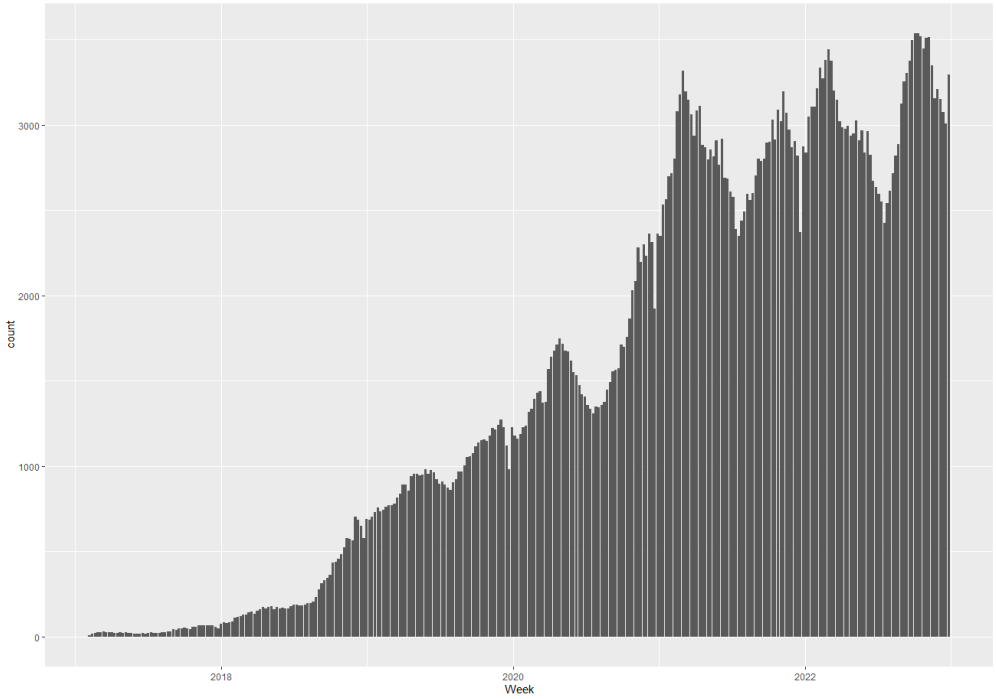


Figure A2. Full sequence of individual working time trajectories 2017-2022 (N = 20090)

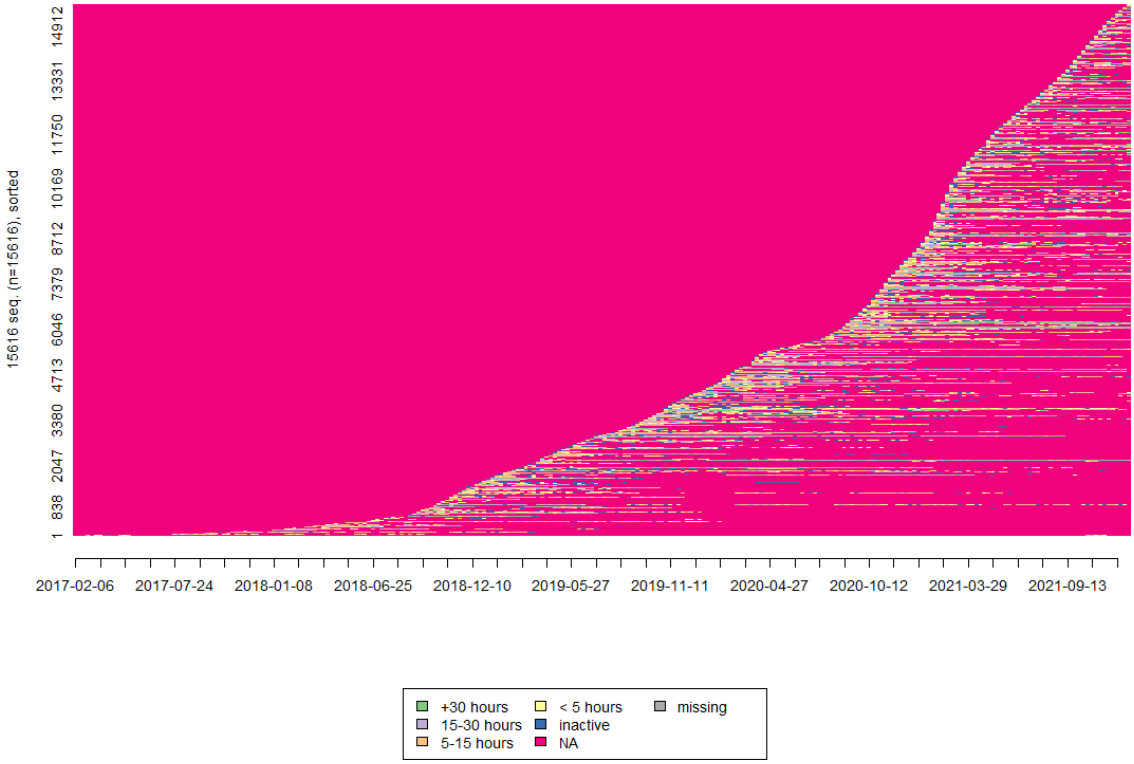


Table A1. Transition probabilities (all sequences 2017-2022)

	[-> fulltime]	[-> parttime]	supl. hours]	[-> few hours]	[-> inac-tive]	[-> NA]
[fulltime ->]	0.69	0.21	0.05	0.01	0.01	0.02
[parttime ->]	0.18	0.47	0.24	0.04	0.03	0.05
[supl. hours ->]	0.04	0.19	0.41	0.14	0.07	0.15
[few hours ->]	0.01	0.06	0.26	0.21	0.12	0.34
[inactive ->]	0.01	0.05	0.17	0.14	0.21	0.42
[NA ->]	0.00	0.00	0.00	0.00	0.00	0.99

Table A2. Substitution cost matrix for OM based on transition probabilities (all sequences 2017-2022)

	full-time	long part-time	short part-time	few hours	inactive	N/A
full-time	0.0	1.6	1.9	2.0	2.0	2.0
long part-time	1.6	0.0	1.6	1.9	1.9	1.9
short part-time	1.9	1.6	0.0	1.6	1.8	1.8
few hours	2.0	1.9	1.6	0.0	1.7	1.7
inactive	2.0	1.9	1.8	1.7	0.0	1.6
N/A	2.0	1.9	1.8	1.7	1.6	0.0

Figure A3. Sequence tree of clustering (all sequences 2017-2022) based on hierarchical agglomerative clustering

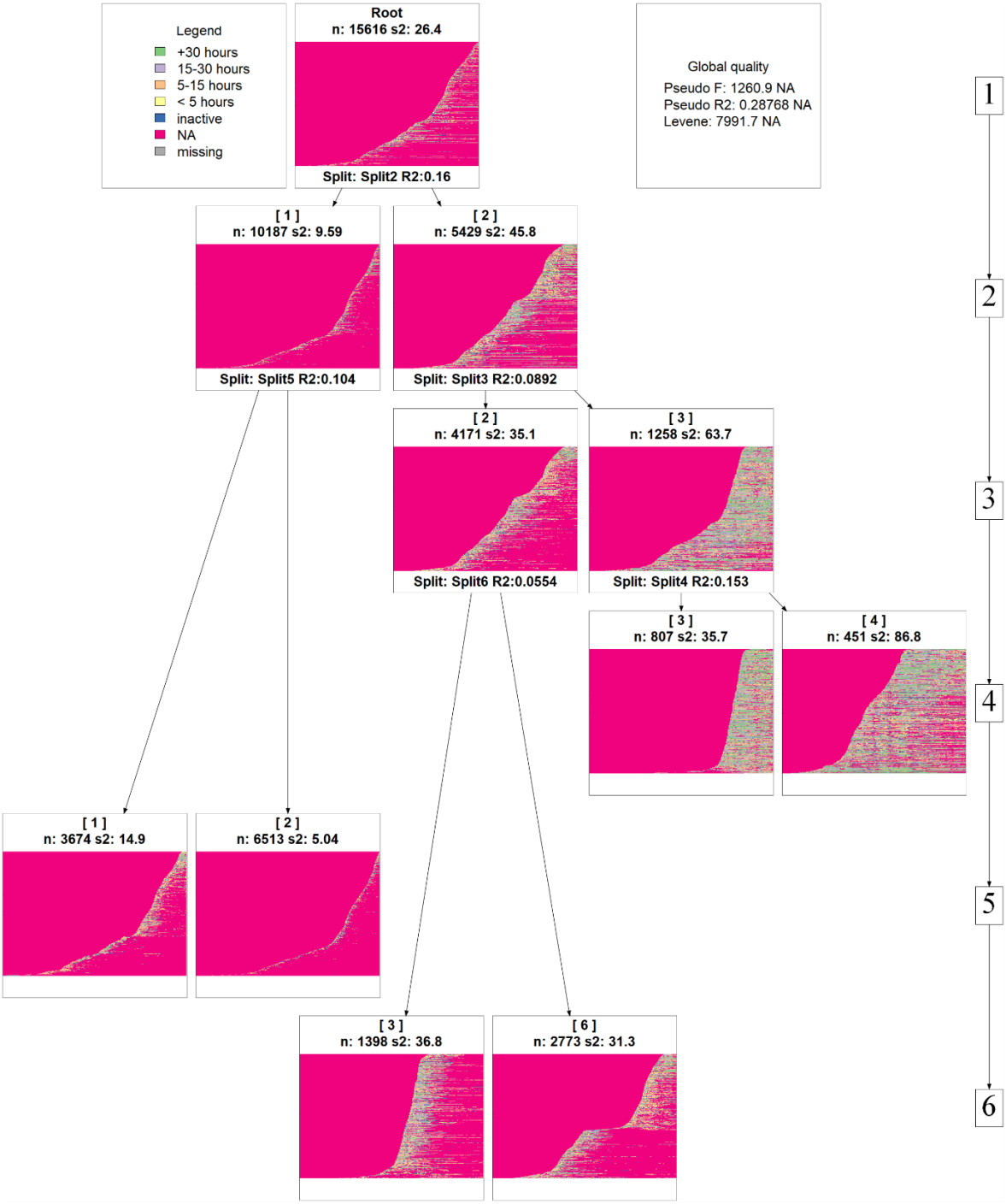


Figure A4. Coherence/minimum gap of different cluster solutions based on Ward's distance. High values = high internal cluster coherence

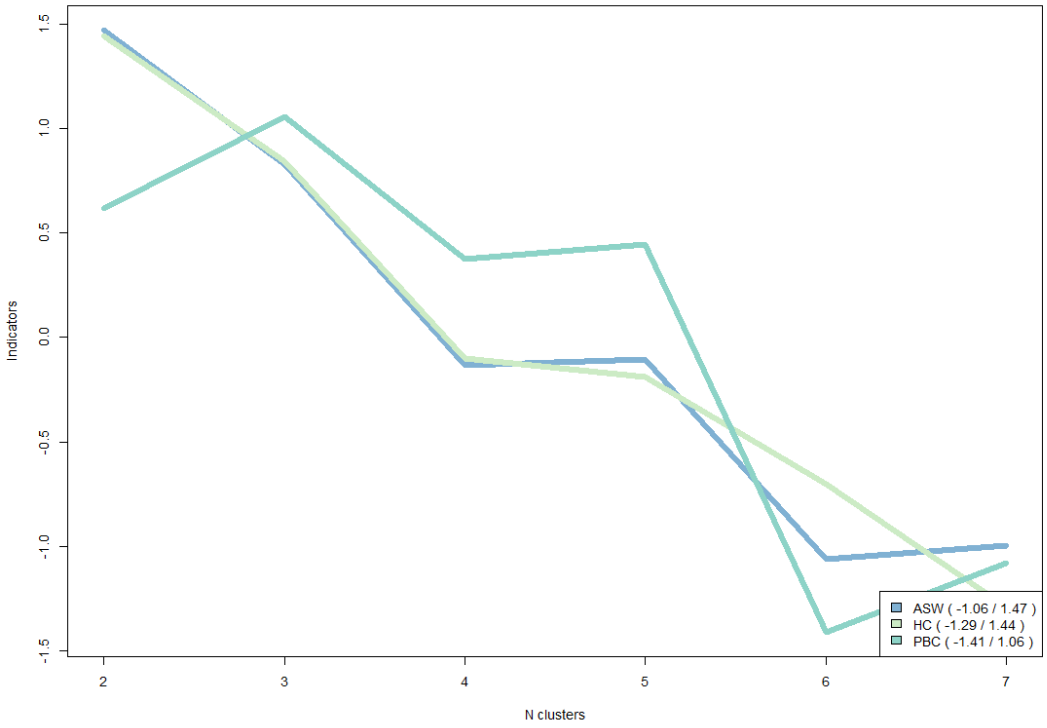


Figure A5. Three clusters with individual working time trajectories (2017, N = 177)

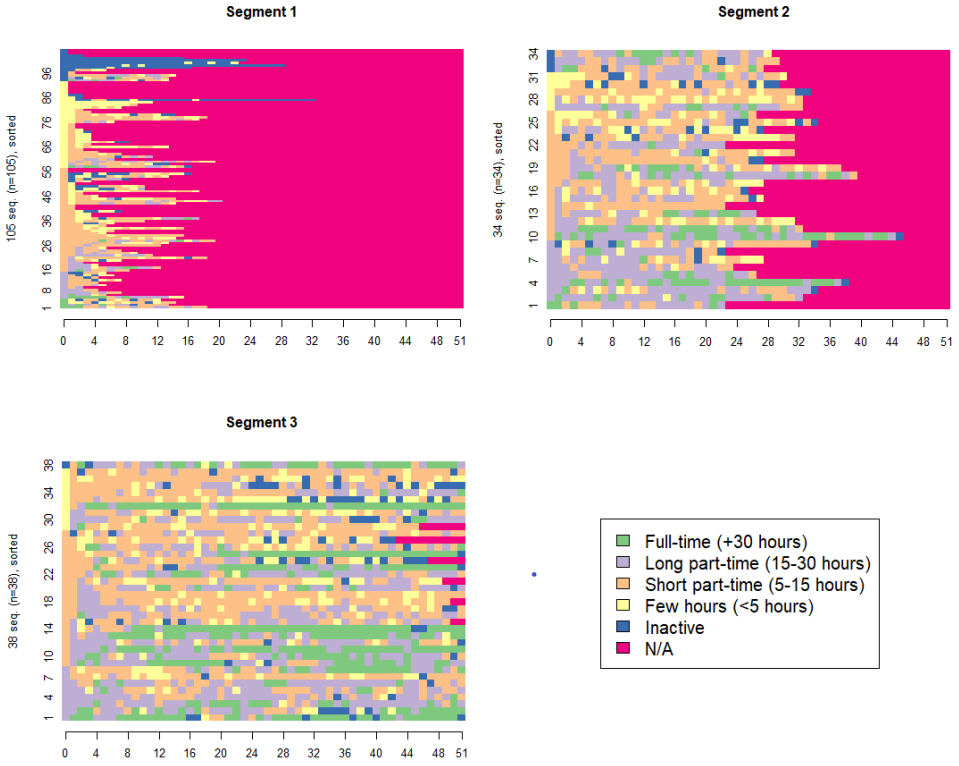


Figure A6. Three clusters with weekly state distributions (2017, N = 177)

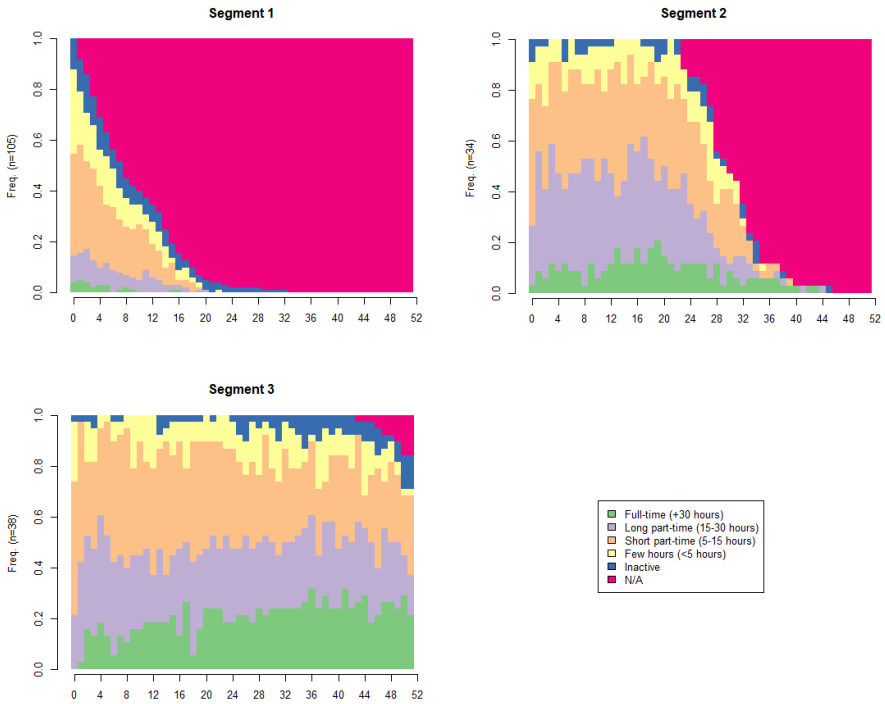


Figure A7. Three clusters with individual working time trajectories (2018, N = 1458)

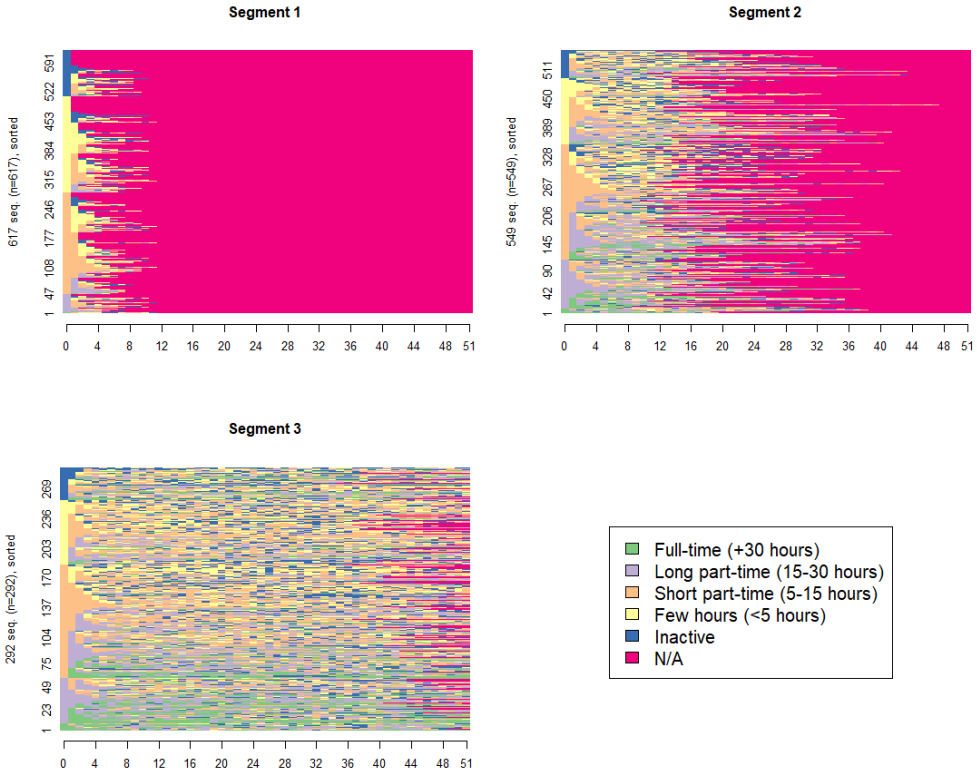
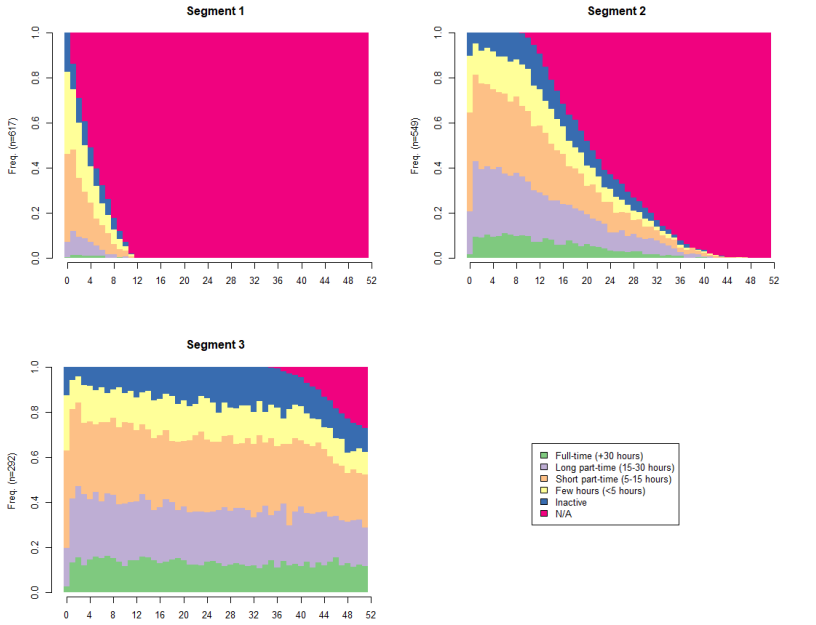


Figure A8. Three clusters with weekly state distributions (2018, N = 1458)



)

Figure A9. Three clusters with individual working time trajectories (2019, N = 2607)

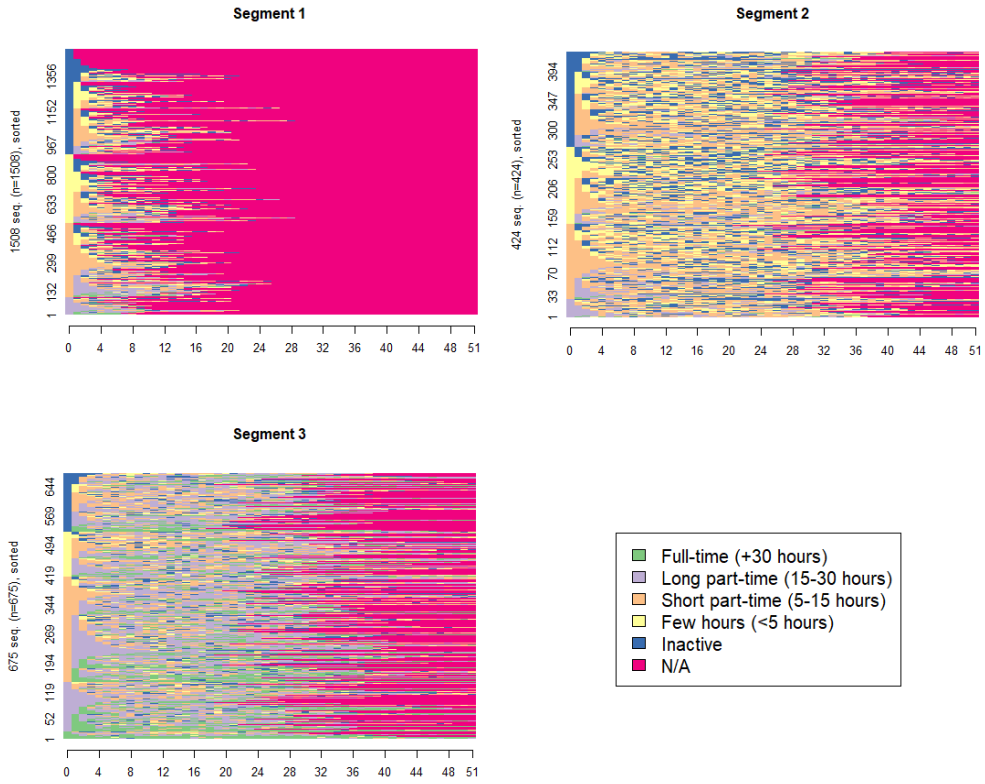


Figure A10. Three clusters with weekly state distributions (2019, N = 2607)

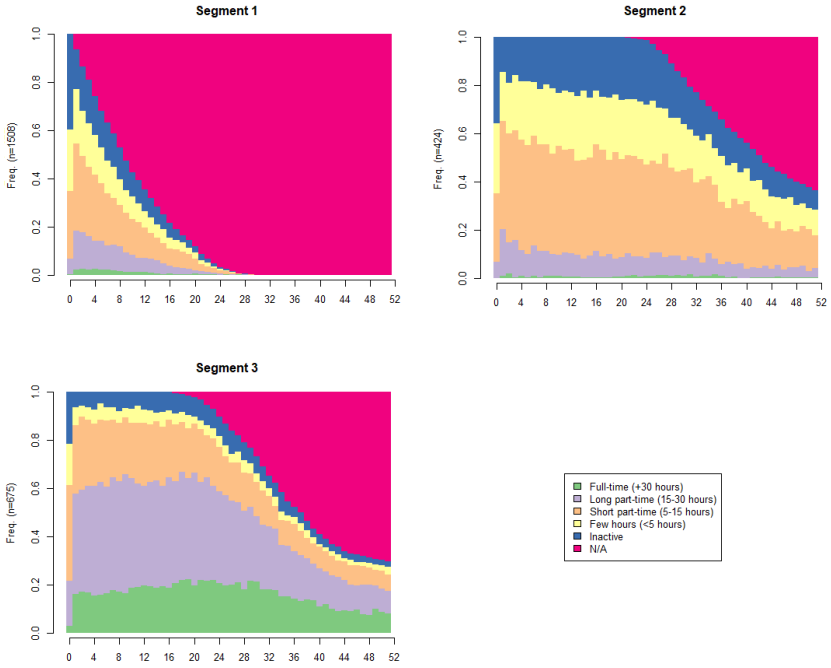


Figure A11. Three clusters with individual working time trajectories (2021, N = 7258)

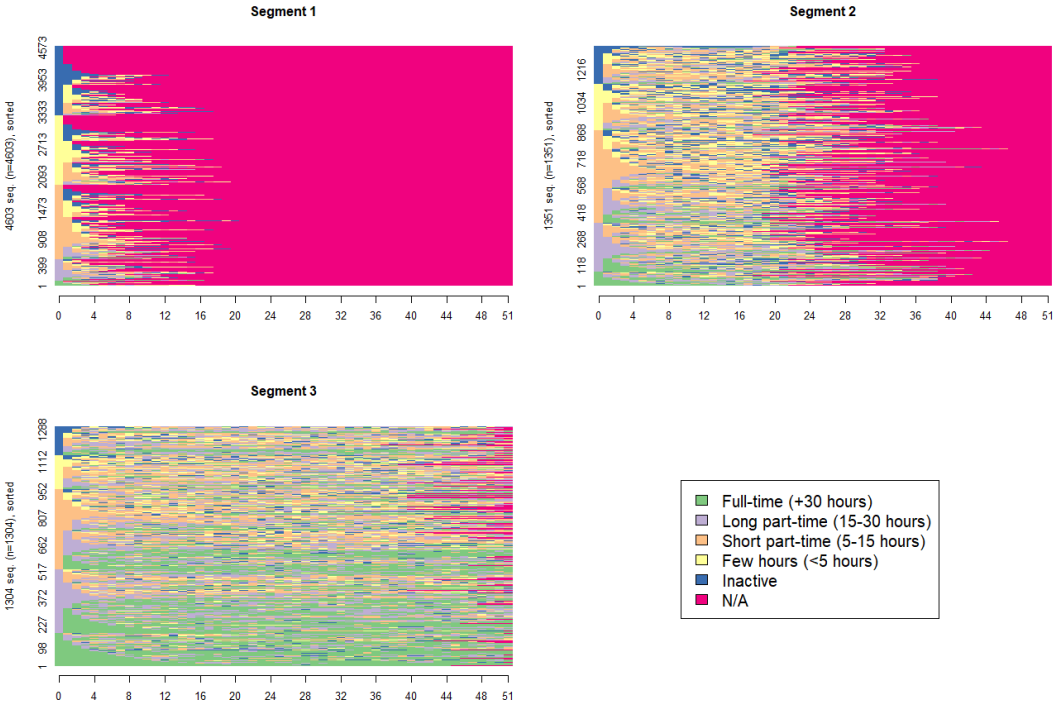


Figure A12. Three clusters with weekly state distributions (2021, N = 7258)

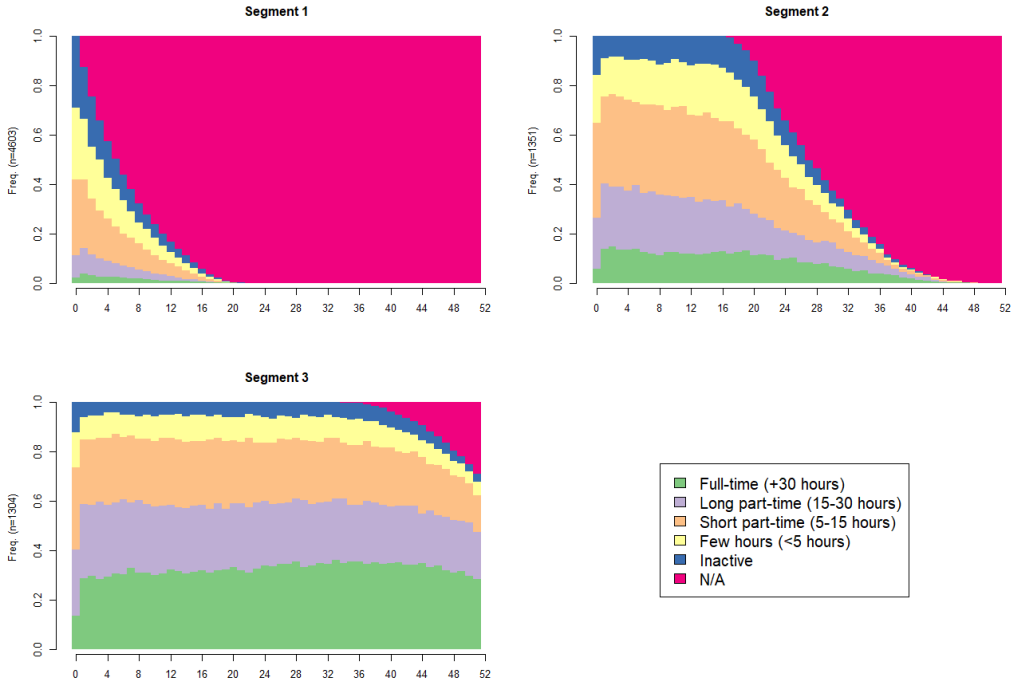
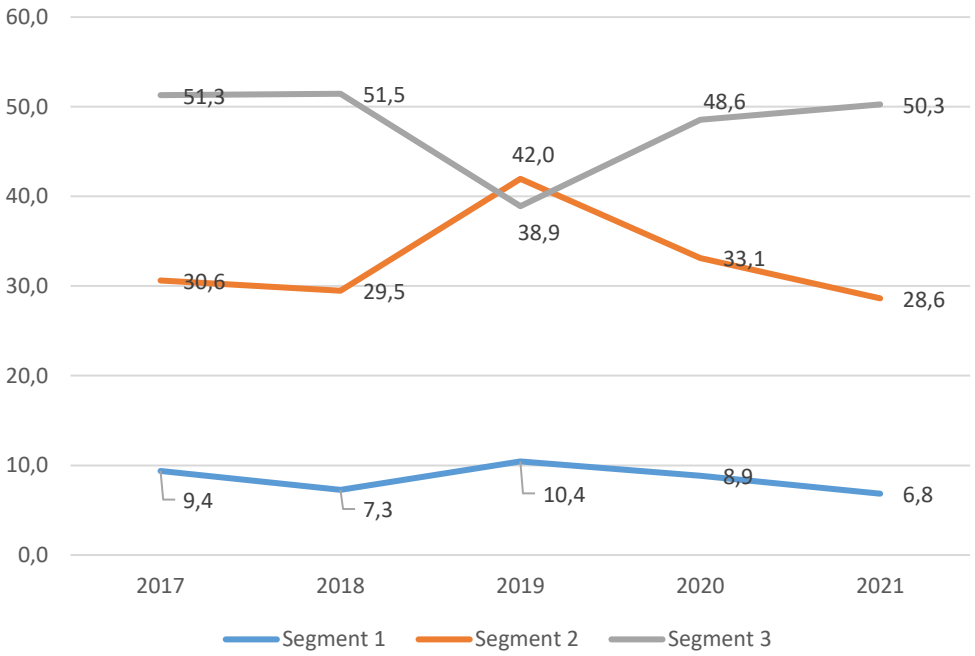
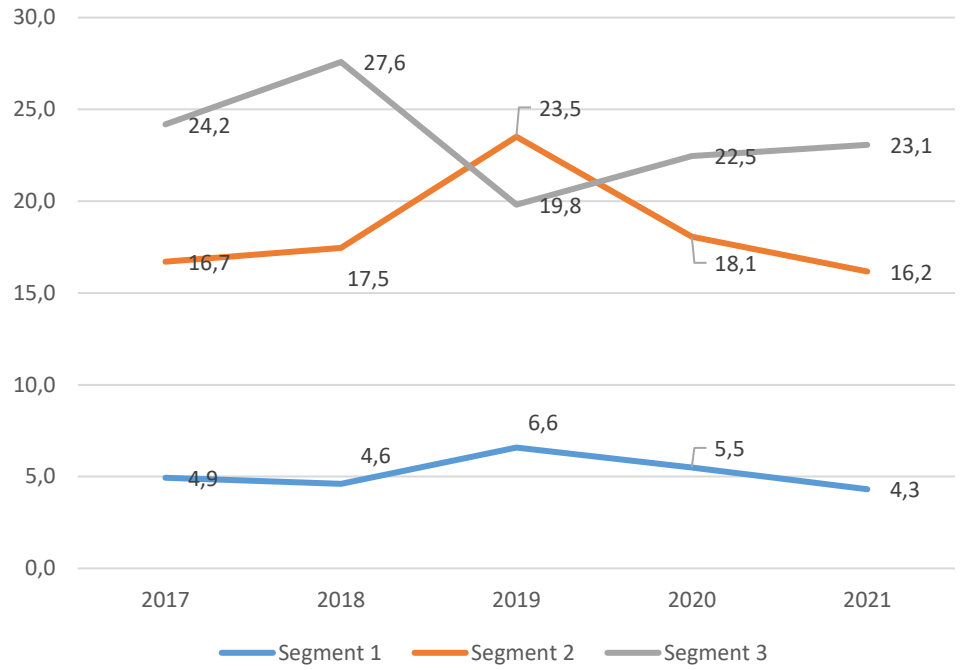


Figure A13. Average number of weeks active on the platform (52 weeks)



Standard deviance 2017-2021. Segment 1: 6.8, 4.9, 7.1, 5.7; Segment 2: 5.3, 8.4, 9.6, 9.5; Segment 3: 1.9, 1.8, 10.5, 5.1

Figure A14. Average number of transitions on the platform (52 weeks)



Standard deviance 2017-2021. Segment 1: 3.3, 3.1, 4.6, 3.6; Segment 2: 4.6, 6.1, 6.8, 6.4; Segment 3: 6.0, 6.4, 6.7, 7.1

Figure A15. Distribution of total of number of trajectories (52 weeks)

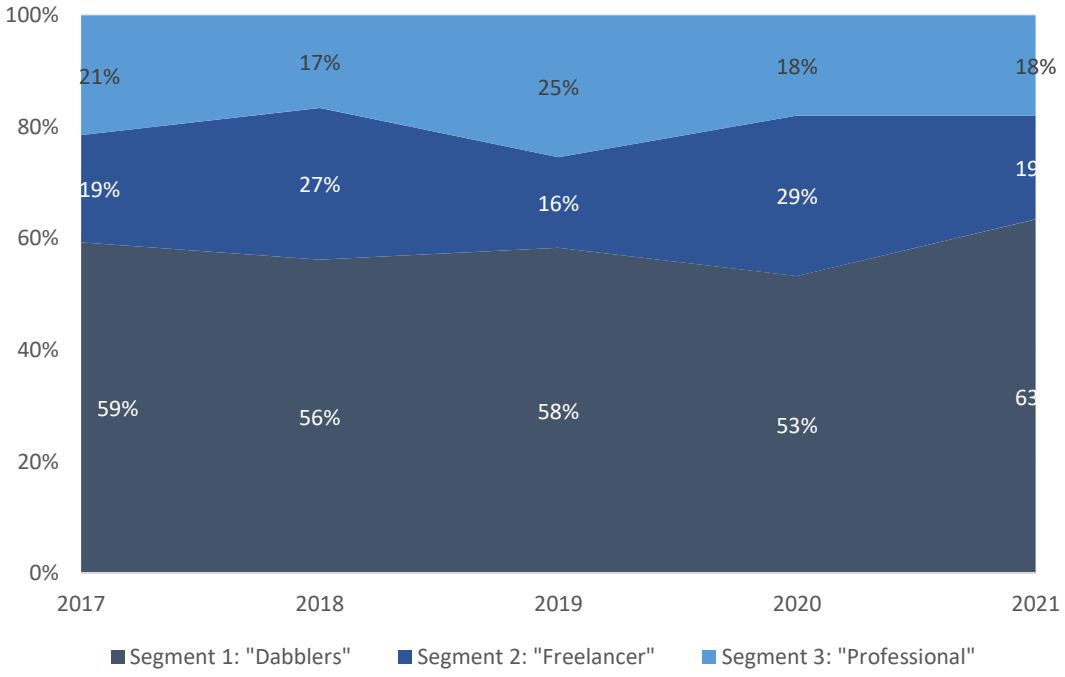


Figure A16. Distribution of total number of online hours (52 weeks)

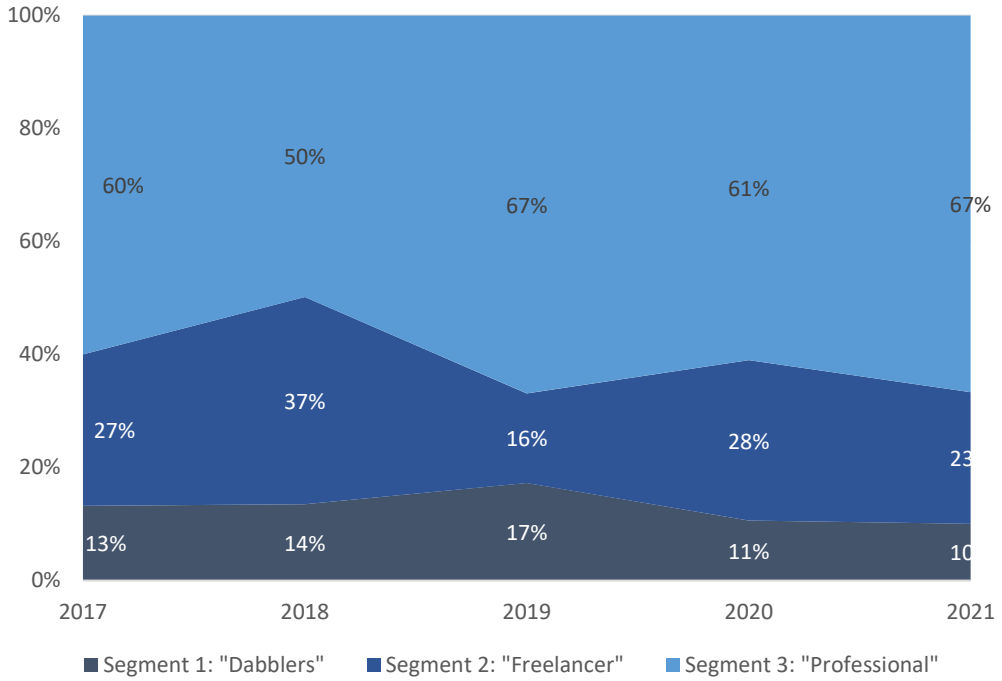


Figure A17. Average state distributions, Segment 1 (52 weeks).

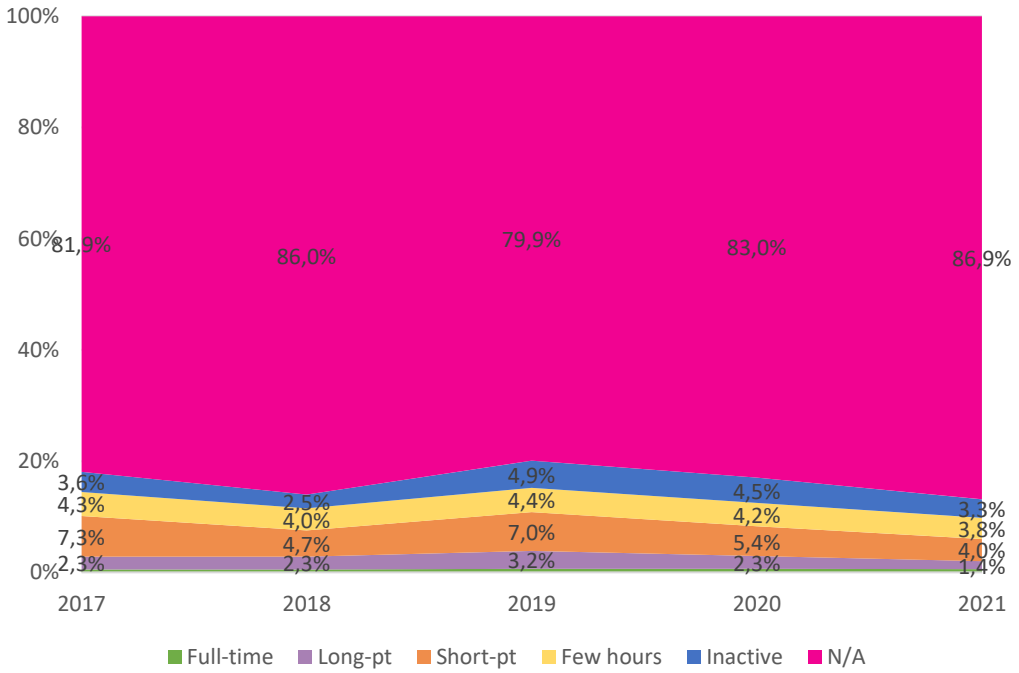


Figure A18. Average state distributions, Segment 2 (52 weeks).

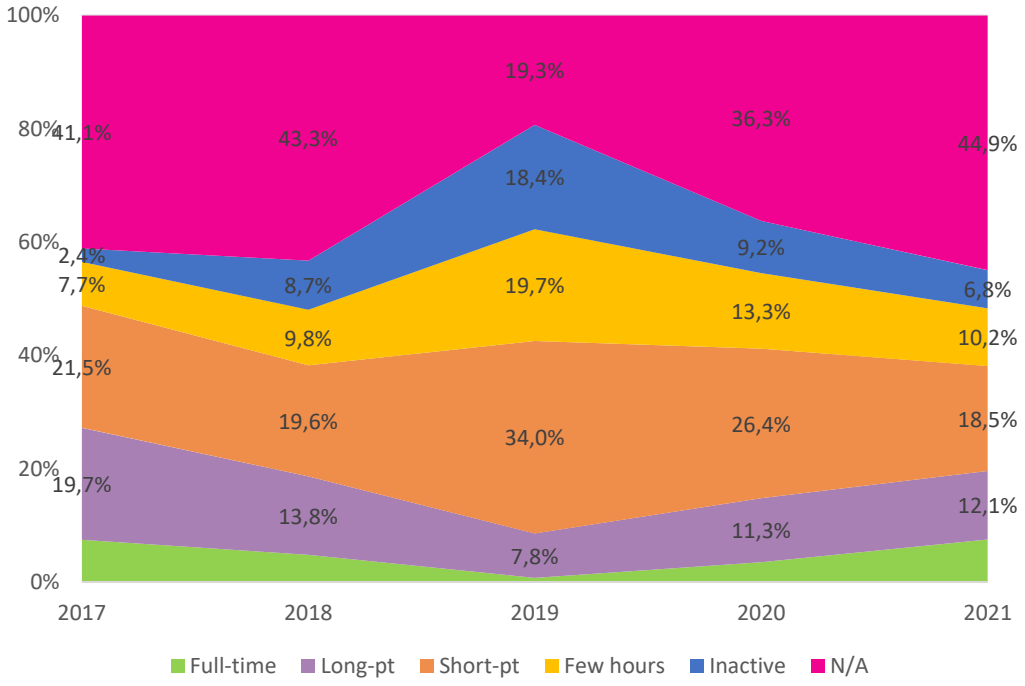
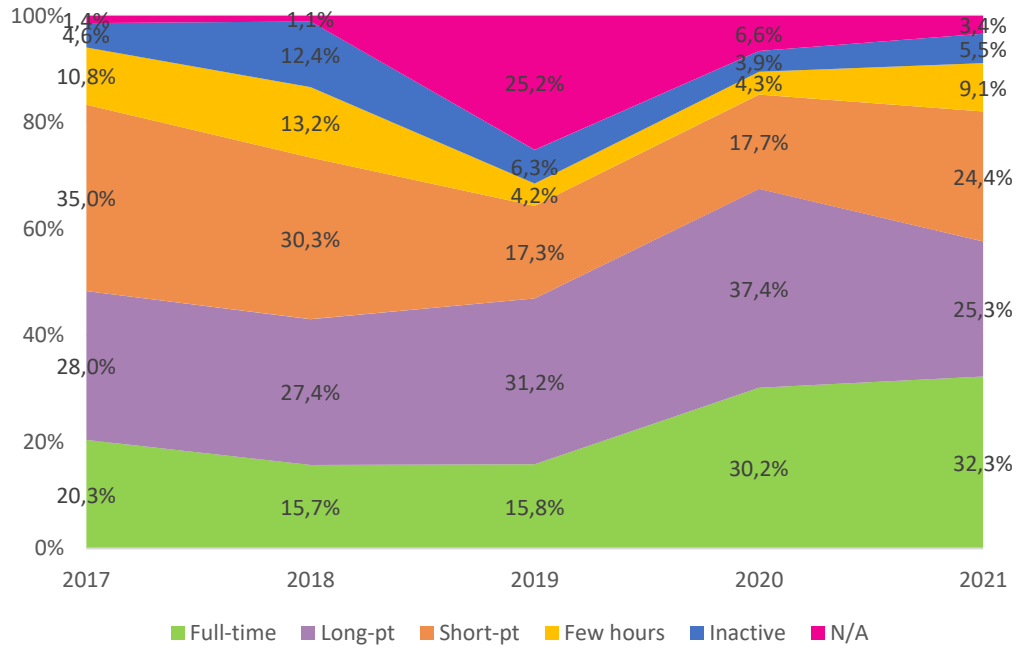


Figure A19. Average state distributions, Segment 3 (52 weeks).



Some gigs are better than others

Algorithmic strategies among food delivery couriers in Copenhagen

Christian Haldrup

Submitted to Nordic Journal of Working Life studies. Under review.

Abstract

This article engages with the relationship between worker agency and the quality of work (i.e., gig quality) in digital labour markets. Departing from prevalent top-down views of algorithmic management systems utilised by digital labour platforms, the article adopts an agency-centred approach based on Archer (2002) to investigate worker strategies employed towards the AM system for maximising earnings. Based on ten interviews with self-employed Wolt couriers in Copenhagen, Denmark, the article identifies four strategies: 1) flowing (accepting all orders), 2) fishing (selecting between orders), 3) squatting (commuting to specific restaurants for orders) and 4) hacking (manipulating particular features of the AM system). The article contributes by emphasising courier agency and assessing the gig quality, focusing on hourly earnings within the competitive platform setting. Due to noteworthy variations in the couriers' hourly earnings, the article discusses how access to other income sources relates to worker agency and gig quality.

Keywords: agency, algorithmic management, digital labour platforms, gig quality, self-employment

1. Introduction

Technological determinism versus individual agency remains an ongoing debate in societies driven by continual technological advancements (Wilkinson & Barry, 2020). Since Marx outlined the transformative power of large-scale machinery for reducing individuals' embeddedness in production tools, the impact on worker autonomy and productivity has been widely analysed in different contexts (Bimber, 1990; Vallas, 2006). The emergence of labour markets integrated with digitalised information systems has catalysed new discussions that echo debates from previous decades (Curchod et al., 2020). More recently, digital labour platforms have gained much attention because of the use of app-based technology and algorithms to remotely connect customers and workers for services and tasks (Duggan et al., 2020). By emphasising a modern capitalist ethos of autonomy and flexibility stemming from highly specialized-work places (Boltanski & Chiapello, 2005), some platforms offer these types of informal working arrangements in combination with low-skilled work such as cleaning or food delivery (Duggan et al., 2020). This includes flexible work schedules that let workers choose when and how much they want to work or degrees of freedom to carry out tasks without following specified instructions (Dunn, 2020).

In this article, I delve into these aspects by investigating the agency exercised by self-employed couriers operating on a food delivery platform and their strategies towards the platform's algorithmic management (AM) system for handling orders (i.e., gigs). Further, I consider how platform strategies relate to the quality of work (i.e., gig quality) with a specific focus on earnings. I address the following research question:

What strategies do gig workers apply towards the platform algorithm – and how do these strategies relate to the workers' gig quality?

Doing this, I elaborate on recent studies that examine worker agency at digital platforms (Anwar & Graham, 2020; Barratt et al., 2020) and depart from dominant views on platform workers' interaction with algorithmic management (AM) systems (Griesbach et al., 2019; Heiland, 2022).

Often defined as an "evaluative infrastructure' (Kornberger et al., 2017), AM forms a feedback loop where the platforms utilise data to evaluate worker performances and distribute tasks based on various criteria (Stark & Pais, 2021). Much empirical research has analysed AM as a top-down structure imposed by the platforms portraying workers as passive recipients of algorithmic control (Griesbach et al., 2019; Wood et al., 2019). This has mainly been put forward on platforms that facilitate low-skilled gig work characterised by on-site tasks of shorter duration, such as food delivery and cleaning (Dunn, 2020). These studies suggest that AM, often in combination with self-employed work arrangements, establishes a restrained and competitive working environment for platform workers (Heiland, 2022; Wood et al., 2019). This points to poor outcomes regarding gig quality, reflected in, for instance, low earnings and many unsocial working hours (ibid.).

In this study, I build an agency-centred framework grounded in Archer´s (2002) definition of "primary agents' to approach the workers as self-conscious acting individuals within the platform setting. Empirically, I draw on interviews with ten couriers working at Wolt, a large food delivery platform in Denmark that employs 'lenient' (Kusk & Bossen, 2022) AM practices, which enables couriers to accept or decline tasks without the risk of sanctions. I present two main contributions. First, based on my findings, I provide a perspective on how worker agency articulates within digital labour markets by putting forward four worker strategies toward AM on the platform. Together, the strategies represent a typology of different ways of engagement with the AM system for maximising earnings (Halkier, 2011). The four strategies are 1) *flowing*, where couriers accept all incoming orders 2) *fishing*, where couriers select between different types of orders 3) *squatting*, where couriers commute to the same restaurant or supermarket; and 4) *hacking*, where couriers take advantage of unintended errors within the AM system such as logging off the app and then logging in when reaching a preferred destination to get a specific order nearby offered instantly. Second, I engage with the job and gig quality literature and systematically focus on courier earnings per hour as a central gig quality indicator (Gundert & Leschke, 2023). My findings indicate that the competitive structure imposed by AM and self-employment does not per se lead

to "bad' gig quality but results in differentiated earnings between couriers (Barratt et al., 2020; Kalleberg, 2011). Based on these findings, I discuss the couriers' different ways of using their agency and how inequalities in earnings may relate to various circumstances, including their access to other income sources (Kuhn & Maleki, 2017; Schor et al., 2020).

The article is structured as follows: I establish the analytical framework and then introduce the methodology. Following this, I present the studied platform before analysing courier strategies towards the algorithm. I end the article by discussing the findings and drawing the main conclusions.

2. Analytical framework

The quality of gig work

In discussions regarding working conditions at digital labour platforms, aspects such as earnings and working hours have been linked to the broader multidimensional concept of job quality (Findlay, 2013; Muñoz de Bustillo et al., 2011). Research in this field focuses on various critical indicators to differentiate between what constitutes a "good' and "bad' job, as formulated by Kalleberg (2011). The job quality literature often takes its point of departure in "objectivist' criteria to assess job quality in employment relationships typically stated in standard employment contracts (Holman, 2013). "Good' objective criteria encompass elements like open-ended contracts, high wage standards (e.g., hourly or monthly), guaranteed minimum hours (e.g., weekly), and social protection (e.g., pensions) (Grimshaw et al., 2016). Examples of "bad jobs" usually include non-standard work arrangements with low wage levels, fluctuating and no guaranteed working hours, and lack of social protection (ibid.). In the past decades, the literature has evolved due to changes in employment preferences to include 'subjectivist' criteria when evaluating job quality, such as job satisfaction and worker motivation (Clark, 2015).

More recently, researchers have investigated working conditions across various platforms, focusing on aspects related to different job quality indicators, with some studies also addressing novel forms of collective resistance (Hau & Borello, 2023; Wood et al., 2019). Several studies explicitly draw on the job quality literature, where some apply the related concept of gig quality to mark a shift in focus from jobs (e.g., employment contracts) to tasks as the unit of analysis on the platform (Goods et al., 2019; Myhill et al., 2021). This focus is grounded in the platforms' utilisation of AM systems for automated task distribution (Wood et al., 2019). Combined with self-employed work arrangements, this results in task-based earnings rather than fixed hourly wages, which has led to conclusions with poor gig quality in the analysis of different platforms due to the individualised risk caused by these working arrangements, where platform workers spend much unpaid time searching for available tasks (Gregory, 2021; Pulignano et al., 2023). Other studies analyse AM's controlling and disciplining aspects, where platform workers report getting their profiles deactivated for rejecting too many tasks or being exposed to "subjectification" techniques by the platform (Galière, 2020; Wood et al., 2019). In these cases, couriers comply with the competitive logic of the AM system by working during busy hours or accepting all incoming tasks, even if earnings are low (Ibid.; Franke et al., 2023). Continuous modifications to AM features by the platform coupled with a lack of transparency regarding earnings may also cause discontent among the platform workers and make them feel disillusioned about AM functionalities (Griesbach et al., 2019; Heiland, 2022).

Agency on the platform

While much research has analysed AM as a top-down structure, I deviate from this perspective by grounding my agency-centered perspective in Archer's (2002) concept of the 'primary agent.' Archer characterises primary agents as individuals exercising 'self-conscious' practices in an interplay with a specific structural context to access a share of the limited resources within this context (Archer, 2002). The individual actions of primary agents precede the development of

"corporate agency," which encompasses collective and coordinated agency among individuals (ibid.). When applied within a platform context, the primary agent reflects platform workers seeking to optimise their earnings from the available pool of tasks distributed by the AM system (Heiland, 2022).

Parts of the platform literature have touched upon aspects of worker agency related to AM and self-employment (Anwar & Graham, 2020; Barratt et al., 2020). Examples include 'diverting' the AM system by accepting all tasks to increase ratings to act more freely on the platform at other times (Galière, 2020). Also, findings indicate that some workers practice 'multi-mapping' (Barratt et al., 2020) by being active and selecting between tasks on numerous platforms. Further, 'bypassing' (Möhlmann et al., 2021) tasks are also common among platform workers, by either choosing the most profitable incoming orders in the platform app or by cancelling already accepted orders if they turn out to be unprofitable (Franke et al., 2023).

Regarding self-employment, empirical research stresses that loose working arrangements provide workers with 'temporal flexibility,' allowing them to decide when to work and to take time off (Goods et al., 2019; Wood et al., 2019). Further, degrees of autonomy in task discretion allow self-employed platform workers to optimise their performance. For instance, food couriers invest in different gear (e.g., vehicles) and use informal skills, such as spatial knowledge of local city geography, to complete tasks faster (Duus et al., 2023; Gregory, 2021). Studies suggest that workers with a basic income and/or access to social protection from other employment may significantly benefit from self-employment and act with higher autonomy on the platform (Kuhn & Maleki, 2017; Schor et al., 2020) As they are not dependent on income from the platform they can decide only to accept the most profitable tasks and work during hours when demands are exceptionally high.

Analytical framework: Examining agency and gig quality on the platform

Combining Archer's (2002) concept of the primary agent with existing platform research on AM and self-employment, my agency-centered perspective seeks to analyze how platform workers use strategies to optimize their gig quality. Inspired by a recent review by Gundert and Leschke (2023), I systematically approach gig quality through two critical indicators derived from the job quality literature (Dunn, 2020; Holman, 2013; Wood et al., 2019): 1) compensation and 2) working time.

Table 1: Job and gig quality indicators

<table>
<tr><th></th><th>Compensation</th><th>Working time</th></tr>
<tr><td>Job quality indicator</td><td>Hourly wages</td><td>Minimum working hours</td></tr>
<tr><td rowspan="2">Gig quality indicator</td><td>Earnings per task</td><td>Number of hours active on the platform</td></tr>
<tr><td colspan="2">Earnings per hour</td></tr>
</table>

Rather than analysing earnings and working hours separately, I focus specifically on platform workers' earnings per hour to reflect the income variations originating from task-based earnings and changing demands on the platform (Goods et al., 2019; Pulignano et al., 2023). This may result in hourly earnings that go above or below the typical minimum wages for employed workers in this sector (see Table 2), pointing to instances of both 'good' and 'bad' gig quality related to various worker strategies (Kalleberg, 2011). Further, this objectivist indicator remains central in discussions on improving overall working conditions within platform work (Gundert & Leschke, 2023). Based on previous findings, I expect workers with additional income sources to have higher earnings per hour compared to those relying on income from the platform, which is reflected in different strategies towards the algorithm between the two groups (Kuhn & Maleki, 2017; Schor et al., 2020). Although I acknowledge the subjectivist dimension concerned with the platform workers' motivation and satisfaction (e.g., Cansoy et al., 2020), I do not address this dimension systematically in the analysis.

3. Methodology

Case selection: Wolt

My locus of study is Wolt, the second largest food delivery platform in Denmark after the platform Just Eat. Wolt entered the Danish labour market in 2017 and has since expanded continuously. As of 2023, the platform has around 4000 active couriers and operates in over 16 Danish cities. Wolt operates within the market-volatile service sector, with a relatively high level of non-standard work arrangements, including low wages, unsocial working hours in the evenings and weekends, and high worker turnover (Ilsøe, 2016). In recent years, the platform has received widespread public attention in the Danish public mainly due to its loosely defined working arrangements based on self-employment that, for instance, leaves out a minimum wage floor (Ilsøe & Larsen, 2022). Further, Wolt exemplifies trends where platforms evade employer responsibilities and opt out of established collective agreements, which is notable within a Nordic context, where collective bargaining coverage is comparatively high (Jesnes, 2019; Rasmussen et al., 2019).

I decided to analyse this specific platform as the working conditions at Wolt resemble typical attributes of gig work platforms, including AM and self-employed work arrangements (Dunn, 2020). As reflected in Table 2, I consider this platform an illustrative case of how workers exercise agency within a relatively autonomous and digitally mediated work setting. Previous findings from studies of Wolt in Denmark indicate that the platform employs 'lenient AM' practices that leave the couriers with the choice to accept and reject orders (i.e., tasks) without the risk of facing sanctions (Kusk & Bossen, 2022). Further, the couriers may, as self-employed, choose when to work and when to take time off the platform (ibid.). On the other hand, due to their status as self-employed, they are left without any guaranteed hourly earnings or social protection, such as access to paid sick leave in the event of accidents (Ilsøe & Larsen, 2022)

Table 2: Two types of food delivery platforms

Platform	**Wolt**	**Just Eat (reference)**
Access to work	Active status on the courier app	Shift-assignment
Compensation	Task-based (see table 4)	DKK 133 / € 18 per hour**
Task access	Geographically based (table 4)	Allocated on shift
Working time	Flexible	Minimum 8 hours per week
Employment status	Self-employed	Employed
Collective agreement	No	Yes*

**Signed by the Danish union 3F Transportation and The Danish Chamber of Commerce. Implemented by Just Eat in 2021 and renewed in 2023. ** Along with bonuses for working unsocial hours and contributions to social protection (hourly wage DKK 139 from March 2024) (Dansk Erhverv, 2023).*

In Table 2, the competitor Just Eat is included as a reference case. The working conditions at the platform are regulated via a collective agreement, illustrating recent examples of regulation in the platform economy in Denmark (Ilsøe & Larsen, 2022). As seen in Table 2, the working conditions at the competitor Just Eat reflect comparatively lower autonomy and flexibility but higher security. For instance, couriers on this platform work through a shift-based model with eight weekly minimum working hours (3F, 2023). In addition, Just Eat provides the couriers with certain levels of security, including minimum hourly earnings of € 18, which resembles wage levels in other unskilled service sector jobs, as well as pension contributions and holiday and sick leave payments (ibid.).

Research design: Recruiting and interviewing food couriers

My primary methodological strategy centred on investigating the lived experiences of platform workers conducting orders and their daily interactions with AM features (Small & Calarco, 2022). As part of the agency-centred analysis, I also conducted desk research to acknowledge conditions set by the structural framework of the platform by mapping central characteristics related to work arrangements and AM at Wolt. I cross-checked the findings from the desk research with previous

research and courier statements (Kusk & Bossen, 2022). For the recruitment of couriers, I took a point of departure in quantitative findings from a previous study of the same platform. In this study, colleagues and I identified three working time segments (i.e., groups) by analysing longitudinal working time series among a total population of food delivery couriers (Haldrup et al). As summarised in Table 3, I recruited couriers with different working hours and demographic characteristics (e.g., nationality and age) on the platform to get a broader range of perspectives from platform workers with various backgrounds (Kuhn & Maleki, 2017; van Doorn et al., 2022).

Table 3: List of interviewed couriers

Courier	**Average hourly earnings***		**Average number of hours per week***	**Vehicle**	**Age**	**Gender**	**Nationality**	**Main income**
	DKK	**€**						
1. Nicholas	190	25.5	60	Scooter	49	M	Non-EU	Yes
2. Luca	130	17.5	45	Bicycle	33	M	EU	Yes
3. Jesper	350	47	5	Bicycle	34	M	DK	No
4. Elena	90	12	36	E-bike	61	F	Non-EU	Yes
5. Peter	170	23	12	Bicycle	22	M	DK	No
6. Jack	250	33.5	6	Bicycle	20	M	EU	No
7. Thomas	300	40	25	Bicycle	32	M	DK	Yes
8. Andris	250	33.5	45	Scooter	25	M	EU	Yes
9. Pavel	210	28	32	Car	30	M	EU	Yes
10. Sandor	200	27	65	Car	40	M	EU	Yes

** Earnings before taxes. Estimates given by the couriers.*

I mostly approached couriers while they were awaiting orders and presented them with the opportunity to participate in an interview (Spradley, 1979). Five couriers were recruited on the street,

three through personal networks, and two with assistance from the studied platform. These two couriers shared critical perspectives on working conditions at the platform that did not echo typical platform owner narratives. As such, I do not consider these two interviews to deviate from the interviews with the other couriers (Brink, 1993). I chose to specifically focus on two segments of couriers who worked part-time or full-time on the platform, as these types of couriers would have accumulated substantial working experience to develop strategies toward the algorithm (Haldrup et al). I used ten interviews for this study, nine of which lasted 1-2 hours and took place either in physical locations or online via video to accommodate the couriers' preferences (Vogl, 2013). I decided to include one interview that took place at street level and lasted 20 minutes. I assessed that this courier had sufficient time to unfold his considerations on earnings, working time, and AM. With the consent of the informants, I recorded the interviews, which were hereafter fully transcribed (Maxwell, 2017).

In the interviews, I sought to gain palpability in the qualitative approach by letting couriers recall concrete scenarios and unfold their attitudes on working at the platform (Small & Calarco, 2022). I used a semi-structured interview guide that explored two main dimensions related to agency and gig quality: 1) the couriers' use of the platform, including working hours, earnings, which orders they preferred, and how they interacted with the platform app and algorithms 2) their motivations for working on the platform, including their use of the platform as either supplementary or full-time work along with certain background information such as nationality, skills, job experience, economic resources, and financial situation.

The recruitment strategy has certain limitations (Hennink & Kaiser, 2022). First, as seen in Table 3, I could only recruit a single female courier among the interviewees. Nevertheless, this gender composition is consistent with existing research indicating that most food couriers are male (Urzì Brancati et al., 2020). Second, although I recruited several couriers with migrant backgrounds, I failed to recruit any migrants with limited English skills, as they showed reluctance to participate in interviews. Considering the educational background and resources of the interviewed couriers,

I assume some perspectives lean towards slightly more positive attitudes to working at the platform than, for instance, seems to be the case for some platform workers with migrant backgrounds (van Doorn et al., 2022).

Analytical strategy: Courier agency

Inspired by abduction, I addressed the first part of the research question by identifying the four algorithmic strategies through an iterative and explorative process (Timmermans & Tavory, 2012). Here, I sought to revisit and refine existing research on worker behaviour about AM by considering unexpected findings about the interviewed couriers' interaction with AM (ibid.). When examining these interactions, I identified and coded AM-related strategies in each interview, which I then condensed and labelled as typologies of worker strategies toward the algorithm (Halkier, 2011). The names of the four strategies were empirically grounded in the couriers' descriptions of their experiences working on the platform (Harris, 1976).

To address the second part of the research question related to gig quality, I drew upon relevant literature on worker agency at the platforms within the framework of AM and self-employment (e.g., Anwar & Graham, 2020; Wood et al., 2019). Inspired by this framework, I explored couriers' considerations for pursuing different strategies, including potentials and risks. I assessed the couriers' gig quality by relating the strategies to their hourly earnings (Pulignano et al., 2023). Additionally, I considered insights from the literature indicating that specific background characteristics may influence worker agency and gig quality, such as whether the couriers used the platform as their main or supplementary source of income (Kuhn & Maleki, 2017; Schor et al., 2020).

Desk research: Self-employment and AM at Wolt

The business model of Wolt is based on an app design that connects customers, restaurants, and self-employed platform couriers responsible for picking up restaurant orders and delivering these

to customers.[1] Due to their status as self-employed, the couriers need to acquire various equipment to be eligible to work at the platform, which, as a minimum, consists of a vehicle, a smartphone, and a thermal bag for deliveries. Further, the couriers are responsible for managing their work process. This includes determining when they want to be active on the platform, the types of orders they want to accept, and the specific city areas where they choose to operate.

Wolt mainly uses AM to 1) distribute customer orders (i.e., tasks) to couriers and 2) compensate couriers when they complete orders at the platform.

Table 4: Algorithmic management (AM) features at Wolt

AM feature	**Characteristics**
Task distribution	Tasks allocated based on the following: 1. Courier location 2. Type of vehicle
Compensation*	Earnings per task based on: • Pick up distance to the restaurant • Delivery distance • Spatial conditions • Bonuses during unsocial hours

** The current compensation model was introduced in 2023 and replaced a former system based on a fixed minimum task fee with fixed distance and peak hour bonuses.*

As seen in Table 4, the platform algorithm allocates orders based on courier location and vehicle type, where, for instance, couriers in cars will get larger orders offered compared to couriers on bicycles. When getting an order offered, couriers have 60 seconds to either accept or decline the

[1] This desk research is based on Wolt's 'Transparency Reports' and Wolt's FAQ page, and crossed-checked with previous findings (Kusk & Bossen, 2022; Author A), and the statements of the couriers' interviewed for this particular study.

order. In terms of compensation, the algorithm calculates the potential earnings considering factors such as pick-up distance, delivery distance, weather, city geography, and bonuses for unsocial hours. The AM system also includes features like 'bundle mode' for couriers to pick up additional orders. Additionally, Wolt uses AM to provide information on estimated delivery distance and earnings and aggregates data on daily demand fluctuations and high-demand areas (hotspots).

4. Analysis of interviews: Algorithmic strategies and gig quality

In the analysis below, I follow the structure of the analytical strategy and unfold the four strategies in four separate sections. Within each strategy, I include examples from the courier interviews by focusing on 1) their considerations of potentials and risks of using the strategies, 2) their gig quality, including hourly earnings, and 3) relevant background information. Table 5 provides an overview of the four different courier strategies for the algorithm.

Table 5: Courier strategies towards the AM system

Algorithmic strategy	**Description**	**Potential**	**Risk**
Flowing	Accepting all incoming orders	A steady flow of orders that allows for stable earnings	Many unprofitable orders (e.g., long delivery distances to low-demand areas)
Fishing	Selecting between different types of orders based on criteria such as certain restaurants, delivery distances	Relative high earnings per task from accepting the most well-paying orders	Extra waiting time between orders from spending much time rejecting or waiting for incoming orders
Squatting	Commuting to the same restaurant or supermarket with ongoing orders	A steady flow of orders that allows for stable earnings	Extra waiting time for orders if they are often delayed at the restaurant/supermarket
Hacking	Take advantage of unintended errors in the compensation model or task distribution system (see example in the specific section).	Extra earnings, often as a supplement to one of the other three strategies	The platform may adjust features in the AM system that render certain hacking practices impossible.

Flowing

Some of the interviewed couriers accepted each incoming order offered on the platform app regardless of differences in earnings and delivery distances. Jesper, a 34-year-old courier, enjoyed that he would stop thinking and 'just follow a plan' and compared the flow of orders provided by the task distribution system with playing the video game Grand Theft Auto (i.e., street-level action game), where he competed with himself on how fast he could complete orders. Jesper worked a maximum of five hours once a week during peak hours in the evening or at weekends when the number of available orders would be high. Jesper accumulated up to €47 per hour and used the platform to exercise and top his earnings from his full-time academic desk job.

Couriers favouring this strategy considered a consistent workflow preferable over a more selective approach involving cancelling low-paying or delayed restaurant orders. As Jack, aged 20, putted it, 'I'm like, it probably evens out. If you're too picky, you spend all your time… just rejecting orders, and then you kind of waste it'. Jack earned an average of €33.5, worked six weekly hours, and mainly used the platform to supplement his basic earnings from student allowances. Jack expressed awareness about not relying on income from the platform, which allowed him not to be mentally 'worked up' about delayed restaurant orders. Like Jesper, he liked the physical nature of the work as an active break from his studies. Couriers employing this strategy also expressed general confidence in the design of the AM system. Luca, aged 33, believed that when he was about to finish a delivery, the algorithm would appropriately select the nearest and best order based on his current location,

> Luca: There is this new thing on the app where you can see how much you will earn, like if you're going to make €6 or €10. And I never do that. I always accept every order.
>
> *Interviewer: As long as you can get like €7-8 for [an order]...*
>
> Luca: No, I don't care. If it's €4.5, it doesn't matter to me. I never check that. Because I figured out for me the algorithm leads me to better things. I just trust the algorithm.

Luca estimated his hourly earnings to be €17.5 and worked an average of 45 weekly hours daily. In contrast to Jesper and Jack, Luca used the platform as his main source of income and described it as a 'money job' to pay off debt. He considered the platform the best of existing job alternatives, having previously worked part-time at Just Eat before joining Wolt, where he could accumulate more hours. Moreover, he experienced having few job alternatives because of insufficient educational credentials and a limited network due to his foreign background.

Fishing

In contrast to flowing, other couriers exhibited a highly selective approach when accepting orders, for instance, by rejecting incoming orders (in line with *bypassing* (Möhlmann et al., 2021)) from specific areas, restaurants, or within certain distances. As stated by Peter, aged 22, 'You need to know where it's good to throw down the fishing line, right? So, there is a bit of sport in it. So, who of us can get the best catch?' Peter often exchanged tips on high-demand areas when encountering couriers on the street. He tended to frequent central areas of the city on his bicycle, and during peak hours, he prioritised orders with minimal delivery distances. Peter had recently started working on the platform due to rising inflation rates in society and used his hourly earnings of €23 and 12 weekly working hours to supplement two part-time jobs. Couriers using the fishing strategy often worked with their predefined thresholds for incoming orders. Elena, aged 61, mostly rejected orders below €6.7 (i.e., 50 DDK) and described herself and couriers on the platform as 'bidders,' either opting in or out on incoming orders. Limited physically due to her age, Elena tried to maximise her earnings by commuting to areas on her e-bike with high local demands (i.e., 'hot spots'). However, she expressed discontent with her earnings of €12 per hour and experienced instances during her 36 weekly hours, especially outside peak hours, waiting for incoming orders. Elena mainly worked on the platform in a lack of other job alternatives, despite a long employment history of different communication jobs. She considered the language boundary (i.e., limited Danish skills) and her age to be challenging for finding employment elsewhere.

Some couriers using this strategy were prone to cancel orders if they experienced significant restaurant delays. For instance, Thomas aged 32, who, in contrast to Elena, considered 'hot spots' to be a 'myth,' focused mainly on avoiding orders from specific restaurants,

> So once you have been there for a while, you find: This place [restaurant], without naming names, they're always late, and they're kind of nonchalant about it (…) And the platform doesn't have a system where they can enforce that something is done about it, so you have to just think about yourself and be like, 'Hey' (…). One: Don't go to those who delay you. Two: There is also no reason to go to those who are rude and not very nice. Just avoid it. Why fit it into your day? So, go to those who are on time and who are nice.

Thomas was highly preoccupied with maintaining his hourly earnings average of €40 based on 25 weekly hours on the platform by considering his physical shape, eating habits, and using less trafficked biking lanes. However, the remote connection with the platform frustrated him, as he found it difficult to reach the platform beyond the basic support level to resolve delays or more complex order irregularities. Thomas started working at the platform during the COVID-19 pandemic, where national lockdowns in 2020 and 2021 forced him to wind down his company temporarily and seek other job opportunities. At the time of the interview, Thomas was considering his future involvement with the platform.

In general, a lack of confidence in the efficiency of the task distribution system was present among couriers adopting this strategy, as they believed it to contain built-in errors, as expressed by Andris, aged 26,

> Sometimes you pass the restaurant, and when you're already, like, a kilometer away from the restaurant, it [the app] gives the order to you and says 'food ready, minus two minutes.' So, why didn't you give it to me in the beginning? It is doing this very often.

Andris experienced these errors regularly and considered them, along with restaurant delays, his most significant threat to keeping up with his earnings average of €33.5 per hour. He switched between the flowing and fishing strategy, where he would turn to the latter during high demands. Working up to 45 weekly hours using a scooter, he often accepted orders with longer distances in

different city areas. He was prone to activate 'bundle mode' to pick up multiple delivery orders. Being an unskilled worker relying on income from the platform, he had previously held different jobs in the service sector. However, he preferred the temporal flexibility of the platform, allowing him to visit his family in his home country.

Squatting

Given the daily fluctuations in order volumes, certain couriers resorted to shuttling back and forth between specific restaurants or supermarkets known for providing a steady stream of orders. Luca named the strategy 'squatting' and explained that these couriers 'would just sit with their bikes and wait for deliveries.' Places used for squatting often offered products customers ordered continuously during the day, such as McDonald's or the platform's supermarket service 'Wolt Market.' The couriers using this strategy would remain near the specific place to secure incoming orders immediately after finishing a delivery. Nicholas, aged 49, would, similar to Luca, use flowing to keep up his earnings. Occasionally, he turned to the squatting strategy, which he considered a 'guarantee for orders,' and commuted on his scooter to pick up orders at Wolt Market. Despite getting a stable number of orders, these couriers would have to comply with the workflow of the restaurants, such as delays. Besides this, Nicholas and some other couriers raised concerns about the current compensation model. He considered the varying earnings estimates for incoming orders generated by AM less transparent than the former model (fixed task fee and bonuses). He believed this resulted in higher fluctuations and less payment for bundle orders and orders with longer distances, which he preferred. Earning an hourly average of €25.5, Nicholas considered earning less from his 60 weekly hours on both weekdays and weekends due to the changes to the compensation model.

> They [Wolt] have to find the right balance where it is worth for us to work at the platform. Because per hour we have to make €20-27. If it comes down to, for example, €8, it is not worth it for us… Because they don't miss anything. They always get what they want. But we have these problems. Competition.

Nicholas relied on income from the platform for savings, and despite holding an academic degree, Nicholas had primarily worked in unskilled transportation jobs in Denmark for many years. Compared to other unskilled job alternatives, Nicholas (along with other interviewed couriers) expressed awareness of the lack of social protection as self-employed on the platform. Nicholas considered this a trade-off between security and autonomy, of which he preferred the latter due to his temporary perspective of working at the platform.

Hacking

Some couriers also reported engaging in different practices to take advantage of and 'hack' different features in the algorithmic system that involved different aspects of the task distribution system and compensation model. One hacking strategy related to the former included couriers logging out of the app after delivering an order and then driving strategically to restaurants with high demands or specific sought-after products. Then, these couriers would log in shortly before arrival to receive orders from their preferred restaurant. A popular strategy related to the compensation model involved initially accepting an order in 'bundle mode' (i.e., picking up multiple orders). Couriers would thus drive to the restaurant and physically pick up the order, but without pushing the button in the app that would indicate readiness for delivery in the platform app and drive towards the delivery destination. When doing so, couriers could keep the app open for additional incoming orders for bundle deliveries instead of only conducting the first incoming order. Sandor expressed it this way:

> (…) So you can manually force the system to give you orders. But because everyone was abusing it… everyone was sitting in their car with one order in the bag and not delivering; they were waiting: maybe there is something in the neighborhood to pick up again.

As reflected in Sandor's statement, continuous platform adjustments would eventually make such hacking options unavailable to the couriers. This hacking practice has also been discussed in a previous study (Kusk and Boesen, 2022).

Sander and the courier Pavel mentioned hacking as a supplementary strategy for flowing and fishing. According to Sander, he was in high demand at national lockdowns during the COVID-19 pandemic, able to handle a 'bundle of bundle' of orders by filling the back seats of his car and delivering to numerous customers around the city. However, Sander also experienced that the task delivery system unitedly disrupted the couriers' delivery efficiency, as the system could be 'over-heated' during high demands. For instance, Sander would occasionally get a single order assigned when using bundle mode. However, upon reaching the restaurant to collect the assigned order, he noticed multiple orders ready for delivery in the same direction he was heading. Further, Sandor and Pavel raised concerns about adapting to recently lowered demands, which complicated their strategies in choosing the most profitable orders. Earning an average of €27-28, with Sandor working 65 weekly hours and Pavel 32 weekly hours, they struggled to keep up their earnings due to these recent changes. Having insufficient educational credentials, they used the platform as their main income, and like Andris, they considered the flexible working hours on the platform to allow them to engage with other responsibilities such as hobbies and community work.

5. Discussion

Conditioned agency

Grounded in an agency-centered approach (Archer, 2002), this qualitative analysis reveals a notably active form of worker engagement in the productive features of AM, where the couriers appear highly considerate with finding ways of utilising the AM system to maximise their earnings, as detailed in the four outlined strategies. This level of engagement differs from many studies that typically portray platform workers as actors mainly adapting or responding to the controlling AM framework, resembling Marx's characterisation of how large-scale machinery reduces human embeddedness into the production tools (Bimber, 1990; Möhlmann et al., 2021; Wood et al., 2019). With this study, I elaborate on recent agency-centred research (Anwar & Graham,

2020; Barratt et al., 2020) and provide perspectives on workers' interaction with novel AM systems in digital labour markets.

Concerning my expectations, the couriers' use of specific strategies does not seem to reflect whether they have access to additional income sources or not (Kuhn & Maleki, 2017), as examples of both cases are evident in the contrasting strategies of flowing (e.g., Jesper (€ 47) and Luca (€17.5) and fishing (e.g., Thomas (€40) and Elena (€12)). However, in line with some studies, certain tendencies appear regarding how couriers with different degrees of income dependency navigate potentials and risks associated with the strategies (see Table 3) (Barratt et al., 2020; Gregory, 2021).

The couriers that used the earnings from the platform as a supplement to existing income sources and mainly worked during peak hours seemed less affected by risks tied to their strategies. For instance, Jesper, with hourly earnings of €47, worked full-time outside the platform, and Jack, with access to student allowances and earned €33 per hour, capitalised on the stable earning potential of flowing (see Table 5). While Jesper compared working on the platform with a video game, Jack did not appear to be affected by, for instance, delayed orders at restaurants but used these delays as convenient brakes.

On the contrary, other couriers dependent on income from the platform focused more on minimising risks associated with their strategies. Thomas, for example, mostly used fishing to keep up his hourly earnings of €40 as he considered carrying out orders from specific restaurants to be a waste of time, threatening his earnings average. Other couriers adapted their strategies to access orders despite the risk of low earnings. For instance, Nicholas, who earned €25 per hour, resorted to squatting during low demands, and Luca trustfully accepted all incoming orders offered by the algorithm, resulting in €17.5 per hour, and thus contended to the platform's subjectification techniques (Galière, 2020). These findings suggest that access to alternative income sources may allow some couriers to exercise their agency more freely than others by choosing the most convenient strategy (Schor et al., 2020). This is in line with the literature on multiple job-holding that

suggests engaging in a secondary job, such as platform work, could be a chance to test a different job type and earn extra income without being exposed to inherent risks (Campion et al., 2020). This is possible because the primary job offers sufficient social protection and financial security (ibid). As this article is based on a limited number of interviews, I suggest further empirical research to address differences in agency between platform workers and their engagement with the broader labour market and the welfare state.

Individualised gig quality

My second contribution relates to ongoing discussions of the quality of work at different types of platforms (Gundert & Leschke, 2023; Wood et al., 2019). Based on this systematic approach for assessing the gig quality through the couriers' hourly earnings, I argue that the competitive and individualised work setting caused by AM and self-employment does not necessarily result in poor gig quality, as suggested in some studies (Heiland, 2022; Wood et al., 2019). Instead, the hourly earnings among the interviewed couriers reveal substantial variations (table 3), spanning from €12 – €47 per hour, highlighting instances of both 'good' and 'bad' gig quality (Kalleberg, 2011) when benchmarking against the hourly wage of €18 (excluding social protection contributions) at the competing platform Just Eat. These differences in earnings signify the couriers' varying success with employing strategies towards the algorithm.

This indicates that a strategy towards the algorithm does not guarantee high or low earnings. The couriers' differing considerations of the efficiency of their strategies may in part relate to the changing demands and reported lack of transparency in the AM system, such as recent modifications of the compensation model, which make the couriers develop their theories on how to navigate the AM system (Griesbach et al., 2019; Heiland, 2022). Further, insights from the interviews reveal that the efficiency of the couriers' strategies may be closely intertwined with the use of informal skills, as mentioned in previous studies (Duus et al., 2023; Gregory, 2021). For instance, Sandor, earning €27 per hour, took advantage of using a car, allowing him to handle multiple

orders. On the contrary, Elena, earning €12 per hour, experienced her delivery efficiency limited by her age. Tips from fellow couriers and knowledge of local demands and the city geography, as seen in the case of Peter, earning €23 per hour, also seemed to play a specific role in maximising earnings.

The differences in earnings and exercised agency on the platform also relate to recent debates in Denmark and the EU on addressing inequalities among platform workers (Ilsøe & Larsen, 2022). As noted, couriers using the platform as their main income may find themselves in a vulnerable position without access to social protection (i.e., pensions) and have limited employment opportunities (Kuhn & Maleki, 2017; Schor et al., 2020). For instance, Andris, earning €33 per hour, had mainly worked unskilled jobs in the service sector, and Elena, earning € 12 per hour, had difficulties getting access to the Danish job market due to insufficient language skills despite being a highly skilled academic (van Doorn et al., 2022). Examples of newly implemented collective agreements and proposed regulation of the platform economy may support some of these workers by defining minimum floors for earnings and working hours (Ilsøe, 2020; Rosin, 2022). For instance, the collective agreement at the cleaning platform Hilfr in Denmark allows platform workers to choose between self-employed or employed (ibid.). In addition, a recent directive proposed by the European Commission includes a presumption rule that may force some platforms to classify their workers as employees (European Commission, 2021). These initiatives may also address other urgent matters on the platforms, such as transparency in using AM, social protection, and health and safety measures (Ilsøe & Larsen, 2022).

7. Conclusions

Much empirical research has contended about agency and the quality of work in digital work settings, particularly involving studies focusing on low-skilled platform work (Barratt et al., 2020; Curchod et al., 2020). The experiences from interviews with ten self-employed couriers in this

article suggest a relatively active form of worker engagement in the productive features of the AM system than otherwise depicted in some previous studies (Heiland, 2022; Wood et al., 2019). Grounded in an agency-centered approach (Archer, 2002), I have identified four types of strategies towards the platform's algorithmic management (AM) system, where workers: 1) accept all orders (flowing), 2) exhibit high selectivity (fishing), 3) commute strategically to specific restaurants with many orders (squatting), or 4) manipulate specific features of the AM system to pursue profitable orders or receive extra orders (hacking). In discussing these findings, I suggest that income dependency influences how couriers navigate the risks associated with these strategies and highlight the impact of alternative income sources on workers' agency (Campion et al., 2020; Schor et al., 2020). In addition, I have engaged in discussions on the quality of work (i.e., gig quality) in the gig economy with a specific focus on the hourly earnings of couriers, which indicate notable differences between couriers, reflecting instances of both good and bad gig quality (Gundert & Leschke, 2023; Kalleberg, 2011). Therefore, I suggest that strategies toward the algorithm alone do not guarantee high or low earnings but also relate to changing demands, lack of transparency in the AM system, and the use of informal skills (Duus et al., 2023; Gregory, 2021).

References

3F (2023). Collective agreements 2023: private services, hotels, and restaurants. https://www.3f.dk/ok23/privat-service-hotel-og-restauration

Anwar, M. A., & Graham, M. (2020). Hidden transcripts of the gig economy: Labour agency and the new art of resistance among African gig workers. *Environment and Planning A: Economy and Space*, *52*(7), 1269–1291. https://doi.org/10.1177/0308518X19894584

Archer, M. (2002). Realism and the Problem of Agency. *Alethia*, *5*(1), 11–20. https://doi.org/10.1558/aleth.v5i1.11

Barratt, T., Goods, C., & Veen, A. (2020). 'I'm my own boss…': Active intermediation and 'entrepreneurial' worker agency in the Australian gig-economy. *Environment and Planning A: Economy and Space*, *52*(8), 1643–1661. https://doi.org/10.1177/0308518X20914346

Bimber, B. (1990). Karl Marx and the Three Faces of Technological Determinism. *Social Studies of Science*, *20*(2), 333–351. https://doi.org/10.1177/030631290020002006

Boltanski, L., & Chiapello, E. (2005). The New Spirit of Capitalism. *International Journal of Politics, Culture, and Society*, *18*(3), 161–188. https://doi.org/10.1007/s10767-006-9006-9

Brink, H. I. L. (1993). Validity and reliability in qualitative research. *Curationis*, *16*(2), Article 2. https://doi.org/10.4102/curationis.v16i2.1396

Campion, E. D., Caza, B. B., & Moss, S. E. (2020). Multiple jobholding: An integrative systematic review and future research agenda. *Journal of Management*, *46*(1), 165–191.

Cansoy, M., Eddy, S., Ladegaard, I., & Schor, J. B. (2020). Homines Diversi: Heterogeneous Earner Behaviors in the Platform Economy. *Sociologica*, *14*(3), Article 3. https://doi.org/10.6092/issn.1971-8853/11508

Cesko, J., & Soes, K. (2020). *Blurring the Boundaries Between Being an Employee and Self-employed—An EU Competition Law Analysis of the Employment Status of Wolt Couriers* (SSRN Scholarly Paper ID 3705203). Social Science Research Network. https://papers.ssrn.com/abstract=3705203

Clark, A. (2015). What makes a good job? Job quality and job satisfaction. *IZA World of Labor*. https://doi.org/10.15185/izawol.215

Curchod, C., Patriotta, G., Cohen, L., & Neysen, N. (2020). Working for an Algorithm: Power Asymmetries and Agency in Online Work Settings. *Administrative Science Quarterly*, *65*(3), 644–676. https://doi.org/10.1177/0001839219867024

Duggan, J., Sherman, U., Carbery, R., & McDonnell, A. (2020). Algorithmic management and app-work in the gig economy: A research agenda for employment relations and HRM. *Human Resource Management Journal*, *30*(1), 114–132. https://doi.org/10.1111/1748-8583.12258

Dunn, M. (2020). Making gigs work: Digital platforms, job quality and worker motivations. *New Technology, Work and Employment*, *35*(2), 232–249. https://doi.org/10.1111/ntwe.12167

Duus, K., Bruun, M. H., & Dalsgård, A. L. (2023). Riders in app time: Exploring the temporal experiences of food delivery platform work. *Time & Society*, 0961463X231161849. https://doi.org/10.1177/0961463X231161849

Findlay, P. ; K. (2013). The challenge of job quality. *Human Relations*, *66*(4), 441–451.

Franke, M., Pulignano, V., & Marà, C. (2023). Workers' contentions over unpaid labor time in food delivery and domestic work platforms in Belgium. *Work in the Global Economy*, *3*(1), 6–30.

Galière, S. (2020). When food-delivery platform workers consent to algorithmic management: A Foucauldian perspective. *New Technology, Work and Employment*, *35*(3), 357–370. https://doi.org/10.1111/ntwe.12177

Goods, C., Veen, A., & Barratt, T. (2019). "Is your gig any good?" Analysing job quality in the Australian platform-based food-delivery sector. *Journal of Industrial Relations*, *61*(4), 502–527. https://doi.org/10.1177/0022185618817069

Gregory, K. (2021). 'My Life Is More Valuable Than This': Understanding Risk among On-Demand Food Couriers in Edinburgh. *Work, Employment and Society*, *35*(2), 316–331. https://doi.org/10.1177/0950017020969593

Griesbach, K., Reich, A., Elliott-Negri, L., & Milkman, R. (2019). Algorithmic Control in Platform Food Delivery Work. *Socius: Sociological Research for a Dynamic World*, *5*, 237802311987004. https://doi.org/10.1177/2378023119870041

Grimshaw, D., Johnson, M., Rubery, J., & Keizer, A. (2016). *Reducing Precarious Work: Protective gaps and the role of social dialogue in Europe*. European Work and Employment Research Centre, University of Manchester, UK.

Gundert, S., & Leschke, J. (2023). Challenges and potentials of evaluating platform work against established job-quality measures. *Economic and Industrial Democracy*, 0143831X231199891. https://doi.org/10.1177/0143831X231199891

Haldrup, C., Ilsøe, A., Larsen, T.P, Kristiansen, J.H., Demant J. The Flexible Platform Firm – Segmentation of working time in the gig economy. Unpublished.

Halkier, B. (2011). Methodological Practicalities in Analytical Generalization. *Qualitative Inquiry*, *17*(9), 787–797. https://doi.org/10.1177/1077800411423194

Harris, M. (1976). History and significance of the emic/etic distinction. *Annual Review of Anthropology*, *5*(1), 329–350.

Hau, M. F., & Borello, A. (2023). Between coping and resistance: Migrant networks and alternative forms of collectivism. *Economic and Industrial Democracy*, 0143831X231216001. https://doi.org/10.1177/0143831X231216001

Heiland, H. (2022). Neither timeless, nor placeless: Control of food delivery gig work via place-based working time regimes. *Human Relations*, *75*(9), 1824–1848. https://doi.org/10.1177/00187267211025283

Hennink, M., & Kaiser, B. N. (2022). Sample sizes for saturation in qualitative research: A systematic review of empirical tests. *Social Science & Medicine*, *292*, 114523. https://doi.org/10.1016/j.socscimed.2021.114523

Holman, D. (2013). Job types and job quality in Europe. *Human Relations*, *66*(4), 475–502.

Ilsøe, A. (2016). From living wage to living hours – the Nordic version of the working poor. *Labour & Industry: A Journal of the Social and Economic Relations of Work*, *26*, 40–57. https://doi.org/10.1080/10301763.2016.1152534

Ilsøe, A. (2020). The Hilfr agreement. *Negotiating the Platform Economy in Denmark. FAOS Research Paper*, *176*.

Ilsøe, A., & Larsen, T. P. (2022). Digital Labor Markets - from jobs to tasks [*Digitale arbejdsmarkeder—Fra jobs til opgaver]*. Djøf Forlag. https://www.djoef-forlag.dk/digitale-arbejdsmarkeder

Jesnes, K. (2019). Employment Models of Platform Companies in Norway: A Distinctive Approach? *Nordic Journal of Working Life Studies*, *9*. https://doi.org/10.18291/njwls.v9iS6.114691

Kalleberg, A. L. (2011). Good jobs, bad jobs. *New York*.

Kornberger, M., Pflueger, D., & Mouritsen, J. (2017). Evaluative infrastructures: Accounting for platform organization. *Accounting, Organizations Society*, *60*, 79–95.

Kuhn, K. M., & Maleki, A. (2017). Micro-entrepreneurs, Dependent Contractors, and Instaserfs: Understanding Online Labor Platform Workforces. *Academy of Management Perspectives*, *31*(3), 183–200. https://doi.org/10.5465/amp.2015.0111

Kusk, K., & Bossen, C. (2022). Working with Wolt: An Ethnographic Study of Lenient Algorithmic Management on a Food Delivery Platform. *Proceedings of the ACM on Human-Computer Interaction*, *6*(GROUP), 4:1-4:22. https://doi.org/10.1145/3492823

Maxwell, J. A. (2017). The validity and reliability of research: A realist perspective. *The BERA/SAGE Handbook of Educational Research*, *1*, 116–140.

Möhlmann, M., Zalmanson, L., Henfridsson, O., & Gregory, R. W. (2021). Algorithmic Management of Work on Online Labor Platforms: When Matching Meets Control. *MIS Quarterly*, *45*(4), 1999–2022. https://doi.org/10.25300/MISQ/2021/15333

Muñoz de Bustillo, R., Fernández-Macías, E., Esteve, F., & Antón, J.-I. (2011). E pluribus unum? A critical survey of job quality indicators. *Socio-Economic Review*, *9*(3), 447–475. https://doi.org/10.1093/ser/mwr005

Myhill, K., Richards, J., & Sang, K. (2021). Job quality, fair work and gig work: The lived experience of gig workers. *The International Journal of Human Resource Management*, 1–26. https://doi.org/10.1080/09585192.2020.1867612

Proposal for a Directive of The European Parliament and The Council on Improving Working Conditions in Platform Work. (2021). European Parliament.

Pulignano, V., Grimshaw, D., Domecka, M., & Vermeerbergen, L. (2023). Why does unpaid labor vary among digital labor platforms? Exploring socio-technical platform regimes of worker autonomy. *Human Relations*, 00187267231179901. https://doi.org/10.1177/00187267231179901

Rasmussen, S., Nätti, J., Larsen, T. P., Ilsøe, A., & Garde, A. H. (2019). Nonstandard Employment in the Nordics – Toward Precarious Work? *Nordic Journal of Working Life Studies*, *9*. https://doi.org/10.18291/njwls.v9iS6.114689

Rosin, A. (2022). Towards a European Employment Status: The EU Proposal for a Directive on Improving Working Conditions in Platform Work. *Industrial Law Journal*, *51*(2), 478–493. https://doi.org/10.1093/indlaw/dwac011

Schor, J. B., Attwood-Charles, W., Cansoy, M., Ladegaard, I., & Wengronowitz, R. (2020). Dependence and precarity in the platform economy. *Theory Society*, *49*(5), 833–861.

Small, M. L., & Calarco, J. M. (2022). *Qualitative Literacy: A Guide to Evaluating Ethnographic and Interview Research*.

Spradley, J. P. (1979). *The ethnographic interview*. Waveland Press.

Stark, D., & Pais, I. (2021). Algorithmic Management in the Platform Economy. *Sociologica*, *14*(3), 47–72. https://doi.org/10.6092/issn.1971-8853/12221

Timmermans, S., & Tavory, I. (2012). Theory Construction in Qualitative Research: From Grounded Theory to Abductive Analysis. *Sociological Theory*, *30*(3), 167–186. https://doi.org/10.1177/0735275112457914

Urzì Brancati, M. C., Pesole, A., & Fernandez-Macias, E. (2020). *New evidence on platform workers in Europe: Results from the second COLLEEM survey* (JRC Working Paper JRC118570). Joint Research Centre (Seville site). https://econpapers.repec.org/paper/iptiptwpa/jrc118570.htm

Vallas, S. P. (2006). Empowerment Redux: Structure, Agency, and the Remaking of Managerial Authority. *American Journal of Sociology*, *111*(6), 1677–1717. https://doi.org/10.1086/499909

van Doorn, N., Ferrari, F., & Graham, M. (2022). Migration and Migrant Labour in the Gig Economy: An Intervention. *Work, Employment and Society*, 09500170221096581. https://doi.org/10.1177/09500170221096581

Vogl, S. (2013). Telephone Versus Face-to-Face Interviews: Mode Effect on Semistructured Interviews with Children. *Sociological Methodology*, *43*(1), 133–177. https://doi.org/10.1177/0081175012465967

Wilkinson, A., & Barry, M. (2020). *The Future of Work and Employment*. Edward Elgar Publishing. https://doi.org/10.4337/9781786438256

Wood, A. J., Graham, M., Lehdonvirta, V., & Hjorth, I. (2019). Good Gig, Bad Gig: Autonomy and Algorithmic Control in the Global Gig Economy. *Work Employ Soc*, *33*(1), 56–75. https://doi.org/10.1177/0950017018785616

Appendix

Interview guide – Wolt couriers

	Topic	Questions

1.	Context and back-ground	**Introduction:**
		• Purpose with interview:
		  o Project about working conditions at platforms (Wolt)
		  o Why courier works at the platform and how they use it
		  o First general questions about you and background
		  o And then how you work at the platform, use of app, contact with support, other couriers, customers - different experiences with that
		• Consent
		
		Background information
		• Tell a little about yourself… (sense the context)
		• Nationality – where are you from?
		  o If foreigner – how long have you been in the country? How long do they intend to stay?
		  o Did you plan to work as a courier before you arrived here?
		• Age
		• Where do you live (housing)? With others or alone? maybe a bit sensitive]
		• Education
		  o Are you a student?
		  o Can you use your education here?
		• Labour market experience (before or along with platform)
		  o Is it difficult to find a job because of your national background, network, education?
		  o Do you work with something else during weekdays? Employee? Own business?
		  o Do you spend much time on a hobby?
		
		Motives
		• Why did you start working at Wolt?
		  o Flexibility? (working time)
		  o Easy access to earn money?
		  o Better working conditions than other jobs?
		  o Lack of other opportunities?
		  o No boss? (autonomy)

2.	Courier profile	**Working time**
		• For how long have you been working at Wolt?
		• How many hours do (approximately) work each week?
		• When do you work?
		  o Daytime? Evening? Why?
		  o Weekdays? Weekends? National holidays?
		
		Earnings
		• What are your weekly monthly earnings on the platform?
		• Do you use the platform as your main income? Or as something extra?
		• Do you earn more than DKK 50,000? Are you registrered as a sole proprietorship
		
		Gear
		• What gear/equipment do you use?
		  o Bike, e-bike, scooter
		  o Power Banks, electronic equipment
		  o Clothing (season)
		  o Have you changed gear or upgraded it?

3.	Practices and strategies	**General guideline**
		• Make the courier recall recent experiences and describe these situations – how many hours, what kind of deliveries, what area etc…
		
		Areas/hot spots
		• In which areas do you typically do deliveries? Why?
		• How do you get information on where to find deliveries/hotspots?
		  o Support?
		  o Network (other couriers)?
		  o App?
		
		Unpaid time
		• Do you often spend much time waiting for new orders?
		  o Do you do something to prevent this? Why?
		• What do you do if the order is delayed at the restaurant?
		  o Do you contact support to give you a new order?
		
		Deliveries
		• What role does the app/algorithms play when you do deliveries? Do you use certain strategies/practices to optimize your earnings?
		  o Do you mainly do (and why):
		  ▪ Single or bundle deliveries?
		  ▪ Small or large deliveries?
		  ▪ Short or long distance?
		  o Do you accept each order you get offered? Or how do you select between orders?
		  o What do you do after picking up an order? Bike towards delivery adresss or wait for additional orders? Other strategies?

		Interaction with support workers about deliveries/app
		• Do you sometimes experience that the app does not make any sense? Can you give examples?
		  o For instance that the app gives you an order far away or pay you less without saying why?
		  o Do you contact the support if some of this happens (text or call them)? What do you tell them? Something about the app? What do they say? Is it helpful?
		
		Information about app/algorithms
		• Do you experience that the platform sometimes change things on the platform? How? What do you think about these changes?
		• When you use the app – do you think about how the platform uses algorithms to distribute tasks?
		• Did the platform inform you about how the app works? for instance when you were at the information meeting before you started?
		
		Interaction with customers
		• Do you use the app to text customers about how to find the address? Other things?
		• How do you experience customers?
		  o Do they give you tips?
		  o Are they friendly?
		  o Do you talk to them when you deliver food? or just give them the food and then leave?
		  o What do you do if they tell you something is wrong with the order? E.g., that they did not get all the things they ordered?
		
		Attitudes
		• Overall, do you think the app help you support your needs (e.g. flexibility, autonomy) when you work on the platform?

4.	Network and interactions	**Personal relations/networks**
		• Do you have friends you met at the platform or know people who also work as couriers on the platform?
		  o Few people or a larger group?
		  ▪ Are you part of a WhatsApp group?
		  o People from the same country as you? Speak the same language?
		  o Do you meet during working hours? What do you do?
		  ▪ Text each other while working?
		  ▪ Give each other tips?
		  o Do yout meet outside work? What do you do?
		  ▪ Hang out somewhere?
		  ▪ Do activities?
		  ▪ Help each other out with different things? (if foreigner: tax registration, finding jobs etc)
		
		Informal relations
		• Do you talk with other couriers you don't know (while working)?
		  o E.g., when you wait for orders?
		• What do you talk about?
		  o How things are going? E.g., if it is a busy day? Where to find more orders?
		  o Issues with the app, customers or platform?
		
		Organizing networks/groups
		• Are you part of a group or have you heard about networks/groups that try to organize couriers?
		  o Do you know what they do?
		  o Arrange meetings or events for couriers?
		  o Do they talk with Wolt about working conditions on the platform – how the app/algorithms work and changes, earnings, health and safety (in bad wheater, customers, trafic)
		  o Do these groups meet with the platform? physical meetings? Write mails?
		  o Do these groups talk/write with unions about these problems?
		• Does the platform arrange meetings for couriers?
		  o What do you talk about there? E.g. platform changes, app design
		  o

5.	Summing up	**Attitudes (if not already touched upon)**
		• What do/don't you like about the work?
		  o Earnings (enough, too little)?
		  o The exercise? Too hard (physical)?
		  o Self-employment (no boss - but no security)?
		  ▪ Would you rather be employed by the platform?
		  o Like to be on your own? Too lonely?
		  o Problems with taxes? Difficult to register as sole proprietorship? Temporary residence permit?
		• Do know for how long you will keep working on the platform?
		• Anything you forgot to say?

Agency in platform work and multiple jobholding from a labor market risk perspective

Jonas Hulgård Kristiansen, Trine Pernille Larsen, Anna Ilsøe & Christian Haldrup

Abstract

The increasing presence of digital labor platforms has amplified interest in platform workers' working lives and working conditions. Much of the literature has stressed platform workers' precarious situation while highlighting platform work's role as a supplementary income. However, few studies have systematically compared platform workers' labor market biographies to those of other types of workers. In this study, we combine data from the Danish Labor Force Survey with national register data on labor market affiliation to compare the labor market biographies of platform workers and other multiple jobholders. We conceptualize labor market biographies using multi-state sequence analysis on developments in working time and income levels across a three-year period and use regression models on mobility in industry, occupation, and income. We find substantial labor market mobility among all groups of multiple jobholders. However, multiple jobholders engaged in self-employment as a secondary job have a more stable labor market position, while platform workers and those in secondary wage work tend to face greater job insecurity. We make two primary contributions to the literature. Firstly, our focus on different dimensions of labor market mobility among multiple jobholders gives a more nuanced understanding of how secondary jobs are used in different ways as part of a larger labor market biography. Secondly, platform work provides limited institutional protection, and platform workers often start from uncertain labor market positions. However, they do exhibit a certain degree of upward mobility in the Danish labor market, indicating more labor market agency than is often recognized.

1. Introduction

Throughout the 20th century, most European welfare states and labor market institutions developed to protect against social risks such as unemployment, old age, sickness, etc. Their social- and employment protection systems typically developed with the full-time, open-ended contract and male-breadwinner model in mind (Bosch, 2004; Huber & Stephens, 2006; Esping-Andersen, 1999). In recent years, this very foundation has been challenged by shifts in occupational structures, rising female employment, increased organizational fragmentation, and new emerging forms of work organization across European labor markets, often fueled by globalization, digitalization, and automation (Bryson et al., 2010; Lehndorff et al., 2018; Rubery et al., 2018; Taylor-Gooby, 2004). This has subsequently led to rising shares of non-standard work and associated social risks, which we define as unstable career patterns characterized by income instability, underemployment, and part-time or temporary employment (Bonoli, 2006).

One way for workers to manage these social risks is through multiple jobholding, i.e., working more than one job at the same time and thereby supplementing earnings from a primary job with a secondary job (Campion et al., 2020). With the emergence of online labor platforms facilitating platform work, the possibilities of multiple jobholding have become even more accessible, and there are signs that it could also take novel forms as the boundaries between standard and non-standard employment get blurred (Jesnes, 2019).

Platform work has been linked to increased social risks as it often happens in the grey zones between standard employment and self-employment, where workers typically shoulder most social risks due to their fluid employment status and limited coverage within the ordinary social protection systems (Schor et al., 2020; Drahokoupil & Vandaele, 2023). The Nordic welfare states, including Denmark, seem better geared than other European welfare states to address the social risks experienced by platform workers due to the early integration of self-employed within

the social protection systems (Bonoli, 2006; Jerg et al., 2021). However, Nordic social protection continues to be uneven, notably for groups with fluid employment status (Mailand & Larsen, 2018; Spasova et al., 2021). In Denmark, the social and employment protection systems clearly distinguish between self-employed and standard employment in their service delivery, while the employment status of platform workers remains unclear, which implicitly influences such workers' access to social and employment protection from the wider regulatory framework (Larsen & Ilsøe, 2021; Munkholm et al., 2022).

Ample research indicates that platform work is a supplementary income alongside a primary job, but these studies often focus solely on platform work and rarely compare platform workers' situation with other groups of multiple jobholders (Ilsøe et al., 2021; Piasna et al., 2022; Schor et al., 2020; Urzi Brancati et al., 2019). Likewise, the multiple jobholding literature rarely compares platform work with other combinations of multiple jobholding and tends to primarily focus on individuals' primary employment and seldom distinct forms of secondary employment such as platform work, self-employment, and wage labor (Campion et al., 2020; Conen et al., 2019). In fact, most studies on platform work and multiple jobholding rarely consider the potential interlinkages between primary and secondary employment related to individual labor market biographies, understood as the developments and changes over time in workers' employment records.

This paper contributes to the debates on platform work and multiple jobholding by offering novel insights into the dynamics between primary and secondary employment of distinct groups of multiple jobholders on the Danish labor market from a longitudinal perspective. We analyze similarities and differences between platform workers and multiple jobholders with secondary jobs as self-employed or wage workers at the time of the LFS and follow their individual labor market biographies over a three-year period. We limit our focus to platform work, self-employment, and waged labor due to the different employment statuses that are associated with these employment forms.

Our research questions are: *What characterizes the labor market biographies related to platform work and multiple jobholding? Secondly, are some groups more clearly associated with upward labor market mobility, understood as increased earnings and job shifts?*

To address these research questions, we draw on data from the Danish Labor Force Survey on platform workers and multiple jobholders, but in combination with register data. In our analysis, we apply a longitudinal perspective on the relationship between multiple jobholding and an individual's labor market biography. *Analytically*, we seek inspiration from the literature on agency theory, multiple jobholding, and platform work. We argue that multiple jobholding can be considered a way to compensate for social risks and further stress that platform workers, similar to other groups of multiple jobholders, such as self-employed and waged workers can be seen as active labor market agents coping with social risks by finding new work opportunities.

The article starts with a brief literature review of recent studies on platform work and multiple jobholding with a particular focus on the strategies underpinning multiple jobholding. We then introduce the notion of agency to develop our analytical framework, before presenting our research design, used methods, and data. Afterwards, we analyze the characteristics and labor market biographies of multiple jobholders engaged in the three distinct types of secondary work (platform work, self-employment, and waged work). Finally, we discuss our findings, and our main conclusions are drawn.

2. Analytical framework

Platform work and multiple jobholding from an agency perspective

Platform work and multiple jobholding have received increased political and academic attention and there has been a mushrooming of research documenting these groups of workers' wage and working conditions, often fluid employment status, and the institutional setting within which they work such as the platform economy (Berg et al. 2018; Schoor et al. 2020; Conen et al. 2021).

They find that platform work and multiple jobholding are particularly associated with increased risks of labor market insecurities and often consider such employment forms yet another layer of non-standard work, exerting downward pressure on wages and working conditions (Berg 2016; Goods et al. 2019; Palier, 2018; Campion et al. 2020). Many platform workers and multiple jobholders, especially those engaged in various forms of self-employment, typically have to shoulder most, if not all social risks, due to their limited protection from the broader regulatory framework, including social and employment protection (Thelen et al. 2018; Kalleberg and Vallas, 2018; Woods et al. 2019). While research has examined multiple jobholding and platform work from various analytical lenses, less researched are the interactions between, for example, platform work and the wider labor market (Vallas and Schor, 2020; Ilsøe and Larsen, 2021; Piasna et al. 2022). Likewise, distinct forms of multiple jobholding, especially the varied forms of secondary employment, are rarely compared and analyzed as the focus tends to be on individuals' primary employment and their decisions to take up a second job or more (Conen and Stein, 2021; Campion, 2020). In addition, agency is typically not used as the analytical lens when examining the employment situation of platform workers and other groups of multiple jobholders. In fact, few studies consider platform work itself or multiple jobholding as a sign of agency, although different commentators have hinted at it (Schor et al., 2020; Piasna et al., 2021). Platform workers' agency has primarily been discussed when they engage in actions of mobilization (e.g., Tassinari & Maccarone 2022). An exception is the work by Niels van Doorn (2022) on migrant platform workers in Amsterdam, Berlin, and New York City, where he notes that some migrant workers consider platform work an acceptable but precarious and temporary form of work that represents a possible stepping stone into better employment (van Doorn, 2022). Lam & Triandafyllidou (2022) analyzing migrant pathways in platform work in Canada mirror this sentiment. They find that some migrant workers facing barriers and discrimination in the traditional labor market tend to use platform work actively as an opportunity, as added income security, as an exploration or transition, while platform work for other migrants becomes a forced-choice and last resort (Lam & Triandafyllidou 2022).

In this paper, our main argument is that platform workers, and multiple jobholders in general, can be seen as active labor market agents coping with social risks utilizing different strategies. Taking on platform work or another type of secondary employment is considered a strategy to either adapt or transform to risks or labor market uncertainties. In the following, we will draw on agency theory and MJH to expand upon this argument and develop the analytical framework we apply to understand the relationship between different strategies and labor market positions.

Agency theory

There is a vast literature on the relationship between agency and structure in the labor market, discussing the effects of structural constraints on worker agency and vice versa (Emirbayer & Mische, 1998; Schmid, 2017; Schoon, 2020; Scully-Russ, 2005). This is especially evident in the life-course research on labor market transitions discussing how individuals' work-life choices are influenced by structural constraints. However, individuals are still portrayed as active co-producers of their own development with changing preferences or capacities over the life course (Heckhausen & Buchmann, 2019; Schoon & Lyons-Amos, 2017). In this paper, our focus is on conceptualizing multiple jobholding as an expression of agency in the labor market, and here we draw on the work by Dadgeviren and Donoghue (2019) that explores how individuals employ distinct practices to overcome hardships. They understand agency as "an *ability or capacity of individuals to make a positive adjustment to negative experiences, thereby rebounding from hazards, crisis or adversity"* (Dadgeviren and Donoghue, 2019 p. 549). Building on their conceptualization, we distinguish between adaptive and transformative agency that represent distinct strategies for handling uncertainties, which we will relate to different aspects of multiple jobholding.

Adaptive strategies concern individual's efforts to protect and stabilize their income through, for instance, multiple jobholding. However, this is done in a way that conforms to changing circumstances, and where the burden falls on the individual, i.e., there is no effort to change the conditions that one lives under (Dagdeviren & Donoghue, 2019). This could be the case if an individual

facing economic hardship after getting her hours cut in a primary job would start working a secondary job to compensate for lost hours. *Transformative strategies* concern actions trying to shape circumstances so that the individual is better off than when they started (Dagdeviren & Donoghue, 2019). This could be attempts to increase employment security through different strategies of career development and/or changing career paths.

However, structural forces can also significantly constrain or embrace the possibilities for individuals' agency, e.g., labor market institutions and welfare systems, as well as the initial conditions and resources of individuals coping with labor market insecurities (Dagdeviren & Donoghue, 2019; Schoon, 2020; Scully-Russ, 2005). Therefore, we expect that structural forces influence individuals' engagement in multiple jobholding and platform work, aspects that are also emphasized in much multiple jobholding literature.

Multiple jobholding: the push & pull factors

Previous studies on multiple jobholding typically distinguish between primary and secondary employment and examine the underlying motives for individuals to take up a second job, including the implications for their employment situation and labor market biographies (Campion et al. 2020; Conen, 2020; Panos, et al. 2014). The multiple jobholding literature lists a plethora of motives for multiple jobholding, typically grouped into one of two broad categories of "push" and "pull factors". Regarding push factors, the literature focuses on financial difficulties as an important driver for why individuals pursue an additional job; this can be due to underemployment and low or fluctuating earnings in an individual's primary job (Hirsch et al., 2016, p. 1; Poliakas, 2018; Conen & de Beer, 2021). Likewise, studies on platform work point to close ties between platform workers' earnings in the conventional labor market and their engagement in platform work, with low-wage earners being overrepresented on labor platforms (Kristiansen et al., 2022; Schor et al., 2020; Piasna et al., 2022).

Regarding the pull factors listed within the multiple jobholding literature, these cover, among others, possibilities for up-skilling, career advancement, job shifts, or exploring entrepreneurial aspirations as important reasons why people take up a secondary job (Campion et al., 2020; Wu et al., 2009). Studies indicate that multiple jobholders are more likely to become self-employed or business owners, and a secondary job can be a way to explore self-employment as an alternative career path without risking the social protection and financial security offered by the primary job (Campion et al., 2020; Panos et al., 2014). Similar notions are echoed in the platform literature with some scholars discussing platforms as potential incubators for entrepreneurialism (Vallas & Schor, 2020). Following this vein of literature, we expect that people's income levels and career advancement may influence their engagement in multiple jobholding. By building on these notions, we seek to capture the role of agency within multiple jobholding in shaping an individual's employment biography before and after taking up multiple jobholding and platform work at the nexus between primary and secondary employment.

Agency in multiple jobholding – an analytical framework

To contribute to the literature on multiple jobholding and platform work, we propose a perspective that moves beyond the usual approach and considers multiple jobholding and platform work as a sign of agency in itself. We understand agency as different strategies for dealing with labor market uncertainties that are reflected in different types of multiple jobholding with important implications for an individual's broader labor market biography. We assume from our brief literature review that a worker's situation and the broader institutional context influence their engagement in multiple jobholding, and their agency is thus expected to play out differently for distinct groups of multiple jobholders.

Analytically, we consider taking up self-employment as secondary labor a sign of transformative agency, since it carries the possibility for a career change. Likewise, changing industries or occupational groups is also considered a sign of transformative agency, since it indicates an element

of broader labor market experience or new career paths. This type of agency should be more widespread among individuals with higher income and full-time, stable employment in their primary job. By contrast, we posit that a higher degree of adaptive agency will characterize those individuals with higher levels of risks based on their primary employment, e.g., non-standard work. From the literature, we assume that employment in the same industry or sector as the primary job is considered a sign of adaptive agency since it brings little chance of changing the overall employment security; however, it can help increase income levels.

In sum, the aforementioned analytical framework will be used to explore the role of agency within multiple jobholding and platform work. We use these groups' labor market trajectories during multiple jobholding as illustrative examples of distinct forms of strategies for dealing with labor market uncertainties based on the research design, methods, and data material presented in the following section.

3. Research design and methodology

Data presentation

This study draws on survey data from the Danish Labor Force Survey in 2017 and 2019 combined with longitudinal register data on labor market status from the *Danish labor market account* (AM-RUN). The Danish LFS covers approx. 18.000 respondents each quarter and is a representative sample of the working-age population in Denmark with individual weights. The LFS includes a question on whether individuals had more than one job at the time of the survey, and if that job is as self-employment or as waged work. In the first quarter of both 2017 and 2019, additional questions concerning work on digital labor platforms were asked to all respondents. Using this data, we can identify both those individuals involved in conventional multiple jobholding as defined in the Labor Force Survey, as well as those individuals who have performed some kind of platform work. Additionally, we have narrowed our sample to individuals between 20 and 65 years of age

at the time of the survey, to make sure that they are part of the workforce in the three-year period where we examine their labor market biographies.

It is important to note that the Labor Force Survey is cross-sectional, and it is therefore not possible to follow the developments in multiple jobholding based on the survey data. In addition, the question of multiple jobholding is formulated in such a way that it only asks whether you currently have more than one job. It is, therefore, not possible to know when they started being multiple jobholders or for how long they will continue to be so. Our analysis, therefore, focuses on describing and analyzing the differences between different types of multiple jobholders and does not attempt to establish causal relationships concerning factors leading to multiple jobholding or its potential effects.

To analyze the labor market trajectories of multiple jobholders, we link them to Danish register data on labor market participation (AMRUN), which covers all Danish residents going back to 2008. The register is based on income reports of both wages and income benefits as stated by private employers and public institutions. Information is also available on the industry and sector of the reporting institutions. We use this data to follow the monthly developments in working hours and income in our sample in a three-year period covering the time before, during, and after the participation in the LFS. This allows us a longitudinal perspective on the labor market activity among multiple jobholders in Denmark and gives us insight into how multiple jobholding interacts with the broader employment biography. The development and stability (or lack thereof) in employment act as an indicator of how multiple jobholding is used to adapt to or transform working conditions (Campion et al., 2020). It is important to note that while we use the LFS data to categorize workers by their secondary jobs, we use the register data to analyze their labor market affiliation concerning the primary job.

Methods: labor market sequences and regression analysis

We will now present the methods we use to analyze our survey and register data. We start by introducing multi-state sequence analysis, which we use to operationalize the labor market biographies of multiple jobholders. The goal here is to explore differences in the labor market trajectories of those who engage in waged work, self-employment, and platform work as secondary jobs. We then introduce the regression models we use to analyze the labor mobility of multiple jobholders.

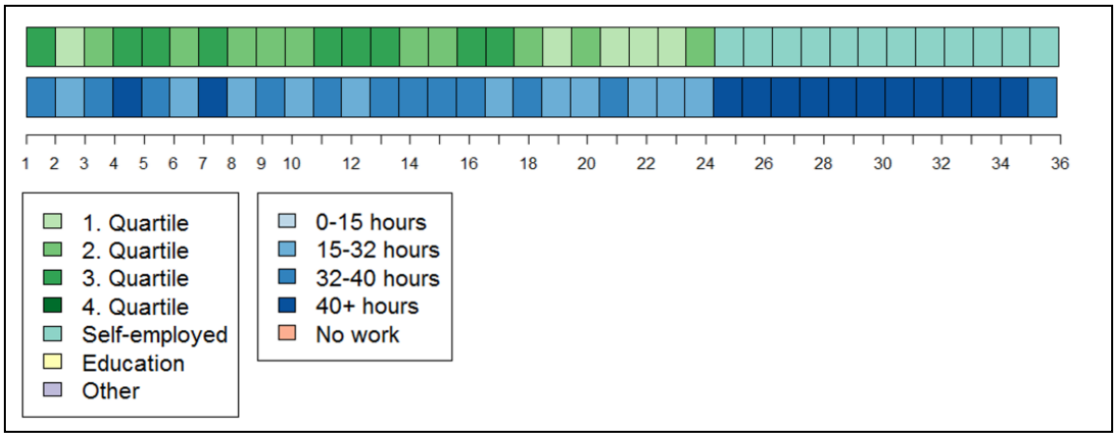
Sequence analysis is a descriptive statistical method for analyzing longitudinal data in order to study social processes and patterns of change (Abbott, 1995). It is particularly useful for studying processes that involve multiple stages or phases, such as in the context of employment trajectories, where the timing of job changes, periods of unemployment, and other employment-related transitions can have a significant impact on an individual's career prospects (Gauthier et al., 2010).

In this paper, we examine workers' labor market biographies using multidimensional sequences based on both working time and income data. We know from the literature that income is pivotal for the choices of MJH, with low-income workers more likely to hold secondary work for financial reasons and high-income workers in order to pursue alternative career paths (Campion et al., 2020). In a similar vein, working time is perhaps the most important labor market characteristic as an indicator of work stability and security over time (Lukac et al., 2019; Seo, 2021; Yoon & Chung, 2016).

Here, we use data on workers' working time as reported in the AMRUN registers, as well as a combination of income level and source of income. Working time sequences are coded in five states: "No work", "0-15 hours", "15-32 hours", "32-40 hours", and "40+ hours". We use these intervals following the literature where marginal part-time is often defined as less than 15 hours per week, and the Danish standard working week is 37 hours; however, with some variations, which is why we use the interval 32-40 hours (Nielsen et al., 2022). We combine working hours across multiple jobs.

Income is coded based on two types of information. For workers in waged work (both on permanent and temporary contracts), income is observed at a monthly level in the AMRUN registers, and we code these levels as quartiles, going from lowest to highest as "Q1", "Q2", "Q3" and "Q4". However, this is not possible for individuals in self-employment since income from businesses is only recorded annually; in addition, individuals on public benefits all qualify as the lowest income quartile. Individuals with a primary labor market affiliation other than waged work are therefore coded according to their main income source; "Income from self-employment," "Student allowance," or "Public benefits." We do this to capture transitions in both income levels and income sources. Sequences then reflect changes and developments each month in both working hours and income. All sequences are made using the TraMineR package in R (Gabadinho et al., 2011). An example of what a sequence can look like for an individual worker is shown in Figure 1.

Figure 1: Multi-state sequence of a single individual



Here we see how a worker can change between states during the 36-month period that we follow them. The worker in Figure 1 has waged work during the first 24 months with some fluctuations in both income and working time, but changes to self-employment during the last 12 months and starts working more than 40 hours a week. We present these multi-state sequences in the first part of our analysis, comparing trajectories between multiple jobholders with secondary wage work, self-employment and platform work. This gives us insights into the simultaneous developments

in working-time and income sources and levels across the three groups. Working time and income are important indicators of labor market risks and uncertainties.

As part of our analysis, we tried different clustering algorithms to test whether there were clear patterns in the different types of trajectories that multiple jobholders experience. Even though we ultimately decided against using these clusters in the analysis of this paper due to a relatively low cluster quality, they have been an active part of our process in writing this paper and formulating the analysis. The clusters helped visualizing the relatively high degree of stability in work-trajectories among most multiple jobholders while highlighting what types of movement are present. However, based on common cluster quality criteria like point biserial correlation and average silhouette width, we decided against using these clusters in further analysis. For interested readers, we have added a solution with 5 clusters as part of the appendix.

In the last part of our analysis, we compare labor market mobility among multiple jobholders with single jobholders. Here we draw on the MJH literature that highlights skill development, income progression, and job transitions as central measures of mobility (Campion et al., 2020; Panos et al., 2014; Wu et al., 2009). We define four different aspects of labor market mobility, measured one year after the LFS compared to two years before the LFS, as *industry mobility* (work in a different industry), *income mobility* (have an annual income increase of 20 pct.), *occupational mobility* (work in an occupation with a lower ISCO-classification), and *unemployment*. We use the International Standard Classification of Occupations (ISCO) that groups jobs according to their degree of skill level and specialization, going from 1 (managers) to 9 (elementary occupations). We use these aspects of labor market mobility as indicators of how the different types of multiple jobholding relate to adaptive or transformative strategies.

In our regression models, we analyze the relationship between these mobility indicators and secondary employment (platform work, traditional wage work, and self-employment) while we control for central sociodemographic characteristics. We include primary employment (permanent

contract, temporary contract, and self-employment), age, gender (male, female), ethnicity (Danish, immigrant/descendant), education (primary, secondary, and tertiary), single parent (yes, no), member of unemployment insurance fund (yes, no) and ISCO-classification.

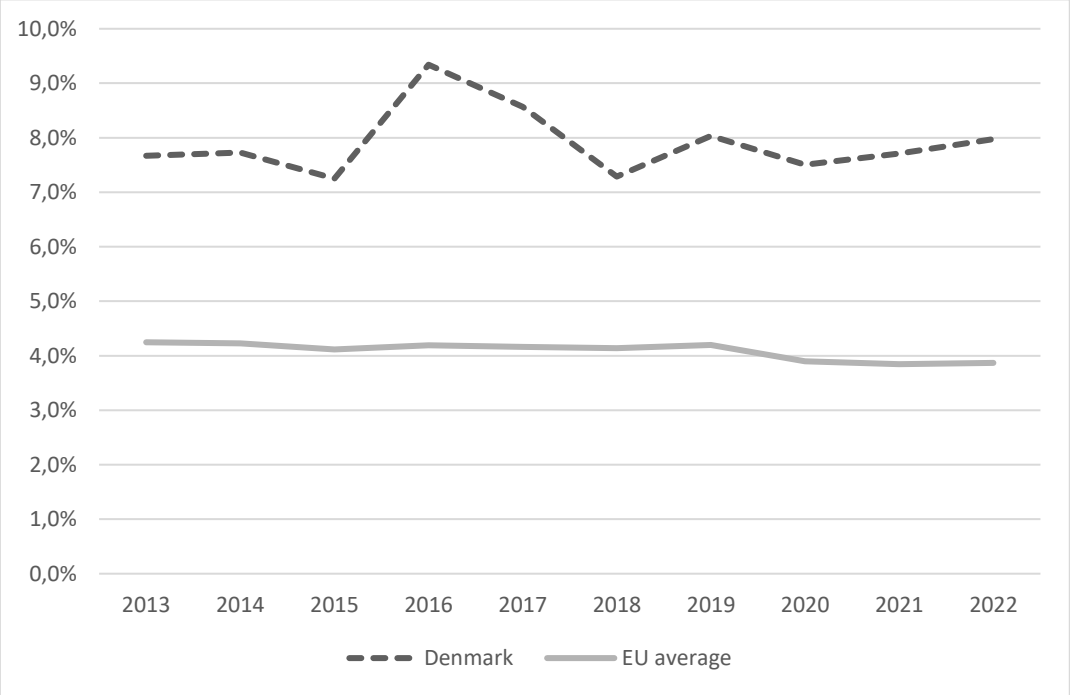
4. Analysis

We will now present some context on multiple jobholding in Denmark and descriptive statistics comparing multiple jobholders and single jobholders. The intention of this section is to offer contextual knowledge regarding multiple jobholding in Denmark.

Multiple jobholding in perspective

Multiple jobholding is an integrated part of the Danish labor market, with around 8 percent of the Danish workforce working more than one job. This figure has remained fairly stable since 2000, with a small decline since 2008, but remains twice as high as the EU average (4 percent) – see Figure 2. Multiple jobholding is most widespread in sectors such as education, health, and social work not only in Denmark but also in the rest of Europe when measured by multiple jobholders' primary employment (Eurostat, 2023; Table 1; Conen & De Beer, 2021). In Denmark, 37 percent of multiple jobholders combine jobs in the Education, Health, and social work sectors with a secondary job compared to the EU average of 29 percent (Conen, 2020: 12; Table 1).

Figure 2: Multiple jobholders as percentage of employed persons in Denmark and the EU



Source: Eurostat 2023

When narrowing our focus to multiple jobholders on the Danish labor market, we further find that their employment position often differ compared to single jobholders. For example, part-time work and temporary contracts are more widespread among multiple jobholders (36 % and 15 %) than among single jobholders (20 % and 8 %). Multiple jobholders are also more likely to be low-income earners. However, there are also important variations among the group of multiple jobholders as to other key characteristics such as their earnings, social protection coverage, and primary and secondary jobs (table 1). In this paper, we differentiate between three groups of multiple jobholders based on their secondary employment (platform work, traditional wage work and self-employment) and find that 11 per cent of multiple jobholders combine their primary job with platform work, 67 per cent with a secondary job characterized as traditional wage work and 22 per cent with self-employment (table 1).

Table 1: Descriptive statistics for single jobholders and multiple jobholders

	Single jobholders	**Multiple jobholders (secondary job)**		
		Wage workers	Self-employed	Platform workers
Employment status (primary job)				
Self-employed	8%	6%	14%	17%
Temporary contract	8%	19%	5%	15%
Permanent contract	84%	75%	80%	68%
Fulltime				
Yes	80%	59%	77%	67%
No	20%	41%	23%	33%
Age				
20-29	20%	34%	8%	35%
30-39	22%	18%	20%	26%
40-49	25%	22%	32%	23%
50-65	33%	26%	41%	16%
Gender				
Male	53%	49%	70%	60%
Female	47%	51%	30%	40%
Ethnicity				
Danish	86%	87%	93%	87%
Immigrant/descend-ant	14%	13%	7%	13%
Educational level				
Primary education	17%	14%	13%	18%

Upper secondary + vocational training	44%	44%	40%	40%
Tertiary education	40%	42%	47%	42%
Annual income				
Lower quartile	24%	36%	22%	45%
2. quartile	26%	18%	17%	21%
3. quartile	25%	19%	23%	16%
Upper quartile	25%	26%	38%	18%
ISCO				
Managers and professionals	32%	34%	36%	35%
Technicians and associate professionals	19%	13%	24%	20%
Clerical support, service and sales workers	25%	31%	17%	23%
Skilled and unskilled workers	25%	21%	22%	22%
Industry				
Manufacturing and construction	20%	10%	20%	16%
Health, education and social work	28%	42%	27%	27%
Retail, hotels, restaurants, transportation and cleaning	24%	19%	20%	24%
Other	28%	29%	33%	34%

Unemployment insurance				
Yes	82%	78%	75%	71%
No	18%	22%	25%	29%
Observations N (weighted data)	**2.386.000**	**309.000**	**103.000**	**52.000**

Source: Authors' own calculations based on LFS and Danish register data. Note: All numbers are weighted according to Statistics Denmark's guidelines.

Across the three groups of multiple jobholders working secondary jobs as platform workers, wage work, or self-employment, there are similarities but also considerable differences as to their exposure to and strategies for dealing with social risks such as low earnings, non-standard work, and unemployment.

Platform workers are characterized by an overrepresentation of young people, men, low-income earners (45%), non-insured in case of unemployment and primary jobs characterized by non-standard work (table 1). One in three of the platform workers work part-time in their primary job, while 17 per cent have a primary job as self-employed and another 15 per cent combine platform work with a temporary primary job. They often combine platform work with a primary job in sectors such as Education, Health and Social work (27%), followed by retail, transport, cleaning, hotel and restaurants (23%). We further find that the largest group of platform workers work as managers and professionals in their primary job (35%), followed by clerical support, service or sales workers (23%) and then Technicians or associate professionals (20%), or skilled/unskilled workers (20%) (Table 1). Thereby, platform work appears, in line with our expectations and other studies, to be a sign of adaptive agency strategy, notably adopted by low wage workers, to supplement their low primary income from a permanent, temporary or part-time job in the conventional labor market (Ilsøe et al. 2021; Piasna et al. 2020; Pesole et al. 2018). However, the large share of platform workers working in managerial or professional positions in their primary job

combined with their relatively average- or high income earnings also point to platform work being an example of transformative agency strategies, where individual worker's may use platform work to test alternative career paths while limiting inherited social risks by retaining their primary job.

Multiple jobholders with a secondary wage job in the conventional labor market are mostly *dual wage earners* (94 %), typically combining a permanent primary job – (75%) with a secondary wage job. Many are working reduced hours in their primary job (41%) and are typically employed within the Education, Health, or Social work sectors (42%). They work across the occupational job spectrum, with 34% having a primary job as managers and professionals compared to 31% working as clerical support, service, or sales workers, 21% as skilled/ unskilled workers, and 13% working as technicians and associate professionals (table 1). We further find that there is a more equal gender distribution among this group of MJH, and they are more likely to be covered by an unemployment benefits scheme than, for example, platform workers (table 1). However, young people, non-standard work and low wage income earners are similar to platform workers overrepresented among multiple jobholders with a secondary wage job, especially compared to single jobholders (table1). These findings indicate that many dual-wage earners have a secondary wage job to top up a part-time, temporary or low wage primary job. It may thus be indicative of adaptive rather than transformative agency strategies to protect against social risks often associated with non-standard and low wage work in the conventional labor market such as reduced hours, low income, especially as there is an overrepresentation of low-income groups -35% - working in private services sectors at the lower end of the occupational job spectrum.

Multiple jobholders with self-employment as a secondary job is the second largest share of multiple jobholders on the Danish labor market. Four in five combine a secondary job as self-employment with a permanent primary job, while 14% can be classified as multiple self-employed as they work as self-employed in both their primary and secondary jobs. Relatively few – 5% - combine a temporary primary job with self-employment (table 1). Full-time primary jobs – 77%

- are common among this group and their share is higher than the platform workers and dual-wage earners. They also tend to be slightly older than platform workers and MJH with secondary wage jobs and there is an overrepresentation of men, high-income earners, highly educated and individuals within the upper end of the job occupational spectrum (table 1). Thirty-six per cent work as managers, professionals in their primary job, while 24% are technicians, associate professionals, 22% are skilled/unskilled workers, and 17% are clerical support, service or sales workers (table 1). We further find that this group of multiple jobholders are likely to work within Danish manufacturing, construction and less so in private services than the other multiple jobholder groups (table 1). These findings are indicative of transformative agency strategies, notably among the high earners, the managerial and professional groups. In this context, self-employed as a secondary job may be a way of testing entrepreneurship dreams without jeopardizing the social protection secured through their primary high paid job. There are, however, also signs of adoptive agency strategies, especially among the low wage and non-standard workers. They may use a secondary job as self-employed to boost their low primary income or compensate their lower levels of social protection as they are less likely to be member of an unemployment benefit fund than other groups (table 1).

The descriptive data offers a snap shot of the employment situation and strategies of the different groups of MJH, but is unable to capture if their choices could potentially lead to up-ward or downward mobility in terms of, income, occupation, industry, or (un)employment. We explore these aspects in the following sections by adopting a longitudinal perspective, using multi-state sequence analysis on developments in working time and income.

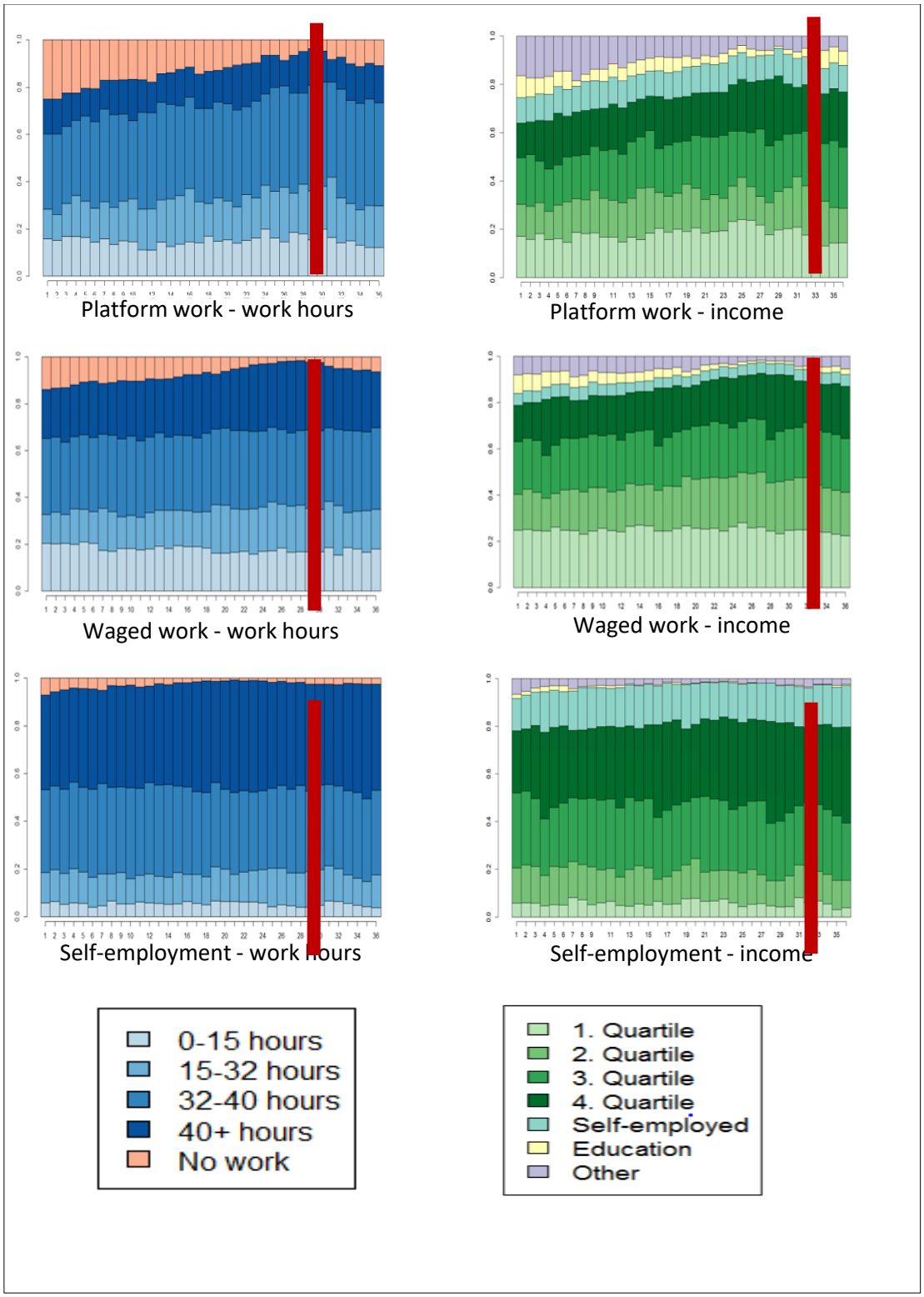
Multiple jobholders and their labor market biographies

Figure 3 depicts the compositional changes in total working hours and income among multiple jobholders for the 36 months that we follow them in the registers. The labor market biographies of multiple jobholders with secondary jobs as platform workers, wage earners, and self-employed

appear fairly distinct when depicting the compositional changes in their total working hours and income over a 36-month period covering two years before and one year after they responded to the LFS. We follow them by combining the LFS data with longitudinal Danish register data and illustrate our findings in Figure 3 using sequence analysis.

We further elucidate the sequences shown in Figure 3 by summarizing their key characteristics in Table 2. In this analysis, we focus on the temporal developments and compare labor market trajectories among workers with secondary wage work, self-employment, and platform work, offering critical insights into their labor market sequences. It should be noted that the sequences in Figure 3 represent the cumulative distributions and hide how workers every month can actually transition back and forth between different states. The number of transitions between states are shown in Table 2.

Figure 3: Distribution of state frequencies comparing multiple jobholders with secondary work as platform work, wage work, and self-employment.



Source: Authors' own calculations based on LFS and Danish register data. Note: The red lines represent the time of the LFS.

Starting with the *platform workers*, we compare the sequences in Figure 3 with the statistics in Table 2 and find relatively large changes over time. Approximately one in four is out of work at the beginning of the period. However, this share decreases quite drastically until the time of the LFS and then slightly increases again before it stagnates at 11 percent at the end of the three-year period. This illustrates that a relatively large share of the platform workers take up work during this period, and the majority are able to keep working. This development is also reflected in the income sequence, with a similar decrease in individuals on public benefits. Moreover, substantial shifts are observed in full-time employment (from 47% to 60%) and increases in upper quartile income (from 14% to 23%), indicating considerable upward mobility for platform workers. From Table 2, we further find that platform workers have a median of six transitions in working hours and seven transitions in income over the 36-month period, further indicating a high degree of mobility. In combination with our knowledge of the relatively young age groups among platform workers, it could indicate that platform work is part of a strategy among workers in the earlier parts of their careers trying to find their footing in the labor market.

Table 2: Central statistics from the beginning (t1) and end (t36) of the three-year labor market sequences

		Wage workers	**Self-employed**	**Platform workers**
Median transitions in working hours		9	3	6
Median transitions in income		9	7	7
Working more than 32 hours	**t1**	53%	75%	47%
	t36	59%	80%	60%
Working less than 15 hours	**t1**	33%	18%	28%
	t36	35%	17%	29%
Out of work	**t1**	14%	7%	25%
	t36	6%	3%	11%
Income in the lower quartile	**t1**	25%	6%	17%
	t36	23%	4%	15%
Income in the upper quartile	**t1**	16%	26%	14%
	t36	23%	40%	23%

Source: Authors' own calculations based on LFS and Danish register data. Note: t1 represents the first month of our three-year period, and t36 represents the last month.

Among *multiple jobholders with a secondary wage job*, we find a somewhat similar pattern as among the platform workers, although the changes over time are not as large. The share of workers in this group that are out of work changes from 14 pct. at the beginning to 6 pct. at the end of the period. We find a larger share of workers in this group compared to the other two, with an income in the lowest income quartile (approximately one quarter during the entire period). Workers with secondary waged work have a median of nine transitions in both working hours and income, whereby half of this group changes monthly working hours nine times or more during the three-year period, which is the highest number of transitions among all MJH. These findings show that there is a higher prevalence of low-income and unstable working hours and somewhat

less progression for MJH with secondary wage jobs compared to platform workers and MJH with secondary self-employment. This could indicate that MJH with secondary wage jobs are more likely to use MJH as an adapting strategy due to income and employment insecurity.

Multiple jobholders with self-employment as a secondary job stand in contrast to both platform workers and secondary wage workers and exhibit a more stable pattern with very little change during the three-year period. The large majority are working more than 32 hours pr. week, a very low share is out-of-work, and there is the largest share of workers with an income in the upper quartile. There is also a larger share of workers in this group with self-employment as their primary income source. Workers with secondary self-employment have the fewest transitions, with a median of three transitions in working hours and seven transitions in income. This corroborates that there seems to be a larger degree of stability in employment biographies among workers with secondary self-employment and a larger volatility among those with secondary waged work, with platform workers somewhere in between. This finding is in line with our expectations from the literature; that self-employment as a secondary job is more common among workers with secure employment who can afford to take risks to further personal or career goals instead of being driven by financial concerns.

Two central points stand out from this analysis. Firstly, multiple jobholders who engage in secondary work as self-employed exhibit highly stable labor market biographies compared to workers with secondary platform work and secondary wage jobs. Even over a three-year period, they constantly work many hours, with a high income and very little change in overall working-time or income. Secondly, multiple jobholders with secondary waged work or platform work illustrate signs of more diverse labor market biographies, with a substantial share of individuals in full-time work, a smaller share in part-time work, and also some transitioning from out-of-work to work. Likewise, our results seem to indicate that multiple jobholders with secondary waged work or platform work are more often driven by hours constraints or financial concerns, as they are more likely to have volatile labor market biographies dominated by part-time work and low-income.

To build upon and further qualify these findings, we will in the next part of the analysis present regression models focusing on different aspects of labor market mobility.

Upward mobility in multiple jobholding?

We will now address the last part of our research question concerning labor market mobility. Table 3 presents regression results from four linear probability models, each highlighting a different aspect of labor market mobility, comparing multiple jobholders with single jobholders as the reference category.

The first regression shows industry mobility, operationalized as the probability of an individual working in a different industry one year after answering the LFS as compared to one year before the LFS. The second regression shows income mobility, operationalized as an income increase of more than 20 pct. in the three-year period from two years before the LFS to one year after. The third regression shows occupational mobility, operationalized as the probability of an individual working with an occupational classification (ISCO) lower (i.e. with a higher skill level) one year after the LFS than they did two years prior to the LFS. The fourth regression shows the risk of unemployment measured at the end of the three-year period.

Table 3: Labor market mobility in multiple jobholding

	Industry mobility		Occupational mobility		Income increase		Unemployment	
	Base model	**Full model**	**Base model**	**Full model**	**Base model**	**Full model**	**Base model**	**Full model**
(Intercept)	0.205***	0.380***	0.115***	0.304***	0.367***	0.990***	0.036***	0.011
	(0.004)	(0.017)	(0.003)	(0.013)	(0.005)	(0.018)	(0.002)	(0.007)
Multiple jobholding (Single jobholders)								
Wage work	0.119***	0.093***	0.077***	0.056***	0.102***	0.038**	-0.020***	-0.022***
	(0.015)	(0.012)	(0.012)	(0.009)	(0.016)	(0.013)	(0.004)	(0.005)
Self-employment	0.062**	0.082***	-0.023	-0.004	0.037	0.074***	-0.017**	-0.016
	(0.022)	(0.020)	(0.015)	(0.016)	(0.024)	(0.022)	(0.007)	(0.009)
Platform work	0.041	0.008	0.080**	0.048*	0.185***	0.063*	-0.003	-0.002
	(0.031)	(0.028)	(0.028)	(0.022)	(0.037)	(0.030)	(0.013)	(0.012)
Primary job (Permanent contract)								
Self-employed		-0.030*		-0.028*		0.109***		-0.015*
		(0.014)		(0.011)		(0.015)		(0.006)
Temporary contract		0.085***		0.036***		0.102***		0.043***
		(0.013)		(0.010)		(0.014)		(0.006)
Age		-0.005***		-0.005***		-0.015***		0.001***
		(0.000)		(0.000)		(0.000)		(0.000)
Female		-0.009		-0.010		-0.036***		0.003
		(0.008)		(0.006)		(0.008)		(0.003)
Non-danish descent		-0.029**		-0.015		0.059***		0.003
		(0.011)		(0.009)		(0.012)		(0.005)
Education (Primary educ.)								
Secondary or vocational educ.		-0.022*		-0.015		0.033**		0.036***
		(0.011)		(0.009)		(0.012)		(0.005)
Tertiary educ.		-0.017*		-0.013*		0.045***		-0.003
		(0.008)		(0.006)		(0.009)		(0.004)
Unemployment insurance		0.044***		0.040***		-0.023*		-0.018***
		(0.010)		(0.008)		(0.011)		(0.004)
R^2	0.008	0.038	0.006	0.047	0.007	0.173	0.001	0.016
Adj. R^2	0.008	0.037	0.006	0.046	0.006	0.172	0.001	0.016
Num. obs.	12255	12224	12255	12224	12255	12224	12255	12224

***p < 0.001; **p < 0.01; *p < 0.05

For all groups of multiple jobholders, we find that they are more likely to show some form of labor market mobility than single jobholders. However, this association varies between the different groups of multiple jobholders.

Platform workers are more likely to experience both upward occupational and income mobility compared to single jobholders. While the strength of the association between doing platform work and income and occupational mobility decreases when we include socio-demographic controls, the association stays statistically significant; indicating that platform work for some workers is part of upward labor market mobility. We find no link between platform work and changing industries, or being unemployed, compared to single jobholders.

Multiple jobholders with a secondary wage job are more likely to change industries, get an income increase, and move up the occupational ladder compared to single jobholders. These findings

point to a relatively high degree of upwards labor market mobility among this group of workers. We also find a significant negative association between secondary wage work and unemployment, indicating that this group of multiple jobholders is less likely to become unemployed during the three-year period compared to single jobholders. These findings seem to indicate that there are both adaptive and transformative strategies at play among this group since they are not only adapting to social risks through increasing their income and reducing unemployment risks but there are also indications of transformative strategies with career changes in new industries and occupations. This nuances the findings from our sequence analysis.

Multiple jobholders with self-employment as a secondary job are more likely to change industries and see an income increase. We also find a significant negative association with unemployment; however, this association becomes insignificant when we include control variables. There is no association between self-employment as a secondary job and occupational mobility. These findings underscore the role of secondary self-employment as a chance to try your hand at something new, changing careers and increasing income.

5. Conclusion and discussion

In this paper, we have investigated how the labor market trajectories of platform workers develop over a three-year period and compared them with multiple jobholders in secondary waged work and self-employment. Our findings have emphasized how a longitudinal analysis of platform workers' labor market positions can help advance our understanding of this type of work and its relationship to the broader labor market. Specifically, we find a high degree of labor market mobility among all three groups of multiple jobholders, albeit with some differences that we will discuss in the following section. Methodologically, our focus on different dimensions of labor market mobility among multiple jobholders gives a more nuanced understanding of how secondary jobs are used in varied ways as part of a larger labor market biography. In this study, we apply

both longitudinal and comparative perspectives on the labor market biographies of platform workers. Most quantitative studies on platform workers are based on cross-sectional survey data without comparable labor market groups (Drahakoupil & Piasna, 2022; OECD et al., 2023; Pesole et al., 2020). Applying both longitudinal and comparative perspectives on the labor market biographies of platform workers, we make a significant contribution to the literature in contextualizing platform work from a broader labor market perspective.

For platform workers, we find that at the beginning of the three-year period where we follow them, some of their defining characteristics are a large share of individuals out of work, a relatively small share of individuals working full-time, and a very small share of high-income workers. These all point to labor market positions of comparatively high social risk among workers engaging in platform work. However, during the three-year period, there is a large increase in full-time and high-income workers as well as a large decrease in individuals out of work. Adding to this, we also find that performing platform work is associated with upward occupational mobility in the primary job as well as an income increase. This type of labor market mobility among platform workers hints at platform work being part of an upward labor market trajectory.

Among workers who engage in secondary self-employment, we find that they tend to have very secure labor market positions during all three years. The majority work full-time, there is a large share of high-income workers, and very few individuals are out of work at any time during the period. Interestingly, they also show a substantial degree of labor market mobility. Unlike platform work, having secondary self-employment is not associated with occupational mobility but with changing industries. These findings are in line with our expectations based on the existing literature that self-employment as a secondary job is more common among workers with secure employment who can afford to take risks to change careers or pursue new goals (Campion et al., 2020; Panos et al., 2014; Wu et al., 2009).

Workers with secondary waged work experience more transitions in working time and income levels than those doing platform work or self-employment, indicating more volatile labor market

trajectories. We also find that they have the largest share of workers working marginal part-time and having an income in the bottom quartile. However, secondary waged work is also associated with a large degree of labor market mobility in both industry, occupation, and income. The relatively insecure employment position of workers with secondary waged work corroborates the expectations from the literature that these individuals are more likely to be driven into multiple jobholding by push factors such as hours constraint and low income from the primary job. The high degree of labor market mobility is, however, a bit surprising and indicates that at least some workers with secondary waged work use it as part of an upward labor market trajectory.

In the literature, secondary self-employment is portrayed as a strategic tool for workers to tentatively explore alternative career paths and possibly transform their work lives without jeopardizing the social protection and financial security provided through their primary jobs (Campion et al., 2020; Wu et al., 2009). This is in line with our findings as workers in secondary self-employment enjoy the largest degree of labor market security in their primary jobs. In contrast, much of the literature on platform work focuses on the lack of social protection on labor platforms and the associated risks of working in the grey zones between standard employment and self-employment (Berg, 2016; Vallas & Schor, 2020). And just like platform workers, those who take on secondary waged work are often portrayed with little agency as it is structural conditions in the labor market, such as low levels of employment and social protection, that pressure individuals to take up multiple jobs (Panos et al., 2014; Hirsch et al., 2016: Conen & de Beer, 2021). Based on our findings that substantial labor market mobility exists in these two groups of multiple jobholders, we argue that these workers have more agency than the literature often attributes them. They are not just taking on a secondary job to absorb the costs of, e.g., hours constraints in the primary job; they are also adapting and transforming their work lives, achieving better occupational status and higher income. We argue that, through the lens of agency, we are able to contribute to the literature on platform workers and multiple jobholding by shedding new light on mobility patterns.

It seems that at least some workers are successful in using platform work and multiple jobholding to reduce social risks (Bonoli, 2006; Taylor-Gooby, 2004). This is especially evident for MJH with secondary wage job and platform workers who display a relatively high degree of labor market uncertainties as well as upward labor market mobility. They are responding to unstable career patterns, seen as income and employment instability, by working more than one job and seeking new career opportunities.

One limitation of this study and an avenue for future research is that our focus on multiple jobholders, who, by definition, are already in the labor market, limits the generalizability of our findings for platform workers who are only active on the labor platforms. Even though most studies find that platform work is primarily a supplementary income, limiting our focus to platform workers with other jobs might result in us missing the platform workers with the most social risks. The labor market trajectories of platform workers with no other work income are relevant to analyze further but are also related to one of the oft-discussed limitations of using population-scale surveys like the LFS to analyze platform work (O´Farrell & Montagnier, 2020). To be exact, the relatively small population of platform workers can quickly lead to problems with sample sizes that are too small to be statistically significant in subgroup analysis. Previous research has discussed whether the LFS, in general, underestimates the most vulnerable groups in the labor market, and for instance, ethnic minorities and migrant workers are shown to only participate in this survey to a limited extent (Font & Mendez, 2013; OECD et al., 2023).

Summing up, we make two primary contributions to the literature. Firstly, our focus on different dimensions of labor market mobility among multiple jobholders gives a more nuanced understanding of how secondary jobs are used in different ways as part of a larger labor market biography. Secondly, while platform work gives limited institutional social protection and platform workers often start from uncertain labor market positions, they do exhibit a certain degree of upward mobility in the Danish labor market, indicating more labor market agency than is often

recognized. This can, however, be closely related to the role of the Danish welfare state in reducing social risks and ensuring high labor market mobility (Madsen, 2004). In Denmark, at least, it seems that platform work is not just another precarious layer in the labor market but tells a more complicated story that, for some workers, may be more positive.

References

Abbott, A. (1995). Sequence Analysis: New Methods for Old Ideas. *Annual Review of Sociology*, *21*, 93–113.

Aisenbrey, S., & Fasang, A. (2017). The Interplay of Work and Family Trajectories over the Life Course: Germany and the United States in Comparison. *American Journal of Sociology*, *122*(5), 1448–1484. https://doi.org/10.1086/691128

Armingeon, K., & Bonoli, G. (2006). *The Politics of Post-Industrial Welfare States: Adapting post-war social policies to new social risks*. London/New York, Routledge. https://cadmus.eui.eu/handle/1814/22662

Bonoli, G. (2006). New social risks and the politics of post-industrial social policies. In *The Politics of Post-Industrial Welfare States*. Routledge.

Bonoli, G. (2007). Time Matters: Postindustrialization, New Social Risks, and Welfare State Adaptation in Advanced Industrial Democracies. *Comparative Political Studies*, *40*(5), 495–520. https://doi.org/10.1177/0010414005285755

Campion, E. D., Caza, B. B., & Moss, S. E. (2020). Multiple Jobholding: An Integrative Systematic Review and Future Research Agenda. *Journal of Management*, *46*(1), 165–191. https://doi.org/10.1177/0149206319882756

Conen, W. (2020). *MULTIPLE JOBHOLDING IN EUROPE*. *20*, 61.

Conen, W., & de Beer, P. (2021). When two (or more) do not equal one: An analysis of the changing nature of multiple and single jobholding in Europe. *Transfer: European Review of Labor and Research*, *27*(2), 165–180. https://doi.org/10.1177/10242589211002630

Conen, W., & Stein, J. (2021). A panel study of the consequences of multiple jobholding: Enrichment and depletion effects. *Transfer: European Review of Labor and Research*, *27*(2), 219–236. https://doi.org/10.1177/1024258920985417

Dagdeviren, H., & Donoghue, M. (2019). Resilience, Agency and Coping with Hardship: Evidence from Europe during the Great Recession. *Journal of Social Policy*, *48*(3), 547–567. https://doi.org/10.1017/S0047279418000624

De Stefano, V. (2015). The Rise of the Just-in-Time Workforce: On-Demand Work, Crowdwork, and Labor Protection in the Gig-Economy. *Comparative Labor Law & Policy Journal*, *37*(3), 471–504.

Doorn, N. van. (2022). Liminal precarity and compromised agency: Migrant experiences of gig work in Amsterdam, Berlin, and New York City. In *The Routledge Handbook of the Gig Economy*. Routledge.

Gabadinho, A., Ritschard, G., Müller, N. S., & Studer, M. (2011). Analyzing and Visualizing State Sequences in R with TraMineR. *Journal of Statistical Software*, *40*, 1–37. https://doi.org/10.18637/jss.v040.i04

Gauthier, J.-A., Widmer, E. D., Bucher, P., & Notredame, C. (2010). Multichannel Sequence Analysis Applied to Social Science Data. *Sociological Methodology*, *40*(1), 1–38. https://doi.org/10.1111/j.1467-9531.2010.01227.x

Hau, M. F., & Savage, O. G. (2022). Building coalitions on Facebook: 'Social media unionism' among Danish bike couriers. *New Technology, Work and Employment*, *n/a*. https://doi.org/10.1111/ntwe.12261

Huber, E., & Stephens, J. (2006). Combating old and new social risks. In *The Politics of Post-Industrial Welfare States*. Routledge.

Ilsøe, A., Larsen, T. P., & Bach, E. S. (2021). Multiple jobholding in the digital platform economy: Signs of segmentation. *Transfer: European Review of Labor and Research*, 1024258921992629. https://doi.org/10.1177/1024258921992629

Kusk, K., & Bossen, C. (2022). Working with Wolt: An Ethnographic Study of Lenient Algorithmic Management on a Food Delivery Platform. *Proceedings of the ACM on Human-Computer Interaction*, *6*(GROUP), 4:1-4:22. https://doi.org/10.1145/3492823

Lehndorff, S., Dribbusch, H., & Schulten, T. (Eds.). (2018). *Rough waters: European trade unions in a time of crises* (Second and updated edition). European Trade Union Institute (ETUI).

Mailand, M., & Larsen, T. P. (2018). *Hybrid work—Social protection of atypical employment in Denmark. 11*.

Palier, B. (2018). *The politics of social risks and social protection in digitalised economies*. Policy Network. https://policynetwork.progressivebritain.org/opinions/essays/politics-social-risks-social-protection-digitalised-economies/

Panos, G. A., Pouliakas, K., & Zangelidis, A. (2014). Multiple Job Holding, Skill Diversification, and Mobility. *Industrial Relations: A Journal of Economy and Society*, *53*(2), 223–272. https://doi.org/10.1111/irel.12055

Piasna, A., Pedaci, M., & Czarzasty, J. (2020). Multiple jobholding in Europe: Features and effects of primary job quality. *Transfer: European Review of Labor and Research*, 1024258920958836. https://doi.org/10.1177/1024258920958836

Ritschard, G., & Studer, M. (Eds.). (2018). *Sequence Analysis and Related Approaches: Innovative Methods and Applications* (Vol. 10). Springer International Publishing. https://doi.org/10.1007/978-3-319-95420-2

Rubery, J. (2015). Change at work: Feminisation, flexibilisation, fragmentation and financialisation. *Employee Relations*, *37*(6), 633–644. https://doi.org/10.1108/ER-04-2015-0067

Rubery, J., Grimshaw, D., Keizer, A., & Johnson, M. (2018). Challenges and Contradictions in the 'Normalising' of Precarious Work. *Work, Employment and Society*, *32*(3), 509–527. https://doi.org/10.1177/0950017017751790

Schneider, D., & Harknett, K. (2019). Consequences of Routine Work-Schedule Instability for Worker Health and Well-Being. *American Sociological Review*, *84*(1), 82–114. https://doi.org/10.1177/0003122418823184

Schor, J. B., Attwood-Charles, W., Cansoy, M., Ladegaard, I., & Wengronowitz, R. (2020). Dependence and precarity in the platform economy. *Theory and Society*, *49*(5), 833–861. https://doi.org/10.1007/s11186-020-09408-y

Smith, A., & McBride, J. (2021). 'Working to Live, Not Living to Work': Low-Paid Multiple Employment and Work–Life Articulation. *Work, Employment and Society*, *35*(2), 256–276. https://doi.org/10.1177/0950017020942645

Spasova, S., Ghailani, D., Sabato, S., Coster, S., Fronteddu, B., & Vanhercke, B. (2021). Non-standard Workers and the Self-employed in the EU: Social Protection During the Covid-19 Pandemic. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3802372

Studer, M., & Ritschard, G. (2016). What matters in differences between life trajectories: A comparative review of sequence dissimilarity measures. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, *179*(2), 481–511. https://doi.org/10.1111/rssa.12125

Tassinari, A., & Maccarrone, V. (2020). Riders on the Storm: Workplace Solidarity among Gig Economy Couriers in Italy and the UK. *Work, Employment and Society*, *34*(1), 35–54. https://doi.org/10.1177/0950017019862954

Taylor-Gooby, P. (Ed.). (2004a). New Risks and Social Change. In *New Risks, New Welfare: The Transformation of the European Welfare State* (p. 0). Oxford University Press. https://doi.org/10.1093/019926726X.003.0001

Taylor-Gooby, P. (Ed.). (2004b). New Social Risks and Welfare States: New Paradigm and New Politics? In *New Risks, New Welfare: The Transformation of the European Welfare State* (p. 0). Oxford University Press. https://doi.org/10.1093/019926726X.003.0009

Urzi Brancati, C., Pesole, A., & Macias, E. (2019). *Digital Labor Platforms in Europe: Numbers, Profiles, and Employment Status of Platform Workers*. https://doi.org/10.2760/16653

Vallas, S., & Schor, J. B. (2020). What Do Platforms Do? Understanding the Gig Economy. *Annual Review of Sociology*, *46*(1), 273–294. https://doi.org/10.1146/annurev-soc-121919-054857

Wood, A. J., Graham, M., Lehdonvirta, V., & Hjorth, I. (2019). Good Gig, Bad Gig: Autonomy and Algorithmic Control in the Global Gig Economy. *Work, Employment and Society*, *33*(1), 56–75. https://doi.org/10.1177/0950017018785616

Appendix

Figure A1: Density plots for the five-cluster solution

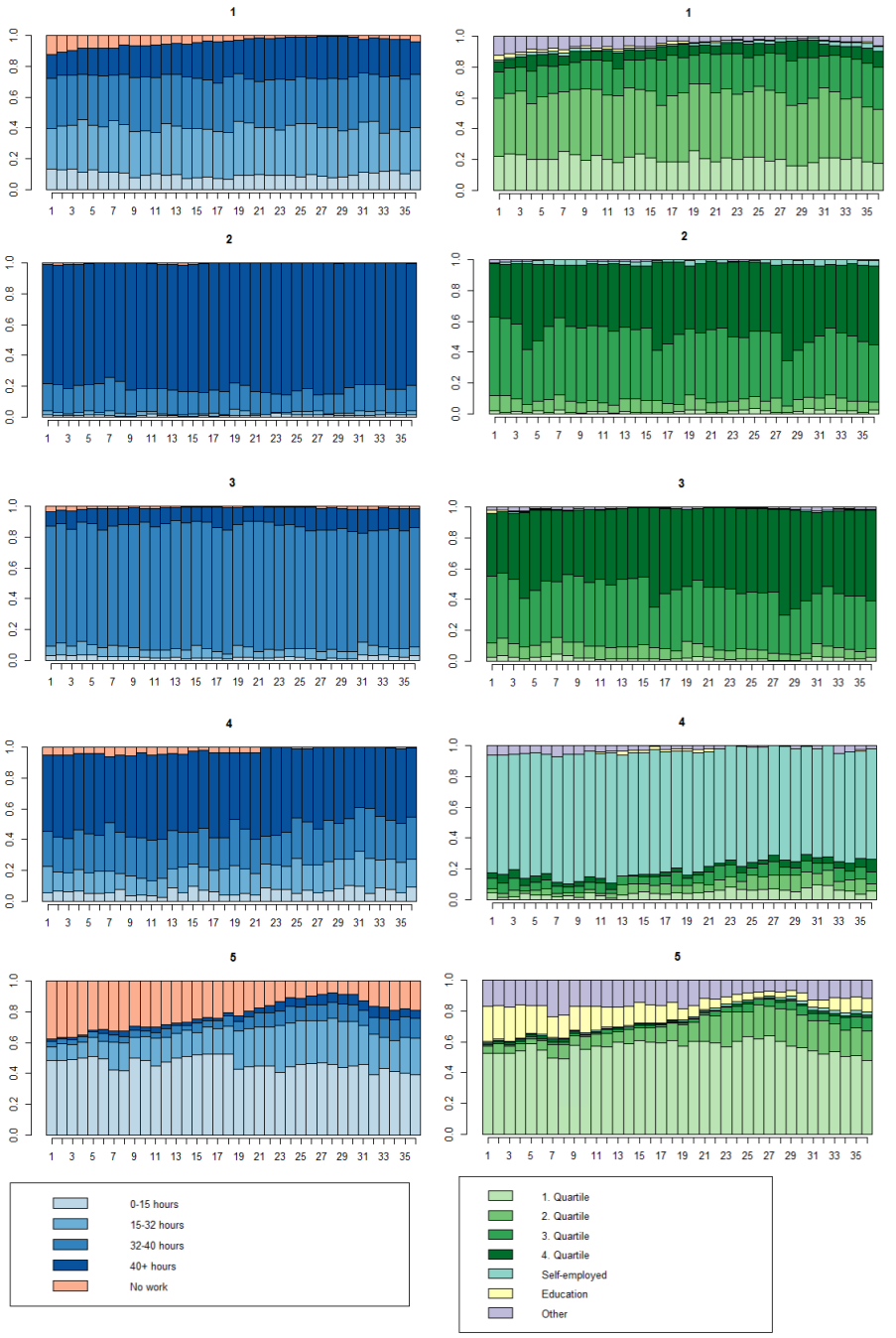


Figure A2: Cluster indicators

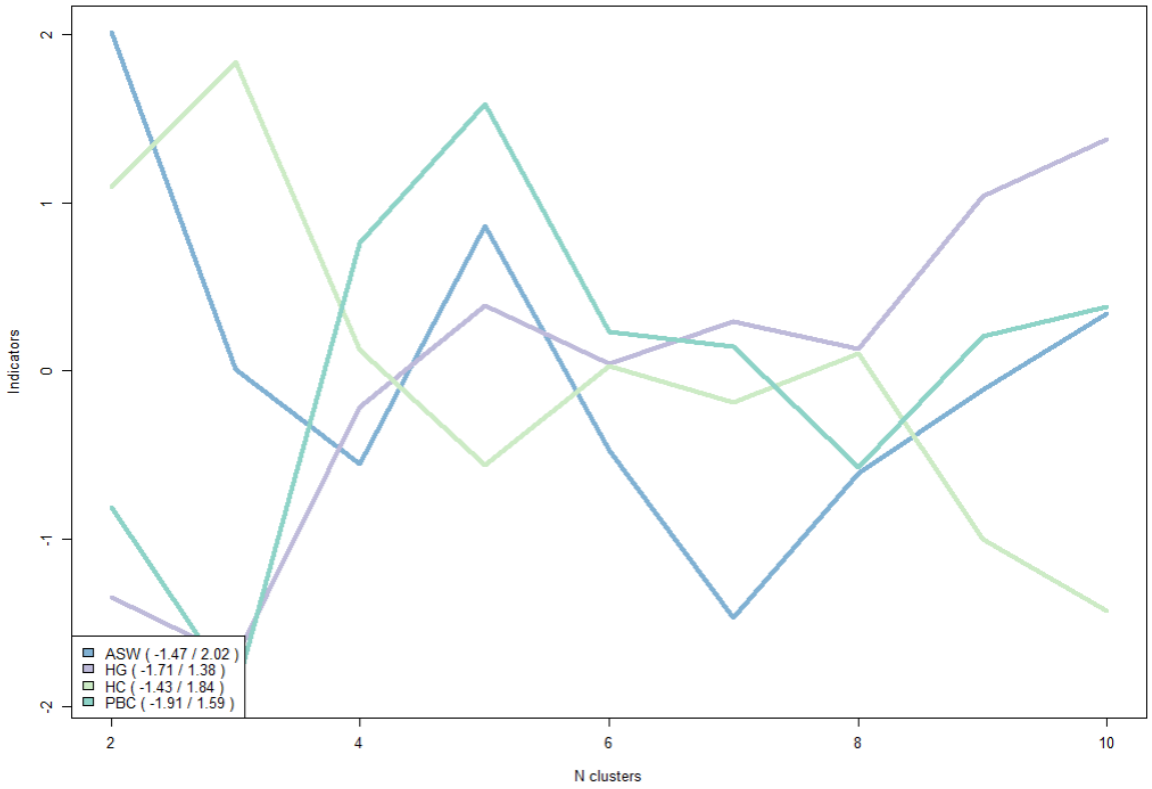
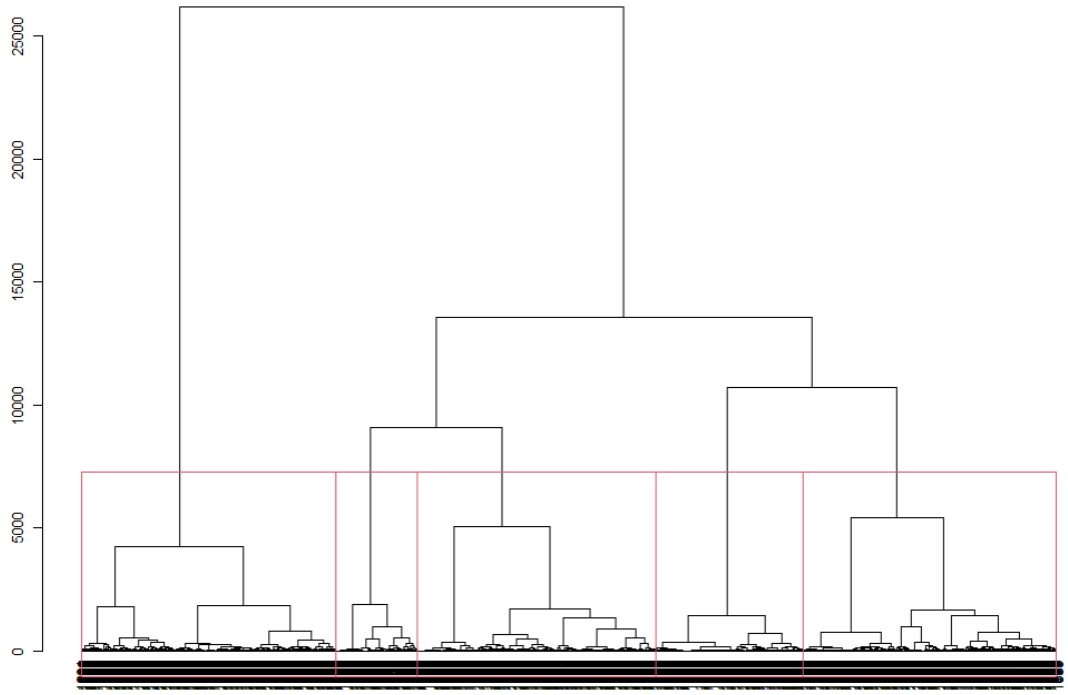

Indicators
2
1
0
-1
-2
2
4
6
8
10
N clusters
ASW (-1.47 / 2.02)
HG (-1.71 / 1.38)
HC (-1.43 / 1.84)
PBC (-1.91 / 1.59)

Figure A3: Dendrogram



Summary

The main objective of this dissertation is to study working conditions – the quality of work – over time at digital labour platforms such as Wolt or Hilfr with the Danish labour market as an empirical case. These platforms have recently gained much attention for providing easy access to tasks and earnings through a digitally mediated infrastructure. However, they have also faced criticism for contributing to labour market inequalities due to their digitalised and unregulated working conditions, which have led to uncertainties in the quality of work in the form of fluctuating working hours and earnings. Limited access to platform data further complicates studying these contexts, as many platforms are reluctant to share their data with researchers.

This dissertation bridges this gap by utilising a working time data series from a total population of food delivery couriers provided by the prominent food delivery platform Wolt. By applying a longitudinal perspective on these data, the dissertation offers novel empirical insights relevant to ongoing discussions on regulating the platform economy and the implications of digitalisation on organisational structures and contemporary working lives.

The dissertation's main contribution is revealing three previously unidentified segments of platform workers with stable and distinct working time patterns, indicating that labour market inequalities are evolving within the platform. Further, the dissertation examines the platform and the worker levels, providing complementary perspectives of structural conditions that cause inequalities to emerge within the platform.

Overall, the dissertation consists of four separate research articles that quantitatively and qualitatively analyse the abovementioned aspects.

Article 1 examines platform management practices, particularly the use of algorithmic management alongside traditional practices, and highlights the platforms' challenges in controlling work processes due to the digital gap between the platforms and the workers.

Article 2 analyses the working time data from Wolt and identifies three stable segments: Dabblers, Temporaries, and Regulars with various working time patterns. Foreigners are prevalent among regulars, and compared to the two other segments, regulars often work full-time and stay for extended periods on the platform.

Article 3 focuses on worker strategies for navigating the platform's algorithmic management system to maximise the quality of work with a focus on hourly earnings. Further, the article highlights how access to alternative income sources influences the worker agency.

Article 4 explores platform workers' engagement in multiple job holdings in the broader labour market and its role in mitigating risks associated with platform work.

Across the four articles, the dissertation concludes by suggesting that inequalities related to platform work are, to some extent, caused by the platforms' limited management presence and the loosely defined working conditions. Despite platforms promoting flexibility and autonomy and the possibility of supplementary earnings, their reliance on a group of foreigners that often work full-time (i.e. Regulars) to meet labour demands leaves them with an issue for justifying the working conditions. While recent trends of worker mobilisation and regulatory initiatives for protecting the most vulnerable platform workers suggest maturation processes occurring within the platform economy, challenges persist for work organisations based on digital meditation with implications both at the company and worker levels.

Sammenfatning

Formålet med denne afhandling er at undersøge, hvordan arbejdsforhold – også kaldet arbejdskvalitet – udfolder sig over tid på digitale arbejdsplatforme som f.eks. Wolt eller Hilfr med det danske arbejdsmarked som empirisk udgangspunkt. Digitale arbejdsplatforme har inden for den seneste årrække været genstand for en hel del opmærksomhed ved at tilbyde en enkel adgang til opgaver samt fleksible arbejdsforhold gennem en digitalt medieret infrastruktur. Platformene har dog fået kritik for at bidrage til at skabe ulighed på arbejdsmarkedet, hvilket bunder i deres løst strukturerede arbejdsforhold, som får arbejdstiden og indtjening til at fluktuere, hvilket er med til at skabe uklarhed om arbejdskvaliteten på platformene. Platformes tilbageholdenhed med at dele disse data, gør det desuden svært at undersøge arbejdskvaliteten på platformene.

Afhandlingen kommer denne problematik til livs igennem at analysere arbejdstidsdata fra en fuld population af platformsarbejdere fra madudbringningsplatformen Wolt. Ved at anvende et longitudinelt perspektiv på disse data bidrager afhandlingen med nye empiriske indsigter, som er relevante for igangværende diskussioner om, hvordan man mest hensigtsmæssigt regulerer platformsøkonomien. Disse bidrag relaterer sig dog også til sociologiske tematikker om digitaliseringens indvirkning på organisationsstrukturer og moderne arbejdsliv.

Afhandlingens hovedbidrag består i at identificere tre segmenter af platformsarbejdere, der endnu ikke blevet fundet i forskningslitteraturen. De tre segmenter har stabile og differentierede arbejdstidsmønstre, hvilket antyder, at uligheder udfolder sig mellem grupper inden for platformsstrukturen. Afhandlingen undersøger derudover også aspekter af virksomheds- og arbejdstagersiden, der bidrager med komplementære perspektiver om strukturelle forhold, der får ulighederne til at manifestere sig på platformene.

Afhandlingen består af fire forskellige forskningsartikler, der både kvantitativt og kvalitativt belyser de førnævnte tematikker.

Afhandlingens første artikel undersøger ledelsespraksis på platformene med et specifikt fokus på platformenes brug af algoritmiske ledelsesværktøjer overfor mere traditionelle af slagsen. Artiklen påpeger, at platformene har udfordringer med at kontrollere arbejdsgange som følge af den digitale afstand mellem platformen og arbejderne.

Den anden artikel analyserer arbejdstidsdataene fra Wolt og identificerer tre stabile segmenter – på engelsk benævnt 'dabblers', 'temporaries' og 'regulars' – med forskellige arbejdstidsmønstre. Det sidstnævnte segment består af en stor andel udlændinge, og sammenlignet med de to andre segmenter, arbejder denne gruppe ofte fuld tid, og bliver inde på platformen over længere perioder.

Den tredje artikel har fokus på strategier, som platformsarbejderne bruger over for platformens algoritmiske ledelsessystem til at forbedre deres arbejdskvalitet i form af en højere gennemsnitlig timeløn. Artiklen diskuterer hvordan adgangen til andre indkomstkilder ser ud til at påvirke, hvordan platformsarbejderne udøver deres autonomi (agens) på platformen.

Den fjerde artikel undersøger betydningen af platformsarbejderes brug af deltidsarbejde og adgang til supplerende indkomstkilder på det bredere arbejdsmarked som redskab til at understøtte den usikkerhed som er forbundet med de uregulerede forhold inde på platformene.

På tværs af de fire forskellige artikler konkluderer afhandlingen, at uligheder i arbejdskvalitet i et vist omfang skyldes platformenes begrænsede tilstedeværelse over for platformsarbejderne i kombination med de løse arbejdsforhold. På trods af at platformene offentligt promoverer autonomi og fleksibilitet samt muligheden for supplerende indtjening, viser afhandlingen at platformenes relative afhængighed af en mindre gruppe udenlandske fuldtidsarbejdere, efterlader dem med et forklaringsproblem. Nyere tendenser inden for mobilisering og regulering med henblik på at implementere visse beskyttende foranstaltninger over for de mest udsatte platformsarbejdere kunne afspejle, at en modningsproces er i gang inden for platformsøkonomien. Der er dog stadig visse

udfordringer forbundet med digitaliserede organisationsformer, som udfordrer både arbejdsgiver- og arbejdstagersiden.