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The Worker, the Consumer, and the Platform

A Quantitative Exploration of Work Patterns and Employment Practices in the Danish Platform Economy

PhD Dissertation 2024

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Chapter 1

Introduction

Chapter 1: Introduction

Since Uber was founded in 2009 and first launched in Europe in 2011, digital labor platforms have increasingly caught the eye of consumers, policy-makers, and scholars (Rosenblat, 2016; Thelen, 2018; Vallas & Schor, 2020). Consumer demand has driven a rapid evolution and expansion of labor platforms across various sectors that now cover food delivery, ride-hailing, cleaning, care work, home improvement services, translation services, data cleaning, and software development (Pesole et al., 2020). In all of these areas, it is possible to contract someone through a digital platform to complete a task. Recent estimates suggest that more than 500 digital labor platforms are active in the European Union, providing work for more than 28 million workers in 2021, and this number is expected to rise to 43 million by 2025 (European Commission, 2021). In comparison, the EU working-age population is 285 million.

Shortly defined, labor platforms mediate the provision of labor by one party through a digital platform to another party. This business model typically involves three central actors: the platform, the customer, and the worker (Healy et al., 2017). In this triangular relationship, workers are often contracted as self-employed, challenging conventional labor relations consisting of an employment relationship between an employer and employee (Cherry, 2016; De Stefano, 2016; Hiessl, 2021). Using slogans such as "Be your own boss" platforms promise workers the flexibility to decide when and how much they want to work[1]. However, this flexibility often comes at the cost of employment protections, leaving platform workers to shoulder more risks (Hotvedt & Munkholm, 2019; Jacqueson, 2021). This tradeoff between flexibility and security is a fundamental principle in many contemporary labor markets, often viewed through the distinction between standard and non-standard work arrangements (Hauben et al., 2020; Rubery et al., 2018). However, platform work, characterized by the extensive use of technology and flexible employment, exemplifies these trends, highlighting a shift towards increased labor market inequality as traditional full-time positions decline and non-

[1] This particular example comes from a commercial brought by the food-delivery platform Wolt in Denmark.

standard employment rises (Kalleberg, 2011; Rubery, 2015; Thelen, 2019; Vallas & Prener, 2012).

In February 2024, the European Parliament and Council reached a provisional deal on the proposed *Platform Work Directive* to improve working conditions in the platform economy across the EU (ETUI, 2024). If adopted, the directive introduces a presumption rule to address potential misclassification of platform workers as self-employed instead of employees. It also focuses on workers' rights concerning platforms' use of automated monitoring and decision-making systems (European Parliament, 2024). These are two central aspects of how labor platforms challenge core elements of the traditional labor market. Both the policy and scholarly debates on labor platforms revolve around whether (and how) platform work is changing and potentially deteriorating working conditions. The aim of this dissertation is to contribute to this literature by engaging with the overarching research puzzle of *how digital labor platforms relate to the traditional labor market and existing patterns of inequalities in standard and non-standard work in Denmark.*

The dissertation is article-based, and I approach this subject through four empirical chapters, each with its own research question addressing distinct aspects of platform work in Denmark:

- **Chapter 2**: What are the typical patterns of combining labor on digital platforms with traditional economic activities?
- **Chapter 3**: 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?
- **Chapter 4**: What developments and processes of segmentation do we observe over time in individual working time trajectories on a gig work platform?
- **Chapter 5**: How do consumer attitudes towards working conditions and worker stereotypes influence labor relations on gig work platforms, and are there differences across distinct platform services?

All four articles build on quantitative data and focus on platform work in Denmark, but I draw on different data sources and apply different methodological and analytical perspectives in each article to address these sub-questions.

In Chapter 2[2], I draw on the Labor Force Survey and use latent class analysis to identify three distinct groups of platform workers based on their activities in the online and traditional labor market. This analysis points to variations in hybrid work arrangements and blends of mobility among platform workers, nuancing the often-dichotomized view of labor markets characterized by classic segmentation theory. In Chapter 3[3], I investigate the developments and changes over time in labor market affiliation among platform workers combining data from the Labor Force Survey with longitudinal register data. Applying a comparative perspective, I find that for some workers, the platform economy is associated with upward labor market mobility. Chapter 4[4] draws on unique longitudinal data on work activity covering a six-year period from Wolt, one of the largest food-delivery platforms in Denmark. Using sequence and cluster analysis, three stable working-time segments are identified. In Chapter 5[5], I analyze how consumer attitudes can influence working conditions on labor platforms. Using a survey experiment to elicit consumer preferences for platform workers based on their wages, social benefits, ratings, and demographic indicators, I analyze how consumer attitudes and biases can affect employment relations on gig work platforms.

In the remainder of this introductory chapter, I first briefly review the literature on digital labor platforms, focusing on various definitions and key debates central to the field. This is followed by a presentation of the theoretical and analytical concepts that I draw on throughout the dissertation to analyze platform work. I then present my research design, focusing on how the different data sources and methods complement

[2] Chapter 2 is co-authored with Trine Pernille Larsen and Anna Ilsøe and published in *Nordic Journal of Working Life Studies.*

[3] Chapter 3 is co-authored with Trine Pernille Larsen, Anna Ilsøe and Christian Haldrup.

[4] Chapter 4 is co-authored with Christian Haldrup as lead author and Anna Ilsøe, Trine Pernille Larsen and Jakob Demant and submitted to *New Technology, Work and Environment.*

[5] Chapter 5 is single-authored and submitted to *Socio-Economic Review.*

each other. The chapter ends with a brief summary of the four articles and how they complement each other, along with a discussion of their limitations, contributions, and implications for future research.

1.1 Literature review

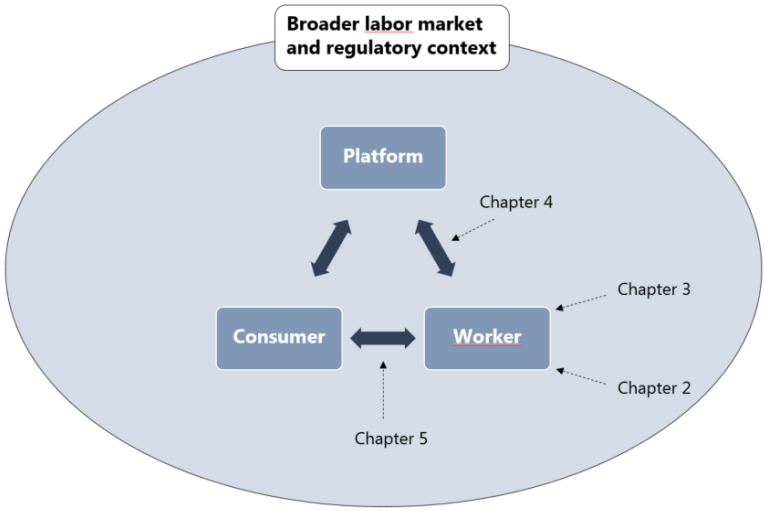
Defining labor platforms

While scholars have focused on many different aspects of platform work, here I will focus on two definitions in the literature. Kovalainen et al. (2019) define digital labor platforms according to five key dimensions: 1) reliance on digital technology, 2) self-classification as intermediaries and classification of workers as independent contractors, 3) atomization of work into tasks/gigs, 4) individualization and isolation of workers, and 5) algorithmic governance of work performance. Vallas and Schor (2020) use four features to define labor platforms: 1) digital intermediation as a business model, 2) transformation of the employment relationship, 3) distributed control mechanisms, and 4) spatial dispersion of work.

While these definitions by Kovalainen et al. (2019) and Vallas and Schor (2020) vary, there is much common ground. Firstly, they focus on the increased role of technology as important for understanding platform work. The platform business model relies on digital infrastructure that connects users across time and space and uses algorithms in various roles, e.g., matching workers and consumers/employers, dispatching work tasks, and managing workers. Secondly, the nature of work is argued to be changing in different ways, e.g., work that would traditionally be considered a full-time job is divided into smaller tasks/gigs that are completed piecemeal, and workers that would traditionally be colleagues and meet during the workday are dispersed and set up as competitors. Thirdly, the role of platforms as mediators instead of employers and the resulting classification of workers typically as self-employed instead of employees shifts the traditional risks borne by employers to the individual workers (Thelen, 2018; Urzi Brancati et al., 2019). This last point is often used to portray platform work as consisting of a triangular relationship, with the platform in the center, connecting a service requester (consumer) and a service provider (worker) (e.g., Meijerink & Keegan, 2019; Vallas & Schor, 2020). Relating my dissertation to this triangle, in

Chapters 2 and 3, I focus on the platform workers and their relationship to the traditional labor market and resulting patterns of inequality. In Chapter 4, I focus on how mechanisms on a food-delivery platform relate to inequalities among workers. Finally, in Chapter 5, I focus on the role of consumers in (re)producing worker inequalities. Figure 1 visualizes how my studies are placed in this platform triangle. I have placed the classic platform triangle in a circle symbolizing the broader labor market and state institutions, which constitute an important context for how the platform economy unfolds.

Figure 1: The platform triangle



Throughout this dissertation, I apply a somewhat narrow definition of platform workers as individuals who take on relatively specific tasks for monetary gain mediated by a digital platform. This definition excludes multiple groups of people that are engaged in the broader platform economy. The first distinction I make is between labor and capital platforms, where the latter relies on users owning capital, typically in the form of a home or car (e.g., Airbnb and ShareNow), which they rent out to other users, while the former facilitates an exchange of labor services for money (e.g., Uber, Wolt, HappyHelper, UpWork) (Schor & Attwood-Charles, 2017). While capital platforms require users to perform some work, the monetary gains are determined by the value of their capital property and not the amount of work they do. The second distinction made

in this thesis is between the workers directly involved with developing and maintaining the platform and those who register to take on jobs available through the platform (Vallas & Schor, 2020). A third distinction frequently made in the literature is the subset of individuals who work as content creators on social media platforms, who are treated as a separate group (Vallas & Schor, 2020). By excluding capital platforms, platform developers, and influencers, I only focus on individuals taking jobs mediated by platforms.

There is a large variety of different platforms facilitating many different types of work. Some oft-used distinctions are 1) whether the task is performed online or offline, 2) the size of the task, ranging from micro-tasks taking seconds to large projects taking months, and 3) the level of skill required to perform the task. Drawing on these three aspects, platform work can be grouped into three general types, gig-work (short-term, offline tasks, low/medium skill), click-work (short-term, online tasks, low skill) and freelance work (long-term, offline/online tasks, high skill) (De Stefano, 2016; Howcroft & Bergvall-Kareborn, 2018; Kalleberg & Dunn, 2016). Gig-work platforms are more often marketed towards private households, while click-work and freelance platforms are mainly targeted at businesses and institutions, which means that private consumers are less likely to have any experiences with these types of platforms. Click-work platforms, where workers from all over the world typically compete for the same micro tasks with often very low remuneration, tend to attract more workers from the Global South while they seem to have a lower uptake in Europe (Berg et al., 2018; Pesole et al., 2020). Freelance platforms primarily attract professionals with a high level of technical skill who would also traditionally work as self-employed and receive higher remuneration compared to gig work and click-work. For these reasons, gig work platforms have attracted the most political and academic attention. The articles presented in Chapters 2 and 3 are on platform work in general, while Chapters 4 and 5 focus on gig work.

Key debates in the literature on labor platforms

I will now present some of the key debates characterizing the literature on digital labor platforms. I specifically focus on three themes that have attracted much attention within

the literature: algorithmic management, the employment relationship, and worker heterogeneity. While worker heterogeneity and the employment relationship are central to my dissertation and common themes across all four articles, algorithmic management plays a minor role in this dissertation. However, it is a key theme in the literature and a primary concern for platforms, workers, and policy-makers, so I will provide a cursory overview of the algorithmic management literature, focusing on how it relates to the study in Chapter 5, before moving on to the two other themes.

Algorithmic management and consumers

An expanding body of literature has engaged with the role of technology and algorithms on labor platforms (Stark & Pais, 2020). Most of these studies have focused on algorithms' new central role in managing, supervising, and controlling the workforce. On labor platforms, the performance management of workers is primarily left to algorithms that are used to direct, evaluate, and discipline workers (Kellogg et al., 2020; Veen et al., 2020; Wood et al., 2019). Workers have little to no contact with human managers when working through labor platforms; they get their tasks and receive instructions through the app, their work is rated through the app, and they are paid through the app (Rosenblat, 2016; Heiland, 2022). This algorithmic transformation of the control relationship between managers and workers has been scrutinized in the burgeoning algorithmic management literature, showing how consumer ratings and reviews can have very direct consequences for workers' labor relations on platforms and, in some cases, lead to termination from the platform (*e.g.*, Noponen et al., 2023; Maffie, 2022; Wood et al., 2019). In a Danish study of algorithmic management on Wolt, a leading food delivery platform in Denmark, the authors introduce what they describe as lenient algorithmic management (Kusk & Bossen, 2022). Drawing on fieldwork and interviews with food couriers, they find that on Wolt in Denmark, there are neither penalties nor wage reductions and that human support complements the algorithms, which contrasts with the harsh and despotic algorithmic management regimes often depicted in other countries (Purcell & Brook, 2020; Wei et al., 2022). This is further supported by findings from Haldrup et al. (*forthcoming* 2024).

One of the emerging themes related to the algorithmic management literature is the role of consumers in the platform economy. While the majority of AM studies focus on the relations between workers and algorithms, it has been highlighted that consumers play a central part in the functioning of algorithms (Duggan et al., 2020; Kellogg et al., 2020; Meijerink & Keegan, 2019). On the majority of platforms, consumers initiate contact with platform workers and rate and review their work afterward. In addition, on some platforms, e.g., cleaning, care, and freelance platforms, consumers have extended control in defining the aim of the work and how it should be carried out (Pulignano et al., 2023; Ticona et al., 2018). In this way, platform consumers are taking on a more central role than usually assumed in the industrial relations literature, and they have a substantial influence on working conditions in the platform economy (Pekarek & Healy, 2022). In Chapter 5, I go more in depth with this literature, arguing that as consumers gain more influence on working conditions on labor platforms, they become a central focus for research on labor relations in the platform economy.

The employment relationship

The classification of platform workers is one of the central issues in relation to online labor platforms. The traditional distinction between standard employment and self-employment has blurred significantly. As many platforms categorize their workers as independent contractors or solo self-employed, this has been the cause of conflict and tensions between platforms and trade unions, often combined with increased policy interest at EU and national levels (De Stefano et al., 2021; Hotvedt & Munkholm, 2019; Urzi Brancati et al., 2019). The use of self-employment in the platform economy is often driven by a call for flexibility among platform firms to adjust their labor force almost instantly in accordance with consumer demand on the respective platforms. Pichault & McKeown (2019) develop an analytical matrix for analyzing self-employment on a spectrum between low and high autonomy concerning three central dimensions: work status, work content and working conditions. This approach highlights the balance between the benefits of increased autonomy, such as flexibility and opportunity, against the drawbacks, including reduced security and potential for exploitation. A significant portion of the literature on labor platforms has focused on platform workers from a precariousness perspective (*e.g.,* Vallas & Schor, 2020).

Especially for workers reliant on income from the platform, the perceived autonomy may feel limited as they have less freedom to choose between tasks on the platform, positioning them closer to employees in practice than to the self-employed status that platforms assign them (Schor et al., 2020; Urzi Brancati et al., 2019).

In a study of case law on the classification of platform workers in Europe, Hiessl (2021) reviews 175 judgments and administrative decisions across 15 European countries where various courts and authorities have ruled or taken a stance on the employment relationship of platform workers. The sheer number of cases where an employment relationship is contested illustrates the contentiousness of platform work. In Denmark, the employment relationship has also been contested in various settings. In a breakthrough agreement, the cleaning platform Hilfr signed a company agreement with the trade union 3F in 2018. However, in August 2020, the Danish Competition Authority questioned the practice of having minimum-wage agreements for cleaners on the platform as they considered them self-employed (Jacqueson et al., 2021; Ilsøe et al., 2020). In 2021, the food delivery platform Just Eat (through the Danish Chamber of Commerce) obtained a sector-level collective bargaining agreement with 3F (Ilsøe & Söderqvist, 2023). However, Wolt (their main competitor) has criticized the collective agreement by Just Eat and has continued to contract couriers as self-employed. In 2023, the Danish tax authorities decided to treat all income from Wolt food couriers as if they were employees. This was later followed up by SIRI (Danish Agency for International Recruitment and Integration), which adjusted its practice to treat Wolt as an employer so couriers could be registered with the same rights as other employees, e.g., parental leave and cash benefits[6]. The employment relationship of platform workers in Denmark continues to be a highly contentious issue, with various agreements and disagreements between the various key stakeholders involved. While the tradeoff between flexibility and security lies at the core of platform work and has yet to be resolved, we see tendencies in Denmark and the other Nordic countries that platforms increasingly

[6] https://nyidanmark.dk/en-GB/News%20Front%20Page/2023/11/Adjustment%20of%20practice%20for%20registrating%20Wolt%20courier%20partners%20under%20the%20EU%20regulations
https://www.woltfakta.dk/2023/05/02/wolt-indeholder-a-skat-og-am-bidrag-for-kurerpartnerne/

engage in collective bargaining agreements and hire workers as employees with social benefits (Ilsøe & Larsen, 2021; Jesnes, 2019; Vandaele, 2021). The different risks related to the non-standard work arrangements on labor platforms are explored further in Chapters 2, 3, and 4.

Worker heterogeneity

Another theme that has characterized the literature on digital labor platforms is the heterogeneous nature of platform work and platform workers; labor platforms are active in various sectors, and workers have different socio-economic backgrounds, motivations, needs, and levels of dependency on the platforms. A number of studies have shown that platform workers are generally younger, highly educated, and more ethnically diverse, with an overrepresentation of men compared to the general labor market (Berg, 2016; Urzi Brancati et al., 2019; Pesole et al., 2020). However, it is also argued that the differences when comparing platform workers to the general workforce are smaller than often presented (Piasna et al., 2022). These findings are echoed in Chapter 2. The diversity among platform workers can be partly attributed to the relatively low entry barriers, as almost anyone can register for work on the majority of platforms (Vallas & Schor, 2020).

Urzi Brancati et al. (2019) highlight platform workers' diversity, categorizing their activity as a sporadic, secondary, or primary income source. They find that while the majority of platform workers are not full-time active on labor platforms and only use platform work as a sporadic or secondary income, a minority of platform workers are highly dependent upon platform work. Schor et al. (2020) further explore this diversity, finding that workers who only use platform work as a supplemental income and are not economically dependent upon the platform work express considerably higher satisfaction. This is because workers who are dependent upon platform income experience less autonomy as they are pressured to spend more time browsing for jobs and accepting jobs of low pay and low quality (Schor et al., 2020). They conclude that most platform workers must depend upon income security from other sources in order to achieve satisfactory results from platform work.

Studies focusing on workers' motivations for engaging in platform work have highlighted different aspects. Dunn (2020) develops a typology of platform workers' orientations toward gig work in an attempt to grasp how the heterogeneous nature of the different motivations for completing gig work affects the perceptions of job quality on labor platforms (Dunn, 2020). Dunn (2020) finds that the workers engaged in gig work do not uniformly demarcate attributes of gig work as good or bad, and even workers doing the same job can have different perceptions of the quality of the job. While some workers are oriented towards gig work as a temporary and voluntary effort, others see it as a permanent and involuntary work situation (Dunn, 2020). These different orientations towards gig work highly affect how the workers view the quality of their jobs. Cansoy et al. (2020) further discern between three types of earner behaviors among platform workers: profit-maximizing, socially oriented, and instrumentally oriented workers. With the relatively high concentration of migrant workers on labor platforms, other studies have focused specifically on how migrants use platform work. Lam and Triandafylli (2022) analyze six different pathways among migrant workers in Canada. 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). Likewise, Niels van Doorn (2022; 2020) has studied how some migrant workers consider platform work an acceptable but precarious and temporary form of work that represents a possible stepping-stone into better employment. However, he notes that platform work can also be a dead-end if workers are unable to move beyond the platform (Doorn, 2020). The high degree of heterogeneity among platform workers across different types of platforms and on the same platforms makes it difficult to treat them as a unitary group of workers. This is especially true as these differences concern a range of factors concerning socioeconomic background, their level of dependency on the platform income, and their motivations for using the platforms. Worker heterogeneity is a central theme in this dissertation that is expanded upon in especially Chapters 3 and 4.

Summing up, existing research has focused on algorithmic management, employment relationships, and worker heterogeneity and tends to approach it from a precarious work

perspective. The workers on labor platforms are often portrayed as individuals who are being exploited by the platforms. In this dissertation, I add to the literature in different ways. In Chapters 2 and 3, I focus on the importance of platform workers' relation to the traditional labor market. In Chapters 3 and 4, I add a longitudinal aspect that is missing in the majority of platform studies while also focusing on workers' agency. In Chapter 5, I focus on the role of the consumers, which has been overlooked (in large part) in the literature.

1.2 Theoretical and analytical inspirations

In this dissertation, I draw on different analytical concepts and literature in labor market research: segmented labor markets, multiple jobholding, (firm) flexibility, and worker-management relations. The different strands of literature are used to engage with one of the defining elements of platform work, namely the nature of non-standard work, which has been a guiding light for the four articles that comprise my dissertation. For this reason, I want to re-visit some sociological classics and their take on the nature of work, which I believe to be relevant for understanding our contemporary distinction between standard and non-standard work.

The nature of work

Karl Marx was one of the first to theorize extensively on the nature of work, and while much sociology of work has moved beyond Marx, there are some central ideas I want to use as a starting point for further discussions. It should be noted that engaging extensively with Marxist traditions is beyond the scope of this dissertation, and I will only briefly engage with his literary work.

In an often-discussed quote from "The German Ideology" Marx writes that the division of labor in capitalist societies forces individuals into a single sphere of activity that they cannot escape (Grint & Nixon, 2015). This is contrasted with the communist society where it is "*possible for me to do one thing today and another tomorrow, to hunt in the morning, fish in the afternoon, rear cattle in the evening, criticize after dinner, just as I have a mind to, without ever becoming hunter, fisherman, herdsman or critic.*" (Marx &

Engels, 1970, p. 54). Today, a modernized version of this would probably sound something like this: *it is possible for me to do one thing today and another tomorrow, to deliver food in the morning, clean houses in the afternoon, design webpages in the evening, and translate after dinner without ever becoming a food courier, cleaner, webpage developer or translator*. Whether this scenario, enabled by the rapid emergence of digital labor platforms, more closely resembles a Marxist utopia or dystopia, I will leave it up to the reader to decide. However, this quote touches upon several key aspects of digital labor platforms that lie at the core of this dissertation, namely the nature of work in capitalist societies and the commodification of labor, both of which I relate to the distinction between standard and non-standard work.

In the capitalist-worker relation, workers sell the rights to their labor power, meaning that capitalists control not only the products that workers produce but also the time during which they work (Burawoy & Wright, 2001). In pure capitalist societies, work is completely commodified, with workers owning nothing but their labor power, which is sold and bought like a commodity on the labor market, and nothing safeguarding workers against volatility in the market (Lebowitz, 2003). Workers are exploited and alienated; they have no control over what they produce, their activity is repetitive and instrumental, other workers are reduced to competitors, and creativity in production is removed (Burawoy & Wright, 2001; Lebowitz, 2003; Leopold, p. 230f, 2007). These are exactly some of the themes that are often discussed in relation to platform work. Work activities become more repetitive and instrumental as jobs are reduced to gigs, control over work is reduced as algorithms are directing and managing workers, and workers are set up as competitors trying to gain an edge in getting the next task (De Stefano, 2016; Kovalainen et al., 2019; Vallas & Schor, 2020).

Here, I want to highlight two ideas of human freedom (fulfillment and self-realization) that are present in Marx's writings: human freedom *through* work and *outside* work. Freedom through work is often associated with the young Marx and can be seen in contrast to the conditions of work that Marx used to describe the alienating capitalist-worker relations (Leopold, p. 229, 2007). In non-alienated work, workers are fulfilled because they express individuality in their work by applying all of their abilities, they

feel in control of their work through understanding the entire production process, and they gain satisfaction through knowing that their work is useful to other individuals and society as a whole (Leopold, 2007; McCarthy, 1978). In contrast, the later Marx focuses on human freedom beyond the realm of necessity, i.e., beyond work. If the realm of freedom lies outside work, then reducing the amount of time workers are working becomes a primary concern in order to increase their free time to self-realize (Klagge, 1986; McCarthy, 1978; Leopold, 2007). This is not to say that freedom becomes impossible in the realm of necessity for the later Marx, but only that his focus shifts to freedom outside work. Traces of both notions on the nature of work, that work is a form of self-realization or that self-realization lies outside work, are echoed in ample labor market literature. In a landmark study, Goldthorpe et al. (1969) analyzed the attitudes of affluent industrial workers in England. They found that manual workers tended to hold instrumental work attitudes, in large part experiencing their work as meaningless but received relatively high compensatory wages, which allowed them to engage in meaningful activities outside work (Grint & Nixon, 2015). In contrast to the manual workers, a group of white-collar workers expressed that they found satisfaction and meaning in their work. Studies that are more recent indicate that workers, in general, prioritize extrinsic rewards (e.g., pay) over intrinsic rewards (e.g., satisfaction or meaning) in their jobs (Rose, 2005; Tilly & Tilly, 1998). The central role of work in humans' lives that Marx described stands in contrast with later theorists like Zygmunt Bauman, Richard Sennett, and Ulrich Beck. While their work is extremely varied, they hold some common perspectives on the declining significance of work for individuals in contemporary society (Bauman, 2005; Beck, 2000; Sennett, 1998). In industrial societies, work was fundamental for identity formation (at least for male workers, see also Hakim, 2005; Hakim, 2015), but with the erosion of traditional work structures, increasing flexibility and individualization, identity is no longer fixed by a stable career in paid employment. Individuals are left with the burden of constructing their own identities. The declining significance of work as a unifying identity marker is reflected in the heterogeneous work attitudes among platform workers. Engaging in platform work can hold very different meanings to different individuals; some workers may experience self-realization as an entrepreneur engaging in self-employment, some may deliberately use platform work to reach certain economic goals outside work, and others

may have no other options (Dunn, 2020; Cansoy et al., 2020; Murgia & Pulignano, 2021).

Whether you see work as a source of fulfillment and self-expression in itself or just as a means to an end, where your free time is what gives you meaning, the commodification of labor remains a central tenet. If human labor power is completely commodified, workers' interests are of no concern as long as they do not align with production interests (Satz, 2023). Workers have no control over their work nor guarantee for future employment or any income security, meaning that human fulfillment and pursuit of interests, either through work or outside work, becomes extremely limited. However, in most modern capitalist societies, the commodification of labor is restricted through various measures, e.g., employment regulation and social safety nets (Satz, 2023). A central component in the decommodification of labor has been the development of the standard employment relationship (SER), i.e., employment on full-time, open-ended contracts, in contrast to non-standard work, e.g., part-time, temporary, and zero hours contracts (Rubery et al., 2018). In SER, workers are protected against being treated as a pure market commodity through employment rights and social protections guaranteed by employers and the state (Rubery et al., 2018). Rubery et al. (2018) present an ideal standard employment relationship that safeguards against commodification of labor by offering 1) security of income, 2) opportunities for development, 3) fair treatment, and 4) life beyond work. However, these elements of the standard employment relationship tend to exclude individuals who are in non-standard forms of employment (NSFE), e.g., short-term contracts, part-time work, and temporary agency work (Rubery et al., 2018). Workers in NSFE risk limited access to the same protections and opportunities that govern SER, e.g., guaranteed hours of work and wages, regular work schedules, company training, and voice at work (Rubery et al., 2018). Access to these elements safeguards labor against commodification and gives workers security.

While non-standard work does not necessarily equate to insecurity and precarious work, there are some overlaps worth exploring. In a definition of precarious work, Rodgers and Rodgers (1989: 3) define four dimensions of insecurity: temporal, control, protection, and economic. Temporal insecurity relates to the certainty with which work

is guaranteed in the future, jobs that are temporary or with a high risk of job loss have a high temporal insecurity. The control dimension reflects that workers who, either individually or collectively, have autonomy over certain aspects of their work, like intensity and wages, have more security. Protection concerns the level of social coverage (e.g., social security benefits, unemployment insurance) and legal protection against discrimination and unfair dismissal. Economic insecurity concerns the level of wages and income stability associated with a job. These four dimensions of insecurity can be found in different forms in platform work. This is seen, e.g., as platform workers often face uncertainties regarding work schedules, lack control over working conditions, have limited social protections, and encounter fluctuations in income (REF). These dimensions are useful in assessing what makes work in general precarious but determining whether any single job is precarious can be a challenging endeavor. Jobs are often characterized by different levels of insecurity in one or more of these dimensions, and workers may have different orientations toward what types of insecurity are acceptable. While most OECD countries have seen an increase in non-standard forms of work during the last decades, scholars disagree whether this development has also led to an increase in precarious work arrangements (Kalleberg, 2011; Kalleberg & Vallas, 2017).

There are significant overlaps between the protections offered by standard employment and the insecurities tied to precarious work. One dimension highlighted in both frameworks is the importance of country-specific labor market models and welfare states in sheltering individuals from insecurities and commodification. The Danish welfare state and labor market will be detailed further in Section 1.3, where I also argue for using Denmark as a relevant case for studying platform work.

In the following section, I will introduce the different analytical concepts that I use throughout my dissertation and relate them to these discussions on the commodification of labor, precariousness, and the distinction between standard and non-standard forms of work.

Segmented labor markets

Labor market segmentation theory developed in the 1970s with seminal contributions by Doeringer and Piore (1971) and Reich et al. (1973) as a critique of the classical and functionalist accounts of how the labor market worked. In these models, there is a direct link between the qualifications and productivity of an individual and their job opportunities and wages in the labor market, i.e., individuals are matched with jobs purely based on supply and demand (Leontaridi, 1998). The main critique that segmentation theory addresses in these accounts of the labor market is an acknowledgment that the relationship between workers' productive value and their rewards in the labor market is far from straightforward and transparent, i.e., wages are not purely based on workers' production (Grimshaw et al., 2017). Instead, segmentation theory focuses on institutional barriers and constraints that effectively segment the labor market so individuals are restricted from freely moving between segments. In its simplest form, SLM distinguishes between a primary and a secondary labor market (Doeringer & Piore, 1971). The primary labor market is characterized by large and unionized corporations with internal structures for promotions that are restricted to internal workers, leading to stable working habits. The secondary labor market is characterized by employment instability, jobs tend to be unskilled, wages are low, and there are no clear career ladders. In addition to these structural differences, the workers belonging to each segment are expected to exhibit different personal characteristics, with an overrepresentation of women and ethnic minorities in jobs in the secondary labor market (Doeringer & Piore, 1971; Leontaridi, 1998; Rosenberg, 1987).

Perhaps the most popular development in the segmented or dual labor market literature is John Atkinson's (1984) work on the "flexible firm," distinguishing between a group of core workers and a group of peripheral workers. Atkinson (1984; 1987) argues that firms are pressured to find more flexible ways to organize their workforce to better adapt to and meet new requirements in a labor market characterized by globalization and fast-paced technological development. For this purpose, firms look to three forms of flexibility: functional, numerical, and financial. Functional flexibility concerns the ways in which workers can shift between different activities and tasks inside the firm. Numerical flexibility can be divided between internal, e.g., adjusting working hours

upwards or downwards for employed workers, and external, e.g., hiring and firing of workers or use of non-standard contracts to adjust the number of workers to the number needed freely. Financial flexibility concerns the ability of firms to adjust the costs of employment (i.e., wages) according to market fluctuations. The different types of flexibility are closely related, as financial flexibility increases with numerical flexibility (Atkinson, 1984). In Atkinson's model, firms employ a core group of workers for whom they pursue strategies of functional flexibility and insulate them against market fluctuations that can lead to wage pressure or firings. In addition to the group of core workers, firms employ a group of periphery workers with an emphasis on numerical flexibility where jobs are easy to fill and workers are hired and fired in response to market fluctuations (ibid.). Atkinson's model also highlights the dichotomous and potentially conflicting interests between firms' chasing flexibility and workers' rights to security. These representations of a segmented labor market with a primary/core segment with stable, full-time employment and a secondary/periphery segment with unstable, non-standard employment are, of course, an ideal type and have been critiqued for oversimplifying dynamics in the labor market (Kalleberg, 2001; Grimshaw et al., 2017; Procter et al., 1994). However, they provide a useful starting point for analyzing persistent differences between labor market groups, highlighting central characteristics that divide workers. The segmentation literature provides us with a framework for analyzing the development and structuring of platform labor as a new labor market segment, focusing on capturing and elaborating on the divisions and similarities between the online and traditional labor markets. This is a central focus in Chapters 2 and 4.

Multiple jobholding

Where labor market segmentation puts focus on the precarious nature of jobs in the secondary/periphery labor market, multiple jobholding provides a different analytical perspective on non-standard work. Multiple jobholding (MJH) is "the act of working more than one job simultaneously, including working for employers and self-employment, wherein all tasks, or sets of tasks, are performed in exchange for, or expectation of, compensation." (Campion et al, 2020, p. 170). I engage more thoroughly with the MJH literature in Chapters 2 and 3, here it suffices to state the literature

distinguishes between those who take on secondary jobs to compensate for risks associated with their primary jobs and those who take on secondary jobs to pursue new opportunities (Campion et al., 2020; Conen & Stein, 2021; Panos et al., 2014). The first group is characterized by precarious work situations, while the second group is more likely to be well established in the labor market. However, they are willing to take on risks to pursue new career avenues. The MJH literature thus adds a complementary perspective to the SLM literature that I argue better encompasses the heterogeneity that is apparent among platform workers. The multiple jobholding literature also provides a framework for exploring how workers can potentially bridge different labor market segments with a focus on mobility, where the segmentation literature tends to be more silo like (Ilsøe, Larsen & Bach, 2021).

The division between standard and non-standard work that lies at the heart of segmentation literature is a central theme in all four of my articles. I explicitly draw on the segmentation literature in Chapters 2 and 4 that focuses on patterns of division among platform workers. In Chapters 2 and 3, I draw on the multiple jobholding literature to analyze the different income patterns among platform workers. As most individuals use platform work as a secondary and supplementary income, they qualify as multiple jobholders. I draw on this perspective in Chapter 2, where I focus on all types of platform workers and the hybrid work arrangements they engage in, including other types of income-generating activities, e.g., student allowances, pensions, and unemployment benefits. In Chapter 3, I narrow my focus specifically to platform workers with another primary job, and compare them to other multiple jobholders. In Chapter 4, I focus on the flexible working-time arrangements that exist on a food-delivery platform leading to three distinct worker segments. In Chapter 5, I emphasize the role of consumers in the platform economy, focusing on how they can contribute to or lessen tendencies of inequality among platform workers based on their attitudes towards platform workers' working conditions.

1.3 Research design

Case description: The Danish welfare state and labor market model

The Danish labor market model constitutes an important context for analyzing and understanding the relationship between standard and non-standard work and inequalities in the labor market both on and off labor platforms. In this section, I will present a brief overview of some central characteristics of the Danish labor market and welfare state.

The core idea of a welfare state is that the granting of social rights entails a de-commodification of individuals so that their welfare is not exclusively dependent on their role in the market, as the welfare state guarantees other means of subsistence (Esping-Andersen, 1990, p. 105). This also means that if welfare benefits are too low or associated with social stigma to a degree where individuals do not seek them, it limits the degree of de-commodification that welfare states bring (Esping-Andersen, 1990, p. 106). Using Esping-Andersen's (1990) terminology, the social-democratic welfare states have the most de-commodifying effects, while the liberal welfare state offers the lowest degree of de-commodification. The Danish welfare state, belonging to the social-democratic regime, was in large part developed in the 20th century, as in many other European countries, to accommodate the risks associated with the full-time, standard employment of a (primarily male) main breadwinner (Huber & Stephens, 2006). These risks primarily concerned job loss, i.e., unemployment, invalidity, and retirement. Therefore, welfare services focused on income replacement (Bonoli, 2006; Taylor-Gooby, 2004). Denmark has become famous for its flexicurity model that supposedly balances flexibility for employers with security for workers (Bekker & Lescke, 2023; Viebrock & Clasen, 2009; Wilthagen & Tros, 2004). In Denmark, flexicurity rests on a flexible labor market with high mobility and low employment protection, generous unemployment support, and prominence of active labor market policies (Bekker & Mailand, 2019; Hansen & Leschke, 2022; Madsen, 2004). However, the Danish flexicurity model is ill-suited for platform work and other non-standard work with high contract flexibility as the model builds on the notion of the standard employment relationship with workers shifting between full-time, open-ended contracts and not gigs (Ilsøe & Larsen, 2023).

Digital labor platforms, while growing, still represent a small fraction of the Danish workforce, with approximately 1% having tried platform work in 2017 and 2019 (Ilsøe & Larsen, 2020). However, estimates from the COLLEEM survey find substantially higher numbers in our neighboring countries, estimating that approximately 6-10 pct. of the working-age population in Sweden, Finland, and Germany have tried platform work with approximately 1-2 pct. using it as a main income source (Pesole et al., 2020). The COLLEEM survey has been criticized for relying on online panel survey data, which is expected to overestimate the number of platform workers (OECD, 2023). A recent finding from Eurostat, drawing on data from the Labor Force Survey, estimates that approximately 3 pct. of the population between 15-64 years in 16 EU countries, including Denmark, has tried platform work (Eurostat, 2023). Wherever the exact number lies, platform work can still be considered a marginal phenomenon in the Danish labor market but is anticipated to rise with the normalization of platform work and the emergence of new platforms across various sectors (O'Farrell & Montagnier 2020; Piasna et al. 2022).

The Danish labor market is distinguished by its high level of organization, centralized collective bargaining, consensus-driven relations between social partners, and a minimal level of state intervention, favoring voluntary regulation (Due et al., 1993). However, the emergence of labor platforms poses significant challenges to this established model. By classifying workers as self-employed and acting as intermediaries rather than employers, these platforms disrupt traditional labor relations with very low levels of unionization among platform workers (Ilsøe & Söderqvist, 2023). Moreover, the platform economy introduces issues such as tax evasion and unbalanced welfare contributions, further straining the model (Skattestyrelsen, 2023; Ilsøe & Larsen, 2021). Despite the progressive welfare model and labor market policies in Denmark, both systems are primarily designed around standard employment relationships, often overlooking the needs of those engaged in non-standard work arrangements, which creates disparities in security and protection for individuals outside traditional employment (Mailand & Larsen, 2018). The Danish case offers valuable insights into the dynamics of platform work in a highly regulated labor market and socially secure

welfare state, providing a unique lens through which to explore some of the challenges and opportunities presented by labor platforms.

Data sources

This dissertation builds on a combination of survey data, register data, and company data from a platform firm, as the basis of the empirical work. Chapters 2, 3, and 4 of my dissertation all rely on data sources that, in different ways, complement each other by adding various insights concerning platform workers and their working lives, i.e., there is data integration between the articles (Frederiksen, 2013). However, Chapter 5 focuses on the consumer perspective and relies on survey data from Danish consumers; this means that here, the integration between articles is based on complementary theoretical and analytical insights as described in the previous sections and not the data sources. Therefore, I will present the data sources for the first three articles and discuss their strengths and weaknesses, and then I will present the data for my fourth article separately afterward. I will start by highlighting what the main challenges are when researching labor platforms to present my argument for using multiple data sources.

The evolution and complexity of online labor platforms necessitate the use of diverse data sources. As these platforms are relatively new and constantly evolving, with both their operational setups and government regulations adapting to this novel work format, traditional labor market research methodologies fall short. These platforms, often multinational with no comprehensive official registry of their activities, are not adequately captured in typical labor market registries. Moreover, the reliance on self-employed individuals rather than traditional employees further complicates data collection, as conventional labor statistics based on company employee data do not account for platform workers' activities. This results in a significant gap in data availability regarding work activities on these platforms. The main challenges in researching platform labor can be summarized as 1) the absence of a universal definition of platform work, 2) heterogeneity in the types of work and worker demographics, and 3) a prevalent model of self-employment. Given these challenges, I draw on multiple data sources and apply different methods to provide complementary analytical perspectives on platform labor in the four articles in my dissertation. I will

now present and then discuss the relative strengths and weaknesses of the data and methods used in the dissertation.

Labor Force Survey

In my first article, I use data from the Danish version of the European Labor Force Survey (LFS) that Statistics Denmark collects every quarter on the Danish working-age population. The LFS is the largest and best data source for European labor market statistics (Eurostat, 2024). In 2017 and 2019, questions concerning activities on digital labor platforms were added to the questionnaire, which forms the basis for estimations of how widespread work via labor platforms is in Denmark (Ilsøe & Larsen, 2020). Similar studies have been undertaken in other European countries (OECD, 2023; O'Farrell & Montagnier, 2020). In Chapter 2, I rely on LFS data to develop a typology of platform workers in Denmark based on socio-demographic characteristics and their affiliation with the traditional labor market using latent class analysis. In Chapter 3, I couple the LFS data with Danish register data on labor market activity from a 5-year period. This means that I can go more in-depth with the changes and developments in the labor activity of individuals who have worked via labor platforms in Denmark, and analyze how their work trajectories develop over time and compare with other groups of workers. The longitudinal aspect of register data thus adds a new depth to the LFS data that is cross-sectional. In Chapter 4, I rely on company data from a large food-delivery platform in Denmark. This data gives a unique insight into the working-time patterns that develop over time among food couriers in Denmark. Here we zoom in on a very specific subset of platform workers in Denmark, which adds a nuance to the more cursory insights we get from the first and second articles in my thesis. In Chapter 5, I once again rely on survey data, but here my focus is on platform consumers instead of platform workers. This data adds valuable insights into the third actor in the platform triangle of platform companies, platform workers, and platform consumers.

One major concern when working with survey data on the prevalence of work via online labor platforms is how the questions and items, which are used to define platform work in the survey, are formulated (Riggs et al., 2019; O'Farrell & Montagnier, 2020). Some of the central things to consider here is how to anchor the respondent's understanding of

what platform work is, and what timeframe is used, e.g., does the question concern activity during the last week, month, or year. Alternatively, does the question focus on monetary earnings or hours worked instead? Depending on what aspect of platform work we want to study, these dimensions can be defined very differently. The question that I use to define and measure platform work in this thesis was formulated and added to the Danish LFS before the start of my Ph.D. by Anna Ilsøe and Trine P. Larsen[7]. The specific question that I use is:

> **During the past 12 months, have you generated income by performing work tasks found via websites or apps – for example via Uber/Happy Helper?**
>
> **Instructions***: Uber provides driving services online, where car owners can make money by transporting passengers from A to B. Additionally, it could be work tasks found through Happy Helper, Upwork, Meploy or A handyhand. This also applies to gigs found through other websites and apps. The question does NOT include selling of used belongings or other secondhand goods – for instance via bilbasen.dk or dba.dk.*

With this question, there is a sharp distinction between capital and labor platforms, ensuring that it is only the latter we measure here. However, the focus on labor platform is broad and relates to all types of platform work at all activity levels, within the last year.

One of the problems with only relying on large population-wide survey samples is that phenomena like platform work which is estimated to be around 1-2 percent of the Danish population, results in a small sample size with too few observations to go in-depth with much of the variety between different groups of platform workers (OECD, 2023; O'Farrell & Montagnier, 2020). For example, we do not discern between the amounts of money that workers have earned through labor platforms or the type of work

[7] Ilsøe, A., Larsen, T. P., & Bach, E. S. (2021). Multiple jobholding in the digital platform economy: signs of segmentation. *Transfer: European Review of Labour and Research*, *27*(2), 201-218. https://doi-org.ep.fjernadgang.kb.dk/10.1177/1024258921992629

that they do. This results in treating food-delivery couriers, cleaning workers, and online freelance web-developers as well as workers who only tried platform work once and workers who have it as their primary income source all the same. Some of these important differences are just not represented when we work with population-wide survey data. The strengths are, of course, that they are representative and give a great overview of platform work as a phenomenon in Denmark with insights into how widespread it is and what the central characteristics of individuals engaging in platform work are.

One of the other limitations when working with the LFS data is that some groups are more difficult to reach via surveys. Although Statistics Denmark uses complex ways to weigh the population samples to ensure representativity, it has been documented that especially immigrants and marginalized groups are more difficult to reach in surveys (Font & Mendez, 2013). This is potentially an extra-large concern when we work with platform workers since we expect that relatively large portions of workers on labor platforms are migrants. The LFS is administered every quarter to a large representative sample of working-age residents in Denmark; this means that you need a CPR number to be part of the LFS. Even after applying Statistics Denmark's weights for representativity, we expect to underestimate some of the more precarious groups among platform workers.

In summary, there are three important things to consider when using population-wide survey data on platform workers: 1) how to define platform work, 2) issues of underrepresented groups on the edges of the labor market, e.g., migrant workers, and 3) small phenomena yield small sample sizes even in large surveys. These issues should not take away from the strengths in representativeness and comparability of surveys like the LFS, but they are important to consider when working with these data, and I try to balance them using other data sources, as outlined below.

Panel data

I work with two different types of panel data in my thesis. In Chapter 3, I draw on Danish national register data on labor market affiliation, which is data that is collected

for administrative purposes and only made available for research purposes as a secondary aim. Panel data has many strengths since it allows us to follow the trajectories and developments in work careers, and we know that careers are not a stable phenomenon as many individuals change jobs over time (Aisenbrey & Fasang, 2017; Schmid, 2015). Some workers become unemployed for a short stint, and others are unemployed for extended amounts of time; some individuals change between self-employment and waged work, while others change industries. For some, platform work may be a viable career path for a longer period, while it, for others, might be a one-off experience that they just wanted to try out. All of these fluctuations are impossible to cover using only cross-sectional data, but using panel data, we are able to focus on these developments that we would otherwise not find. However, the register data on labor market affiliation only cover activities on the traditional labor market, as it relies on registrations from employers of employee activities. When platform workers are registered as self-employed they have to report their own activities and because labor platforms are active in very different sectors there is no sector code that uniquely identify platform work. This means that platform work, at the moment of writing, is impossible to identify in national registers.

To accommodate some of these shortcomings, in Chapter 4, I use panel data that comes from company registrations by a large food-delivery company (Wolt). This data is once again not collected for research purposes but are registrations made by the company with the primary purpose of having an overview of their business activities. As this data is private, it required many negotiations with the company to be able to gain access to their data. However, there are also some specific limitations to this data since there are definite limits on what type of information they want to have publicized. We were, for example, limited to data on their courier's amount of hours spent active on their app. However, we were not able to get access to any information on monetary aspects, e.g., how much couriers earned or how many deliveries they actually made during the time they were active on the app. In addition, the couriers themselves, who can elect to share more or less information about themselves, supply all of the demographic data on couriers on this platform. This means there is a large number of couriers for whom we have very limited knowledge concerning their gender, nationality, and whether they are

working with a registered business or not. These types of data limitations are not a problem with the LFS or register data, where there is full information on all individuals in the respective populations. However, the strength of the platform company data, which really complements the LFS data, is that it becomes possible to go more in-depth with a very specific subset of platform workers. Insights from this paper can thus help nuance some of the more general findings presented in Chapters 2 and 3.

Consumer survey

Where the studies presented in Chapters 2, 3, and 4, all rely on data on workers active on digital labor platforms, the fourth and final study focuses on consumers instead of workers. This data complements the other three data sources not because it adds new information on workers but because it adds a different analytical perspective. The survey was administered by YouGov, a professional survey company, to their online panel of respondents living in Denmark between 18-70 years old. I developed the survey myself and tested the questions on various co-workers and family members. Following that, YouGov sent the survey to approximately 150 respondents in a limited release, providing valuable feedback on question formulations. This type of survey is great for research where it is relevant to get perspectives from a broad range of respondents, e.g., it would not be feasible to target platform workers specifically, but it is possible to get a broader consumer perspective because most Danes have tried using or have knowledge about different digital platform services. It should be noted that unlike the other types of data used in the dissertation, which are all observational, this data is experimental. This means that the data allows for causal estimates of relations between variables. However, as it is a survey experiment, the data reflects the attitudes of respondents and not their real-world actions. I will go much more in-depth with what constitutes a survey experiment and its strengths and limitations later in this chapter as well as in Chapter 5.

Methods

This dissertation engages with two central methodological discussions happening in quantitative sociology: firstly, an argument between descriptive vis-à-vis causal analysis

and secondly, a call for more open science. Therefore, I will start this section by reflecting on some of these developments in relation to my dissertation. Utilizing descriptive statistics as a core method in three of the four studies, this dissertation can be viewed as part of the descriptive turn in sociology focusing on description over causality (Abbott, 1995; Savage, 2009; Savage & Burrows, 2007). The first three papers are focused on the use of latent class analysis and sequence analysis. Common for latent class analysis and sequence analysis is that they rely on observational data and are not used to make causal estimates concerning which variable causes a change in the other variable; rather, they are used to explore and describe relationships between variables. Latent class analysis and sequence analysis can both be categorized as person-centered approaches in the sense that the object of these methods is to identify patterns and describe sub-groups of the population (Howard & Hoffman, 2018). Sequence analysis was introduced to the social sciences by Andrew Abbott as part of a critique of the orientation towards causality in the social sciences and represented a move away from a focus on variables and units and towards a focus on context and connections (Abbott, 1995; Abbott, 1997; Manzo, 2007). In a somewhat similar fashion, John Goldthorpe advanced the use of latent class analysis, advocating for the importance of understanding the patterns in social regularities, e.g., class structure and social mobility, before engaging in causal interpretations (Savage, 2009). When analyzing an emerging and constantly changing phenomenon like platform work, descriptive analysis becomes important for understanding the characteristics of platform work before analyzing its potential causes and effects.

In the fourth study, I conducted a survey experiment that I pre-registered with the Open Science Framework[8]. Pre-registration of experimental studies is becoming more and more prevalent in the social sciences and is part of a movement toward more open science (Nosek et al., 2015). Pre-registration is a way for researchers to state hypotheses and describe their analysis plan before gaining access to data and thus functions as a safeguard against some of the recent findings of questionable research practices in statistical research like p-hacking and HARKing (Brodeur et al., 2020; Kerr, 2015).

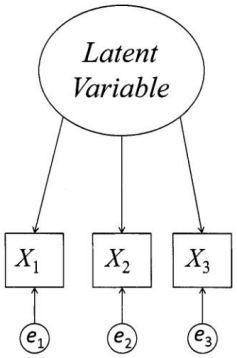
[8] Link: https://osf.io/8dbt5/?view_only=f9806029c7a84fda9d6072b203b1787c

HARKing is an acronym for Hypothesizing After the Results are Known, while p-hacking refers to testing a multitude of variables for correlations and only reporting those that end up being statistically significant. Pre-registration is thus a way to secure a higher degree of transparency and thus strengthen the validity and reliability of quantitative research. It is important to note that pre-registration is intended for confirmatory research that is aimed at testing hypotheses of causality between variables. In exploratory and descriptive research, the goal is to discover new insights by finding patterns in empirical data and identifying subgroups. Here openness about how classifications are determined is of high importance. I will now present the methods I have used in the dissertation.

Latent class analysis

In Chapter 2, I use latent class analysis to identify subgroups of platform workers. Latent class analysis is a statistical method used to categorize individuals based on a set of observable characteristics. Simply put, the researcher chooses a set of categorical variables and then applies LCA to group individuals exhibiting similar values on the chosen characteristics. In latent class analysis, the model postulates the existence of a latent, unobserved variable that is measured indirectly using observed variables (Collins & Lanza, 2009). Figure 2 illustrates the conceptualization of latent class analysis. While empirically, it is the indicator variables that are used to estimate the latent variable, theoretically, the latent variable causes the indicator variables. Since the latent variable can never be observed and only estimated, the model includes an error term that captures the variance between the actual latent variable and the observed variables.

Figure 2: Latent variable with three observed indicator variables



Source: Collins & Lanza 2009: 5.

Mathematically Latent Class Analysis (LCA) relies on a maximum likelihood estimation that categorizes individuals into distinct classes, guided by their specific responses to observed variables (Collins & Lanza, 2009). Essentially, it calculates the probability function that best explains the patterns of responses evident in the data. LCA produces two sets of parameters as output: 1) latent class membership probability and 2) indicator variable response probabilities for each latent class. The latent class membership probability represents the proportion of each class in the population, and for every individual, a probability is estimated for how likely they are to belong to each class. The indicator variable response probabilities represent the probabilities of observing the different outcome levels of each variable and they are calculated for each class. It is through an examination of the pattern of the probabilities that we are able to interpret the differences between the classes. If there are large differences in the pattern in response probabilities, the more distinct the classes are, and the interpretation of the classes is much clearer.

In Chapter 2, the latent variable represents platform worker segments, and we use indicator variables on age, income, educational attainment, and labor market status to estimate the segments. Each latent class then represents a worker segment characterized by a distinct response pattern on the observed variables. In the study, we find three classes of approximately equal size: *established workers*, *labor market entrants*, and *transitional workers*. The first two of the three classes we identify are quite homogenous with very distinct response probabilities, making them easy to interpret,

while the third class is more heterogeneous. These classes are elaborated further on in Chapter 2.

Sequence analysis

In Chapters 3 and 4, I use sequence analysis to find patterns in working-time developments over a longer time period among platform workers on a labor platform (chapter 4) and on the traditional labor market (chapter 3). Sequence analysis is an analytic method for systematically studying a series of ordered states and events that (typically) unfold over time (Cornwell, 2015). Sequence analysis has been particularly central to the research on life courses and careers (Abbott, 1995; Ritschard & Studer, 2018). Sequence analysis focuses on the sequential nature of social reality, in other words, the many aspects of social life that are experienced as an ordered chain of events (Cornwell, 2015). This can be life-course transitions from going to school as a child, starting further education as a young adult, then entering the labor market and finally retirement, or the transitions during a day from waking up, going to work, coming home, and going to bed, or the transitions in a romantic relationship. While there are many variations in how these sequences play out individually, they are characterized by a regularity that allows for a systematic analysis of patterns and dissimilarities, which is the focus of sequence analysis.

In Chapter 4, we use sequence analysis to study the working time patterns of food couriers on a large food-delivery platform in Denmark. In this study, we operationalize working time as a categorical variable distinguishing between five states of working fewer or longer hours. Conceptually we think of worker trajectories on the platform as a sequence of varying levels of activity over time. The sequences are then used to differentiate workers based on both their level of activity and the duration of their activity on the platform. In Chapter 3, we use multi-state sequence analysis that allows us to consider the simultaneous developments in two different sequences. Here, we focus on developments in the traditional labor market in working time and income among platform workers with a primary job and two other groups of multiple jobholders.

Survey experiment

In Chapter 5, I conduct a survey experiment. Unlike latent class analysis and sequence analysis, the methodology behind survey experiments relies on a counterfactual model of causality. Simply put, an individual can only be exposed to one treatment at a time, and only one outcome can be observed for this individual based on the specific treatment (Morgan & Winship, 2014). This means it is impossible to estimate the individual-level effect of a given treatment since we have to rely on a counterfactual estimate of what the outcome would have been for the same individual had she been exposed to a different treatment, this is also referred to as the potential outcomes (Morgan & Winship, 2014). Let us consider an oft-discussed example in the sociology of work, the causal effect of education on labor market outcomes. In one scenario, a person completes a tertiary education and we measure their income one year later. In the other scenario, the same person does not complete tertiary education and we measure their income one year later. The causal effect of this person's education on their income would then be the difference between the two scenarios. However, this is a theoretical and counterfactual exercise, since both scenarios can never be true at once. Causal inference, therefore, relies on estimating the average treatment effect (ATE), which is the difference in outcomes between a treatment and control group. This difference in outcomes between the two groups can only be considered a causal effect of the treatment if there are no other observed and unobserved differences between the two groups that could be causing the differences in outcomes. This is a strong assumption that is difficult to fulfill in the social sciences. However, experiments solve this problem by randomly assigning individuals to either treatment or control groups. Since the two groups are randomized (if the experiment is successful), there should be no difference in both observed and unobserved traits of the two groups on average, which allows us to estimate the average treatment effect as causal. Real experiments are rare in the social sciences, which is why survey experiments have become increasingly popular for drawing causal conclusions. Survey experiments are, at their core, characterized by researchers asking respondents to answer a question based on a small description where some features are varied experimentally. This lets researchers manipulate variables of interest and achieve random assignment of respondents to treatment and control conditions (Auspurg & Hinz, 2015). Survey experiments are very versatile; however,

they only elicit information on respondents' answers to hypothetical scenarios, so we cannot know how respondents actually behave in the real world. Survey experiments are therefore used to gain insights into respondents' attitudes, preferences, judgment principles, or behavioral intentions.

The forced-choice conjoint survey experiment that I use in Chapter 5 is a special case of survey experiments. This method was developed in marketing research to analyze consumer preferences but has since been popularized in the social sciences (Bansak et al., 2022; Hainmueller et al., 2014). Where classic survey experiments are unidimensional and only vary one variable, conjoint surveys are multidimensional allowing researchers to estimate the causal effect of various factors and their internal relationships. The conjoint experiment consists of a vignette, a small description of a fictitious person, object, or situation, which is composed of several attributes (dimensions) that vary over a set number of levels (Auspurg & Hinz, 2015). In the conjoint experiment, respondents are presented with two or more of these descriptions, and they are then asked to choose between or rate the hypothetical scenarios (Hainmueller et al., 2014). The conjoint survey holds different strengths. Firstly, the multidimensional design allows researchers to estimate the relative importance of different attributes on the outcome of interest, and secondly, the use of choice tasks increases the external validity of the experiment as this better reflects decision-making in the real world and increases engagement as it forces respondents to compare attributes across scenarios (Hainmueller et al., 2015).

The survey experiment I designed in Chapter 5 presents respondents with two platform workers on a cleaning or food-delivery platform. The workers are described according to five dimensions (name, rating, social benefits, average hourly earnings, and price of the service). These five dimensions have two to four possible levels, resulting in a total of (4*3*2*4*4) = 384 possible worker profiles. Each respondent is presented with two worker profiles in three different choice tasks on each type of platform where they have to choose which of the two presented worker profiles they would prefer in the hypothetical situation. I go more in-depth with the research design and how the different dimensions and levels of these worker profiles are constructed in Chapter 5. Here I want

to focus on how randomization is applied in the experiment to ensure the estimation of causal effects. In the conjoint experiment, the worker profiles are generated randomly from the pool of 384 possible profiles, the order of the dimensions is randomized, and finally, whether respondents are presented with choice tasks on a cleaning or food-delivery platform is randomized. This randomization is meant to ensure that there are no observed or unobserved factors at the individual level that can explain what type of profile respondents are presented with.

The outcome of interest in the conjoint experiment is whether a worker profile is selected as the preferred one by respondents. Here, we may be interested in whether respondents generally tend to choose a worker profile with a higher rating over a worker profile with a lower rating. Hainmueller et al. (2014) show that using an ordinary least squares regression, we can estimate the average marginal component effect (AMCE) of a change in attribute *l* on the probability that a worker profile is chosen by respondents. In a regression setup, I then use the five dimensions of the worker profiles as independent variables, and the dependent variable is whether a specific profile was chosen or not. Each regression coefficient of the independent variables then represents the marginal probability of choosing a profile with that specific level of the dimension averaged over all possible combinations of the remaining dimensions. The survey experiment combines the benefits of both experimental and survey research (Auspurg & Hinz, 2015). The randomization guarantees that variations in respondents' responses can be causally linked with the variations in the descriptions of worker profiles, increasing internal validity. External validity is secured in the survey using nationally representative population samples.

Methodological considerations

I want to end this section by highlighting three central points. Firstly, the different limitations that are on the availability of empirical data on platform workers play an integral part in the types of analyses that are possible. In the three articles of this thesis that focus on platform workers, I have opted to use methods that are more descriptive to focus on the patterns of platform work. Secondly, considering the above-mentioned data limitations, it becomes highly important to utilize complementary data sources. The

various data sources that form the basis of this dissertation, each with their unique strengths and weaknesses, complement one another effectively. The LFS data allows us to identify platform workers, which is not possible using register data. However, register data complements the snapshot nature of the LFS with a longitudinal dimension, while the company data adds depth to the more general insights from the LFS and register data by giving access to a full population of platform workers on a single platform. In addition, the survey experiment contributes a causal framework that adds depth to the descriptive analyses. Thirdly, I wish to point out that both causal and descriptive methods are important for answering central but distinct sociological questions. In conclusion, the dissertation emphasizes the synergy between various data sources and the use of both descriptive and causal methods as crucial for providing a nuanced understanding of platform work in the Danish labor market.

Rounding up, I want to comment shortly on the compatibility of the theoretical and analytical concepts, and the data and methods I use. The distinction between standard and non-standard work that stands central in all four of my studies focuses on what we can call objective dimensions of work, e.g., employment conditions, working time, and income. These dimensions are easily measured by survey and register data, which form the basis of my dissertation. Methodologically, I focus on descriptive methods such as latent class analysis and sequence analysis, which are aimed at finding and describing patterns and sub-groups in populations. I have chosen these methods due to the analytical outset in labor market segmentation theory, which focuses on the existence of different labor market segments. I consider these segments as sub-populations that are best understood using person-centered instead of variable-centered approaches (Howard & Hoffman, 2018).

1.4 Findings and implications

In this section, I will discuss the overall contributions and limitations of the dissertation as well as implications for further studies. I will conclude with a summary of each of the four studies in my dissertation and their respective contributions to the literature on digital platform labor.

The four studies comprising this dissertation each make a significant empirical contribution to the platform literature. The findings in Chapter 2 identify three groups of platform workers engaging in various hybrid work arrangements. Chapter 3 shows significant labor market mobility among platform workers. Chapter 4 identifies three working time segments among food couriers on Wolt. Chapter 5 illustrates how consumer attitudes and biases can affect employment relations on gig work platforms. Taken together, these findings contribute significantly to our understanding of how digital labor platforms relate to the traditional labor market and existing patterns of inequalities in standard and non-standard work in Denmark. I will discuss the importance of these findings, focusing on the methodological and analytical contributions.

As previously described, platform work is particularly difficult to study quantitatively for a number of reasons, which have led the literature to focus on qualitative interviews and online surveys. A central contribution of this dissertation is, therefore, the use of various data sources, descriptive statistics, and longitudinal data to study platform workers' working lives, both on and off the platform, which represents novel findings. The large-scale, representative nature of the Labor Force Survey increases the external validity of the findings on platform workers, which is lacking in large parts of the literature. The coupling of platform workers in the LFS with the longitudinal register data adds a unique insight into workers' patterns when moving around, in, and out of the labor market. This type of longitudinal data on platform workers represents a novel contribution. In the same vein, the longitudinal data from Wolt on food couriers' working time adds novel insights into how work patterns evolve on a gig-work platform. The experimental setup in the final chapter also contributes to a new understanding of the role consumers have in affecting working conditions in the gig economy. Comparing the findings across these studies, a central point stands out, namely that a thorough understanding of platform work requires a multifaceted approach. One of the main contributions of this dissertation, then, is to approach platform work using multiple data sources and examining multiple actors in the triangle of workers, consumers, and platforms.

This point becomes clearer when we consider the interrelations of the different findings in this dissertation. Chapter 4, using panel data from Wolt on their food couriers' activity for multiple years, shows us that there is a substantial difference between the average worker registered as a food courier and the average worker actually delivering food. The weekly activity patterns across a year show that the Dabblers, which represent the majority of food couriers registered on the platform, are only active for short amounts of time, indicating that they have no reliance on the income from Wolt. These individuals are also primarily of Danish origin. On the other hand, the Regulars represent a minority of registered couriers, but they are by far the most active workers on the platform. These workers are often of immigrant origin, and their high activity levels indicate they are more likely to rely on the platform income. This group may be underrepresented in traditional surveys. These findings underscore that it is not enough to define platform workers based on whether they have been active on a platform. There is a need to analyze platform workers based on their work activities. This study can thus be considered a corrective to the findings in Chapters 2 and 3 and other studies relying solely on survey data on platform workers. However, the findings in Chapters 2 and 3 also clearly establish that solely focusing on platform workers' activities on a labor platform only provides a rough perspective of their overall working lives. Combining data from the LFS with panel data on labor market activity from Danish registers shows us that focusing only on activities on labor platforms gives a very one-sided picture of platform workers' working lives. The majority of platform workers engage in platform work for a limited amount of time and often as a secondary activity. It is, therefore, crucial to include a broader labor market perspective to understand how labor platforms relate to labor market inequalities. Here, I want to comment on the findings in Chapter 5. While platform firms may set up the overall conditions on the platforms, and workers may manage risks by balancing activities in the online and traditional labor market, consumer attitudes and biases can substantially affect working conditions and should be taken into account as well. In combination, the findings in Chapters 2, 3, 4, and 5 bring significant implications to future studies on digital platform work in highlighting the importance of context. It is difficult to assess the precariousness of platform work based solely on cross-sectional and/or platform data. To comprehend platform workers' working lives, it is necessary to consider their relationship to the wider labor market,

their activity levels over time, and to consider all the actors that affect them. The literature on digital labor platforms could thus benefit from engaging more with various data sources that combine information on activities on and off the platforms.

In short, the main contributions of this dissertation can be split into a methodological and an analytical section. Methodologically, I highlight the importance of using various complementary data sources, with a specific focus on longitudinal data. Analytically, I contribute with a focus on consumers as important labor market actors in the platform economy and a focus on the interrelation of the online and traditional labor market by developing two typologies of platform workers' activities, one on activity patterns on the platform and one on their relation to the traditional labor market.

I want to end this dissertation by remarking on two directions for future studies on digital labor platforms that I believe are fruitful to pursue. In this dissertation, I have focused on what can be considered objective or formal dimensions of platform work, e.g., employment conditions, working time, and income, which are all central parts of characterizing standard and non-standard work. However, this also means that I lack a focus on the more subjective dimensions of work, e.g., job satisfaction and meaning. As evident from my literature review, the heterogeneity among platform workers in their expectations, motivations, and needs can make it difficult to assess the more subjective dimensions of platform work (e.g., Cansoy et al., 2022; Dunn, 2020; Kalleberg & Dunn, 2016; Schor et al., 2020). However, this should not stop us from trying. In future studies using large-scale surveys targeting platform workers, a key focus could be on how objective and subjective dimensions of work quality interrelate. A deeper understanding of when and how platform workers believe platform work to be a positive vis-à-vis negative experience should be central to how the platform economy is regulated. Secondly, I have contributed to the emerging literature focusing on consumers' central role in the platform economy, showing how they can influence working conditions. I believe this is a fruitful avenue for future research to pursue and develop. While I focused on the importance of consumers' discriminatory attitudes towards platform workers and their (un)willingness to pay for better wages and social benefits, there are many dimensions where consumers are more influential in the platform economy than

often considered in traditional employment relations. Survey experiments hold important strengths in this regard to elicit consumer preferences and provide insights into what attributes of platform work consumers give weight to. A better understanding of consumer actions in the platform economy can help secure better working conditions for platform workers.

Chapter 2: Hybrid Work Patterns: A Latent Class Analysis of Platform Workers in Denmark

Authors: Jonas Hulgård Kristiansen, Trine Pernille Larsen & Anna Ilsøe

In this study, we argue that the extant literature on digital labor platforms has focused on platform workers' conditions on the labor platforms and, therefore, has only cursorily considered the interlinkages between digital labor platforms and the wider labor market. This is even though studies have shown that labor platforms foster a heterogeneous worker group, and platform work is often a supplementary source of income for workers that tend to combine both online and traditional labor as well as other income-generating sources. To overcome this shortfall in the literature we combine data from the Danish Labor Force Survey identifying platform workers with register data on their income and socio-demographic characteristics. Using Latent Class Analysis, we use this information on worker activities on both the online and traditional labor market to identify three distinct groups of platform workers with differing labor market positions in the traditional labor market. We find a segment of *established workers* in traditional employment that have a buffer against the volatility and insecurities of online labor markets due to their higher-skilled, stable jobs. The second segment we identify is *new labor market entrants* using platform work as a supplementary income to student allowances. The third segment we categorize as *transitional workers*, and they combine platform work with less secure employment or rely on social benefits, thus facing greater risks and possibly struggling to meet eligibility for social protections. Our article adds to the literature by offering new insights into the heterogeneous workforce on labor platforms and their interplay with the traditional labor market. We highlight the significant yet often overlooked impact of the broader traditional labor market and welfare system on individual platform workers' circumstances.

Chapter 3: Agency in platform work and multiple jobholding from a labor market risk perspective

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

In this study, we build upon the findings of paper 1, highlighting the interlinkages between the online and traditional labor market, and investigate the developments and changes over time in labor market affiliation among platform workers. We argue that individuals engaged in platform work holding a primary job are essentially multiple jobholders and, therefore, compare their labor market trajectories with other groups of multiple jobholders, i.e., workers with secondary waged work and workers with secondary self-employment. These two groups make for an interesting comparison since one of the great points of contention in the platform literature is whether platform workers are considered employees or self-employed. We use data from the Danish Labor Force Survey to identify platform workers and multiple jobholders and combine it with longitudinal register data on labor market affiliation for a three-year period stretching two years prior to the LFS and one year after. Using multi-state sequence analysis and regression models, we explore similarities and differences in the labor market biographies of the three groups of multiple jobholders. In this article, we contribute with a longitudinal, comparative perspective on platform workers labor market trajectories, finding that while platform workers may often start from labor market positions with higher social risks, there is a notable degree of labor market mobility, with a relatively high share of platform workers experiencing upward job mobility and income growth over the three-year period.

Chapter 4: The flexible platform firm: segmentation of working time in the gig economy

Authors: Christian Haldrup, Anna Ilsøe, Trine Pernille Larsen, Jonas Hulgård Kristiansen & Jakob Demant

In this study, we argue that while the scholarly literature debates whether platform work mainly benefits the platforms, often at the expense of workers who adjust their schedules to demand and conditions set by platforms, it seldom explores how these work patterns evolve. This limitation is closely linked to platform firms' restriction on

access to their data. In this study we draw on unique longitudinal data from a leading food delivery platform in Denmark consisting of time series of online hour activity of all couriers (N = 20.090) during six years (2017-2022) supplemented by demographic characteristics. Using sequence analysis and clustering algorithms we identify three distinct working time segments among platform workers and classify them as; *Dabblers, Temporaries* and *Regulars*. All three groups display stable working time patterns over time that vary according to the number of weekly hours and number of weeks spent on the platform (i.e. trajectory length). *Dabblers* work few hours over few months, *Temporaries* work part-time over several months and *Regulars* work full-time for typically one year or longer. Among the groups of *Temporaries* and *Regulars*, we find an overrepresentation of workers with a foreign background. Despite of market fluctuations and adjustments implemented by the platform that influences the working options of couriers during the six-year period, we find that the three working time patterns are remarkably consistent over time. This stability in working-time patterns suggests that the platform facilitates the presence of couriers with different labor market positions.

Chapter 5: Consumer Preferences and Employment Relations in the Platform Economy: Evidence from a Survey Experiment

Authors: Jonas Hulgård Kristiansen

In this paper, my focus shifts from the platform workers to the platform consumers. Studies suggest that consumers significantly influence the platform economy, both directly and indirectly as initiators and evaluators of platform services, however, few studies have engaged with how consumers influence labor practices and the working conditions of platform workers. I argue that it is important to understand how consumer attitudes towards working conditions and worker stereotypes potentially influence labor relations on gig work platforms. As platforms continue to evolve, the interplay between the platform and governmental policies, and workers' rights will undoubtedly be influenced by consumer attitudes. To elicit consumer attitudes I conducted a paired forced-choice conjoint online survey experiment distributed to a representative sample of 3.029 Danish citizens between 18-70 years. I presented respondents with a choice

between two platform workers performing the same service (i.e. food-delivery or domestic cleaning) and then varied dimensions related to consumer price, the workers' wages, and social benefits, as well as worker ratings and names indicating gender and ethnicity. Across food-delivery and cleaning platforms, I find a large positive effect of social benefits on respondents' choice of worker, while increasing workers' wages has a much smaller effect. I also find that respondents tend to choose female and ethnic Danish workers on both types of platforms. The preference for benefits over wages remains consistent across different wage levels, and wage increases only influence choices at lower wage levels. Consumers' gender and ethnic biases are somewhat moderated by workers' ratings in cleaning services, unlike in food delivery. This study thus adds to the literature by providing novel insights into consumer attitudes and their potential impact on employment relations in the platform economy.

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Chapter 2

Hybrid Work Patterns: A Latent Class Analysis of Platform Workers in Denmark

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Abstract

This paper presents a novel approach for studying differences and similarities among platform workers, by taking into account the wider labor market position of platform workers. Analytically, we seek inspiration from literature on labor market segmentation (SLM) and multiple jobholding (MJH) to nuance the often-dichotomized view of labor markets characterized by SLM theory. By using survey data from a set of additional questions tied to the Danish LFS, we apply latent class analysis models to discover patterns of labor market divisions among platform workers in Denmark. We identify three major groups of platform workers, and while all of them have multiple income sources, they have very different labor market positions in the traditional labor market. We categorize them as 'established workers', 'transitional workers', and 'new labor market entrants'. These divisions point to marked differences among platform workers, implying that platform work is characterized by varying blends of labor market hybridity.

Keywords

Labor platforms, latent class analysis, multiple jobholding, worker segmentation

2.1 Introduction

The emergence and spread of digitally mediated labor has been addressed as one of the major drivers in transforming the nature of work in the present as well as the future (Berg et al. 2018; Healy et al. 2017). Digital labor platforms such as Uber and Upwork are changing fundamental conceptions of the labor market; work is redefined as 'gigs', employees are often replaced with self-employed, management is governed by algorithms, and social contact is mediated through digital apps (Kovalainen et al. 2019; Vallas & Schor, 2020). What these changes entail for the future of work remains unclear, but they are undoubtedly challenging work organization and existing labor market structures. Some have even argued that digital platforms can have disruptive effects on the labor market due to these changes (Danish Disruption Council 2019; Hauben et al. 2020; Urzi Brancati et al. 2019). This is also the case in the Nordic countries, where the first empirical studies of platform work highlight work practices characterized by new forms of flexibility with associated social risks (Jesnes 2019; Oppegaard 2020; Sloth Laursen et al. 2021).

The new digital work arrangements brought about with the platform economy have eased people's opportunities to engage in a multitude of different tasks, combining income from diverse sources. Much labor market literature on digital platforms has predominantly been occupied with the precarious aspects of digital labor, such as low pay, uncertain working hours, and lower levels of social protection (Berg 2016; De Stefano 2016; Vallas & Schor 2020). Platform workers are not covered to the same extent by Danish labor laws and collective agreements as other groups of non-standard workers (Ilsøe & Larsen 2020). However, ample research also indicates that many platform workers rarely depend exclusively on income from platform work, but tend to use platform work as a supplementary income (Ilsøe et al. 2021; Schor et al. 2020; Urzi Brancati et al. 2019). However, the different ways in which platform workers organize labor and income-generating activities across the online and traditional labor market are less researched yet important to better apprehend the dynamics between labor platforms and the future of work.

This paper contributes to the growing body of literature on platform work by examining the interactions between the online and traditional labor market through the lenses of platform workers' various income-generating activities. Our main research question is explorative: what are the typical patterns of combining labor on digital platforms with traditional economic activities?

Our locus of analysis are platform workers in Denmark, as the Danish labor market is often portrayed as having a well-developed social safety net combined with a highly regulated labor market. Denmark thus appears well suited for analyzing the interlinkages between platform work and the traditional labor market. Analytically, we draw on labor market segmentation (SLM) and multiple job holding (MJH) literature (Campion et al. 2020; Conen 2020; Grimshaw et al. 2017; Smith & McBride 2021). By drawing on these strands of literature, we depart from the more dichotomized view of labor markets within much segmentation and MJH literature and seek to nuance the ongoing academic debates. Following these strands of literature, we expect the platform economy to attract groups belonging primarily to the periphery labor market segment, but with some variation among platform workers, as there are multiple reasons for engaging in platform work.

We use survey data from the Danish Labor Force Survey conducted in 2017 and 2019, combined with register data from Statistics Denmark concerning the Danish population's income. Combined, these data provide us with a comprehensive overview of the labor market position of a representative sample of platform workers in Denmark. Methodologically, we apply latent class analysis (LCA) models to uncover patterns of labor market segmentation.

Through our LCA, we find three distinct groups of platform workers with very different labor market positions, and from these findings, we develop new typologies for capturing hybridity between traditional labor market segments and platform work. Our article thus contributes to the literature on digital platforms with new perspectives on both the heterogeneous workforce and how they interact with the traditional labor market. We specifically illustrate the important, but often

underestimated role of the wider traditional labor market and welfare setting for individual platform workers' situation (Schor et al. 2020; Thelen et al. 2018).

The paper is structured as follows. First, we briefly introduce the Nordic and Danish platform economy with an explicit focus on labor platforms. We then develop our analytical concepts through a brief review of contemporary literature on digital labor platforms, labor market segmentation, and hybrid work arrangements. Afterwards, we present the data and methods used, followed by our analysis and results. We conclude with a discussion of our main findings.

The Nordic and Danish platform economy and labor platforms

Digital labor platforms are an emerging phenomenon in the Nordic countries that has garnered increased public and academic attention. Recent figures indicate that although platform work is one of the fastest growing employment forms in the Nordic, it remains marginal on the Nordic labor markets. Between 1% and 2% of the Nordic workforce can be considered platform workers, and these figures are expected to increase in the coming years with the mushrooming of new labor platforms across distinct sectors and occupations (O'Farrell & Montagnier 2020; Piasna et al. 2022; Sutela & Pärnänen 2018).

The Nordic countries are a special case concerning the spread of platform work. The Danish labor market--together with other Nordic labor markets---is often mentioned as an example of a densely regulated labor market with extensive social security provided by both labor market institutions and universal welfare states. This is also the case when it comes to emerging forms of employment like solo self-employment and platform work. However, digital labor platforms often rescind from traditional employer responsibilities, leaving more in the hands of platform workers and subsequently platform workers are often less covered by Nordic social protection schemes, which set different criteria for employees and self-employed (Hotvedt et al. 2020; Jesnes 2019). In fact, platform workers often work in the grey zones between traditional employment and self-employment, and they thus tend to struggle to meet these eligibility criteria, even if Denmark in Nordic comparisons is often considered one of the trendsetters for protecting platform workers within the wider welfare and

industrial relations setting (Hotvedt & Alsos 2021; Vandaele 2022). Labor platforms operate in many different submarkets; however, the focus in Denmark has so far been on the development in the service-sector, e.g., food-delivery and cleaning, where the Danish industrial relations model is comparatively weaker (Mailand & Larsen 2018).

2.2 Digital labor platforms and labor market divisions: An analytical framework

Developing our analytical concepts, we start from the discussions in the literature on platform work, where we mainly concentrate on the definitions of labor platforms. We then briefly engage with theories of labor market segmentation as well as seek inspiration from theories and findings on multiple job holding, as these literatures offer concepts that will enable us to better apprehend the hybrid work arrangements of platform workers. While ample research focuses on different aspects of the platform economy, it rarely engages with these interlinkages between platform work and the traditional labor market, which seems increasingly important since platform work tends to be a secondary source of income for most workers.

Digital labor platforms

There are ample and often ambiguous definitions of digital platforms and the platform economy, but in this paper, we focus rather narrowly on labor platforms defined as digital intermediaries facilitating the exchange of monetary compensation for the provision of labor such as Wolt and Upwork, as opposed to capital platforms like Airbnb (Schor & Attwood-Charles 2017; Vallas & Schor 2020). Thereby, we include work performed online as well as offline; in addition, we focus exclusively on the platform workers performing tasks facilitated through the platforms, and not, e.g., the architects or back-office workers developing and maintaining the platforms. We choose this analytical lens on platform workers, as our object of interest is the relationship between platform work and the traditional labor market. When we distinguish between labor platforms and the traditional labor market, we define the latter as the labor market where there is a direct relation to the employer, which

encompasses both standard and non-standard work, but is dominated by the standard employment relationship.

Labor platforms are usually characterized by a few set features, often defining themselves as intermediaries linking platform workers looking for work with customers looking for easy solutions. There are relatively low entry barriers on most platforms and they often offer flexibility to individual platform workers in terms of free choice of hours and work organization (Kovalainen et al. 2019; Vallas & Schor 2020). The platforms operate digitally, meaning that the relationship between customer, worker, and platform is primarily handled through internet applications and mobile devices, often governed by algorithms. They also tend to engage in a fragmentation of the labor processes into smaller tasks or gigs, and platforms will often categorize their workers as independent contractors or solo self-employed, i.e., self-employed without employees (Thelen 2018; Urzi Brancati et al. 2019). Thereby, platform workers often control when and (to some degree) how they want to work, while many platforms (especially those facilitating smaller tasks) maintain power over pricing and work allocation (Vallas & Schor 2020). However, there are significant variations among labor platforms, and multiple studies have developed typologies on different types of digital labor platforms and platform work (Berg et al. 2018; Hauben et al. 2020). Some frequently used distinctions are whether the work is location-based or web-based, whether it entails high- or lower-skilled, the level of autonomy for workers and the duration of work (Howcroft & Bergvall-Kåreborn 2019; Kalleberg & Dunn 2016). Other studies have focused on the differences among platform workers. Urzi Brancati et al. (2019) stress that a majority of platform workers only use platform work as a sporadic or secondary income, while a minority of workers have platform work as their main income. In a similar vein, a study by Schor et al. (2020) finds that workers who only use platform work as a supplemental income and are not economically dependent upon the platform express considerably higher satisfaction than workers who rely upon income from the platform to pay basic expenses. In the Danish context, platform work is primarily used as a supplementary income (Ilsøe et al. 2021). While we are unable to distinguish between different types of labor platforms or worker satisfaction, we can contribute

to this important literature on the interlinkages between platform work and the traditional labor market with a new perspective, by looking at the patterns of hybrid work that platform workers engage in.

Segmented labor markets

Our main analytical outset is labor market segmentation (SLM) theory, which analytically distinguishes between core and periphery labor market segments according to distinct indicators like labor market status, types of employment forms, skill levels, wages, and working conditions (Atkinson 1987; Doeringer & Piore 1971; Peck 1996). In the SLM developed by Doeringer and Piore (1971), they emphasize the demand-led factors, notably companies' role in the shaping of employment inequalities and thus offers a different perspective to the neoclassical economic understanding that companies adjust their labor supply based on human capital (Leontaridi 1998). Following SLM, different companies tend to develop core and periphery labor markets depending on their needs for specialized knowledge and flexible work as well as adjusting to the shifting economic cycles and technological advancements (Doeringer & Piore 1971; Rosenberg 1987). The core labor market is characterized by high wages, stable employment, and opportunities for career advancement for a core group of employees (Grimshaw et al. 2017). In contrast, the periphery labor market is characterized by low wages, unstable employment, and missing career opportunities (Doeringer & Piore 1971). As such, there will over time evolve distinct labor market segments with sharp demarcations between the different segments and this in turn limit labor market mobility between segments, and, for example, standard and non-standard employment (Kalleberg 2011; Rosenberg 1987). More recent research utilizing SLM theory emphasize increasingly supply-led factors, illustrating that individual worker characteristics such as gender, age, skills, financial situation, and other jobs also influence labor market segmentation, where individuals tend to join different segments based on their bargaining power (Palier & Thelen 2010; Rubery & Piasna 2017). In this context, much segmentation literature use employment stability as an indicator of core and periphery, which tend to be portrayed as standard vis-a-vis non-standard employment (e.g., temporary and part-time work) (Lukac et al. 2019; Seo 2021; Yoon & Chung 2016). Likewise,

educational level is an important indicator in much segmentation literature, as high-skilled and low-skilled workers are generally understood to be in different segments of the labor market (Kalleberg 2011; Leontaridi 1998). Age is another important differentiator concerning labor market position, as young people are less likely to be in standard employment and more likely to experience shifts in their occupational status and find better employment as they age (Doeringer & Piore 1971).

Although there is a common conception of the existence of a core and periphery labor market segment, including their general characteristics within the SLM literature, there is no scholarly consensus on how to delineate labor market segments or how to assess the precise number of segments (Leontaridi 1998). Instead, SLM often functions as an umbrella term for a broader polarization or dualization trends of employment structures that may relatively be less prominent in the Nordic countries, yet still noticeable (Boje 1986; Palier & Thelen 2010; Rasmussen et al. 2019). The segmentation literature thus provides us with an analytical lens for understanding the development and structuring of platform labor as a new labor market segment.

In this broader context, studies on labor platforms often portray platform workers as another periphery segment characterized by low pay and insecure employment with limited career prospects, as platforms often operate on the fringes of the regulated labor market (Berg et al. 2018; De Stefano 2016; Kalleberg and Vallas 2018). Following this literature, platform work with its fewer entry barriers, low pay, and often insecure and low skilled work compared to the traditional labor market is expected to attract certain groups sharing characteristics with other non-standard workers and thus add yet another layer of segmentation due to limited mobility between the core and the periphery segments. Therefore, we expect that labor platforms primarily attract workers from the periphery segment in the traditional labor market, when looking at individual characteristics like income, education, labor market status, and age.

Hybrid work and multiple jobholding

To analyze the complex income arrangements of platform workers, we draw on theories and findings on hybrid work and multiple jobholding (Campion et al. 2020; Conen 2020; Smith & McBride 2021). Most studies on hybrid work arrangements focus on *multiple jobholding*, which Campion et al. (2020: 170) define as 'the act of working more than one job simultaneously, including working for employers and self-employment, wherein all tasks, or sets of tasks, are performed in exchange for, or expectation of, compensation'. However, ample research has also looked beyond the focus on jobs, and included different types of income such as student allowances, unemployment benefits, and social assistance (Carter et al. 2004; Kibria 1994). Studies on labor platforms also indicate that platform workers often combine income sources from other than just primary and secondary employment (Piasna et al. 2022; Schor et al. 2020; Urzi Brancati et al. 2019). This distinction between multiple jobs or other income sources offers thus a perspective that moves beyond the usual approach within much segmentation literature that posit limited mobility between distinct segments. The concepts of hybrid work and MJH assume that individuals combining multiple income/jobs are active in distinct segments such as the digital platform economy and the traditional labor market, where they may have income from various sources such as other jobs, unemployment benefits, or other forms of social security. Thereby, these strands of literature provide us with ways to capture the interlinkages and possible bridges between distinct segments such as the digital platform and the traditional labor market, even if such research also adopts the notion of primary and secondary jobs.

Studies on motives behind MJH are often grouped into one of two broad categories 'financial necessities' (i.e., individuals are *pushed* into MJH for financial reasons) or 'boosting preferred job portfolios' (i.e., *pull* factors, where MJH is for personal or professional fulfilment) (Campion et al. 2020; Conen 2020). Grounded in the MJH literature, we would thus expect multiple drivers of mobility among platform workers, but we here focus on the role of income and employment in the traditional labor market for people active in the online labor market. Ample research stresses that low and insecure earnings from individual's primary income source tend to be an

important driver for people taking on additional jobs or gigs, even at a lower wage and thus point to close ties between people's engagement with platform work and the traditional labor market (Hirsch 2016; Ilsøe & Larsen 2020; Schor et al. 2020). Therefore, annual income from non-platform sources is a crucial indicator for measuring labor market divisions among platform workers. Drawing on these insights, we use the concept of hybrid work to explore segmentation at the nexus between the digital platform and the traditional labor market, which also allow us to broaden our analytical focus from purely employment relations to the wider economic activity of individuals. From this literature, we expect to observe platform workers working across multiple labor market segments due to multiple drivers of mobility.

Our analytical framework

Contributing to the academic debates on platform work, we offer a perspective that departs from the often more dichotomized view of labor markets characterized by much literature on SLM, MJH, and platform work. We explore if the common notion within much segmentation, MJH, and platform literature that the labor market is divided into distinct segments comprised of a core and periphery or good and bad jobs/gigs may explain differences among platform workers based on their employment status in the traditional labor market. From the literature reviewed above, we expect from SLM that 1) platform workers belong primarily to a periphery labor market segment due to the comparatively lower levels of regulation in the platform economy; and 2) we expect, following the MJH theory of multiple drivers of mobility, some heterogeneity among platform workers. The platform economy may attract distinct labor market groups ranging from those with low and insecure earnings to those with other reasons than financial. We thus expect to see patterns of labor market division among platform workers following individual characteristics like income, education, labor market status, and age.

2.3 Research design, data, and used methods

The Danish Labor Force Survey and platform work

This paper uses data from the Danish Labor Force Survey (LFS) of 2017 and 2019, where added questions regarding activity on digital platforms were introduced. The LFS is conducted every year, and its size and scope make it particularly useful for our endeavor, as it provides a comprehensive overview of the labor market position of a representative sample of the working age population in Denmark, which covers the ages of 15-74 years. In the first quarter of both 2017 and 2019, participants in the LFS were asked if they during the last 12 months had generated income by performing work done through websites or apps. In Q1 2017, there was a response rate of 52% with 18,043 Danes participating in the survey, and in Q1 2019, there was a response rate of 56% with 18,583 respondents. Around 1% of the respondents in both 2017 and 2019 answered yes, to whether they had generated income by performing work tasks on digital platforms, and this group is the basis of our analysis. The large size of the survey makes it ideal for measuring the labor market demographics of the relatively small group of platform workers in Denmark. However, the small number of platform workers also set some limitations on the level of detail in our analysis. This trade-off between the LFS providing representative samples and comparability with general labor market statistics, but small absolute numbers of platform workers are one of the difficulties in measuring platform labor (O'Farrell & Montagnier 2020; Piasna et al. 2022). In compliance with Statistics Denmark's guidelines on reporting results from the LFS, all results are weighted (Statistics Denmark 2012). We choose to pool the platform workers from the 2017 and 2019 survey in order to increase the sample size for the analysis.

The subject of our analysis is platform workers irrespective of their employment status in the traditional labor market, i.e., employed, unemployed, or outside the labor force. This also means that our locus of analysis varies slightly from a traditional labor market perspective, as we are not only interested in combinations of traditional and digital work, but also want to capture supply-side variations among platform workers, irrespective of their employment status in the traditional labor market. We use the term hybrid work to capture this heterogeneity, which entails that

we broaden our analysis to include not only the traditionally employed population as is often the case in much labor market research, but we also include students, pensioners, and unemployed, who are also active on labor platforms, but not necessarily active in the traditional labor market.

Who are the platform workers?

In Table 1, we present how the platform workers compare to the employed Danish population in 2019 on central demographic and labor market characteristics covered in the LFS, combined with register data on annual income. We categorize 'Main labor market status' as *Standard employment*, *Non-standard employment*, *Student*, and *Other*. Standard employment are individuals on an open-ended position and working more than 30 hours weekly in the traditional labor market. Non-standard employment is defined as individuals whose main status is employment, but other than standard employment in the traditional labor market. This covers temporary workers, part-time workers, and solo self-employed. The *Other* group is composed of retirees, permanently disabled and unemployed, and were merged into one group due to too few observations in each of these groups to treat them individually, but at the same time, they represent a small, although relevant part of the labor platform workforce. They share similar characteristics in that they have all been active on a labor platform, but are inactive in the traditional labor market.

Table 1. Descriptive statistics comparing platform workers and the general employed Danish population, ages 15-74 years

	Platform workers		Employed population, 2019	
	Frequency	Percent	Frequency	Percent
Gender				
Male	47,000	56%	1,522,000	53%
Female	37,000	44%	1,346,000	47%
Ethnicity				
Danish	68,000	81%	2,471,000	86%
Non-Danish	16,000	19%	644,000	14%
Age				
15 – 25	31,000	37%	471,000	16%
26 – 39	25,000	29%	807,000	28%
40 – 74	29,000	34%	1.591,000	55%
Main labor market status				
Standard employment	29,000	34%	2,013,000	70%
Non-standard employment (excl. Student and Other)	18,000	22%	526,000	18%
Student	27,000	32%	256,000	9%
Other (unemployed, retired, disabled)	11,000	13%	74,000	3%
Educational level				
Primary education	26,000	31%	602,000	21%
Upper secondary + vocational training	34,000	40%	1,200,000	42%
Tertiary education	25,000	29%	1,066,000	37%
Annual income				
< 150,000 DKK	37,000	44%	417,000	15%
150,000 - 300,000 DKK	18,000	21%	577,000	20%
> 300,000 DKK	30,000	35%	1,874,000	65%
Observations N (weighted data)	**84,000**		**2,869,000**	

From the results in Table 1, we see that the Danish platform workers are quite similar to the general employed population concerning gender and ethnicity, but vary on other key characteristics. There is also a quite large heterogeneity among platform workers themselves. While platform workers are generally younger and more often students than the employed population, we find a large group of platform workers aged 40 years+. In addition, platform workers are less likely to be in standard employment within the traditional labor market and their total annual income tends to be in the lower end (Table 1). Yet, among the platform workers, one-third are also

standard employed, as defined by their relation to the traditional labor market, and 35% earn more than 300,000 DKK annually, in comparison the Danish median income is ca. 250,000 DKK. In most cases, platform workers are viewed as self-employed, and it is therefore their own responsibility to report earnings from platform work to the public authorities. However, screenings performed by the Danish tax authorities suggest that workers on labor platforms misreport their earnings in 95-99% of the cases (Fink & Ettrup 2019). We therefore regard these platform workers as multiple income earners, since the income from platform work is most likely not a part of their registered income and therefore not included in the annual income described in Table 1.

Method: Latent class analysis

When we look at the descriptive statistics, our results echo other platform studies (Piasna et al. 2022). However, there are also significant differences among the platform workers, and these differences tend to get lost in quantitative research studies. In studies using variable-centered approaches like regression analysis, focus is often on the relationship between variables in an assumed single population where differences are averaged out (Howard & Hoffman 2018). With such an approach, we would, for example, compare the average platform worker to the average standard-employed on a parameter of interest. However, both qualitative and quantitative platform studies indicate that platform workers are not a single population. We therefore argue for the use of a person-centered approach, where instead of comparing averages, we turn to differences within the population (Howard & Hoffman 2018). A person-centered approach is useful to determine if different subgroups of platform workers exist, and to describe the differences among them according to given characteristics.

In this case, we use LCA as a method to identify subgroups based on distinct labor market characteristics. LCA is a latent variable model, which means that it presupposes a latent, unobserved variable that is estimated through observed indicator variables (Collins & Lanza 2009). In LCA, both the latent variable and the indicator variables are treated as categorical, as opposed to cluster analysis that takes continuous variables as input. LCA uses maximum likelihood estimation to assign

individuals to classes based on their response patterns on the observed variables. In other words, we estimate the probability function that is most likely to have caused the response patterns we observe in our data. All data-work was done in Stata, and we implemented LCA using the Stata Plugin developed by Lanza et al. (2018).

LCA has been applied in different ways to derive labor market groupings. Van Aerden et al. (2014) used LCA to develop a typology of employment arrangements in the European Labor Force, and both Yoon & Chung (2016) as well as Lukac et al. (2019) have measured segmentation patterns in the labor market using LCA. While these studies have shown the value of LCA in studying the complexity of labor market segmentation, their focus is entirely on individuals active on the traditional labor market. As several studies have established, digital platform workers are often multiple-jobholders or using platform work to supplement their income from outside the labor market (Schor et al. 2020; Urzi Brancati et al. 2019). In Denmark, recent studies indicate that hardly any individuals have platform work as their main source of income, and the majority of platform workers earn less than 25,000 DKK annually (Ilsøe et al. 2021).

To grasp the hybrid work arrangements that platform workers engage in, we widen our lens from purely labor market characteristics, to focus on more general work-life characteristics. This means that instead of looking at, i.e., wages and occupational class, we include annual income, attained educational level, labor market status, as well as age. We selected these variables, as they relate to the supply side factors of the labor market, that is, the characteristics of platform workers. Annual income is a central indicator of economic security, which is an important aspect of both multiple jobholding and segmentation literature. Educational level reflects the skill level of the workers, and unlike occupational class that only holds information for the currently employed, educational level is a meaningful measure for both platform workers employed and unemployed in the traditional labor market. We also include primary labor market status, where we distinguish between standard employment and non-standard employment as well as students and others outside the labor market. Lastly, we include age as an important aspect of the work life, since young people in

general are more likely to experience employment instability and shifts. By focusing on the platform workers and the supply side perspective, we also complement the varied literature developing platform typologies based on the demand side, e.g., gig-platforms vs. freelance platforms.

Model selection

We use latent classes as an analytic tool for representing the heterogeneity among platform workers across the dimensions of age, labor market status, educational level, and annual income. This does not mean that the classes found in this model are representative for all individuals in the population, but it allows us to conceptualize different segments of platform workers based on empirical observations.

Each latent class model was run with 100 randomly chosen starting values for the maximum-likelihood estimation. The two and three-latent-class models were clearly identified and converged to the same mathematical solution in 95-100% of the cases. The four and five-latent-class models converged at the same solution in 16% and 8%, respectively, of the cases, indicating under-identification issues, i.e., the information in the data becomes scarce compared to the amount of parameters estimated (Collins & Lanza 2009).

Once identified, there are no clear guidelines in the literature for assessing the best fit of a latent class model (Weller et al. 2020). While there is no agreement on the best way to determine the correct latent class solution, there are some common approaches. The preferred process in most LCA studies is a combination of using information criteria and model interpretability when choosing the optimal solution (Collins & Lanza 2009; Weller et al. 2020). The most commonly used information criterion is the Bayesian Information Criterion (BIC), which is used to assess the relative model fit and where lower values indicate a better solution. When evaluating the different latent-class models, we also referred to model parsimony and interpretability by looking at homogeneity *inside* the classes, and separation *between* the classes (Collins & Lanza 2009). Homogeneity means that the item-response probabilities are relatively close to zero or one, indicating intra-class uniformity, as individuals in each group are likely to have the same response-patterns. Latent-class

separation is observed in the way that classes are distinctively characterized by the response probability outcomes, i.e., none of the classes have similar profiles.

Table 2 presents summary information for the various model-fit statistics we used in evaluating and choosing a latent class model.

Table 2. Summary information for choosing latent class model

No. of classes	AIC	BIC	Adj. BIC	L2	d.f.	Entropy sq.	Pct. of seeds associated with best fitted model
1 class	594	629	601	-1629	98	1	100%
2 class	247	321	261	-1446	88	0.85	100%
3 class	**207**	**320**	**228**	**-1416**	**78**	**0.77**	**95%**
4 class	204	355	232	-1404	68	0.81	16%
5 class	196	387	231	-1391	58	0.82	8%

We find that the three-class model represents the best solution in this case, as it has the lowest BIC value of all models. This model also has the highest degree of interpretability while maintaining parsimony, as we observe both homogeneity and clear latent-class separation. While assessing our latent class models, we compared the chosen three-class solution with the two and four latent-class solutions (see appendix). In the two-class solution, we see that the response probabilities in both classes are generally lower than in the three-class solution, indicating a lower degree of homogeneity inside the groups and making them less distinct. We interpret this as the three-class solution adding substantial interpretive power to the analysis. In the four-class solution, we note that two of the classes are very similar on three of our four indicators, showing low class separation. Therefore, we determine that the four-class solution does not add enough extra analytic power weighed up against model parsimony. Summing up, we find that the three-class solution is optimal based both on statistical indicators like the BIC, and on interpretability, and we see three clearly distinct groups of platform workers on the Danish labor market, which we will present in the next section.

2.4 Results: Patterns of hybridity among three classes of platform workers

We will now present the results from the three-latent-class model that we found best represented the patterns of labor market division among the platform workers in our data. Table 3 presents the item response probabilities conditional on latent-class membership for the four indicator variables used in the model. These values can be understood as the probability of an individual in a given class to express a certain characteristic. Based on the included set of variables in the LCA, we have coined the three classes that we find as *New labor market entrants* (younger students), *Established workers* (high-income, full-time employed), and *Transitional workers* (low-income, low employment security); they each represent approximately one-third of the respondents. We will now present each group in more detail.

The *new labor market entrants* are characterized by a high probability of young people aged 25 years or younger (91%) and they are most likely students (77%). This group also tends to have primary education as their highest attained educational level (65%), and their annual income is typically below 150,000 DKK (99%). We have chosen to label this group as *new labor market entrants* primarily due to their age and employment status. These variables indicate that this group are in a phase of their life cycle, where they have just entered the labor market and they will most likely shift labor market position later in their career, as we know that young people tend to be highly mobile (Sloth Laursen et al. 2021). These findings are, however, not surprising, as young people with limited career trajectories tend to be overrepresented among other groups of non-standard workers and thus the so-called periphery segment on the labor market according to much segmentation and platform studies, as well as in line with our expectations (Berg 2016; Healy et al. 2017; Pesole et al. 2018).

The *established workers* are characterized by a high probability of being in standard employment (80%), they are most likely to have an annual income above 300,000 DKK (90%), they are substantially older than the other two classes with a 56% probability of being 40-74 years old, and they have a relatively high probability of

having completed tertiary education (55%). Their relatively high income and employment in permanent, full-time positions as well as their age and educational level points to this class being established on the traditional labor market, which is why we have chosen to label them as *established workers*. This group is perhaps the most surprising to find on digital labor platforms. In traditional labor market segmentation theory, they would likely be considered as part of the core segment, and we could expect that this group is primarily active on high-skilled platforms. This is interesting, and not as expected from the literature, since they seem to be established in a core labor market segment, but they also have one foot in the platform economy, indicating some kind of mobility among this group.

The last class, the *transitional workers*, is not as clearly defined as the previous two classes. While these workers are characterized by some degree of heterogeneity, they do have a substantially higher probability of being in non-standard employment (31%) and having employment status *Other* (32%), which is comprised of different groups outside the labor market (unemployed, pensioners, etc.) compared to the other two classes. They are also very unlikely to have an annual income above 300,000 DKK (7%), which distinguishes them very clearly from the established workers. Considering the generally low income and insecure employment often associated with non-standard work, we have chosen to label this class as *transitional workers.* They share a number of features for groups typically belonging to periphery segment characterized by insecure employment, low pay, and non-standard work. In fact, their low income, age, and small probability of being in standard employment indicate that this group, in line with our expectations, is probably closest to how platform workers are often portrayed within the literature. However, we also see some degree of sideways mobility within the periphery segment on the labor market, i.e., between the traditional and the online labor market.

Table 3. LCA results for three-class model

	Established workers	Labor market entrants	Transitional workers
Latent class prevalence	0.36	0.30	0.34
Item responses	Response probabilities conditional on class		
Age			
15 – 25	0.05	0.91	0.22
26 – 39	0.39	0.00	0.44
40 – 74	0.56	0.09	0.34
Labor market status			
Standard employment	0.80	0.03	0.12
Non-standard employment	0.14	0.19	0.31
Student	0.00	0.77	0.25
Other (unemployed, retired, disabled)	0.05	0.00	0.32
Educational level			
Primary education	0.13	0.65	0.34
Upper secondary + vocational training	0.32	0.34	0.42
Tertiary education	0.55	0.01	0.25
Annual income			
< 150,000 DKK	0.00	0.99	0.51
150,000 - 300,000 DKK	0.09	0.00	0.42
> 300,000 DKK	0.90	0.01	0.07

To check the internal validity of our results, we have calculated the average latent class posterior probability (Weller et al. 2020). This is a way to assess the latent class model's risk of misclassification of individuals between classes. There is no standard for what is considered ideal values, but an average closer to one indicates high certainty of class membership. Some researchers have suggested using values above 0.8 as an acceptable cut-off (Weller et al. 2020). The results from our calculations are portrayed in Table 4. Here, we see that the individuals who are classified as *established workers* have on average a 94% probability of belonging to this class, and a 6% probability of belonging to the *transitional workers*. Interestingly, there is no overlap between the *established workers* and the *labor market entrants*. These two classes are very clearly distinct. It is only the *transitional workers* where there is, on average, a small probability of belonging to either of the other two classes.

Table 4. Average latent class posterior probability

	Established workers	Labor market entrants	Transitional workers
Established workers	**0.94**	0.00	0.06
Labor market entrants	0.00	**0.90**	0.10
Transitional workers	0.05	0.09	**0.86**

These findings support our understanding of this class as *transitional* workers; in some aspects, a few of them may resemble the new labor market entrants, and a few may be a bit closer to the established workers. However, overall, the average latent class posterior probabilities in our model are close to one indicating a low classification error.

Additionally in furthering our understanding of the three groups, we have also examined their gender and ethnicity composition, as these are commonly used indicators in both platform and labor market studies. Table 5 depicts the proportion of individuals in each latent class who are respectively male and of Danish ethnicity. Here, we see that the established workers are predominantly men and of Danish ethnicity, while among the transitional workers, only two-thirds are of Danish ethnicity. The new labor market entrants is the only class with a majority of women. As such, we see some very clear gender and ethnic differences among our three classes that resemble what we may have expected from the literature. Women and ethnic minorities are often reported as being more vulnerable with higher risks of low income and employment instability (Fiadzo et al. 2020). This corresponds well with our findings, where especially the transitional workers have a substantially higher degree of non-Danish ethnicity. These results support the claim that our latent-class model is able to distinguish labor divisions among platform workers.

Table 5. Gender and ethnicity

	Established workers	Labor market entrants	Transitional workers
Male	0.69	0.39	0.57
Danish ethnicity	0.91	0.81	0.67

2.5 Discussion and conclusion

Most platform studies examine the platform economy often with limited consideration for the wider labor market and welfare setting and may thus overlook important aspects influencing individual platform workers' situation (Vallas & Schor 2020). The research aim of this paper has been to contribute to the growing body of literature on platform work by exploring the typical patterns of individuals combining activities in the online and the traditional labor market. Drawing on the notion within much segmentation theory of a dichotomized labor market comprised of a core and periphery segment, we expected platform workers to belong primarily to a periphery labor market segment. Supplementing this perspective, we introduced MJH theory leading to the assumption that there would be some variation among the platform workers due to multiple drivers of mobility. To explore empirically these assumptions, we draw on two large-scale representative cross-sectional surveys and apply LCA to uncover such potential patterns of segmentation. Three main aspects are emphasized in our discussion of our results and the used method.

Methodologically, recent studies have increasingly applied LCA to explore segmentation as a multidimensional phenomenon (Lukac et al. 2019; Seo 2021; Yoon & Chung 2016). Inspired by this work, we apply LCA to explore the often-dichotomized view of the labor market into core and periphery labor markets as well as uncover patterns of segmentation at the nexus of the online and traditional labor markets. LCA thus provides useful insights in our case, as it is designed for determining heterogeneous response patterns across different indicators (Collins & Lanza 2009). This allows us to identify commonalities between individuals, and differences between groups in large datasets. We find that this sensitivity toward heterogeneity is important for understanding platform workers as a more complex group than just yet another group of periphery or non-standard workers. Nonetheless, it should be mentioned that LCA is a data-reduction method, and so, there will be finer differences among platform workers that we cannot capture with this method; however, we still find LCA to be a valuable heuristic tool for generalizing different types of platform workers.

Novel typologies for capturing the heterogeneity among platform workers

The results from our analysis demonstrate marked differences among platform workers with varying blends of hybridity than often assumed in much platform and segmentation literature (Jesnes 2019; Schor et al. 2020; Vallas & Kalleberg 2020). We identify three clearly distinct groups of platform workers that we categorize as 'established workers', 'transitional workers', and 'new labor market entrants', respectively. The group labeled *established workers* are characterized by combining platform work with often high-skilled and well-paid full-time permanent jobs in the conventional labor market. They also tend to be middle-aged men of Danish origin and thus share many of the features often considered as core workers in much platform and segmentation literature (Atkinson 1987; Berg 2016; Rubery 2015). Although these groups could be expected to be primarily active on high skilled labor platforms, the presence of a large group of established workers on the Danish labor market engaging in platform work is interesting, notably due to the broad assumptions within the literature, which we also expressed. Platform work is often considered just another layer of a periphery segment within the labor market, which our findings question as we find online activities even among high skilled and well-paid workers (Jesnes 2019; Vallas & Kalleberg 2020). There are some limitations to have in mind when interpreting these results. The analysis is based on a relatively small, but representative sample of platform workers surveyed in 2017 and 2019. The sample size of our population of platform workers reduces the granularity with which we can describe the three classes, and there may be internal differences that our model does not capture. Likewise, the platform economy is flexible by nature and the relative sizes of the different types of platform workers may thus change over time.

The two groups---*transitional workers* and *new labor market entrants*---differ from the *established workers* on several parameters and they share similar features with the groups that are often overrepresented in the so-called periphery labor market segment (Atkinson 1987; Healy et al. 2017). Platform workers belonging to the group of *new labor market entrants* are typically young people and students with few educational credentials and low income, typically in the form of student allowances

or student jobs in the traditional labor market. Unlike new labor market entrants, the group of *transitional workers* appear more heterogeneous, but with a higher degree of platform workers that are aged 25+ years with low paid non-standard jobs or without a job in the traditional labor market. These findings suggest that while the new labor market entrants may be in a phase of their career, where they are most likely to shift labor market position, this may only apply to some within the group of transitional workers. Unemployed, retirees, and other groups outside the labor force are overrepresented among this group, and for some, platform work could appear to be a stepping-stone into paid employment, while others may experience the vicious circle of combining distinct forms of low paid non-standard work across different periphery segments, i.e., the online and traditional labor market. The presence of both groups of *labor market entrants* and *transitional workers* is in line with expectations from the literature. In further research, it could be interesting to explore the differences between distinct groups often operating on the outskirt of the labor market such as the unemployed looking for labor market re-entry and other groups such as retirees not necessarily seeking to re-enter, but primarily seeking to exit slowly the labor market. Such analyses may display important differences as to these individual groups' motives to engage in platform work as well as the role of platform work for their employability in the traditional labor market.

It has been suggested that platform work holds the potential for individuals to bridge segments and it could potentially lead to upward mobility for some groups, as it offers a leeway into the labor market (Healy et al. 2017). This is supported by the fact that the three groups identified within our data question the common notion of limited mobility between segments within much segmentation literature (Rubery & Piasna 2017). We identify examples of individuals active across distinct core and periphery segments where some combine platform work with a relatively high income and standard employment in the traditional labor market. Others combine mainly low paid and non-standard jobs in both the online and traditional labor market and thus appear to be shifting sideways between distinct periphery segments on the labor market. Therefore, we see a slightly different form of mobility than what is usually considered within much segmentation and MHJ literature (Grimshaw et al.

2017; Hirsch 2016). This calls for further research into the career trajectories of these groups. It seems especially pertinent to understand how they develop over time. Do we see certain 'recruitment paths' into platform work for the different groups, and how do their labor market experiences outside the platform develop over time? The existence of three distinct groups of platform workers suggests that labor platforms are associated with a higher degree of mobility, but we need to apply a longitudinal employment perspective to understand these dynamics genuinely.

Interlinkages between platform work and the traditional labor market

Our analysis illustrates the important, but often underestimated role of the wider traditional labor market and welfare setting when analyzing the platform economy (Schor et al. 2020). In Denmark, most platform workers combine their online activities with alternative income, typical paid work in the traditional labor market, findings that corroborate with other comparative research (Pesole et al. 2018; Sloth Laursen et al. 2021). In fact, our results also indicate that divisions in the traditional labor market are important when analyzing the platform economy and trying to understand platform workers. Labor market segmentation theory is usually applied in a dichotomous way with a sharp demarcation between periphery and core with limited mobility between the segments, and most of the literature on platform workers can be argued to consider them as part of the periphery (Atkinson et al. 1987; Vallas & Kalleberg 2020). By widening the analysis of platform workers to include the different types of hybrid work they engage in, we find a more nuanced view of individuals on labor platforms. Our analyses point to distinct segments of workers with different labor market positions, where some groups, especially those belonging to the category of *established workers*, appear more protected against the associated risks of low pay, uncertain hours, and job insecurities when operating in the less regulated online labor market. Their often well-paid and high skilled permanent jobs in the traditional labor market offer a sort of buffer against such insecurities, while their peers combining platform work with non-standard employment or other income sources like unemployment benefits in the traditional labor market appear less protected. They may not only struggle to qualify for social protection, but they also risk to exhaust their rights due to the various eligibility

criteria often associated with social benefits, aspects that are also emphasized in other studies on platform work, MJH, and non-standard work (Conen et al. 2021; Hotvedt et al 2020; Thelen et al. 2018). Therefore, the interlinkages between the online and traditional labor market, notably the variations in the hybridity and blends of mobility among platform workers, may have crucial implications for policy development and call for further studies that systematically engage with the dynamics between the digital platform economy and the wider traditional labor market and welfare setting.

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Appendix

A1. Latent class model with two classes

	Class 1	Class 2
Class membership	0.57	0.43
Item responses	Response probabilities conditional on class	
Age		
15 - 25	0.60	0.05
26 - 39	0.21	0.41
40 - 74	0.19	0.54
Employment status		
Standard employment	0.05	0.73
Non-standard employment	0.25	0.17
Student	0.54	0.01
Other	0.15	0.09
Educational level		
Primary education	0.43	0.14
Upper secondary + vocational training	0.44	0.34
Tertiary education	0.12	0.52
Annual income		
< 150,000 DKK	0.75	0.02
150,000 - 300,000 DKK	0.23	0.19
> 300,000 DKK	0.02	0.79

A2. Latent class model with four classes

	Class 1	Class 2	Class 3	Class 4
Class membership	0.28	0.37	0.18	0.18
Item responses	Response probabilities conditional on class			
Age				
15 - 25	0.11	0.05	0.91	0.85
26 - 39	0.53	0.39	0	0.01
40 - 74	0.36	0.56	0.09	0.13
Employment status				
Standard employment	0.12	0.80	0.03	0.07
Non-standard employment	0.30	0.14	0.11	0.33
Student	0.23	0.00	0.85	0.55
Other	0.35	0.05	0.01	0.05
Educational level				
Primary education	0.40	0.13	0.81	0.01
Upper secondary + vocational training	0.35	0.32	0.19	0.84
Tertiary education	0.25	0.55	0	0.14
Annual income				
< 150,000 DKK	0.52	0.00	1	0.64
150,000 - 300,000 DKK	0.42	0.10	0	0.33
> 300,000 DKK	0.06	0.90	0.00	0.03

Chapter 3

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

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Chapter 3: Agency in platform work and multiple jobholding from a labor market risk perspective

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.

3.1 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.

3.2 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.

3.3 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* (AMRUN). 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

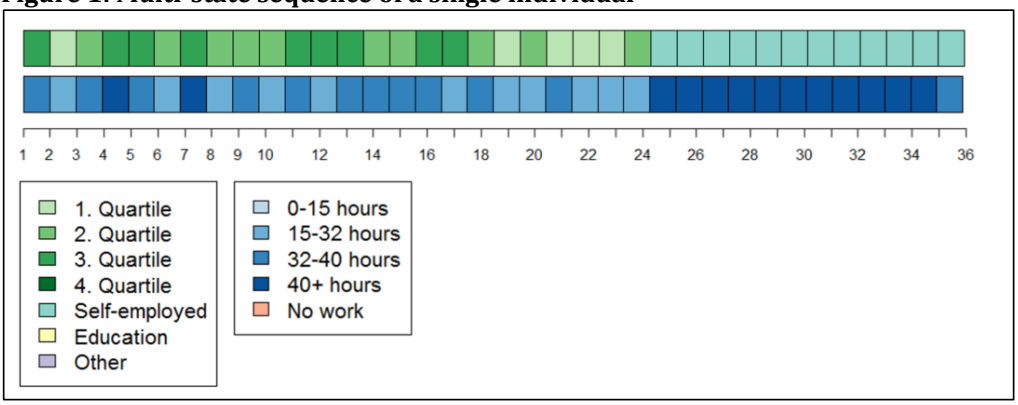
We will now present the methods we use to analyze our survey and register data. We start by introducing multi-state sequence analysis, which we use to operationalize the labor market biographies of multiple jobholders. The goal here is to explore differences in the labor market trajectories of those 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.

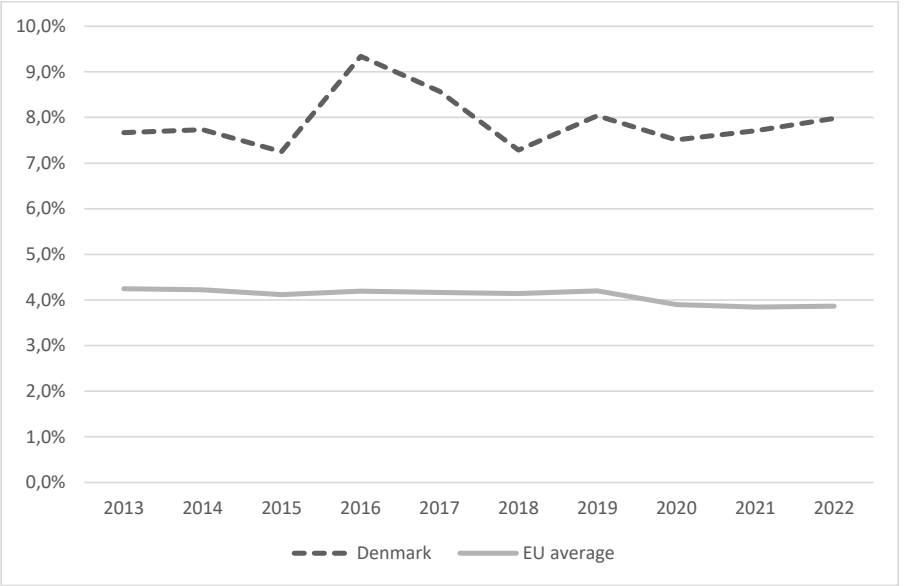
3.4 Analysis

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/descendant	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

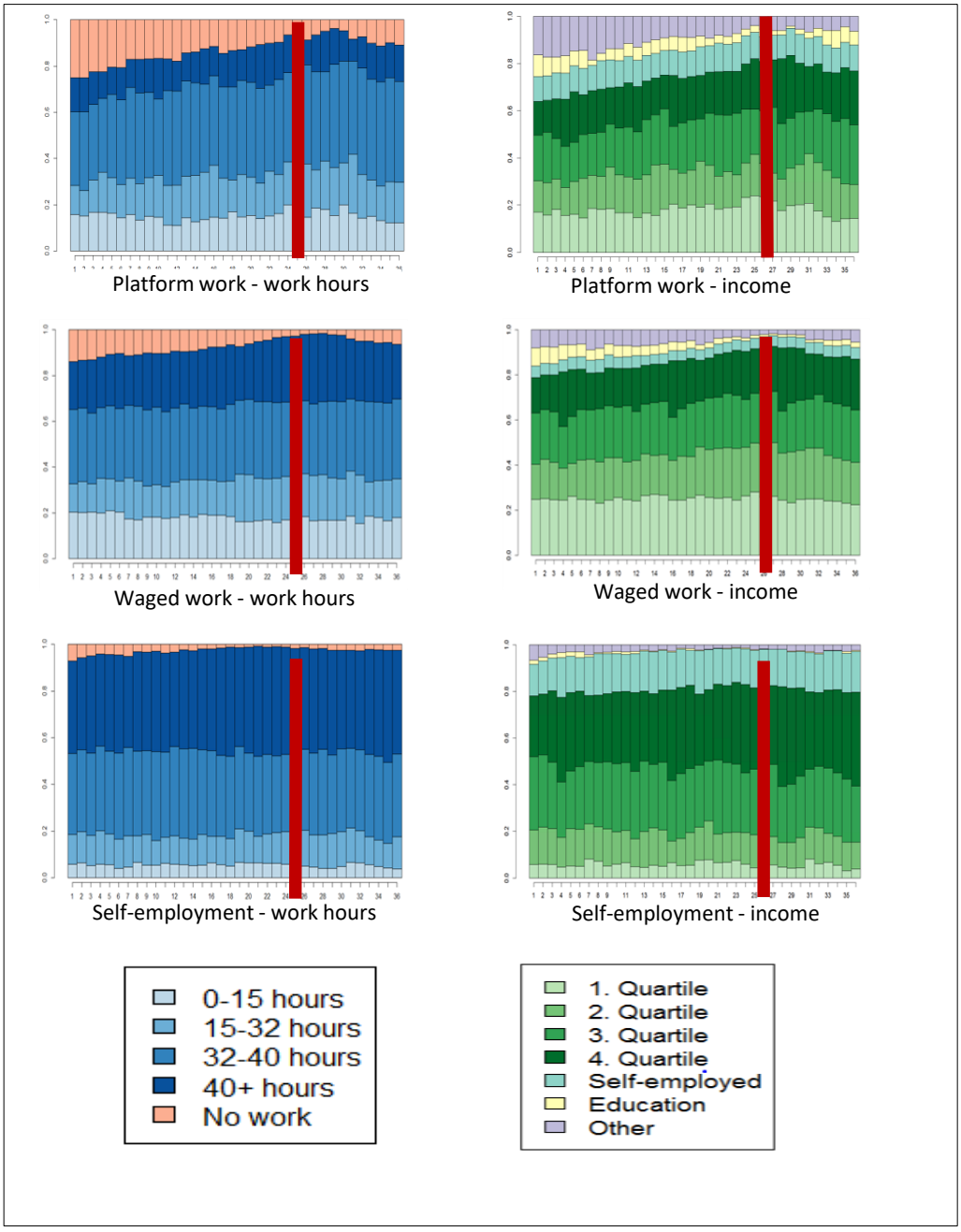
workers, and 17% are clerical support, service or sales workers (table 1). We further find that this group of multiple jobholders are likely to work within Danish manufacturing, construction and less so in private services than the other multiple jobholder groups (table 1). These findings are indicative 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.

3.5 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.

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Appendix

Figure A1: Density plots for the five-cluster solution

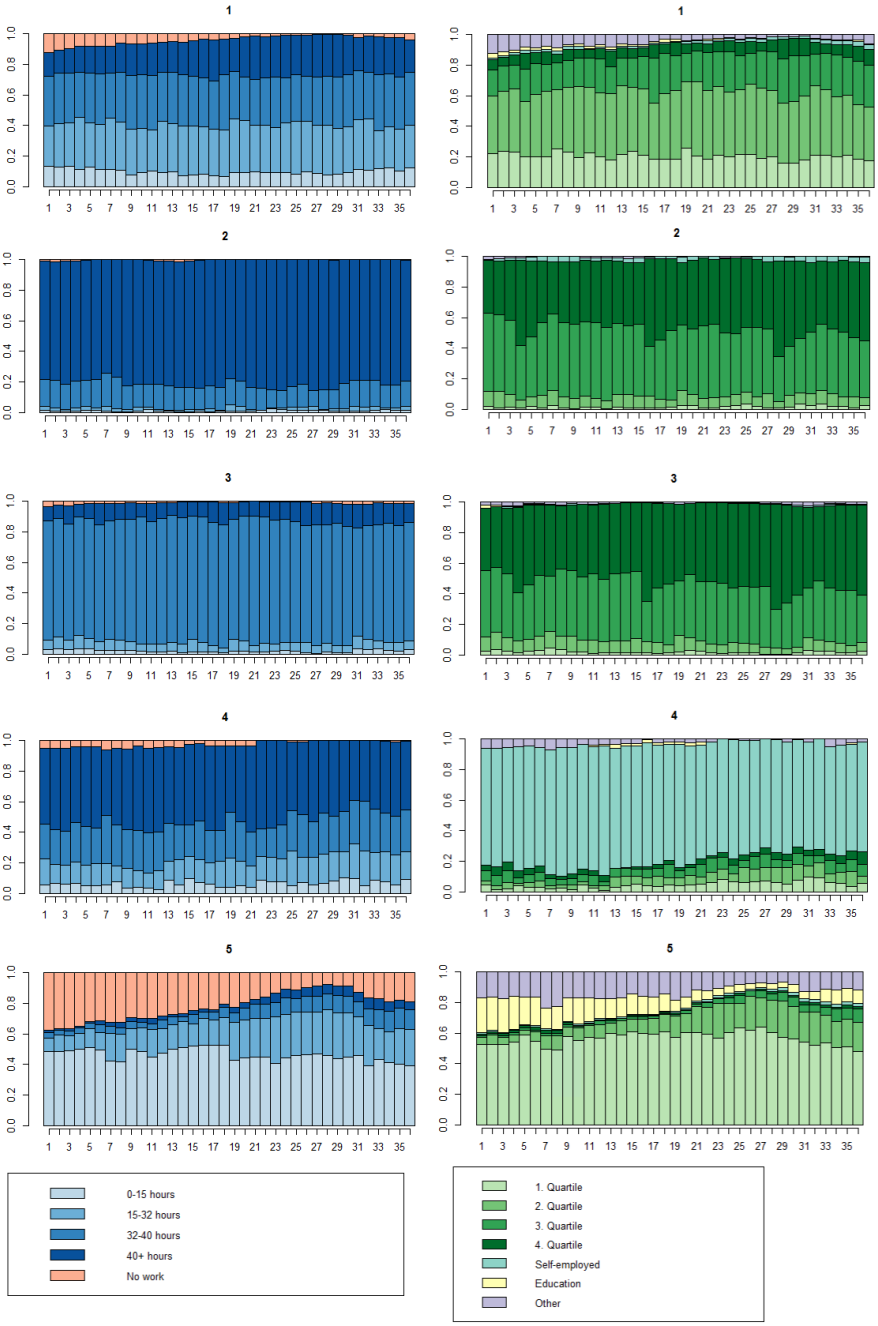


Figure A2: Cluster indicators

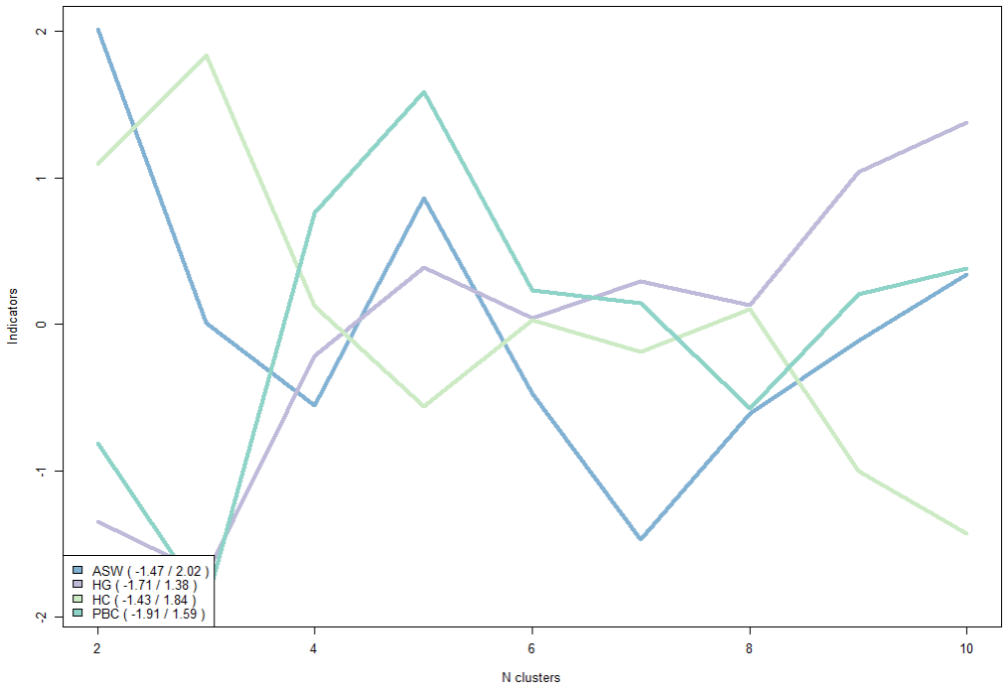
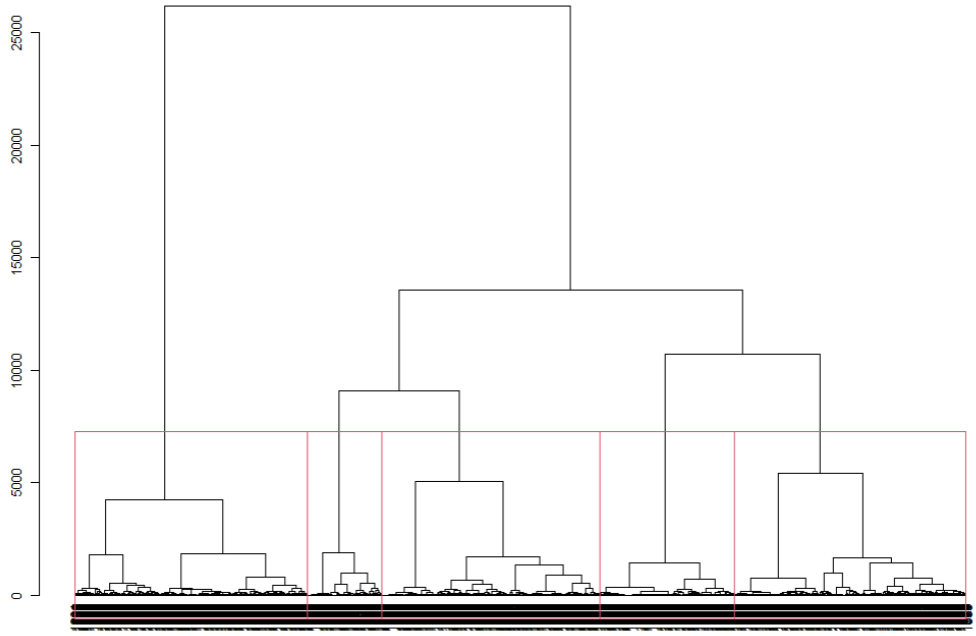


Figure A3: Dendrogram



Chapter 4

The flexible platform firm: Segmentation of working time in the gig economy

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Chapter 4: The flexible platform firm: Segmentation of working time in the gig economy

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

4.1 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.

4.2 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).

4.3 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).

4.4 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 earnings 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)

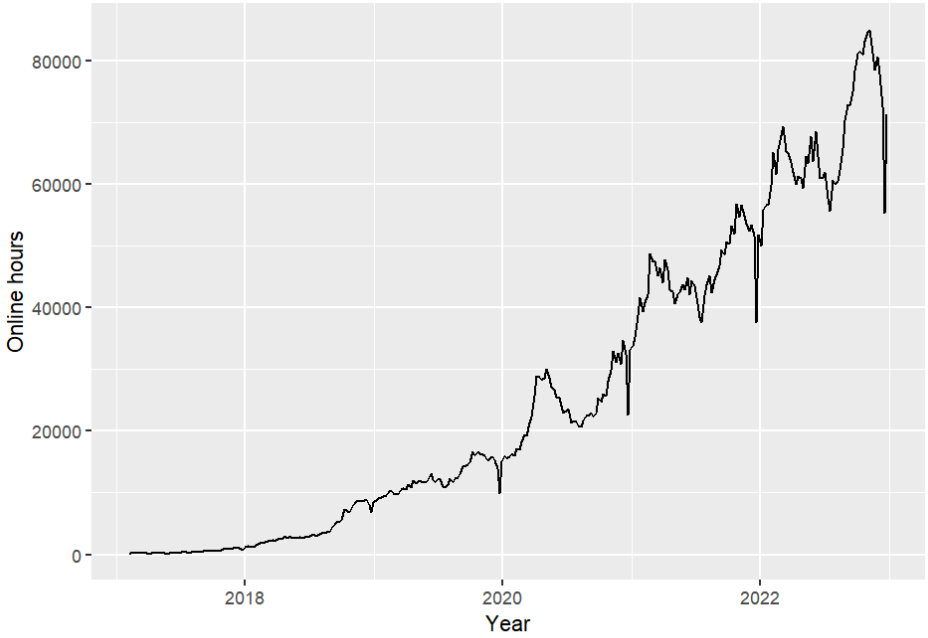

Figure 1 illustrates that the online hours on the platform increased significantly from March 2020 onwards. This trend likely relates to a heightened demand for food deliveries, indicating platform expansion. The increase occurred during a period characterised by the COVID-19 pandemic hitting most European 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.

4.5 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)

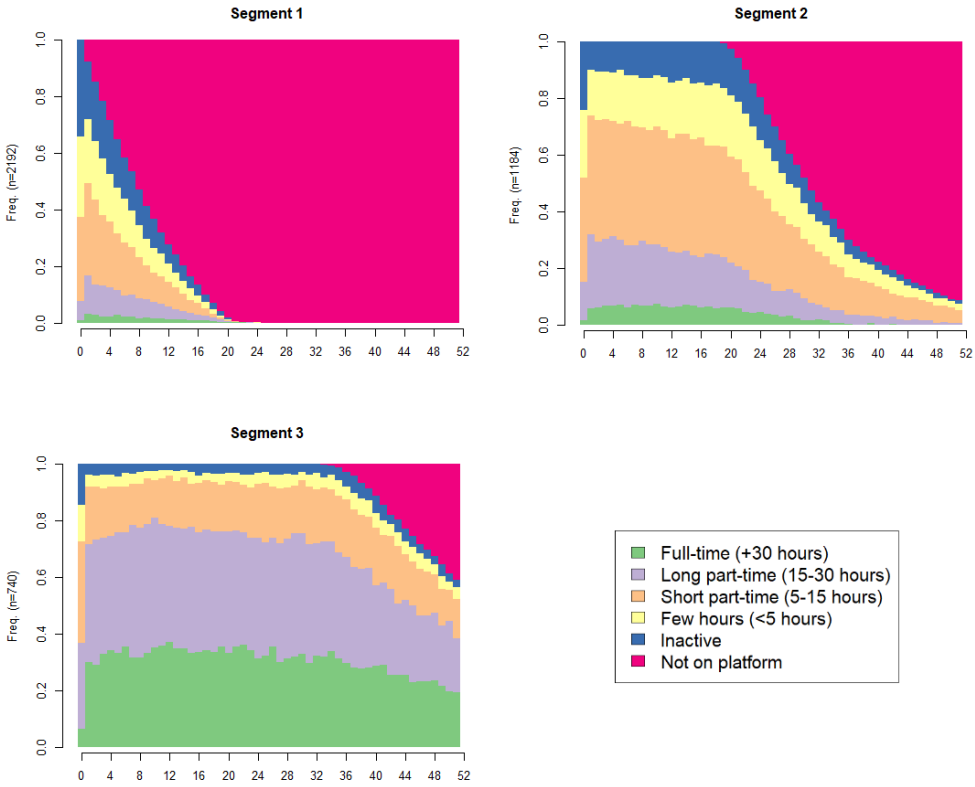

Figure 2 plots the segments based on their weekly distribution of working time states (i.e., weekly online hours). The colour scheme displays different patterns of working time activity, where the y-axis plots the activity distribution in all trajectories, while the working time states of the trajectories 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.

4.6 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).

4.7 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 research 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).

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Appendix

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

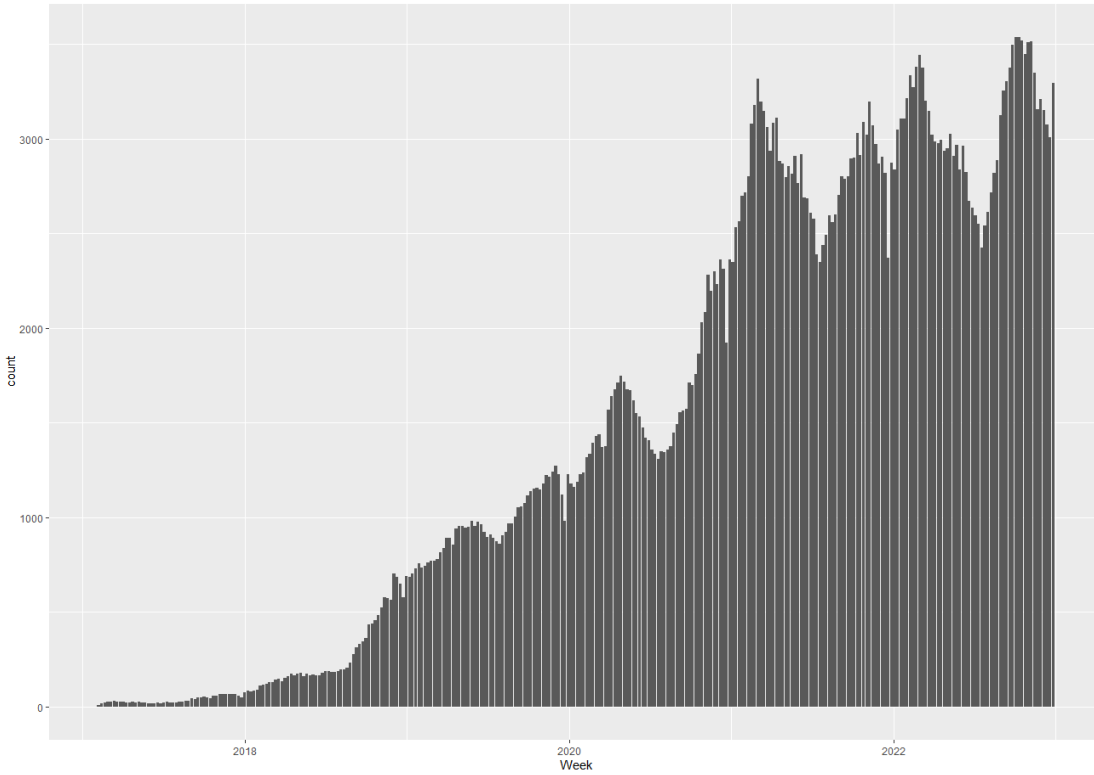


Figure A2. Full sequence of individual working time trajectories 2017-2022 (N = 20090)

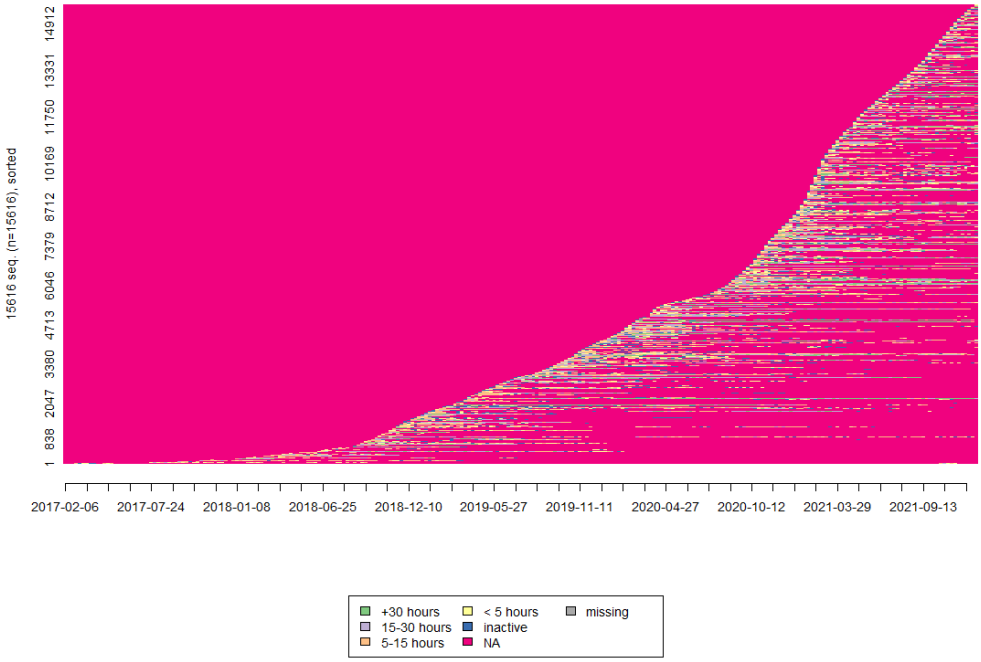


Table A1. Transition probabilities (all sequences 2017-2022)

	[-> fulltime]	[-> parttime]	supl. hours]	[-> few hours]	[-> inactive]	[-> 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

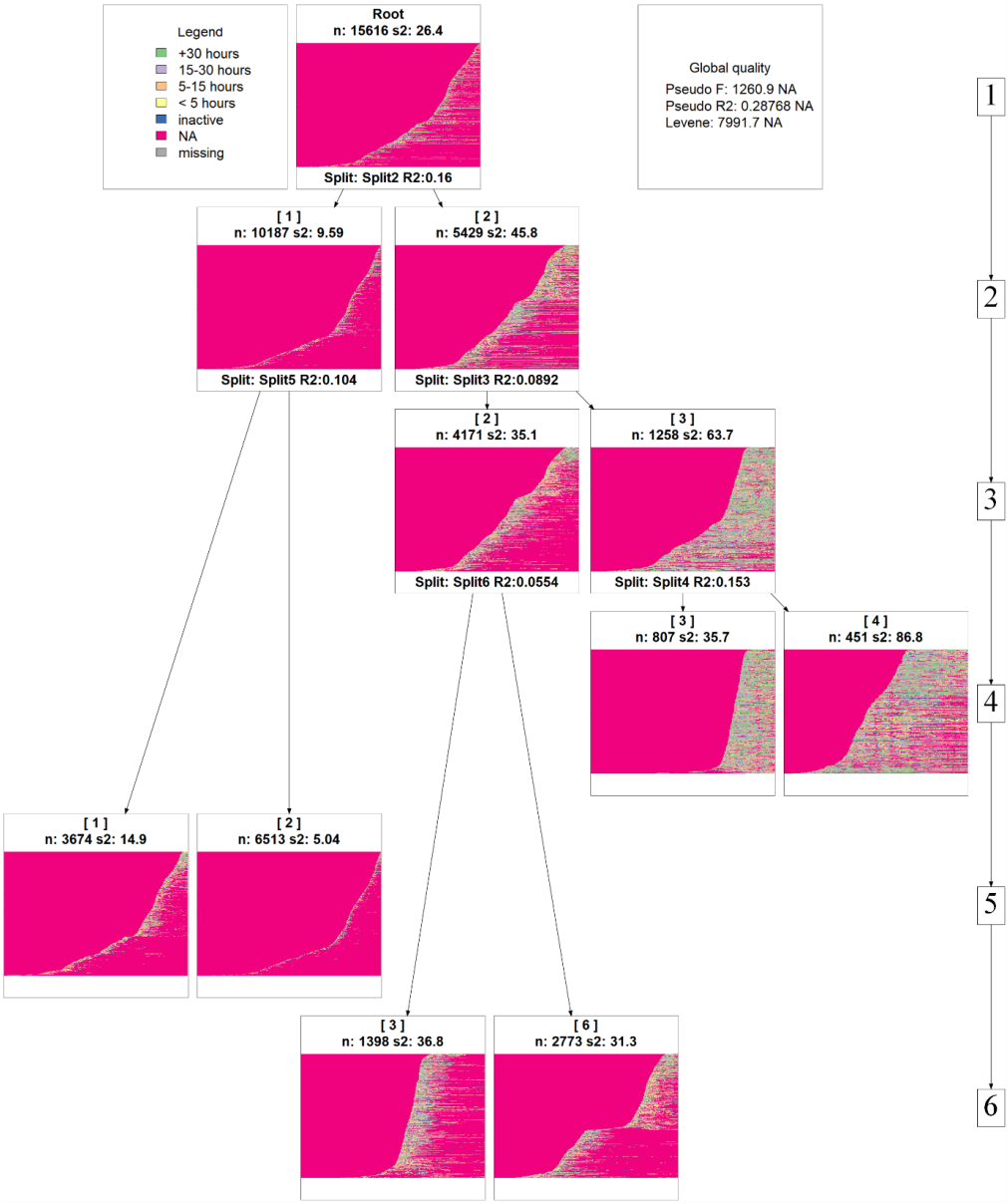


Figure A4. Coherence/minimum gap of different cluster solutions based on Ward's distance. High values = high internal cluster coherence

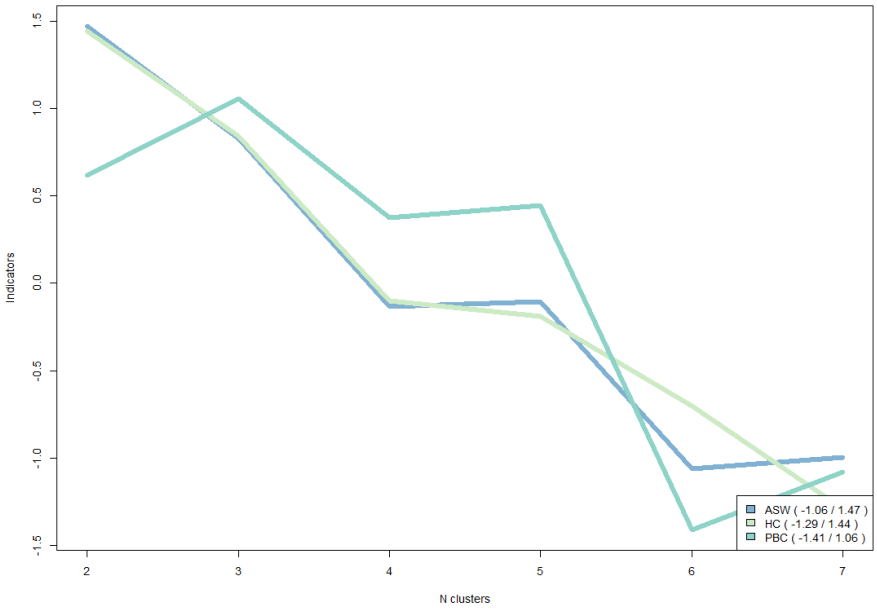


Figure A5. Three clusters with individual working time trajectories (2017, N = 177)

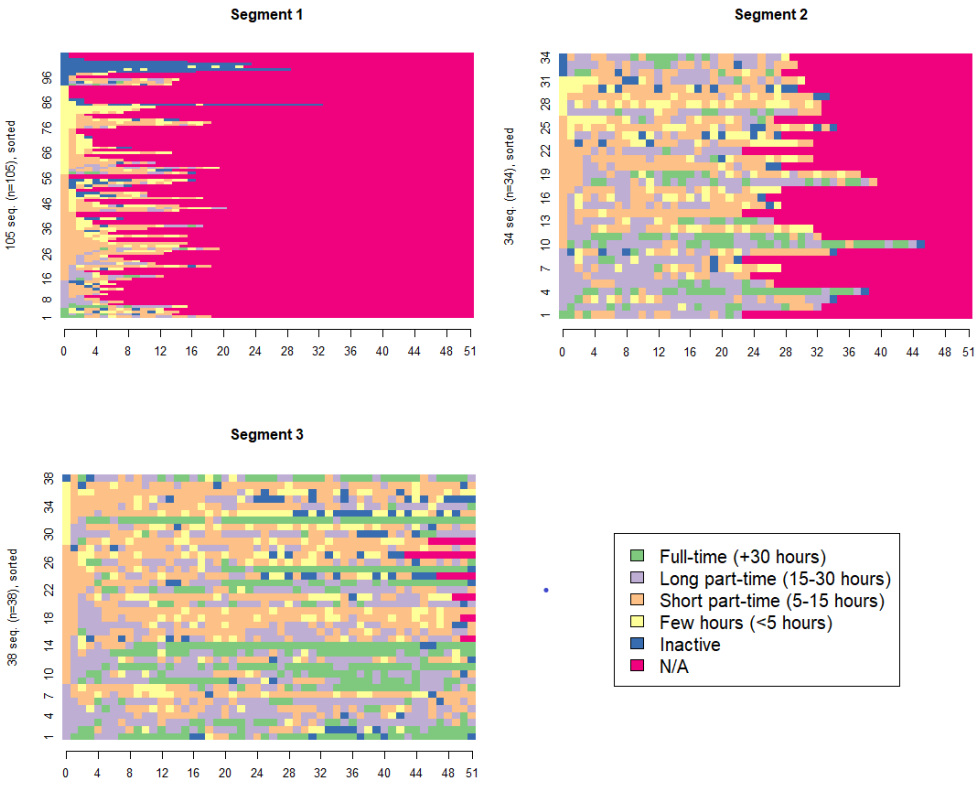


Figure A6. Three clusters with weekly state distributions (2017, N = 177)

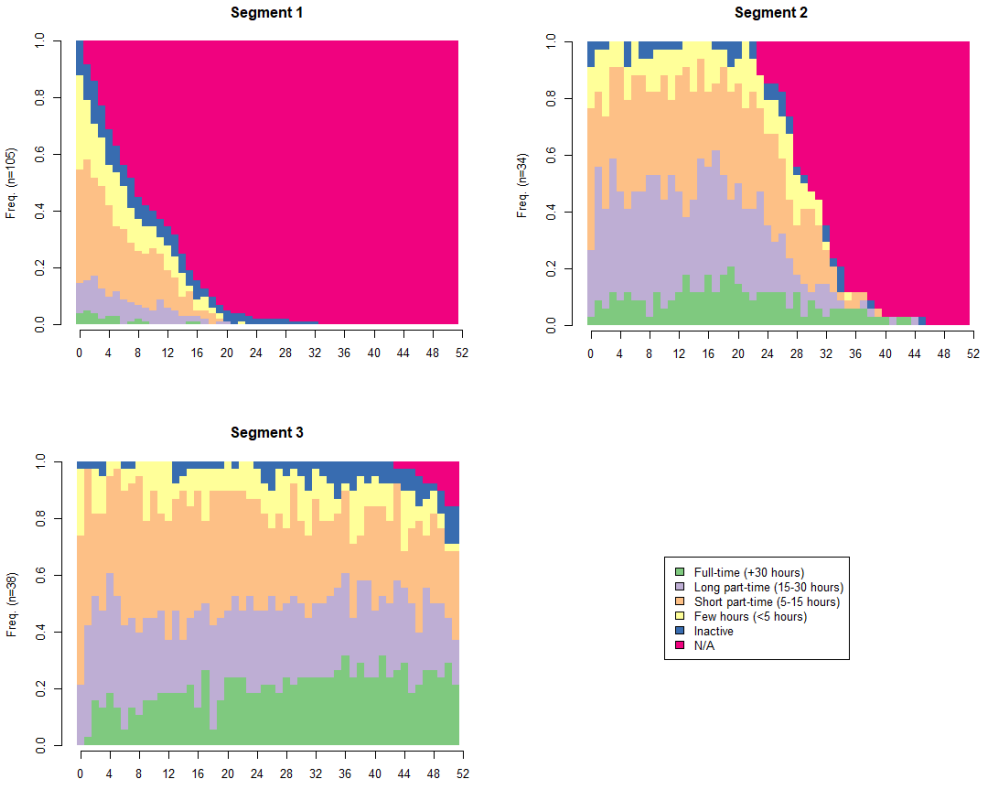


Figure A7. Three clusters with individual working time trajectories (2018, N = 1458)

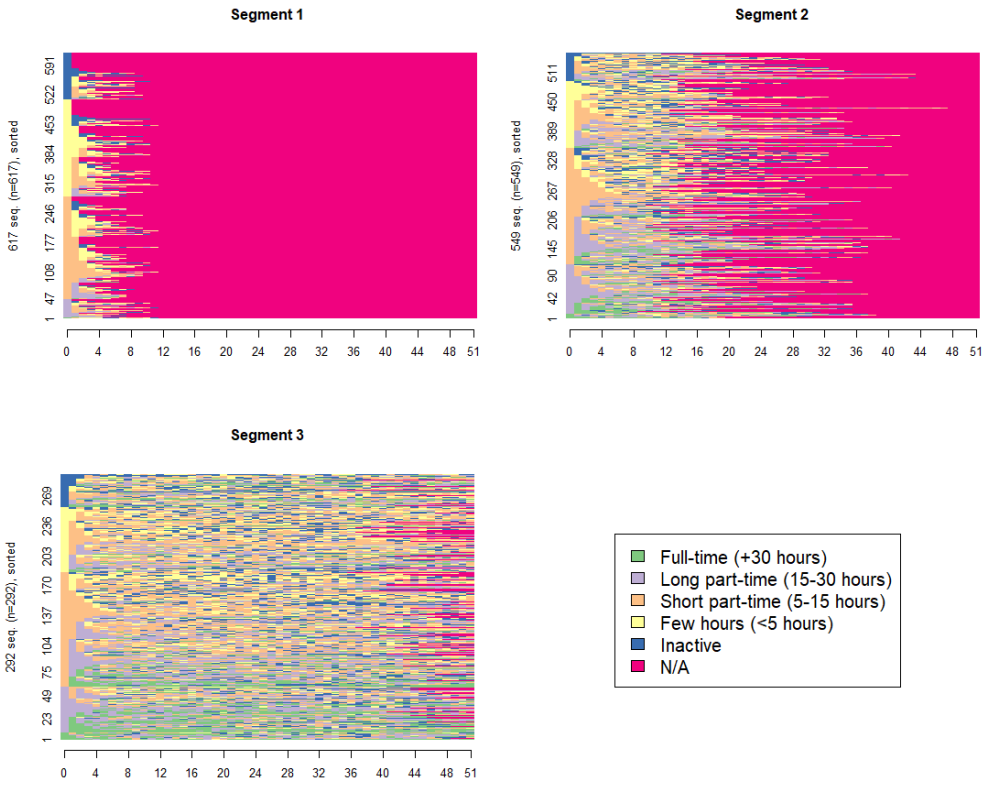
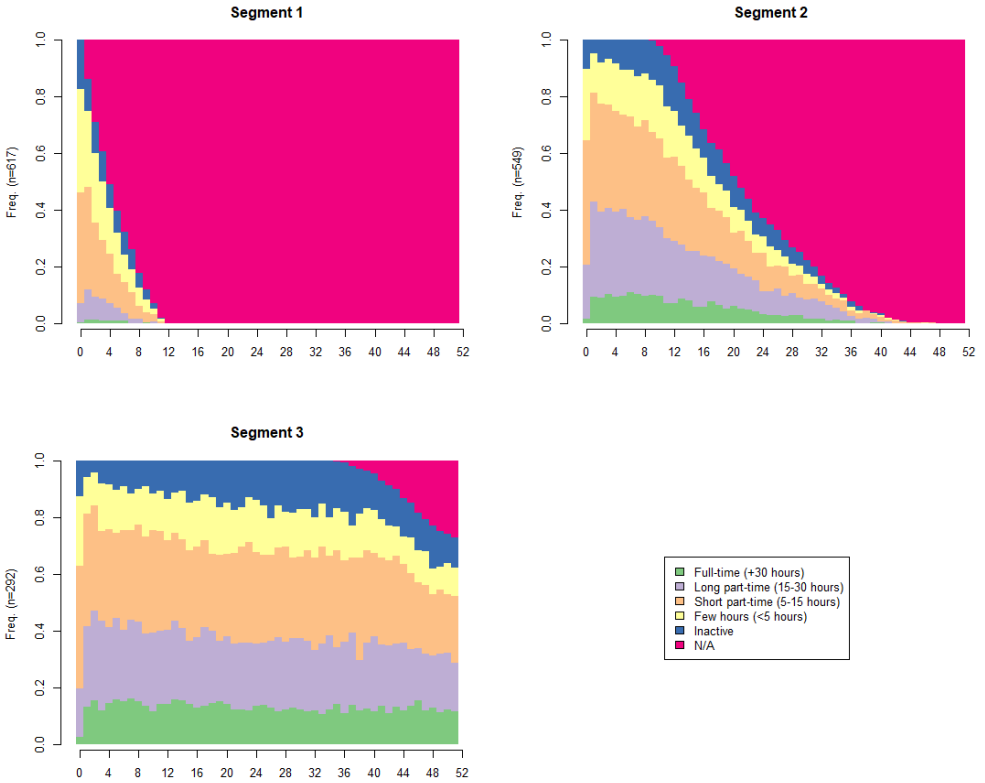


Figure A8. Three clusters with weekly state distributions (2018, N = 1458)



)

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

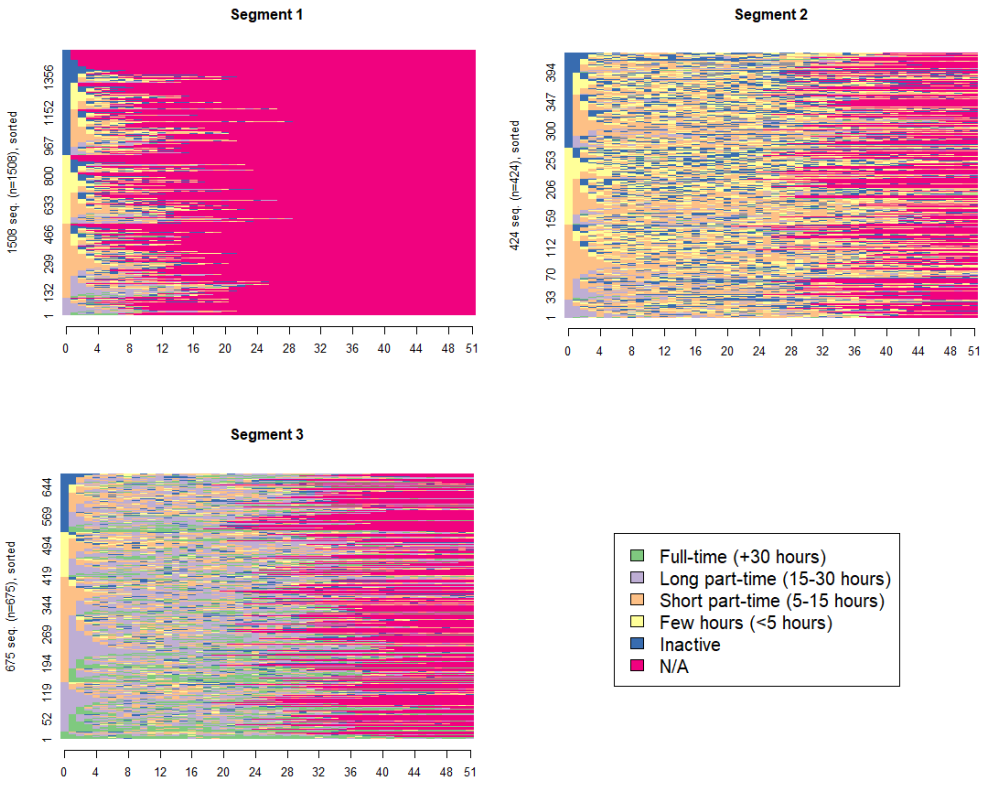


Figure A10. Three clusters with weekly state distributions (2019, N = 2607)

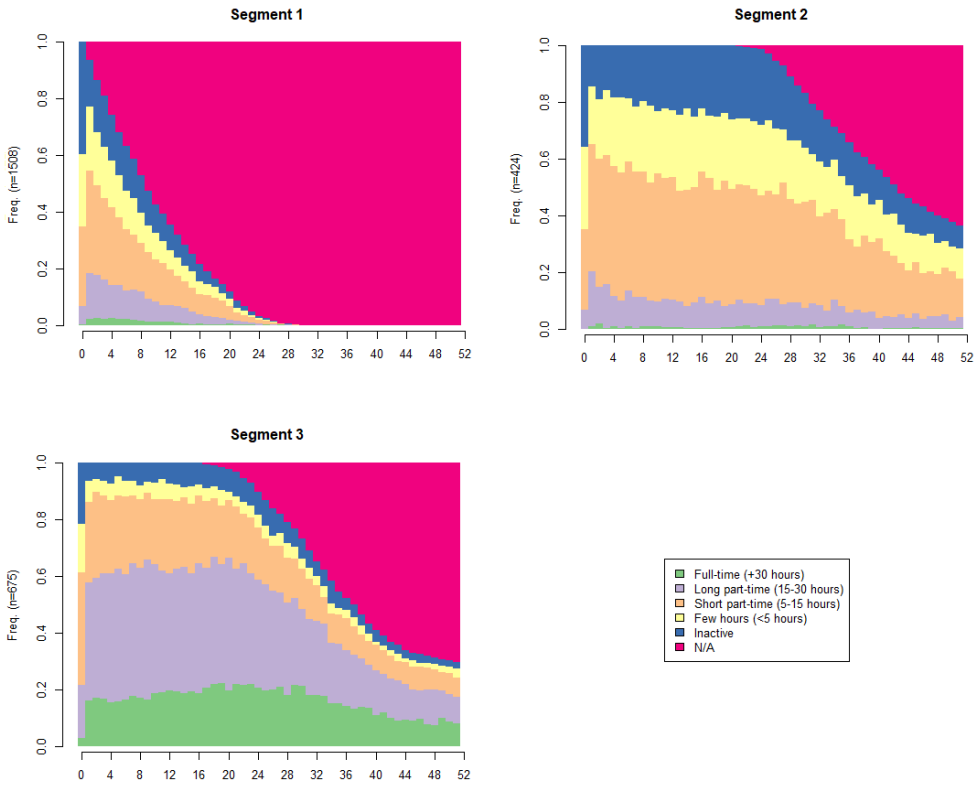


Figure A11. Three clusters with individual working time trajectories (2021, N = 7258)

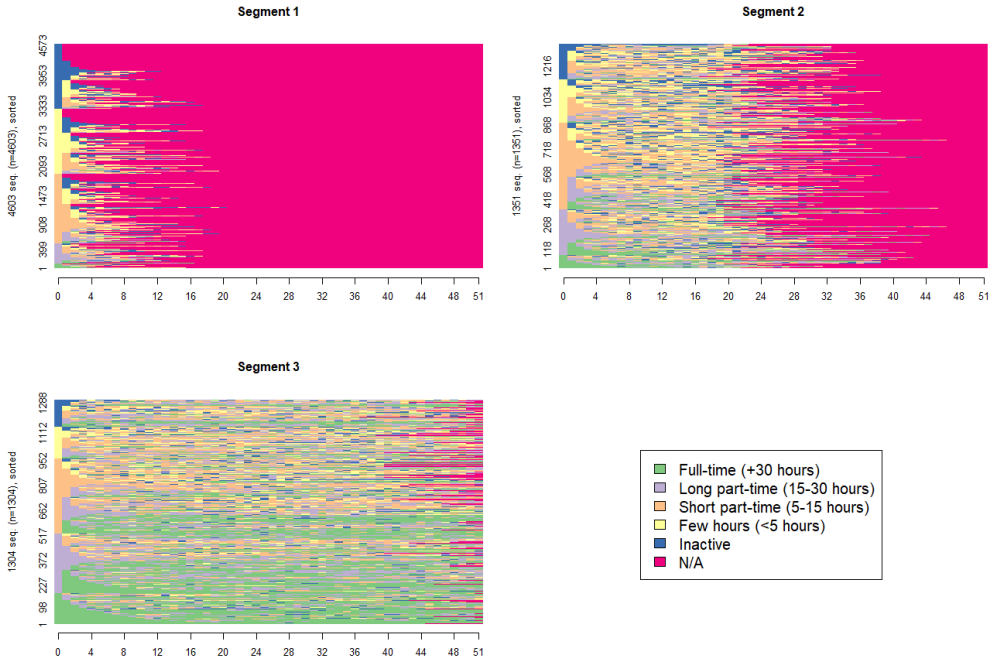


Figure A12. Three clusters with weekly state distributions (2021, N = 7258)

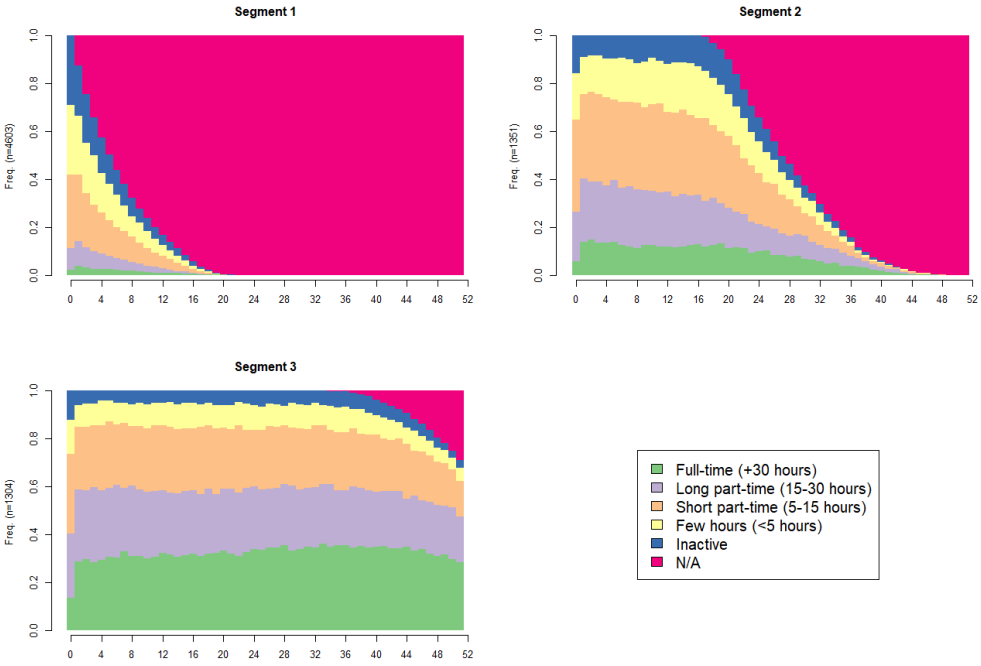
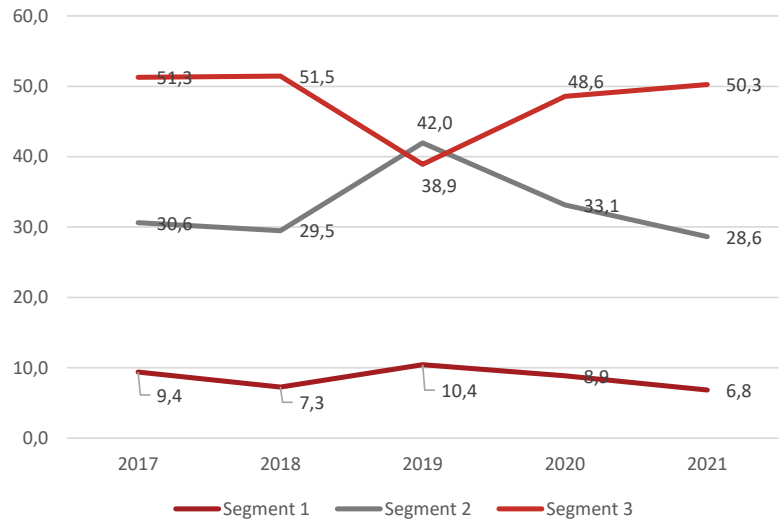
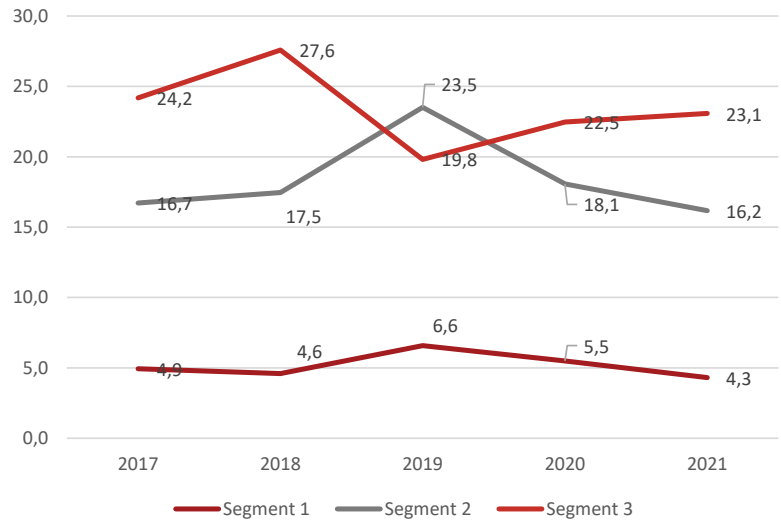


Figure A13. Average number of weeks active on the platform (52 weeks)



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)

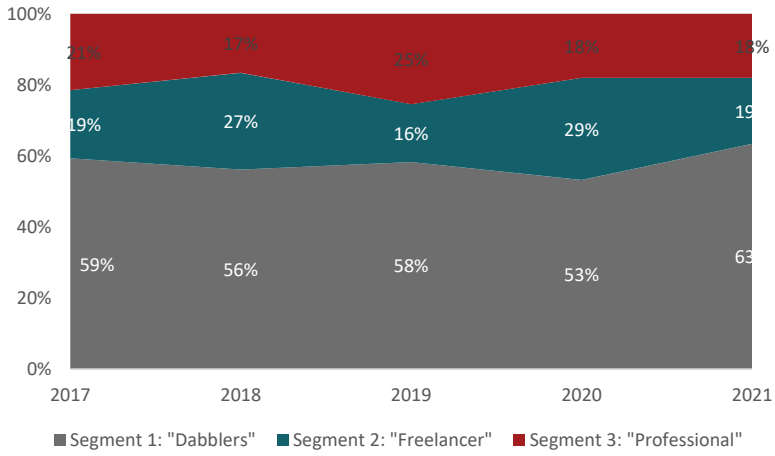


Figure A16. Distribution of total number of online hours (52 weeks)

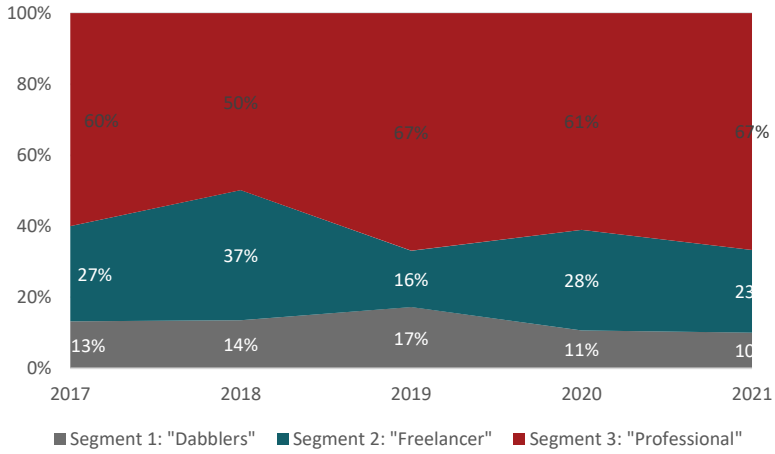


Figure A17. Average state distributions, Segment 1 (52 weeks).

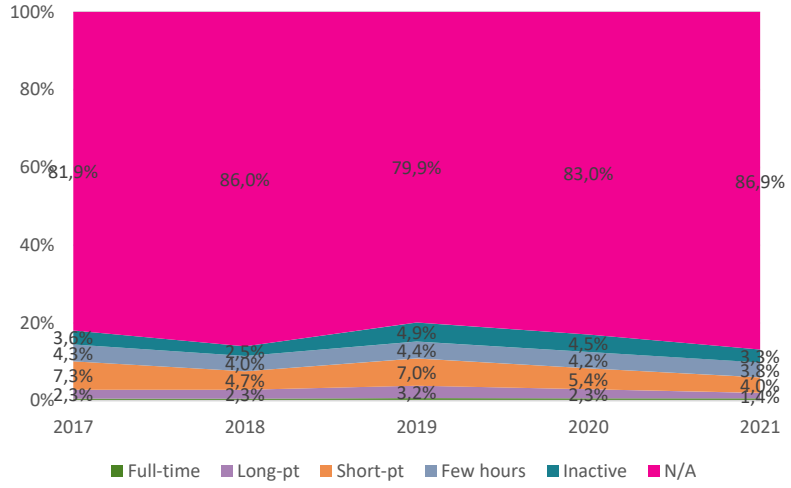


Figure A18. Average state distributions, Segment 2 (52 weeks).

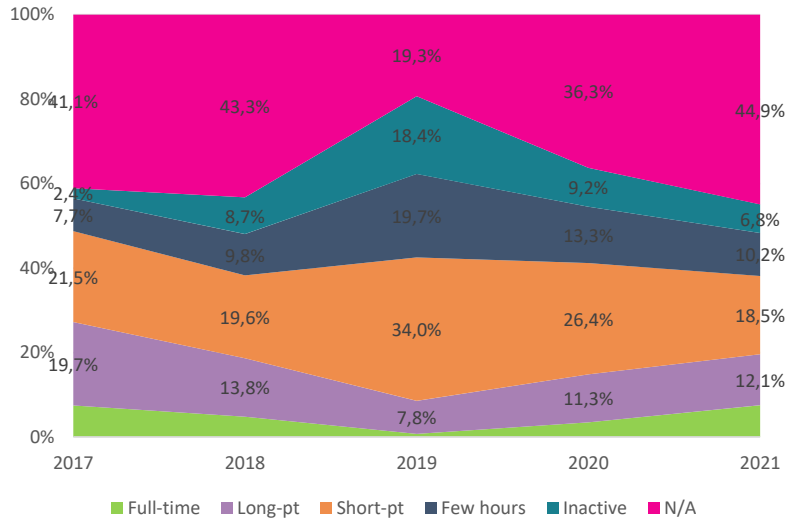
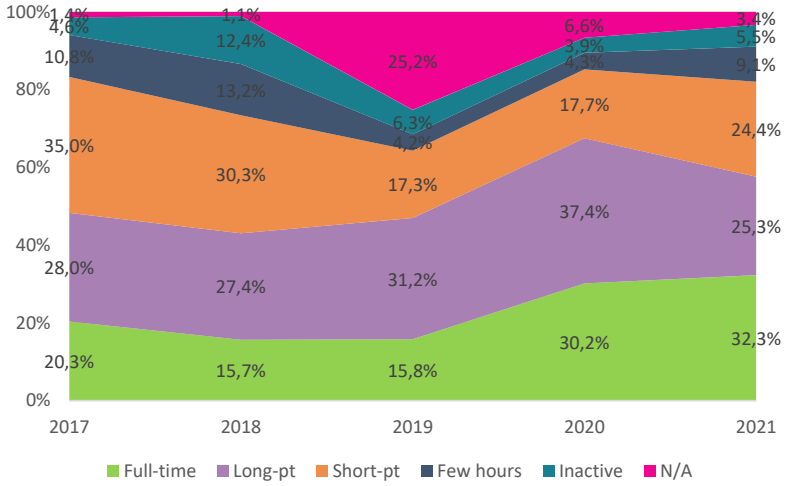


Figure A19. Average state distributions, Segment 3 (52 weeks).



Chapter 5

Consumer Attitudes and Employment Practices in the Gig Economy: Evidence from a Survey Experiment

Author: Jonas Hulgård Kristiansen

Submitted to *Socio-Economic Review*

Chapter 5: Consumer Attitudes and Employment Practices in the Gig Economy: Evidence from a Survey Experiment

Abstract

The role of consumers as key labor market actors is periodically brought up in the industrial relations literature. With the consolidation of digital labor platforms as an integral part of the labor market, attention to consumers has increased. Studies suggest that consumers significantly influence the platform economy, directly and indirectly, e.g., when platforms delegate central management practices to platform consumers, both regarding performance management through ratings and reviews and assigning work. Despite the central role consumers play as initiators and evaluators of platform services, few studies have engaged with how consumers influence employment and management practices along with the working conditions of platform workers. Following a pre-registered study plan, we conducted a forced-choice conjoint survey experiment administered to a representative sample of 3,029 Danish respondents. We sought to answer how attitudes towards working conditions and worker stereotypes potentially influence labor practices in the gig economy and whether differences exist across distinct platform services. Across food-delivery and cleaning platforms, we find that respondents consistently indicate a substantive preference for workers with access to social benefits, while workers' wage levels have a minimal influence on respondents' choices. Secondly, we find significant gender and ethnic biases among respondents on both platforms, and while these biases are moderated by workers' ratings, they persist even for workers with perfect ratings. This study provides novel insights into consumer attitudes and their potential impact on labor practices in the platform economy. In conclusion, we discuss the potential implications of consumer attitudes toward gig workers' rights for policy and further studies.

5.1 Introduction

The scholarly literature on digital labor platforms has grown substantially in recent years, adding significant contributions to our understanding of central elements, i.e., what an online labor platform is, how they function, who the workers are, and what characterizes the working conditions. Here, I define labor platforms as digital intermediaries facilitating the exchange of money for labor and narrow the focus to gig work platforms as a subsection of these platforms that mediate short-term tasks carried out offline (Schor & Attwood-Charles, 2017; Vallas & Schor, 2020). A plethora of studies have investigated the disputes between platform companies using solo self-employed as the primary workforce and workers and unions arguing for employee rights, as well as the consequences of algorithmic management on work experiences (for a review, see Vallas & Schor, 2020). The consumer, on the other hand, often defined as the third central actor in the platform economy, has had considerably less focus in the literature (Healy & Pekarek, 2022). It has been argued that as many platform companies abrogate an employment relationship with platform workers and the employer responsibilities this would entail, they shift central management practices to consumers and workers (Kirchner & Schüssler, 2019). This is evident when consumers are responsible for initiating contact and thus assigning work and performance management through ratings and reviews (Duggan et al., 2020; Kellogg et al., 2020; Meijerink & Keegan, 2019). The critical role consumers play in the platform economy, influencing management practices and the working conditions of platform workers, has led to a call for more focus on the role of consumers of platform services as labor market actors that can resist or reinforce tendencies of precariousness in platform work (Franke & Pulignano, 2021; Pekarek & Healy, 2022).

The role of consumers as labor market actors in the gig economy is especially pertinent in the Danish labor market, as there have been several examples of labor platforms negotiating collective bargaining agreements with trade unions, thus securing employee rights for affiliated workers (Ilsøe & Larsen, 2021; Ilsøe & Söderqvist, 2022). Subsequently, employee rights and working conditions have thus been and still are options that Danish consumers can choose between when buying

services through different platforms. Two of the most high-profile cases of collective bargaining agreements with labor platforms in Denmark were the cleaning platform Hilfr in 2018 and the food delivery platform JustEat in 2021[9]. These agreements presented consumers in Denmark with a choice between different platforms with some workers covered by collective bargaining agreements and others who are not. Food delivery and cleaning platforms are some of the most widespread yet quite different types of gig work, representing an interesting comparative case (Ticona et al., 2018).

In this study, I examine the attitudes consumers display towards workers on gig-work platforms and the relative importance of the factors that affect consumers when using services on gig-work platforms. The main research question is *how attitudes towards working conditions and worker stereotypes potentially influence labor relations on gig work platforms and whether differences exist across distinct platform services.*

To answer the research question, I set up a forced-choice vignette survey experiment distributed to a representative sample of 3029 Danish citizens between 18 and 70 years. The study was pre-registered with the Open Science Framework before survey data was collected and made available[10]. I presented respondents with two platform workers performing the same service with varying dimensions related to consumer price, the workers' wages, and social benefits, as well as their ratings and names indicating gender and ethnicity. I constructed harmonized vignettes for workers on both food delivery and cleaning platforms to ensure comparability. Respondents answered three choice tasks each for workers on both types of platforms.

[9] Madudbringningsoverenskomsten 2021 – 2023, Dansk Erhverv and 3F: https://www.danskerhverv.dk/siteassets/mediafolder/dokumenter/03-overenskomster/overenskomst-2020-2023/madudbringningsoverenskomst-2021-2023.pdf
Collective agreement Hilfr and 3F 2018 - 2019: https://d5nqtx2qwf2f0.cloudfront.net/a5280b1d-3cde-43e9-ab36-5ed5fcbad74a/pdf/hilfr_collective_agreement.pdf

[10] Link: https://osf.io/8dbt5/?view_only=f9806029c7a84fda9d6072b203b1787c

This paper makes three central contributions. First, it adds to the emerging literature, bringing consumers in the platform economy to the forefront as labor market actors. Secondly, I apply a comparative perspective on consumer attitudes across different platforms. A cross-platform perspective is essential as digital labor platforms are popularized in more sectors. Thirdly, I give causal estimates on the relative importance of price, wages, social benefits, and workers' gender and ethnicity on consumers' intention to hire platform workers.

5.2 Theoretical motivation

In this section, I develop the analytical framework, starting with insights from the industrial relations literature (IR) and the human resource management literature (HRM) on the role of consumers, and argue that consumers on gig-work platforms are important labor market actors. Then, applying Granovetter's (1985) concept of embeddedness and reviewing empirical platform studies, I highlight two central areas where platform consumers directly influence employment practices. I argue that the shift in management practices and responsibilities from employer to consumer places the platform consumer as a central labor market actor, manifested through consumer biases and preferences in the gig economy.

Consumers as labor market actors

The modern industrial relations paradigm focuses on labor-management relations and operates with three labor market actors: workers, employers, and state institutions (Kaufman, 2008). While there are many ways of typifying different labor market models, generally, the Danish labor market is described as highly organized with a high unionization rate, active labor market policies, and consensus-based collective bargaining processes (Campbell & Pedersen, 2006; Due & Madsen, 2006; Hall & Soskice, 2001). However, this model contrasts with the relatively unregulated platform economy (Jacqueson, 2021). In addition, while consumers often take a periphery role in traditional industrial relations literature, in the platform economy, they are arguably a central actor wielding considerable influence (Culpepper & Thelen, 2020; Healy et al., 2020; Goods et al., 2023).

In this section, I draw on prior advances in industrial relations research focusing on consumers as labor market actors to outline how consumers shape labor relations in the platform economy. In a critique of the underdeveloped concept of actors in industrial relations, Bellemare (2000) argues that the extent to which an actor can be defined as such in the IR system depends on "*if, through their action, they either directly or indirectly influence the industrial relations process or the causal powers deployed by other actors in the IR system.*" (Bellemare, 2000, p. 386). In his work, Bellemare (2000) illustrates how consumers of public urban transportation influence industrial relations at an organizational level through co-design, co-production, and co-supervision of the service (i.e., transportation), while consumers' influence at the institutional level is expressed through political and legal processes. Other scholars advancing the role of consumers as labor market actors have focused on how different consumer identities, as well as organizational contexts, play an essential part in forming consumers as labor market actors (Donaghey et al., 2014; Heery & Freege, 2006; Kessler & Bach, 2011). Drawing on these developments, Healy and Pekarek (2022) have proposed a typology for consumers as labor market actors in the gig economy. They distinguish between consumers as 1) platform market participants, 2) managerial agents, and 3) labor market regulators, and subsequently, they argue that there is a trend toward consumers across all three roles to reinforce tendencies of precarity in gig work (Healy & Pekarek, 2022).

Complementing this focus on consumers as labor market actors in the gig economy, studies in the HRM literature have highlighted different ways in which labor platforms, by abrogating an employment relationship with platform workers, are giving consumers extended influence on traditional HRM activities (Duggan et al., 2020; Haldrup et al., 2023). Consumers' influence on management practices is expressed here in two ways: through performance management of workers and work assignment processes. On labor platforms, the performance management of workers is primarily left to algorithms that are used to direct, evaluate, and discipline workers; however, these algorithms are based on user input from consumers (Kellogg et al., 2020). This algorithmic transformation of the control relationship between managers and workers has been scrutinized in the burgeoning algorithmic

management literature, showing how consumer ratings and reviews can have very direct consequences for workers' labor relations on platforms and, in some cases, lead to termination from the platform (e.g., Noponen et al., 2023; Maffie, 2022; Wood et al., 2019). The second form of consumer influence on labor relations is evident when consumers, instead of employers, determine the demand for labor when they choose to buy a service on a platform (Meijerink & Keegan, 2019). With competing platforms operating in the same sectors, consumers are presented with an abundance of choices, not only on the platforms where they can pick and choose between different workers but also when they opt between different platforms (Meijerink & Arets, 2021; Ticona et al., 2018). In this sense, consumers effectively function as labor market actors when they browse different platform services and worker profiles, hiring and directing work in the process, thus directly influencing labor relations. While the IR literature has focused on how consumers can affect labor relations on gig platforms through ratings and reviews, few studies have engaged with how consumers affect labor relations through decisions in the work assignment process. In the next section, I focus on the worker/consumer relationship on gig work platforms, emphasizing how consumers potentially influence labor relations through discriminatory practices and attitudes towards working conditions.

The worker-consumer relationship on gig-work platforms

Drawing on Mark Granovetter's (1985) work on embeddedness, I conceptualize the relationship between consumers and workers on labor platforms as an inherently economic action; the consumer buys a service, and the worker delivers it. However, this economic action is embedded in social arrangements underpinning platform work (Franke & Pulignano, 2021; Joyce, 2020; Wood et al., 2019). This means that while there is an element of self-interest and opportunism in actors' economic actions, they are "embedded in concrete, ongoing systems of social relations" (Granovetter, 1985, p. 487). Therefore, an analysis of economic action should pay attention to the actual patterns of personal relations and social structure (Granovetter, 1985, p. 504). Granovetter stresses that there is a preference among individuals to transact with others of "known reputation", and this trust is established best through personal relations or networks (Granovetter, 1985: 490). In the platform economy,

where consumers and workers often meet as strangers with no pre-knowledge of each other, trust is built through reputation systems, i.e., direct experiences of other users made public through the platform as ratings and reviews (Hoffman & Glückler, 2023; Tadelis, 2016). Ratings and reviews by third parties are thus a way to reduce the uncertainty that is otherwise characteristic of exchanges between strangers, and they are used as a primary indicator of trustworthiness (Benson et al., 2020; Gandini et al., 2016).

In addition to these two aspects, the economic costs of the service and the individual workers' ratings, two other central aspects inform consumer decisions on labor platforms: workers' characteristics and their working conditions. Firstly, the expanding literature on ethical consumerism has highlighted how consumers decide what products and services to buy based on ethical considerations that include working conditions across the supply chain (Carrington et al., 2021; Donaghey et al., 2014; Hainmueller et al., 2015). However, the gig economy is changing a fundamental part of the relationship between workers and consumers (Healy & Pekarek, 2022). Workers' working conditions are hidden from consumers in other parts of the labor market. While you may know there is a risk that poor farmers harvest the coffee you buy, you never meet the workers. However, on gig platforms, consumers and workers interact directly; on some platforms, working conditions are an explicit element of the choices you make as a consumer. Despite this feature of the gig economy, only a few studies have directly engaged with how consumers respond to information on platform workers' working conditions. A study on consumers' views on gig work (Healy et al., 2020) found that Australian consumers generally hold positive views on key aspects of gig work, albeit with some concern about the financial security of workers. Belanche et al. (2021) found that consumer perceptions of working conditions on food-delivery platforms could influence the intentions to use and recommend these services. Smith et al. (2021) applied a survey experiment to investigate consumers' willingness-to-pay (WTP) for improved working conditions on food-delivery platforms. They find that while awareness of working conditions raises WTP for better working conditions, the individuals who use the platforms regularly are the least inclined to pay more (Smith et al., 2021). In

summary, these studies demonstrate the potential of consumers to affect labor relations on gig work platforms positively (or negatively) depending on how they value workers' working conditions. The study adds to this emerging literature with two central contributions. Firstly, I aim to disentangle the individual contributions of wages and social benefits to consumer attitudes towards working conditions. Secondly, I apply a comparative perspective focusing on the differences and similarities in consumer preferences on cleaning and food-delivery platforms. Including a cleaning platform strengthens the experiment's validity since the vignettes more closely reflect real-world interactions.

Secondly, platforms often present some personal information on active users, e.g., names and profile pictures, which is used to verify users' identity and enhance a feeling of personal connection; however, it also provides fertile ground for extensive discrimination (Kas et al., 2022; Tjaden et al., 2018; for a review, see Fiers 2023). Studies focusing on race and gender show that biases influence consumers' willingness to interact with platform workers; however, there are considerable differences in findings across studies. Chan and Wang (2018) utilized data from an online labor platform to identify a hiring bias that favored women, driven by a preference for women in feminine-typed occupations. Other scholars have also documented the use of gender stereotypes to inform the hiring of online workers for female- or male-typed work (Galperin, 2021; Leung & Koppman, 2018). Hannák et al. (2017), drawing on data from TaskRabbit and Fiverr, discovered a consistent ranking disparity whereby workers perceived as Black consistently received lower rankings across both platforms, while gender results were more mixed. Analyzing data from Mechanical Turk, Litman et al. (2020) revealed a significant gender discrepancy in hourly earnings, with women earning significantly less than men. Jahanbakhsh et al. (2020) demonstrated that gender bias in ratings of online workers was exclusively observed among low-performing workers. This is consistent with the research by Greenwood et al. (2022), who revealed that race or gender had no impact on baseline ratings of drivers in ride-hailing, even though women are penalized more for low-quality work. In summary, studies show that consumer biases are prevalent on online labor platforms, but the extent of such biases and how they vary between

platforms is yet to be settled. Generally, studies on consumer biases in the platform economy have focused on online freelance work or on sharing platforms, while gig-work platforms have received less attention.

In the traditional labor market, workers are, in principle, protected against discrimination by legal institutions and HR departments, even though discriminatory practices still exist. However, on digital platforms, while policy focuses on protecting against algorithmic biases, nothing protects workers without employee status from the discrimination of consumer biases. Research on sharing platforms has indicated that when users lack direct information on the trustworthiness of other users, they are more likely to resort to biases and perceived characteristics of specific demographic groups (Kas et al., 2022; Tjaden et al., 2018). Even though most of the above studies do not outright engage with the consumer as a labor market actor, they demonstrate how consumers, when they initiate and evaluate work in the platform economy, can affect labor relations negatively (or positively) through discrimination (or lack thereof).

A common feature of the studies mentioned earlier is that they typically focus on a single platform or single type of platform work. Due to their methodological setups, they have not compared differences between platforms. In this article, I compare consumer attitudes on food delivery and cleaning platforms. Food-delivery platforms are characterized by limited interaction between consumers and workers, often only at the physical transfer of food. These platforms are, in particular, characteristic of what has been called "humans-as-a-service," i.e., platforms that mask the human workers delivering the services from the consumers behind a digital interface (De Stefano, 2016, p. 477). On food-delivery platforms, the gig is very clearly defined by the platform, and consumers have no influence on how workers complete the gig. On cleaning platforms, on the other hand, the gig is more loosely defined by the platform, and consumers hold much more sway over how the gig should be completed (Ticona et al., 2018). There is thus more interaction as consumers often have guidelines for how the cleaning should be done, and part of the agreement is that the consumers supply cleaning materials to the individual platform workers

(Mailand & Larsen, 2018). In addition, the timeframe of the two gigs is very different. Food delivery is a one-off experience while cleaning is presumably a longer-lasting relationship where the consumer expects the cleaner to return. This all points toward an increased experience of influence among consumers on the labor process on cleaning platforms compared to food-delivery platforms.

Hypotheses

Based on the literature review, I formulated and pre-registered hypotheses with the Open Science Framework . For brevity reasons, I will summarize them here.

First, drawing on Granovetters' work on economic actions, I expect *a stated preference for lower prices compared to higher prices and higher ratings compared to lower ratings*. Secondly, drawing on earlier studies on consumer notions of working conditions, I expect *a stated preference for higher wages compared to lower wages for workers and access to social benefits compared to no benefits*. Thirdly, I expect that as the economic action on cleaning platforms, compared to food-delivery platforms, is embedded in a closer social relation between consumer and worker, *working conditions and ratings are more important to consumers on the former platform*. Finally, drawing on studies on discrimination and labor platforms, I expect that *gender and ethnic biases mean that female workers and workers with Danish-sounding names are preferred to male workers and workers with Muslim-sounding names on cleaning platforms but not on food-delivery platforms*.

Findings related to these confirmatory hypotheses are reported in the first section of the analysis. However, I also include an exploratory analysis elaborating on some of the central findings. Specifically, I seek to examine the relative importance that the two different aspects of working conditions have on consumer attitudes and, therefore, include an interaction between wages and social benefits. Prior research has not explicitly engaged with this question. Secondly, I wish to explore the factors that possibly moderate discriminatory attitudes, including interactions between gender, ethnicity, and the other vignette dimensions.

5.3 Research methods and data

Data

To analyze how consumer attitudes unfold on food-delivery and cleaning platforms, I designed a forced choice survey experiment, where I presented respondents with two platform workers and asked them to choose the one they preferred. I hired YouGov to collect the data by administering the survey to their online panel. The target population for this survey consists of Danish citizens aged 18 to 70 years. To ensure a representative sample, the data collection process involved the use of quotas based on specific criteria, including educational attainment (categorized as short, medium, and long[11]), gender (male/female), age groups (18-34, 35-54, and 55-70), as well as the five regions in Denmark. Based on a power analysis described in the pre-registration report, the target sample population was 3,000 respondents. YouGov reported that 3,547 interviews were started and 3,029 interviews completed. To encourage participation, respondents were provided with incentives in the form of points that can be earned upon completing the survey and exchanged for gift cards through the YouGov panel store. Before beginning the survey, participants are informed about these incentives and are presented with specific requirements, such as completing the survey and carefully reading the descriptions. The data collection lasted three weeks in October/November 2023.

Experimental design

The survey is set up with a short introduction to online labor platforms. This is followed by some introductory questions on respondents' usage of gig work platforms. After this, respondents were presented with the survey vignettes. I present respondents with two types of vignettes, one describing a choice task on a food delivery platform and one on a cleaning platform. For each type of platform, respondents answer three choice tasks. The order of what type of platform was presented first was randomized, so half of the respondents answered the food

[11] Short: ISCED levels 0-4, Medium: ISCED levels 5-6, Long: ISCED levels 7-8. See also https://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-isced-2011-en.pdf

delivery task first, and the other half answered the cleaning task first. An example of what the vignette looked like for respondents can be found in Appendix D. In the following section, I present the vignette dimensions used to create the worker profiles presented in the survey and explain the choices of dimensions and levels. Table 1 provides an overview of the different dimensions and levels included in the experiment.

Table 1: Vignette dimensions and levels

Dimensions	Levels
Name	• Martin, Christian, Søren • Anna, Mette, Helle • Ali, Mustafa, Ibrahim • Fatima, Aisha, Zainab
Average rating	5/5 stars 4/5 stars No previous rating
Hourly wage	120 DKK (16 €) 150 DKK (20 €) 180 DKK (24 €) 210 DKK (28 €)
Social benefits	Workers' compensation insurance, but no paid holiday, sickness pay, or pension. Workers' compensation insurance, paid holidays, sickness pay, and pension.
Price (food delivery)	30 DKK (4 €) 40 DKK (5.35 €) 50 DKK (6.7 €) 60 DKK (8 €)
Price (cleaning)	525 DKK (70 €) 700 DKK (94 €) 875 DKK (117 €) 1050 DKK (141 €)

The profiles are constructed with five dimensions with two to four levels each. This means that there are 4x3x4x2x4=384 possible combinations. These combinations are realistically possible to encounter in the Danish gig economy. With 3,029 respondents performing three choice tasks evaluating two profiles each time for both food delivery and cleaning platforms, the dataset consists of 36,348 worker-profile evaluations, with 18,174 evaluations for each platform type.

I vary the names of the platform workers and use them as proxies of gender and ethnicity, following findings from Dahl and Krog (2018). The names are picked from a pool of the most common Danish and Middle Eastern-sounding names in Denmark. Middle Eastern-sounding names signal an ethnic minority background in Denmark, comprise the largest amount of non-EU immigration, and are center-stage for most of the Danish public debate on immigration (Larsen & Schaeffer, 2021). As such, I expect any ethnic biases I find to be an upper bound estimate. I keep the age of the workers constant at 30 years. Quality of the service is operationalized as an average rating out of five stars, as this is the most commonly used metric on gig-work platforms. Platform ratings are heavily skewed upwards, with ratings below five stars often signalling a less-than-good service (Rosenblatt, 2016). The levels are therefore varied between *five stars* (high quality), *four stars* (mediocre quality), and *no rating*.

I operationalize working conditions as expected hourly wages and access to social benefits. The lowest level for expected hourly wages is set at 120 DKK. A worker with a full-time position with an hourly wage of 120 DKK is equivalent to what a fully guaranteed person is paid in unemployment benefits. This is below the collective agreed minimum wage (135 DKK) set by Just Eat (the largest food-delivery platform in Denmark) and Trade Union 3F in their collective agreement for food delivery workers and at the lowest end of what new workers on cleaning platforms charge. The second level, 150 DKK, is approximately what couriers and cleaners are guaranteed in their collective bargaining agreements, excluding the value of social benefits. The third level, 180 DKK, is approximately the amount that Wolt, one of the largest food-delivery platforms in Denmark, has publicly disclosed as the average pay among their couriers, and it is the wage charged for a standard worker on Happy Helper, the largest cleaning platform in Denmark. The fourth level, 210 DKK, is thus at the high end of what food couriers and cleaners earn on platforms. However, it is also at the median of what cleaners on collective bargaining agreements earn (approx. 219 DKK) when the monetary value of social benefits is

included[12]. There are two levels of social benefits. The first level covers only workers' compensation insurance and nothing else, while the second level, in addition to insurance, includes paid holidays, sickness pay, and pensions. These benefits are often used as examples of the risks that self-employed platform workers bear compared to employees. The levels for prices for both types of platforms are based on actual prices from some of the largest food-delivery and cleaning platforms in Denmark (i.e., Wolt, JustEat, HappyHelper, and Hilfr).

I apply a harmonized vignette design across the two types of platforms. This means that even though the actual choice tasks performed by consumers on cleaning and food delivery platforms are different, I choose to set them up similarly to gain cross-platform comparability. On the most popular Danish cleaning platforms, consumers can choose which worker they want to hire, and they are typically presented with information on the workers' names, profile pictures, ratings, and prices. In addition to this information, titles or badges are used to label the different types of workers. One platform uses *super* to show that this type of worker is employed on a collective bargaining agreement. Similarly, another platform distinguishes between *standard*, *premium*, and *pro* workers, where *pro* workers are professional cleaning companies. The information I use to present the worker-profiles in the survey experiment is thus very close to the experience consumers have on cleaning-platforms. On food-delivery platforms in Denmark, consumers cannot choose between different workers; orders are dispatched to couriers by algorithms. However, the same restaurant often uses multiple delivery services. This effectively gives consumers a choice since the different delivery companies operate with differing working conditions. In addition, while food delivery platforms in Denmark do not present consumers with ratings of workers, ratings are used extensively on other platforms in Denmark and on delivery platforms in other countries. Therefore, I argue that even though the choice tasks presented in this study do not mirror the actual workings of food-delivery platforms

[12] https://workplacedenmark.dk/da/working-conditions/pay-and-working-hours/hourly-rate-cleaning/#:~:text=Timefortjeneste%20for%20reng%C3%B8ringsarbejde&text=arbejdet%20time.,end%20236%2C95%20danske%20kroner.

in Denmark, they do provide a relevant comparison to the findings on the cleaning platform.

Analytical strategy

Leaning on recent advances in the methodological literature on conjoint experiments, I conducted a power analysis to estimate the appropriate sample size to identify true treatment main effects and interaction effects at sufficient power levels (Schuessler & Freitag, 2020). Evaluating statistical power before conducting the study is important to mitigate the likelihood of detecting false positives. The sample of 3,029 respondents who evaluate two profiles in three choice tasks for both a cleaning and food-delivery platform results in an effective sample size of 18,178 for each platform type. Assuming a two-tailed significance test and a critical value of 0.05, the sample size allows identification of average marginal component effects (AMCE) of 5 pct. with a statistical power of 99 pct. Furthermore, this allows us to identify interaction effects (AMCIE) of 7.5 pct. with a statistical power of 99 pct. and interaction effects of 5 pct. with a statistical power of 79 pct. These calculations are based on an interaction between attributes with three and two levels. In the exploratory part of the analysis, I include interactions between variables with three and four levels, which decreases power levels.

The primary objective of this paper is to identify the effects of higher wages and better benefits for workers on respondents' stated preferences and compare them between food delivery and cleaning platforms. To do this, I run OLS regressions identifying the average marginal component effects of all dimensions in the vignettes. Since respondents evaluate multiple vignettes due to the repeated choice tasks, I run the regressions with robust standard errors clustered on the respondent level. I include post-stratification weights delivered by YouGov to ensure further representativity. I performed balance checks to ensure the vignettes' experimental conditions were balanced across the control variables used to sample respondents. As an additional check, I run all regressions with and without respondents' socio-demographic background characteristics to ensure that treatment effects are sufficiently balanced across the sample. In total, three models are run: one without

controls, one with the socio-demographic controls used to sample respondents (i.e., age, gender, education, and region), and one with additional controls on family status, occupation, politics, and income. The results in the three models are nearly identical, and I, therefore, report the results from the model without controls in the results section. However, all three models are reported in Appendix A.

5.4 Results

Who are the platform consumers in Denmark?

A recent report from Statistics Denmark highlighted that the share of Danes aged 16-74 who engaged in online shopping during the past three months had risen from 60 percent in 2012 to 82 percent in 2021[13]. While there is a difference between online shopping and gig-work platforms, this report clearly demonstrates that using apps or websites to buy goods and services is widespread in the Danish population, which is also mirrored in this study. In Table 2, I present descriptive statistics on the socio-demographic characteristics of the respondents. Among the respondents, 60 percent had tried using at least one type of gig-work platform. Notably, there is a considerable overlap between users of different platforms, with the majority being users of food-delivery platforms. The most significant difference between platform users and non-users is their age, with 45 percent of platform users being 18-34 years old, while only 14 percent of non-users belong to this age group. The differences between the two groups on other socio-demographic characteristics are less notable. However, there are some differences, e.g., there is a higher share of students and people from the capital region among platform users. Due to the growing reach of digital platforms, I find it relevant to include both users and non-users in the analysis.

[13] https://www.dst.dk/da/Statistik/nyheder-analyser-publ/Publikationer/VisPub?pid=1537

Table 2: Descriptive statistics on respondents

Characteristics	**All respondents (n=3029)**	**Platform users (n=1791)**	**Non-users (n=1238)**
Experiences with the platform economy			
Used food-delivery platform	56%	95%	-
Used cleaning platform	12%	20%	-
Used other gig-work platform	17%	29%	-
Worked via platform	7%	11%	1%
Women	52%	50%	54%
Age			
18-34	32%	45%	14%
35-54	35%	35%	36%
55-70	32%	20%	50%
Region			
Capital Region	32%	37%	25%
Central Denmark	14%	13%	16%
North Denmark	21%	21%	21%
Region Zealand	23%	22%	24%
Southern Denmark	10%	7%	14%
Children (yes)	34%	37%	29%
Partner (yes)	58%	57%	60%
Education			
Primary	13%	11%	16%
Secondary	52%	50%	53%
Tertiary	35%	38%	31%
Occupation			
In work	63%	66%	59%
Out of work	27%	21%	36%
Student	10%	13%	6%
Politics			
Coalition government parties[14]	20%	20%	20%
Left opposition	17%	20%	13%
Right opposition	30%	30%	30%
NA*	32%	30%	36%
Income			
Under 300.000	36%	36%	37%
300.000 - 500.000	31%	31%	30%
Over 500.000	18%	20%	14%
NA*	15%	13%	19%
N	**3029**	**1791**	**1238**

*NA includes missing, “Do not know”, and “Do not want to answer”.

[14] Social-democratic led coalition government with Venstre (The Liberal Party of Denmark) and Moderaterne (center-right party).

Confirmatory analysis

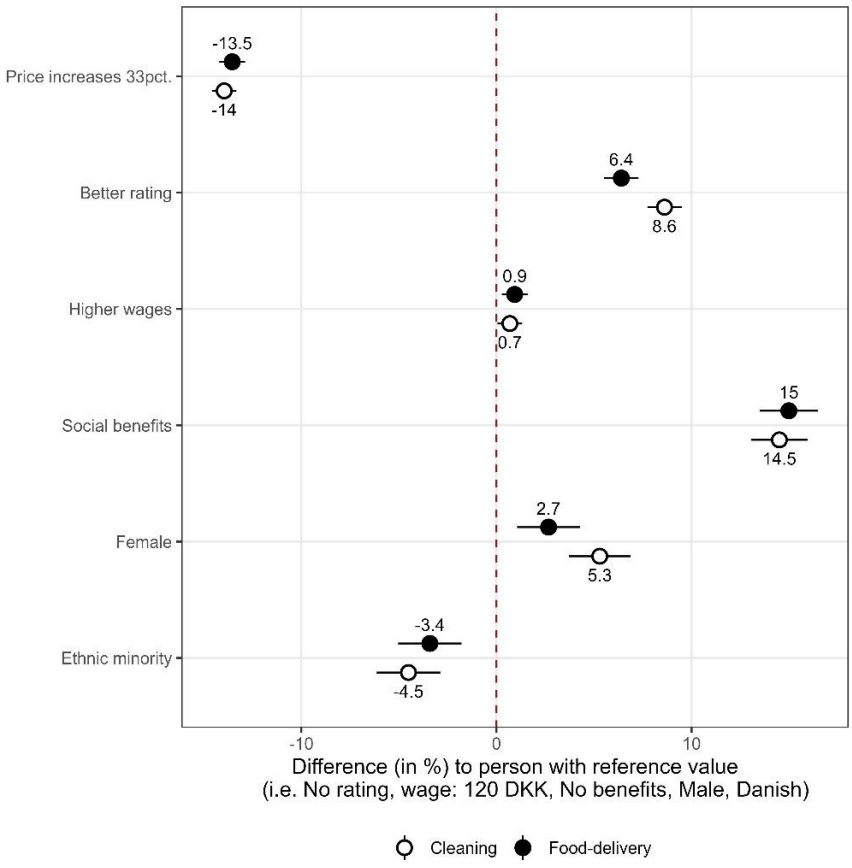
The analysis consists of two sections. In the first section, I present results on the main effects of the five treatment dimensions included in the vignette experiment. Here, I focus on the primary drivers behind consumer preferences concerning platform workers and how they differ between food delivery and cleaning platforms. In the second section, I go into more depth with the two central aspects of consumer influence that I covered in the theoretical section: assessments of working conditions and potential biases. To answer the research question, I will present the regression analysis results on the average marginal component effects of the dimensions varied in the survey experiment. The results are reported as coefficient plots in Figure 1, while the regression tables can be found in Appendix A. The plots in Figure 1 represent the effect of a change in levels in the corresponding attribute, averaged over other attributes, on the probability that a respondent chooses that worker profile (Bansak et al., 2022; Hainmueller et al., 2014).

From Figure 1 we see that when the price increases by 33 pct. (i.e., 10 kr. on food delivery platforms and 175 kr. on cleaning platforms) respondents are 13.5 and 14 pct. less likely to choose that option. This indicates that respondents are quite (and equally) price-sensitive on both types of platforms. As the price dimension has four levels, price is the single most important dimension for respondents' choices, and a doubling of the price from, e.g., 30 to 60 DKK on a food delivery platform leads to an approx. 40 pct. decrease in the likelihood that respondents choose that option. Next, I find that when workers' ratings increase, respondents are 6.4 pct. more likely on food-delivery platforms and 8.6 pct. more likely on cleaning platforms to choose that worker. Here, there is a significant difference between the two types of platforms, confirming the hypothesis that better ratings are more important on cleaning platforms than on food-delivery platforms.

Turning to the two dimensions that signify working conditions in Figure 1, I find that higher wages (i.e., a wage increase of 30 kr.) have a minimal but significant positive effect on both platforms, 0.9 pct. on food-delivery platforms and 0.7 on cleaning platforms. On the other hand, social benefits in the form of pension, holiday, and

sickness pay have the largest effect, with increases of 15 and 14.5 pct. on the likelihood that a profile with this attribute is chosen. This shows that social benefits are much more important to respondents than workers' wages. Lastly, I examined gender and ethnic biases by varying workers' names. Here, I find a gender bias, with respondents preferring female to male workers on both platforms. This gender bias is larger on cleaning platforms than on food-delivery platforms. I also find an ethnic bias on both platforms, with respondents preferring Danish to Middle Eastern-sounding names. This finding is somewhat surprising, as it shows that while discrimination is more prominent on cleaning platforms, respondents would still discriminate against food-delivery workers if they could. I explore this finding further in the second section of the analysis, where I include interaction effects.

Figure 1: Average marginal component effects on respondent choices



While these findings generally support the pre-registered hypotheses, some interesting deviations exist. The largest surprise is that there is no difference in the importance of working conditions on food-delivery and cleaning platforms. The similar effect sizes of workers' wages and benefits on both platforms indicate that working conditions are valued equally. This finding seems to refute the hypothesis that the closer relationship between consumers and workers on cleaning platforms would result in a perception of working conditions as more important. This could indicate that for respondents, both food-delivery and cleaning services are seen as pure consumption, and they are unreflective about their role as labor market actors.

Instead, I find that access to social benefits, which indicates that workers are employees and not self-employed, has large substantive effects on respondents' choices on both platforms, while increasing workers' wages only has a small, almost negligent effect on their choices. This finding could reflect that since there is no national minimum wage in Denmark due to the highly organized labor market where wages are set in collective bargaining agreements at the sector or local level, consumers are less cognizant of specific wage levels, and it becomes difficult to evaluate what constitutes a "fair" wage. On the other hand, social benefits and employee status are seen as paramount in the Danish model. As platform users may generally hold attitudes more favorable toward gig work than non-users, I tested whether the main findings varied between these two groups. These results are presented in Appendix C. Here, I find that the only significant difference between users and non-users concerning main effects is that non-users value workers' social benefits higher than users, which aligns with prior research (Smith et al., 2021).

Exploratory analysis

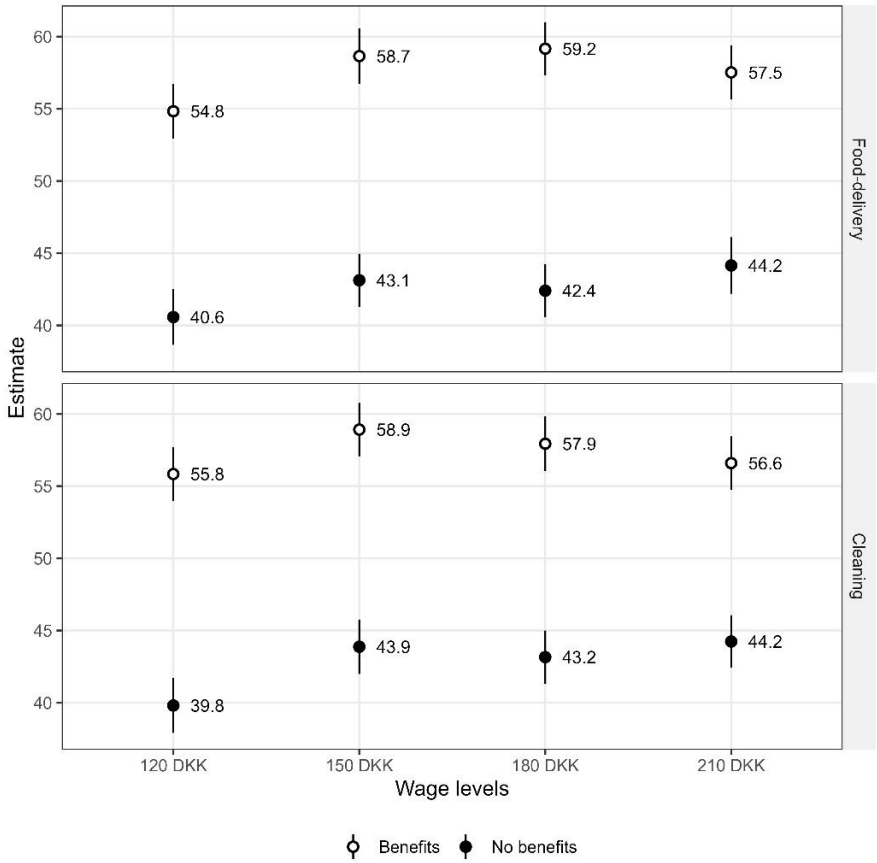
The relation between workers' wages and social benefits

In this section, I wish to explore further two central findings from the confirmatory analysis. Firstly, I want to test if the finding that workers' wages only have a negligible effect on respondent preferences holds across the different levels of wages and benefits. Secondly, I wish to explore whether other dimensions in the vignettes exacerbate

respondents' gender and ethnic biases. I start by running regressions with interaction effects between benefits and the four different levels of workers' wages. In Appendix B, I report regression tables with interaction effects between wages and benefits. As a robustness check, I run one regression with wages as a continuous variable and one as a categorical variable. In both cases, I find insignificant interaction effects at conventional levels of statistical significance. This finding illustrates that there seems to be no trade-off between benefits and wages in respondents' stated preferences concerning working conditions. The stated preference for workers with social benefits is neither higher nor lower depending on workers' wage levels. To illustrate this point further, I have depicted the differences in estimated marginal means between workers with and without benefits given different wage levels and averaged across the other vignette dimensions in Figure 2. It should be noted that in Figure 2, the findings of the regression model with wages as a categorical variable re reported.

In Figure 2, we see that across all wage levels on both cleaning and food-delivery platforms, workers' access to social benefits increases respondents' preferences by ca. 13-16 pct. points. A change in wage levels from 120 DKK to 150 DKK increases respondent preferences by ca. 3-4 pct. points, while further wage increases bring no change. This finding indicates that respondents have a slight preference for workers with wages at 150 DKK compared to 120 DKK, but wages any higher than 150 DKK have no effect on their choices. In other words, respondents are no more likely to choose a worker with wages of 210 DKK compared to 150 DKK, even if it does not cost them anything. The effect size of the negative impact of a 33 pct. price increase (13-14 pct. points) is comparable to the positive impact of workers' access to social benefits (13-16 pct. points) on consumers' stated preferences. This indicates that respondents are willing to accept a price increase of 33 pct. if workers have access to social benefits, however, they will not pay more than that. The small effect size of higher wages indicate that respondents are unwilling to pay more for higher wages for workers.

Figure 2: Difference in estimated marginal means across benefits and wages



Based on these results, we can conclude that workers' access to social benefits is very important to respondents regardless of workers' wage levels, while wages are only important if they are deemed as too low. These elaborated findings indicate that consumers in Denmark are less concerned with workers' concrete wage levels but very concerned with workers' social benefits. The monetary value of social benefits for workers is difficult to calculate. However, some trade unions argue that their collective bargaining agreements add somewhere between 20-30 pct. to workers' annual wages, with employer-paid pensions as the single largest contributor[15]. This would mean that for a worker earning 120 DKK, the added value of social benefits is

[15] https://socialpaedagogen.sl.dk/arkiv/2020/12/saa-meget-er-din-ok-vaerd/
https://www.hk.dk/omhk/sektor/kommunal/overenskomstforhandlinger/overenskomsten-vaerd-2

somewhere in the range of 24-36 DKK. For most workers, it would thus be more beneficial to earn 210 DKK without benefits compared to 120 DKK with benefits. However, respondents are much more likely to choose the latter. This illustrates that while consumers may believe that social benefits are desirable and that 120 DKK is a low wage, they are unaware of the concrete value of social benefits vis-à-vis higher wages.

Variations in gender and ethnic biases

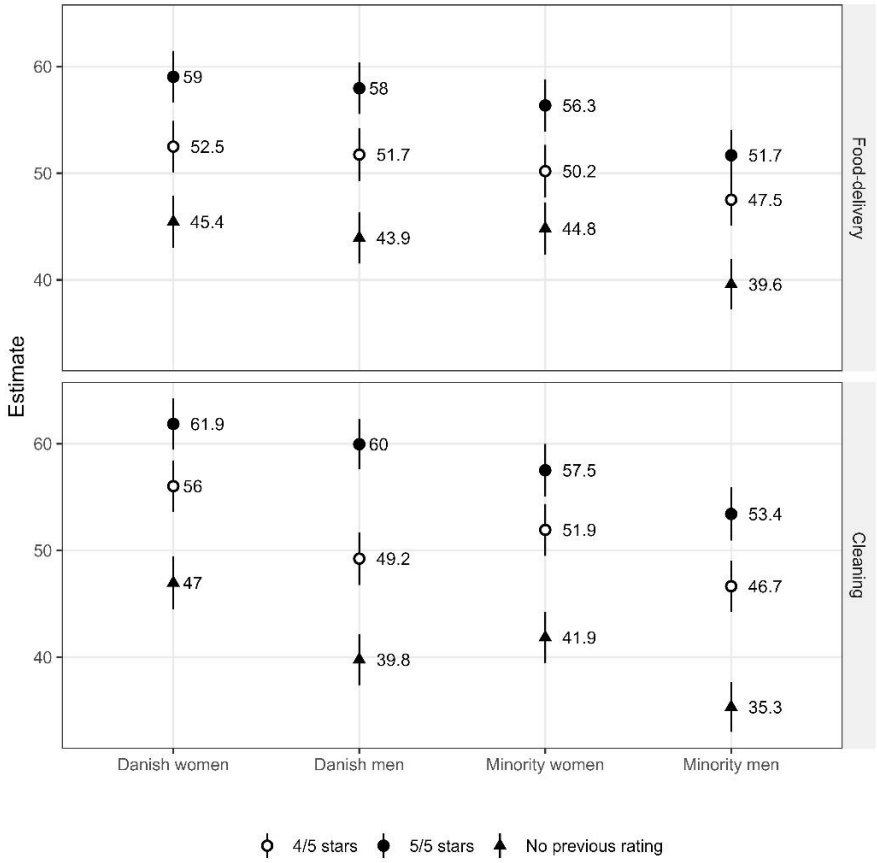
The second finding that I wanted to elaborate on is the gender and ethnic biases I find. Therefore, I ran regressions at the vignette level of names representing gender and ethnicity, presented in Appendix B. Furthermore, I ran regressions with interaction effects between workers' names and the other vignette dimensions. These results are also presented in Appendix B. Here, I find that the only significant interaction effect with names is ratings. I illustrate these different interaction effects in Figure 3, representing the differences in estimated marginal means between workers given their ratings and names and averaged across the other vignette dimensions. A couple of findings stand out.

Firstly, I find that on food-delivery platforms, Middle Eastern-sounding male names drive the biases I found concerning both gender and ethnicity. Across the three different levels of ratings, I find no significant differences between Danish-sounding male and female names and Middle Eastern-sounding female names. Only Middle Eastern-sounding male names are consistently 5-7 pct. point less likely to be chosen by respondents compared to the other groups. This indicates that there is a targeted bias against Middle Eastern-sounding male names but no general gender and ethnic biases on food-delivery platforms, which is in line with other studies showing that Muslim men face harsher discrimination in the Danish labor market (Dahl & Krog, 2018). The picture is more complex on cleaning platforms, and I find a mix of gender and ethnic biases. Here, Danish-sounding female names are the most likely to be picked by respondents across all levels of ratings, while Middle Eastern-sounding male names, once again, are the least likely. The smallest difference at similar rating levels is 2 pct. points between Danish-sounding female and male names with 5-star

ratings, while the largest difference is 12 pct. points between Danish-sounding female and Middle Eastern-sounding male names without prior ratings.

Secondly, I find a positive interaction effect between female names and mediocre or missing ratings on cleaning platforms. This means respondents have an increased preference for women compared to men on cleaning platforms when both have mediocre or missing ratings. In other words, the gender bias is exacerbated for workers with mediocre or missing ratings. When I compare men and women on cleaning platforms, the gender penalty for having a mediocre or missing rating history becomes apparent. The difference in marginal means between women with a five-star rating and women with no previous rating is 14.9 pct. points for Danish-sounding female names and 15.6 pct. points for Middle Eastern-sounding female names. The same difference is 20.2 pct. points for Danish-sounding male names and 18.1 pct. points for Middle Eastern-sounding male names. This finding indicates that when respondents on cleaning platforms lack information on workers' reputations, as indicated by the rating history, they are more inclined to rely on biases. I cannot say whether this is due to a belief that women are better at cleaning than men or because they trust women more than they trust men. However, the lack of a similar interaction effect on food-delivery platforms indicates that it is specifically related to the type of work performed on cleaning platforms.

Figure 3: Difference in estimated marginal means across ratings and names



Finally, I want to make note of the extent to which respondents display discriminatory attitudes towards men with Middle Eastern-sounding names, which becomes apparent in Figure 3. Studies on peer-to-peer sharing platforms (e.g., carpooling and accommodation services) have pointed to ratings as a possible solution to discrimination (Cui et al., 2020; Tjaden et al., 2019). However, the findings suggest that while discriminatory attitudes may be less prevalent towards workers with perfect ratings, respondents consistently discriminate against worker profiles with Middle Eastern-sounding male names, regardless of their ratings and the type of platform work they engage in.

5.5 Discussion

The study makes significant contributions to the field in two key areas. Firstly, it positions consumers in the platform economy as central labor market actors. This perspective adds depth to the emerging literature on platform consumers, moving beyond the traditional focus on workers and platform managers and acknowledging consumers' pivotal role in shaping gig economy labor dynamics. Secondly, the paper adopts a novel methodological comparative approach to understand consumer attitudes across distinct platforms. As digital labor platforms are bourgeoning across numerous sectors, a cross-platform perspective becomes crucial (Fiers, 2023).

Theoretically, I have argued that platform consumers hold a substantial influence on labor relations in the gig economy and, therefore, warrant more research. In this study, I have focused on two aspects of work assignment on gig-work platforms where consumers have an effect: consumer biases about workers can lead to gender and ethnic discrimination, and consumer attitudes towards working conditions can increase or decrease precariousness on platforms. In relation to working conditions, platform scholars have argued that platform firms framing themselves as intermediaries instead of employers are disembedding labor from social and legal norms, leaving platform workers with little protection from regulative institutions (Bergvall-Kåreborn & Howcroft, 2014; De Stefano, 2016; Wood et al., 2019). This disembedding process potentially amplifies gig workers' precariousness, making consumer preferences even more critical in shaping labor relations. In this paper, I show the intricacies of how consumers can affect labor relations on gig work platforms by hiring or non-hiring workers based on their working conditions. Danish consumers are very responsive to workers' access to social benefits and value this highly, while they are less responsive to workers' specific wage levels. Interestingly, I find no difference in how these attributes are valued by consumers across food delivery and cleaning platforms. This indicates that the closer social relationship between consumers and workers on cleaning platforms does not translate to an increased focus by consumers on workers' working conditions.

When I turn to gender and ethnic biases on labor platforms, some scholars have argued that gig-work platforms can serve as a stepping-stone for minorities into the more organized labor market (Kenney & Zysman, 2016; Schüssler et al., 2021). This is due to gig work platforms having little-to-no formal barriers to entry for workers and can give access to a wide range of work opportunities. However, consumers' biases and discrimination may create a barrier to some groups. The results indicate that stereotypes significantly influence consumer biases, particularly in gendered sectors like cleaning platforms. Ethnic minority men face especially harsh discrimination, which may make it even more challenging for this group to gain a foothold in the platform economy. This is exacerbated by the fact that women are disproportionately favored on cleaning platforms when there is no previous rating history for consumers to rely on. This finding indicates that the platform economy may hold hidden barriers for minorities in the Danish labor market.

Consumers can potentially play a part in re-embedding platforms in labor regulations if their consumption patterns are driven by attention to platform workers' working conditions. From a policy discussion, this is interesting as it suggests a potential avenue for improving workers' conditions through consumer behavior. This is underscored by a recent initiative by the Danish agency in charge of national implementation of the Nordic and EU Ecolabels (Svanemærket). The agency introduced a new label for online delivery platforms, awarded to companies that adhere to environmental standards and guarantee employment rights at the level of national collective bargaining agreements. An interesting avenue for further research is how this label can affect consumer behavior and, if so, see broader adoption in the platform economy. However, consumers' discriminatory attitudes could also be an important point for future regulation. With consumers' increased influence over working conditions in the platform economy, protecting workers from adverse side effects of consumer biases becomes essential.

The methodological approach has some limitations that I will discuss here. I opted for a forced-choice survey experiment because it has been proven efficient in analyzing preferences across a broad spectrum of social and political situations and

in complex situations where one has to evaluate multiple dimensions simultaneously (Hainmueller et al., 2014; Hainmueller et al., 2015). Studies have shown that it is especially useful in revealing underlying biases and preferences that may not be evident in more straightforward survey methods (Auspurg et al., 2017; Schaeffer & Haderup, 2023). This is corroborated further by other studies that have used survey experiments to assess behavior among employers and workers in hypothetical hiring and job-acceptance scenarios (Abraham et al., 2013; Di Stasio & van de Werfhorst, 2016; Kroczek & Späth, 2022). However, survey experiments are hypothetical situations, and it is impossible to know if respondents will act the way they say. It is, after all, an inconsequential decision for them. Nevertheless, the findings in this study show that respondents display a high degree of price sensitivity as well as gender and ethnic biases, which indicates that they treat the choice task as a real situation and are not only choosing what they believe is the most socially acceptable.

5.6 Conclusion

In this study, I have explored the dynamics of consumer decision-making within gig-work platforms. I have analytically focused on the different dimensions that inform consumers' decisions on gig-work platforms, with platform workers' working conditions as a central emphasis. Here, I conducted a forced-choice conjoint survey experiment administered to a representative sample of 3,029 Danish consumers to analyze how respondents respond to different worker and platform characteristics in the gig economy. In line with the pre-registered hypotheses, I found that Danish consumers prefer lower prices and higher ratings, and price is the relatively most important attribute for consumers. As expected, ratings are more important for consumers on cleaning platforms than on food-delivery platforms. I also found that while gender and ethnic biases exist on both platforms, they are more prevalent on cleaning than on food delivery platforms. Surprisingly, there was no difference in consumer preferences concerning working conditions between the two platforms; social benefits are more important to consumers than workers' wage levels and are equally important on both platforms. Investigating these findings further, I performed an exploratory analysis of the interaction effects between wage levels and benefits as well as ratings and names. Examining interaction effects between workers' wages

and benefits, I find that consumers assess benefits similarly across all wage levels, and the added value of higher wages becomes negligent. In addition, I find that workers' rating history moderates consumers' gender and ethnic biases on cleaning platforms, indicating that consumers, when they lack information on workers' ratings, are more likely to rely on biases in platform situations that require a higher degree of interaction with the worker.

Future studies engaging with the role of consumers as labor market actors could benefit from more comparative perspectives, both focusing on additional types of platform work and, perhaps especially, using cross-country research designs. The findings, indicating that consumers value workers' access to social benefits over higher wages, may be unique to Denmark's welfare context and could differ in other national settings. Perhaps differences in welfare state models relate to differences in consumer valuations of working conditions and the gig economy. As platforms continue to evolve, the interplay between the platform and government policies and workers' rights will undoubtedly be influenced by consumer choices. Future research should delve deeper into the complexities of these relationships, particularly in different sectoral and regulatory contexts, to better comprehend the implications of consumer behavior in the gig economy.

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Appendices

Appendix A:

Table A1: Regression results for cleaning platforms

Average marginal component effects on respondents' platform worker preference

	Model 1	Model 2	Model 3
Intercept	0.524***	0.519***	0.516***
	(0.018)	(0.019)	(0.021)
Treatments			
Price	-0.140***	-0.140***	-0.140***
	(0.003)	(0.003)	(0.003)
Wage	0.007*	0.007*	0.007*
	(0.003)	(0.003)	(0.003)
Rating	0.086***	0.086***	0.086***
	(0.004)	(0.004)	(0.005)
Benefits: pension, sickness and holiday pay	0.145***	0.145***	0.145***
	(0.007)	(0.007)	(0.007)
Non-ethnic dane	-0.045***	-0.045***	-0.045***
	(0.008)	(0.008)	(0.008)
Female	0.053***	0.053***	0.053***
	(0.008)	(0.008)	(0.008)
Age (reference: 18-34 years)			
Female		0.000	-0.000
		(0.003)	(0.003)
35-54 years		-0.003	-0.002
		(0.004)	(0.004)
55-70 years		-0.002	-0.001
		(0.004)	(0.004)
Region (reference: Hovedstaden)			
Midtjylland		0.004	0.003
		(0.005)	(0.005)
Nordjylland		0.005	0.004
		(0.004)	(0.004)
Sjælland		0.003	0.002

		(0.004)	(0.004)
Syddanmark		-0.001	-0.002
		(0.005)	(0.005)
Education (reference: Primary or less)			
Secondary		0.004	0.005
		(0.004)	(0.004)
Tertiary		0.005	0.007
		(0.005)	(0.005)
Danish			0.002
			(0.008)
Kids			0.003
			(0.004)
Partner			0.001
			(0.003)
Occupation (reference: In work)			
No work			0.005
			(0.004)
Student			0.009
			(0.006)
Politics (reference: Government/centre parties)			
Left leaning opposition			-0.005
			(0.005)
Right leaning opposition			-0.004
			(0.004)
DK / no vote			-0.001
			(0.004)
Income (reference: Under 300.000 DKK)			
300-699.999 DKK			-0.001
			(0.004)
Over 700.000 DKK			0.000
			(0.007)
No info			-0.004
			(0.005)
R^2	0.142	0.142	0.142
Adj. R^2	0.142	0.141	0.141
Num. obs.	18174	18174	18174
N Clusters	3029	3029	3029

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$; $^{+}p < 0.1$

Table A2: Regression results for food-delivery platforms

Average marginal component effects on platform worker preference

	Model 1	**Model 2**	**Model 3**
Intercept	0.532***	0.536***	0.548***
	(0.019)	(0.019)	(0.021)
Treatments			
Price	-0.135***	-0.136***	-0.136***
	(0.003)	(0.003)	(0.003)
Wage	0.009**	0.009**	0.009**
	(0.003)	(0.003)	(0.003)
Rating	0.064***	0.064***	0.064***
	(0.005)	(0.005)	(0.005)
Benefits: pension, sickness and holiday pay	0.150***	0.150***	0.150***
	(0.008)	(0.008)	(0.008)
Non-ethnic dane	-0.034***	-0.034***	-0.034***
	(0.008)	(0.008)	(0.008)
Female	0.027**	0.027**	0.027**
	(0.008)	(0.008)	(0.008)
Age (reference: 18-34 years)			
Female		0.001	0.002
		(0.003)	(0.003)
35-54 years		0.001	0.001
		(0.003)	(0.004)
55-70 years		0.005	0.005
		(0.003)	(0.004)
Region (reference: Hovedstaden)			
Midtjylland		-0.008+	-0.008+
		(0.004)	(0.004)
Nordjylland		-0.004	-0.003
		(0.004)	(0.004)
Sjælland		-0.006	-0.005
		(0.004)	(0.004)
Syddanmark		-0.006	-0.006
		(0.005)	(0.005)
Education (reference: Primary or less)			

Secondary		-0.003	-0.004
		(0.004)	(0.004)
Tertiary		-0.001	-0.002
		(0.004)	(0.004)
Danish			-0.014*
			(0.007)
Kids			-0.001
			(0.003)
Partner			0.001
			(0.003)
Occupation (reference: In work)			
No work			-0.001
			(0.004)
Student			-0.001
			(0.005)
Politics (reference: Government/centre parties)			
Left leaning opposition			-0.004
			(0.005)
Right leaning opposition			0.002
			(0.004)
DK / no vote			0.003
			(0.004)
Income (reference: Under 300.000 DKK)			
300-699.999 DKK			0.002
			(0.004)
Over 700.000 DKK			0.006
			(0.006)
No info			-0.001
			(0.004)
R^2	0.128	0.128	0.128
Adj. R^2	0.128	0.127	0.127
Num. obs.	18174	18174	18174
N Clusters	3029	3029	3029

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$; $^{+}p < 0.1$

Appendix B:

Table B1: Regression results for interaction effects between wages and benefits

	Food-delivery			Cleaning		
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
(Intercept)	0.676***	0.687***	0.671***	0.739***	0.716***	0.702***
	(0.019)	(0.027)	(0.032)	(0.018)	(0.026)	(0.030)
price	-0.135***	-0.135***	-0.135***	-0.140***	-0.140***	-0.140***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
as.factor(wage)2	0.032**	0.013		0.035***	0.051	
	(0.010)	(0.031)		(0.010)	(0.032)	
as.factor(wage)3	0.031**	-0.007		0.027**	0.046	
	(0.010)	(0.031)		(0.010)	(0.032)	
as.factor(wage)4	0.031**	0.045		0.026*	0.081**	
	(0.011)	(0.032)		(0.010)	(0.031)	
as.factor(rating)4/5 stars	-0.058***	-0.058***	-0.058***	-0.072***	-0.072***	-0.072***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
as.factor(rating)No previous rating	-0.128***	-0.128***	-0.128***	-0.172***	-0.172***	-0.172***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
entitlement	0.150***	0.143***	0.153***	0.145***	0.160***	0.173***
	(0.008)	(0.015)	(0.018)	(0.007)	(0.014)	(0.017)
nameDanish men	-0.011	-0.012	-0.011	-0.053***	-0.053***	-0.053***
	(0.011)	(0.011)	(0.012)	(0.011)	(0.011)	(0.011)
nameMuslim women	-0.019	-0.019	-0.019	-0.045***	-0.045***	-0.045***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
nameMuslim men	-0.061***	-0.061***	-0.061***	-0.098***	-0.098***	-0.098***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
as.factor(wage)2:entitlement		0.013			-0.010	
		(0.020)			(0.020)	
as.factor(wage)3:entitlement		0.025			-0.013	
		(0.020)			(0.020)	
as.factor(wage)4:entitlement		-0.009			-0.037+	
		(0.020)			(0.020)	
wage			0.011			0.024*
			(0.010)			(0.010)
wage:entitlement			-0.001			-0.011+
			(0.006)			(0.006)
R^2	0.129	0.129	0.128	0.142	0.143	0.142
Adj. R^2	0.128	0.128	0.128	0.142	0.142	0.142
Num. obs.	18174	18174	18174	18174	18174	18174
N Clusters	3029	3029	3029	3029	3029	3029

***p < 0.001; **p < 0.01; *p < 0.05; +p < 0.1

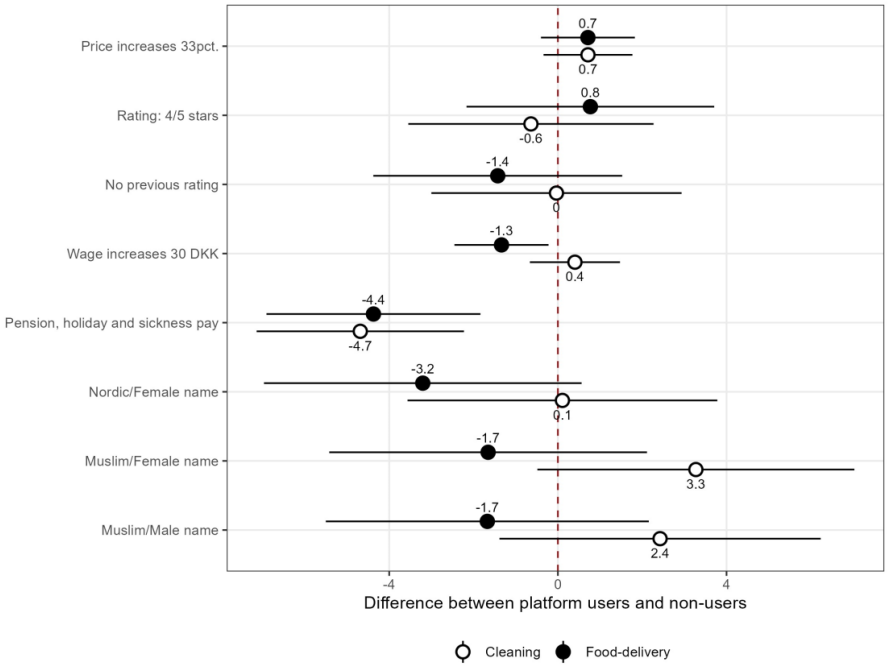
Table B2: Regression results for interaction effects between name-dimension and other vignette dimensions

	Food-delivery				Cleaning			
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**
(Intercept)	0.671***	0.651***	0.671***	0.672***	0.700***	0.705***	0.713***	0.690***
	(0.024)	(0.024)	(0.021)	(0.027)	(0.023)	(0.023)	(0.021)	(0.026)
price	-0.138***	-0.135***	-0.135***	-0.135***	-0.143***	-0.140***	-0.140***	-0.140***
	(0.007)	(0.003)	(0.003)	(0.003)	(0.006)	(0.003)	(0.003)	(0.003)
wage	0.009**	0.015*	0.009**	0.009**	0.007*	0.001	0.007*	0.007*
	(0.003)	(0.007)	(0.003)	(0.003)	(0.003)	(0.006)	(0.003)	(0.003)
rating4/5 stars	-0.058***	-0.058***	-0.062***	-0.058***	-0.072***	-0.072***	-0.107***	-0.072***
	(0.009)	(0.009)	(0.018)	(0.009)	(0.009)	(0.009)	(0.017)	(0.009)
ratingNo previous rating	-0.128***	-0.128***	-0.140***	-0.128***	-0.172***	-0.172***	-0.202***	-0.172***
	(0.009)	(0.009)	(0.017)	(0.009)	(0.009)	(0.009)	(0.017)	(0.009)
entitlement	0.150***	0.150***	0.150***	0.145***	0.145***	0.145***	0.145***	0.146***
	(0.008)	(0.008)	(0.008)	(0.014)	(0.007)	(0.007)	(0.007)	(0.014)
relevel(name, ref = "Danish men")Danish women	0.011	0.026	0.011	-0.004	0.036	0.035	0.019	0.075*
	(0.025)	(0.025)	(0.018)	(0.032)	(0.023)	(0.025)	(0.018)	(0.031)
relevel(name, ref = "Danish men")Muslim women	-0.034	0.011	-0.016	-0.008	0.011	-0.006	-0.024	0.005
	(0.025)	(0.025)	(0.018)	(0.032)	(0.024)	(0.025)	(0.018)	(0.032)
relevel(name, ref = "Danish men")Muslim men	-0.047+	-0.023	-0.063***	-0.061+	-0.067**	-0.069**	-0.065***	-0.062+
	(0.025)	(0.026)	(0.018)	(0.032)	(0.024)	(0.025)	(0.018)	(0.032)
price:relevel(name, ref = "Danish men")Danish women	0.000				0.007			
	(0.009)				(0.008)			
price:relevel(name, ref = "Danish men")Muslim women	0.011				-0.001			
	(0.009)				(0.008)			
price:relevel(name, ref = "Danish men")Muslim men	-0.001				0.009			
	(0.009)				(0.009)			
wage:relevel(name, ref = "Danish men")Danish women		-0.006				0.007		
		(0.009)				(0.009)		
wage:relevel(name, ref = "Danish men")Muslim women		-0.007				0.005		
		(0.009)				(0.009)		
wage:relevel(name, ref = "Danish men")Muslim men		-0.010				0.009		
		(0.009)				(0.009)		
rating4/5 stars:relevel(name, ref = "Danish men")Danish women			-0.003				0.049*	
			(0.024)				(0.025)	
ratingNo previous rating:relevel(name, ref = "Danish men")Danish women			0.004				0.053*	
			(0.025)				(0.024)	
rating4/5 stars:relevel(name, ref = "Danish men")Muslim women			0.001				0.051*	
			(0.024)				(0.025)	
ratingNo previous rating:relevel(name, ref = "Danish men")Muslim women			0.025				0.045+	
			(0.025)				(0.024)	
rating4/5 stars:relevel(name, ref = "Danish men")Muslim men			0.020				0.040	
			(0.025)				(0.024)	
ratingNo previous rating:relevel(name, ref = "Danish men")Muslim men			0.019				0.021	
			(0.024)				(0.024)	
entitlement:relevel(name, ref = "Danish men")Danish women				0.010				-0.015
				(0.020)				(0.020)
entitlement:relevel(name, ref = "Danish men")Muslim women				0.000				0.002
				(0.020)				(0.020)
entitlement:relevel(name, ref = "Danish men")Muslim men				0.008				0.011
				(0.020)				(0.020)
R^2	0.128	0.128	0.128	0.128	0.142	0.142	0.142	0.142
Adj. R^2	0.128	0.128	0.128	0.128	0.142	0.141	0.142	0.142
Num. obs.	18174	18174	18174	18174	18174	18174	18174	18174
N Clusters	3029	3029	3029	3029	3029	3029	3029	3029

***p < 0.001; **p < 0.01; *p < 0.05; +p < 0.1

Appendix C:

Figure C1: Effect heterogeneity between platform users and non-users



Appendix D:

YouGov

Page:

Du er ved at bestille rengøringshjælp til hjemmet via en app, og bliver præsenteret for to forskellige rengøringshjælpere.

Mulighed 1	Mulighed 2
Rengøringsassistenten hedder Zainab og er 30 år.	Rengøringsassistenten hedder Mustafa og er 30 år.
Zainab har en gennemsnitlig bedømmelse på 4 stjerner ud af 5 stjerner.	Mustafa har en gennemsnitlig bedømmelse på 5 stjerner ud af 5 stjerner.
Zainabs timeløn fra platformen er på 210 DKK.	Mustafas timeløn fra platformen er på 180 DKK.
Derudover betaler Zainabs platform for arbejdsskadeforsikring, samt feriepenge, løn under sygdom og pension.	Derudover betaler Mustafas platform for arbejdsskadeforsikring, men ikke feriepenge, løn under sygdom eller pension.
Prisen du skal betale er 875 DKK for rengøring af 100 m2.	Prisen du skal betale er 875 DKK for rengøring af 100 m2.

Hvilken af de to muligheder ovenfor vælger du?

- ○ Mulighed 1
- ○ Mulighed 2

Summary

This dissertation's point of departure is how digital labor platforms relate to the traditional labor market and existing patterns of inequalities in standard and non-standard work in Denmark. Digital labor platforms have been discussed as harbingers of a new future of work, drawing both scholarly and regulatory attention. The focus of this dissertation is to bring new empirical insights on the working lives of platform workers in Denmark.

In the dissertation's first article, I expand upon existing literature on digital labor platforms by examining the interconnections between digital labor platforms and the broader labor market. Through a combination of data from the Danish Labor Force Survey and register data on income and socio-demographic characteristics, the study identifies three distinct groups of platform workers: established workers with stable jobs, new labor market entrants (typically students), and transitional workers combining platform work with less secure employment or social benefits. The findings highlight the heterogeneous nature of platform workers and the significant impact of the broader labor market and welfare system on their circumstances. In the second article, I build on the first study and investigate labor market changes over time among platform workers who are working other jobs. Using longitudinal data, it compares the labor market trajectories of platform workers with other multiple jobholders. The study reveals noticeable labor market mobility among platform workers, i.e., experiencing upward job mobility and income growth over a three-year period. This contributes with a longitudinal, comparative perspective on platform workers' labor market trajectories. The third article addresses the segmentation of working time among platform workers, using longitudinal data from a leading food delivery platform in Denmark. It identifies three stable working time patterns: Dabblers, Temporaries, and Regulars, each with different engagement levels with the platform. The findings indicate that despite market fluctuations, working-time patterns remain consistent, suggesting the platform's role in facilitating diverse labor market positions. In the fourth and final article, I shift focus from workers to consumers, and explore how consumer attitudes towards working conditions and stereotypes may influence labor practices in the platform economy. Through a conjoint survey experiment, I find that consumers have a strong preference

for workers with access to social benefits and display biases based on gender and ethnicity. This study adds to the understanding of consumer influence on employment practices in the gig economy.

Taken together the dissertation makes significant empirical and analytical contributions to the study of digital platform work. Empirically, it utilizes a variety of data sources to reveal novel insights into platform work patterns in Denmark. Analytically, it introduces typologies on platform workers' activity patterns and their relationship to the traditional labor market, emphasizing the importance of understanding these interrelationships. Additionally, it highlights the role of consumers as key actors influencing labor relations. The findings underscore the complexity of assessing the precariousness of platform work without considering its context within the broader labor market and suggests directions for future research.

Sammenfatning

Denne afhandling tager afsæt i hvordan digitale arbejdsplatforme interagerer med det traditionelle arbejdsmarked og eksisterende mønstre i ulighed i standard- og atypisk arbejde i Danmark. Digitale arbejdsplatforme er blevet beskrevet som forløbere for en ny fremtid på arbejdsmarkedet, og har vakt stor interesse både akademisk og politisk. Afhandlingens formål er at bidrage med ny empirisk viden om folk der bruger arbejdsplatforme i Danmark.

I afhandlingens første artikel udbygger jeg den eksisterende litteratur om digitale arbejdsplatforme ved at kigge på forbindelserne mellem digitale arbejdsplatforme og det bredere arbejdsmarked. Ved at kombinere data fra den danske Arbejdskraftsundersøgelse med registre over indkomst og socio-demografiske karakteristika identificeres tre grupper af platformsarbejdere: etablerede beskæftigede, nyankommne på arbejdsmarkedet (typisk studerende), og løst beskæftigede, der kombinerer platformsarbejde med mindre sikre ansættelser eller sociale ydelser. Resultaterne fremhæver platformsarbejdernes heterogene natur og den betydelige indflydelse som det bredere arbejdsmarked og velfærdsamfundet har på deres vilkår. I den anden artikel bygger jeg videre på det første studie og undersøger ændringer på arbejdsmarkedet over tid blandt platformsarbejdere med anden primær beskæftigelse. Ved brug af longitudinelle data på arbejdernes arbejdsmarkedstilknytning sammenlignes platformsarbejdernes karriereforløb med andre multiple jobholders. Resultaterne viser en bemærkelsesværdig arbejdsmarkedsmobilitet blandt platformsarbejdere, hvor mange oplever opadgående jobmobilitet og indkomstfremgang over en treårigperiode. Artiklen bidrager med et komparativt, longitudinelt blik på platformsarbejderes arbejdsmarkedsforløb. I den tredje artikel adresseres segmentering af arbejdstid blandt platformarbejdere, ved hjælp af longitudinelle data fra en førende madudbringningsplatform (Wolt) i Danmark. Her identificeres tre stabile mønstre for arbejdstid: Dabblers, Temporaries og Regulars, der hver repræsenterer forskellige aktivitetsniveauer på platformen. Resultaterne indikerer, at på trods af markedsudsving forbliver mønstrene for arbejdstid stabile, hvilket antyder at platformen accepterer tilstedeværelsen af forskellige arbejdsmarkedssegmenter. I den fjerde og sidste artikel skifter jeg fokus fra arbejdere til forbrugere og udforsker hvordan forbrugernes

holdninger til arbejdsforhold og stereotype opfattelser kan påvirke arbejdsforhold i platformsøkonomien. Gennem et conjoint survey ekseperiment finder jeg, at forbrugerne foretrækker arbejdere med adgang til sociale ydelser samt udviser eksplicitte bias baseret på køn og etnicitet. Denne undersøgelse bidrager til forståelsen af forbrugernes indflydelse på arbejdsforhold i platformsøkonomien.

Samlet set bidrager afhandlingen både empirisk og analytisk til studiet af arbejde via digitale platforme i Danmark. Empirisk anvendes en række forskellige datakilder til at tilvejebringe nye indsigter i arbejdsmønstrene på og uden for arbejdsplatforme i Danmark. Analytisk introduceres nye typologier over platformarbejderes aktivitetsmønstre og deres forhold til det traditionelle arbejdsmarked, hvilket understreger vigtigheden af at forstå disse i sammenhæng. Desuden fremhæves forbrugerens rolle som nøgleaktør, der påvirker arbejdsforholdene. Resultaterne på tværs af de fire artikler understreger kompleksiteten i at forstå platformsarbejde og fremhæver vigtigheden i at tage hensyn til den bredere arbejdsmarkedskontekst.