Terrible Timing: The Causes and Consequences of Problematic Work Schedules

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Abstract

In an attempt to mitigate uncertainty stemming from volatile customer demand while keeping labor costs low, organizations in a host of industries frequently adjust when work occurs without taking employee input into account. The practices they use to do so often produce problematic schedules, or unstable and unpredictable hours that workers feel are out of their control and that negatively impact their lives, on and off the job. Drawing on a mix of quantitative and qualitative data from a multi-year study of a large U.S. retailer's supply chain division, this dissertation shows that the consequences of problematic schedules are real but not inevitable. In Chapter 1, I use detailed time-keeping records from 20,000+ hourly workers across multiple business functions to construct a multidimensional measure of schedule quality. I find variation in workers' exposure to problematic schedules, even after controlling for job, workplace, and worker characteristics, which I attribute to variation in the scheduling practices used by frontline managers. A crucial facet of job quality, schedules thus stratify workers in the same organization, and this is due not only to the work they perform but also to managerial discretion. In Chapter 2, I use interviews and fieldwork to document how frontline managers in the retailer's e-commerce fulfillment centers (FCs) go about the complex task of scheduling. I find that despite pressures for conformity, management teams in each FC use distinct bundles of scheduling practices, which each have predictable consequences for FC performance. The bundles emanate from and reinforce the local organizational cultures in which managers are embedded, making some FCs better places to work than others. In Chapter 3, I combine my measure of schedule quality with workers' employment histories, finding that problematic schedules are associated with substantial increases in job exit. As a whole, I show that scheduling practices that at first appear cost-effective actually raise turnover and reduce performance. At the same time, managers are not totally constrained by industry, technology, or company policy in how they schedule work hours—even in highly uncertain environments, they can implement scheduling practices that are better for workers while remaining competitive.

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I could not be more fortunate to have honed this craft as a member of the Institute for Work and Employment Research, known colloquially as IWER. Were I to produce anything of the caliber of what my teachers have already produced in their careers, I would consider it a smashing success. I mean it: I truly admire the scholarship of the IWER faculty and feel privileged to have learned from them and alongside them. Going forward, they will always be my imagined audience. They are sharp and generous and curious and committed to making the world better, which makes, I think, for a very good combination. I will miss not being able to hear their insights so regularly, not to mention getting a weekly dose of their mostly good cheer. I have gotten to learn from the best.

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INTRODUCTION

Over the past several decades, organizations in the U.S. and abroad have foisted a growing share of the risk they face onto their workforce. Whereas employers once at least partly insulated their employees from changing business conditions, employees are now more likely to experience market turbulence directly and individually (Cappelli, 1999; Jacoby, 2001; Kalleberg & Vallas, 2017). A number of management practices have enabled this risk redistribution, including the increasing use of layoffs, contingent pay, and temporary contracts (Bidwell et al., 2013).

This dissertation explores the crucial and under-appreciated role that the scheduling of work hours has played as a channel for redistributing risk from employer to employee. In a bid to match staffing with the ups and downs of consumer demand, employers increasingly seek to vary when and how often work is carried out (Lambert, 2008). For many employees, the practices used result in what I term *problematic schedules*: volatile and unpredictable hours that are out of employees' control, either because they do not have any actual say on when they start and stop work or because they perceive they have little ability to express their preferences. Flexible only from the employer's perspective, these sorts of schedules do not stem from the employee-driven practices popularly hailed for granting workers more autonomy but rather from employer-driven practices in which the need to manage business uncertainty predominates.

Given their abundance and impact, problematic schedules are of growing interest in organization theory, sociology, and employment relations (Bessa & Tomlinson, 2017; Feldman et al., 2020; Gerstel & Clawson, 2018), as well as in policymaking and practice (Kalloch et al., 2022; Williams et al., 2018; Wolfe et al., 2018). For one thing, such schedules are not confined to a small subset of the population: more than a third of U.S. workers likely face them in some form (Fugiel & Lambert, 2019). For another, just as we know that rising exposure to market

competition and demand volatility has brought about a general decline in a host of employment outcomes (Kalleberg, 2011), mounting evidence shows that problematic schedules, in particular, harm worker well-being, health, and economic security (Schneider & Harknett, 2019). Most of these insights, however, come from research looking across populations. We know much less about why, how, and to what end organizations use practices that produce problematic schedules.

To help fill this gap, I present three studies based on a multi-method investigation of scheduling in the supply chain division of a large U.S. retailer, placing particular emphasis on its warehouse operations. Warehouses are preeminent sites for the transference of business risk onto workers via their schedules. Today, high performing warehouses are expected to be "agile," adjusting operations in real time to respond quickly and efficiently to fluctuating customer demand (Christopher 2000), and many warehouse managers see flexible staffing as an especially effective way to do this (Baker 2008). As a result, warehouse workers stand as buffers against uncertainty, with their schedules often suffering. This dissertation shows how warehouse managers use schedules to mitigate uncertainty and how this impacts the workers they oversee.

Warehouses also arguably represent a new phase of blue-collar work. Hallmark investigations of work and organizations in the middle of the 20th Century, like Walker and Guest (1952), Chinoy (1955), and Blauner (1964), focused on the biggest firms of their age, the automakers. Were they to scrutinize today's analogs, they would focus on the likes of Amazon and Walmart, firms with expanding e-commerce footprints and extensive roles in global supply chains. Indeed, warehouses provide work for more than 1.3 million people in the U.S., a number projected to grow faster than the overall labor force (U.S. Bureau of Labor Statistics, 2017, 2021b), possibly making up for many of the jobs lost in brick-and-mortar retail (Mandel, 2017). The Covid-19 pandemic has only heightened warehouses' economic significance, with many

consumers relying on them to get products to their front doors instead of venturing out to retail establishments. What's more, warehouses figure prominently in recent discussions over wages (Sheehan, 2021), safety (Athena Coalition, 2019), unionization (Long, 2021), automation (Gutelius & Theodore, 2019), and surveillance (Moore et al., 2018). Thus, this dissertation illuminates a critical setting for understanding contemporary management practices as well as the work experiences of those in a rapidly expanding sector of the economy.

In the first chapter, I show that work hours are not distributed equally, even among those who perform the same job for the same employer. I begin by introducing my conception of a problematic schedule, arguing that work hours are an important indicator of job quality. With detailed timekeeping records for more than 20,000 hourly workers, I then construct a novel, multidimensional measure of schedule quality, using it to examine the range and frequency of problematic schedules in this firm's supply chain division. I am able to look across business functions (e.g., warehousing, delivery, call centers), job types, establishments, and individuals. I find that business functions that are more directly exposed to consumer demand tend to give their workers worse schedules. However, even within functions, there is significant variation in schedule quality, suggesting that processes that occur at the level of the establishment can make schedules more or less problematic. My analysis points to frontline managers and the scheduling practices they use as a possible source of heterogeneity.

In the second chapter, I show how problematic schedules are made. Previous research often treats scheduling as straightforward and routine, overlooking the complex dynamics and contestation surrounding the allocation of work hours (Kossek et al. 2016). To shine light on the scheduling practices themselves, I go to the ground floor of this firm's warehouses, documenting how managers go about scheduling, based on interviews and limited fieldwork in six different

establishments. I focus specifically on the firm's fulfillment centers (FCs), which handle e-commerce orders. I find that rather than a straightforward task of posting work hours, scheduling in the FCs entails daily negotiations between managers and workers and implicates multiple tools and technologies. Significantly, I find that the way managers adjust hours varies across FCs. In any given FC, certain scheduling practices tend to hang together as bundles, producing predictable patterns of work hours, some of which are less problematic than others, as well as predictable consequences for overtime, job satisfaction, and turnover. I attribute the bundles to the local organizational cultures circulating inside the FCs.

In the third chapter, I use my measure of schedule quality to show that FC workers with more problematic schedules are more likely to exit the firm. In line with the overall rates for the warehousing industry, these FCs lose more than 40 percent of their workers each year, a large share of whom quit within several months of taking the job. I find that exposure to a very problematic schedule can more than double the risk that a worker leaves. I also find that what makes a schedule problematic differs for full- and part-time workers. The first group is most affected by long, late, and variable hours, and the second group is most affected by short and variable hours. Thus, this firm experiences repercussions for offering problematic schedules in the form of increased turnover and higher recruiting costs.

Read together, this dissertation makes several primary contributions to organization theory, sociology, and employment relations. First, I develop a measure of schedule quality that captures multiple dimensions of work hours. Up to this point, most research focuses on a single dimension and relies on self-reported, rather than actual, data on work hours. Second, I quantify how problematic schedules, despite their profusion, are costly to employees and employers. While they may reduce labor outlays, problematic schedules heighten turnover and sometimes

compromise productivity, quality, and safety. Third, I develop a new account of intra-organizational variation in management practices, which recent research shows to be the course of things yet has not fully explained. Whereas predominant theorizations assert that variation arises through a diffusion process in which managers customize well-established blueprints to their settings, I argue that it can occur because organizational cultures vary at the local level in such a way that many workplace-specific management practices do not generalize to become field-wide institutions or company-wide best practices. The differences in scheduling practices I observe stem overwhelmingly from managers' attempts to handle operational challenges in situ, not from market or institutional pressures or from the adoption of already existing best practices. An important insight is that local differences in culture and practice produce heterogeneity in job quality within organizations. Fourth, I elaborate how scheduling happens in the warehousing industry, perhaps the new blue-collar workplace *par excellence*, and, in the process, show that problematic schedules are not the only option available to organizations concerned with managing risk: better ways of scheduling that do not compromise performance yet leave workers better off are possible.

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CHAPTER 1—THE VARIETIES OF TEMPORAL EXPERIENCE: THE DISTRIBUTION OF PROBLEMATIC SCHEDULES ACROSS BUSINESS FUNCTIONS, JOBS, AND WORKPLACES

When it comes to job quality, some organizations are recognized for being good places to work and others for the opposite. Costco and Market Basket, for example, are regularly hailed for providing their employees with above-market wages, job security, and respectful treatment (Cascio, 2006; Korschun & Welker, 2015). Walmart and Amazon, on the other hand, receive scrutiny for subjecting their employees to intense levels of control and surveillance while giving them little reason to stick with the job (Guendelsberger, 2019; Reich & Bearman, 2018; Vallas et al., 2022). This perspective is one that views organizations as either good or bad throughout.

Seeing organizations as homogenous aligns with many existing theories of organizations and empirical approaches to studying them (Davis, 2010), as well as folk opinions (Ashforth et al 2020). With respect to job quality, in particular, organizations are often understood to have certain ways of arranging work, either because of their industry (Datta et al., 2005; Osterman, 2018) or the commitments of their executives (Steffensen et al., 2019), resulting in them being good or bad places to work. Yet there is evidence across multiple domains that organizations are not unified but are instead replete with variation. Wages (Barth et al., 2016), human resource management practices (Bloom et al., 2019; Ichniowski et al., 1997; McGovern et al., 1997), safety compliance (Gray & Silbey, 2014)—key correlates of the experience of work—all vary within organizations. Despite signs that job quality varies within organizations, however, this sort of variation has not been examined in depth.

The goals of this chapter are thus twofold. First, I quantify the extent to which job quality varies within an organization. Second, I locate the sources of the variation I uncover. In essence,

I answer the following question: why do some people have worse jobs than others? Is it because of what they do, where they work, or who they are? Or some combination of all three?

To achieve these goals, I examine the distribution of schedule quality inside a large U.S. retailer. Schedules are a significant but, until recently, underappreciated aspect of job quality, serving to distinguish better jobs from worse ones (Kalleberg, 2011). Although wages typically receive the most attention in research on job quality, schedules can have as large an effect as pay levels on worker well-being and economic security (Schneider & Harknett, 2019). I evaluate this crucial aspect of job quality by creating a novel, multidimensional index with detailed timekeeping records for the more than 20,000 hourly workers employed in this retailer's supply chain division from 2017 to 2019. The index arrays workers each month from lowest to highest quality schedule according to the length, predictability, and timing of their work hours. I then decompose the index's variance, teasing out the relative importance of different influences on schedule quality. Due to the scope of my data, I am able to look at the influence of business function, workplace or establishment, job, and individual worker characteristics on schedule quality. Because the study takes place inside a single organization in a single country, I am also able to hold constant differences in schedule quality that might be attributable to firm strategy or the institutional environment (Berg et al., 2004; Rubery et al., 2005).

I document substantial within-organization variation in schedule quality, even among those who hold the same job title and perform the same work tasks. Some workers regularly experience long, late, and unstable hours, while others experience a more conventional schedule. Schedule quality is most closely associated with business function, which delimits the primary activities in which workers engage and the end-users they serve. Schedules are more problematic in functions where workers are more exposed to fluctuations in consumer demand, such as

warehousing and delivery. Yet within function, some workers still experience much worse schedules than others. In explaining this variation, I find nearly as big a role for establishment as I do for job type, even though the latter has commonly been taken to be a major influence on one's work hours (Gerstel & Clawson, 2018; Golden, 2001). To understand why establishment has so large an influence, I perform a supplementary analysis, focusing on a single business function (warehousing) for which I have data on establishment- and worker-level characteristics. I find that the variation across workplaces persists even after controlling for expected predictors of schedule quality, like staff size and workload. In other words, the schedules of two workers performing different jobs in the same workplace are more likely to be similar than the schedules of two workers performing the same job in different workplaces. I attribute this residual, which cannot be entirely explained by the types of workers employed at the site, the technologies they use, the tasks they perform, or the policies to which they are subject, to the practices used by the operations-level managers in charge of creating schedules in particular workplaces. In netting out the effects of workplace-level predictors of schedule quality, I also find persistent race and gender gaps in schedule quality, further suggesting that managers play a role in shaping temporal experiences at work and do so differently based on workers' demographics or identities.

In outlining the contours of schedule quality within an organization, I make several contributions. First, my finding that schedule quality and thus job quality varies inside a single firm highlights the value of looking inside the black box that is the organization to locate the determinants of good jobs (cf. Jiang et al., 2013; Ramsay et al., 2000). Without denying that industry, occupation, and organization are central to shaping work experiences, I show that the place in which one works is also influential. Cross-establishment heterogeneity is promising because it signals that organizations can propagate better employment practices by examining

what some of their units are already doing—rather than blaming poor schedules or job quality on either their market strategy (e.g., a commitment to quick delivery times) or competitive pressures within their industry more broadly. I identify local management teams as a key source of variation in schedule quality, in line with recent expositions emphasizing frontline managers as the crucial link between employment practices and employee outcomes (Kehoe & Han, 2020).

Second, I make two contributions to the literature on work schedules. One, I construct comprehensive measures of schedule quality when, up to this point, data limitations have served as a constraint. Public datasets in the U.S., such as the General Social Survey (GSS), do not typically ask questions with enough specificity or breadth to accurately describe a worker's hours (Lambert & Henly 2014, Golden 2014), and studies that have used more detailed measures, such as Schneider and Harknett (2019), rely on self-reported rather than actual measures of a worker's time on the job. In addition, existing research tends to be cross-sectional. We thus do not know what schedules the subjects in these studies *actually* get over time. I use my index of schedule quality to track several features of work schedules that previous studies have indicated can negatively impact workers. Two, I provide evidence that schedules are unequally distributed *within* organizations. Workers employed in the same firm are exposed to different degrees of variable, unpredictable, long, and late hours. With this finding, I advance the notion of within-organization temporal inequality, arguing that schedule quality should be added to the list of well-known sources of stratification in firms, such as wages or status.

Job quality within organizations

Discussions about job quality are often grounded in industries (e.g., Carré et al., 2012; Osterman, 2020). Competitive pressures that are felt similarly by firms in the same industry are held to make certain employment practices more effective and thus more common, minimizing firm to firm variation in outcomes important to employees (Kaufman & Miller, 2011; Osterman, 2018). That being said, there are often substantial differences in job quality within industries, even in those associated with an abundance of bad jobs (Meisenheimer, 1998). In line with this insight, some scholars have taken to singling out organizations that offer higher quality jobs than their competitors (e.g., Gittell, 2005; Ton, 2014).

Both approaches pay minimal attention to differences in job quality that may arise within organizations, leading to conclusions that certain industries are destined to be home to bad jobs or that employers who provide better jobs than their competitors are idiosyncratic (Osterman, 2018). And yet, while there is limited research on within-organization variation in job quality *per se*, there is evidence showing variation in things related to it, as well as good reason to expect job quality to vary across units of the same organization. A first supporting finding is that wages—often seen as the primary measure of job quality (Kalleberg, 2011)—differ greatly across establishments of the same firm (Barth et al., 2016). A second supporting finding is that human resource management practices also differ from site to site (Bloom et al., 2019; Ichniowski et al., 1997; McGovern et al., 1997). Within-organization variation is also not surprising to those who understand workplaces as the primary level at which material and symbolic resources are created and obtained, in turn generating distributional inequalities (Baron & Bielby, 1980; Tomaskovic-Devey & Avent-Holt, 2019). It is within organizations that managers engage, oversee, reward, and discipline workers, in turn shaping the quality of their jobs. The way managers do this depends on the social relations, norms, and practices at work in their workplaces.

For these reasons, there is value in looking inside organizations to document how and why some jobs are better than others. Analytical issues, however, complicate this task. Job quality is multifaceted and hard to measure; relevant data are not easy to come by (Findlay et al., 2013). An analysis of schedule quality provides an entry point.

Schedule quality within organizations

Recent research has emphasized the "temporal dimension" of work, arguing that schedules are a major component of job quality (Lambert et al., 2019; Schneider & Harknett, 2019). Not all schedules are equal (Gerstel & Clawson 2018), compromising job quality for some workers. What makes these workers subject to worse schedules than others?

Like the job quality research described above, studies of schedule quality have paid limited attention to differences within organizations. Instead, they have focused predominantly on occupation (e.g., Feldman et al., 2020; Kossek & Lautsch, 2017) and industry (e.g., Golden, 2001; Golden & Wiens-Tuers, 2005) as the major determinants of work hours. This approach has been fruitful. Organizations provide their incumbents with a set of commitments, responsibilities, and relationships, segmenting the temporal structure of life (Zerubavel, 1979). Those in lower status occupations, such as truck drivers (Viscelli, 2016) and fast food workers (Talwar, 2002), are usually granted little control over how they use their time and are subject to close monitoring and frequent scheduling changes. At the other extreme, high status occupations, like consulting (Blagoev & Schreyögg, 2019) and banking (Mazmanian et al., 2013), typically come with the expectation that workers will be readily available on short notice and at any hour. Industries make specific demands on their workers' time, largely due to their need to coordinate particular

sets of tasks (Thompson, 1967). Manufacturers, for example, often maintain tightly controlled shifts throughout the day and night so that their operations can run continuously (Perrucci & Macdermid, 2007).

Nonetheless, there are indications that schedule quality varies within industries and organizations as well. As preliminary evidence, research from The SHIFT Project finds that workers who have the same employer are subject to different levels of hours instability (Schneider & Harknett, 2019; Storer et al., 2020). Studies have just begun to dig deeper into why this might be the case. Current explanations pin the cause on the managers who are tasked with implementing and maintaining schedules (Kossek et al., 2016; Lambert & Haley, 2021; Ch.2 of this dissertation). From a theoretical standpoint, temporality is constructed through the local synchronization of actual people and tasks (Fine, 1990), and workplaces are where managers enact the scheduling practices that produce certain temporalities. Therefore, looking at schedules inside organizations can illuminate what influences job quality.

Measuring schedule quality

A work schedule cannot be characterized by a single feature. Although some schedules may be notable for their length, others for their variability, others for when they occur, and still others for something else, all schedules can be arrayed and compared by their different features. To account for the ways in which schedules vary, Lambert and Henly (2014) argue for assessing schedule quality on four dimensions: the 1) number of hours, 2) timing of hours, 3) predictability of hours, and 4) workers' ability to control their hours.

What constitutes a low quality schedule will depend on where the schedule is located within each of these dimensions. Research suggests that working very long or very short hours, working at night, experiencing last minute schedule changes, and having little say over when and where work is carried out are undesirable from workers' point of view (Bloom et al., 2015; Kelly et al., 2014; Mas & Pallais, 2017) and may yield negative physiological, psychological, economic, and employment outcomes (Bolino et al., 2021; Choper et al., 2021; Nijp et al., 2012). Importantly, these dimensions are additive: a schedule that is undesirable on two dimensions will be more problematic than a schedule that is undesirable on only one.

Hereafter, I deem a *problematic schedule* to be a low-quality schedule characterized by volatile and unpredictable hours that are out of employees' control, either because the employees do not have any actual say on when they start and stop work or because they perceive they have no say. This definition is necessarily general, serving more as a shorthand for the numerous ways in which a schedule can negatively impact a worker's life, on and off the job. Nevertheless, it encompasses a broad set of schedule types that present challenges for a worker. For example, a schedule with a fluctuating number of weekly hours is a volatile one, just as is a schedule with variable start times. By a similar token, a schedule that deviates from what a worker expected when she took the job is unpredictable and so is a job where a worker is on call. These different sorts of schedules all fall under the umbrella of a problematic schedule.

Although these components of a problematic schedule are widely recognized, measuring them in practice has proved difficult. A first issue, few existing studies use multiple measures, even though the major takeaway from Lambert and Henly (2014) is that problematic schedules must be assessed holistically. Apart from the work of Schneider, Harknett, and colleagues (2021; 2019; 2020), there is in little in the way of research that simultaneously examines multiple

dimensions of work schedules. Instead, most studies tend to focus on a single element (e.g., Dunifon et al., 2013; Swanberg et al., 2005; Wight et al., 2008). This "collapsing" of variation to a single dimension risks leading researchers to conclude that a given schedule is more or less problematic than the schedule really is, and it makes comparing schedules across employment contexts and research settings difficult because studies do not use like measures (Fugiel & Lambert, 2019).

A second issue concerns data limitations. Most of our knowledge about the distribution of schedule quality across the population comes from large-scale surveys, such as the General Social Survey (GSS). These sources are overly broad in that they rarely capture all of the various dimensions of schedule quality. They also often cannot provide granular information on their respondents, such as details about workplaces, and they suffer from the fact that their measures are self-reported and infrequent (something that can also be said about the instrument used by Schneider, Harknett, and colleagues). A lack of longitudinal data is particularly challenging for the study of problematic schedules because the dimensions of a problematic schedule (e.g., fluctuations in work hours) are most appropriately measured over time, with a sufficient number of observations, and because schedules change day to day, week to week, and season to season. Such dynamics are largely lost in cross-sectional data. To be sure, increasing access to companies' administrative records has allowed some researchers (e.g., Chung, 2022; Hashemian et al., 2020) to examine the actual schedules experienced by a sample of workers, but these studies suffer from the initial limitation of focusing only on a subset of the dimensions of schedule quality. Existing research leaves us, therefore, with measures of problematic schedules that do not adequately account for the varieties of temporality that workers experience.

Research setting and data

The Sigma supply chain

Sigma[1] is a mid-sized (market cap: ≈$5.5 bn), U.S.-based retailer with about 40,000 full-time and 30,000 part-time employees globally. It sells a diverse set of products to households and firms across the U.S. and Canada at brick-and-mortar retail stores, online, and through business contracts. The company is split into retail and supply chain divisions, with separate management and reporting structures. The present study focuses on the entire set of permanent,[2] hourly workers in the U.S. supply chain from 2017-2019.

The U.S. supply chain employs around 9,000 hourly workers at any one time in one of six business functions: warehousing, shipping and delivery, installation, production, call centers, and administration. Warehousing is further separated into fulfillment and distribution. Each function engages in a primary business activity. Fulfillment centers (FCs) prepare orders received through Sigma's e-commerce channel and business contracts. Distribution centers (DCs) prepare new stocks of inventory for Sigma's retail stores (and thus serve as the one interface between Sigma's retail and supply chain divisions). Shipping and delivery transports orders primarily to DCs and to customers who have business contracts with Sigma; shipping companies, such as FedEx, handle transportation to households. Installation sets up orders at customers' workplaces and homes. Production manufactures promotional goods and custom

[1] The name has been changed to preserve confidentiality. Some details, such as the types of products the company sells or exact number of establishments it has, have also been changed for this reason.
[2] Data on temp staff are available, but they are left out the present analysis because it is difficult to determine the kind of schedule they expect to receive when they are assigned to a Sigma job.

orders. Call centers provide customer support and telemarketing. Administration houses various sorts of office work, including finance, IT, and marketing.

A few features of Sigma operations are worth keeping mind. One, the exchange of people and resources between functions is minimal. The closest cross-function interaction occurs between warehousing and shipping when delivery drivers receive and drop off loads at the warehouse loading dock, but the two functions are managed and staffed independently. Two, workers can and do move across jobs and sites when they change positions, but this is a relatively rare occurrence. Three, certain jobs, like clerical work and HR services, are found across functions. Hence, the functions are not made of entirely distinct sets of jobs: not all work in the production function, for example, involves assembly. That said, certain jobs are more or less common in each function, and some are entirely unique to a function. Breakpack picking, for example, which entails retrieving individual items for home delivery, is found only in the FCs.

Table 1 provides descriptive statistics on the six functions. In total, there are roughly 200 sites operating in more than 30 states. Most sites are involved in administrative work or shipping and delivery, but most of the 20,000+ supply chain workers are employed in the FCs. Because salaried workers are missing from the sample, it is likely that the office workforce is substantially larger. The other functions have salaried workers in their management ranks, but these make up a much smaller share of their workforce. The majority of hourly workers are full-time. All sign on to Sigma with the expectation that they will work a certain number of hours each day, ranging from four to 12, and that they will work, for the most part, on the same days each week.[3]

[3] Those working for ten hours per day work four days per week; those working twelve-hour days work three days per week. Week to week, workers on these longer shifts sometimes come to work on different days.

---Insert Table 1 with descriptive statistics here---

Admittedly, focusing on a single firm comes with limitations. This sample covers multiple workers, workplaces, jobs, and institutional environments (i.e., states with different scheduling legislation),[4] but it does not cover multiple industries or organizations *per se*. The lack of industries is arguably less concerning than the lack of organizations. Although Sigma may ultimately be considered a member of the retail sector, its multidivisional form means that its business functions cut across industries (Chandler, 1980). What's more, in several of the large-scale surveys that inform research on schedule quality, such as the Current Population Survey (CPS), industry is classified at the establishment level, which means that Sigma sites involved in, say, shipping products would be classified differently than sites involved in marketing as long as they are not co-located, even though both sites ultimately fall under the retailer's purview. For this reason, it is not out of the question to think of Sigma's business functions as situated in different industries.[5]

Sigma scheduling data and sample

The data come from the timekeeping records Sigma uses to track how long its hourly employees spend at work. An internal system records the time and date when a worker "swipes" her ID in and out, marking the start and end of her workday. Lunch breaks, absences, tardies, early departures, and other attendance events are also recorded. Each row of data contains identifiers

[4] A collective bargaining agreement only covers one site, having been acquired after a union contract was in place.
[5] Sigma owns several subsidiaries that operate under different corporate names and with their own management teams. They are excluded from the present study but could figure as separate organizations in future analyses.

that allow workers to be located in jobs, in workplaces, and in functions, over time. The data also contain a shift designation, which the timekeeping system uses to calculate overtime eligibility; the shift designation indicates the number of hours an employee expects to work each day and week and thus differentiates part-time and full-time workers.

The sample was selected as follows. To be included, a worker must be observed at work[6] for at least five days between 2017 and 2019. Sites with fewer than four workers were also discarded. This yielded 6.9 million worker-days, including absent days, from 20,914 workers. The average worker is observed at work 294 times, which suggests she was employed by Sigma for about one year and two months.

For a subset of workers (10,278), I have additional records on their demographic characteristics, employment histories, and workplaces. These workers are all part of the FC function. I use this data in a secondary analysis to drill further down into the sources of variation in schedule quality.

Constructing a problematic schedule index

To assess the distribution of schedule quality across Sigma, I develop a multidimensional index. I draw from Lambert and Henly (2014) to select its components. The nine measures making up the index, displayed in Figure 1, capture different aspects of a worker's schedule, corresponding to the number of hours worked, nonstandard timing, and predictability.

[6] I use "observed at work" to indicate that a worker swiped into the timekeeping system, recording some number of work hours (i.e., daily work hours > 0). Absences, where daily work hours equal zero, are also in the data. An absent worker would not be "observed at work."

---Insert Figure 1 with problematic schedule index components here---

To create the index, for each worker I first calculate the individual components and then average them over a given month, which in this case is a "period," a calendar unit that Sigma uses to track business performance and plan its fiscal year.[7] I then perform a min-max normalization so that all components range from zero to one. Finally, I take each worker's period average across all components and multiply it by 100 to arrive at an overall score. This yields an index value for 332,268 worker-periods.

A few features of the index are worth emphasizing. First, while this index provides a measure of schedule quality in general, I label it a "problematic schedule index" because an increase in any one of its components is associated with what existing research would count as a lower quality and thus more problematic schedule. Hence, a higher index value indicates a more problematic schedule.

Second, because of the min-max normalization, it is also a relative index. It is best suited for comparing schedules within Sigma to evaluate whether some are more problematic than others, rather than for making statements about a particular schedule's absolute quality. For this reason, it would not make sense to compare the index values for workers at another organization to the values of those who work at Sigma unless the index components from both organizations were pooled together before calculating the composite score.

[7] A period is roughly a month, or 30 days, long and typically begins and ends in parallel with a calendar month, give or take a few days. The benefits of using periods are twofold. One, the period system keeps weeks together that cross two months; if one were to calculate monthly averages of weekly measures, such weeks would be artificially separated. Two, to the extent that Sigma makes business decisions on a period timeline that end up affecting work schedules, these changes are more likely to be captured

Third, a strength of the index is that it encompasses several time horizons: the day, the week, and the period. Emphasizing one horizon at the expense of another can lead to mistaken conclusions about schedule quality. Consider two workers who each spend 45 hours at work over the course of five days. The first worker spends nine hours on the job every day; the second worker spends 12 hours on Monday, 11 hours on Tuesday, and eight hours the rest of the week. Although their weekly hours totals are the same, their schedules are likely to be experienced very differently. In the first, long hours are spread throughout the week. In the second, the long hours are concentrated at certain points in the week. By a similar logic, it is one thing to work 12 hours every Monday and another thing to unexpectedly work 12 hours on a particular Monday. As far as I know, no existing measures of schedule quality can make such fine-grained distinctions.

Fourth, for many of the components I count total hours worked as the total number of hours *spent* at work. Workers are not paid for their 30-minute lunch break, so earning eight hours of pay requires spending 8.5 hours at the workplace. Accordingly, when calculating differences between actual and expected hours spent at work, I add 30 minutes to all expected shift lengths for shifts that are supposed to last longer than six hours[8] and 2.5 hours (.5 x 5) to the expected weekly hours for those who typically spend 40 hours on the job.[9] Normally, this operationalization has the effect of making my measure differ from the total number of hours reported on a worker's paycheck by a small, set amount. Sometimes, however, workers take longer breaks, leading to larger divergences between their hours spent at work and the hours of work for which they are paid. Although my measure of the total number of hours spent at work

[8] All workers are eligible for a lunch break after spending six hours on the job in a single day, regardless of part-time or full-time status.
[9] I adjust this number for workers who typically spend three or four days on the job or who are granted longer lunch breaks due to state law or job type.

may not be reflected in a worker's paycheck, it is a better indicator of the possible conflicts that may arise from spending extended stretches of time on the job.

Fifth, I account for absences, tardies, and early leaves in calculating the index components. Taking a vacation or time off, showing up to work late, or leaving early are all opportunities for workers to exert some control over their schedule. If a problematic schedule is one over which a worker has little say, these events make the schedule less problematic, albeit marginally so. Variable hours that are imposed on the worker, on the other hand, work in the opposite direction, detracting from schedule quality. To account for this, I leave absences out of the calculation of all measures. (In the analyses, I control for total hours worked in a period, which is related to absences.) I also do not include the hours over which a worker was tardy or absent in calculating the index components. Including them would equate days in which hours fell below what was scheduled because of manager discretion with days in which they fell below what was scheduled because of worker discretion.

Finally, the index is weaker on some dimensions than others. Notably absent is the dimension of control, which is central to much existing research on problematic schedules (e.g., Kelly & Moen, 2007; Swanberg et al., 2011). This is a limitation of the data. Nevertheless, there is reason to believe that this dimension of schedule quality would exhibit low levels of variation were it to be included, given the sample of workers in this study. For one thing, reduced control is inherent to hourly work, in contrast to salaried work, because hourly workers' time on the job is closely monitored. For another, Ch. 2 shows that Sigma workers in one business function, the FCs, have and perceive that they have very little say over their hours. This is likely to be the case for workers in the DC and shipping functions as well. Schedule predictability is also hard to measure with this index because I do not directly observe whether a shift was changed at the last

minute and because workers in this sample all receive advance notice of their work hours, in that they all have a putatively set schedule. Nevertheless, a glance at certain worker's hours, such as those shown in the figures below, suggests unpredictability is a common characteristic of Sigma work hours. That is, some workers' hours are not patterned but instead jump from day to day. In addition, interviews and fieldwork conducted for Ch. 2 show that last-minute shift extensions are a common occurrence in the FCs. In any event, the index captures start and stop time fluctuations, providing one measure of predictability. The actual versus expected hours components get at predictability as well: when hours depart from what a worker signed up for, the hours are in essence misaligned with what would be predicted based on the worker's shift.

Problematic schedules across Sigma

A glimpse at the temporal experience of a Sigma worker

Sigma's timekeeping records allow for an in-depth examination of the schedules experienced by a host of workers performing different lines of work in different settings. Figure 2 depicts the possible sources of variation in schedule quality at Sigma: function, workplace (establishment), job, and worker. The figure includes an intervening level (market/customer) to signify that DCs and FCs are both engaged in warehousing but serve different customers. The box outlining the institutional environment signifies that the workplaces are located in different parts of the U.S., where scheduling laws may be differ.

---Insert Figure 2 on sources of scheduling variation at Sigma here---

To provide an initial impression of schedule quality at Sigma, I randomly selected a full-time worker from an office, FC, and DC and examined their hours. Here I present several dimensions of their schedules in graphic form. Figure 3 illustrates the amount of time each worker spent on the job each day in the sample window, and Figure 4 illustrates the times at which the worker started his or her day.

---Insert Figure 3 with select workers' daily hours worked here---

---Insert Figure 4 with select workers' start times here---

Several initial insights about the number, timing, and predictability of these workers' hours can be gleaned. First, the schedules clearly vary from worker to worker. The length of the office worker's day is tightly bound around eight hours, and his or her days consistently begin at 7:30 a.m.; the few occasions when this worker comes in at a different time tend to be later in the day. Together, the figures suggest that the office worker has a highly predictable schedule. The DC worker also tends to put in eight hours each day, but this schedule is punctuated by stretches of days of 10 or more hours and the occasional short workday. This suggests that there are times of the year when the DC in which this person works is busier than other times. The FC worker's hours display the most volatility. These hours tend to be longer, sometimes reaching the extremes of 15 hours. The fluctuations appear to rise and fall throughout the year, suggesting there is seasonality to FC work. This worker also starts his or her day much earlier than others, around 4 a.m., though this time fluctuates frequently as well. Second, the quality of these three

schedules appears to differ. The FC worker's schedule seems more problematic than the DC worker's, which seems more problematic than the office worker's. In words, the FC worker frequently experiences long, nonstandard, and unpredictable hours. At the other extreme, the office worker possesses the typical eight hours-per-day, five days-per-week schedule. The DC worker's schedule is somewhere in the middle: it features large swings in hours, but these seem to be regular and perhaps even predictable.

The variation in schedule quality persists when we look at the workplaces and jobs in which these select workers are situated. Figure 5 displays the total daily hours worked by all employees in the same workplaces as these three workers. Figure 6 displays the typical hours of operation in these sites. The office hours appear steady, occurring between 7 am and 5:30 pm and lasting for six to 10 hours. The DC hours span a wider range, from four to 11 hours, and they bunch at certain durations, like five and nine hours. There seems to be two distinct shifts in the DC: a normal day shift and an evening shift that ends around midnight. The FC hours are much more dispersed. In general, they are longer and more variable, though some workers routinely work five hours each day. The FC is also continuously active, with downtime only occurring around 3 a.m. All in all, the select three workers' schedules appear similar to others in their workplaces.

---Insert Figure 5 with select workplaces' daily hours worked here---

---Insert Figure 6 with select workplaces' typical hours of operation here---

Figure 7 parallels Figure 5, displaying the daily hours of workers in the same jobs across workplaces. That is, it compares the randomly chosen office worker to workers with the same job at other Sigma workplaces and does the same for the FC and DC workers. The similarities between the select workers and others in the same job are less apparent. Hours in the office job are steady but more dispersed. The DC job exhibits a variety of shift durations. The schedules associated with the FC job are much more heterogeneous.

---Insert Figure 7 with select jobs' daily hours worked here---

Exploring the sources of variation in schedule quality at Sigma

Data visualizations provide preliminary evidence that schedule quality is unequally distributed across Sigma. They suggest, moreover, that the chance that a worker's schedule is problematic is more closely tied to her place of work and the function in which she is engaged than to her job. The problematic schedule index allows for an investigation of whether these patterns hold across the Sigma supply chain.

Applying the index to Sigma's hourly workforce

Table 2 provides summary statistics on the index components, and Figure 8 shows the index's distribution across Sigma. The mean score is 14.18 with a standard deviation of 8.42. The low mean indicates that most workers do not have a particularly problematic schedule compared to

their coworkers. The highest score is 56.75, indicating that no worker is subject to a schedule that is especially problematic along all dimensions[10].

---Insert Table 2 with problematic schedule index summary statistics here---

---Insert Figure 8 with index histogram here---

Yet the long right tail evident in Figure 8 suggests that problematic schedules are not distributed equally at Sigma. About a quarter of observations have an index rating greater than 20, and there is a mass of observations with index scores around 30. Hence, there is substantial heterogeneity in schedule quality at Sigma.

Examining individual workers' scores demonstrates that the index is able to capture actual differences in schedule quality. As an example, the worker with the worst index score is a full-time production worker whose schedule vacillates between morning and night shifts of different durations. On some days, he or she starts at 8 a.m. and works for about eight hours; on other days, he or she starts at 5 p.m., working past midnight, for a total of 11 hours. On one week, this person put in 18 hours of work; on another week, the total was 40. The worker with the least problematic schedule is an office worker who clocks in every workday between 7:29 and 7:31 am and clocks out at exactly 4 pm every single day, without a single deviation.

Decomposing the variation in schedule quality

[10] This is partially an artifact of the index's construction: some components, such as hours greater than and less than expected, tend to move in opposite directions, making it unlikely that a worker fairs poorly on both dimensions.

Figure 8 shows that schedule quality varies across workers at Sigma, but it does not identify the sources of variation. I employ a mixed effects model to assess whether workplace, job, or business function explains a greater share of the variation in the problematic schedule index.

Because it estimates the variance attributable to different levels of clustering, the mixed effect model can indicate whether workers' schedules are more similar because of where they work, the jobs they perform, or the business functions they serve. In the specifications reported here, I treat business function, workplace, job, and worker as separate random effects. Because workers can move across jobs, workplaces, and functions, and jobs are found in multiple workplaces and functions, they are crossed, rather than nested, random effects; nested would imply that a worker only has one job in one workplace in one function (Hox et al., 2017). I include controls for total hours worked over the period and shift duration because these variables likely shape whether a worker is at risk of a problematic schedule, and I add fixed effects for period and year to account for seasonal and annual trends in work hours.

The estimates of interest are the variances of the random effects, which show how much of the index variation is attributable to worker, workplace, job, and business function. These shares are captured by the intraclass correlation coefficient (ICC), which is a measure of the proportion of total variance explained by a given level in the model.

Table 3 displays the ICCs for the full model, which includes all controls and fixed effects. The full model results are displayed in Appendix Table A1.

---Insert Table 3 with ICCs---

The largest share of variation occurs at the level of the worker. That is, from period to period, a worker's schedule is highly correlated. This should come as no surprise because Sigma workers are assigned to schedules, which they tend to experience repeatedly unless they switch jobs, workplaces, or functions. Business function has the next largest ICC, explaining around 20 percent of variation in the index. To put this into context, the ICC suggests that the schedules of two randomly selected call center workers' who may have different job titles are more likely to be similar than the schedules of two forklift operators' who have the same job but work in different functions. The remaining variation is attributable to workplace and job type. It is interesting that both levels of clustering explain similar shares of variation, the implication being that schedule quality can vary within jobs across sites. In addition, job and workplace do not explain a trivial amount of the variation: the cutoff for a "low" ICC is typically held to be 0.05.

The mixed effects model estimates can also be used to examine the range in schedule quality across workplaces, jobs, and functions. Figure 9 illustrates this distribution across functions. It shows how much the predicted mean schedule index (the random intercept) for each business function differs from the overall sample mean, after accounting for the other sources of variation. There are clear differences in schedule quality by business function. FCs have, on average, the most problematic schedules; offices have the least.

---Insert Figure 9 showing function intercepts here---

Extending this analysis to the other levels, Figure 10 shows the average intercepts by workplace. The figures are notable for showing substantial heterogeneity. That is, even within functions, some workplaces are characterized by much more problematic schedules than others.

---Insert Figure 10 showing workplace intercepts here---

Taken together, the results suggest the business function in which a worker is engaged plays a primary role in shaping the kind of schedule she experiences. Looking at the individual dimensions of the problematic schedule index shows what is behind these differences. Figure 11 plots each function's predicted mean value for the individual index components. Lines closer to the periphery correspond to higher scores. These charts confirm the previous findings, showing FC workers possess the most problematic schedules. A mean index rating of 17.10 puts the average FC worker's schedule at the 70th percentile in Sigma's overall distribution. The reasons for this ranking are that FCs typically have long, late, and variable hours. DC's, which have the second most problematic schedules, appear to subject their workers to a different temporality. The issue for these workers seems to be a perennial lack of work, reflected in hours that are less than expected and in variable end times. At the other extreme, office hours are much more tightly concentrated at the center of the chart and thus less problematic on most dimensions.

---Insert Figure 11 showing index components by function here---

Looking more closely at the sources of variation

Although the results so far show variation in schedule quality, they do not pin down its sources, nor do they reveal if there are systematic differences in the types of workers who get problematic schedules. I investigate these questions using additional data from the FCs. With this data, I am

able to quantify the variation that may be due to worker and workplace characteristics. It could be, for example, that certain workplaces employ different kinds of workers (e.g., more men than women) or that certain workplaces have distinct production processes, both of which might yield certain quality schedules. Furthermore, there may be concerns that two jobs in different functions are not comparable (though studies focused on occupations necessarily make such comparisons across organizations and industries), such that it does not make sense to look at their correlations. At Sigma, however, jobs in the same function largely entail the same tasks, designed according to standard operation procedures. Hence, looking only at the arguably allows for more appropriate comparisons.

In a second analysis, I add worker- and workplace-level variables as well as additional random effects to the mixed model specification. The worker variables are gender, race, tenure, and age, which have been shown to influence schedule quality (Golden, 2001; Storer et al. 2020). The workplace variables are the average number of workers the FC employed over the period, the share of workers who were part-time, the share of workers who were temps, the number of orders it received, and the primary technology it uses to move boxes throughout the building (hand-pulled carts, conveyors, or robots). The first three of these variables reflect whether the FCs use different labor strategies, and the second two reflect whether the FCs have different productive capacities. Together, they control for the possibility that the FCs maintain different production regimes (Dörflinger et al., 2021). In addition to the job and worker random effects, I include a work department[11] random effect so that this level of the organization is reflected in the variance decomposition.

[11] Work departments handle particular steps in the fulfillment process. Inside a department, the job tasks and shift times are similar. All workers are assigned to a particular department.

Table 4 displays the results. At the level of the FC, larger shares of part-time workers and temps are associated with more problematic schedules. Larger buildings tend to have better schedules. Technology is not a strong predictor of schedule quality, though the use of conveyors is weakly associated with worse schedules. For workers, tenure and age are associated with better schedules. Women tend to have better schedules than men. Workers of color tend to have worse schedules than their white coworkers.

---Insert Table 4 showing FC regression results---

With the addition of these explanatory variables, the estimates account for more of the sources of variation in schedule quality, and yet the levels of clustering continue to explain differences in schedule quality. Looking at the ICC from this model, displayed in Table 5, workplace has replaced business function in explaining the largest share of variance after worker, and is now followed by department. Surprisingly, job's share of the variance has shrunk. We would expect the same job to be more similar within function (e.g., order pickers in different FCs) than across them (e.g., maintenance worker in warehousing versus delivery), yet this is not the case.

What stands out about these results is that they show a worker would be just as likely to improve her schedule by switching workplaces as she would by switching departments. Departments have distinct job tasks, demands, and shifts, and the same departments are found in each FC. As such, it would be reasonable to expect there to be greater differences between departments than FCs, but this is not the case. The lingering importance of workplace in spite of

the added explanatory variables suggests that there must be other factors that account for the correlation of schedule quality at the level of the establishment.

---Insert Table 5 showing FC ICCs here---

Discussion

Organizations are more like puzzles than stacking dolls. Though their units share certain characteristics that enable coordination, their units are at the same time distinct; they are not all miniature versions of some prototypical form nor do they all resemble each other. Existing research demonstrates that these distinctions are substantial when it comes to the performance and pay levels of workplaces owned by the same firm. This study shows this to be true for job quality as well.

Focusing on schedules as a crucial dimension of job quality, I find that workers' temporal experiences vary considerably within a single organization. The predominant influence on schedule quality in this study is business function. The patterns identified above point to a possible explanation. Functions bound the tasks that need to be performed, who they need to be performed for, and the pace at which they need to be performed. The three functions with the most problematic schedules at Sigma are directly involved in meeting customer demand, which is highly variable. FCs, which have the most problematic schedules, are subject to the most volatile demand because they receive orders throughout the day and race to fill them within 24 hours. DCs are also involved in warehousing, but they serve Sigma retail stores, which tend to request inventory in regular intervals; DCs are indirectly impacted by customer demand. Shipping and delivery serve customers that tend to put in orders at scheduled times, thus leading

to more predictability. That said, many of those employed in this function must leave their workplace to carry out their jobs, exposing them to another external shock: traffic. It follows that business function may indicate the degree to which workers and the business activities they conduct are exposed to environmental uncertainty. At Sigma, workers in some functions are less buffered from external shocks than others, and this translates into their work hours.

At the same time, business function does not wash away the importance of job type or workplace in influencing schedule quality. That job types are sources of variation accords with much of the existing research on occupational differences in schedule quality. That workplace plays a similar role in explaining the variation has only been suggested in recent work (Kossek et al., 2016; Lambert & Haley, 2021). If schedules vary from workplace to workplace even when the workplaces serve the same functions and house similar jobs, it seems that frontline managers, in enacting scheduling and human resource practices, are integral to shaping workers' experiences of time. One's line of work is thus not totally determinative of schedule quality or job quality—it also depends on whom one works with and for.

Supporting this role for managers, a supplementary analysis that controlled for establishment-level characteristics showed that workplace is as important as the tasks a worker performs in shaping her work hours. That is, even after accounting for operational features of a workplace, including size, technology, and business volume, workplace continues to explain a portion of the variation in schedule quality. Although a direct examination of this lingering effect is beyond the scope of this study (but see Ch. 2), the results raise the possibility that something intangible, like the practices managers use or their relations with workers, may be in play.

The supplementary analysis also showed that different kinds of workers get different kinds of schedules. In particular, workers of color and male workers tend to have more

problematic schedules, even after controlling for the type of jobs they do and their work experience. Workers in the same job may have different schedules because they have different preferences or because their managers have assigned them different schedules, perhaps reflecting discrimination by race or gender or other worker characteristics in the allocation of more attractive schedules. This finding warrants further investigation.

Limitations

Future research can improve upon this study in several ways.

There is first the caveat that comes with all studies of a single organization: Sigma may be unique. However, given the research showing that problematic schedules are not uncommon in the U.S. and that they vary within industries, it is unlikely that Sigma is the only organization with a heterogeneous set of schedule types. What is more limiting about focusing on a single organization is that it makes it impossible to explore several other possible sources of variation in schedule quality. This includes the proclivities of top management (Hambrick & Mason, 1984) and the effects of path dependency (Stinchcombe, 1965). That said, there is good reason not to pin all of this study's findings on the particularities of Sigma. For one, the fact that there is so much variation across the organization weighs against conceiving Sigma as a monolith. There are also the details that many of Sigma establishments were acquired and thus have their own legacies and that business functions are granted high levels of autonomy. And yet without being able to analyze variation at a higher level—across organizations—I cannot see if the sources of variation attributed to function, workplace, or job would be swamped by organization-specific effects. Future research at Sigma could exploit the fact that it owns several subsidiaries—not

included in this sample but for which data do exist—that operate independently and can hence be thought of as separate organizations.

Data limitations mean this study is only able to analyze hourly workers. This is despite the fact that Sigma employs high status professionals who can be expected to put in long hours (Feldman et al., 2020). A lack of salaried workers is likely to be a general limitation of studies that use administrative records, given that hourly workers are more likely to be monitored, their times recorded, than salaried workers (Williams & Boushey, 2010). That said, if one assumes that schedules for salaried and hourly workers follow a similar tempo within function, we would not expect these findings to change much were salaried workers included. Indeed, normative pressures lead managers to put in the same (or longer) hours as their subordinates (Perlow, 1998) as does the fact that mangers in many business functions must be physically present to oversee their staff. The study also leaves out temporary workers, who are likely to have schedules that are problematic on multiple dimensions.

As previously mentioned, the index in this study lacks a measure of schedule control. Including such a measure would likely show additional heterogeneity in Sigma schedules. Hourly workers at Sigma are subject to mandatory overtime. Workers who more frequently receive mandatory overtime have less control over their schedules. Because overtime is not equally distributed across the firm, neither is control. Adding control to the problematic schedule index would help to further distinguish the temporal experiences of Sigma workers.

A remaining drawback is that this study classifies a schedule as problematic according to past research findings. It does not do so according to whether a worker *actually* perceives it to be a problem. Consequently, it is possible for a worker to have a schedule that by all measures is a bad one and yet be satisfied with it. Such a situation is likely to occur in instances where workers

self-select into jobs with problematic schedules because the hours complement their needs out of work. An example would be a worker who takes the nightshift in order to care for a child during the day. Of course, just because the worker prefers her problematic schedule does not render the schedule unproblematic—nightshifts, for example, are still associated with poor health outcomes (Kecklund & Axelsson, 2016)—but it is worth exploring whether a worker's perceptions of her schedule matches the diagnosis. Interviews with Sigma workers carried out as part of this research project show that many experience their schedules as problematic. One way to gauge workers' impressions of their schedules would be to look at their revealed preferences: how do they react to being exposed to a problematic schedule? Such an analysis is carried out in Ch. 3, which examines turnover in response to problematic schedules. Taking this approach has the added benefit of showing which dimension of a schedule is most problematic. In the present study, all index components receive equal weight, but it remains to be seen whether certain components are experienced by workers as more problematic than others.

Implications

Hours are not distributed equally at Sigma. Some workers experience schedules that have been shown to negatively impact job performance, health, and personal life, whereas others rarely encounter those schedules. Accordingly, schedules play a role in differentiating workers within this organization. Schneider and Harknett (2019) urge scholars and practitioners alike to consider "temporal precarity" on par with economic precarity in stratifying workers across the labor market. This study shows that work hours also stratify workers within organizations. Given the role that work hours play in shaping life outcomes, it follows that schedule quality should figure

alongside other widely recognized inequalities operating within organizations, like earnings and status (Baron, 1984).

The problematic schedules found at Sigma are at risk of becoming more common in other organizations. This tendency is likely strongest among businesses engaged in e-commerce. In attempting to deliver goods to customers as quickly as possible, these businesses are increasingly opting for flexible staffing strategies that entail adjusting schedules in response to fluctuating demand. This move will have significant consequences for a large and growing share of the U.S. workforce. Vast supply chain networks, which connect producers, warehouses, and consumers, underpin quicker delivery times; they require a large supply of workers, making the warehousing industry among the fastest growing sources of employment in the U.S. (Cumming & Zickhur, 2022). Given this outsized growth, it is informative to compare schedules in Sigma FCs to the schedules in its production facilities. For many, manufacturing is the archetypal blue-collar work. At Sigma, FC schedules appear to be more extreme versions of the manufacturing ones. FC hours are longer, more variable, and more likely to occur at nonstandard times.

Although the pressures may be less, workers outside the e-commerce industry are also susceptible to deteriorating schedule quality. Employers are increasingly likely to push market turbulence onto their workforce (Cappelli, 1999; Jacoby, 2001; Kalleberg & Vallas, 2017). In the case of scheduling, this means "passing the buck" (Lambert, 2008a) to workers by adjusting their hours in line with the vicissitudes of demand. If current trends in staffing are to continue, workers in customer-oriented functions are especially likely to face more problematic schedules.

If there is a silver lining, it is that, despite pressures for worse schedules, schedule quality has not converged at Sigma. Even within business function and job type, there is still variation in schedule quality, and even within those functions and jobs with the most problematic schedules,

on average, some workers have more favorable temporal experiences. Hence, if there is a race to the bottom, it is not proceeding so fast that there are no alternative courses of action. The task is to figure out what currently enables the existence of good schedules at Sigma. Rather than looking outward to see what other industries or organizations are doing, Sigma can turn inward if it wants to find ways to improve schedule quality. Some Sigma workplaces, and likely their management teams, have figured out how to buck the trend instead of passing the buck.

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Tables and figures

Tables

Table 1: Descriptive statistics of hourly workers in sample

	Total	Call center	DC	FC	Installation	Office	Production	Shipping
# Hourly workers	20,914	968	1,469	11,503	450	3,519	765	2,710
Mean obs. per worker	294.24	400.78	336.46	256.71	454.74	357.09	354.07	298.99
# Hourly workers by shift length								
4	504	55	13	238	0	18	23	158
5	1,076	12	25	902	1	5	18	116
6	2,508	17	26	2,319	1	8	8	131
8	17,421	923	841	9,080	446	3,504	739	2,333
10	389	40	9	244	3	2	1	91
12	618	0	618	0	0	0	0	0
Daily hours worked								
Mean	8.40	8.13	8.94	8.09	9.22	8.50	8.41	9.02
SD	1.96	1.84	2.11	2.07	1.62	1.47	1.62	2.01
Weekly hours worked								
Mean	36.38	34.86	34.12	35.55	40.43	37.58	36.68	38.83
SD	11.47	11.30	11.50	11.32	12.14	10.03	11.44	13.04

This sample covers all permanent hourly works employed in the Sigma U.S. supply chain from 2017 to 2019. To be included, workers must appear in the data for at least five workdays. Sites with fewer than 4 workers were discarded.

Table 2: Summary statistics of problematic schedule index components

	Variable	Mean	SD	Min	Max	1	2	3	4	5	6	7	8
1	**Daily hours greater than expected**	0.07	0.08	0.00	1.00								
2	**Weekly hours greater than expected**	0.05	0.07	0.00	1.00	0.96							
3	**Daily hours less than expected**	0.07	0.08	0.00	1.00	-0.39	-0.4						
4	**Weekly hours less than expected**	0.05	0.07	0.00	1.00	-0.42	-0.4	0.92					
5	**Range in weekly hours**	0.36	0.20	0.00	1.00	0.02	-0.03	0.17	0.12				
6	**Daily nonstandard hours share**	0.27	0.33	0.00	1.00	-0.04	-0.03	0.18	0.16	0.07			
7	**Weekly nonstandard hours share**	0.33	0.31	0.00	1.00	-0.02	0.00	0.15	0.14	0.07	0.97		
8	**Start time variation**	0.02	0.05	0.00	1.00	0.09	0.06	0.07	0.04	0.07	0.09	0.08	
9	**End time variation**	0.06	0.07	0.00	1.00	0.18	0.09	0.34	0.26	0.20	0.11	0.11	0.61

These raw values have not been normalized. N = 332,268 worker-periods from 20,848 workers.

Table 3: Proportion of variance explained by each clustering level across Sigma

Group	ICC
Individual	0.487
Job	0.094
Workplace	0.085
Function	0.196
Residual	0.139

The ICC represents the proportion of total variance explained by each group. These values come from the full mixed effects model, Model 2, shown in Appendix Table A1.

Table 4: Mixed effect estimates of schedule quality across FCs

	Model 1
Intercept	20.355 (0.797)***
Total hours worked	-0.012 (0.000)***
Shift length: 4 hr	-0.100 (0.196)
5 hr	0.006 (0.105)
6 hr	0.398 (0.068)***
10 hr	3.239 (0.146)***
Female	-0.405 (0.094)***
Race/ethnicity: AIAPI	0.495 (0.239)*
Black	0.529 (0.133)***
Hispanic	0.263 (0.136)+
Multiracial	0.157 (0.237)
Age	-0.032 (0.004)***
Wage	0.040 (0.015)*
Tenure: First 90 days	0.854 (0.058)***
90 days - 1 year	0.704 (0.041)***
2 - 3 years	-0.525 (0.047)***
3 - 4 years	-0.656 (0.067)***
4 - 5 years	-0.953 (0.088)***
5+ years	-1.590 (0.096)***
FC technology type: Conveyor	1.409 (0.726)+
Robotics	0.911 (0.735)
FC order volume (1000s boxes)	0.001 (0.000)*
FC avg. share PT workers (%)	0.032 (0.004)***
FC avg. share temp workers (%)	0.048 (0.003)***
FC avg. headcount	-0.010 (0.001)***
Worker random effects?	Yes
Job random effects?	Yes
Department random effects?	Yes
Site random effects?	Yes
Period fixed effects?	Yes
Year fixed effects?	Yes
N	144,669
RMSE	3.536

Standard errors in parentheses. The reference category for shift length is eight hours; for tenure, it is 1-2 years; for race/ethnicity, it is white; for technology, it is hand picking. Age and wage are centered at the sample median.

Table 5: Proportion of variance explained by each clustering level in FCs

Group	ICC
Individual	0.433
Workplace	0.083
Department	0.082
Job	0.051
Residual	0.352

The ICC represents the proportion of total variance explained by each group. These values come from the FC mixed effects model, Model 2, shown in Table 4.

Figures

Figure 1: Problematic schedule index components

Dimension	Sub-dimension	Measure
Number of hours	Actual versus expected hours	**Daily hours greater than expected** $D = \begin{cases} 1, actual\ daily\ hours > expected\ daily\ hours \\ 0, actual\ daily\ hours \leq expected\ daily\ hours \end{cases}$ $\frac{1}{days\ worked\ in\ period} \sum D(actual\ daily\ hours\ - expected\ daily\ hours)$ **Weekly hours greater than expected** $D = \begin{cases} 1, actual\ weekly\ hours > expected\ weekly\ hours \\ 0, actual\ weekly\ hours \leq expected\ weekly\ hours \end{cases}$ $\frac{1}{weeks\ worked\ in\ period} \sum D(actual\ weekly\ hours - expected\ weekly\ hours)$ **Daily hours less than expected** $D = \begin{cases} 1, actual\ daily\ hours < expected\ daily\ hours \\ 0, actual\ daily\ hours \geq expected\ daily\ hours \end{cases}$ $\frac{1}{days\ worked\ in\ period} \sum D(expected\ daily\ hours\ - actual\ daily\ hours)$ **Weekly hours less than expected** $D = \begin{cases} 1, actual\ weekly\ hours < expected\ weekly\ hours \\ 0, actual\ weekly\ hours \geq expected\ weekly\ hours \end{cases}$ $\frac{1}{weeks\ worked\ in\ period} \sum D(expected\ weekly\ hours\ - actual\ weekly\ hours)$
	Fluctuations in hours worked	**Range in weekly hours** $\frac{max(weekly\ hours\ worked\ in\ period) - min(weekly\ hours\ worked\ in\ period)}{max(weekly\ hours\ worked\ in\ period)}$
Nonstandard work timing	Hours at nonstandard times	**Daily nonstandard hours** $\frac{1}{days\ worked\ in\ period} \sum \frac{actual\ daily\ hours\ - actual\ daily\ hours\ outside\ 6\ am - 6\ pm}{actual\ daily\ hours}$ **Weekly nonstandard hours** $\frac{1}{weeks\ worked\ in\ period} \sum \frac{actual\ weekly\ hours\ - actual\ weekly\ hours\ outside\ 6\ am\ -\ 6\ pm}{actual\ weekly\ hours}$
Predictability	Fluctuations in start and stop times	**Variability in start times** $1 - \left(\frac{1}{days\ worked\ in\ period} \sqrt{\sum \sin \frac{2\pi start\ time}{60 \cdot 60 \cdot 24}^2 + \sum \cos \frac{2\pi start\ time}{60 \cdot 60 \cdot 24}^2} \right)$ **Variability in end times** $1 - \left(\frac{1}{days\ worked\ in\ period} \sqrt{\sum \sin \frac{2\pi end\ time}{60 \cdot 60 \cdot 24}^2 + \sum \cos \frac{2\pi end\ time}{60 \cdot 60 \cdot 24}^2} \right)$

Figure 2: Sources of variation in schedule quality at Sigma

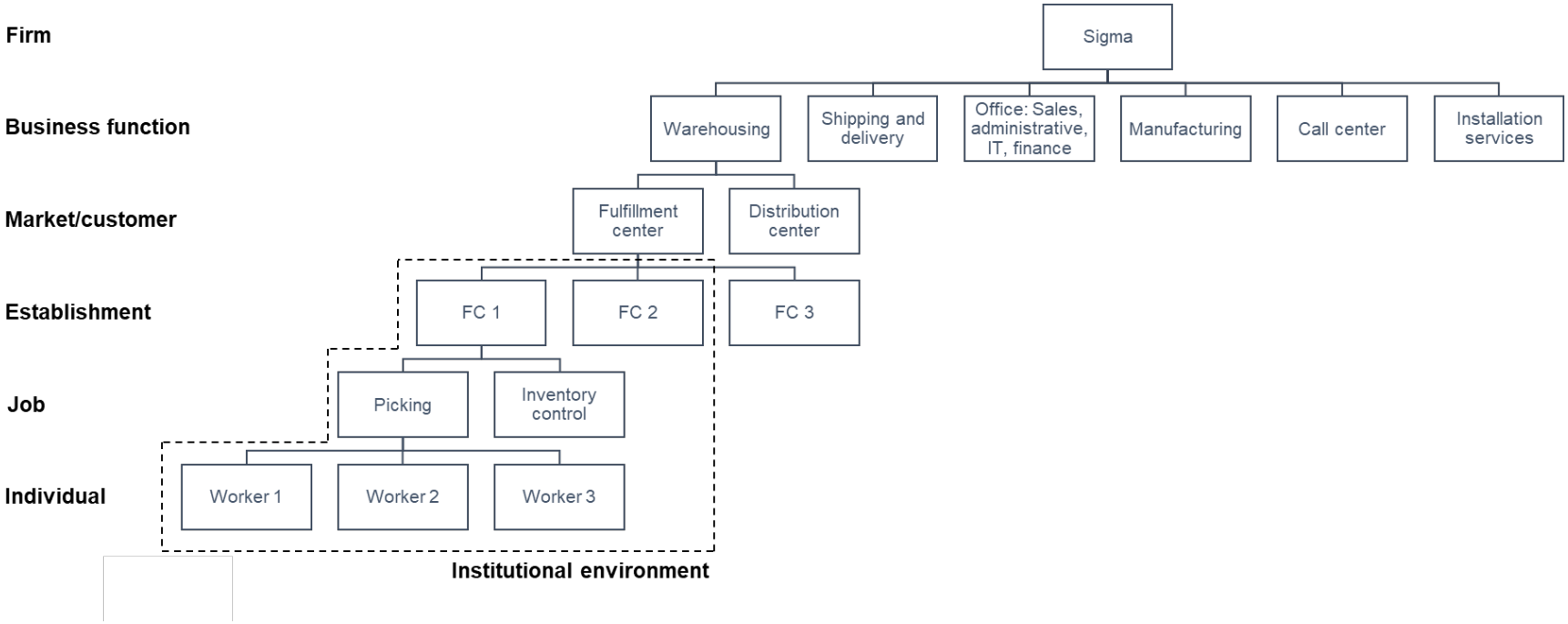
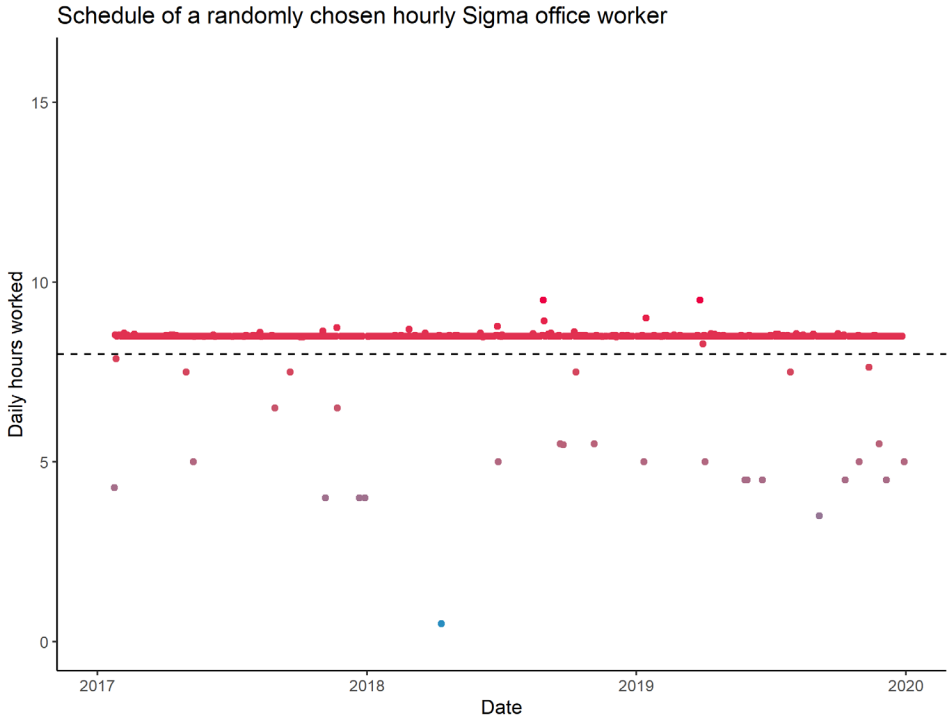
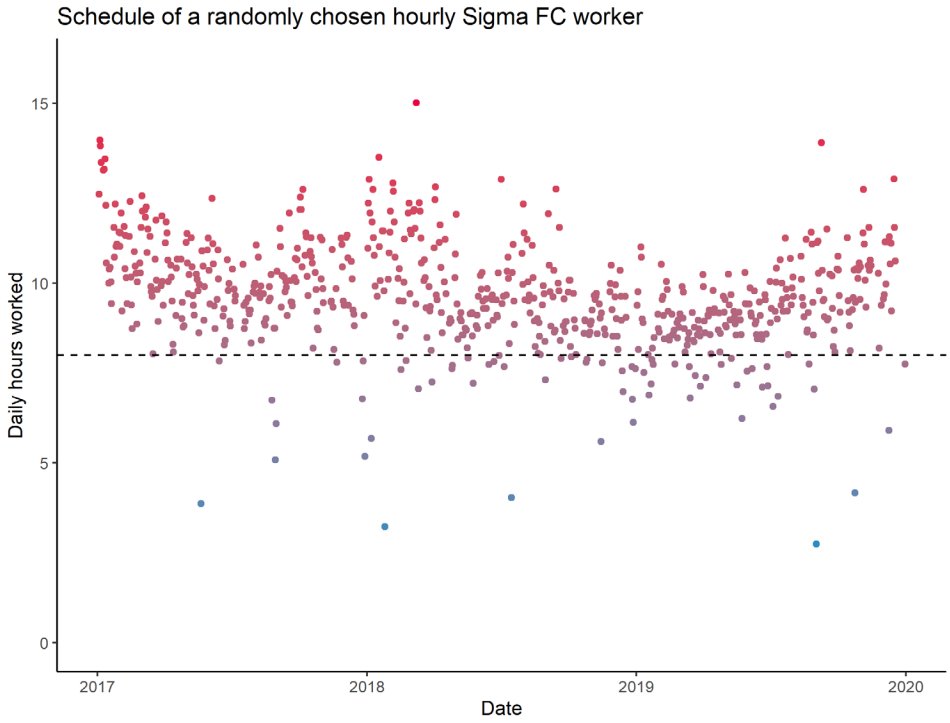


Figure 3: Example of daily hours worked by select office, FC, and DC worker





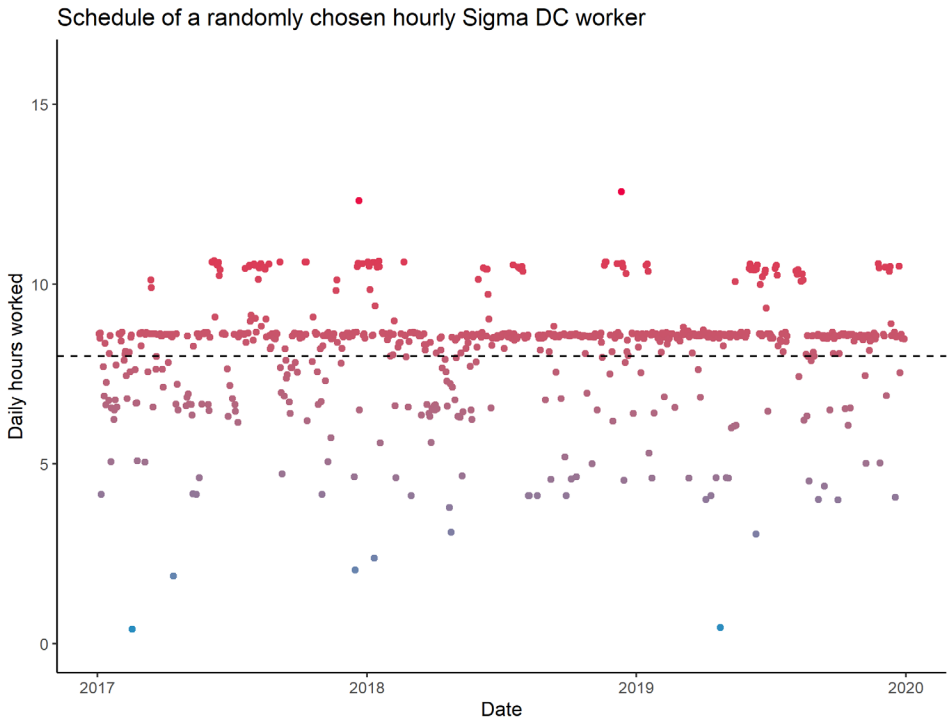
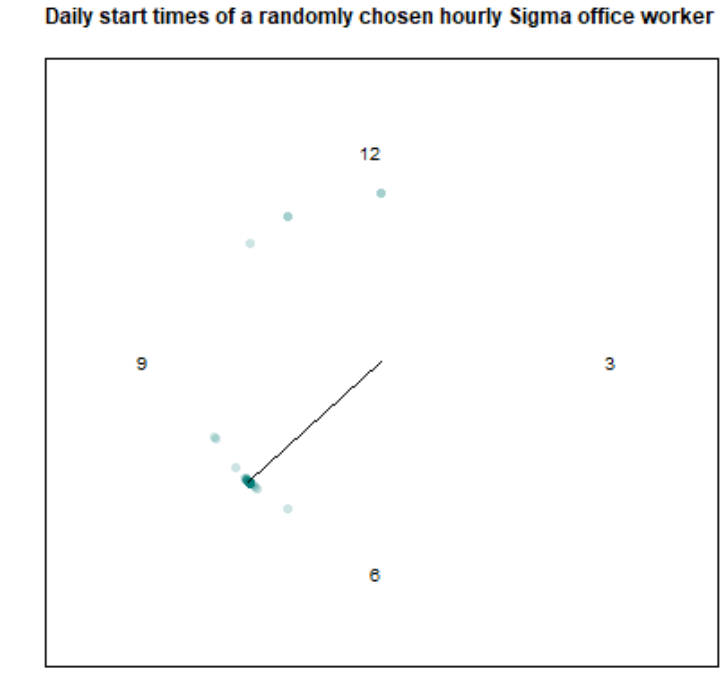
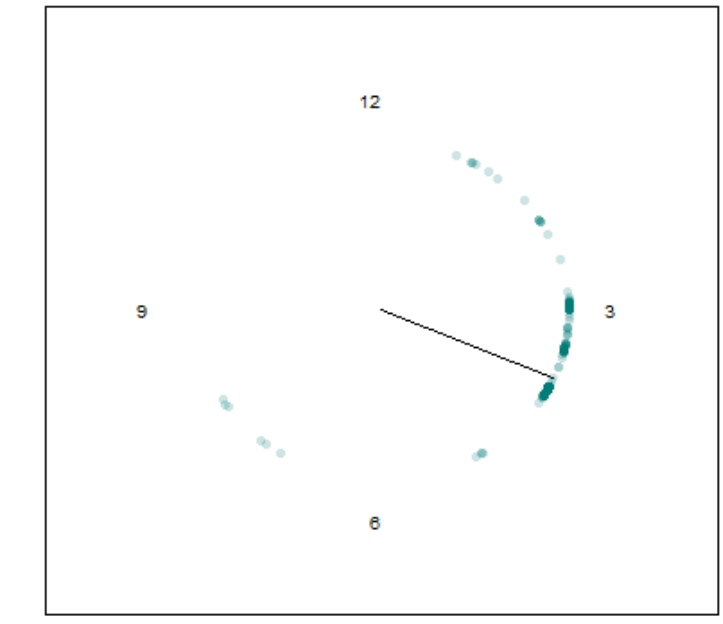

Schedule of a randomly chosen hourly Sigma DC worker
Daily hours worked
15
10
5
0
2017
2018
2019
2020
Date

Figure 4: Example of daily start times by select office, FC, and DC worker

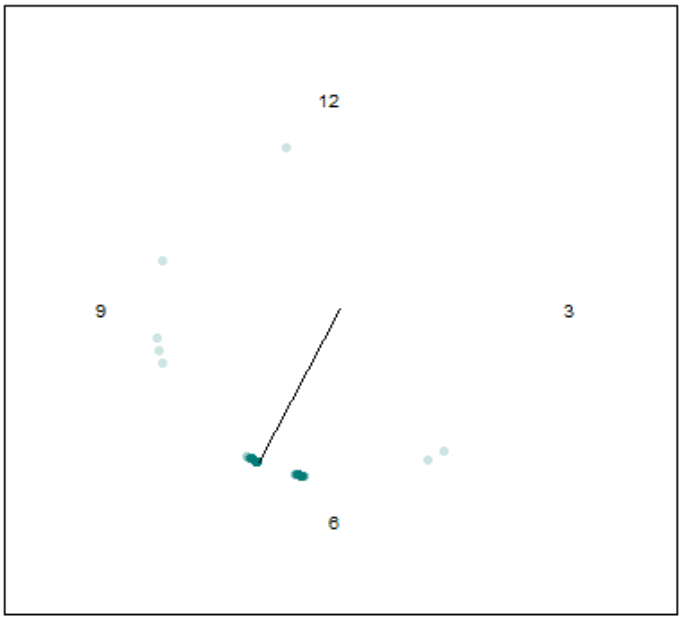


Times are in a.m.
Line represents mean start time. Darker points indicate a higher density of start times.
Data cover 2017-2019.



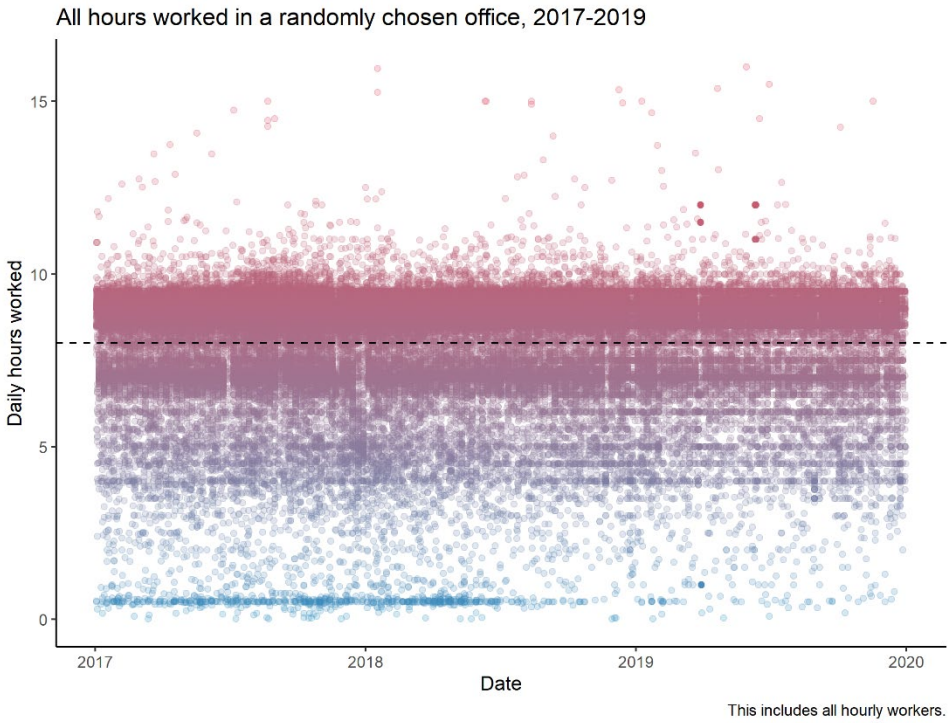
Times are in a.m.
Line represents mean start time. Darker points indicate a higher density of start times.
Data cover 2017-2019.

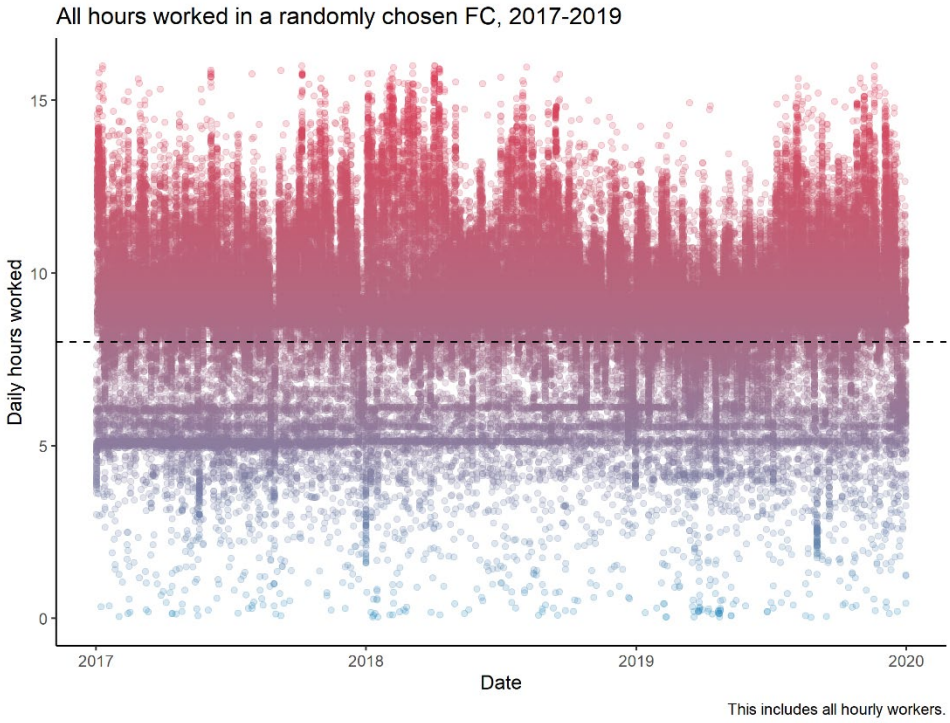
Daily start times of a randomly chosen hourly Sigma DC worker



Times are in a.m.
Line represents mean start time. Darker points indicate a higher density of start times.
Data cover 2017-2019.

Figure 5: Daily hours worked by all employees in select office, FC, and DC





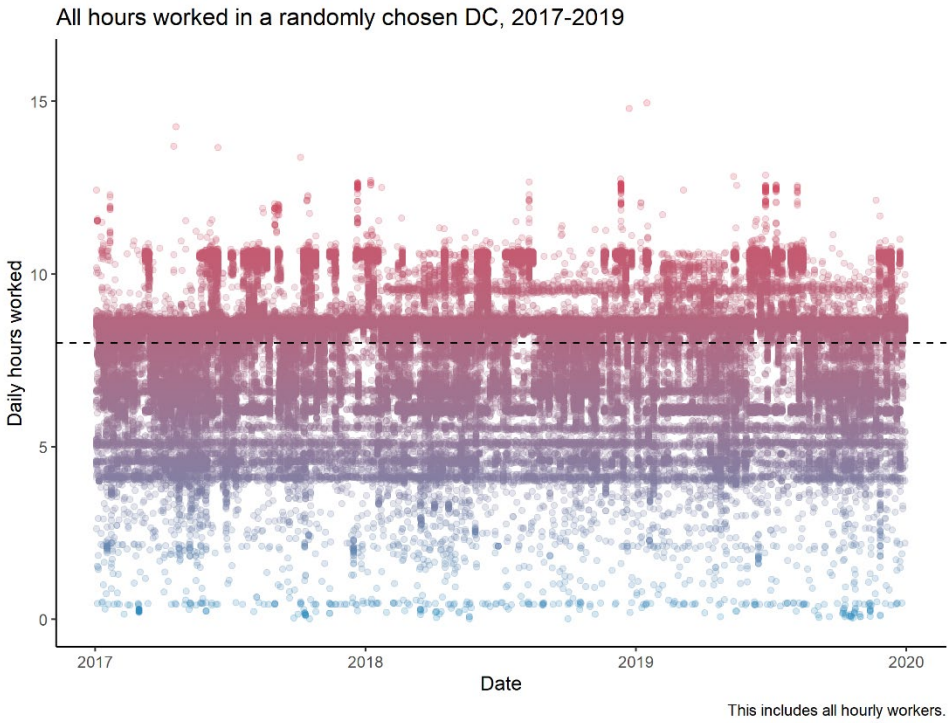
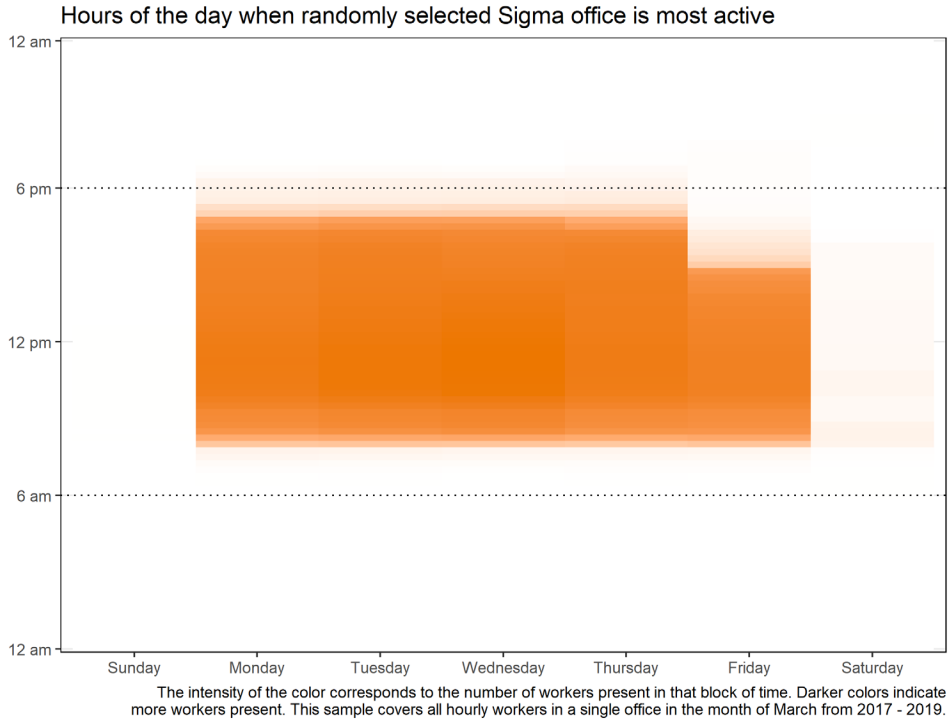
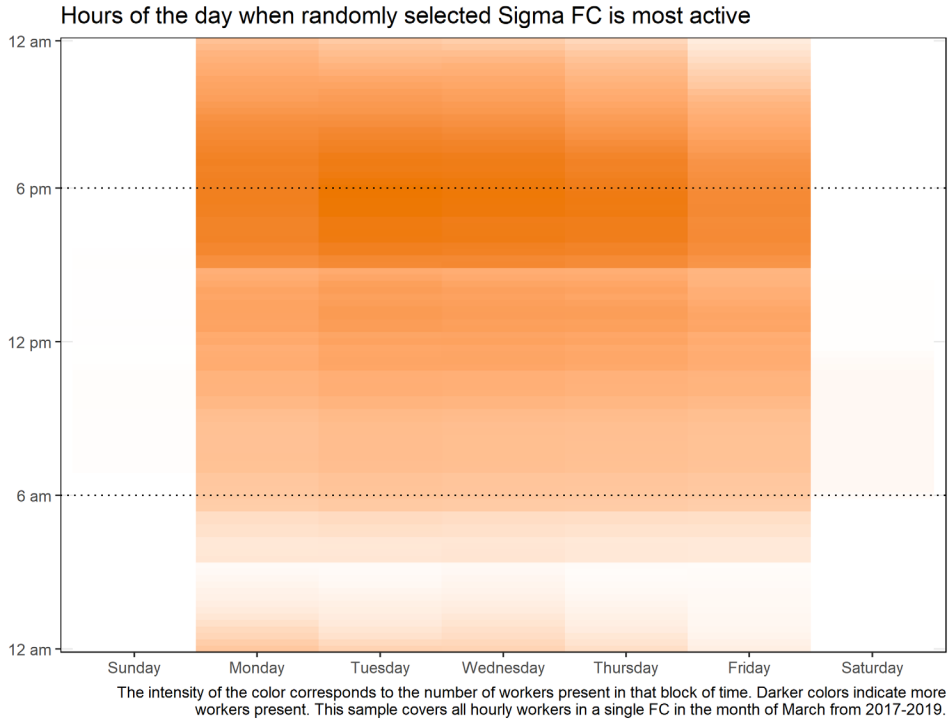

All hours worked in a randomly chosen DC, 2017-2019
Daily hours worked
15
10
5
0
2017
2018
2019
2020
Date
This includes all hourly workers.

Figure 6: Typical hours of operation in select office, DC, and FC





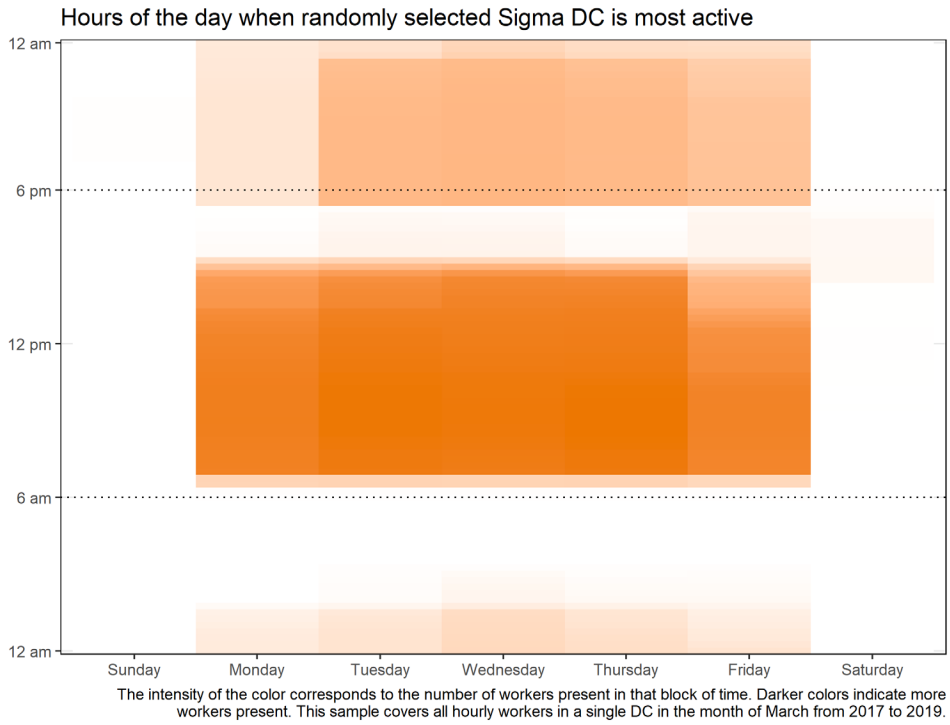
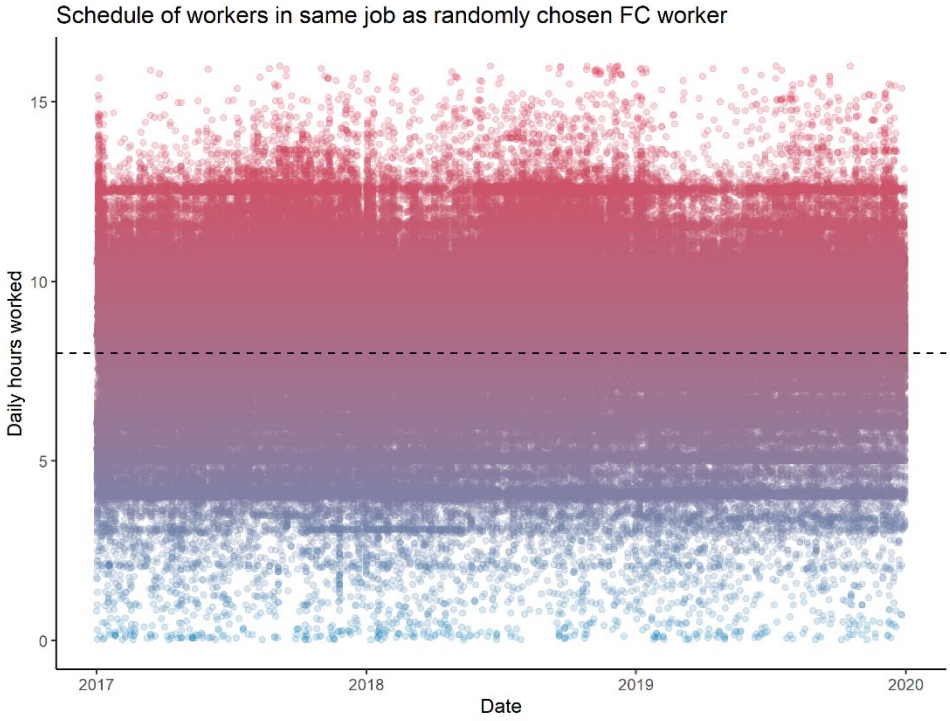

Hours of the day when randomly selected Sigma DC is most active
12 am
6 pm
12 pm
6 am
12 am
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
The intensity of the color corresponds to the number of workers present in that block of time. Darker colors indicate more workers present. This sample covers all hourly workers in a single DC in the month of March from 2017 to 2019.

Figure 7: Daily hours worked by all employees in select office, FC, and DC jobs



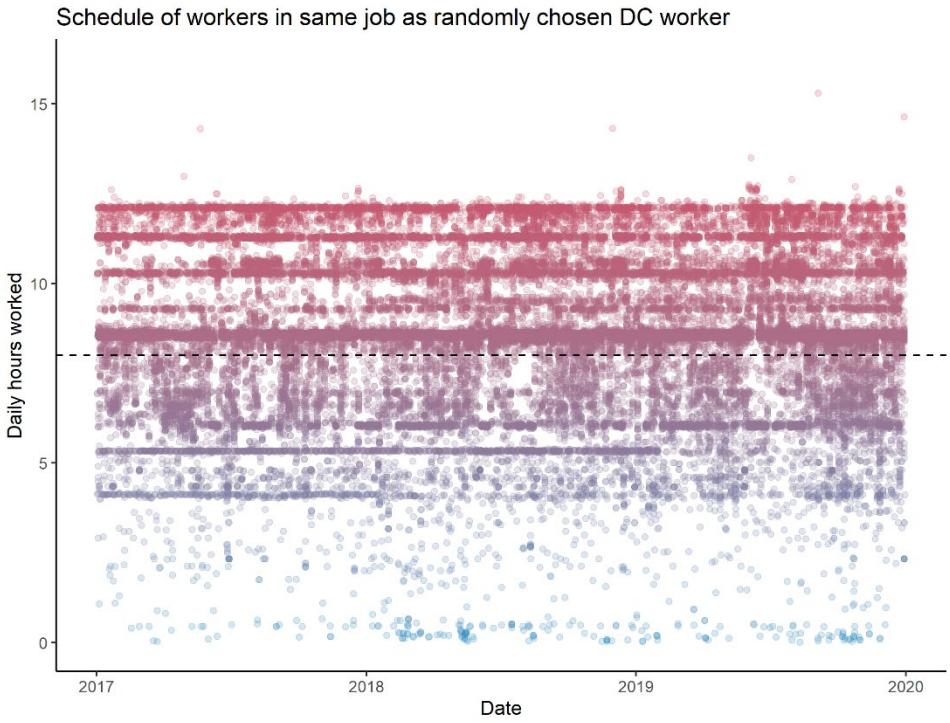

Schedule of workers in same job as randomly chosen DC worker
Daily hours worked
15
10
5
0
2017
2018
2019
2020
Date

Figure 8: Histogram of problematic schedule index

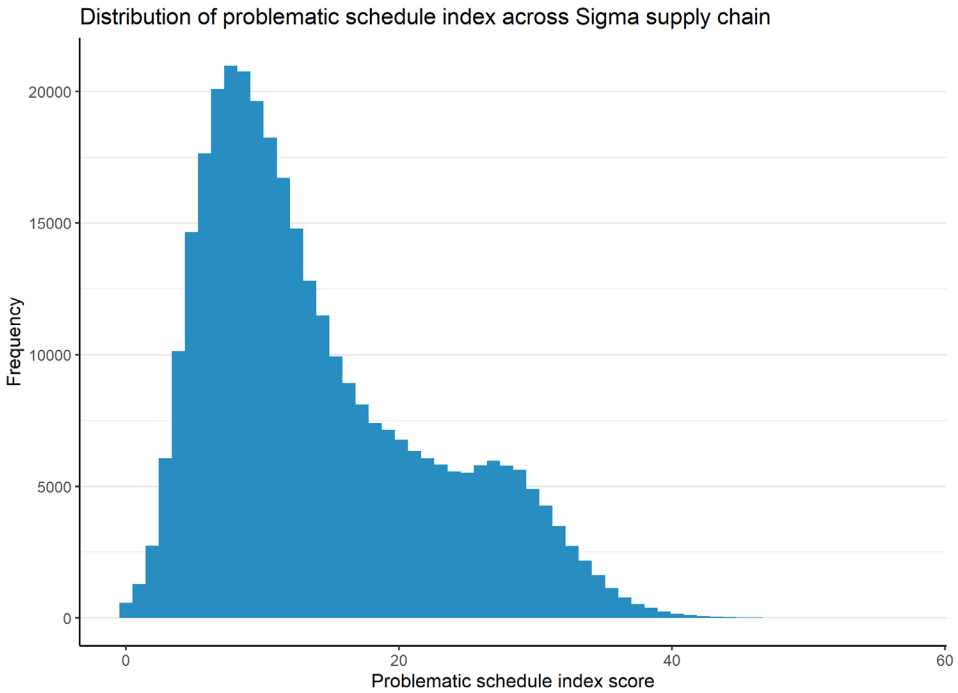


Figure 9: Plot of random intercepts for problematic schedule index by function

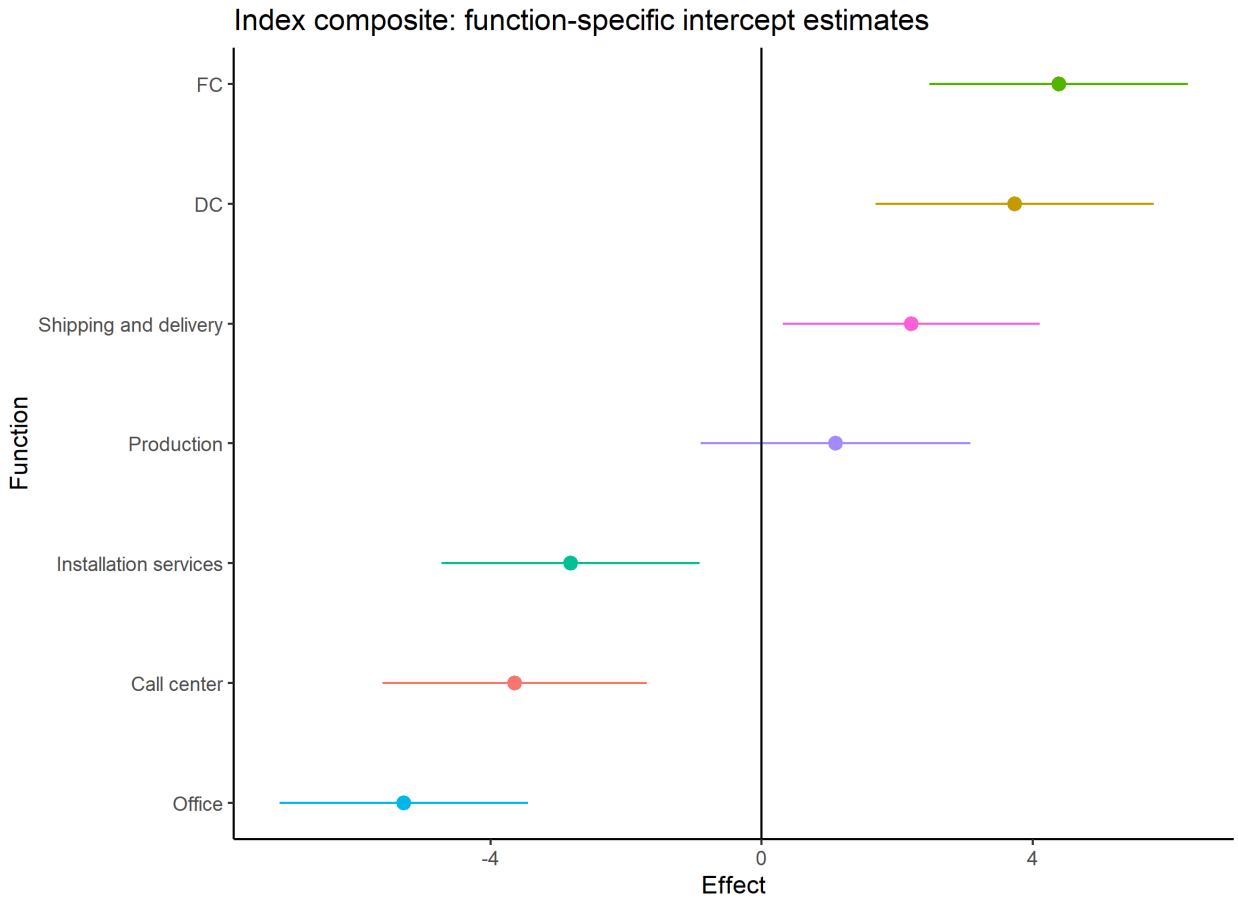


Figure 10: Plot of random intercepts for problematic schedule index by workplace

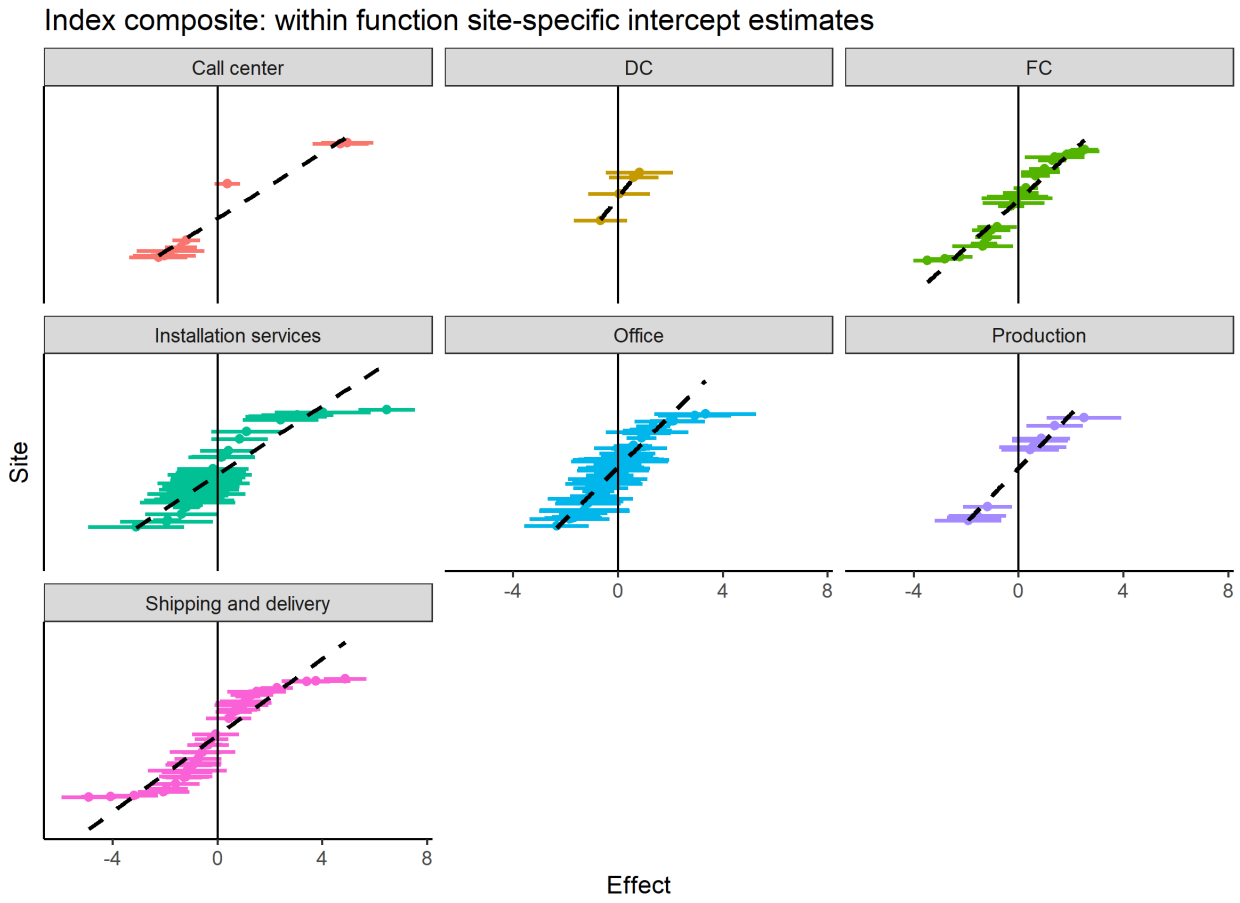
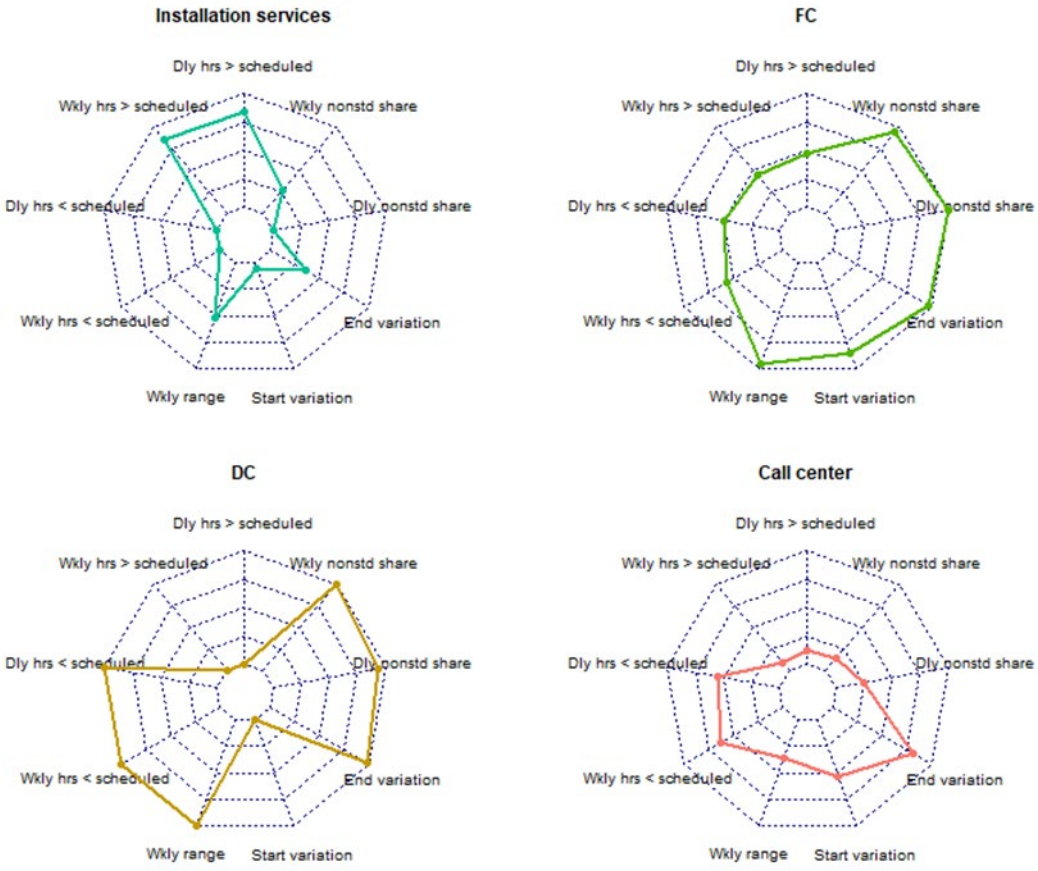
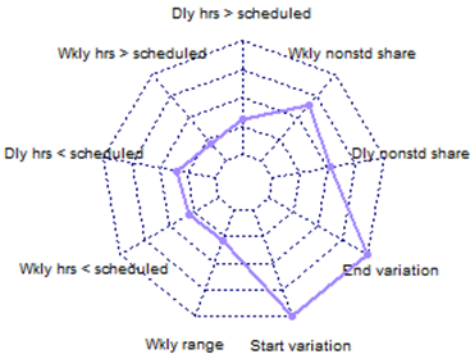


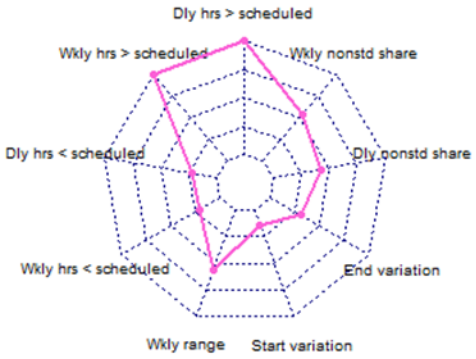
Figure 11: Dimensions of schedule quality by business function



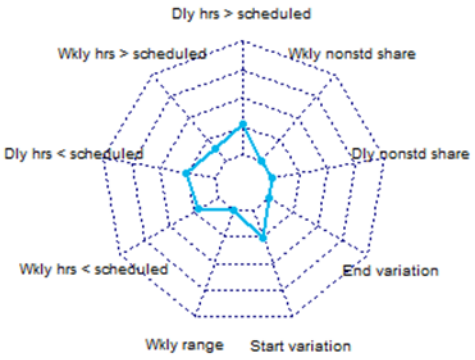
Production



Shipping and delivery



Office



Appendices

Tables

Table A1: Mixed effects estimates of determinants of schedule quality

	Model 1	Model 2
Intercept	12.861 (1.445)***	14.719 (1.500)***
Total hours worked		-0.017 (0.000)***
Shift length: 4 hr		-0.153 (0.148)
5 hr		-0.543 (0.094)***
6 hr		-0.693 (0.064)***
10 hr		3.129 (0.107)***
12 hr		2.630 (0.377)***
Worker random effects?	Yes	Yes
Job random effects?	Yes	Yes
Site random effects?	Yes	Yes
Function random effects?	Yes	Yes
Period fixed effects?	No	Yes
Year fixed effects?	No	Yes
N	332,268	332,268
RMSE	3.675	3.512

Standard errors in parentheses. The reference category for shift length is eight hours.

CHAPTER 2—HOW TO SQUEEZE THE LEMON: LOCAL ORGANIZATIONAL CULTURES AND VARIED MANAGEMENT PRACTICES

Organizational scholars increasingly recognize that management practices vary across firms in the same industry in ways that affect the experience of work (e.g., Banks et al., 2016; Henderson, 2020; Kelly & Moen, 2020; Kochan & Dyer, 2021; Pfeffer, 2018; Williams, 2021). Given the ubiquity of low quality jobs in the U.S. and abroad (Kalleberg & Vallas, 2017), practices that prioritize employee outcomes appear to be uncommon, even when some of them, such as stable scheduling (Williams et al., 2018) and career ladders (Ton, 2014), have been shown to benefit both employers and employees. What prevents managers from adopting those practices that support their employees and enhance organizational performance at the same time?

Two common answers invoke either a lack of knowledge on the part of managers or insufficient incentives. From one vantage, managers may be unable to identify all the pieces of a practice that are essential for it to function effectively in their organization (Rahmandad & Ton, 2020). From another vantage, weak competitive pressures may give managers little motivation to change what they are doing (Bloom & Van Reenen, 2007), or misaligned incentives may lead them to focus on short-term goals that seem at odds with employee outcomes (Appelbaum & Batt, 2014). Gibbons and Henderson (2012, 2013) suggest that organizational culture presents another barrier. Although earlier lines of research have hinted at culture's role in the adoption of management practices that are wins for both employers and employees (e.g., Ichniowski et al., 1997), little work to date has documented or theorized this role.

To explore how organizational culture affects the uptake of beneficial practices, I study the ways that managers in six warehouses, or fulfillment centers, of a single firm schedule their employees' work hours. The six fulfillment centers are comparable in terms of the technologies they use, the products they sell, and the policies they uphold, and their managers are beholden to

the same performance metrics and incentives set at the corporate level. Yet in spite of these common pressures, managers in each center use different scheduling practices. Some practices yield high levels of organizational performance while also producing better outcomes for workers. What is puzzling is that the managers know about alternative practices, communicate with each other frequently, and track performance metrics across the centers but do not feel compelled to change their approach to scheduling even when they appear to be underperforming.

Better scheduling practices do not spread across the fulfillment centers, I argue, because distinct local, establishment-level cultures operate within the organization. On the one hand, these are organizational cultures because they are systems of ideas, beliefs, and values that render action meaningful among a social group operating within a corporation (Giorgi et al., 2015; Schein, 2010; Sewell, 1999; Van Maanen & Barley, 1985). On the other hand, they are local cultures because they vary across the establishments of a single organization. My findings show that different scheduling practices coexist because local cultures differentially affect how managers judge practices' *consequence* and *appropriateness*. Such judgements are necessary because managers must pursue multiple objectives, which no practice can optimize simultaneously (Ethiraj & Levinthal, 2009; Hu & Bettis, 2018) and which can be pursued in multiple ways (Gresov & Drazin, 1997). To chart a course of action in the face of equivocality (Weick, 1995), fulfillment center managers make distinct prioritizations among multiple objectives as well distinct conclusions about a practice's suitability. Because scheduling challenges are filtered through managers' local cultures, managers in some centers do not select what appear to be better scheduling practices either because the practices are not oriented toward the objectives they prioritize, the practices do not align with their sense of propriety, or both.

I draw on a mix of administrative data, field observations, and 48 interviews with managers at different levels of the organization to make this case. I begin by outlining the operational challenges fulfillment center managers face. They are expected to fill a fluctuating and only partially predictable number of orders within a set time, using a staff that turns over frequently and regularly misses work. Because order volume depends on individual customers and is thus out of managers' control, managers manipulate work hours to keep productivity up. Yet maximizing productivity is only one objective. Managers must also sustain worker satisfaction and minimize errors and injuries. Given these objectives' interconnectedness, there is no broadly accepted or mandated way to optimize across them all. It turns out that scheduling is not a straightforward task of routinely posting work times but the product of daily negotiations, planning, problem solving, and in some cases hourly adjustments, oriented to these multiple objectives. I next show that, in any given center, certain scheduling practices hang together as bundles. There are four bundles, with some yielding comparable organizational performance outcomes (productivity, overtime, and quality) yet different employee outcomes (satisfaction, turnover, and injuries). One bundle stands out for its ability to deliver strong results on both types of outcomes. Finally, I identify four distinct local cultures. I then describe how the four bundles of scheduling practices make sense in and reinforce these cultures, preventing managers from converging on a single way to schedule.

In so doing, I make three contributions to our knowledge of management practices and organizational culture. First, I develop a framework for assessing the fit between a management practice and organizational culture. Existing studies of practice diffusion show that organizational culture can alter a management practice's form and effectiveness (Ansari et al., 2014; Bertels et al., 2016; Blader et al., 2020; Canato et al., 2013). This research emphasizes the

compatibility between a practice and adopting culture, but it does not specify the link between culture and practice apart from suggesting that certain cultures support certain practices. I elaborate this link, highlighting how culture manifests in the notions of consequence and appropriateness that managers use to assess whether a practice fits their setting.

Second, I address the oft-mentioned ambiguous links between organizational culture and performance (Chatman & O'Reilly, 2016). Whereas past studies of management practices have often assumed that culture is unified within an organization, I find heterogeneity: distinct local cultures (at the establishment level, division level, etc.), made up of distinct practices, can exist across any one organization. By treating organizational culture as homogenous, there is thus a risk that the real relationships between culture and performance will be elided or collapsed.

Finally, I contribute to debates over the viability of "High Road" or "good jobs" strategies. A key question animating the search for practices that are beneficial to both firms and workers is whether firms facing similar pressures can adopt better practices or whether they are constrained by their environment (Osterman, 2018). This question is all the more relevant in the warehousing and logistics industry, a rapidly expanding sector of the global economy where concerns about job quality are widespread (Dörflinger et al., 2021), and in light of evidence showing the consequences of poor schedules (Schneider & Harknett, 2019). My findings suggest that good jobs strategies are feasible. Indeed, they already exist where we might least expect them, in environments characterized by volatility, competition, and intense time pressures. However, transferring what works well in one locale will not necessarily lead to better employee outcomes if local culture is not taken into account.

What prevents performance-enhancing management practices from spreading further?

Well-established impediments

Management practices are crucial to the experience of work. Some ways of managing are better for employees than others, in terms of economic outcomes, such as wages, skill, and job security (Batt & Colvin, 2011; Jiang et al., 2012; Osterman, 2006), and in terms of psychological and physical outcomes, such as job satisfaction and safety (Moen et al., 2016; Zacharatos et al., 2005). In many industries, however, the most prevalent management practices often produce poor working conditions and harm workers' well-being (e.g., Batt et al., 2020; Fugiel & Lambert, 2019; Klerman et al., 2012; Tilly & Carré, 2017).

The relative scarcity of management practices that put a premium on employees would be less surprising if these practices came at the cost of organizational performance. Yet certain practices, often described as "High Road," have been shown to be win-win's from the perspective of both employers and employees, supporting a highly motivated and productive workforce (Appelbaum, 2000; Bailey & Bernhardt, 1997; Ton, 2014). These include the use of problem-solving teams, skills training, stable scheduling systems, and employee involvement programs (Huselid, 1995; Litwin, 2011; Williams et al., 2018).

The reason such practices are not more common has stimulated considerable discussion (e.g., Bartling et al., 2012; Ichniowski et al., 1996; Osterman, 2018; Pil & Macduffie, 1996; Rahmandad & Ton, 2020). Summarizing a range of literatures, Gibbons and Henderson (2012, 2013) offer a useful framework for distinguishing different accounts of why performance-enhancing management practices may not spread widely. The first account emphasizes what they call problems of perception: managers may not know there are benefits to adopting a practice because they believe their current approach works fine, even if better alternatives exist. In

several of, for example, Bloom and colleagues find that managers who do not adopt superior practices think that their organizations are well-managed and that there is no benefit to change (Bloom et al., 2013, 2014). Second are problems of inspiration: managers may not know how to adopt a superior practice because its components are too complex or too tacit to imitate. Rahmandad and Ton (2020) assert that High Road practices, in particular, are made up of multiple, interdependent components, making piecemeal transfers difficult. Third are problems of motivation: managers may not have strong enough incentives to change practice. As an example, U.S. firms facing lower levels of international competition were less likely to adopt innovation work practices, like Total Quality Management (TQM) (Osterman, 1994). A lack of motivation may also reflect the imbalance of worker-management power when workers have little latitude for pressuring managers to change practice. Finally, there are problems of administration: managers may want to adopt a particular practice but face challenges during implementation. According to Gibbons and Henderson, a major reason why implementation challenges arise is because many performance-enhancing practices cannot readily be broken down into routines; successful practices work because managers and employees fill in the gaps when contingencies arise, which requires high levels of cooperation and mutual understanding. They highlight the difficulty of implementing the Toyota Production System, which grants workers considerable discretion to identify and address problems as they arise. Copying Toyota does not only require implementing the formal procedures it uses but also nourishing less tangible assets, such as trust.

Problems of inspiration and motivation appear frequently in research on management practices. Knowledge barriers and capacity constraints that prevent the transfer of best practices fall under the umbrella of inspiration problems. Managers, for instance, may fail to adopt a

particular practice because they are unsure how it works or because other managers, even those in the same firm, do not share information widely (Chew et al., 1990; Maritan & Brush, 2003; Szulanski, 1996). Studies of the ways that competition impacts management practices fall under the umbrella of motivation problems. Managers who experience lower levels of competition are less likely to converge on the same practices because they are less motivated to look for new ways of arranging work (Bloom & Van Reenen, 2007).

The other two problems identified by Gibbons and Henderson have received less attention. Because they concern perception and understanding, these problems operate in the realm of meaning. Indeed, in more recent work Gibbons and coauthors have suggested that the kinds of workplace relationships that enable the use of certain practices hinge on organizational culture (Gibbons & Prusak, 2020; Martinez et al., 2015). Research motivated by this suggestion is now emerging (e.g., Blader et al., 2020), but it has neither fully drawn on sociological and organizational theories' richer understanding of culture nor elaborated the connection between culture and practice in ways that explain how culture can provide a barrier to practice adoption.

Cultural barriers to practice adoption

While an interest in organizational culture's relation to management practices is newer among the organizational economics, strategy, and employments relations scholars cited above, other scholars have explored culture while studying the diffusion of management practices within and across organizations. Grounded more firmly in sociological and organizational theories, this literature suggests that culture can facilitate or impede practice adoption. It typically defines culture in a Schein-ian (2010) sense, pointing to the values, beliefs, assumptions, and behaviors circulating inside an organization (Detert et al., 2000). Whether a culture supports adoption is

held to depend on the "fit" between the practice and this meaning system. Fit is defined as "the degree to which the characteristics of a diffusing practice are compatible with the cultural values, beliefs, and practices of potential adopters" (Ansari et al., 2010, p. 78). Performance-enhancing management practices, it follows, will not be found where they are incompatible with culture.

By demonstrating that organizational culture may clash with certain behaviors demanded by a practice, the diffusion literature provides a fruitful starting point for understanding how it is that culture can get in the way of superior management practices. Nevertheless, this understanding is only partial. The diffusion literature's most important limitation is that it does not elaborate how potential adopters *assess* fit, leaving the connection between culture and practice vague. In this literature, fit depends, for example, on whether a culture "enables or condones" the actions required by a practice (Bertels et al., 2016) or whether it "supports" or "impedes" certain behaviors (Detert et al., 2000). Love and Cebon (2007, p. 243), for another, posit that a management practice will be compatible if "relevant aspects of the organization's culture enable managers to render a functional meaning" to it. But what determines whether a practice and a culture are consonant? An answer is not specified in the existing literature, making it hard to generalize which elements of culture prevent adoption. It is only with reference to specific cultures and practices that these studies can identify fit or a lack thereof.

The other limitations are empirical. Because they analyze either a single culture in a single organization (Ansari et al., 2014; Bertels et al., 2016; Canato et al., 2013) or multiple cultures in different organizations (Dobbin et al., 2011; Love & Cebon, 2007), these studies have limited ability to separate the abovementioned knowledge and incentive barriers to adoption from cultural ones. Nor can they rule out other known sources of practice variation, including institutional and technological pressures (e.g., Baron et al., 1986; Batt et al., 2009; Blau et al.,

1976; Gooderham et al., 1999; Lounsbury, 2001). In other words, they cannot say whether there are non-cultural reasons for their observations.

Read together, these existing literatures suggest that organizational culture plays an important role in limiting the adoption of performance-enhancing practices, but how it does so remains unclear. To fill this gap, I use the rest of this paper to analyze how managers who run different fulfillment centers belonging to a single company schedule work hours in different ways despite pressures for convergence and the existence of an ostensibly optimal practice. I first demonstrate that: 1) although managers share common objectives, they prioritize them differently and possess different ideas about the appropriate ways to pursue them, both of which manifest in local, establishment-level cultures; 2) scheduling practices and culture co-vary across the centers; 3) some scheduling practices stand out for delivering high levels of performance and keeping employees engaged and yet they do not appeal to managers who use other practices. I then theorize what prevents managers from seeing the appeal of beneficial practices.

Research setting, data, and methods

The warehousing and e-commerce fulfillment industry

Warehouses are in the business of efficiently moving goods at short notice. Due in large part to the development of information communications technologies that more rapidly apprise businesses of customer demand, response times are shortening (Ackerman, 1999; Sanders & Ritzman, 2004). Pledges by businesses to deliver goods within one day of their order are also growing in popularity (Mims, 2018). Consequently, “flexibility” has become a key goal

governing what goes on inside warehouses. High performing warehouses are expected to be "agile," adjusting operations in real time as customer demand fluctuates (Christopher, 2000). To handle demand volatility, many managers see flexible staffing as particularly effective (Baker, 2008). Adding extra shifts, calling overtime, and relying on temporary labor have become popular practices. The push for flexibility means warehouse workers are bearing a greater share of the risk that stems from the ups and downs of consumer purchasing habits (Lambert, 2008).

Description of Sigma

Sigma[12], a large U.S.-based retailer, maintains a network of warehouses scattered across the country. Twenty or so of its warehouses, called fulfillment centers (FCs), prepare products to be shipped to homes and businesses. Unlike static storage warehouses where order volume is stable, typically called distribution centers (DCs), FCs face heightened pressure because they process online orders in real time. With a few exceptions, Sigma FCs operate for 24 hours a day from Monday to Friday.

The two key features of Sigma's FC operations are the company's commitment to next-day delivery and its experience of persistent volatility in demand. Any order received by a pre-specified time known to customers is expected to be delivered the following day. The number of orders received at an FC changes throughout the week, typically decreasing by Friday, with important seasonal variations.

Each FC is structured similarly. There are around 10 departments in each building. The work flows like an assembly line. Vendor products are unloaded, sorted, and placed onto shelves

[12] The name has been changed to preserve confidentiality. Some details, like the total number of warehouses, have also been changed slightly for this reason.

before being placed into boxes and loaded onto trucks that will take them to a shipper, such as FedEx. Each department is responsible for a step in this process. A warehouse management system (WMS), orchestrates the workflow, allocating and tracking orders to departments and workers. Three core technologies move goods: conveyors, hand-pulled carts, and robots. Each Sigma FC predominately uses one of these.

The basic management structure inside each building consists of an FC manager (FCM) at the top, a middle level of operations managers, and frontline managers. As buildings grow in size, another layer of management is sometimes inserted above frontline staff. FCMs report to regional vice presidents (RVPs), which they refer to as "corporate." Across Sigma's network, management teams are beholden to the same corporate policies and expectations.

Sigma FC's employ more than 5,000 workers, who are called "associates." FC size is variable. The largest has more than 430 hourly workers, and the smallest has only nine. The median headcount is 183. Just as the warehousing industry as a whole employs a disproportionate share of workers of color, more than a third of Sigma FC workers are Black and a quarter are Hispanic. Also in line with industry figures, almost two-thirds of Sigma FC workers are men. Most do not have college degrees. Sigma pays those in entry jobs more than $16 per hour, on average. It also provides full-time workers with paid time off and subsidized health care. Part-time and temporary workers make up less than 25 percent of the hourly workforce.

Each worker is assigned to a department. The modal position is "picker," situated in either the breakpack or bulk picking departments. Pickers put products into boxes, which come to them on a conveyor, robot, or cart (hauled manually or with machinery). Workers move quickly and continuously and lift items of varying weight, with their productivity, error rate, and time off the floor carefully monitored. Each building holds workers to its own minimum

productivity standard, though Sigma workers are seldom terminated for inadequate performance. Like many warehouses, these facilities are often loud and hot; injuries can and do happen due to falling products, collisions, repetitive stress, and more (Guendelsberger, 2019; MacGillis, 2021).

Research carried out as part of a separate project on warehouse pay (Kowalski, 2021) revealed scheduling to be a chief concern for Sigma workers. Although hired into a shift with expected hours, workers are frequently asked to start at different times, stay later than planned, leave early, or take the day off, depending on order volume. Oscillations are felt especially by full-time workers because Sigma policy requires they be available for mandatory overtime (OT) where shifts are extended from nine to sometimes 12-plus hours. Consequently, Sigma workers identify long, unpredictable hours as a source of limited time with family, fatigue, disrupted sleep, and dissatisfaction with work. At the other extreme, they express displeasure when they consistently receive fewer hours than expected and paychecks shrink. Confirming widespread concern, a 2019 company survey showed that out of 20 possible new employment practices, the four that FC workers saw as most desirable pertained to scheduling and control over hours.

Data collection

Research followed three phases, which are captured in Figure 1.

---Insert Figure 1 describing sample here---

The first phase aimed to document how Sigma managers went about scheduling workers' hours. Previous organizational research generally treats scheduling as straightforward and routine, although a few studies focused on work-life conflicts are beginning to consider how

specific organizational actors make scheduling decisions (e.g., Kossek et al., 2016 on nursing home "schedulers"). To shine light on Sigma's scheduling practices, I conducted fieldwork, along with some collaborators for another project, that included observation, interviewing, and document collection. We focused our activities on a subset of six FCs, which we selected with the goal of covering what we expected to be theoretically relevant in explaining scheduling practices. That is, we chose a subset of sites matched by size (< 100 vs. > 200 workers), core technology (conveyor vs. robotics vs. hand-pulled carts), and overtime levels (high vs. low for the FC network). Table 1 shows this sample, using location names to distinguish each FC.

In the first half of 2019, I spent three days in each of these FCs, often staying late into the night, to observe operations, shift changes, scheduling decisions, townhalls, and planning sessions. This yielded 160 pages of fieldnotes, written primarily by me with a few notes from collaborators. During each visit we also conducted semi-structured interviews with four to five managers lasting from 30 minutes to an hour.[13] Questions were formulated to gauge Sigma managers' opinions of current scheduling practices as well the job pressures they felt.

---Insert Table 1 on sample FC's descriptive stats here---

The second phase aimed to document managers' views of the scheduling practices they commonly used and their knowledge of alternatives. After using the initial interviews and observations to enumerate the scheduling practices inside Sigma FCs, I noticed that certain scheduling practices tended to hang together as bundles, appearing together in certain FCs. Looking across the FCs for commonalities and differences, I categorized these bundles in a

[13] Twelve to 15 workers were interviewed in each site in 2019 as well, which I do not emphasize in the current study.

typology. Although there was some variation across managers and departments within each FC, I found that the buildings' practices were much more similar within a particular FC than compared to the practices in other FCs, suggesting that each had a consistent approach to scheduling.

To see if my characterizations matched Sigma managers' sense of how they scheduled, I conducted follow-up interviews with the six sites' FCMs (i.e., the top manager in the building) at the end of 2019. In these semi-structured interviews, I asked questions to assess whether the FCMs recognized the practices I had identified, probing at whether they saw themselves using one of them, and if so, at their rationale for doing so. I also recorded their opinions on the strengths and weaknesses of each. I began the interviews by presenting the typology to FCMs, then asking them to choose the one that best described their building; only afterward did I reveal my placement of their building. Each FCM's assessment aligned with mine.

The third phase was undertaken with the aim of understanding the "models" (Baron et al., 1999) underpinning the scheduling practices: why did managers schedule in the ways that they did? At the start of 2021, I held a final round of interviews with the FCMs and a subset of lower level managers. During these 10 interviews, I asked less directly about scheduling and more about managers' views of how work should be arranged, what made for a good worker or manager, and managers' relationships with other buildings and corporate leadership. A central device was the use of a vignette to gain insight into a manager's approach to scheduling: I asked managers to walk me through an unexpected spike in volume due to a problem in another FC that would increase overtime in their own FC. Conversations in response to these questions provided additional information on the context in which scheduling practices were used and the actors' interpretations of their work environments.

Data analysis

The analysis proceeded inductively and iteratively. To identify the scheduling strategies, I coded the fieldnotes, 48 interviews, and documents collected in the first phase in Atlas.Ti, noting patterns in the use of certain practices within and across FCs (Miles & Huberman, 1994). I then triangulated my observations using administrative data made available to the research team by Sigma, which included information on worker and manager characteristics, individual hours worked and where the work was carried out, and on performance and worker outcomes. The second round of interviews generated more confirming and clarifying information about the different scheduling practices. Moving between the data collected so far and the literature (Timmermans & Tavory, 2012), I began to identify possible explanations for the patterns I had documented as well as to arrive at open questions. What stood out was the way managers in a given FC talked about handling contingencies and interacting with other members of their organization as well as the curated symbols, like motivational posters, suggestion boxes, and performance rankings, displayed in their buildings. The four strategies appeared to go hand-in-hand with distinct kinds of worker-manager relationships and with managers' articulated commitments and interpretations of the business environment and labor pool. I recognized these elements as part of culture, that is, part of a system of interpretations that renders action meaningful within a set of social relations (Sewell, 1999). In this case, it was organizational culture. The back-and-forth process shaped the questions I asked in the third round of interviews.

With all the data in hand, I coded again with a focus on organizational culture, specifically the working relationships, artifacts, stated preferences, circulating narratives, and espoused resources and constraints on action inside the FCs (Eliasoph & Lichterman, 2003; Giorgi et al., 2015; Gray & Silbey, 2014; J. Martin, 2002). I discovered that each facility's local

culture supported a particular approach to scheduling. I grouped the initial resulting codes into more general conceptual categories, creating axial codes (Corbin & Strauss, 2008). Categories distinguishing different elements of FC culture began to emerge. What stood out as consistently distinct about the contexts in which the different practices were used were managers' sense of agency, their aspirations, and their relations to other members of their organization, categories that are consonant with reviews of the general dimensions of organizational culture (Detert et al., 2000). I used these categories to illustrate how certain practiced mapped onto to certain cultures, corresponding to variation in the practices that managers used.

Findings

The scheduling-performance link at Sigma

What problem must all Sigma managers confront? It stems from the unwavering expectation that all orders be filled in a set amount of time and in line with performance objectives even though order volume fluctuates over the day and week. "The challenge all of our buildings face is the fact that there's no true pattern to when customers order," said the Blue FCM. "We are literally flying by the seat of our pants because of the unknown that is the volume." A breakpack manager at White put it succinctly: "We're at the mercy of the orders."

To be sure, managers are not totally in the dark when it comes to anticipating demand. There are reliable seasonal fluctuations in order volume, and Sigma's corporate office provides FCs with daily projections based on historical trends. Yet these predictions are only so helpful. "Corporate sends out a forecast, which is just like the weather," said the Red bulk manager. "It

can be right. It can be wrong." This being the case, managers combine corporate projections, their own review of historical data, and "gut feel, tribal knowledge" to guess a day's workload. A Blue operations manager described this task as more art than science.

Unlike the uncertainty in demand, however, the deadline to fill orders is consistent and known in advance. If a customer places an order by a pre-specified time, Sigma commits to getting it to them by the next day. To do this, FC workers must load the order onto a delivery truck before a fixed "cut-time." Cut-times depend on destination but generally range from mid-evening to midnight, pressuring FC managers to push their workers to speedily fill all orders before the corresponding truck leaves. Equipment failure, a spike in orders five minutes before the promised time, an HR meeting that takes workers off the floor, or a larger than usual number of absences all create obstacles to meeting shipping cut-times and thus a smooth day's operation.

Sigma executives use a number of criteria to assess FC managers' ability to meet these demands. Managers consistently point to meeting their operating budgets, maintaining sufficient levels of quality (as measured by the number of orders reported missing), keeping workers engaged and satisfied, and minimizing the number of injuries as their top objectives, though they prioritize these in different orders.

Scheduling impacts all of these objectives. The connection is most clear in relation to the budget. FCs are viewed as cost centers, and meeting the budget depends on minimizing the resources used to fill orders. "We try and be as productive as possible and try and squeeze as much out of the lemon as we can," a breakpack manager at White said. As his comment suggests, to meet the budget is to maximize a building's productivity, measured as the boxes it processes per hour (BPH). Because volume, the numerator in this measure, is out of managers' control, managers focus on holding down workers' hours, the denominator, in order to hit

productivity targets. “It’s my job to make the budget,” said the new Yellow FCM.[14] “How do we spend our money? First of all, we need to cut back on overtime. There should not be any overtime.” This said, scheduling also impacts quality, safety, and satisfaction, because overburdened workers are more likely to err on the job or put less effort forward. Scheduling is thus a crucial means for FC managers’ achieving performance objectives.

Crucially, how managers use schedules to “squeeze the lemon” is up them. While Sigma has an ample set of standard operating procedures, managers use them to varying degrees and frequently devise local procedures. “It's not like we have corporate dictates that say: ‘Here's how you're going to run your building,’” said the Green FCM. The Purple FCM concurred: “We have to follow policies, laws, and the overall values of the company, but, after that, we're really left to our own creativity, based on the tools that we're given, the technology that we have, and the systems that we use to help drive performance.”

Complementing the freedom to manage as they see fit is the belief, expounded by nearly all managers, that their respective FCs are unique. Management at White, for example, joked that there was “definitely something in the water” piped into their building, which was a “different animal” altogether. Managers in each building referenced how they intentionally “set up” or “built” their FCs around a certain set of practices. The implication was that they must devise local means for common objectives. “Not the same thing works in every building,” said the Red FCM. From managers’ perspective, there were no readily transferable “best” practices.

[14] When the final round of interviews were carried out, the previous Yellow FCM had been promoted to RVP. The new FCM had been an operations manager during her tenure. The new FCM made clear that his vision for the building was the same as the old FCM’s and that he had learned a lot from working with her.

To be sure, several scheduling practices do tend to be found in use across the FCs, two of which merit elaboration. The first is mandatory OT.[15] Full-time FC workers must stay on the job when requested. OT is typically "called"—often with less than the formally prescribed two hours' notice—when orders exceed forecasts but also when equipment breaks down, absences are heavy, or staff have not been hired to replace those who have quit or been fired. Throughout the whole FC network, an average of 4.6 percent of all hours worked in 2019 were carried out after an employee had already worked 40 hours—when overtime pay premia are required. In the six sites, the average was 4.5 percent, which translates into two hours of OT per week per worker. The other common tool is voluntary time off (VTO). Managers offer VTO when they perceive there is not enough volume to keep current staff around and maintain desired BPH levels. As I will show below, managers differ in how they apply VTO, but Sigma policy stipulates that it should be granted to workers who agree to leave early when asked; workers with more seniority are expected to get first say over whether they want to leave. Other practices available to Sigma managers across the network include the changing of start and stop times to better align with the ebbs and flows of volume, sending cross-trained workers to departments with more volume, and relying on temporary labor. Yet, to different degrees, managers hone these practices to their settings as well as develop new ones. The outcome is systematic variation in scheduling practices across the FCs, which I discuss in turn.

Different approaches to scheduling

[15] I use OT to denote when workers are asked to stay longer than their expected shift length, which for most Sigma workers is eight hours. The official number of OT hours worked is based on local law. Typically, an hour is considered OT if it pushes a worker's weekly total past 40. (In West, OT is daily, such that any time worked past eight hours is OT.) I use OT in the informal rather than the legal sense because this is how workers use the term and because working past one's shift requires extra hours on the job even if the worker is not paid a premium for them.

Coding my data, I identified four distinct approaches to scheduling taken by Sigma managers in the face of intense time pressures and uncertainty. The more common practices in a given FC tended to complement each other, suggesting coherence and complementarity. Managers recognized and highlighted certain practices, suggesting an intent in using them. These bundles, some of which are found in more than one FC, are summarized in Table 2 and detailed below.

--Insert Table 2 showing scheduling practices here---

Shuffling. Managers intentionally alter workers' schedules throughout the week. Their aim is to keep enough staff on hand to accommodate volume while holding OT to a minimum. Accordingly, even though a given worker's shift might last longer than eight hours on a given day, managers will use a variety of tactics to keep this worker's total weekly hours at or below 40. "We go at exhausting lengths to minimize overtime," the Purple FCM said.

Managers central preoccupation is manipulating hours within and across departments. Within departments, they send individuals home early, extend their break times, and ask them to come in later than scheduled if they are at risk of working more than 40 hours. Their thinking is that if they can prevent any one worker from getting OT, they can reduce the department's overall OT. This requires targeting individual workers, as exemplified by a White operations manager who told breakpack managers that he needed them to "microscope." To this end, managers cycle through which workers receive OT and which leaves early, trying to ensure that weekly hours are evenly distributed. At White, managers solicit volunteers for time off the day before VTO is to occur using a list they receive from administrators highlighting who is at risk of OT. They can look at the list and offer early leaves to those who are nearing 40 hours. Such a

practice runs contrary to corporate VTO policy, which emphasizes decision by seniority but gives managers maximum leverage to adjust individual schedules.

Shuffling hours across departments entails cutting hours in one department to make up for excess hours in another. Workers in certain departments tend to experience long, late hours, while those in others experience standard hours each week. Managers will often tell the workers who receive and restock inventory to leave early, even if they have not finished their day's work in order to save time for outbound workers, responsible for putting items into boxes and loading them onto delivery trucks under the pressure of cut-times. In this scenario, completing outbound tasks may take more than eight hours of a worker's day, but building-wide OT is kept down.

Shuffling occurs spatially too, when managers send workers to departments where overall hours are lower. The Purple inventory control manager called directing workers in this way "plug and play," deeming managers to be orchestrators and suggesting different workers were equivalent. In his FC, breakpack workers each have a printed sheet telling them when to move to a new task and when to take lunch and breaks. Workers are "conditioned" to perform three to four jobs a day, the operations manager said. If they were to implement this practice in other FCs, it "would lead to WWIII" because workers would resist moving to other departments. In White breakpack, managers use a chart to position workers each day, shifting names around like pieces in a board game. A rotation is enforced so workers do not get "complacent."

Cross-manager coordination is also essential to shuffling. At White, managers in the same departments meet daily amongst themselves to discuss how to balance, by name, individual workers' hours. At Purple, before any worker goes home early, her manager reaches out to other managers to make sure that no other department can use that worker's help. In staffing meetings,

Purple managers discuss building-wide OT, strategizing how they can cut hours in one department to make up for too many hours in another department.

Overstaffing. Managers hire more workers than needed, sending them home early so that no one worker is likely to spend more than 40 hours on the job each week even when volume is high. The underlying motivation is to "get ahead" with staffing. The belief that holding onto excess workers is the best way to keep OT down is infused throughout levels of management. "I would pick overstaffed every, every day," said a lower level manager at Blue. The FCM said the same thing: "I am convinced this is the right strategy."

Overstaffing is straightforward in that managers who use it can safely assume one of their tasks for the day will be to determine which workers to send home early. A Yellow breakpack manager said that at the start of her day she cuts workers "right off the bat," and, so long as things are going normally, she can "continue cutting" as the day goes on. Managers there hold a meeting across departments at 3:30 pm to figure out how many hours they need to trim. If they cannot find a place to cut that day, they try to identify a spot to cut later in the week. Because they have enlarged headcounts, departments are usually "looking to give hours away," such that if any one of them encounters an unforeseen event, they will likely not have trouble finding help from a worker in another department who would otherwise be sent home. Cutting is so frequent that even equipment issues that force workers to stay later than expected will not lead to more than 40 hours that week because the workers will have gone home early on other days.

To cut hours, managers typically proceed in one of two ways. Sending workers home early, after that day's volume has been assessed, is the primary approach. Managers can either target individual workers or end an entire department's day early. When managers anticipate

they have too much staff for the rest of the week's expected volume, the other approach is to shift a department's start time back, e.g., tell a group of workers who usually come in at 11 a.m. to show up the next day at 12 p.m. Managers can shift start times because they know they have enough staff on hand to accomplish their work in a compressed period. Furthermore, because the end of the day tends to be busier than the start, they know that by starting later they will not have to worry about spreading around a limited amount of work in the morning and thereby pulling productivity down. In Yellow breakpack, start times vary from Monday to Friday, with the end of the week typically having later starts. Managers adjust these times weekly, announcing the changes on Mondays or Tuesdays. In Blue breakpack, managers opted to shift everyone's start time back an hour, indefinitely. When an entire shift or department's hours are reduced, workers do not have the option to turn down the change. Hence, while the reduction in hours is recorded internally as VTO, it is not voluntary. In both Blue and Yellow's approach, workers tend to get out at about the same time each day despite the later start, so the scheduling adjustments reduce their overall hours. At one point staffing levels were so high at Yellow that managers were giving workers VTO for an entire week at a time; in other FCs VTO is only for a few hours. Because workers are not paid during VTO, some took vacation during this time because they knew that doing so would guarantee them 40 hours' worth of pay.

The work managers do in overstaffing buildings seems more routinized than it does in other buildings. At Blue, the FCM told HR to hire four new people every week by default—even though his workers were already putting in less than eight hours per day—because he assumed he would lose as many to turnover; in other FCs, openings are posted after managers identify actual staffing gaps. In overstaffing FCs, policies are also applied in line with corporate specifications. Seniority, for example, is the law of the land when deciding which individuals to

send home. Yellow managers cycle through a laminated list of names, ordered by tenure, when offering VTO; they draw a line below the name of the last person to take it, starting with the next person when they next offer VTO. The most senior workers get first say over whether or not they would like to go home early. However, if managers deem that they need to cut most or all workers on a single day, only the most senior workers have a chance of getting their preferences. Managers in both FCs also closely follow a spreadsheet throughout the day, which one manager referred to as the "crystal ball," that tells them how many workers need to be sent home to keep BPH levels up and still fill that day's orders. Managers update the spreadsheet on the hour with their current and expected order volume and the number of workers they have on the floor.

Reacting. Workers' schedules closely track the ups and downs of order volume. Managers make real-time adjustments to schedules each day, providing workers with limited notice. When demand is heavy, workers stay for excess hours; when demand is light, they are sent home. One Green manager said changes are made "on the fly." Another said, "You take what you're dealt." And another: "My main goal is getting everything out at all costs."

Negotiation with workers and between managers is key to managing hours in this approach. Managers begin their days by communicating with each other in a search for extra workers when they are short-staffed. The FCM instructs his supervisors to make the rounds each day asking part-time workers to stay an extra hour. There is thus a back-and-forth between managers and workers as they try to get as much labor as they can out of the latter.

Running a department is a more isolated affair. Managers scramble to find help from other departments when volume is overwhelming, and, when they cannot, their department takes on the extra work in the form of long hours. Managers protest that they rarely receive support

from other departments, that they are sometimes left on their own "island." Without help, they must make do, as described by a breakpack manager:

> It's kind of like one of those, "Oh yeah, you got to hit a 23 BPH." What do you want me to do? Shit out a diamond? I mean you gave me a pile of shit. Am I going to make a diamond out of this? All I can do is make sure everything's out.

A bulk manager joked that the first thing he does when he learns he will be short-staffed for the day due to worker absences is cry; then he gets on his phone and calls his colleagues looking for help. A good day is one where he can find some extra hands to come work in his department.

To help mitigate coordination issues, all managers meet twice throughout the day, once at 12:30 pm and once at 3:30 pm to discuss how that day is faring. The meetings' flavor is one in which frontline supervisors report to the FCM their expected hours and the number of absences they have; the FCM encourages departments to pick up the pace, but the general mood is one of resignation. "Good enough for government work" was a frequent refrain when projected finish times were discussed. "Corporate throws the dart, and we adjust," the FCM said.

Harmonizing. Managers encourage workers to use their own discretion to rotate to other tasks or departments when workers perceive that help is needed or when a worker has downtime. "That's what makes us different here," said the inventory control manager. "We have them do everything." Managers put a premium on flexibility and self-initiative and believe workers are willing and capable of pitching in wherever, whenever called for. For this reason, the operations manager could say his workers were "very well versed in just going where needed."

Managers invest heavily in cross-training workers who are then granted the autonomy to direct their own work. “Everybody has three main job functions under their belt,” the operations manager said, using the breakpack department as an example.

> When there is nothing in a pick cell, you’re going run over and start picking carton flow. When there’s nothing running in carton flow, you’re going work the shipping dock to help get carts back to induction to start again. They all know it’s a very important task to keep these carts moving, and the work may not always be in the same place every day.

He went on to explain that, during training, workers learn about the value of rotation and that they do not like “standing around” as a result. Managers have also aligned shift times so that departments can better share labor. Having a nimble and proactive group of workers creates a labor pool that can be drawn on to handle spikes in demand and thus mitigate OT.

Managers embody harmonizing principles as well. They regularly move across the floor, helping workers with work tasks when they see gaps. Amongst themselves, they communicate with walkie-talkies and cell phones rather than gathering in pre-scheduled meetings.

Scheduling practices, organizational performance, and work outcomes

The existence of distinct practices indicates managers operating under similar constraints and in pursuit of common objectives nevertheless have considerable discretion in how they run their operations. Notably, there is variation across FCs that use the same core technologies and are of similar sizes, which suggests that production or technical factors cannot by themselves explain

scheduling practices. The same practices, moreover, exist in different FCs, suggesting that the strategies are not singular or idiosyncratic and that location is not determinative.

Table 3 shows that the different scheduling practices yield different performance and worker outcomes. None maximizes all outcomes—for example, OT is lower at Yellow than at Red—but harmonizing stands out for delivering high levels of organizational performance and positive outcomes for workers. For those concerned only with organizational performance, overstaffing also appears to be a promising strategy. Why does one or both of these bundles not predominate? Why are shuffling or reacting practices still present at Sigma?

---Insert Table 3 on performance outcomes here---

The analysis that follows suggests that organizational culture plays a crucial role in shaping which scheduling practices get put to use. This is because organizational culture, as a set of ideas, beliefs, and values about what matters, structures the inherently ambiguous or equivocal situations that managers are tasked with overseeing and in which they must put their practices to use. As Trice and Beyer (1993) put it, culture allows managers respond to the inevitable uncertainties and chaos they encounter. Here I outline culture's connection to management practices in order to motivate the remaining empirics.

My starting point is that there are two sources of ambiguity that create special problems for managers. If we take management practices to be "approaches used by managers… with the goal of achieving certain types of performance" (Flynn et al., 1995, p. 1326), such practices are goal-directed behaviors.[16] To be efficacious, they need to be directed toward an objective. Yet

[16] I am employing the telic notion of practice as an activity seeking a goal (Turner, 1994). This usage differs from the sense in which organizational practice theorists use the term. In this literature, practices are the ongoing

which objective a manager should pursue and which behaviors she should enact to obtain it are not readily deduced without some guide.

For one, managers are generally charged with pursuing more than a single objective (Obloj & Sengul, 2020). A manager, for example, may be expected to reduce costs, maintain product quality, and keep employees safe, not to mention the more personal or idiosyncratic goals that any one manager might possess. So long as these objectives are weakly or negatively correlated, the manager will be unable to map her actions onto a single measure of overall performance, like profit, even if she so desires, because doing so would be too cognitively taxing (Ethiraj & Levinthal, 2009; Hu & Bettis, 2018). Accordingly, managers must prioritize their multiple objectives, accepting gains in some at the expense of others. This also means that managers who have the same set of objectives have a legitimate reason to order them differently—there is not likely to be one ordering that maximizes across all outcomes, a rational basis for selecting one ordering above the others.

For another, there can be more than one way for a manager to successfully pursue a given objective once that objective has been prioritized (Doty et al., 1993). Organizational scholars invoke the notion of equifinality to argue that "the final state, or performance of an organization, can be achieved through multiple different organizational structures even if the contingencies the organization faces are the same" (Gresov & Drazin, 1997, p. 404). For example, Kogut et al. (2004) find that high-performing automobile assembly plants differ in how they maintain buffers and arrange work. Managers thus have some latitude in selecting a practice.

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everyday activities that enact the social world (M. S. Feldman & Orlikowski, 2011). I use practice in the telic sense because I am focused on the concrete activities managers use with certain outcomes in mind and because this language allows me to engage with existing literatures on management practices writ large (e.g., Bloom 2019) and on specific management practices, like HPWS, TQM, and scheduling.

Ambiguity, it follows, exists because multiple ends (in the sense of differently ordered objectives) and multiple means (in the sense of different ways to achieve the same objectives) are available to managers in the same settings. Without fixed ends and means, managers face what I call problems of consequence and appropriateness (cf., March & Heath, 1994). That is, to select and enact a practice, managers need to determine which objectives should take priority over others and which of the alternative courses of action is most desirable. Culture resolves both problems because it provides a measure of what is worth pursuing and what is right.[17] It filters how managers perceive they should do their jobs.

With these claims in mind, we can sketch out a framework for assessing the fit between management practices and organizational cultures. Organizational culture reflects what to managers seems consequential and appropriate. A practice will fit only with a culture if it is oriented to objectives that members of this culture prioritize and if it seems sensible to them. Figure 2 captures these dimensions of fit. The blocks represent the managers' objectives, and their relative size represents how they have been prioritized. The solid lines represent notions of propriety. Both are manifestations of organizational culture. The dashed lines represent a practice; its angle represents the objectives to which it is oriented. A practice fits when it complements the solid line and is angled to the most heavily weighted objectives. There is misfit when a practice does not appear to managers to be as consequential, appropriate, or both. The third panel represents a case of misfit along both dimensions.

[17] My use of consequence and appropriateness differs from that of March and colleagues, who brought these concepts into organizational analysis. To them, consequence and appropriateness are opposing decision-making "logics." The logic of consequence allows decision makers to assess which action best yields a desired outcome. The logic of appropriateness allows decision makers to select an action when they do not have a particular outcome in mind but are instead seeking to follow convention. The implication is that the first logic accompanies rational decision-making and the second accompanies customary or sanctioned behavior. I am arguing that both logics are always in play because actors need to know which consequences matter and which means are appropriate for obtaining them.

---Insert Figure 2 depicting practice-culture fit here---

This framework enables a cultural account of why ostensibly optimal management practices, including those that benefit both employer and employee, do not spread more widely. In the case of scheduling, harmonizing would only be seen as optimal to managers who believe that employee outcomes are worth prioritizing and that giving employees heightened autonomy is appropriate. A different culture would see overstaffing as the best way to schedule.

Importantly, unless managers in different establishments of the same organization share a culture, they will not share the same conception of a win-win practice, reducing the likelihood that they will adopt what works well in another location. Heterogeneity in culture promotes heterogeneity in management practices, in general, and scheduling practices, in particular.

To show how scheduling practices seem appropriate and consequential to the managers who use them and are thus inseparable from the contexts in which they are used, I next detail the cultures that accompany each bundle.

The cultural basis of scheduling practices

The scheduling practices used in a given FC reflect and reinforce the culture at play in that building. Scheduling practices seem appropriate and consequential in relation to a culture because culture influences the relative weight managers place on the competing objectives they must pursue and what managers see as sensible means for achieving them. Moreover, using certain scheduling practices has the effect of perpetuating a culture because key messages contained in that culture get embedded in quotidian activities and routines.

In what follows, I sketch out the contours of the local, establishment-level cultures as well as other related management practices that accompany the various scheduling practices at Sigma. The cultures are summarized in Table 4, where I arrange their key elements according to managers' beliefs about their agency, aspirations, and relationships to other managers, workers, and corporate leaders.

---Insert Table 4 summarizing cultures here---

Chess. In the chess culture, found with shuffling practices, managers are players and workers are pawns. Knowing what is best for the business, managers strategize where to move subordinates around (or out of) the building to keep productivity up and hours down. Workers relinquish their autonomy at the point of hire, agreeing to such control. They must embrace this vision or leave; there is no expectation among managers that workers can be trained to fit their ideal. Because workers are seen as set in their ways with little capability for learning, managers believe it is managers' job to save the day when obstacles arise. A pervasive accountability rhetoric keeps managers on their toes, removing their ability to point to circumstance as the reason for poor performance. It also provides them with a justification for other's poor performance and thus a sanctioning device: when someone fails, it is because they did not take ownership of their situation. As a whole, managers in the chess culture feel empowered to micro-manage individual worker's locations and schedules each day, the key to shuffling.

The entrepreneur is the managerial archetype in the chess FCs. A good manager needs to be creative, all at once an orchestrator, executive, and experimentalist. Her job is to figure out how to tactically move workers in the name of performance. A Purple replenishment manager

described her strength as: “I’m able to see the whole picture and effectively maneuver people to where we need them in the building instead of just the department level.” The operations manager in this building described the way the FC is run thusly: “We’re chess, not checkers.”

Managers hold the knowledge and expertise in this culture. A knit pillow hanging on the Purple FCM’s office doorknob communicated this message explicitly. It read: “The only person who really knows what’s going on.” The White FCM used similar hyperbole, describing himself to an audience of workers as “solver of the world’s problems.” Purple managers refer to when they manually control the allocation of orders as “divine intervention.”

As entrepreneurs, managers are only limited by their ingenuity. Purple managers remarked that they had a long leash to experiment. “[My supervisors are] pretty good with saying, ‘The department's your sandbox. You can build it. Rome wasn’t built in a day,’” a breakpack manager noted. An openness to problem-solving is also present at White, where, for example, the operations manager exhorted his outbound staff to “get creative” during a staffing meeting, praising one manager for suggesting a delayed start time and giving another high marks for highlighting three workers who had been absent earlier in the week and were thus good candidates for working more than eight hours that day without hitting OT for the week.

A view of managers as the ingenious ones promotes a hierarchy in which managers stand above workers. Predictably, chess managers do not think highly of the function workers serve or that workers’ jobs are ones that demand much skill. “It’s really not that hard,” explained the Purple FCM. “Anyone who can move can do it.”

Adding to this devaluation of workers’ capabilities, managers in both buildings believe workers to be immutable, or at least set in their ways. A White breakpack supervisor explained that workers sorted themselves into better or worse “patterns of behavior.” When that pattern is a

bad one, the worker is beyond help. A consequence is that managers see worker development as less essential. The White FCM noted he did not put a lot of resources toward cross-training. A stated goal of the Purple FCM was to make work tasks as simple as possible, removing all obstacles to enable "distraction free picking." Hence, worker discretion has to be minimized.

Because workers cannot be taught, the point of hire is crucial to assembling the desired workforce. For one thing, there is little room for workers to develop further once on the job. For another, hiring gives managers the chances to find those who will "work" in their culture. During onboarding sessions, Purple managers explain their vision to new hires and then "invite them to align themselves to [the FC's] values." "If you can't make that commitment, don't even start," the Purple FCM said. "Because it'll never work." In this way, they expect the worker to take the initiative, self-selecting into the organization and buying into the managers' objectives.

What traits are they looking for? Subservience and dedication are tops. In White, the FCM's ideal candidate is one who "if I tell them it's a 12 hour day, they're like, 'Yeah, let's do it. I'll work these hours all day long.'" The Purple FCM summed it up more grandiloquently:

> They have got to be flexible enough to work with whatever schedule that we have, and they have to be focused enough to be able to follow the recipe that we give them because we know when they deviate from that the experience the customer gets is too variable. It's nothing that I can teach people... And I don't want to have to convince people that what we're doing is something greater than putting a K-cup in a box. If you can align to that, that really is helpful in what we do.

In essence, the traits of good workers are not ones that put workers in a position to contribute to solutions but rather to be used as managers' implements.

Paired with the notion that workers cannot be taught, the desire for hyper-committed candidates leads to a cycling through of hires until the putative "good ones" stay. Indeed, the White FCM said his ideal is to retain only higher performers while "burning through" the others. The Purple FCM thought only a fraction of his workforce fit his bill: "20 percent of them I never have to worry about. They're going to come in and say, 'I am who I am, and I'm going to do a great job.'" Another 20 percent of them, he said, probably need to find another job.

By taking the job and signaling that they buy into the organization's goals, workers forfeit their autonomy in the eyes of managers. The Purple FCM mentioned letting go of "a pretty weak" supervisor who gave his workers too much freedom:

> When we changed the leadership, [workers] weren't deciding what to do. We were structuring things better so folks had a pretty good idea of what the expectation was when they came into work and how to do their jobs as opposed to just wildly doing whatever they thought they needed to do.

Similarly, managers at White repeatedly justified undesirable changes to workers' schedules by pointing out that the workers knew what they were getting into when they signed up for the job.

Expected to follow their ingenious leaders, workers are seen as minions or acolytes. This produces a detached, if not strained, set of relations between managers and workers. At White, two townhalls, periodically held to update workers on larger changes at Sigma, were replete with supporting examples. When the FCM asked if there were questions and no one responded, he

filled the silence by reminding his workers that "everyone knows I have an open door." A female worker replied, in a hostile tone: "When did that change?" At the second townhall, none of the workers sat up front near management but crowded several rows away. The FCM later pointed out that he measured the success of an initiative by the number of workers coming into his office to complain about it, suggesting that he was not interested in consulting his workforce during the problem-solving phase. Thing were similar in Purple, where the operations manager did not greet workers as he walked the floor. It is not surprising that managers in either building are not typically accommodating when workers asked to miss work or leave early. "The business model does not permit dinner with family," said the Purple FCM.

Manager-manager relationships, on the other hand, come across as collaborative. Before any worker is sent home early at Purple, his or her manager makes sure that no other department can use that worker's help. The staffing meetings at White are ritualistic, fast-paced, and full of lots of back-and-forth between managers.

Devising creative solutions means that corporate is kept at arm's length. Deviations from corporate policy are commonplace in both buildings. At White, for example, they hired an in-house recruiter, going against a recent network-wide move to outsource this function. At Purple, managers expressed frustration that corporate was totally distanced from the on-the-ground realities of managing. Its forecasts, for example, were way off; its attendance policies created bad behaviors. The FCM relayed an anecdote in which he was asked to adopt a new tool developed by corporate, which he adopted just to make sure he would not be in trouble for being noncompliant while still retaining the tool he had developed for his building. It follows that managers in the chess culture feel a strong sense of agency. "When I give you an opinion, it doesn't mean you have to run with it," asserted the White bulk supervisor.

The freedom to experiment, however, is held in check by managers' recognition that they are accountable for their own decisions. Managers are expected to take ownership over their work and not point fingers. Part of the reason they switched to an in-house recruiter at White, the FCM said, was so that hiring would be led by his staff; they could take the blame when they made a bad hire rather than pin it on an external recruiter. The White bulk manager more than once said, "I'll put my face on it," meaning he would own his choices. The same rhetoric resounded throughout Purple. If the installation of a new technology fails, the receiving manager said, it was because management did not introduce it properly. Similarly, a Purple bulk supervisor refused to put the blame for planning challenges on fluctuating demand or unpredictability: volume is "just a number," he said. "It's on me." The Purple FCM was dismissive of managers in other FCs, who he said would try to excuse deviations from their budget by pointing to circumstances out of their control.

This same accountability rhetoric can also be used to discipline workers for poor performance and to shut down any resistance by reminding workers that they need to take ownership of the commitment they made to the company. "You need to hold people dangerously close to expectations if you want them to succeed," said the Purple FCM. "With too much freedom, humans create chaos." At the second townhall, the White FCM shot down complaints made by several workers that equipment breakdowns were preventing them from starting their workday. He turned their protest back at them, arguing that even when the machinery (which is necessary to their jobs) was not working, they needed to be "hitting all eight cylinders." He continued: "We need you to not fall victim to circumstances." At this townhall, the FCM also explained to workers that management would be instituting a new one-on-one performance feedback session to "get the human piece back in." "This is not an observation of a work period,

where someone follows you around and 'does tick marks,'" he tried to make clear. But, as the HR manager later explained in a one-on-one conversation, the sheet had been devised more to create a paper trail that could be used for accountability, documenting how workers had repeatedly been informed of their performance levels.

Accountability in the chess culture is, in the end, tied not to members of the organization but to the consumer. When asked about managerial prerogatives, the Purple replenishment manager's summary indicated that managers' prerogative was understood, if not shared, broadly: "The majority of us have an understanding that it is about the customer and how we get the product to the customer effectively without damages." By externalizing the aims of their work—telling workers that they are doing "more than just putting a K-cup in a box"—managers in the chess culture can pressure workers to accept, or, in this case, "own" the schedules that are asked of them, sometimes to their personal detriment. After noting that "the goal is to service the customer," the Purple HR manager relayed an anecdote that revealed the tough consequences of such a culture. Earlier that year, she said, there was a blizzard that kept kids home from school and made the commute treacherous, but managers still expected their workers to come into the FC. "Managers are torn between metrics and not wanting to hurt people."

Accountant. In the accountant culture, found hand in hand with overstaffing, managers justify their actions by pointing to "business needs." Business needs serve both a rhetorical and practical purpose. Rhetorically, managers can summarily rationalize their decisions and communicate them to workers by acknowledging that their decisions will further performance. Practically, managers can evaluate various courses of action according to whether the courses help them meet the budget. It follows that any practice that benefits workers has to benefit the

business as well. Workers come to be seen as line items, costs that need to be kept to a minimum. To this end, workers need to fungible. Managers are not as personable or empathic toward their subordinates. To best meet business needs, FCMs strategize from inside their offices while their management teams are out on the floor implementing their plans. Practices here are more rule-bound and automatic, less fluid. Fairness and following policy by the books are primary. All this helps managers in accounting cultures to treat workers like numbers, frequently adjusting their work hours downward out of budgetary concerns.

Managers in accounting FCs are well-versed in articulating why their actions are essential for the business, even if they are undesirable from the worker's perspective. Managers frequently append "as a business…" or "business wise…" to their statements. The purpose of implementing a new practice, said the Yellow FCM, is to boost productivity; if productivity is not increased, the practice is abandoned. A case in point, this FCM only agreed to a wage increase if workers were willing to offer better performance in return. She devised a "commitment sheet" and displayed it throughout the building to signal to workers what she expected of them in exchange for this "investment." "The Commitment," as it was titled, stated that workers would get a raise, more feedback, and mentorship on the expectation that BPH would rise and turnover would fall.

A calculus that puts primary emphasis on business needs leaves managers with little room to bring their own insights and personalities into the job. They are more like executors who can do little to change the work environment. When, for example, a Yellow breakpack manager did have to call OT, he told his workers that the decision was out of his control: "I'm just doing my job. It's not my call. It's what needs to be done." While he later remarked that he understood workers might have personal commitments that made it hard for them to work past their scheduled end time, this was not something he felt he could take into consideration. "Mandatory

is mandatory," he said. Managers deliver orders that emanate from the top. The no OT mandate, for example, "trickles down the chain of command." In both FCs, front-line managers reported being told of changes instead of being involved in decision-making. Given the top-down structure, it is not surprising that many managers said there was nothing they would change about current their FC's scheduling practice.

Instead of relying on their creativity, managers closely follow rules and stick to policy. The new Yellow FCM's described his way of managing as following what's on the books:

> Whether it's me, [the previous FCM], or anybody else sitting in this chair, it's all dictated by Sigma policy. I don't interfere with that at all. I make sure that the policy is being followed… As long as we stay true to the policy, we will be in good shape.

To this end, managers rely heavily on "tools." The labor planning spreadsheet, for example, provides a method for consistently cutting hours. Managers in both buildings handle VTO using a list ordered by seniority. Such fixed procedures also allow managers to attribute blame to an object when they anticipate worker resistance to being told what to do.

Because workers are supposed to understand that business needs come first, they are expected to be acquiescent and reliable. The fear that workers will push back, namely by quitting, is the main constraint on managers and the reason they do not target the budget more aggressively. The Blue FCM insisted he would promote VTO to reduce hours until it drove turnover up to an unsustainable level.

An emphasis on business needs makes it hard for managers to take workers' perspectives. Workers seemed fickle to the Blue FCM, their actions unintelligible. He relayed that he could

not understand how workers experiencing long hours were eager to go home early and thus lose money, yet workers experiencing truncated hours were not pleased with their schedules:

> That's funny to me. What I've heard is that associates want 40 hours, but at the same time they're happy to leave early if they get the opportunity. Seems contradictory to me… They will volunteer to leave, but when we're making them leave because there's no work, then they're very upset.

Tellingly, the relationships between workers and managers in these FCs are impersonal. I did not observe either FCM walking the floor or engaging informally with their hourly staff. When asked about the experience of his workers, a breakpack manager at Yellow tempered his comment by calling it a "wild theory," just a "wild guess." He did not point to any individual's experience or use any anecdotes, in contrast to managers in other buildings who mention workers by name or recount particular episodes. This same manager's understanding that FC work was not fun was borne more out of reasoning than experience or hearsay: "I don't think it's something that people would enjoy," he said. A Yellow HR manager attributed a large share of turnover to a management team who did not know how to be engaging and mentoring and who suffered from an inability to give feedback.

Prioritizing business needs and distancing themselves from workers makes it easier for managers to treat workers as interchangeable. Everyone's hours need to be cut; individual needs do not need to be taken into consideration. "We can't just, you know, find work for people… [if we do that] we'll never deliver our commitment to the supply chain," said the Yellow FCM. A team manager described the new Yellow FCM this way: "His natural state is to kind of be

business minded more than people minded. He has to recognize that and kind of force the other. Because naturally he's kind of more focused on business-wise."

Cooperation among managers is made easier because the excess supply of labor means that any department that does encounter a need for help can usually find it. At the same time, managers can run their departments independently because there are usually enough staff in their departments to handle a day's volume.

Corporate is on managers' minds more as a stakeholder that they want to impress than as one to which they are accountable. "We know we need to manage our budget," the Yellow FCM said. "Nobody says we got to do that… Nobody's sitting at corporate saying you need to have no overtime. We just know that with the volume that we have right now and the sales that we have, we can't afford to have any." Both FCMs said they hoped to lead the network on performance rankings.

In these managers' eyes, fairness and transparency are essential to helping them meet the budget and be the best in the network. Above all, sticking to policy and applying it consistently helps them keep OT down. To do this, as many workers as possible need to be sent home when necessary. To treat all workers the same is to treat them like a number, which can easily be minimized. Numbers do not balk in the face of business needs.

Underdog. In the underdog culture, which is tangled up with reacting practices, managers fashion themselves as coaches, motivating and disciplining workers so together they can make it through their tough circumstance. They do not consider workers to be very reliable, so they frequently have to remind their subordiantes why they are asking them to accept the drudgery, giving pep talks along the way. At the same time, managers believe that good workers can be

developed into assets. Accordingly, they try to accommodate workers and help them achieve personal goals, whether the goals concern the current job or take the worker elsewhere. They try to be friendly and amusing as well. Yet the team these managers are leading can only be as good its coaches, and managers here have trouble executing. It is not easy for them to coordinate amongst themselves. They also feel like they have little control over their situation: they are resigned to some turnover; they believe they cannot push back against corporate decisions; they feel the threat from competition acutely. Camaraderie and trying to make the best of their situation becomes the main ways they attempt to handle the cards they have been dealt.

To handle operational challenges, underdog managers concern themselves foremost with having a stock of experienced and energized workers to draw from. This involves determining which worker is a good fit for a certain job, helping newcomers grow into their roles, and trying to keep workers "fresh" in spite of the excessive OT the building is experiencing. Managers do not want their roster to have "holes" in it, and they want to prevent "burning out" or "killing" their staff. One manager said that workers needed to perform a variety of tasks to prevent them from "getting into a rut." Another manager said that he liked allowing his subordinates to work in other departments so that they can "make a name for themselves." The FCM spoke of his workers becoming "more valuable" as they gained more skills and tenure. A bulk manager likened his role to helping workers find their proper seat on a bus.

As coaches, managers also feel the need to make their status clear. Indeed, one manager described his workers as "soldiers," implying that he is leading them into battle. He began each day as if he were holding a locker room pep talk:

> At startup meetings, I don't say anything until everybody's in the square I painted around the board. I will stop and just sit there and stare out. It kind of gives me a little bit, like, "Hey, look, I have a little authority here." If they start talking, I'll stop.

With that authority, managers try to communicate to workers the nature of the work and why, despite the pain it might cause, certain actions need to be taken. The FCM said more than once that the key to successfully handling changes that would have a big impact on workers is "messaging." He pressures his managers to have five minute, one-on-one conversations with their staff every couple of weeks to get a "touchpoint," which he believes will save them time in the long run by reducing future issues.

Underdog managers also use geniality and humor to relate to their staff as if doing so can diffuse the tension caused by long hours. Though the building is large, the FCM walked the floor frequently, stopping along the way to crack jokes with workers. Once, when he was with the research team, he flagged a group of workers down and indicated our presence: "Sonny, these guys are here for you," he said. "They're from OSHA. They heard you crashed [a forklift]." To announce our visit, he walked to the center of a startup huddle, stopping to do a sort of wrestling move by pretending to pull a male worker's head to the ground. During a staffing meeting, the managers tossed around bags of Nerds and SweetTarts. "We've got candy everywhere," the operations manager said. Later, bulk workers were helping themselves to Laffy Taffy.

Management sees itself as a team as well. Each member thinks it has a different skillset to bring to the table. "We, all the supervisors, as far as department-wise, we need to be on the same page, rowing the same direction, and understanding why we're doing it that way," a breakpack manager said.

Yet if these managers are coaches, they are leading a perennially losing team. They feel as if the difficulties they encounter are forced upon them and out of their control. Above all, they protest that they have access to a limited pool of labor. Getting workers in the door is "a constant battle," one manager said. Workers flock to the FC when there is an economic downturn, leaving as soon as the economy recovers, the operations manager lamented. Others point frequently to competing warehouse jobs in the area, even though the local HR manager said that Sigma paid more than local employers and that the FC had no trouble attracting new candidates.

And many of the workers who do come in the door are seen as unreliable. One breakpack manager said finding a hardworking employee would be like "winning the lottery." In a bid to increase worker engagement, the operations manager put a suggestion box in the lounge to no avail. "It's been empty for five months. The associates asked for us to let them provide more feedback but then give nothing. I don't get it." He thought workers created problems for themselves by avoiding being team players. They did not realize that by skipping out on a day of work to avoid OT, they would be increasing the number of hours everyone else had to work.

Corporate's presence is felt as constraining in this culture. Managers pegged the slow hiring process as a major reason it was hard for them to get new workers on board, and, unlike other FCs, they did not see a way they could change it. A trainer expressed frustration because corporate was not coming through with a footwear rebate it had pledged. "Robots don't need shoes," she sighed. The FCM was fatalistic, seeing many of his FC's challenges as stemming from practices and policies that were out of his control, like the "sacred" next day delivery pledge. Corporate gives the FCMs "a moment to get on our soapbox" but then tells them they will have to live with its decisions. Asked about how he would handle an influx of volume

caused by problems in another building, the FCM indicated that his building would have to take the hit for the benefit of the organization.

The way managers mitigate spikes in volume, apart from trying to keep workers from getting burnt out, is to negotiate. The FCM said any successful initiative needed to start with worker buy-in. A key ask each day is for part-time workers to stay longer. With workers, conversations begin by acknowledging the tough circumstances. A breakpack manager let his workers know he understood their situation "sucks" and that he was trying to find more help. Managers can also turn to other departments for help, but they usually have limited success. One breakpack manager described the typical outcome as this: "What happens is, nobody helps us out, then our overtime rate is off of the roof." To provide the kind of extra help that breakpack needed on a given day would often require taking so much staff away from other departments that the other department's performance would suffer. This dissuades them from sharing.

The challenge of getting enough help combined with a sense that much is out of their control ultimately leads these managers to focus more than anything else on getting through the day. Hence, the FCM's urging of his managers to "see the forest for the trees" and to focus a bit more on "this period, this quarter, this year, or next year." From within these tough circumstances, the FCM aspired for the FC to make do with its circumstances, not worry about performance relative to the network: "What drives us is the desire to do the best job that we can." With self-improvement as an ideal, the FCM sought to strengthen what he called his FC's culture, creating "more inclusion and recognition." By doing so, his FC would be a better place to work than competitors. He did not want to be like Amazon, where many of his workers had once been employed, because "they don't care about the people, they just care about the numbers." The FCM did not want to be "just a high churn business… just simply going after

efficiency and in terms of getting product out every day, [no] matter how many associates we have to burn through to get there." The reality, he said, is that managers cannot accommodate every single person's needs and some workers would find opportunities to advance the career elsewhere. The challenge for managers here, then, is to work within this constraint: "You have to create the environment that's conducive to the majority of the folks."

Community. In the community culture, which hangs with harmonizing, managers and workers are colleagues who form a unit. "Family" aptly describes relations, both because managers and workers toil alongside each other, converse with each other, and share meals together and because managers hold the word "family" up as a primary good. Expectations are consistent for managers and workers: both are supposed to be versatile, taking initiative to find where they can pitch in. Managers aim to get through the day without a hitch, leaving corporate with little reason to take notice. They want their FC to be one where workers feel valued, so they emphasize reciprocation and taking care of each other. Managers' openness to sharing workers across departments and giving workers the discretion to move to where they see a hole, paired with workers' actual willingness to make these moves, enables this building to be nimble.

Managers in a community culture aim to be good citizens. What the Red FCM looks for in a manager is in sharp contrast to managers in a chess culture: "We narrowed it down to two things. One, personality. How they are going to interact with the team? And, two, are they teachable?" The FCM remarked further that he asked a lot of his supervisors, more than what was reasonable given the pay they earned. His expectations rested on self-initiative and responsibility, which other managers interpreted as a source of freedom.

Managers also believe that they are not above workers. “Don’t get me wrong,” said the FCM. “I’m not tooting my own horn, but you don’t see a lot of FCMs out on the floor working finalizing during break or induction or taping some boxes.” This statement was not simply a projection of ideals. I observed the FCM helping workers multiple times, taping up boxes, folding new ones. He fixed machine jams himself. He helped run startup huddles. The operations manager did this too, for example, sorting order tickets and folding boxes. In this last case, a worker had a personal emergency that meant she had to leave early, so the operations manager took her place. “It’s OK,” he said. “It gives me time to jump in and play around.”

Managers are confident in their ability to roll with volatility and uncertainty because they employ a collectivist approach to handling unexpected events. Everyone pitches in, regardless of department or place in the hierarchy, to wrap up for the day. For example, in other buildings workers in the shipping department are typically the last ones out the door; Red pickers split up when they are done, with half going to help shipping and half cleaning up the building. “One shift, one finish,” the operations manager said.

In accordance with a collective mindset, managers emphasize group rather individual successes. In breakpack, for example, they record team, not individual, performance. The wooden plaque where they engrave the names of that quarter’s best performer has not been updated since 2016. During my visit, the FCM and operations manager decided that breakpack had been “knocking it of the park,” so they planned to “fire up” the grill they had purchased for dedicated for celebratory cookouts at the end of the week. This reward was tangible and enjoyed communally. It was also subjective, tied not to a fixed metric but based on managers’ judgments.

Managers come across as friendly and collegial toward their subordinates. “The standard operating procedure for supervisors is to be engaged and to get on the floor and see what’s going

on," said the inventory supervisor, noting that this approach was followed by the FCM on down. This matched my observation. The FCM greeted each worker we passed, often stopping for a brief conversation. He took new hires out to lunch. Though Red is a smaller building, this nonetheless demonstrates a different level of engagement. Indeed, the FCM could give a detailed primer about each worker's personality before I interviewed them. Workers' responses to a recent survey were so positive that the FCM was unsure where he should focus his efforts. He settled on a single improvement, leadership development, because he had recently taken on a couple of new managers. What he planned to stress to these new hires was telling about his orientation to workers: "soft skill… just having what I call the nonsense conversations on the floor. You know, 'Hey, how's it going? I know your kid was sick last week.' 'Hey, how did that trip go to Duluth?' Things like that."

A commitment to family is shared across management. When asked about worker morale, the inbound manager replied: "If I can use the word culture, I think the culture is really good here. Because they've been together for so long, they're like family." He also said: "I rarely have turned anybody down for [last minute scheduling changes due to family] because my idea was it's families first. Period."

Management is also keen to solicit worker input. When the building was switching to robots, for example, the FCM picked one worker to be the first to test it out:

> The reason we brought [her] over here, for one, she speaks her mind, right, wrong or indifferent. She's very, very vocal. But she's also very logical, and she's not afraid to say, "Why are we doing this? What are we doing?"

In the FCM's opinion, robots proved to be an improvement over the conveyors they previously used primarily because the technology created a better experience for workers.

Workers appear to buy into management's vision, meeting them halfway. "Everyone is team oriented and ready to get the job done" noted the inventory manager. As a result, he did not have to police his workers: "It's very, very few times that I have to keep people on task." Startup huddles provide an image of relations that differs from that of other FCs. In bulk, a worker led the meeting, with his coworkers focused firmly on him. As he read out the previous night's performance stats, his coworkers cheered. The workers then all stretched, taking each move seriously and counting together rather than faking the motions. The manager joined them. The same thing happened in breakpack; they also all wished well the workers who had birthdays.

Managers are similarly tightknit. They openly talk about each other's home lives. The FCM said he thought that managers tended to stick around in his FC because there was a sense of togetherness, which he described as like "family."

Being close facilitates the coordination necessary to handle exigencies. Meetings are not a regular occurrence. Instead, managers use their phones or radios to reach each other, often outside of work, if they are "running into a scenario." When the operations manager described how he had arranged departments to be able to share labor, he pointed out that he was willing to share labor across departments, hurting performance metrics in the sending department if the recipient department needed the help to wrap up its work.

That is not to say that tight bonds are not without issue. They can at times be a hindrance, causing people to get too comfortable with the way things are and thus resistant to change. The FCM offered an anecdote about a manager who repeatedly checked in with a worker who had been out for a knee replacement:

> By the time she came back, there had been so many changes that she just kind of could not accept it. She was complaining out on the floor and the supervisor did an awesome job, pulled her off to the side and said, "OK, so I understand there's a lot of changes, you used to come in an hour earlier. That shift isn't available anymore. What is really the root cause of why you're not happy anymore?" And she couldn't really say. But it did kind of change her attitude around.

Additionally, managers say the hardest part of their job is dealing with interpersonal tensions between workers, the flipside of having such a tightknit team. Workers "all have their moments," said the inbound manager. "Because they've been together for so long, they're like family, and, you know, when you get around family, sometimes they don't get along so much."

Managers do not feel pressure to appease corporate, but they recognize that corporate can make their lives harder. Their wish is to perform well enough to be left alone, said the FCM:

> We always call it the "Island of [Red]" because we don't give people a reason to come here. We don't want people to come here. We do our job, we do it well. But then we don't get the attention either.

The inbound manager said he does not buy into the corporate mantra of serving the customer. On the contrary, he does not stress out on the job because the FCs are not performing a vital service, like saving lives. Managers here will push back against corporate decisions, though often to no avail. The FCM said that he did not opt in to having robots—he was told, without his

consultation, which ticked him off, underscoring the value he places on voice and input. Nevertheless, he felt like he could speak his mind to his superiors. “There are not many companies where you can walk up to the supply chain chief and tell him he’s wrong.” In a similar vein, the FCM said he often “screams” on behalf of his workers when it comes to securing wage increases.

All in all, community managers try to steer their ship in a way that takes into account managers’ and workers’ needs, on and off the job. They are not hyper-obsessed with the budget or holding OT down. The FCM and other managers are firmly opposed to overstaffing because they believe that when managers diminish worker’s earnings, they hurt their personal lives. Further, when making changes, the FCM says he is willing to place a premium on workers’ benefit, even forgoing some productivity:

> If we’re trying something, we have to figure out the pros and cons. Did we take a hit in productivity? Did we raise or reduce overtime? Where are we sitting with overall quality and safety? It might not be the right philosophy—but I don’t have a problem with taking a slight dip in productivity if it’s the right thing to do for the associates.

Community managers’ primary ambition is to get through the day smoothly. My “favorite part about my job is the feeling of completeness that you get from it,” said the receiving manager. “Everything got done that should have. I like when things go without a hitch.”

Discussion

The entanglement of culture and practice

In the warehouse setting, managers must oversee the filling of a variable and uncertain number of orders in a fixed amount of time with minimal resources. To do this, they use differently patterned scheduling practices, altering the number of hours their employees work. Rather than a simple task of routinely posting start and end times, my study shows that schedules are the complex product of planning, coordination, and daily negotiations between managers and workers, which implicate an array of tools and technologies. These practices are not prescribed by a higher level of management overseeing the supply chain network. Nor is there some external interest group or stakeholder promoting a best way to schedule. Instead, managers draw on their own experiences and resourcefulness to craft practices that work within their FCs.

The practices managers use hinge on how they prioritize their objectives and their notions of propriety. To understand why this is the case, it is helpful to draw on pragmatic models of human action. Pragmatism conceives of human actors—here managers—as problem solvers who are influenced by both concrete behavioral incentives, such as performance metrics and promotion opportunities, and larger social systems, such as ideologies, institutions, and other organizations. It recognizes that even instrumental choices are formulated and appraised according to meaning systems (Gross, 2009), thus providing a "third way" between rational and structural accounts of action (Farjoun et al., 2015) and overcoming the longstanding division between overly deterministic and overly agentic models of culture (Weber & Dacin, 2011). In the pragmatist tradition, practices are understood as habituated modes of problem solving. For an actor to accept a practice as an adequate solution, she must, importantly, make a valuation (Whitford, 2002). This valuation depends on a simultaneous assessment of means and ends. When an actor faces the problem posed by multiple possible ends (Ethiraj & Levinthal, 2009; Hu

& Bettis, 2018) and means (Gresov & Drazin, 1997), as is the case with FC managers, culture will lead her to place more weight on certain ends and means than others, in turn shaping which practices seem consequential and appropriate. As such, it is apt to describe management practices as "entangled" with organizational culture (c.f., Bertels et al., 2016). By analyzing the culture in which management practices are entangled, we thus gain insight into why managers have settled on certain practices. We also gain insight into why certain practices seem to appeal to certain managers, affecting their likelihood of adoption.

I identify four practice-culture entanglements. Within each FC, these are coherent; they can be read (Geertz, 1972). To describe the practices, I examine the activities involved in scheduling. These practices come in bundles, in line with existing work that shows certain types of management practices tend to cluster together (Ichniowski et al., 1997). To describe the cultures, I examine managers' agency, working relationships, and aspirations.

Managers' priorities and notions of propriety, I have argued, manifest in cultures and enable managers to select which practices will work for them. Hence, in FCs where managers move workers around the building and micromanage their schedules, managers see themselves as entrepreneurs and expect their workers to be committed to being controlled. They prioritize keeping OT down and are attracted to practices that give managers enough flexibility to apply them as they see fit. In FCs where staffing levels are intentionally inflated, managers stick rigidly to policies that do not differentiate workers so that they can subject all workers to scheduling cuts that reduce their hours in the name of business needs. They prioritize meeting the budget and value practices that can be routinized and applied using a standard. In FCs where managers have trouble coordinating and make on-the-fly decisions, managers, knowing the precariousness of this situation, try to engender amicable relationships with their staff and keep morale up so

they can make it through the day. They prioritize getting through the day and filling out all orders before cut-times and look for practices that will be accepted by at least a core group of dedicated workers. In FCs where workers possess the autonomy to move where they see help is needed, managers treat workers more like peers and put an emphasis on family and cooperation. They prioritize creating a welcoming and smooth-running place to work and see as appropriate practices that promote teamwork and collaboration. In these ways, management practices makes sense within the cultures with which they are entangled. Table 5 shows how managers assess the consequence and appropriateness of a practice in each practice-culture entanglement.

---Insert Table 5 describing consequence and appropriateness in each FC here---

The practice-culture entanglements also vary across the FCs. Crucially, the variation I document does not occur across more than one organization but within a single division of a single company. This squares with the longstanding recognition that an organization's culture should be not thought of as monolithic but instead as comprised of subcultures (J. Martin & Siehl, 1983; Van Maanen & Barley, 1985), though the related literature typically looks to occupational jurisdictions, technologies, or functional boundaries as sources of differentiation, which are not at play in my setting. It also squares with the more recent evidence on the extensiveness of within-firm practice variation (Bloom et al., 2019a). It does not support theorizations and research that treat organizations as "unified units of analysis" (Zilber, 2016). Furthermore, recognizing local culture avoids granting primacy to top-down influences in organizational life, whether these are high-level executives or outside institutions. This is an important observation because top managers play a prominent role in existing research on

management practice variation (e.g., Canato et al., 2013; Reay et al., 2013), running counter to the insight that most of what an organization does results from the day-to-day decisions and activities of lower level managers (Siggelkow & Rivkin, 2009). That said, my observations do not suggest that organizations are made up of "warring factions" or that different establishments have nothing in common. A global organizational culture is present at Sigma to the extent that certain objectives, artifacts, and practices are found across the FCs, though this culture only goes so deep; held constant across the setting, it is not a predictor of variation in scheduling practices.

At the same time, the local cultures are not totally idiosyncratic. This is not a story where no practice can be used outside of a single setting. Some practice-culture entanglements are found across FCs, begging the question of their origins. Determining how the entanglements came to be in the situation is the work of historical analysis. What such an analysis uncovers can then be tested by following the entanglements over time. Does, for example, a change in the FCM lead to a change in culture and thus management practices or vice versa? Possible explanations to consider include the opening conditions of each FC (Baron et al., 1999; Stinchcombe, 1965), managers' backgrounds and work experiences (Bertrand & Schoar, 2003; Hambrick & Mason, 1984), and power relations between managers and workers (Hallett, 2003).

The presence of establishment level cultures may also help explain why existing research has so far failed to find a strong connection between organizational culture and organizational performance. Chatman and O'Reilly (2016) attribute the equivocal link to an overabundance of definitions of organizational culture, in other words, to a lack of construct validity. My study indicates that even if a consistent definition were used, researchers might still fail to discover a link if, as many do, they start with the assumption that organizational cultures are unified. For example, Hartnell et al.'s (2011) meta-analysis, which finds an ambiguous relationship between

culture and performance, explicitly treats organizational cultures and subcultures as "isomorphic." Operationalizing organizations as homogenous would wipe out the associations between local cultures and performance that I observe.

It is worth noting that in explaining practice variation, I find little evidence that the kinds of external, environmental influences, be they institutional, technical, or competitive, often held to shape management practices have a major affect (Bloom et al., 2014; D'Aunno et al., 2000; Gooderham et al., 1999; Lounsbury, 2007; Oliver, 1991). The FCs all face the same "pressures" from formal policies, executive oversight, the legal and political environment, and core business strategy, pressures that from an institutionalist or economics standpoint would be expected to promote convergence. This is not to say that such pressures are not at work—the next day delivery pledge is used by competitors; as in many workplaces, Sigma workers are called "associates"; lunch breaks remain a standard 30 minutes long—yet these similarities only go so far. It is, in addition, more difficult to detect widespread similarities in the scheduling practices I find across the FCs than it is for other practices, like promotions or branding.

Culture and the notion of "best" practice

That management practices are entangled with culture also suggests why some practices that enhance performance in some dimension do not spread. In existing literature (e.g., Bloom & Van Reenen 2007; Maritan & Brush, 2003; Szulanski, 1996), a practice that is, on its face, performance-enhancing remains confined to one setting because managers elsewhere either do not recognize that they are using an underperforming practice, do not know that alternatives exist, are not motivated to adopt the alternatives, or lack the capabilities to implement them. Yet, according to the arguments I have sketched and the evidence I have provided, all of these hurdles

could be absent and yet a practice could still fail to travel. In fact, FC managers are all aware of their relative standings and how other buildings are being run. Harmonizing practices should appear superior to managers who want high levels of organizational performance and positive worker outcomes. Yet no single bundle is clear a win-win in the eyes of all the FC managers.

To be a win-win, a practice needs to fit with the FC's culture, and these cultures vary across the FCs. The FC managers stress that they run their buildings in different ways, and my analysis shows that they do so indeed. There is thus merit to the managers' claims that their FCs are unique and that what works in one building will not work in another (c.f., J. Martin et al., 1983). In fact, at least one study on the barriers to practice adoption (Chew et al., 1990) showed that managers in different establishments of the same firm said they did not take up innovations developed elsewhere in the firm because the establishments were too dissimilar, and yet the authors dismissed this rationale. Based on my findings, identifying what is a best practice requires identifying a complementary culture, specifically what the managers who use this practice deem to be objectives of consequence and appropriate means of pursuing them. Transferring a practice becomes a project of both changing procedure and embracing the culture in which this procedure functioned.

A corollary is that studies that focus on universal "best" practices, like TQM or Lean Six Sigma, without highlighting complementary cultures will likely be focused on a particular phenomenon: when they can be identified, "best" practices will likely be of the sort that are easily modularized into independent, standardized components (Rahmandad & Ton, 2020), oriented to a single objective and used in more stable or certain environments. Such practices likely do not rely heavily on relational coordination or subjective judgement and are not likely flexible. In this light, it is less surprising that Bloom and colleague's research program has

focused on what they call “structured” management practices (Bloom et al., 2019a). These practices pertain to monitoring, targets, and incentives, all of which are amenable to being routinized as administrative procedures. Yet these are only one kind of practice, a kind that does not help businesses meet all the situational demands of the workplace. In fact, all Sigma FCs use all the “best” practices identified by Bloom et al., and yet I observe different performance outcomes. This suggests that while Bloom et al. have taken a step large step forward by charting variation in management practices, they have given us limited insight into the sources of performance differences. How do we explain heterogeneity in outcomes among what Bloom et al. would deem well-managed firms or establishments? I am asserting we have to look inside the firm to more “social” explanations.

Implications

For those interested in changing management practices two major takeaways from this study are in tension. On the one hand, they should be encouraged by the finding that different management practices can coexist in the same institutional, technical, and competitive environments; forces for uniformity are not overwhelming. At the same time, the reason that different practices can coexist is because they are tangled up in different cultures, and cultures are notoriously hard to change (Alvesson & Sveningsson, 2016).

One of the reasons that variation is promising is because it shows there is more than one way to manage a business. If firms facing the same constraints find that one strategy is most profitable, neoclassical economic theories predict that this strategy should be widely adopted. Given the widespread deterioration in employment conditions in the U.S. (Kalleberg, 2013), one

might surmise that management practices that generate low wages and poor job quality have prevailed because they are the best way to run a business. Yet my study has shown that there are differences in management practices even within the same firm, some of which are better for workers than others without hampering performance. This finding is in line with new work theorizing divergent paths to optimal business outcomes (Rahmandad & Ton, 2020). One of these paths is the High Road, offering high quality jobs with above-market wages while remaining profitable; the Low Road offers the opposite. Does Sigma take the High Road? FC jobs pay well for the workforce they attract—few workers brought up financial insecurity as a source of stress, except for when they were working fewer hours than expected—but in some FCs the temporal features are problematic. Harmonizing practices appear to keep workers satisfied and turnover at sustainable levels while maintaining high productivity. Sigma thus has the opportunity to choose which scheduling practices it promotes across its network.

The question then becomes how to get the other FCs at Sigma to adopt High Road scheduling practices. This is where the challenge lies. Osterman (2018) argues that firms will not find the High Road on their own because it is not as profitable as the alternative. Yet I have showed that within firms some managers may have already taken a path that is more desirable to workers. The spread of High Road strategies across an organization, however, is likely to be limited. Practices' entanglement with culture means that a change in practices requires a change in managers' belief systems. In both Osterman's telling and mine, the High Road will be limited unless there are sustained pressures promoting its spread. Osterman points to worker-led collective action and regulations as two sources of pressure. My work implies that we should only expect so much of these forces. Worker-led collective action faces high barriers where practices and cultures supporting voice are not already in place. Indeed, decades ago Kochan,

Katz, and McKersie (1994) argued that managerial ideology deserved a larger share of the blame for the deterioration of U.S. labor relations, blame that was typically granted to external sources, like rising foreign competition or changing laws. Regulations, furthermore, still need to be enacted, during which there is a chance for noncompliance (Huising & Silbey, 2021). A possible reason for failure may be that the enactment of a regulation cannot be separated from the culture in which enactment occurs. It is thus concerning that recent research shows that existing organizational cultures (in the retail and food services industries) are not currently conducive to the kinds of practices promoted by scheduling laws (Lambert & Haley, 2021b).

Unless the benefits of switching to High Road practices lead to sizeable, visible gains in the objectives that managers already care about, one cannot change practices alone and expect the desired results. Organizational culture must change too. Changing culture is a difficult undertaking because members of organizations become familiar with, perhaps even in experts in, their local practices, leading to "high costs of cultural retooling" (Swidler, 1986, p. 284). This study suggests that changes in culture will affect what managers perceive as resources and constraints, how they relate to other members of the organization, and what they see as desirable outcomes, making new practices more or less appealing. How can these dimensions of culture be altered? Without mechanisms for voice, workers who want to effect change may find recourse only in exit. A perhaps sobering conclusion, then, is that better management practices depend primarily on the managers using them. Barring the ability to open a new establishment (Ichniowski et al., 1997) or major shocks that result in epiphanies, managers who do not currently use such practices need to see value in them, likely through education and training (Khurana, 2010; Kochan & Dyer, 2021; Yang et al., 2020). If this is not on the table, the final option is to change the team of managers who make up the organization via hiring. This seems

like the more feasible though not easy path forward. Organizations need to get managers in the door who find it appropriate and consequential to take the High Road.

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Tables and Figures

Tables

Table 1: Descriptive statistics of FCs in this study*

	White	Yellow	Green	Blue	Purple	Red
Total hourly staff	243	298	188	202	102	61
Technology	Conveyor	Conveyor	Cart	Cart	Robots	Robots
Overtime rate (%)	6.4	0.9	9.0	1.3	6.6	3.6

*All numbers are averages using weekly data across fiscal year 2019. Overtime rate is calculated as the total hours worked in which employees received pay premia divided by total hours worked.

Table 2: Staffing practices across FCs

	Green	White	Purple	Yellow	Blue	Red
Practices	Reacting	Shuffling	Shuffling	Overstaffing	Overstaffing	Harmonizing
Staffing						
*Part-time (% hourly staff)**	High	Medium	High	High	High	Low
*Temp (% hourly staff)**	Low	Low	Low	Low	Medium	High
*Staffing levels**	Low	Low	Low	High	High	Medium
Daily staffing meetings						
Across departments	x	x	x	x		
Within departments		x				
VTO						
*Utilization**	Low	Medium	Medium	High	High	Medium
Strictly seniority-based				x	x	
Rotating/selective	x	x	x			x
Overtime process						
Rotating		x	x			
Start times						
Variable throughout week	x	x	x	x	x	
Staggered within shift	x		x			x
*Measured variability**	High	High	Medium	Medium	Medium	Low

This table is based on observations, interviews, and administrative data. *Rows with asterisk come from fiscal year 2019 data. Outcomes are ranked based on a network-wide comparison. For each outcome, the within-FC mean is taken, and FCs are then sorted into three equally sized bins. Staffing levels is a measure of an FC's degree of under- or overstaffing. It is calculated as the total number of full-time equivalent (FTE) workers divided by number of workers necessary to fill the week's orders while maintaining productivity levels and giving all FTEs 40 hours per week. In other words, it shows whether an FC could complete all its work with fewer people without hurting productivity levels; high staffing levels mean a building could use fewer workers to accomplish the same volume of work. VTO utilization is the share of worker-days with recorded VTO. Measured start time variability is the circular variance in a worker's start time in the past two weeks (see Ch. 1 for more detail). It captures, for example, whether someone is repeatedly starting at 8 am or if she is sometimes starting at 7 am and other times at 9 am.

Table 3: Performance outcomes across FCs

FC:	Green	White	Purple	Yellow	Blue	Red
Overtime rate	High	High	High	Low	Low	Low
Productivity (BPH)	Medium	Medium	Medium	High	Medium	High
Quality	Low	Low	Low	High	Medium	High
Turnover	High	Medium	Medium	Medium	High	Low
Worker satisfaction	Low	Medium	Medium	Medium	Medium	High
Injuries	Medium	High	High	High	Low	Low

Outcomes ranked using network-wide comparison of weekly data for fiscal year 2019. For each outcome, the within-FC mean is taken, and FCs are then sorted into three equally sized bins. Overtime rate is the total hours worked in which employees received pay premia divided by total hours worked. Productivity is the total number of boxes processed divided by total hours worked. Quality is the dollar value of boxes reported missing by customers divided by total sales. Turnover is the number of job exits divided by the average headcount that year. Worker satisfaction is measured as the share of workers who reported in a 2019 Sigma-administered survey that they "agree" or "strongly agree" with the statement "I look forward to coming to work." Injuries are the "total recordable incident rate," an OSHA-required measure of the number of injuries in a fixed amount of work hours.

Table 4: Different cultures across the FCs

Dimensions of culture	**Chess** Shuffling White, Purple	**Accountant** Overstaffing Yellow, Blue	**Underdog** Reacting Green	**Community** Harmonizing Red
Agency				
Resources: what enables action	Creativity	Formulas, policies, standards	Responsiveness, authority	Cross-hierarchy teamwork
Constraints: what limits action	Own abilities	Fear of workers quitting	Labor market/ corporate policy	Familiarity/ emotional connection
Working relations				
Manage-worker	Acolyte/ detached	Line item/impersonal	Team-player/ engaged	Colleague/engaged
Manager-manager	Coordinated	Independent	Uncoordinated	Coordinated
Manager-corporate	Unimpeded	Motivated to impress	Beholden	Avoidant
Aspirations				
Values	Accountability	Fairness	Self-improvement	Family
Ideal manager	Problem-solver	Rule-follower	Coach	Colleague

Table 5: Practice-culture entanglement across the FCs

	Consequence	Appropriateness
Shuffling	Does this reduce OT?	Does this permit managerial discretion?
Overstaffing	Does this improve our standing on the budget?	Can this be routinized and applied with a standard?
Reacting	Does this help us make it through the day?	Can we get managers to implement this?
Harmonizing	Does this make our workers worse off?	Does this support teamwork and collaboration?

Figures

Figure 1: Data collection process

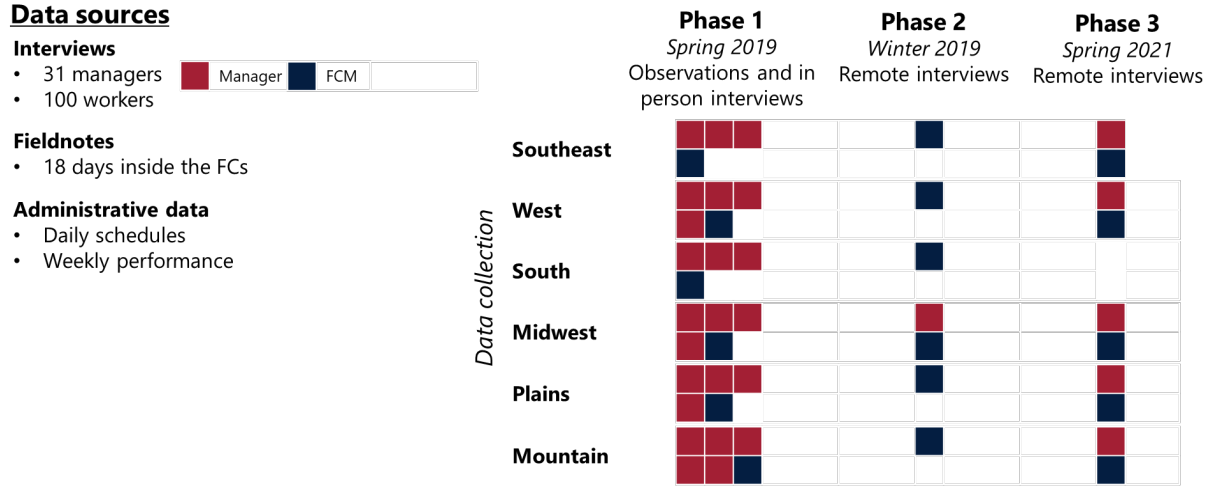
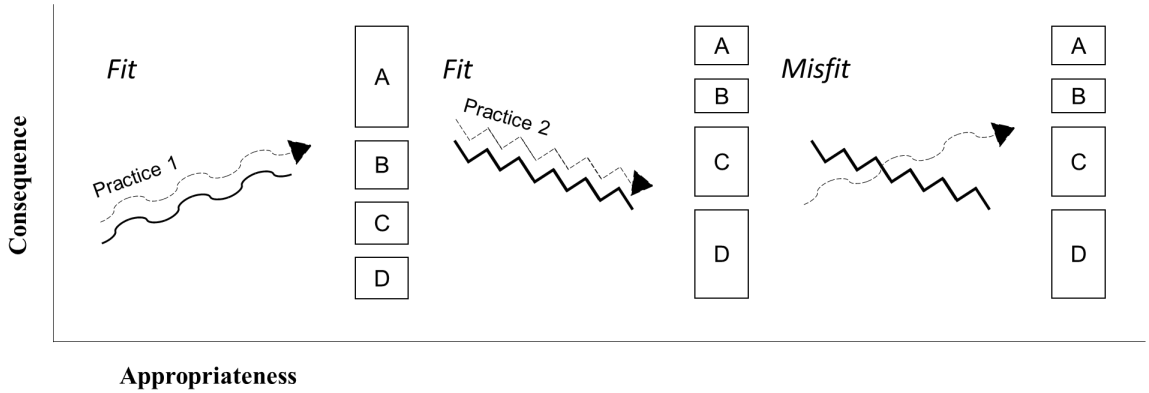


Figure 2: A model of the fit between management practices and organizational culture



CHAPTER 3—THE TOLL OF TOIL: PROBLEMATIC SCHEDULES AND WORKER TURNOVER

Problematic work schedules exact a toll on the workers who are subject to them. The toll may be physical, psychological, financial, or some combination of all three (Bannai & Tamakoshi, 2014; Lambert, Henly, Fugiel, et al., 2019; Nijp et al., 2012; Schneider & Harknett, 2019). To avoid paying this price, prior research suggests that workers may ultimately leave their jobs (Choper et al., 2021; Chung, 2022). In leaving, both the individual and her employer are liable to experience an additional cost: the individual might lose what is otherwise a well-paying job as well as the firm-specific skills that were acquired with it, and the organization might face increased recruiting and training expenses.

This chapter shows that these additional costs are real. Using a novel dataset capturing all the hours that 9,531 hourly workers in a single firm spent on the job from 2017 to 2019, I construct a multidimensional measure of schedule quality, which I then link with employment histories to examine the connection between schedule quality and worker turnover. My method has two primary benefits. First, I do not focus on a particular feature of a schedule, like long or unstable hours, as do existing studies, but instead examine how differences in the length, predictability, and timing of work hours jointly and individually affect job exit. Second, I adopt a revealed preference approach to define what makes a schedule problematic, assessing workers' views of their schedules based on their behaviors. Though the literature on problematic schedules informs index construction, I make no assumptions about which aspect of a worker's schedule is most challenging but instead let the worker's decision to exit her job show this. Revealed preferences have a long history in the economics of consumer choice (Varian, 2006) and have

recently been used to study job search (Sorkin, 2018), but as far as I know, no management or employment relations studies have treated turnover as revealed preference.

The dataset also overcomes several limitations in existing studies. First, the data records the actual schedule every employee works each day. Prior research is largely survey-based and so can only provide measures of schedule quality that are short (e.g., spanning a month or two), sparse (e.g., averaging over long intervals of time), coarse (e.g., recording whether a schedule was longer than expected as opposed to the true hours of overtime worked), and susceptible to recall bias (Bound et al., 2001; Lambert & Henly, 2014). Second, the data records when a worker actually exits the firm rather than relying on the worker's turnover intentions. Knowing the exact time someone left her job is an added benefit because lags between when turnover is recorded and when it actually occurs alter the measured association between the antecedents of turnover and the event itself (Griffeth et al., 2000). Finally, the data contain detailed information on job types and worker characteristics, allowing me to control for other predictors of turnover. No existing studies have all of these strengths.

The study takes place inside a large U.S. retailer's fulfillment centers (FCs), shining light on a growing industry known for high levels of turnover (Tung & Berkowitz, 2020) and tough schedules (Abbott & Gould-Werth, 2020). Up to this point, most research on schedule quality has centered on retail and fast-food. Compared with those industries, FC-work is higher paying,[18] more physically demanding, and oftentimes presents workers with a surplus rather than a deficit of hours. As such, this setting provides an opportunity to assess turnover due to the psychological and physical costs of problematic schedules in addition to the financial ones that

[18] In the warehousing industry (NAICS 493), nonsupervisory workers earned an average of $18.54 per hour at the end of 2019; in the retail industry (NAICS 44-45), this number was $16.88, and in the fast food industry (NAICS 722513), it was $11.86 (U.S. Bureau of Labor Statistics, 2020a).

are common where workers struggle to find enough hours. Focusing on a single organization has the added value of holding constant between-firm differences in job design, technology use, and staffing strategy, which may all affect workers' tolerance for certain kinds of schedules. At the same time, the workers in this study are subject to a variety of scheduling practices (see Ch. 2), leading to heterogeneous temporal experiences.

Together, these features of the method, data, and setting allow me to evaluate the actual job exit behaviors of workers who are exposed to different elements of a problematic schedule. I find consistent support for the conclusion that problematic schedules lead to a higher risk of job exit. What constitutes a problematic schedule differs between full- and part-time workers, but both of these groups are less likely to stay in their jobs when their hours get tough.

What we know about problematic schedules and worker turnover

What makes a schedule problematic?

Problematic work schedules come in many forms. It is generally agreed that the degree to which a schedule is problematic depends on the number of hours an employee works, the timing and predictability of those hours, and how much control the employee has over them (Lambert & Henly, 2014). Key to this conceptualization, schedule quality is multidimensional (Fugiel & Lambert, 2019). Hence, a schedule can be problematic because the hours are long, variable, occurring outside of the typical workday, subject to last-minute changes, or entirely employer imposed. A more problematic schedule will have some combination of these features.

Problematic schedules touch many members of the U.S. labor force. How they do so varies according to the characteristics of the worker and their workplace. Hourly workers, for example, are more likely than salaried workers to experience fluctuating shift times (Lambert, Henly, & Kim, 2019). Salaried workers, on the other hand, are more likely to put in more than 50 hours per week at their jobs (Kuhn & Lozano, 2008). When it comes to having say over when to start and stop work, for another example, part-time workers enjoy greater control than their full-time counterparts (Golden, 2008). Differences in work hours extend across industry, occupation, and worker demographics as well. Salaried and professional workers, for example, report much greater schedule control than those in hourly and lower wage occupations (Kossek & Lautsch, 2018). That said, the incidence of problematic schedules has been on the rise across the U.S., with many types of workers experiencing longer, more variable hours that do not match their preferences (Finnigan, 2018; Jacobs & Green, 1998; Kuhn & Lozano, 2008; LaBriola & Schneider, 2020; McCrate, 2012).

Though they may be prevalent, problematic schedules weigh on the workers subject to them. Workers with problematic schedules are more likely to experience excessive workloads, diminished recovery times, fluctuating earnings, heightened work-life conflict, and limited job control, which each present physiological, psychological, and economic challenges (for reviews, see Bolino et al., 2021; Caruso et al., 2004; Ganster et al., 2018; Nijp et al., 2012; Spurgeon et al., 1997). Indeed, most workers prefer stable and predictable work hours (Mas & Pallais, 2017).

The connection between problematic schedules and worker turnover

Given the multiple challenges associated with problematic schedules, there are several pathways through which prolonged exposure to such a schedule could lead an employee to ultimately exit his job. First, problematic schedules are likely to negatively impact workers' physical and mental well-being. Faced with little control over high or fluctuating work volumes and limited or changing time to disengage outside of work hours raises workers' exposure to on-the-job stressors and reduces their time to recover (Baumeister et al., 1998; Ganster et al., 2018; Geurts & Sonnentag, 2006; Karasek & Theorell, 1990; Sonnentag & Fritz, 2015). Second, problematic schedules are likely to increase work-family conflict. Schedules that keep workers on the job for long periods of time or fluctuate in ways that prevent them from meeting caregiving obligations make the demands of work roles clash with the demands of out-of-work roles, particularly in the family domain (Greenhaus & Beutell, 1985). Third, problematic schedules are likely to increase financial insecurity, particularly for hourly workers. Unstable and unpredictable work schedules, with large swings in hours, are associated with income volatility and household economic instability (Finnigan, 2018; Schneider & Harknett, 2019).

Each pathway can provide several impulses for job exit. Most generally, when a schedule does not meet a worker's preferences, he is liable to feel a lack of fit between his needs and his work environment, resulting in job dissatisfaction and eventually exit (Kelly & Moen, 2007; Swanberg et al., 2011). Burnout and fatigue, work-family conflict, and concerns with low pay all heighten a worker's desire to seek a new job (Boyar et al., 2003; Conroy et al., 2022; Jensen et al., 2013; Podsakoff et al., 2007). Existing studies support these findings with respect to work schedules, showing that turnover intentions increase when hours are variable, nonstandard, and out of workers' control (Allen et al., 2000; Choper et al., 2021; Chung, 2022; Martin et al., 2012; McNall et al., 2009; Moen et al., 2017). In all of these instances, the decision to exit is arguably

voluntary, but problematic schedules can also raise the frequency of events leading to employer-initiated termination. Performance issues are a major cause of job exit (Zimmerman & Darnold, 2009), and workers subject to challenging hours are more prone to decreases in productivity (Pencavel, 2016) and work quality (West, 2009) and to increases in accidents (Folkard & Lombardi, 2006) and absenteeism (Baltes et al., 1999; Dalton & Mesch, 1990). In these instances, workers exit their jobs because their employers have disciplined them for outcomes related to their schedules. It is less clear whether these exits are voluntary, for the worker may prefer to stay on the job, but their employer's problematic scheduling practices and strict scheduling policies prevent them from doing so (Williams & Boushey, 2010; Wood, 2020)

Limitations of existing research

The multidimensionality of a problematic schedule has created several difficulties for prior research. To begin, nearly all existing studies of the relationship between work hours and turnover examine a single dimension of a schedule. A singular focus makes it challenging to assess a) the relative importance of other dimensions and b) whether the dimensions come together to form particularly problematic combinations. By way of example, existing studies, such as Martin et al. (2012), cannot disentangle the connection between working the night shift and job exit from other aspects of a work schedule, such as shift duration. They also cannot speak to interactive effects: working the night shift *and* long hours is likely to be more encouraging of job exit than working either alone. A second difficulty related to schedule multidimensionality stems from the available data. Most studies rely on survey data, which present particular issues for the study of problematic schedules. For one, capturing the range and

frequency of variations in a worker's hours is especially hard when the respondent reports a single estimate of a single feature of their schedule, as is common in most surveys (Lambert & Henly, 2014). Effectively characterizing work hours requires longitudinal data that cover the various dimensions of a schedule. For another, relying on self-reports, especially when questions require respondents to recall complex information from memory, increases measurement error. In the case of reporting hours worked, central to the study of problematic schedules, multiple studies show respondents tend to overestimate the time they spend on the job (Bound et al., 2001). This bias speaks to value of using administrative data in place of surveys.

When researchers are interested in turnover, surveys bring additional difficulties. Accurately evaluating the relationship between an antecedent of job exit and the exit event requires capturing the period of time between when the worker was exposed to the antecedent and when she exited the job; otherwise spurious relationships can be observed (Griffeth et al., 2000). Surveys necessarily fix the time of exposure according to when they are administered. This would seem especially problematic when exposure varies over time, as does exposure to a problematic schedule. Furthermore, surveys typically record a worker's intention to exit a job rather than the exit event itself. Although intent and exit are highly correlated, turnover intentions do not reveal if and when a worker actually left her job.

Two recent studies are notable for overcoming some of these difficulties. Deriving a multidimensional measure of schedule quality from a survey of retail and food service workers, Choper et al. (2021) find that exposure to unstable work schedules boosts turnover. They combine indicators on timing changes, advance notice, recovery times, on-call shifts, and canceled shifts from a two-period panel study to form a summary instability scale, on which they regress job exit. Chung (2022) uses administrative records from a fast food chain to show that

variable work schedules, marked by fluctuations in the timing and length of hours, increase restaurant-level turnover. Though these studies provide some of the strongest evidence to date that problematic schedules are associated with turnover, they are not entirely shielded from the difficulties mentioned above. Choper et al. (2021) rely on self-reports, collapsing dynamic measures of schedule quality into a small set of categories. Chung (2022) has a narrower focus on variability and is not concerned with the relationship between schedules and turnover at the level of the individual worker.

In this study, I improve on these limitations by constructing a broad set of measures of schedule quality with administrative data from a company involved in e-commerce. The data contain actual measures of workers' exposure to problematic schedules as well measures of workers' behavioral responses to them. In coming up with an overall indicator of schedule quality, I do not take a specific dimension of a problematic schedule, such as instability, to be most problematic a priori but instead let workers reveal which dimension is most problematic to them via their exit from the job.

Research setting, data, and methods

Work schedules and turnover in e-commerce fulfillment

This study takes place inside the warehouses of a U.S.-based retailer, which I call Sigma.[19] Prior research has given outsized attention to retails stores and fast food restaurants, which are known for unpredictable and unstable work hours and high levels of turnover. These same issues exist in

[19] The company's name and some identifying details have been altered to preserve confidentiality.

warehouses, which now count among the fastest growing employers in the U.S. (Cumming & Zickhur, 2022) and thus touch more and more workers.

Warehouses are essential in supporting consumers' shift from brick-and-mortar to online shopping (Litwin et al., 2022). The particular warehouses in this study are known as fulfillment centers, or FCs, because they fulfill orders received through Sigma's e-commerce channel. Once slow to change, warehouse work has been rapidly transformed by the rise of e-commerce (Gutelius & Theodore, 2019). Consumers' ability to order online at any hour of the day, paired with competitive pressure for quick delivery, have heightened the volatility and uncertainty that warehouses face in meeting demand (Mims, 2021).

To handle these fluctuations, many warehouse managers have taken to altering work schedules throughout the day (Baker, 2008). A preference for keeping labor costs down means that they often send workers home early when order volume is low and keep them on longer when it is high. Additionally, the need to fill orders whenever they arise means that warehouse work can take place at any hour of the day. Together, these features render warehouse work hours unstable and nonstandard (Abbott & Gould-Werth, 2020; McMenamin, 2007). While representative data are hard to come by, grounded accounts highlight schedules as an especially challenging element of the warehouse work experience (Geissler, 2018; Guendelsberger, 2019; McClelland, 2012).

Warehouses are also sites of high turnover. In 2021, the industry's rate of job separations approached 50 percent, exceeding the average across the U.S. labor market (U.S. Bureau of Labor Statistics, 2021a). These numbers can be even higher in FCs, where schedules are likely to be most problematic (see Ch. 1 for supporting evidence). Studies of particular firms, such as Amazon, identify FCs with annual turnover rates near 100 percent, meaning that almost all

workers will exit their jobs within a year (Tung & Berkowitz, 2020). In fact, an internal documented showed Amazon managers were concerned they could exhaust their entire labor pool within three years because their turnover rates were so high (Del Rey, 2022).

Work schedules and turnover at Sigma

There are more than 20 Sigma FCs scattered across the U.S. At any given time, around 4,700 hourly workers help prepare packages inside the FCs for delivery to homes and businesses. Sigma pays these workers over $17 per hour, on average, yielding roughly $40,000 per year before overtime wages or shift differentials. Around 20 percent of these workers are part-time.[20]

Just as they create challenges for warehouse workers at other companies, schedules are a cause of concern inside Sigma FCs. Interviews carried out as part of Ch. 2 showed that schedules are among FC workers' top concerns. Long, late, and unpredictable hours are commonplace, and workers point to their schedules as a large source of job dissatisfaction as well as a reason to look for work elsewhere. Collective memories of long stretches of overtime, in which multiple days surpassed 11 or 12 hours in length, haunt workers who are still employed at Sigma and are referenced by managers as a reason many other workers have left. Workers also complain when hours are repeatedly cut (due to lower demand), reducing their take-home pay.

While FC workers are hired into a shift with a set schedule, the hours that they actually get often run against these expectations. With some exceptions, the FCs are open for 24 hours Monday through Friday, with workers assigned to one of three shifts intended to span the same

[20] Around 6 percent are temps; in the present analysis I focus only on permanent hourly workers.

amount of time each day, five days per week. Shift assignment depends on department. The most coveted departments begin on first shift, usually around 5 am, because these are most likely to have stable end times. Third shift starts around midnight and tends to attract those looking for a nonstandard schedule because of family responsibilities or a second job. Second shift, which starts in early afternoon, houses most entry-level positions. The largest concentration of second shift jobs are in the breakpack and bulk departments, which are responsible for retrieving goods throughout the FC and are subject to deadlines determined by delivery trucks' need to leave the building to make their destination. Because the number of goods they must retrieve depends on the volume of customer orders the FCs receive, these departments' hours tend to jump around each day, making them less desirable than others inside the FCs.

Two key Sigma policies underpin these fluctuations. The company's mandatory overtime policy means that full-time workers cannot refuse managers' requests to work longer than eight hours. Importantly, part-time workers can say no to this request. The company's voluntary time off (VTO) policy means that managers can ask workers to go home early when volume is low (although Ch. 2 indicates that workers often experience this policy as mandatory). Accordingly, while full-time (part-time) FC workers expect to spend roughly 40 (30) hours on the job each week, starting and ending their days at the same times, they frequently encounter variable hours and extended shifts.

Workers who have trouble meeting these temporal demands run the risk of receiving disciplinary sanctions. Like many other low- and middle-wage workers, Sigma's hourly FC staff are subject to rigid attendance requirements (Williams & Boushey, 2010). If they leave their jobs early or show up late because they have commitments outside of work, they are disciplined in the form of attendance "points"; too many points in a year results in termination.

Combined with the physical nature of the many of the jobs and stringent performance requirements, scheduling practices and policies at Sigma give rise to a work environment that is conducive to high levels of turnover. In line with national rates, annual turnover inside Sigma FCs averages more than 40 percent. What's more, this figure belies striking differences in turnover by tenure, shown in Table 1. With a turnover rate exceeding 115 percent among the newly hired, most FC workers will quit within the first 90 days of employment. This number is even higher among part-time workers. Turnover declines by the second year of employment and continues downward with each year of tenure. This pattern suggests that workers who can make it through the first year are more likely to stay with Sigma. Indeed, despite these rates of turnover, the mean tenure level of Sigma FC workers is 5.91 years.

---Insert Table 1 on turnover by tenure here---

The incidence of problematic schedules at Sigma along with high rates of turnover suggests that there is an opportunity for Sigma to benefit from improving work hours. Entry-level FC jobs tend to come with the most problematic schedules, and managers relay stories of new hires leaving as soon as they realize they must put in long hours, often without being notified of the extension until their shift is almost over for the day. Sigma managers stand to benefit from reduced hiring costs and lost productivity. Workers who would stay at Sigma if their schedules were more tolerable stand to benefit because warehouse work provides better income and benefits than many other jobs available to those with few educational credentials. Positions in retail sales and fast food, for example, often pay considerably less. What's more, more advanced roles at Sigma come with higher pay and less problematic schedules.

Data

To examine how problematic schedules impact rates of turnover, I use three datasets maintained by Sigma. The first comes from Sigma's timekeeping system. It is a record of hourly workers' start and stop times, the department in which those hours were worked, and whether a worker was tardy, absent, sick, or on vacation on a given day. The granularity and scope of these records make them well suited for an analysis of problematic schedules. They cover all hourly FC workers' daily schedules from 2017 to 2019. Whenever a worker arrives and leaves for the day, she must clock into the timekeeping system so that her hours can be logged and she can be paid appropriately. The system records her "punches" in and out, automatically calculating her hours worked. Because the records determine worker pay, both workers and managers are incentivized to make sure they are accurate. The second dataset is maintained by Sigma's human resource staff and contains information on workers' histories at Sigma, such as tenure, jobs held, and termination reasons, in addition to demographic details. The third dataset comes from Sigma's payroll system. It is a record of workers' weekly hours, the pay they received, and their wage levels. Together, these datasets provide high frequency insight into the actual time an individual worker spends on the job and how this relates to her sticking with or leaving the job.

The sample includes workers of diverse backgrounds in a variety of job types and FC locations. Many of the jobs are physical, requiring workers to lift and cart around large objects throughout the day. That said, the data contain a wide range of jobs: some jobs are clerical in nature; some require using machinery; and others entail maintenance and repair. I exclude workers in rare jobs held by only one or two people, as well as temporary workers, who make up

less than 10 percent of the workforce. The majority of FC workers are full-time, meaning they work either an eight- or 10-hour shift. Most part-time and full-time workers are assigned to work five days per week, with the exception of those on 10-hour shifts, who work four days per week. I exclude those on 10-hour shifts because this group is only found in a handful of FCs in a handful of departments (i.e., 2.5 percent of workers).

The FCs all house similar product mixes, use comparable technologies, and serve similar customers. Some of the FCs have a small headcount, with a staff of 50 or less, while others employ more than 250 workers.[21] I exclude one FC with fewer than 10 workers, where turnover is rare. These restrictions yield a sample of 9,531 workers.

Measures

Dependent variable: Job exit

Job exit is a categorical variable that takes a value equal to "exited" in the period a worker quits or is terminated from Sigma, "other" if the worker leaves the firm for a select set of reasons,[22] and "did not exit" otherwise. Because workers in this sample can experience only one of these events in a period, the events can be viewed as competing risks. However, there is no significant relationship between the problematic schedule indexes and these rare "other" reasons for leaving the sample, so I do not report on those results here; lumping "other" into the "exited" category does not change the results materially.

[21] I do not share the actual number of FCs to preserve confidentiality.
[22] I do not count building closures (two of which occurred during the period of study), the elimination of a job due to restructuring, retirements, or deaths as exits. Instead, I treat it as a form of censoring. Three percent of workers leave the sample for these reasons.

Independent variable: Problematic schedule index

To measure Sigma FC workers' exposure to problematic schedules, I create two problematic schedule indexes, one for full-time and one for part-time workers. I distinguish between expected shift durations both for theoretical and methodological reasons.

In terms of theory, full-time and part-time workers likely have different experiences with their schedules as well as different hours preferences. For one, these groups tend to be made up of different sorts of workers. In the U.S., those who voluntarily choose to work part-time tend to be women who are outside of the prime working age (25-54) (Dunn, 2018). This is the case in Sigma FCs, where women make up around 55 percent of part-time staff, compared with 38 percent of the full-time one, and where the mean age is lower among part-time status workers. Full- and part-time workers also typically have differing degrees of schedule control (Golden, 2008; McMenamin, 2007), a known mediator of turnover (Kelly & Moen, 2007; Moen et al., 2017). At Sigma, full-time workers must comply with the firm's mandatory overtime policy; part-time workers can decide to stay on the job later than expected if they wish. Together, both points suggest that what makes a schedule problematic will differ by full- and part-time status.

Best practices on index construction also point to separating the two indexes. I began the present analysis using the problematic schedule index described in Ch. 1. A general measure, this index captures the length, predictability, and timing of work hours in a given period, regardless of full- or part-time status. It tries to be as broad as possible by including dimensions of schedule quality identified in past research without assuming that any one dimension is most problematic. Ideally, the validity of indexes such as this one would be tested to see if they predict outcomes suggested by theory (Bollen & Lennox, 1991). The data to do so are not available in Ch. 1. Here,

I use data on job exits to assess whether the index captures problematic elements of a schedule. In so doing, I assume that job exits reveal workers' preferences for job amenities (Sorkin, 2018), including work hours. Taking this approach, I find that different elements of a schedule are problematic for full- and part-time workers.

I build the indexes in the following steps. First, I regress job exit on the individual components of Ch. 1's problematic schedule index for the full sample, interacting the index with an indicator for part- and full-time status. The results, displayed in Appendix Figure A1, show different patterns for full- and part-time workers. In particular, longer hours are associated with job exit among full-time workers, whereas shorter hours are associated with job exit among part-time workers. I take this as a cause for splitting the sample into full- and part-time subgroups and creating distinct indexes. Counting significant, positive associations as a validation that the component is an indicator of a problematic schedule, I exclude components with negative or insignificant ($p > 0.05$) associations from each index. To avoid issues of multicollinearity, I next follow MacKenzie et al.'s (2005) advice and exclude select variables when their correlations exceed 0.70 (see correlation table in Appendix Table A1). That is, if two components capture similar features of a problematic schedule (e.g., daily versus weekly share of nonstandard hours), I toss out the one with the smaller effect size. This yields a full-time problematic schedules index with four components and part-time index with three. I describe these components below but see Ch. 1 for greater detail on their measurement.[23]

[23] This index does not include a direct measure of schedule control. Differentiating between full- and part-time workers accounts, in effect, for enacted schedule control (i.e., the exercise of choice over hours) but not for perceived schedule control (i.e., the felt ability to influence working time) (Kelly & Moen, 2007). See this paper's discussion section for more on schedule control.

Full-time problematic schedule index. Two components correspond to the length of work hours. *Daily hours greater than scheduled* is the average number of hours a worker exceeds her expected shift duration each day in a given period. *Weekly hours range* is the maximum weekly hours worked in a period minus the minimum divided by the maximum. One component corresponds to the predictability of work hours. *End time variation* captures fluctuations in when workers end their shift. Because clock time is periodic rather than linear, this is calculated as a circular variance (Cremers & Klugkist, 2018). A variance of 1 means the times workers stop their days are spread out, and a variance of 0 means that these times are concentrated. The last component corresponds to the timing of work hours. *Weekly nonstandard hours* are the share of total hours worked outside of 8 a.m. to 6 p.m.

Part-time problematic schedule index. Two components correspond to the length of work hours. *Weekly hours less than scheduled* is the average number of hours a worker's weekly total hours fall below what would be expected given her shift duration in a given period. *Weekly hours range* is the same as above. One component corresponds to the predictability of work hours. *End time variation* is the same as above

To account for the components' different scales, I perform a min-max normalization. Doing so bounds each component between 0 and 1. I then add the components together to form the problematic schedule indexes, multiplying this sum by 10 so that the index ranges from 0 to 100. Index values closer to 100 correspond to more problematic schedules.

Control variables

The control variables can be grouped into those pertaining to schedules and those pertaining to job and worker characteristics.

The schedule controls include the sum of total hours worked in a given period and a categorical variable indicating time of shift (first, second, or third). Controlling for total hours worked accounts for a worker's exposure to a particular schedule. Averaging an hour of overtime for five days of work, for example, likely has a different effect on a worker than averaging that same amount for an entire month.

The job and worker characteristics controls account for the fact that different kinds of workers are more or less inclined to leave their jobs. In terms of job characteristics, I control for tenure, (median-centered) hourly wage, and whether a worked was rehired after previously working for Sigma (≈350 workers). I make tenure a categorical variable based on a workers' years on the job. I further divide the first year into greater and less than 90 days on the job because that is the point at which a worker exits a probationary period and standard attendance policies begin to apply. I also include fixed effects for job type and department to account for differences in turnover and schedules due to the nature of the tasks the worker performs. In terms of demographic characteristics, in all analyses I control for gender, race, and (median-centered) age. In some analysis, I control for marital status, which is only available for a subset of workers. Finally, I control for the unemployment rate in the county in which the FC is located using U.S. Bureau of Labor Statistics' Local Area Unemployment Statistics, and I include fixed effects for period and year.

Estimation strategy

To assess the relationship between job exit and problematic schedules, I undertake an event history analysis. In multiple specifications, I perform a Cox regression, modeling how the problematic schedules indexes affect that likelihood that full- and part-time workers end up in the dependent variable's "exited" category. Several concerns guide my analysis.

First, schedules likely influence workers' decisions to leave their jobs over time. That is, turnover should depend on repeated exposure to a problematic schedule, rather than an acute but temporary experience with one. To account for this, I analyze exposure to problematic schedules over the company-defined period, which is roughly a month, making my unit of analysis the worker-period. I discard periods in which an individual worked fewer than five days so that there is sufficient variation to calculate the index components.

Second, the decision to exit a job is likely premeditated: after experiencing a bout with a problematic schedule, a worker will decide to leave. To account for this, I lag all time-varying variables (except for the unemployment rate, age, tenure, and wage, which likely play a strong role at time of exit) by one period. Doing so also accounts for the fact that in the period in which they exit, many FC workers seem to shift their work attendance, at first psychologically exiting Sigma by working fewer hours and fewer days. This behavior pulls certain index components downward in a way that is qualitatively different from other reasons for reduced hours. Whereas shorter than expected hours are usually imposed on Sigma workers by their managers, shorter than expected hours leading up to exit reflect a degree of worker choice because they require the worker to use vacation time or miss work without prior approval (which will ultimately result in termination.) Because these dynamics are employee- rather than employer-driven, I leave them out of the index. Using lagged measures has the consequence that all workers who leave after working for Sigma for a single period or less are discarded. Although schedules likely play some

role in the exit decisions of those who exit within 30 days of hire, this group of workers' schedules are often irregular because of training and onboarding events.

Finally, turnover and work schedules are likely to be correlated across observations in this dataset. FCs are a main source of the correlation. Turnover rates vary from building to building as do scheduling practices and schedule quality (see Ch.'s 1 and 2 for more detail). As a consequence, workers are more likely to have similar schedules within FCs than across them. In addition, workers with the same individual manager may also be exposed to different quality schedules as well as other pressures for job exit (Maertz et al., 2007). To account for this, I include FC and manager random effects (Therneau & Grambsch, 2000).[24]

The main analysis using the problematic schedule indexes does not speak to the relative importance of each of the index components in influencing turnover, nor does it get at possible mechanisms connecting schedules and job exit. In supplementary analyses, I simultaneously regress job exit on all of the individual index components, assessing which has the strongest relationship with turnover, and I examine how this relationship varies across a host of interactions and subsamples.

Results

Descriptive statistics on schedules and turnover at Sigma

[24] When I use a linear probability model and logistic regression, including FC and manager as a fixed effect and clustering standard errors at the individual worker- and FC-level, the conclusions are the same.

Table 2 contains descriptive statistics on the sample in this study. Turnover trends are evident in the distribution of worker tenure. A sizable share of workers in the sample (≈40 percent) has been employed at Sigma for five or more years, though this portion is lower among part-time workers. The next largest group of workers by tenure have been at Sigma for 90 days to one year. This pattern suggests that Sigma loses a great deal of workers after their first year of employment, but the ones who stick around often do so for extended periods of time. Most workers start their work on second shift. Sigma's FC demographics, which skew toward male and a larger share of workers of color than the general population, are in line with the overall composition of the warehousing industry (Gutelius & Theodore, 2019).

---Insert Table 2 with descriptive stats here---

The distribution of the indexes is displayed in Figure 1. Both the full- and part-time indexes contain long right tails, indicating that some workers experience schedules that are much more problematic than their coworkers'. As an example, the full-time worker with the worse schedule had a combination of long, late, and variable end times. Although this 3rd shift worker put in an average of 9.3 hours per day, one day lasted 16 hours and several were longer than 10. These hours were paired with end times that typically jumped from around 7:00 to 10:00 am.

---Insert Figure 1 with index histogram here---

The component's raw index values, presented in Table 3, help further contextualize the distribution. Because of the min-max normalization, there is no change between the standardized

and raw variables for the index components that represent shares, making it straight forward to understand how the index changes. For example, the typical full-time worker spends about 42 percent of her week working during nonstandard hours. If her index score were to increase by 20 points solely due to working more nonstandard hours, 62 percent of her work hours would occur during nonstandard times. To illustrate changes on variables with other scales, consider that when a part-time worker works fewer hours than expected, she will, on average, work 1.7 hours fewer per week. If her hours were to drop by one standard deviation (1.9), her index score would increase by three points.[25]

---Insert Table 3 with summary stats on index components here---

Problematic schedules as a predictor of job exit

An initial glance shows that workers who exit Sigma have worse schedules than those who stay. Table 4 displays the difference in means in the problematic schedules index in the previous period between those who leave the firm and those who do not.

---Insert Table 4 difference in means between workers who and do not exit here---

Regressions results support this conclusion. Table 5 presents estimates from a set of Cox proportional hazard models in which I regress job exit on the problematic schedule index and the

[25] To calculate this number, divide the change in the raw score by the maximum raw score minus the minimum.

covariates described above. In all models, the index has a positive relationship with job exit, for both full- and part-time workers. Hence, a more problematic schedule is associated with a greater hazard of job exit. As an example, the full FT model shows that the risk of exit for a worker on an eight hour shift with an index score of 30 is 54 percent higher than a worker on the same shift with an index score of 10. The risk of exit for a full-time worker with the worse index score (62.69) is 120 percent higher than the risk for a worker with the median index score (22.43).

---Insert Table 5 with main regression results here---

The relationship is strongest among full-time workers, but there is also a substantial effect of problematic schedules on job exit for part-time workers. The risk of exit for a part-time worker with the worse index score (55.90) is 133 percent higher than the risk for a worker with the median index score (15.30).

Figure 2 displays the hazard of exit at different levels of the problematic schedule index relative to the median index score for full- and part-time workers. The hazards increase nearly threefold when workers have especially problematic schedules.

---Insert Figure 2 showing hazard ratios here---

Which scheduling dimension is most problematic?

The indexes give equal weight to each of their components, but some components may be stronger predictors of job exit than the others. Moreover, correlations between the components

could mean that one of them is responsible for a greater share of the relationship than the others. Figure 3 plots the coefficients from a full Cox regression that includes all components at the same time. The effect sizes correspond to a 1-unit increase in each index component.

---Insert Figure 3 with index component coefficients here—

For both full- and part-time workers, variation in end times and fluctuating weekly hours have the largest effects on job exit. Although these components both pertain to instability, they touch on different dimensions of schedule quality. The former is a measure of how consistently a worker heads home at the same time each day; the latter is a measure of how much a worker's total hours swing from week to week. High levels of end time variability do not necessarily imply large hours fluctuations, and vice versa. The weekly share of nonstandard hours also predicts job exit for full-time workers. Because I control for time of shift, this component's effect shows what happens when a worker who is not as used to nonstandard hours has a week of later than usual shifts.[26] Although the index components pertaining to daily deviations in hours worked from expectations (daily hours greater than scheduled for full-time workers and weekly hours less than scheduled for part-time workers) still have positive associations with job exit for both groups, these relationships are no longer significant. The decline in significance suggests that the effects of hours deviations operate through the other index components. In other words, long or short hours typically occur alongside end time variability and weekly hours fluctuations, and, when they do, the latter two components have a stronger association with job exit.

[26] When I interact nonstandard hours with shift, the effect on third shift is indistinguishable from zero. As expected, it is strongest for first shift, followed by second shift.

The schedule-related controls are also strongly related to turnover. As total hours worked in a period increases, the likelihood of job exit decreases for both full- and part-time workers. This suggests that workers need a minimum number of hours to stick with their jobs but that, for a given number of hours, a problematic schedule raises the chance they will leave. For full-time workers, working on third shift is also associated with a higher likelihood of job exit. Hence, those accustomed to the night shift are already at higher risk of turning over.

Who is most responsive to a problematic schedule?

Tenure

Worker sorting could alter the relationship between problematic schedules and job exit. This is less of a concern in this setting, where workers have little day-to-day say over their hours and thus cannot pick their schedules to their liking. At the same time, certain departments and shifts have less problematic schedules, and workers can apply to roles with more desirable hours when openings arise. Indeed, the estimates in Ch.1 show a negative relationship between tenure and exposure to a problematic schedule. It follows that more tenured workers may be better able to tolerate problematic schedules because they are more likely to have found a job inside the FC with amenable hours and because they have become accustomed to such hours, whatever they may be, by working at Sigma over time. Both tendencies suggest that workers in more advanced roles will be less responsive to problematic schedules than the newly hired, which would pull down the main estimates reported above. I test the effects of sorting in two ways.

First, I repeat the main analysis, interacting the problematic schedule indexes with the tenure variables. Figure 4 displays the estimated effect sizes. Though the relationship between

problematic schedules and job exit appears strongest among the most senior workers, the effect sizes across tenure levels are not significantly different from each other, for either full-time or part-time workers.

---Insert Figure 4 here with plot of effect sizes by tenure---

Part of the reason for the insignificant differences could be that it is not seniority per se that yields favorable schedules but rather that certain roles—which typically though not necessarily require high levels of tenure to occupy—come with less problematic schedules. In a second test, I restrict the sample to workers in entry-level jobs who have been at Sigma for one year or less. Almost all workers begin their jobs at Sigma in the breakpack or bulk picking departments, which usually start on second shift. These departments tend to have long, late, and variable hours, and workers who are interested in staying at Sigma typically wait it out until a position in another department opens. By restricting the sample to these two departments, I minimize the likelihood that workers have any chance to express their scheduling preferences. By restricting the sample to those who have been at Sigma for less than a year, I make it less likely that I am including workers who have had time to make their schedules "work" by adjusting their lives to minimize work-life conflict. The results, displayed in Table 6, show a positive relationship between problematic schedules and job exit for both full- and part-time workers. Although the restricted sample and full sample estimates are not directly comparable, the difference between the two suggests that those in entry roles are less responsive to problematic schedules than their more senior coworkers. In a separate analysis not reported here, I use an indicator for entry role in the place of the job characteristics, tenure, and shift controls

and find a significant negative effect on the interaction between entry role and the problematic schedules index; the likelihood that these workers exit their jobs still increases as their schedules grow more problematic but at a slower rate than those in advanced roles.

---Insert Table 6 with regression results for entry-level roles here---

Gender

Men and women are likely to have distinct temporal experiences on and off the job (Gerstel & Clawson, 2018). Different demands on their time influence both the kinds of jobs they take and thus the kinds of schedules they get, as well as their willingness to accept certain work hours (Goldin, 2014; Mas & Pallais, 2020). It follows that women may react differently than men in response to a problematic schedule.

Table 7 presents the main results from a full Cox regression in which an indicator for gender is interacted with the schedule indexes. It shows that while women are less likely to exit their jobs, a problematic schedule quickly increases the likelihood they will exit. At higher levels of the indexes, they have overall higher hazards of exit than men.

---Insert Table 7 with gender sample regression here---

Discussion

Work schedules are a critical element of job quality. Very long, short, late, and variable hours can compromise what are otherwise good jobs and make bad jobs even worse. A growing body of research demonstrates that when this element of job quality declines, workers are at greater risk of leaving their jobs. Hence, problematic work schedules translate into higher rates of turnover. Whereas prior studies supporting this conclusion have tended to focus on a single dimension of schedule quality and have often lacked the data to show the actual connection between work schedules and job exit, I use detailed administrative records to construct a multidimensional index of schedule quality, finding that exposure to a particularly problematic schedule can more than double the likelihood that a worker exits her job.

Importantly, what it is that makes a schedule particularly problematic depends on the worker's expectations for her schedule. I identify differing expectations by showing that full-time and part-time workers respond to individual dimensions of schedule quality in different ways. To reach this conclusion, I examine workers' actual exit behaviors, which I take to be a revealed measure of their scheduling preferences, rather than relying solely on what past studies define as problematic or on what workers report as most problematic in surveys. I do not presume, for instance, that unstable or nonstandard hours are an issue for all types of workers; I count them as problematic if they result in a higher likelihood of job exit.

Under this approach, I find that the risk of exit increases for full-time workers as their hours grow longer, later, and more variable. For part-time workers, the risk of exit increases with shorter and more variable hours. This divergence in behavior leads to me to settle on distinct composite indicators of schedule quality for each group when analyzing the relationship between problematic schedules and turnover.

Different mechanisms potentially connect problematic schedules and job exit for full- and part-time workers. Past research indicates that problematic schedules can increase turnover through physical, psychological, or financial pathways. Although I cannot test the relative importance of each in this study, the results suggest that psychological pathways may be in play for full-time workers, whereas financial pathways may be in play for part-time workers.

For full-time workers, variation in end times, fluctuations in weekly hours, and working at nonstandard times are most strongly associated with job exit. These schedule dimensions point to a link between work-family conflict and turnover because they make it difficult for workers to plan life outside of work and maintain relationships, which can, in turn, harm well-being (Grant-Vallone & Donaldson, 2001). Full-time female workers in my sample are also at higher risk of exiting their jobs in the wake of problematic schedules than their male counterparts. Because women perform more household and caregiving labor (Bianchi et al., 2000; Killewald & García-Manglano, 2016), they are more likely to acutely feel the effects of work demands on their time. Indeed, work-family conflict is a stronger predictor of negative well-being among women than men (Kinnunen et al., 2004). Furthermore, when the individual components of a problematic schedules are regressed together, end time variation and weekly hours fluctuations absorb the effects of one of the other index components—long daily hours—suggesting that scheduling challenges for full-time workers may be more about changes in when they get out of work than the extended duration of their hours. For them, it is not about long hours *per se* but about getting out getting out of work later than expected. In short, schedules that conflict with out-of-work responsibilities may be most challenging for full-time workers, who respond by reducing performance levels to the point that they lose their jobs.

Part-time workers likely have a different notion of what makes their schedule problematic. At Sigma, work-family conflict is a less probable cause for concern among this group because part-time workers have the ability to refuse extended shifts. As such, they can expect to work long (and, consequently, late) hours only by choice. Greater schedule control is associated with higher levels of well-being (Moen et al., 2016), which diminishes the likelihood of a psychological pathway to job exit for part-time Sigma workers. Like full-time staff, part-time workers at Sigma are more likely to exit when they experience end time and weekly hours variation, but these predictors are also related with a third indicator of problematic schedules for this group: shorter weekly hours. Together, these correlates of turnover suggest that a financial pathway—smaller paychecks—might incline part-time workers find employment elsewhere. The effects of problematic schedules are also stronger among part-time women, a group that often takes such hours to supplement incomes at home (Becker & Moen, 1999). All in all, part-time workers are likely to deem schedules that deprive them of hours to be problematic.

I do not find conclusive evidence that workers grow accustomed to challenging hours. Regardless of full- or part-time status, workers with high and low tenure exhibit similar risks of exit in the face of problematic schedules. If anything, distinguishing between entry and advanced roles shows that challenging hours may be more likely to induce job exit for those who have spent more time at the organization. In that event, worker expectations come into play because workers in advanced roles are more likely to have sorted into positions with hours that match their preferences. When their schedules grow more problematic, they are thus more liable to perceive the change as a violation of their rights to better hours after having "paid their dues" in roles with worse schedules.

There are limits to the generalizability of these findings. In essence, I have shown that there is no single best measure of schedule quality. What makes a schedule problematic at Sigma differs between full- and part-time workers. To the extent that part-time workers in other settings also have the ability to accept or refuse additional hours, long hours will not likely be a problem for them either. In settings where long hours are less common, such as retail or fast food, full-time workers, in contrast to those in this sample, may find shorter than expected hours to be as problematic as long hours. A similar caveat applies when considering other industries and lines of work: these findings pertain to a single organization, and the types of workers it employs may have different preferences than workers elsewhere. To my knowledge, no existing datasets contain actual scheduling and turnover records across multiple organizations; few have such detailed information for a single organization. Hence, the ability to peer at schedules and job exit up close may currently limit the scope of investigations.

In light of these limitations, a first step for future research would be to use datasets similar to this study's to see which of the multiple dimensions of schedule quality examined here are problematic for other populations, especially salaried workers. Second, future research would benefit from including measures of schedule control. The workers in this sample have little latitude to manage their hours, which makes this oversight less of an issue. In populations where there is greater variation in schedule control, workers may face different scheduling challenges, and so it is worth accounting for this. The sort of data used here, however, raises an important consideration for those seeking to measure schedule quality. The literature makes a distinction between perceived and actual schedule control. The former is the felt ability to alter one's work hours or work location, and the latter is the act of regularly and voluntarily altering work hours and location (Kelly & Moen, 2007). Were measures of perceived schedule control to be included

in this index, they would be at odds with the other components, which are objective measures of work hours. Given existing findings (Moen et al., 2017), it seems appropriate to separate perceived and actual measures of schedule control, treating perceived control as a mediator between schedule quality and outcomes of interest and actual schedule control as a dimension of schedule quality. Finally, this study offers only suggestive evidence of the different pathways that connect problematic schedules to job exit. A combination of administrative and survey data could allow for precise measurement of schedule quality, worker behavior, and the mechanisms linking the two.

Implications

These findings support arguments (e.g., Kalloch et al., 2022) that employers would do well to offer their employees better work hours. Indeed, problematic schedules are costly, for both the workers and the organization in this study.

In quitting Sigma, FC workers lose a job that pays relatively well compared to potential alternatives. The median hourly wage in this sample was $17.60 in 2019, a number that was $15.14 across U.S. warehousing occupations.[27] Most Sigma FC workers have only a high school degree (as is the case for the warehousing industry as a whole), and workers with that level of education earned a median wage of $16.87 per hour across all industries in 2019 (U.S. Bureau of Labor Statistics, 2020b). Hence, Sigma workers are likely to forgo extra earnings when they seek employment elsewhere.

[27] Author's calculations using Integrated Public Use Microdata Series, Current Population Survey (IPUMS-CPS).

It is difficult to determine if the workers are moving onto better opportunities when they exit or if they would prefer the chance to stay at Sigma were their hours to improve. Sigma's human resource department considers most exits voluntary (67 percent). Attendance violations are the second most common recorded reason for exit (16 percent), followed by disciplinary violations, such as poor performance or misconduct (13 percent). Presumably, a voluntary quit signals that a worker has found a job that better meets her preferences. Yet attendance and performance are intertwined with work hours, blurring the distinction between voluntary and involuntary job exit. At Sigma, when workers are repeatedly late or absent or their performance consistently falls below a certain level, they will be terminated. The reason they acted in ways that led to these sanctions may be because their work schedules were unrealistic given their outside obligations or commute options or because their schedules left them fatigued to the point that their performance suffered or they needed to take a day from work to rest. No matter how it is counted, preliminary analysis shows that both worker- and employer-initiated job exit increase as schedules grow more problematic.

When workers exit, Sigma incurs costs as well. Sigma estimates that it spends around $5,000 to bring on a new hire, in terms of training outlays and lower levels of productivity due to learning curves. If the company hires around 2,000 new, full-time workers in its FCs each year, the main Cox model, assuming a problematic schedule index score (23.84) and control variables with values typical for new hires, predicts that about 1,140 of these workers will exit within a year. If Sigma could improve these workers' index scores by one standard deviation (8.28), the model predicts 100 fewer exits. This reduction in turnover translates into $500,000 in savings in a single year. Moreover, Sigma readily admits that its turnover costs are likely higher because

hiring costs alone do not account for the lost productivity of an experienced worker or the deleterious effects of high unit-level turnover.

Sigma is not alone in the e-commerce fulfillment business in offering problematic schedules. Long, late, and variable hours are a common experience throughout the industry (Abbott & Gould-Werth, 2020). This study suggests that Sigma and its competitor would benefit from implementing policies that give full-time workers greater latitude to deny extended shifts and part-time workers greater ability to take on more hours. A logical move would be to allow part-time workers to take on hours that would otherwise be imposed on their full-time coworkers. Although Sigma already informally allows for this, it would benefit from adopting a more efficient procedure for matching those who want to leave for the day and those who want to stay longer. Full-time workers are the majority in Sigma FCs, so the company may further benefit from designing policies specifically for this group's needs. Policies that provide greater stability and predictability of end times may be most effective.

Apart from its practical implications, this study has a main takeaway for scholars interested in investigating how schedules impact individuals and organizations. The different responses by full- and part-time workers to the same index components shows the difficulty of assuming a particular dimension of a schedule to be universally problematic. It is possible that other dimensions of schedule quality unaccounted for in previous studies are more problematic for the populations they sampled. Moreover, I find high correlations between index components, which suggests that measures of schedule quality included in past studies may be picking up the effects of other dimensions of a schedule omitted from their analyses. Going forward, research on problematic schedules should start with a set of plausible measures of schedule quality before identifying the ones that are most important in the setting under study.

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Tables and figures

Tables

Table 1: Annual turnover rates by tenure levels

	Annual turnover rate		
Tenure	**Overall**	**Full-time**	**Part-time**
First 90 days	1.16	1.09	1.27
90 days - 1 year	0.66	0.61	0.77
1 - 2 years	0.36	0.35	0.40
2 - 3 years	0.28	0.25	0.36
3 - 4 years	0.20	0.19	0.24
4 - 5 years	0.16	0.16	0.17
5+ years	0.09	0.08	0.16

The turnover rate is calculated as the total number of exits in a period divided by the average headcount in that period, for a given level of tenure. The rate is then annualized.

Table 2: Descriptive statistics of hourly workers in sample

	Overall				Full-time				Part-time			
Variable	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
Job exit	0.03	0.18	0.00	1.00	0.03	0.17	0.00	1.00	0.05	0.22	0.00	1.00
Problematic schedule index												
Full-time					23.25	9.53	0.00	62.69				
Part-time									15.30	7.66	0.00	55.90
Hours worked in period	152.18	42.65	9.55	337.52	163.35	36.96	9.55	337.52	103.75	29.95	13.60	283.10
Age (years)	39.27	12.56	18.52	76.96	39.93	12.51	18.55	76.96	36.37	12.36	18.52	73.59
Hourly wage ($)	17.38	2.46	10.20	32.25	17.63	2.49	10.20	32.25	16.26	1.96	10.20	29.35
County U-rate (%)	3.99	0.84	2.10	8.50	3.98	0.83	2.10	8.50	4.00	0.88	2.10	8.50
Part-time status	0.19											
Shift												
First	0.36				0.35				0.43			
Second	0.57				0.58				0.56			
Third	0.07				0.08				0.02			
Tenure												
First 90 days	0.09				0.07				0.14			
90 days - 1 year	0.20				0.19				0.26			
1 - 2 years	0.16				0.15				0.18			
2 - 3 years	0.09				0.09				0.11			
3 - 4 years	0.05				0.05				0.06			
4 - 5 years	0.03				0.03				0.04			
5+ years	0.38				0.41				0.22			
Rehire	0.03				0.02				0.03			
Female	0.42				0.38				0.56			
Race/ethnicity												
AIAPI	0.05				0.05				0.05			
Black	0.27				0.27				0.24			
Hispanic	0.29				0.28				0.34			
Multiracial	0.04				0.04				0.05			
White	0.35				0.35				0.33			

N = 135,672 worker-periods from 9,531 workers. AIAPI = American Indian, Asian, and Pacific Islander.

Table 3: Summary statistics of problematic schedule index components

A: Full-time

Variable	Mean	SD	Min	Max	1	2	3
1 Daily hours > expected	0.64	0.69	0.00	6.42			
2 Range in weekly hours	0.36	0.19	0.00	0.98	0.03		
3 Weekly nonstandard hours share	0.41	0.20	0.00	1.00	0.03	0.00	
4 End time variation	0.07	0.07	0.00	0.94	0.21	0.19	0.06

These raw values have not been normalized. N = 110,246 worker-periods from 7,635 workers.

B: Part-time

Variable	Mean	SD	Min	Max	1	2
1 Daily hours < expected	1.68	1.93	0.00	20.95		
2 Range in weekly hours	0.36	0.20	0.00	0.96	0.05	
3 End time variation	0.03	0.05	0.00	0.82	0.03	0.15

These raw values have not been normalized. N = 25,426 worker-periods from 2,785 workers.

Table 4: Difference in problematic schedule index for workers who do and do not exit

		Job exit		
		Did not exit	Exited	Difference between exited and did not exit
Problematic schedule index score	Full-time	23.14	26.88	3.74***
	Part-time	15.17	17.63	2.46***

The difference in means between those who exit and those who do not is significantly different for both full- and part-time workers (two sided t-test with $p < 0.001$).

Table 5: Cox regression estimates of relationship between problematic schedules and job exit

	Basic		Full	
	FT	PT	FT	PT
Problematic schedule index (FT)	0.034 (0.002)***		0.020 (0.003)***	
Problematic schedule index (PT)		0.034 (0.003)***		0.021 (0.004)***
Total hours worked			-0.011 (0.001)***	-0.015 (0.001)***
Shift: 1st			-0.047 (0.068)	-0.111 (0.078)
3rd			0.203 (0.100)*	-0.012 (0.326)
Female			-0.116 (0.043)**	-0.051 (0.064)
Race/ethnicity: AIAPI			0.018 (0.102)	0.367 (0.149)*
Black			0.284 (0.053)***	0.326 (0.083)***
Hispanic			-0.120 (0.059)*	-0.108 (0.089)
Multiracial			-0.075 (0.096)	-0.047 (0.171)
Age			-0.019 (0.002)***	-0.010 (0.003)***
Wage			-0.238 (0.021)***	-0.155 (0.030)***
Rehire			-0.028 (0.103)	-0.092 (0.146)
Tenure: First 90 days			0.584 (0.109)***	0.663 (0.179)***
90 days - 1 year			0.220 (0.077)**	0.444 (0.132)***
2 - 3 years			-0.255 (0.092)**	-0.093 (0.157)
3 - 4 years			-0.495 (0.131)***	-0.568 (0.238)*
4 - 5 years			-0.356 (0.148)*	-0.907 (0.327)**
5+ years			-0.794 (0.106)***	-0.711 (0.195)***
County unemployment rate			-0.007 (0.047)	0.024 (0.054)
Supervisor random effects?	Yes	Yes	Yes	Yes
FC random effects?	Yes	Yes	Yes	Yes
Job type fixed effects?	No	No	Yes	Yes
Department fixed effects?	No	No	Yes	Yes
Period fixed effects?	No	No	Yes	Yes
Year fixed effects?	No	No	Yes	Yes
Number of exits	3,255	1,247	3,382	1,276
N	110,246	25,426	110,246	25,426
BIC	54,360.677	17,717.319	51,880.829	17,308.671
Log likelihood	-25,949.12	-8,503.417	-25,198.21	-8,282.798

Coefficients are not exponentiated. Standard errors in parentheses. The reference category for shift is 2nd; for tenure, it is 1-2 years; for race/ethnicity, it is white. Age and wage are centered at the sample median. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6: Cox regression estimates for relationship between job exit and problematic schedules for entry-level positions

	FT	PT
Problematic schedule index (FT)	0.016 (0.004)***	
Problematic schedule index (PT)		0.014 (0.006)*
Total hours worked	-0.011 (0.001)***	-0.016 (0.002)***
Department: Bulk	0.427 (0.213)*	-0.132 (0.332)
Job level: 2	-0.160 (0.213)	-0.009 (0.323)
Female	0.002 (0.064)	0.041 (0.088)
Race/ethnicity: AIAPI	-0.151 (0.160)	0.667 (0.207)**
Black	0.289 (0.083)***	0.517 (0.119)***
Hispanic	-0.107 (0.093)	0.082 (0.131)
Multiracial	-0.172 (0.158)	0.639 (0.223)**
Age	-0.012 (0.003)***	-0.003 (0.004)
Wage	-0.243 (0.036)***	-0.096 (0.045)*
Rehire	-0.037 (0.150)	-0.110 (0.198)
Local unemployment rate	-0.040 (0.068)	-0.062 (0.072)
Supervisor random effects?	Yes	Yes
FC random effects?	Yes	Yes
Period fixed effects?	Yes	Yes
Year fixed effects?	Yes	Yes
Number of exits	1,316	595
N	16,087	6,171
BIC	19,177.586	7,702.568
Log likelihood	-9,360.945	-3,677.57

Sample is restricted to full-time breakpack and bulk departments workers on second shift with a year or less of tenure. Coefficients are not exponentiated. Standard errors in parentheses. The reference category for race/ethnicity is white; for tenure, it is 1-2 years. Age and wage are centered at the sample median. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7: Cox regression estimates for relationship between job exit and problematic schedules by gender

	FT	PT
Problematic schedules index	0.015 (0.003)***	0.013 (0.005)*
Gender	-0.408 (0.111)***	-0.30 (0.136)*
Problematic schedules index x Gender	0.011 (0.004)**	0.014 (0.007)*

These estimates come from the main specification in Table 5 with an additional interaction term for gender. Coefficients are not exponentiated. Standard errors in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figures

Figure 1: Histogram of problematic schedule index

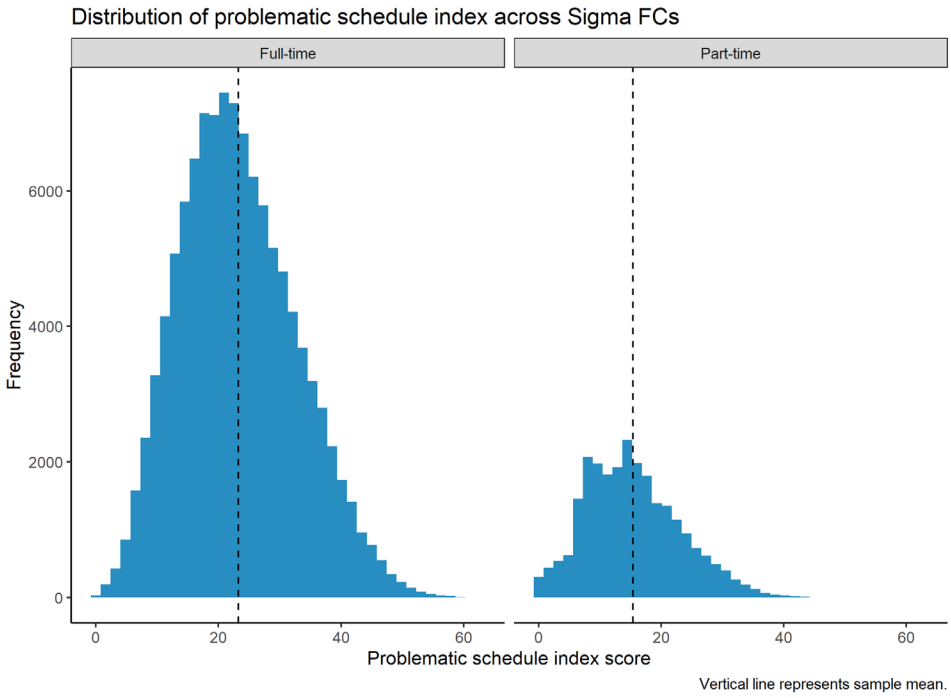
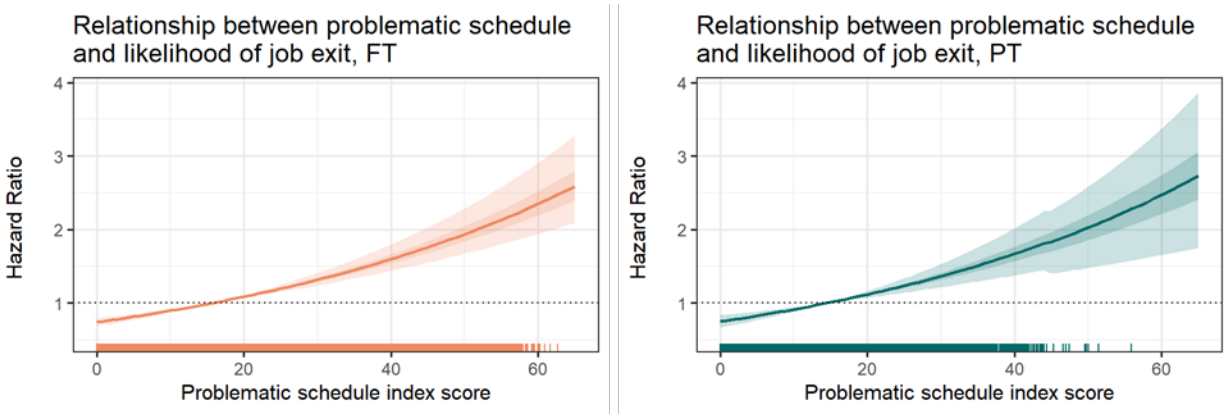


Figure 2: Change in hazard of job exit as schedule becomes more problematic



These figures compare the hazard of job exit for a given index score to the hazard of exit for the median index score for full- and part-time workers, respectively. The dark lines show the estimated hazard ratios. Confidence intervals are generated via simulation (Gandrud, 2015). The darker bands contain 50 percent of estimated hazard ratios; the lighter bands contain 95 percent.

Figure 3: Plot of Cox regression estimates for components of problematic schedule index

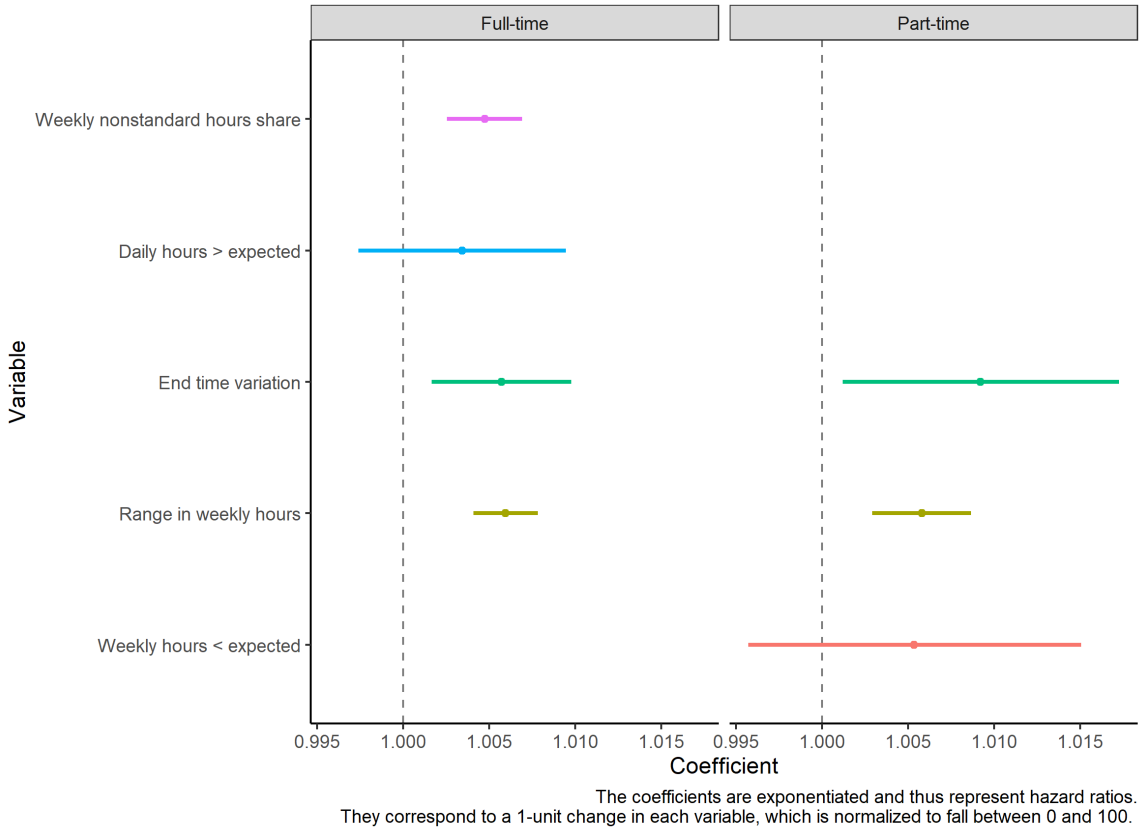
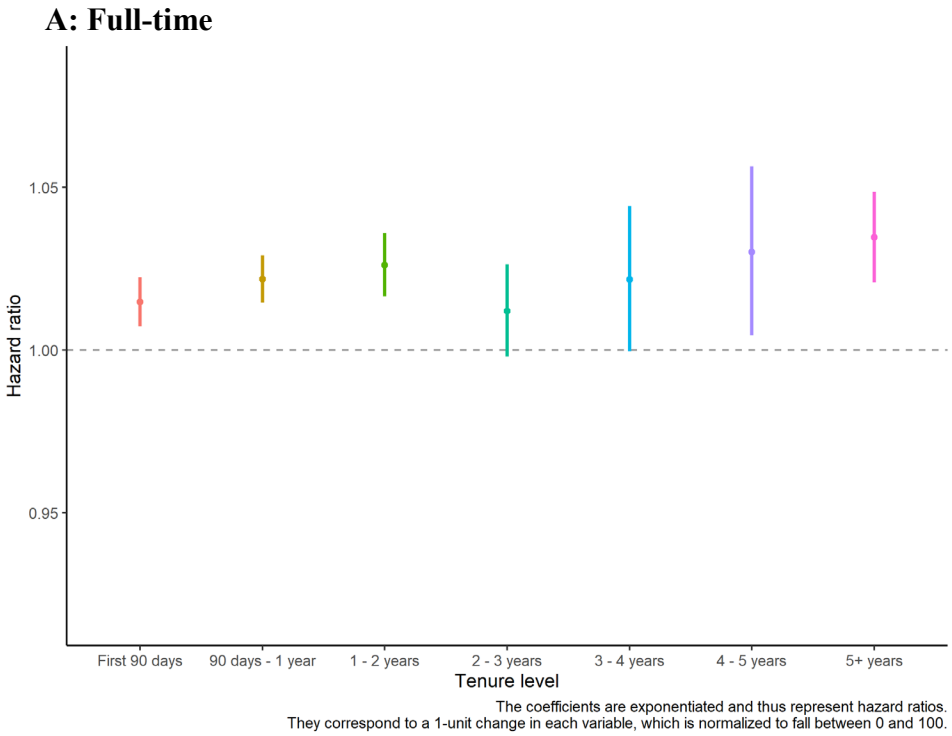
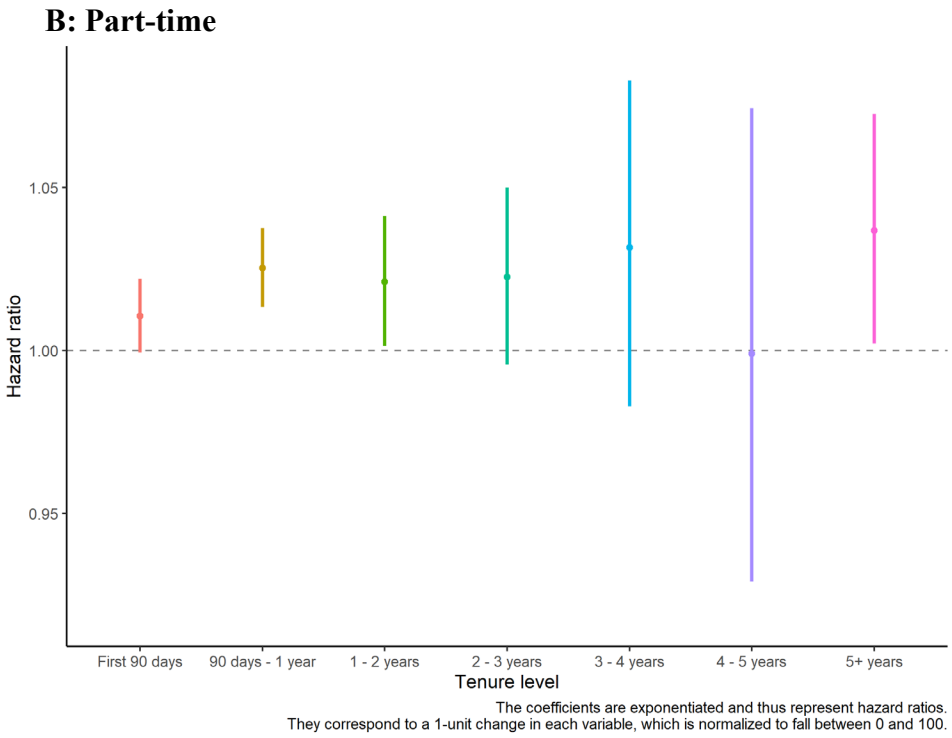


Figure 4: Effect of problematic schedule on job exit by worker tenure





Appendices

Tables

Table A1: Correlation of initial problematic schedule index components

A: Full-time

	Variable	1	2	3	4	5	6	7	8
1	**Daily hours greater than expected**								
2	Weekly hours greater than expected	0.97							
3	Daily hours less than expected	-0.43	-0.44						
4	Weekly hours less than expected	-0.49	-0.46	0.93					
5	**Range in weekly hours**	0.03	-0.03	0.14	0.08				
6	Daily nonstandard hours share	0.04	0.02	0.04	0.01	0.03			
7	**Weekly nonstandard hours share**	0.03	0.02	0.00	-0.02	0.00	0.96		
8	Start time variation	0.07	0.05	0.03	0.00	0.07	0.06	0.05	
9	**End time variation**	0.21	0.13	0.24	0.15	0.19	0.09	0.06	0.67

These values have been normalized. The variables in bold are included in the full-time specific problematic schedule index. N = 110,246 worker-periods from 7,635 workers.

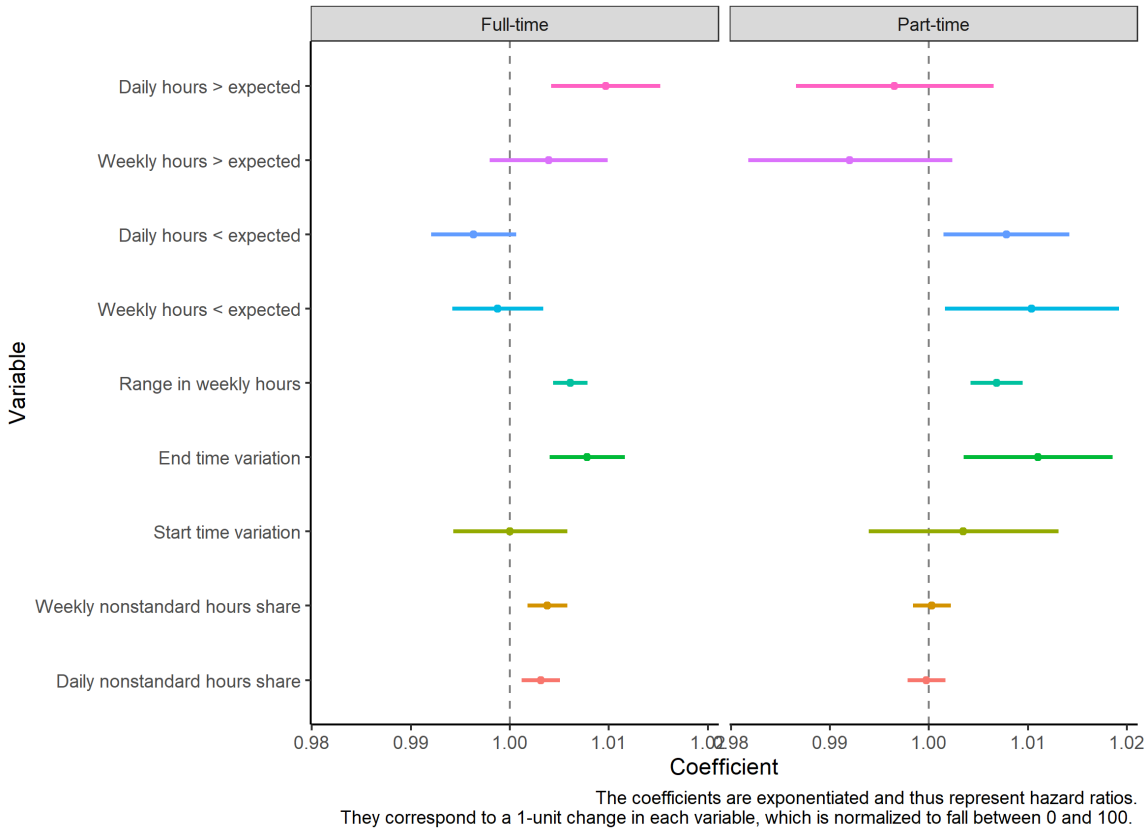
B: Part-time

	Variable	1	2	3	4	5	6	7	8
1	Daily hours greater than expected								
2	Weekly hours greater than expected	0.97							
3	Daily hours less than expected	-0.45	-0.44						
4	**Weekly hours less than expected**	-0.38	-0.38	0.91					
5	**Range in weekly hours**	0.07	0.03	0.10	0.05				
6	Daily nonstandard hours share	-0.06	-0.07	0.08	0.12	0.05			
7	Weekly nonstandard hours share	-0.04	-0.05	0.06	0.09	0.04	0.98		
8	Start time variation	0.17	0.15	-0.02	-0.03	0.09	0.01	0.00	
9	**End time variation**	0.30	0.27	0.03	0.03	0.15	0.04	0.04	0.74

These values have been normalized. The variables in bold are included in the full-time specific problematic schedule index. N = 25,426 worker-periods from 2,785 workers.

Figures

Figure A1: Plot of Cox regression estimates for initial components of problematic schedule index



Each coefficient comes from a full regression of job exit on that index component. The full-time and part-time samples are pooled. Interactions allow for estimates of differences by shift-status.