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Routine Schedule Unpredictability and Material
Hardship among Service Sector Workers**

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Hard Times: Routine Schedule Unpredictability and Material Hardship among Service Sector Workers

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Abstract

American policy-makers have long focused on work as a key means to reduce poverty. And yet work has become increasingly precarious and polarized. This precarity is manifest in low wages, but also in unstable and unpredictable work schedules that often vary significantly week-to-week with little advance notice. We draw on new survey data from The Shift Project on 28,500 hourly retail and food service workers in the United States. We assess the association between routine unpredictability in work schedules and household material hardship. Using both cross-sectional models and panel models, we find that workers who receive shorter advanced notice, those who work on-call, those who experience last minute shift cancellation and timing changes, and those with more volatile work hours are more likely to experience hunger and residential hardships as well as more overall hardship. Just-in-time work schedules afford employers a great deal of flexibility, but at a heavy cost to workers' economic security.

Introduction

For decades, prominent American policymakers and elected officials have argued that employment is the surest anti-poverty approach. From Clinton’s “Welfare to Work” to Ryan’s “Better Way,” the common denominator is that poverty alleviation is most effectively accomplished when policies ensure that poor adults must enter the labor market. Taken at face value, these policies are predicated on the idea that work “is the dividing line between poor and non-poor” (Holtz-Eakin, 2016). Yet, recent analyses show that millions of working Americans are impoverished (BLS, 2016). The failure of employment to deliver workers from poverty is clear in ethnographies of the working poor (e.g. Edin and Shafer, 2016) as well as in quantitative analyses that show that at least a third of households with a working adult experience material hardship (Karpman et al., 2018).

Over the past forty years, the nature of work in the United States has fundamentally transformed as jobs at the bottom of the labor market have become substantially more precarious (Kalleberg, 2009). Notably, these are the jobs that workers at the center of the anti-poverty debate are most likely to enter: thirty years ago, following the passage of the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA), workers who left AFDC and entered the labor market overwhelmingly entered jobs in retail, food service, and hospitality (Brauner and Loprest, 1999). These jobs are economically precarious with low-pay and few fringe benefits (Osterman and Shulman, 2013) and while low income is a predictor of material hardship, a great deal of variation in hardship remains after accounting for income (Iceland and Bauman 2007; Mayer and Jencks 1989; Short, 2005). But, recent research also highlights another dimension of precarity that appears common in front-line service sector positions and has important and independent effects on worker health and wellbeing – temporal precarity (Schneider and Harknett, 2019a).

Large shares of workers in retail and food service occupations appear to grapple with routine work schedule uncertainty and instability in which their employers vary their work schedules from day to day and week to week, often with little advance notice (Lambert et

al., 2014; Schneider and Harknett, 2019a). Such temporal precarity seems likely to cause material hardship in working families by increasing income volatility (Morduch and Schneider, 2014), interfering with benefits eligibility (Hill and Ybarra, 2014), straining informal support networks (Carrillo et al. 2017), reducing entry into marriage (Schneider, Harknett, and Stimpson 2019), and interfering with the ability to plan for the future (Gennetian and Shafir, 2015). In line with these expectations, a series of detailed ethnographies of the working poor consistently shows that work schedule unpredictability reduces economic security (i.e. Edin and Shaefer, 2015; Edin and Lein, 1997). However, severe data limitations have precluded any quantitative and systematic analysis of how work schedule unpredictability shapes household material hardship.

We draw on a new source of survey data from The Shift Project that contains detailed measures of work schedule unpredictability, material hardship, and a rich set of controls for a cross-section of 28,500 hourly workers employed at 115 of the largest firms in retail and food service in the U.S. We examine how work schedule unpredictability is associated with hunger hardship, residential hardship, and any material hardship, net of wages, other dimensions of job quality, and human capital and demographic characteristics. We then draw on three waves of individual panel data collected from a subset of 1,000 respondents to estimate models that allow for causal ordering and some adjustment for unobserved heterogeneity.

We find that household material hardship is common among hourly workers at the nation’s largest retail and food service firms. We show that among these workers, those with more unpredictable schedules - little advance notice, on-call shifts, cancelled shifts, last-minute schedule changes, and work-hour volatility - are significantly more likely to experience hunger and residential hardship as well as at least one of a broader set of hardships. These associations are substantively large and robust to extensive controls and in lagged dependent variable models. In an era of precarious employment, work is not a panacea for poverty and we show that schedule unpredictability is one important cause of significant household material hardship.

Background

Temporal Precarity

Employment in the United States has become more “precarious” over the past fifty years (Kalleberg, 2009). This precarity is manifest in low wages, few fringe benefits, but also in unstable and unpredictable work schedules (Kalleberg, 2013). Particularly in the service sector, workers can no longer count on a regular day shift, or even a regular night or evening shift. Instead, work schedules are often set by employers on short notice and the hours assigned to workers vary from day-to-day and the days worked vary from week-to-week (Lambert 2008). Workers with unstable schedules are likely to be subject to a kind of “routine unpredictability” (Clawson and Gerstel 2015) in which it is a near certainty that their schedule will vary, but a near unknown of what form that change will take.

This broad trend toward greater economic precarity has been characterized as part of a “Great Risk Shift” because employers have transferred more risk onto individual employees (Hacker 2006). This risk shift involves an erosion of guaranteed benefits like pensions and an increase in employee cost sharing or an elimination of benefits altogether. Another important dimension of this risk shift has played out in work time and work schedules. Here, employers have increasingly relied upon so-called just-in-time scheduling practices to closely align staffing with consumer demand and thereby keep labor costs to an absolute minimum. Employers rely heavily on part-time workers who have an economic imperative to pick up shifts offered at the last minute, at any time of day or night (McCrate et al., 2019). Employers also use on-call scheduling in which they keep employees on hold in case they are needed, and typically offer no compensation when the workers are told they are not needed (Fugiel and Lambert, 2019). Workers may also report for a shift only to be sent home because business is slow or asked to stay late if needed, again typically with no compensation for their time and trouble (Golden, 2015). In all of these ways, employers engage in short-term optimization on labor costs by having the access to a flexible workforce and the ability to staff-up when needed without the expense that would come from guaranteeing a set number

of hours per week or honoring work schedules once assigned (Lambert, 2008; Alexander et al., 2015). These practices translate to a great deal of flexibility for employers. However, these practices come at the expense of predictability and stability of time and consistency and sufficiency of earnings for workers. This routine unpredictability in schedules could then plausibly also affect workers’ risk of experiencing material hardship.

Why Would Unpredictable Schedules Affect Material Hardship?

Although a great deal of research documents the prevalence of material hardship, the literature on the causes of material hardship is not well developed (Heflin, 2016) and has focused on trigger events related to disability and health, but also income shocks and household dynamics. We draw on this literature directly concerned with hardship as well as the broader literature related to precarious work to theorize that schedule unpredictability is likely to increase household material hardship through a set of inter-related mechanisms. We do not see these as competing or even necessarily as separable processes, and we do not test or compare particular mechanisms. Instead, we review these mechanisms to make the case that schedule instability could plausibly have an important influence on material hardship.

Income Volatility

Recent research charts volatility in income and earnings between years and shows that income volatility from year to year is both prevalent and on the rise (Dynan et al. 2012; Gottschalk and Moffitt 2009; Hardy and Ziliak, 2014; Hardey, 2017). This important insight on annual income volatility has sparked further explorations into the extent of income fluctuations from month-to-month. The more granular data on monthly income variation is valuable because many large household expenses, such as rent or utilities, are paid on a monthly basis.

The limited research to date on intra-year income volatility suggests that month-to-month income volatility is quite high. According to recent data from the Survey of Household Economics and Decision-making (SHED), one-third of all U.S. households report that their income varies from month-to-month (Federal Reserve 2016). High rates of month-to-month

income volatility are also found in analyses of data from a financial diaries study (Morduch and Schneider 2014; Hannagan and Morduch 2015; Murdoch and Siwicki, 2017) and in big data analyses of one million Chase banking customers (Farrell and Grieg 2016). These multiple data sources and studies reveal then that fluctuations in income from month-to-month are common and are sizable.

Prior research also shows that low-income households are particularly vulnerable to experiencing intra-year income volatility (Bania and Leete 2006; Morris et al. 2015; Farrell and Grieg 2016). Using SIPP data, Bania and Leete (2006) find that intra-month income volatility is higher for low-income households than higher income households and, also using SIPP, Morris et al (2015) find that the coefficient of variation on income for households with children in the bottom decile of income is three times that of those in the top decile and more than twice that of those in the 40th - 50th percentile. Drawing on the JP Morgan Chase data, it appears that in the bottom quintile, 74 percent of households experienced income fluctuations of 30 percent or more from month-to-month (Farrell and Grieg 2016)

Recent research shows that volatility in labor market earnings is a large component of overall income volatility (Morris et al. 2015). Volatility in earnings is created both by dips and spikes. Workers who receive year-end bonuses, overtime pay, or raises will experience volatility in earnings between years and even between months, and so too will those who see their work hours reduced, who experience a period of unemployment, or take unpaid leave. Focusing on low-income households, Murdoch and Siwicki (2017) use data from the Financial Diaries Study to find that a much larger share of this earning volatility stems from within-job pay variation rather than between-job variation. Similarly, Morris et al. (2015) find that for poor parents, volatility in earned income is greater than for unearned income.

Inconsistent work hours are a major driver of this within-job variation in earned income over time (Farrell and Grieg 2016; Federal Reserve 2016). Some evidence for the link between irregular work hours and income volatility comes from research on the Great Recession, which shows that the growth in variable work hours during the recession (LaBriola and

Schneider, 2019) accounts for a significant share of the growth in income volatility over the same period (Finnigan, 2018). Further, recent research from the Federal Reserve’s Survey of Household Economic Decision making (SHED) suggests that unpredictable and unstable work scheduling practices may play an important role in household income volatility dynamics. Of the one-third of respondents who reported that their household income varies from month-to-month, the single most common reason cited for this volatility was an “irregular work schedule.”

In turn, previous research finds that income volatility has consequences for household economic security, food insecurity, and economic hardship (Bania and Leete, 2007; Federal Reserve, 2016; Leete and Bania, 2010; McCarthy et al., 2018) and negative income shocks predict housing hardship (Finnigan and Meagher, 2018). Research also suggests that income volatility is linked to adverse schooling outcomes for children and worse emotional health among adults (Gennetian et al, 2015; Yeung et al, 2002; Hardy, 2014; Prause et al, 2009).

Benefits Eligibility

Unpredictable work schedules may also lead to household material hardship if schedule unpredictability interferes with eligibility for benefits that might otherwise help families avoid material hardship (Hill and Ybarra, 2014). A number of important safety net programs closely link eligibility to earnings and work hours and require frequent recertification. For instance, many TANF recipients are required to work at least 20 hours per week, some SNAP recipients must also work at least 20 hours per week and report any month in which they fall short, and states vary widely in their work hours requirements and re-certification frequency for child care assistance (Ben-Ishai, 2015). These rules have consequences for maintaining benefits eligibility. Higher earnings variability reduces participation in SNAP for low-income households (Moffitt and Ribar, 2009) and, in a study of child care subsidy receipt in New York and Illinois, recipients who worked jobs that required unexpected hours were significantly more likely to leave the subsidy program (Henly et al., 2017).

The difficulties likely posed by unstable and unpredictable schedules for benefits eligibility

and receipt are consequential if public benefits reduce hardship. Here, the literature is quite mixed, likely because the most financially fragile households are most likely to access benefits, suppressing or even reversing the association in observational studies (Pilkauskas et al., 2012; Gundersen and Ziliak, 2014). However, several studies that use exogenous shocks find evidence that public benefits, specifically SNAP, likely reduce hardship. Drawing on data from the Fragile Families Study, Pilkauskas et al (2012) find that the effects of job loss during the Great Recession on material hardship would have been larger but for the compensatory role of SNAP. Similarly, Mykerezi and Mills (2010) use the exogenous variation in SNAP benefits amount generated by errors in payment amount and estimate the SNAP reduces food hardship. In a recent comprehensive examination of safety net benefits and hardship, McKernan et al. (2018) find significant reductions on food hardship and overall hardship with TANF, SNAP, and Medicaid participation.

Household Instability

Another pathway though which precarious work may lead to hardship is by destabilizing household relationships and undermining a form of economic support and stability. A large body of research documents a relationship between economic security and entry into marriage and marital stability (Burstein 2007; Ellwood and Jencks 2004). This literature has shown that men’s steady employment and earnings are associated with marriage formation and stability and that women’s earning and employment have come to function in the same way (Sweeney 2002; Gibson-Davis, Edin, and McLanahan 2005; Xie et al 2003). Although less attention has been paid to how temporal precarity is related to family formation and stability, for hourly workers, temporal precarity translates mechanically into economic precarity. Therefore, we can infer that this temporal precarity may operate as a barrier to family formation and stability. Some direct evidence for this relationship comes from recent research drawing on data from the NLSY97, which shows that irregular work schedules are negatively associated with entry into marriage (Schneider, Harknett, and Stimpson 2019).

If temporal precarity in work schedules interferes with family formation or destabilizes

relationships, then it may also undermine the ability to pool and smooth income with a partner and to share household expenses. Therefore, there is good reason to expect that unstable work schedules could lead to material hardship via the effect on household relationships. However, recent research using panel data from the SIPP is mixed. Helfin (2016) did not find evidence that household transitions affected reports of hardship, but Western et al. (2016) found that divorce is associated with an increase in children’s experience of material hardship.

Over-taxed informal networks

A large theoretical and empirical literature argues that reciprocity is essential for maintaining exchange relationships (Blau 1986; Desmond 2012; Dominguez and Watkins 2003; Harknett and Hartnett 2011; Menjivar, 2000; Nelson, 2000). Qualitative research describes the process by which individuals strategically select persons to ask for support so as not to generate fatigue or resentment on the part of the supportive social tie and how social ties become over-taxed and unwilling to help if called upon too frequently (Dominguez and Watkins, 2003; Menjivar, 2000; Nelson, 2000).

Among working parents, unstable work schedules create needs for just-in-time care providers, and informal network ties are the most flexible and common source of child care support. Parents working in retail commonly rely on grandparents, other relatives, and friends to provide care at the last minute. But in-depth interviews with these parents demonstrate that these repeated last minute requests can be a burden and can lead to tension and frayed relationships (Carrillo et al., 2017; Scott, London, and Hurst, 2005; Henly and Lyons, 2000).

More generally, for any worker with a chronically uncertain and changing schedule, the maintenance of social ties will be challenging given the difficulty of sharing regular time with family and friends. Further, having personal challenges such as low-income and poor health is associated with a lack of supportive social ties that can provide financial or in-kind assistance (Harknett and Hartnett, 2011; Offer 2012). By the same token, the routine instability of just-in-time work schedules may be a serious impediment to maintaining exchange relationships

of support. This is consequential because supportive social ties are a key strategy for dealing with volatile incomes and for buffering against material hardship by providing instrumental supports such as a place to live, a small loan, or child care (Edin and Lein, 1997; Harknett 2006; Henly, Danziger and Offer 2005). The lack of these types of supportive relationships is likely to increase the risk of hunger, housing, and other material hardships.

Ability to plan ahead

Unstable and unpredictable work schedules are also likely to affect a person's ability to engage in planning for the future. Recent work at the intersection of behavioral economics and psychology has argued that under conditions of scarcity, individuals' attention and focus are captured by that which they lack, which leads to tunnel vision and a focus on short-term needs, and undermines the ability to engage in longer range planning (Mullainathan and Shafir, 2013; Shah, Shafir, and Mullainathan, 2014).

In their book, *Scarcity*, Mullainathan and Shafir focus on the effects of shortages of money among those who are poor and shortages of time among highly educated professionals. However, service sector workers face both of these types of scarcity in that their economic resources are scarce but so too is their time. These workers often have the misfortune of underemployment without the upside benefit of predictable free time that could be productively spent. Instead, because many workers have to keep their schedules open and available for work, even when they are not working or getting paid, the challenges of low earnings are compounded by a scarcity of time (Lambert, 2008; Golden, 2015).

The cognitive toll of scarcity and its affects on decision-making may lead to greater risk of material hardship if it leads to increased reliance on payday loans and other high cost alternative financial services (Apaam et al., 2018) and to a range of other decisions that privilege short-term imperatives over longer-range benefits (Gennetian and Shafir, 2015).

Prior Empirical Research

While the reality of unstable and unpredictable work schedules is clear in qualitative and ethnographic accounts of low-wage work (i.e. Williams, 2006; Henly et al., 2006; Halpin, 2015), these studies are focused on the workplace and do not generally connect schedule instability to household or family processes. In contrast, ethnographies of the working poor capture household processes related to hardship and, while providing a multi-dimensional account of the detriments, again and again highlight the role of unpredictable scheduling in household economic wellbeing.

To our knowledge, the issue of schedule unpredictability and hardship first surfaces in Edin and Lein’s 1997 *Making Ends Meet*, where research participants describe unpredictable hours at fast food firms, including being sent home early from shifts. For Edin and Lein’s subjects, this unpredictability leads to both income volatility and to difficulty qualifying for public benefits (p. 68). Twenty years later, Edin and co-authors document similar unpredictability for service workers in *It’s Not Like I’m Poor* (2015) in which respondents talk about how schedule unpredictability “made financial planning a challenge” (p. 33) and continued to interfere with benefits eligibility (p. 49). Workers in Austin, TX report similar intersections between unpredictability and hardship, with Caitlyn Collins describing how one respondent, “Raven,” contended with little schedule control and often learned “of her shifts with only a few hours’ notice,” unpredictability that added up to cutting “it dangerously close to broke at the end of every month” (p. 116). Ehrenreich (2001) similarly highlights how last minute shift changes and unpredictable schedules make it difficult to make ends meet, specifically by interfering with the ability to hold a second job. Most recently, in *\$2.00 a Day*, Edin and Shaefer (2015) show how work schedule unpredictability and hours volatility are a serious constraint on household economic wellbeing.

However, existing large-scale data sets that capture measures of material hardship such as the Fragile Families study and the SIPP do not contain detailed measures of unpredictable

scheduling.¹ While the NLSY97 and GSS contain some measures of unpredictable scheduling, these are not extensive and these surveys do not also gauge material hardship.² The lack of existing data has constrained our ability to investigate how the temporal dimension of precarious work shapes material hardship.

Data and Methods

We use new survey data from The Shift Project for a sample of hourly workers employed at one of 115 of the largest retail or food service companies. The Shift Project uses an innovative recruitment strategy to collect web-based survey data from a sample of low-wage service-sector workers employed at these particular food service or retail employers: targeted advertising through Facebook. As the leading social media platform (Perrin, 2015), with over 80% saturation of the working-aged population in the U.S. (Greenwood et al., 2016), Facebook houses an extensive database of information on broad populations. Facebook draws on both user-reported information and infers user characteristics from user activity, and then allows advertisers to use this information at the group level to target advertisements to desired audiences. The Shift data take advantage of this infrastructure to target survey recruitment messages to Facebook users who reside in the United States, are between the ages of 18 and 65, and list one of 115 large retail or food companies as their employer.

The Shift data are constructed by first placing advertisements on the Facebook platform, which then appear in users’ Facebook desktop newsfeed, mobile newsfeed, or on Instagram. Users who click on the link in the advertisement are redirected to an online survey hosted through the Qualtrics platform. The front page of the survey contains introductory information and a consent form. Respondents provide consent by clicking to continue to the survey instrument. Respondents who complete the survey are entered into a drawing to award prizes to eligible respondents.

¹The SIPP only captures schedule type and if respondents’ report that their usual work hours vary. The Fragile Families Study asks about schedule type: weekdays, evenings, nights, weekends, and “different times each week.” However, there are no items on unpredictability per se.

²The GSS asks about material hardship in 2004, but about a limited set of scheduling items only in 2014 and 2016.

This approach to survey data collection departs from traditional probability sampling methods and some have raised reasonable questions about such approaches (Groves, 2011; Smith, 2013). One possible source of bias arises from our sampling frame of Facebook users. While earlier research noted selection into Facebook activity (Couper, 2011), recent estimates show that approximately 80% of Americans age 18-50 are active on Facebook (Greenwood et al., 2016). Thus, the sampling frame is now on par with coverage of telephone-based methods (Christian et al., 2010).

The Shift approach is innovative, but not without precedent. Faced with declining response rates to traditional probability sample surveys, an emerging body of work has demonstrated that non-probability samples drawn from non-traditional platforms, in combination with statistical adjustment, yield similar distributions of outcomes and estimates of relationships as probability-based samples. This work has drawn data from Xbox users (Wang et al., 2015), Mechanical Turk (Mullinix et al., 2015), and Pollfish (Goel et al., 2015).

Yet, of all of these platforms, Facebook is the most commonly and widely used by the public (Perrin, 2015). Zhang et al. (2017) compare respondents drawn from Facebook and the American Community Survey in terms of veteran status, homeownership, and nativity and find a high degree of similarity between the two data sources. In a recent paper, Schneider and Harknett (2019a) use The Shift Project data to examine the association between routine schedule instability and mental health. They conduct a series of validity checks and show quite consistent results. These same authors report on an extensive set of data validity checks in a separate article, including results from benchmarking against probability samples that show similar univariate distributions and bivariate relationships in the Shift data, the CPS, and NLSY97 (Schneider and Harknett 2019b).

Cross-Sectional Data

The advertisements were fielded between February of 2017 and July of 2018. In total, the advertisements were shown to 3,473,592 targeted Facebook users, including some who were

shown one of the advertisements on more than one occasion. These advertisements generated 325,713 link clicks through to the introductory page of the survey. Then, 58,597 respondents contributed at least some survey data. In all, 9.4% of the displayed advertisements generated a click through to begin the survey and 18% of individuals who clicked on the ad contributed some survey data (representing 1.7% of all advertisements displayed).

Of the 58,597 respondents, we eliminate 9.7% who report that they were not paid hourly. In addition, the survey included a data quality check that instructed respondents to select a specific option on a question. This item was not asked of respondents who attrited early in the survey, but among those who were asked the question, 92% of respondents responded accurately. However, there was substantial attrition over the course of the survey. Of the 58,597 respondents who began, 28,548 fully completed the survey. We perform multiple imputation for those 28,548 respondents who completed the survey but had item non-response. The final analysis sample for a single implicate is 28,548 responses distributed across 115 companies. In separate analyses, not shown, we also impute data for all respondents who completed the first survey module, including those who finished the survey with some item non-response and those respondents who attrited from the survey at various points, and find substantially similar results. The results we present are on the sample with more complete data and more limited imputations.

Panel Data

We also examine data from an embedded panel survey. The basis for the panel is a subsample of 4,311 workers who were interviewed in the Spring of 2017 and resided in the 30 largest U.S. cities. These 4,311 workers had complete data on the key covariates (below) and provided an email and/or phone number. These respondents were re-contacted in the Fall of 2017 using email and text message invitations to complete a follow-up survey. Respondents were offered escalating incentives, starting at \$5 and rising to \$15 to complete the survey. 2,039 (47%) of eligible respondents completed this reinterview. A third wave of data was

collected in the Spring of 2018 using the same procedures and yielding a final sample of 1,000 respondents who completed all three waves.

There is evidence of modest bias in attrition by gender and education. However, there is no significant difference in attrition from the survey by age, race, marital-status, work scheduling characteristics, job tenure, managerial status, or hourly wage (Choper, Schneider, and Harknett, 2019).

Key Variables

Material Hardship

We construct three dependent variables that capture different dimensions of household material hardship. First, we code respondents as experiencing *hunger hardship* if they reported either “receiving free food or meals because didn’t have enough money” or “being hungry, but didn’t eat because couldn’t afford enough food?” in the prior 12 months. Second, we code respondents as experiencing *residential hardship* if they reported either “moving in with other people even for a little while because of financial problems” or “staying in a shelter, abandoned building, car, or any other place not meant for regular housing, even for one night” in the prior 12 months. Third, we construct a measure of exposure to one or more of the following 7 hardships: (1) going hungry, (2) using a food pantry, (3) having utilities shut off for non-payment, (4) needing informal financial assistance from family or friends, (5) moving in with family or friends because could not afford housing, (6) living in a shelter because could not afford housing, or (7) deferring needed medical care because of the cost. We provide means for these variables in Table 1.

Schedule Unpredictability

First, respondents report on the amount of advance notice that they have of their work schedules - that is how far in advance they generally know when and how much they will work (categorized as 0-2 days, 3-6 days, 1-2 weeks, or 2 weeks or more). Second, respondents report whether they were required to be “on-call” for work shifts in the prior month. “On

call” shifts mean that employees must be available for a work shift if called, but may also not be called-in. This variable is coded dichotomously. Third, we asked respondents to report on whether one of their work shifts had ever been scheduled but cancelled in the prior month. This variable is also dichotomous. Fourth, we gauge if respondents had ever had the timing of their shift changed at the last minute in the prior month.

We also separately gauge work hour volatility. Respondents report the number of hours they worked in the week in the prior month in which they worked the most hours and the week in the prior month in which they worked the fewest hours. We calculate the percentage variation in weekly work hours over the prior month as the most hours minus the fewest divided by the most hours.

Finally, the conditions of low-wage work in the service sector vary such that some workers experience stability in their schedules, others experience a great deal of instability, and many fall in between. We count up the number of types of schedule instability that a worker experiences to create an additive scale. A score of 0 on the instability scale means that the worker has at least two weeks advance notice of his/her work schedule; does not work on-call shifts; has not experienced cancelled shifts, and has not experiencing changes in timing. A score of 4 on the instability scale means that a worker has less than two weeks advance notice of his/her schedule; works on-call shifts; and has experienced shift cancellations and timing changes. We provide means for all of these scheduling variables in Table 1.

Other Aspects of Job Quality

We adjust for a number of other dimensions of job quality that could also affect household material hardship and might be correlated with schedule unpredictability. First, the relationship between scheduling practices and household material hardship could be confounded by the level of resources in the household. We control for both hourly wage and for household income (categorized as <\$15,000, \$15K-\$25K, \$25K-\$35K, \$35K-\$50K, \$50K-\$75K, \$75K-\$100K, and \$100K or more). Second, we adjust for a measure of involuntary part-time work. Respondents are coded as “1” if they report usually working fewer than 35 hours per week

and report that they either “strongly agree” or “agree” with the statement “I would like more work hours at my job at [EMPLOYER].” Respondents who usually work at least 35 hours (regardless of whether they want more hours) and respondents who work less than 35 hours and either “strongly disagree” or “disagree” with the statement are coded “0.”

We also adjust for worker control over scheduling. Respondents are coded as lacking control (“1”) if they respond to the question “Which of the following statements best describes how the times you start and finish work are decided at [EMPLOYER],” by selecting “decided by my employer and I cannot change them on my own.” They are coded as having at least some control if they respond “decided by my employer but with my input” or “I can decide the time I start and finish work, within certain limits” (“0”). We also adjust for non-standard work hours, coding respondents as working on weekends if they report “often” working on Saturdays or Sundays and as working non-daytime shifts if they report “often” working night, evening, or early morning shifts. Finally, we adjust for respondents’ reports of being managers, being members of a labor union, and for years of tenure at their current job. We provide means for these variables in Table 2.

Demographic Controls.

We adjust for age, gender, race/ethnicity, educational attainment, school enrollment, marital status, whether a language other than English is spoken at home, and the presence of children in the household. We control for these characteristics in all of our regression models because these work and demographic characteristics could confound the relationship between scheduling experiences and hardship. We provide means for these variables in Table 2.

Analytical Approach

We estimate the association between work schedule unpredictability and our three measures of household material hardship. We do so by estimating a set of linear probability models that take, in turn, each measure of hardship as the dependent variable and each measure of schedule unpredictability - notice, on-call, cancelled shift, timing change, and hours volatility

- one at a time, as the key independent variable. We thus estimate 15 models (3 dependent variables x 5 independent variables) and in each model we adjust for the full set of job and demographic controls. Finally, we estimate an additional model of the association between the schedule unpredictability scale and each of the measures of hardship.

Robustness

Schedule unpredictability is not randomly assigned and we do not have a plausible source of exogenous variation with which to identify our models. Below, we propose a number of logical tests (Stinchcombe, 1987) that, while not definitive, help to build confidence in our results.

We first assess the sensitivity of our estimates to the inclusion of a set of employer fixed-effects. These allow us to focus on within-company variation in scheduling practices. The advantage of this approach is that other unobserved company-level differences that could confound the core relationships are held constant. While the within-company comparisons constrain the range of variation in scheduling practices, prior literature has established that much of the variation in scheduling is based on differences in the behavior of front-line managers within firms (Lambert, 2008; Henly et al, 2006).

We hypothesize that schedule unpredictability leads to material hardship. However, it is certainly possible that adults who experience hardship take on work in order to cope and such labor market entrants may be willing to take on particularly precarious work. This risk of reverse causality is made all the more acute in our models because hardship is measured over the 12 months preceding survey while schedule unpredictability is measured over the 1 month preceding. It is possible that reports of hardship pre-date schedule unpredictability or even, given the high rates of turnover in retail jobs, employment. We test the robustness of our results to conditioning the sample on having at least one year of job tenure at their current employer. While this does not remove the threat of reverse causality, it mitigates the problem to some degree.

We also implement a third robustness test. Implicitly, we estimate the association between schedule unpredictability and material hardship using three sources of variation in scheduling exposures. First, there may be between-firm differences in scheduling. If workers who are more susceptible to hardship sort into more precarious firms, this could bias our results. We address this concern with the within-firm model above. However, within firms, it is possible that managers offer more stable and predictable schedules to workers who are selected based on a set of characteristics, such as related to productivity or personality, that also cause hardship. This too would likely bias our results and is addressed, in part, by the panel models described below. A third possibility is that there is variation within firms and between managers, but not within managers. Indeed, there is some evidence that front-line managers vary in their scheduling practices such that some managers provide more schedule predictability to their supervisees than others (Henly et al., 2006). However, we are not able to cleanly separate this relatively uncontaminated between manager variation from the possibility of within manager variation because the data do not nest respondents within managers. Instead, we reason that whether managers’ preferential treatment of workers is based on a sound managerial rationale or not, workers who experience more schedule unpredictability than their immediate co-workers may feel unfairly treated. All respondents were asked to report on their perception of their treatment by their immediate supervisor. We condition the models to only include those respondents who reported that it was either “always true” or “often true” that “my immediate supervisor treats me fairly.” While not a definitive test, evidence that unpredictability is associated with hardship even among those who feel fairly treated would provide further evidence against this sort of unobserved confounding.

Panel Models

We next focus on the panel data and estimate two different models. First, with the panel data, we are better able to address the problem of temporal ordering discussed above. We estimate the following model:

$$Y_{it3} = \beta_0 + \beta_1 Unpredict_{it2} + \beta_2 Demog_{it1} + \beta_3 Work_{it1} + \beta_4 Sched_{it2}$$

We take material hardship as measured at wave 3 as the dependent variable. β_1 is the coefficient on the schedule unpredictability scale measured at the prior wave $t2$, after adjusting for demographic and work characteristics measured at baseline $t1$ and other schedule characteristics - nights, day, involuntary part time, and control at the same time as unpredictability.

Finally, we estimate a lagged dependent variable model:

$$Y_{it3} = \beta_0 + \beta_1 Unpredict_{it2} + \beta_2 Demog_{it1} + \beta_3 Work_{it1} + \beta_4 Sched_{it2} + \beta_4 Y_{it1}$$

Where we simply adapt the prior model to also include a measure of material hardship captured at baseline. Unfortunately, material hardship was not measured at wave 2 and so we are unable to estimate an individual fixed-effects model.

Results

Descriptive Statistics

We describe the extent of exposure to routine schedule unpredictability in Figure 1. We see that more than 15% of workers in the sample report less than 72 hours advance notice of their schedules and a similar share report just 3-6 days notice. Another third of respondents report 1-2 weeks notice. Combined, just a third of respondents report more than two weeks' advance notice of their work schedules.

More than one in ten respondents report having a cancelled shift in the prior month and nearly 1 in 4 report an on-call shift. Last minute changes to schedule timing are far more common with more than two-thirds of respondents reporting such a change in the last month. We also find high levels of work hour volatility. The average worker experiences a 33% swing in weekly work hours between the week in the last month with the most and the

fewest hours and just a third of workers report less than 20% variation and a third report more than 60% variation.

As shown in Figure 2, 20% of service sector workers enjoy a regular and predictable schedule with 0 types of instability and an additional 35% experience just 1 source of instability. But, 40% of workers experience 2 or 3 sources of instability and a highly exposed minority - about 5% - experience 4 types of schedule instability.

Regression Results

Table 3 presents the first set of regression results from the linear probability models. We see that respondents who report receiving greater advance notice of their work schedules report significantly less hunger hardship. We see similar associations between notice and housing hardship and overall hardship. In each case, we observe a fairly monotonic relationship, though the coefficients are not constrained to be so. We similarly find that respondents who had a cancelled shift are more likely to report each type of hardship as are those who work an on-call shift or have timing change. Comparing these coefficients, it appears that cancellation has the largest association with hardship as compared with on-call shifts and changes in shift timing. While we cannot assess it directly, this would accord with a model in which shift cancellation was more likely to lead to income volatility than on-call shifts or changes in shift timing. In the final row of the table, we see that workers with more volatile work hours are also significantly more likely to report material hardships.

We estimate a set of predicted values from these models in order to size the effects. We find that while 26% of workers who receive 0-2 days' advance notice of their schedules report hunger hardship, the share is significantly lower, at 28%, among those with at least two weeks' advance notice. The analogous divide in housing hardship is 19% vs. 15%. Similarly, while 42% of those with a cancelled shift experienced hunger hardship, only 29% of those without cancelled shifts did so. A similar divide is evident for housing hardship at 23% vs. 15%.

We next present the results for models that include our unpredictability scale in place of the individual measures. Here too, we see strong and fairly monotonically increasing positive coefficients on the scale measure though, as before, the model is not constrained to show a linear relationship. In Figure 3, we plot predicted shares of respondents experiencing each type of material hardship across the values of the unpredictability scale, adjusting for the full set of control variables. We find that 25% of workers who experience no unpredictability (about a fifth of the sample) report hunger hardship, but this share rises significantly with increased exposure, reaching 40% of those who experience three sources of unpredictability (15% of the sample) and as high as 50% of respondents in the 5% of workers experiencing the most unpredictability.

Though residential hardship is less common than hunger hardship, here too we find substantively large effects, with the share increasing from 12% of those with the least. unpredictability to nearly twice the level - 25% - of those experiencing the most. Turning to experiences of any hardship, even among those with the most predictability, half experienced some material hardship,. However, this share is much higher - at 70-75% - of those who experience three or four sources of unpredictability.

In Figure 4, we continue to focus on the unpredictability scale. The coefficients from Table 4 are shown with circular markers. We compare these to two alternative models. The first, with coefficients marked with boxes, uses the matched structure of the data to impose employer fixed-effects. We see that doing so changes the estimates very little.

The second alternative model, with coefficients marked with diamonds, limits the sample to those with at least one year of tenure. This model goes some way towards guarding against the reverse causality of material hardship precipitating entry into a precarious job in that we ensure that employment at the current job predates the hardship report. To the extent that the association between unpredictable schedules and hardship might be driven by an unobserved omitted variable, conditioning on tenure may also reduce the risk that a variable like productivity or personability would bias the estimates as individuals low on such difficult

to observe attributes are more likely to be selected out of the job quickly (Jovanovic 1979; Chatman 1989). As is clear in Figure 4, the estimates are entirely robust to this alternative model.

Finally, the third alternative model, marked with triangles, limits the sample to those who report being fairly treated by their supervisor. Here, we see that the coefficients are slightly attenuated across all three outcomes, in line with the expectation that some of the variation between respondents derives from managers treating some workers differently than others, on the basis of a potentially confounding unobservable. However, we also continue to see large and significant coefficients on the unpredictability scale in each instance.

Panel Regression Results

We next focus on the 1,000 respondents interviewed across three waves. In Table 5, we present three sets of model results for each of the three hardship outcomes. The first model in each set (M1, M4, and M7) reproduces the coefficients on the instability scale from the cross-sectional models shown in Table 4. The next model in each set (M2, M5, and M8), is run on the panel data and allows for the hypothesized time ordering such that unpredictable scheduling exposures precede hardship reports.

For hunger hardship, we see consistent coefficients between M1 (pooled data) and M2 (panel data). The estimates are quite stable across the two models even after allowing for correct causal ordering and after restricting the sample to a substantially different population. Comparing Models 4 and 5, for housing hardship, we find somewhat less consistency. While we find that those with the most exposure are similarly at risk for housing hardship ($\beta_1 = 0.16$ ($p < 0.001$) vs. $\beta_1 = 0.21$ ($p < 0.05$), the estimated coefficients are smaller for those with 2 or 3 exposures and less precisely estimated. In contrast, for any hardship, comparing M7 and M8, we find similar estimates, if larger, for the panel models for those with 1, 2, or 3 exposures, we find a much smaller association between the highest level of exposure (4) and experiencing any hardship in the panel model as compared to the pooled model.

Finally, we present the results from the lagged dependent variable models, in M3, M6, and M9. For hunger hardship, the results are entirely consistent. For housing hardship, the LDV models align with the results in M5 with the significant association now limited to those most exposed to unpredictable scheduling. The same holds true when we model any hardship and compare M8 and M9; including the LDV does not change the association over the simpler panel models.

Discussion

The low unemployment numbers in the U.S. are an indicator of a strong economy, but employment is no guarantee of economic security, as many American workers are employed yet still experience serious material hardships. The U.S. service sector employs 27 million workers, representing 20% percent of the U.S. labor force. This paper uses new data from The Shift Project to examine the experience of hunger, housing, and other material hardships among a sample of almost 30,000 workers employed in the service sector. Well over half of these workers reported experiencing a material hardship in the prior year.

Notably, material hardship varied in proportion to the amount of temporal precarity workers experienced from their jobs. Workers with the most unpredictable and unstable work schedules were twice as likely to report material hardship compared with their counterparts with the most predictable and stable schedules. This strong association was not simply an artifact of struggling workers sorting into job with the worst schedules. We see the same strong association between schedule instability and material hardship within employer as we do between employers. This strong association also does not appear to be driven by struggling workers being treated worse by their managers. The association persists among workers who report that their manager treats them fairly. Using longitudinal data, we also rule out the possibility that this is simply a reverse causal relationship in which hardship leads desperate workers to accept jobs with the most unstable schedules, by estimating models in which schedule instability precedes reports of material hardship. On balance, all evidence

points to schedule instability as an important driver of material hardship, particularly hunger hardship.

Although an examination of potential causal pathways linking schedules with hardship was beyond the scope of the present analysis, there are several mechanisms through which schedules may be connected with material hardship. Unstable work schedules are associated with income volatility, household instability, and frayed social network ties. Unstable work schedules also interfere with continuity of eligibility for safety net benefits, and more generally act as an impediment to medium and long-range planning. Each of these consequences of schedule instability could help explain the strong relationship with material hardship.

The current study takes the service sector as a strategic site for examining the potential consequences of unstable and unpredictable work schedules. Along with unstable schedules, the service sector is also characterized by low pay, little autonomy, few fringe benefits and limited opportunities for advancement. For workers with better pay or better job quality, the consequences of unstable schedules may be less severe. However, some of the hypothesized pathways through which schedules lead to hardship for workers - such as the toll on family and social network ties or the inability to plan longer term - could potentially apply across the socioeconomic spectrum. Our research cannot speak to how broadly the consequences of schedule instability on hardship apply beyond the service sector.

The Shift Project data is not a probability sample of workers in the service sector, and we cannot be sure that the sample is representative of the broader population of service sector workers. However, as part of the data collection and validation process, Schneider and Harknett (2019b) provide some reassurance by showing that key relationships of interest do not significantly vary for paired samples of workers who were purposively recruited so as to differ on an unobserved attribute such as overworked/underworked, job satisfaction/dissatisfaction, or get along with manager/do not get along with manager. Further, comparisons of The Shift Project data with data from the Current Population Survey and National Longitudinal Survey of Youth 1997 show that The Shift Project sample resembles

these probability samples in estimated relationships between job tenure and wages and that The Shift Project data is more similar to these two probability samples than they are to one another (Schneider and Harknett 2019b).

A limitation of our methodological approach is that omitted variables could confound the relationship between schedule stability and hardship. Although we took several measures to address potential confounding - employer fixed effects, controls for supervisor fairness, longitudinal analyses with lagged measures of schedule instability, and lagged dependent variable models - we cannot completely eliminate the possibility that unobserved characteristics bias the estimated relationship between schedule instability and hardship. However, given the magnitude of this relationship as well as the robustness of this relationship to stringent controls and alternative model specifications, it would be surprising if the relationship was entirely driven by omitted variables. The weight of the evidence certainly suggests that schedule instability contributes to the experience of material hardship.

Policy proposals to improve economic conditions for low-wage workers often center around campaigns for a living wage or expansions of the Earned Income Tax Credit. This emphasis is natural given that increasing wages or earnings should intuitively alleviate economic deprivation. Yet, for many low-wage workers, their earnings are a product of both wages and time. To date, wages have received far more attention in research and policy debates than the temporal dimension of low-wage work. Our research has revealed the prominent role of temporal precarity as a driver of material hardship for low-wage workers. Future research and policymaking concerned with the material hardship of low-wage workers should look beyond wages and also be attentive to schedule instability and unpredictability.

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Figures

Figure 1: Schedule Unpredictability

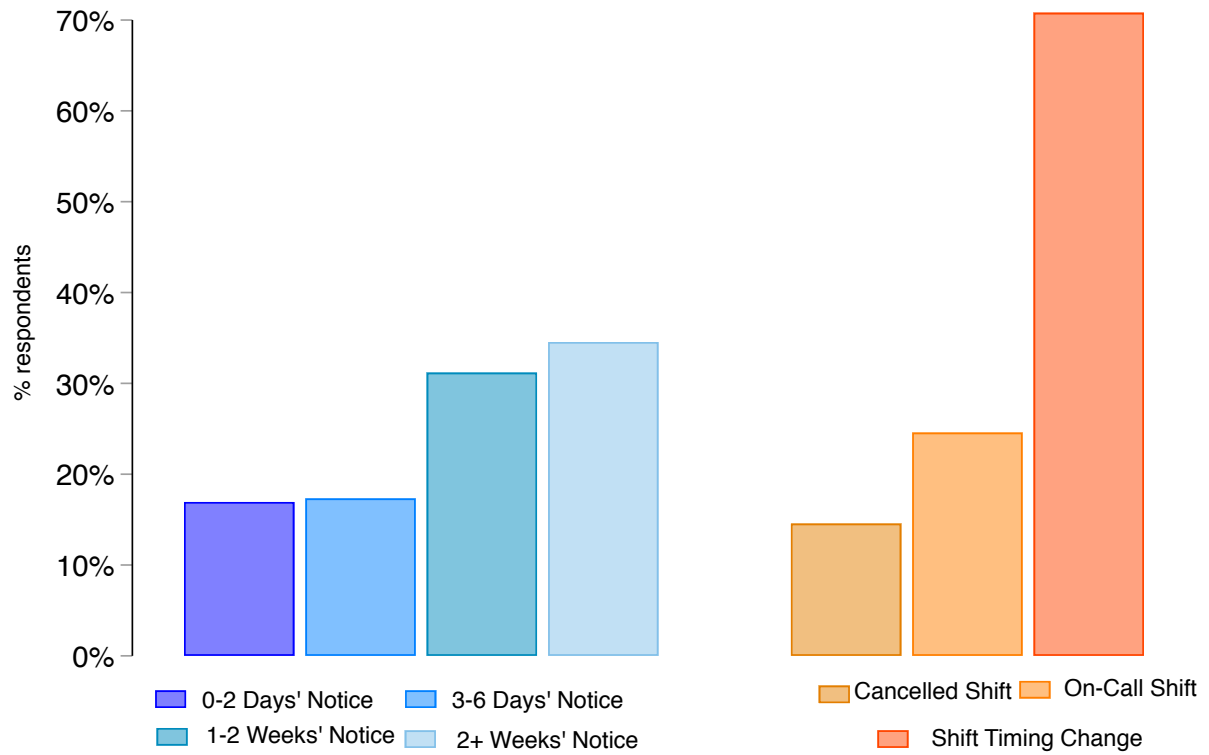


Figure 2: Schedule Unpredictability Scale

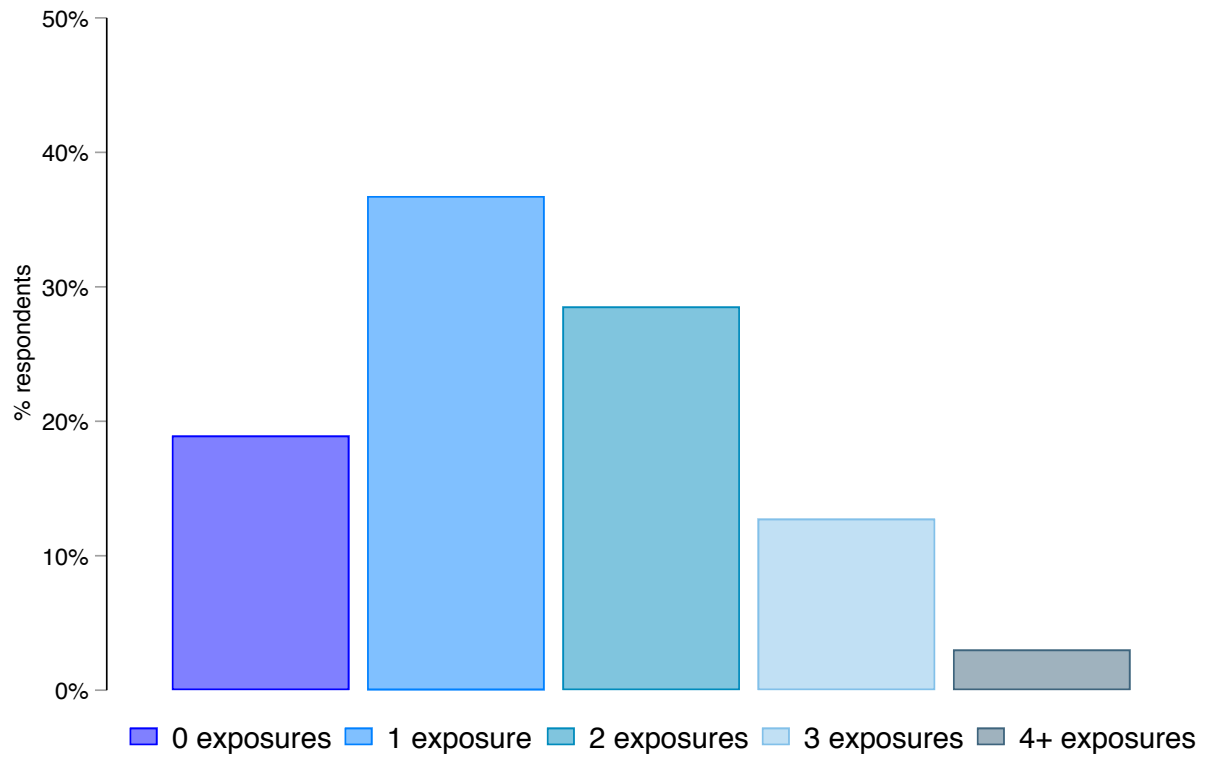


Figure 3: Predicted Material Hardship by Schedule Unpredictability Scale

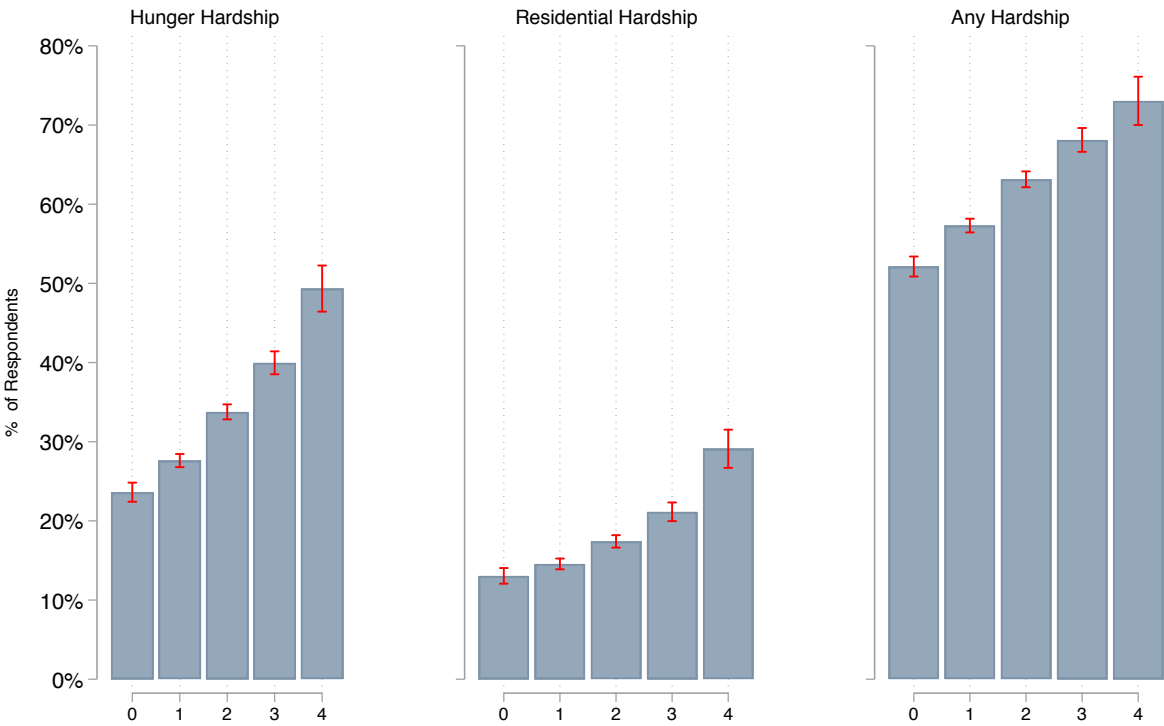
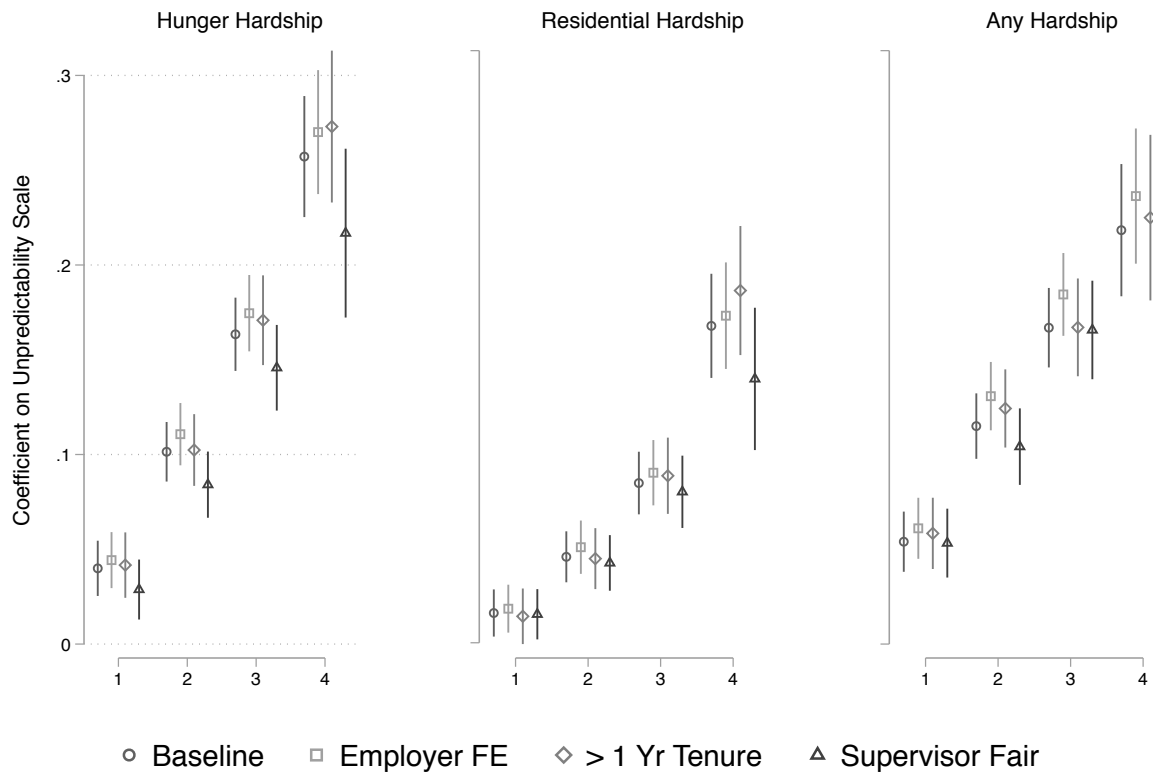


Figure 4: Stability of Association between Material Hardship and Unpredictability (LPM Coefficients)



Tables

Table 1. Descriptive Statistics - Measures of Hardship and Work Schedules

Material Hardship	
Hunger Hardship	31%
Residential Hardship	16%
Any Hardship	60%
Advance Notice	
0-2 days	17%
3-6 days	17%
Between 1 and 2 weeks	31%
2 Weeks or More	35%
At Least One Shift Cancelled in Last Month	
Yes	15%
At Least One On-Call Shift in Last Month	
Yes	25%
At Least One Change in Shift Timing in Last Month	
Yes	71%
Week-to-Week Hours Variation	
Mean	36%
Median	32%
Instability Scale	
0	19%
1	37%
2	29%
3	13%
4	3%
N	28,548

Table 2. Descriptive Statistics - Control Variables

Household Income		
Less than \$15K		20%
\$15K - \$25K		22%
\$25K - \$35K		16%
\$35K - \$50K		16%
\$50K-\$75K		13%
\$75K - \$100K		7%
\$100K or more		6%
Hourly Wage		
Mean		\$11.58
Median		\$11
Involuntary Part Time Work		
Involuntary Part-Time		34%
Schedule Control		
Schedule Set by Employer without Worker Input		47%
Non-Standard Schedules		
Often Works Weekend Shifts		78%
Often Works Non-Day Shifts		70%
Manager		
Is a Manager		20%
Covered by/Member of Union		
Union		7%
Job Tenure		
Less than 1 year		22%
1 Year		15%
2 Years		16%
3 Years		11%
4 Years		6%
5 Years		5%
6 Years or more		24%
Age		
Mean		33
Median		27
Gender		
Female		72%

Table 2. Continued

Race/Ethnicity		
White, non-Hispanic		76%
Black, non-Hispanic		4%
Hispanic		12%
Asian/Other/Multiple		8%
Educational Attainment		
Less than HS		40%
HS or GED		50%
Some College or more		10%
School Enrollment		
Enrolled		30%
Marital Status		
Married		26%
Cohabiting		20%
Single		54%
Speaks Language Other than English at Home		
Yes		13%
Children in Household		
Children 0-4		10%
Children 5-9		9%
Children 10-14		10%
N		28,548

Table 3: Schedule Unpredictability and Material Hardship

	(1) Hunger Hardship	(2) Housing Hardship	(3) Any Hardship
<i>Amount of Notice</i>			
0-2 days	0.00	0.00	0.00
3-6 days	-0.04***	-0.03***	-0.03**
1-2 wks	-0.06***	-0.03***	-0.04***
2 wks or more	-0.08***	-0.04***	-0.06***
<i>Cancelled Shift</i>			
No	0.00	0.00	0.00
Yes	0.13***	0.08***	0.11***
<i>On Call Shift</i>			
No	0.00	0.00	0.00
Yes	0.07***	0.04***	0.05***
<i>Change to Timing of Shift</i>			
No	0.00	0.00	0.00
Yes	0.08***	0.04***	0.10***
<i>Hours Variation</i>	0.08***	0.03***	0.07***
Observations	28,548	28,548	28,548

Table 4: Unpredictability Scale and Hardship

	(1) Hunger Hardship	(2) Housing Hardship	(3) Any Hardship
<i>Unpredictability Scale</i>			
0	0.00	0.00	0.00
1	0.04***	0.02*	0.05***
2	0.10***	0.04***	0.11***
3	0.16***	0.08***	0.16***
4	0.26***	0.16***	0.21***
Observations	28548	28548	28548

Table 5: Panel Estimates

	(1) Hunger Hardship	(2) Hunger Hardship Lag IV	(3) Hunger Hardship Lag DV	(4) Housing Hardship	(5) Housing Hardship Lag IV	(6) Housing Hardship Lag DV	(7) Any Hardship	(8) Any Hardship Lag IV	(9) Any Hardship Lag DV
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.04***	0.09*	0.10**	0.02*	0.05+	0.05+	0.05***	0.12**	0.11**
2	0.10***	0.10*	0.08+	0.04***	0.00	0.01	0.11***	0.10+	0.10*
3	0.16***	0.17**	0.15**	0.08***	0.05	0.05	0.16***	0.18**	0.15*
4	0.26***	0.33*	0.31**	0.16***	0.21*	0.19*	0.21***	0.05	0.05
Observations	28548	955	954	28548	953	953	28548	1000	1000