Healthcare Provider Bankruptcies*

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July 20, 2024

Abstract: Healthcare firms are increasingly filing for Chapter 11 bankruptcy. We show causal evidence that bankruptcies harm patients through increased worker turnover using two strategies. First, in an online experiment, experienced nurses assess hypothetical employers and patient care scenarios. We randomly vary key details, holding everything else fixed. A bankruptcy filing causally increases voluntary departures by 47%. Replacing departing workers with new hires results in a 44% increase in adverse patient outcomes. Second, we compare observed outcomes before and after bankruptcy filings in a high-frequency difference-in-difference design. Using novel administrative data, we find a sharp post-bankruptcy increase in nurse turnover. Bankrupt firms replace departing workers almost one for one, but the worker inexperience adversely affects quality: health inspection violations increase and patient care declines.

*We thank Tomoro Harris, Yoon Sang Moon, Daniel Neagu, and Yan Bo Zeng for their excellent research assistance. Our experimental design and analysis plan were preregistered with the American Economic Association RCT Registry on November 2, 2022: https://www.socialscienceregistry.org/trials/10335. This study has been approved by Harvard's Institutional Review Board (Protocol IRB22-1066) and by UCLA's Institutional Review Board (Protocol IRB22-001483) and by Stanford's Institutional Review Board (Protocol 67509 deemed not human research).

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1 Introduction

Total debt in the US healthcare sector has doubled since 2019. A rise in leveraged buyouts and declining fundamentals have prompted an uptick in healthcare bankruptcies.[1] As a result, Moodys now rates 80% of North American healthcare companies' debts as speculative grade.[2] If the tax benefits of debt outweigh the financial costs of bankruptcy, the tradeoff theory implies this stark increase in default risk could maximize value for healthcare lenders and shareholders. However, financial stakeholders have little reason to internalize the impacts of bankruptcies on patients. This is especially true if patients lack the flexibility or sophistication to avoid financially distressed healthcare facilities.

We provide novel causal evidence that bankruptcy filings negatively affect healthcare firms and their patients through two identification strategies. First, in a randomized experiment of experienced healthcare workers, we show that a bankruptcy filing causes an increase in voluntary departures. While a firm's pre-bankruptcy financial distress causes some workers to leave, a bankruptcy filing dramatically increases the salience of financial distress, increasing attrition. Our experiment also shows that worker turnover harms patients. Second, a difference-in-differences (DiD) design confirms these findings by analyzing outcomes before and after healthcare bankruptcies using high-frequency administrative data to mitigate the confounding effects of unobserved economic and financial distress. We find an immediate increase in worker turnover after a bankruptcy filing, with a coinciding increase in health inspection violations and negative patient outcomes.[3]

Our analysis only covers the healthcare industry. We view this as a strength rather than a limitation. The stakes are arguably higher in healthcare bankruptcies, where patients' lives depend on the outcomes, than in any other bankruptcies. By focusing on healthcare firms, we can study critical patient health outcomes that have no analogs for customers in other industries. Additionally, the healthcare industry is economically meaningful: at $4.3 trillion dollars per year, US healthcare spending is 18.3% of US GDP and exceeds the entire GDP

[1] See, for example, https://www.forbes.com/sites/saibala/2023/08/27/healthcare-sector-bankruptcies-are-on-the-rise/.

[2] See https://www.fiercehealthcare.com/finance/healthcare-companies-default-risk-steadily-rising-most-owned-private-equity-moodys. Moodys defines speculative grade as indicating moderate to very high default risk https://ratings.moodys.com/rating-definitions.

[3] Our administrative data focuses on skilled nursing facilities and includes the Payroll Based Journal and Medicare claims data.

of most countries.[4]

Within healthcare, we focus on skilled-nursing facilities (SNFs), which temporarily house 1.3 million US patients while they receive skilled medical care. SNFs are an ideal setting for our question for at least three reasons. First, leverage and bankruptcies among SNFs have risen due to a wave of private-equity leveraged buyouts.[5] Second, patient health outcomes depend on worker quality, leading to a plausible worker-departure channel by which bankruptcies impact patients. These two features suggest that our study of SNF bankruptcies is plausibly representative of the broader healthcare industry. Third, because of strict regulations, government agencies continually collect detailed, longitudinal, high-frequency data on both workers and patients at SNFs.

We begin our analysis with an online experiment. We survey 244 nurses with SNF work experience. Our first goal is to estimate how SNF financial conditions affect voluntary worker attrition. We ask each nurse to imagine they currently have a hypothetical job at an SNF. We build a job description to match the nurse's prior experience. In the randomly assigned control group, the SNF employer is solvent. In two randomly assigned treatment groups, all job details are the same except: (i) in one treatment, the SNF has a 25% chance of going bankrupt in the next year and (ii) in the other treatment, the SNF recently filed for Chapter 11 bankruptcy and is operating while trying to reorganize. After presenting this information, we ask how likely the nurse would be to look for another job. We also ask, based on the nurse's experience, what fraction of workers would quit that job in a typical year. Holding everything else fixed, financial distress causally increases the nurse-estimated voluntary departure rate by 7.5 percentage points (20% of the control-group mean). A bankruptcy filing causally increases voluntary departures by 18 percentage points (47% of the control-group mean). Turning to nurse responses for their own decisions to search for other work, a bankruptcy causally increases the likelihood of job search by 30 percentage points. Our experiment thus shows that financial distress causes worker departures and a bankruptcy filing exacerbates this effect.

The second goal of our survey is to estimate how worker departures impact patients. Each surveyed nurse reads three hypothetical patient care scenarios. Holding all other details

[4]See https://www.cms.gov/data-research/statistics-trends-and-reports/national-health-expenditure-data/historical and https://data.worldbank.org/indicator/NY.GDP.MKTP.CD.

[5]See Gupta, Howell, Yannelis, and Gupta (2021); Gandhi, Song, and Upadrashta (2022) and https://skillednursingnews.com/2022/02/buying-boom-to-continue-in-skilled-nursing-as-private-equity-keeps-chasing-deals/.

fixed, we randomly vary the *tenure* of the hypothetical nurse at the SNF.[6] We ask our survey participants to (1) estimate how long each patient-care task would take to complete and (2) the likelihood of a negative patient outcome (e.g., an infection or the administration of a wrong medication). Holding everything else fixed, reducing nurse tenure from one year to one week increases the likelihood of negative patient outcomes by 10 percentage points (44% of the mean). Task completion times are also higher for low tenure nurses. This shows that newly hired replacements for departing nurses give lower quality care, harming patients according to SNF nurses.

We use detailed administrative data to confirm the findings of our experiment: bankruptcies increase voluntary nurse departures, harming patients. We identify every Chapter 11 bankruptcy filed by a SNF from the universe of corporate bankruptcy filings. Through a Freedom of Information Act request, we create a novel mapping between bankruptcies and detailed healthcare provider records collected by the Centers for Medicare and Medicaid Services (CMS). For each bankrupt SNF, we obtain staffing records from CMS. We observe worker departures and hour reductions, along with a description of the worker's role, for every worker at every SNF at a daily frequency. We also obtain SNF health inspection data from CMS, allowing us to measure quality of care at each SNF at a roughly annual frequency. Finally, we obtain patient claims and health assessments for each patient at each SNF through CMS. While the exact frequency varies, we observe four to eight assessments for a given patient each year.

We use a DiD design to estimate the causal effects of a bankruptcy filing on worker and patient outcomes. Our identifying assumption is that our treatment group would have been on a parallel trend to the control group in the absence of treatment. This assumption would be invalid if negative unobservable shocks cause both bankruptcy filings and changes in patient outcomes. We address this identification concern in two ways. First, we exploit our high-frequency data to isolate changes in a tight window around each bankruptcy filing. We estimate treatment effects within weeks or months of a bankruptcy filing, rather than years. This implies that any confounding unobservable negative shocks to our treatment group would have to occur almost precisely at the bankruptcy-filing times. Second, in our main analysis, we use a stacked cohort DiD design to compare bankruptcy filers to a cohort

[6]In each scenario, the nurse has either worked at the hypothetical SNF for one year or one week. We randomly assign survey participants to evaluate a high-tenure nurse in all scenarios or a low-tenure nurse in all scenarios. This across-participant design avoids priming participants by varying nurse tenure across questions.

of matched control firms of similar size, patient composition, and occupancy prior to the bankruptcy filing.[7]

Our DiD analysis confirms our experimental result that worker departures spike after a bankruptcy filing.[8] Interestingly, new workers are hired to replace exiting workers almost one for one, suggesting bankrupt firms maintain staffing levels to aid reorganization. Specifically, weekly worker exits increase by 14% of the mean on average over the first sixth months after filing, and by 13% of the mean on average after six months. These exits are met with a 9% and 17% increase in new worker entries during these respective periods, relative to the mean. This leads to maintained overall staffing levels but a dramatic shift in the composition of staff towards short-tenured workers. While our data cannot distinguish between voluntary and involuntary departure, our experiment strongly implies that these departures are voluntary. Moreover, we find that average wages increase after a bankruptcy filing, consistent with a decline in worker labor supply for bankrupt firms.

The DiD analysis confirms the experimental finding that increased worker turnover after a bankruptcy filing harms patients. We find that the shift towards inexperienced labor coincides with a substantial post-bankruptcy increase in health inspection violations. We find the largest increase in violations that are considered quality of care violations by CMS.

Finally, we use individual patient data to evaluate the extent to which bankruptcies affect patient health outcomes.[9] While we do not find increases in either mortality or falls, we do observe evidence of substantial declines in quality of care, including the use of physical and chemical restraints on patients, patients exhibiting behavioral issues, and a decline in resident hygiene.

We provide the first evidence on the impact of Chapter 11 bankruptcies on healthcare workers and patients. Our paper contributes to work studying how healthcare firms' financial decisions impact patients (Adelino, Lewellen, and Sundaram, 2015; Adelino, Lewellen, and McCartney, 2022; Aghamolla, Karaca-Mandic, Li, and Thakor, 2021; Liu, 2021; Gupta, Howell, Yannelis, and Gupta, 2021; Gandhi, Song, and Upadrashta, 2020, 2022) and the impact of a firm's financial distress on the firm's workers (Baghai, Silva, Thell, and Vig, 2021; Falato and Liang, 2016; Brown and Matsa, 2016; Gortmaker, Jeffers, and Lee, 2022; Graham,

[7]We also show our results hold using a staggered DiD design which only includes bankruptcy filing facilities.

[8]Since our experiment does not rely on a parallel-trends assumption, any alternative explanation for our DiD results would have to also explain our experimental results.

[9]We use Traditional Medicare claims data and the Minimum Data Set (MDS).

Kim, Li, and Qiu, 2023; Araujo, Ferreira, Lagaras, Moraes, Ponticelli, and Tsoutsoura, 2021; Ellias, 2022; Berk, Stanton, and Zechner, 2010) and customers (Hortaçsu, Matvos, Shin, Syverson, and Venkataraman, 2011; Matsa, 2011; Hortaçsu, Matvos, Syverson, and Venkataraman, 2013; Phillips and Sertsios, 2013; Antill and Hunter, 2021). Differing from this literature, we contribute the first experimental evidence on the causal effect of firm financial distress on voluntary employee attrition. We thus contribute to this literature by showing how a financially distressed firm's loss of employees has negative operational consequences.

This paper also contributes to the health economics literature that identifies determinants of healthcare provider quality and how disruptions to patients' care adversely affects health (Sabety, Jena, and Barnett, 2021; Schwab, 2023; Sabety, 2023; Agha et al., 2022; Agha, Frandsen, and Rebitzer, 2019). In particular, Olenski (2023) finds that mortality increases 16% when nursing homes close. We contribute to this literature by showing that bankruptcy filings, which are intended to relieve financial distress and avoid closure, cause worker turnover and negative patient outcomes.

The remainder of the paper is organized as follows. Section 2 describes the setting. Section 3 contains the design and results of the randomized experiment. Section 4 describes the nursing home and bankruptcy data. Section 5 presents high-frequency employment responses to bankruptcy. Section 6 presents the analysis of the impact of bankruptcy on healthcare quality and patient outcomes. Section 7 concludes.

2 Empirical Setting

2.1 Nursing Home Industry

Skilled nursing facilities (SNFs), otherwise known as nursing homes, are certified by the Centers for Medicare and Medicaid Services (CMS) to provide skilled nursing services, rehabilitative therapy, and other healthcare services requiring an institutional setting. SNFs are distinct from assisted living facilities, which are sometimes casually referred to as "nursing homes" but are not in fact certified by CMS to provide the same level of care as nursing homes. In contrast, residents at SNFs require substantial medical care. Facilities serve a wide range of patients, from short-stay patients receiving post-acute rehabilitative therapy to long-stay patients receiving treatment for chronic conditions.

The nursing home industry is large, consisting of approximately 16,000 SNFs in the US serving 1.3 million residents. Concerns about the quality of care provided at nursing homes have been voiced by policymakers, academics, and the media alike. In addition to providing healthcare to a particularly vulnerable segment of the population, nursing homes garner much public interest due to the fact that they are largely financed by the government. Specifically, Medicare and Medicaid fund the majority of nursing home care.

Staffing. There are three key nursing staff roles at SNFs: registered nurses (RN), licensed practical nurses (LPN), and certified nursing assistants (CNA). RNs are highly skilled nursing staff who must obtain a two-to-four year degree or diploma in nursing and pass a licensing exam. LPNs are also required to have a degree or diploma in nursing and pass an exam, though these courses typically take one year to complete. CNAs need only acquire a one-to-three month training. The nationwide median hourly wages for RNs, LPNs, and CNAs are \$36.22, \$23.47, \$14.82, respectively.[10] Given their varying levels of certification, staffing quality measures typically differentiate between RN, LPN, and CNA hours. Staffing measures are key indicators of quality at nursing homes (Clarke and Donaldson, 2008; Harrington et al., 2016; Centers for Medicare & Medicaid Services, 2019; Friedrich and Hackmann, 2021), where care for rehabilitative therapy and assistance with activities of daily living are especially labor intensive.

2.2 Bankruptcy

Chapter 11 bankruptcy gives insolvent firms the opportunity to reorganize. In a reorganization, a bankrupt firm continues its operations while it negotiates with creditors. Since a firm cannot operate without employees, the bankruptcy code allows firms to pay employee wages during reorganization. In a successful reorganization, the firm exits bankruptcy and continues operating.[11]

To encourage reorganization, Chapter 11 imposes an automatic stay on all pre-bankruptcy claims against the firm. This prevents creditors from suing the firm or taking the firm's assets to cure defaults. In principle, the automatic stay applies to any wages an employee was owed prior to bankruptcy and has not yet received as of the filing. However, most firms request

[10]Source: Bureau of Labor Statistics (2020).

[11]See Antill (2022) for more details on Chapter 11 and the plan-confirmation process.

permission to violate the automatic stay and pay pre-bankruptcy wages, paying employee creditors before all other creditors. These requests are often filed on the first day of the bankruptcy, demonstrating the importance of employees to bankrupt firms. Even without such a request, some pre-petition employee wages are given special status by the bankruptcy code and must be paid before paying other creditors (See 11 U.S.C. §507(a)4).

Given the ability to earn wages during bankruptcy and the special status of unpaid pre-bankruptcy wages, it is reasonable for an employee to continue working at a bankrupt firm. In fact, some employees might view a Chapter 11 bankruptcy filing as a positive signal that a firm intends to continue operating. However, an employee might nonetheless have reservations about working at a bankrupt firm. Firms that file for Chapter 11 bankruptcy frequently end up liquidating, causing all employees to lose their jobs. Even in successful reorganizations, bankrupt firms often lay off many employees and void union contracts. Some employees might thus respond to a bankruptcy filing by searching for work at other firms to preempt termination.

3 Evidence on Financial Distress, Turnover, and Quality of Care from a Randomized Experiment

Our focus is the impact of Chapter 11 bankruptcy on employee turnover and firm quality. Employees might flee a bankrupt firm to preempt job loss in liquidation or avoid wage cuts. On the other hand, employees of a financially distressed firm might be encouraged that a bankruptcy filing is a step toward solving the firm's problems. In theory, a bankruptcy could thus increase or reduce turnover. An increase in employee turnover can likewise improve or reduce firm quality. Turnover might destroy firm-specific human capital. Alternatively, a firm might be financially distressed precisely because its current employees are ineffective.

To begin, we ask workers to evaluate these hypotheses based on their work experience. We survey workers using randomized "audit studies" (Gaddis, 2018) to avoid biasing them to think bankruptcy or turnover are important. We ask survey participants to evaluate how hypothetical employees would perform. Randomly varying the hypothetical employees' tenure at the firm, we estimate the worker-perceived causal effect of turnover on employee performance. Next, we ask participants to report how likely they would be to leave a hypothetical job. Randomly varying the financial health of the employer, we estimate how

financial distress and bankruptcy affect turnover. Section 3.1 provides a further description of this experiment. Section 3.2 presents the results.

3.1 Experiment Design

3.1.1 Attention tests and selecting participants

In the first stage of the experiment, participants must pass attention tests. These are questions with answers that are obvious if and only if the participant reads carefully. We exclude participants that fail these attention tests.

Next, we identify participants that have worked as a nurse at an SNF. Using a platform called Lucid, we are able to survey a participant sample consisting exclusively of nurses. We ask questions to ensure these nurses have prior work experience at a SNF. We focus on this population to match our empirical setting: the impacts of bankruptcy in a detailed dataset of employees and patients at SNFs.

3.1.2 The effect of employee turnover on patient care

In the second stage of the experiment, we use a randomized audit design to estimate the causal effect of employee turnover on SNF-patient care. Our participants' work experience provides a unique perspective on how employee turnover impacts patients. Suppose one could ask every SNF nurse to report, based on their prior experience, how significantly turnover affects patient care. If these nurses answer honestly, the average response would be a valuable estimate of the true causal effect.[12] Our randomized approach aims to elicit true beliefs without introducing new biases due to anchoring or experimenter-demand effects. In other words, we aim to measure nurse beliefs about turnover without biasing nurses to think that turnover is important. We now describe this approach in detail.

We present each participant with a series of hypothetical situations. Each situation involves a specific set of tasks that a nurse must complete for a specific patient. We use each participant's prior work experience (e.g., RN or LPN) to select which tasks they see. We aim to ask each participant about tasks that they have completed. For example, participants

[12]Of course, it's possible the average nurse belief is biased away from the truth. However, such a bias could be small compared to the omitted-variable bias that would arise in virtually any traditional empirical approach.

with LPN experience see the following situation:

> Sally Conner is a 75 year old diabetic who recently suffered a stroke at home. She has left-sided weakness in her arm and leg, and currently spends most of her time in bed.
>
> Imagine that Mrs. Conner has been moved into a skilled nursing facility for recovery and needs her daily vital signs assessed: blood pressure, heart rate, vision, temperature, glucose levels, and weight.

Appendix A presents the exact text of each situation.

In each situation, we first ask the participant how long they personally would take to complete the tasks. This helps the participant estimate a concrete completion time. We next ask the participant to estimate completion times for the same tasks for two hypothetical nurses. One nurse, "Nurse Smith," has two years of tenure at this SNF. The other nurse, "Nurse Williams" has a shorter tenure at this SNF. A given participant reports estimated completion times for both nurses in all situations.

In theory, participants might infer from this that they are supposed to care about the length of tenure at a SNF. Importantly, our main specification does not compare a given participant's responses for one nurse to the same participant's responses for the other nurse. Instead, we randomize the length of tenure for "Nurse Williams" *across* participants and compare completion-time reports across participants. Specifically, half of participants see that Nurse Williams has one year of tenure at the SNF. The other half are told that Nurse Williams has one week of tenure at the SNF. Once a participant is randomized into a Nurse-Williams-tenure level, they see the same Nurse-Williams description in all situations they evaluate. Comparing responses for Nurse Williams across participants, we can thus exogenously vary a nurse's length of tenure without leading participants to think this variation is important.

In other words, even if a participant thinks they are supposed to report a longer completion time for the shorter-tenure nurse, they cannot possibly believe they are supposed to report a longer completion time than other participants who were randomly assigned a longer-tenure nurse. We use reported completion times for the longer-tenured nurse, Nurse Smith, only to control for idiosyncratic beliefs about completion times. Comparing average reported

completion times for Nurse Williams across the two randomized groups, we estimate the effect of employee tenure on task-completion efficiency.

We use a similar approach to evaluate the impact of employee tenure on task-completion quality. In each situation, each participant evaluates the likelihood that an adverse outcome would occur if they were to complete the tasks. To make this concrete, we give examples of adverse outcomes that could occur. For example, for the above situation, we write the following:

> In completing the above tasks, potential mistakes or bad outcomes include: (i) incorrect or incomplete documentation of vital signs; (ii) not following proper hand hygiene, such as not washing or sanitizing hands and not using new, sterile gloves.

Appendix A presents the exact text of the potential adverse outcomes for each situation. Just as for completion times, each participant then reports the likelihood of an adverse outcome if the task were completed by a hypothetical nurse. Participants provide answers for the same nurses and see the same randomized length of tenure for the less experienced nurse. Comparing responses across participants, we estimate the effect of employee tenure on the likelihood of an adverse patient outcome.[13]

3.1.3 The effect of financial distress on employee turnover

In the third stage of the experiment, we use another randomized audit design to estimate the causal effect of employer financial distress on employee turnover. Participants report the likelihood that they would leave a hypothetical job. Randomizing the financial health of the employer in the hypothetical job, we estimate worker responses to an employer's financial distress.

[13]We exclude participants who do any of the following: (i) report a probability above 100, (ii) report a time to complete a task above four hours, (iii) report a historical wage greater than $100 per hour, or (iv) give answers that are self-contradictory in the following manner: For each participant, we average their reported time for Ms. Williams to complete tasks across the three scenarios/patients. We do the same for Ms. Smith. At the end of this section of the survey, we ask participants whether, on average, they think Ms. Smith is slower than Ms. Williams, faster than Ms. Williams, or the same speed. If the answer to this question is not "same speed" and is inconsistent with the participant's reported times, we drop the participant. For example, we drop a participant if their average reported completion time for Ms. Williams is 45 minutes, their average reported time for Ms. Smith is 20 minutes, yet they say on average Ms. Williams is faster than Ms. Smith. We apply the analogous filter for the reported likelihood of an adverse patient outcome or mistake.

For each participant, we begin by asking for details about their last SNF job, including the position, wage, and state in which the job was held. We also ask the participant to estimate what fraction of employees voluntarily leave that employer each year. The response to this question is used to control for the participant's idiosyncratic beliefs about voluntary worker attrition.

Next, for each participant, we construct a hypothetical job with the same position, wage, and location (state) as the participant's prior job. This controls for a participant's required job characteristics. Each participant then reads a description of the employer in this hypothetical job. Importantly, participants are randomly assigned to see different descriptions of the financial health of the employer. One third of participants see a "Control" description in which the employer is solvent. One third of participants see a "Distressed" description in which the employer has a 25% chance of filing for Chapter 11 bankruptcy in the next year. The final third sees a "Bankrupt" description in which the employer is currently open but "recently filed for Chapter 11 bankruptcy and is currently in bankruptcy proceedings." Appendix A provides the exact text for each description.

After each participant reads the hypothetical job description, we ask them to imagine they are currently working in this position for this employer. We then measure two key dependent variables. First, each participant reports the likelihood they would search for another job rather than continue working in this position. Second, each participant estimates the fraction of employees they believe will voluntarily leave the employer this year. As above, we compare responses across participants in different randomly assigned groups to estimate causal effects without biasing participants toward particular responses.

3.2 Randomized Experiment Results

3.2.1 Turnover harms the quality and efficiency of patient care

To begin, we analyze the importance of employee turnover using the second stage of the experiment (Section 3.1.2). We let $j = 1, 2, 3$ index the hypothetical patient situations considered by each participant i. We let $k \in \{RN, CNA, LPN\}$ index the job that participant i previously held at a SNF.[14]

[14]If a participant reports that they have worked in more than one of these roles, we use the one with the highest required level of training.

Recall that in each situation j, each participant i considers the performance of two hypothetical nurses. The longer-tenured "Nurse Smith" has been at the hypothetical SNF for two years. The shorter-tenured "Nurse Williams" has been at the SNF for less time: we randomize her tenure to be either one year or one week. Once a participant is randomized into seeing one of these two tenure levels, that participant sees the same tenure level in all questions.

To measure the importance of employee turnover, we compare participant evaluations of the one-week-of-tenure nurse to those of the one-year-of-tenure nurse. This is thus a comparison across participants. Since tenure levels are randomized, we evaluate the causal effect of replacing a nurse who has worked at a facility for one year with a nurse who has worked there for one week. Specifically, we estimate the following regression by OLS:

$$\text{Task Completion Time}_{ijk} = \alpha_j + \alpha_k + \delta \text{Turnover}_i + \gamma \text{Perceived Task Difficulty}_{ij} + \epsilon_{ijk}. \quad (1)$$

In this equation, an observation is a participant i with prior job k evaluating a particular scenario j. We include fixed effects α_j and α_k for the hypothetical situation j and the participant i's prior job k. Task Completion Time is the reported completion time for the shorter-tenured nurse. Turnover is an indicator for participant i being randomly selected to consider a nurse with one week, rather than one year, of tenure. Finally, Perceived Task Difficulty is the reported completion time for the longer-tenured nurse; As discussed in Section 3.1.2, we only use participant responses for the longer-tenured nurse to control for idiosyncratic participant beliefs about task difficulty. We cluster standard errors at the participant level.

Finally, we estimate a similar regression to study the effects of turnover on the quality of patient care. Recall that each participant evaluates the likelihood of a mistake or bad outcome in each situation. We use these responses to estimate the following regression by OLS:

$$\text{Rate of Mistakes}_{ijk} = \alpha_j + \alpha_k + \delta \text{Turnover}_i + \gamma \text{Perceived Task Risk}_{ij} + \epsilon_{ijk}. \quad (2)$$

In this equation, Rate of Mistakes is the reported likelihood of a mistake or bad outcome for the shorter-tenured nurse. Perceived Task Risk is the reported likelihood of a mistake or bad

outcome for the longer-tenured nurse. Turnover is once again an indicator for participant i being randomly assigned to evaluate a shorter-tenure nurse with only one week of experience at the hypothetical SNF.

Panel A of Table 1 presents our OLS estimates of equations (1) and (2). According to the nursing staff we survey, turnover reduces the efficiency and quality of patient care. Comparing participants who evaluate a nurse with one week of SNF tenure to those who evaluate a nurse with one year of SNF tenure, the nurse with one week of tenure takes 6.2 minutes longer to complete tasks on average. This represents an increase equal to 14% of the control-group average completion time. Likewise, the nurse with one week of tenure has a higher likelihood of mistakes or bad outcomes - the rate increases by 9.7 percentage points on average, 44% of the control-group mean.

3.2.2 Bankruptcy increases turnover through voluntary employee departures

Next, we evaluate how a firm's bankruptcy or financial distress affects the willingness of employees to work for that firm. As described in Section 3.1.3, each participant i considers a hypothetical job. Participants are randomly assigned to view different descriptions of the employer. Each participant then reports the likelihood that they would search for another job if they currently had this hypothetical job. Participants also estimate the fraction of employees that would voluntarily leave this employer this year. Using these participant responses, we estimate the following regressions:

$$\text{Voluntary Departure}_{ik} = \alpha_k + \beta \text{Distressed}_i + \delta \text{Bankrupt}_i + \text{Turnover Belief}_i + \epsilon_{ik} \quad (3)$$

$$\text{Departure-Rate Guess}_{ik} = \alpha_k + \beta \text{Distressed}_i + \delta \text{Bankrupt}_i + \text{Turnover Belief}_i + \epsilon_{ik}. \quad (4)$$

In this equation, an observation is a participant i with prior job k. Voluntary Departure is the likelihood that participant i would search for another job if they held this hypothetical position. Departure-Rate Guess is participant i's estimate of the percentage of workers that will voluntarily leave this hypothetical employer this year. Distressed is an indicator equal to one if participant i is randomly assigned to evaluate a hypothetical job for a financially distressed employer - one with a 25% chance of filing for bankruptcy in the next year. Bankrupt is an equivalent indicator for being randomly assigned to consider a bankrupt employer. We omit the indicator for the control group. Finally, Turnover Belief is participant

i's estimate of the percentage of workers that voluntarily left participant i's prior employer each year. We use robust standard errors.

Panel B of Table 1 presents OLS estimates of equations (3) and (4). Panel B demonstrates that both bankruptcy and financial distress dramatically decrease willingness to work at a facility and likely increase voluntary worker separations. Specifically, bankruptcy increases the participant's own likelihood of searching for another job by 28.8 percentage points (75% of the control-group mean), while financial distress increases the likelihood by 25.3 percentage points (66% of the control-group mean). Bankruptcy and distress also increase participants' perceived rates of voluntary attrition by 18 (47% of the control-group mean) and 7.5 (20% of the control-group mean) percentage points, respectively.

3.2.3 Mechanisms

After participants answered questions regarding their willingness to work at Facility A, we collected survey evidence from those in the treatment group about the specific concerns that affected their decisions. We asked participants to rate four specific concerns on a scale from 1 (not at all concerned) to 7 (very concerned). Table A1 in Appendix A.2 displays the average ratings reported for the four concerns. Every concern had an average rating above 4, the neutral rating. The strongest concern that participants had was that the facility's financial problems would cause it to close down, forcing them to find another job. The second strongest concern was that the facility would reduce wages.

We also asked participants to share in their own words any concerns that may have influenced their willingness to stay. Appendix A.2.1 contains these free responses in their raw form. Consistent with the numerical ratings, many further reported concerns about job security, the facility closing down, and wages. However, the free responses also brought some additional insights. While some participants expressed direct concerns with working for a facility that was potentially poorly managed (either financially or operationally),

> *"For a nursing facility to file for bankruptcy or have any type of financial troubles is an immediate red flag. It could mean poor leadership or weak business management. I would have no interest in working for any company like that"*

several participants indicated that the financial condition of the facility wasn't a direct consideration, but that their primary concern was the facility being short-staffed. Many

participants specifically reported concerns about the consequences of other workers leaving (e.g., on team dynamics), and particularly that departures of existing workers meant that those who remained would be left to train new hires and become overworked. For example,

> *"I'd be afraid the experienced workers would find other jobs and we would be training mostly brand new employees."*

The Distressed group had relatively mixed responses. Some further emphasized concerns related to wages and shutting down. Some stated that as long as the facility provided adequate pay, the firm's financial distress would not cause them to search. Similarly, some expressed that a 25% chance of bankruptcy was not high enough to leave, and that they would not search for a new job until problems started occurring.

3.2.4 The impact of bankruptcy on patients

Together, the results from the randomized experiment allow for a back-of-the-envelope calculation to estimate the effect of bankruptcy on patient outcomes through the loss of experienced nursing workers. We find that bankruptcy increases voluntary attrition by 47% of the control-group mean, while turnover increases the reported rate of adverse patient outcomes by roughly 44%. Therefore, a crude back of the envelope calculation shows that bankruptcy is likely to increase adverse patient outcomes by 21% through the loss of experienced employees.

Table 1: Results from Online Randomized Experiment on Nursing Staff

Panel A: Effect of Turnover on Task Efficiency and Quality of Care

	Completion Time	Completion Time	Mistake Rate	Mistake Rate
New Hire	6.211***	6.209***	9.666***	9.668***
	(1.516)	(1.517)	(2.099)	(2.102)
Task Difficulty	1.177***	1.180***		
	(0.047)	(0.047)		
Task Risk			0.818***	0.816***
			(0.038)	(0.038)
FE: Job	Yes	Yes	Yes	Yes
FE: Scenario	No	Yes	No	Yes
R^2	0.86	0.86	0.52	0.52
Clusters	247	247	247	247
Control Mean	43.03	43.03	22.13	22.13
Observations	741	741	741	741

Panel B: Effect of Bankruptcy on Job Search and Attrition

	Probability You Job Search	Probability You Job Search	Probability Others Voluntarily Separate	Probability Others Voluntarily Separate
Bankrupt Pool	28.810***	29.741***	17.972***	19.203***
	(5.140)	(4.841)	(3.618)	(2.959)
Distressed Pool	25.295***	27.666***	7.481**	10.615***
	(5.125)	(4.972)	(3.604)	(3.008)
Baseline Turnover		0.431***		0.569***
Belief		(0.091)		(0.058)
FE: Job	Yes	Yes	Yes	Yes
R^2	0.15	0.23	0.13	0.41
Control Mean	38.48	38.48	37.97	37.97
Observations	244	244	244	244

Note. **Panel A:** Each participant is asked three questions about the care provided by Nurse Williams and Nurse Smith to different patients. The tenure of Nurse Williams is randomized over {One Week, One Year} with equal probability across participants. The dependent variable Completion Time denotes participant belief of the number of minutes Nurse Williams takes to complete the task. The dependent variable Mistake Rate denotes participant belief of the probability of a bad outcome or mistake if Nurse Williams undertakes the task. Standard errors in parentheses are clustered at the participant level. **Panel B:** Participants are randomized into Control, Bankrupt, and Distressed with probabilities 1/3, 1/3, and 1/3, respectively. The dependent variables are the participant's reported likelihood of searching for another job and the perceived voluntary worker attrition rate from the facility. Robust standard errors in parentheses. Significance at the 10%, 5%, and 1% level are indicated using *, **, and ***, respectively.

4 Data

4.1 Nursing Home Data

4.1.1 Payroll Based Journal

Starting in the fourth quarter of 2016, the Centers for Medicare and Medicaid Services (CMS) began requiring nursing homes to submit complete daily staffing records for all workers—including both employees and contract workers—engaged in direct resident care. To ensure accuracy, facilities are required to submit data based on payroll and other auditable data. Correspondingly, the system facilities use to submit their data is titled the Payroll-Based Journal (PBJ).

We use the PBJ data to observe the hours worked by nursing staff on each day for each facility. In total, our dataset contains 1.1 billion staffing shifts for 7.5 million different employment relationships. Facilities report the primary role of the staff member, such as whether the individual is a registered nurse, licensed practical nurse, or certified nursing assistant, and also are required to distinguish between employees versus agency and contract staff.

We analyze a sample of PBJ data from 2016Q4 through 2020Q1. We do not extend our sample past 2020Q1 for two reasons related to the COVID-19 pandemic. First, CMS did not require facilities to submit data for 2020Q1 in order to reduce the reporting burden on an industry in crisis. Second, the COVID-19 pandemic affected nursing home staff in dramatic and unprecedented ways. Variation in staffing during the pandemic are likely predominantly attributable to pandemic-induced strains. Moreover, the federal and state governments infused the industry with many billions of dollars in aid—including $21 billion earmarked in the CARES Act (Soergel, 2020)—to prevent facilities from becoming insolvent.

Table 2 provides summary statistics of the staffing data at the facility-week level for facilities that went bankrupt during the sample period. On average, out of the three types of nursing staff, RNs make up the smallest share of total weekly hours while CNAs supply the majority of hours.

4.1.2 Other Nursing Home Data

In addition to comprehensive data on staffing, we obtain detailed nursing home health inspection data from CMS. Nursing home inspections are conducted unannounced by healthcare professionals who visit the facility to assess whether it meets federal requirements. Inspections occur annually on average and time between inspections for a given nursing home rarely exceeds fifteen months. Facilities are penalized for deficiencies that indicate non-compliance with federal standards. The inspections focus on facility practice and policy in a number of areas, including quality of care, resident rights, and physical environment. Identified deficiencies are converted to points based on their severity and scope. Levels of severity range from "no actual harm with potential for minimum harm" to "immediate jeopardy to resident harm or safety." Using the deficiency tags in the health inspection data, we also identify deficiencies that fall under the Quality of Care category as defined by CMS.[15]

Table 2 presents summary statistics of health inspection deficiencies from 2015 to 2020Q1 for facilities that went bankrupt during the staffing data sample period. The table shows that facilities are flagged for around five deficiencies per inspection, which in total amount to 43 points per inspection, on average. Deficiencies of "actual harm" or worse severity and deficiencies falling under Quality of Care as defined by CMS are both rare; the median over the sample of deficiency counts in these categories is zero.

[15] See Section 483.25 of https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/GuidanceforLawsAndRegulations/Downloads/List-of-Revised-FTags.pdf.

Table 2: Summary Statistics of Bankrupt Skilled Nursing Facilities

	Observations	Mean	Median	Std. Dev.
Facility Characteristics				
Bed Count	91,584	120.01	120.00	40.12
Total Weekly Occupancy	91,584	662.92	652.00	261.66
All Nursing Staff (Weekly)				
Employee Count	91,584	69.38	66.00	30.62
Staffing Hours				
Total	91,584	2,289.25	2,173.46	1,013.00
$\geq$ 60 Days Tenure	91,584	1,661.31	1,597.52	1,026.32
$<$ 60 Days Tenure	91,584	548.52	367.03	614.41
CNA				
Employee Count	91,584	40.70	39.00	18.08
Staffing Hours				
Total	91,584	1,323.53	1,263.98	600.33
$\geq$ 60 Days Tenure	91,584	954.54	914.50	604.32
$<$ 60 Days Tenure	91,584	322.29	214.43	369.59
LPN				
Employee Count	91,584	16.67	16.00	8.90
Staffing Hours				
Total	91,584	569.36	539.51	300.65
$\geq$ 60 Days Tenure	91,584	416.84	398.21	288.75
$<$ 60 Days Tenure	91,584	132.24	80.11	173.33
RN				
Employee Count	91,584	12.01	10.00	8.44
Staffing Hours				
Total	91,584	396.36	329.54	280.85
$\geq$ 60 Days Tenure	91,584	289.93	229.63	257.87
$<$ 60 Days Tenure	91,584	93.99	58.61	128.58
Health Inspections (Annual*)				
Number of Deficiencies	2,950	4.96	3.00	4.99
Total Points	2,950	43.42	20.00	87.60
Actual Harm Deficiency Count	2,950	0.28	0.00	0.94
Immediate Jeopardy Deficiency Count	2,950	0.12	0.00	0.74
Quality of Care Deficiency Count	2,950	0.58	0.00	1.12

Table 3: Balance Table

	(1) Treated Facilities	(2) Control Facilities	(3) Difference
Matched On			
Percent Medicare	14.35	14.21	0.13
	(10.12)	(11.35)	
Occupancy Rate	79.10	78.79	0.32
	(14.46)	(14.60)	
Certified Beds	122.18	123.63	-1.45
	(40.25)	(51.10)	
Staffing Characteristics (Not Matched On)			
Staffing Hours per 100 Beds	1961.23	2094.28	-133.05***
	(519.22)	(665.45)	
Workers per 100 Beds	60.26	64.81	-4.55***
	(16.98)	(22.47)	
New Hires per 100 Beds	1.55	1.41	0.14
	(2.25)	(2.24)	
Separations per 100 Beds	1.42	1.52	-0.10
	(1.96)	(3.55)	
$\geq$ 60 Days Tenure Hours per 100 Beds	1527.52	1634.60	-107.08***
	(504.30)	(650.94)	
$\geq$ 60 Days Tenure Workers per 100 Beds	43.65	47.18	-3.53***
	(15.14)	(19.60)	
$<$ 60 Days Tenure Hours per 100 Beds	433.70	459.68	-25.98
	(385.42)	(483.88)	
$<$ 60 Days Tenure Workers per 100 Beds	16.61	17.64	-1.02
	(13.09)	(17.13)	
N	495	2,421	2,916

Note. Columns (1) and (2) present means and standard deviations of facility characteristics for treated and control facilities, where standard deviations are in parentheses. Column (3) presents the difference in means between treated and control facilities. Values are measured 30 weeks prior to the bankruptcy filing date. Significance at the 10%, 5%, and 1% level are indicated using *, **, and ***, respectively.

4.2 Patient Data

In this section, we detail the three linked administrative datasets from the Centers for Medicare & Medicaid Services to observe virtually all patients at nearly every nursing home from 2010 through 2019.

Medicare Enrollment Files We obtain enrollment, demographic, and chronic condition information for all Medicare beneficiaries from the Master Beneficiary Summary File (MBSF). First and foremost, the MBSF provides a record of the enrollment status of Medicare beneficiaries in each month, including whether a beneficiary is enrolled in Original Medicare or Medicare Advantage, and whether the beneficiary is enrolled in Medicaid. The data also includes a rich set of patient demographics, such as sex, age, race, and zip code of residence at the yearly level. The MBSF also tracks chronic conditions, including Alzheimer's, anemia, cancer, diabetes, asthma, stroke, rheumatoid arthritis, hip fracture, osteoporosis, depression, cataracts, glaucoma, chronic kidney disease, atrial fibrillation, chronic obstructive pulmonary disease, ischemic heart disease, acute myocardial infarction, congestive heart failure, hyperplasia, hypertension, hyperlipidemia, and hypothyroidism.

Medicare Claims We also use claims data derived from the Medicare Inpatient (IP) Claims file, Medicare Outpatient (OP) claims file, and the Medicare Provider Analysis and Review (MedPAR) file. The Medicare IP and OP files provide raw claim data, and the MedPAR file provides an aggregation of inpatient claims to the episode level. These data provide a detailed view of the procedures, diagnosis codes, and amounts for all inpatient and outpatient Medicare claims. They allow us to observe the amount, type, and cost of care that Original Medicare enrollees received at their nursing home. The hospital claims data also allow us to observe additional information on a residents' diagnoses that may have led to their nursing home stay, as well as to observe when nursing homes are admitted to the emergency department or rehospitalized. Note that healthcare claims incurred by Medicare Advantage (MA) patients are not observed, so we exclude MA patients from analyses deriving from claims data.

Resident Health Assessments Federal regulations require that nursing homes regularly submit detailed health assessments on each resident to CMS. Regardless of payer source, they must submit specific assessments for each resident at admission, discharge, or major change

in status, as well quarterly and annually. Additionally, for any stay reimbursed by Medicare, the facility must file additional Medicare Prospective Payment System assessments on or around 5, 14, 30, 60, and 90 days, as well as with any readmission or significant clinical change.

We access these assessments through the Long Term Care Minimum Data Set (MDS) version 3.0. These MDS assessments provide a great deal of detail on each resident's health during the assessment period, including their physical ailments, mental and cognitive wellbeing, and evaluations of their ability to perform their activities of daily living (ADLs)—such as eating, bathing, dressing, transferring, walking, and toileting—without physical support from staff. A higher score indicates worse functionality.

4.3 Bankruptcy Data

The Public Access to Court Electronic Records (PACER) service provides electronic public access to federal court records. Established in 1988, the PACER system has grown to provide virtually universal coverage of federal cases. Today, it provides "nearly all the documents filed by a judge or the parties in any case."[16] Since bankruptcy courts are federal courts, PACER contains detailed information on every bankruptcy case.

Since 2008, the Federal Judicial Center (FJC) has publicly provided a dataset containing "every case filed in the PACER system."[17] The FJC only provides a few variables for each case. Fortunately, one of those variables is an indicator equal to one in all bankruptcies involving a healthcare company ("healthcare bankruptcies").[18] We use this indicator to create a dataset containing all Chapter 11 healthcare bankruptcies. Using the FJC's numeric case identifiers, we locate each bankruptcy in PACER and download comprehensive case information for each healthcare bankruptcy.[19] Notably, for each bankruptcy, we obtain the bankruptcy filing date and identifying information such as the name, address, and employer-identification number (EIN) for the bankrupt company. We merge our bankruptcy data with our CMS data using EINs, names, and addresses. Specifically, through a Freedom of Information Act request, we obtain a novel dataset containing the EIN for every healthcare

[16] See https://pacer.uscourts.gov/about-us.

[17] See https://free.law/idb-facts

[18] Corporate Chapter 11 filing petitions include a line requiring filers to disclose if the bankruptcy involves a healthcare company.

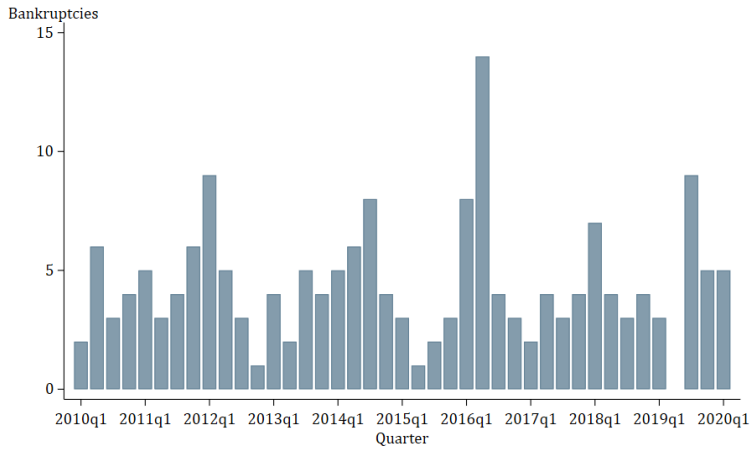
[19] We are grateful to the 18 district courts that provided fee waivers.

provider in the NPPES database. We also obtain EINs for parent companies, allowing us to observe each subsidiary of a bankrupt parent company. In this way, we identify which healthcare facilities in the CMS data file for bankruptcy. See Appendix D for details.

We also use our PACER data to group together healthcare facilities that share a parent company (i.e., facilities that are in the same chain). Restricting attention to SNFs covered in our PBJ sample, our final dataset contains all SNF bankruptcies filed over the period 2016Q4-2020Q1.

Figure 1 illustrates the number of nursing-home bankruptcies at the chain level during the sample period, which includes 180 chain bankrputcies, representing 727 facilities. The frequency of bankruptcies is fairly similar across the sample period. We exploit this variation in treatment timing in our main analysis, which relies on a matched difference-in-differences empirical strategy.

Figure 1: Nursing Home Bankruptcies: 2010 Q1 - 2020 Q1



5 High-Frequency Employment Responses to Bankruptcy

5.1 Empirical Strategy

This section provides an analysis of the effects of Chapter 11 bankruptcy on skilled nursing facility employment. We consider a sample of facilities that all filed for Chapter 11 during the sample period and exploit the differential timing of bankruptcies across nursing homes.

The standard identifying assumption in any difference-in-differences analysis is parallel trends: in the absence of treatment, the treated and control facilities would have experienced similar outcome-variable fluctuations (relative to potentially different baseline values). In our setting, we assume that bankrupt facilities would have experienced similar staffing changes to nonbankrupt facilities in the absence of bankruptcy filings. This assumption would likely be violated if unobservable economic shocks cause both bankruptcy filings and staffing changes. Our empirical design addresses this concern in two ways.

First, we exploit the high-frequency nature of our weekly dataset to isolate the effect of a bankruptcy filing from the effect of unobserved conditions that lead to a bankruptcy. Our main specification isolates the effect of a bankruptcy in the weeks following the bankruptcy filing. Intuitively, any staffing changes observed immediately after a Chapter 11 bankruptcy filing can likely be attributed to bankruptcy.

Second, we match each treated facility to a control group of observably similar non-bankrupt facilities. Specifically, we use coarse exact matching to form a control group of up to five non-treated facilities, matching on ten bins of occupancy rate, ten bins of certified beds, and ten bins of Medicare share in the year before bankruptcy.[20] The matched stacked cohort approach allows us to compare changes in the staffing of bankrupt facilities around the bankruptcy filing to contemporaneous changes in control facilities. We also show that the results are similar when using a staggered difference-in-differences approach, which includes only nursing homes that at some point file for bankruptcy.[21]

[20] Moreover, the large pool of potential control facilities allows us to match without replacement, meaning that each control facility can only be used as a control facility for one treated facility.

[21] Recent econometric papers caution against the two-way fixed effects (TWFE) staggered DiD estimator in the presence of heterogeneous and dynamic treatment effects (e.g., Callaway and Sant'Anna 2020, Sun and Abraham 2021). The key concern is that in the standard TWFE design, earlier treated units may be used as controls for later treated units, which can potentially lead to estimates of the opposite sign from the true ATE. For this reason, we use the matched stacked cohort approach as our main specification, which does not rely on earlier treated units as controls.

The baseline for our analysis is the following matched difference-in-differences specification:

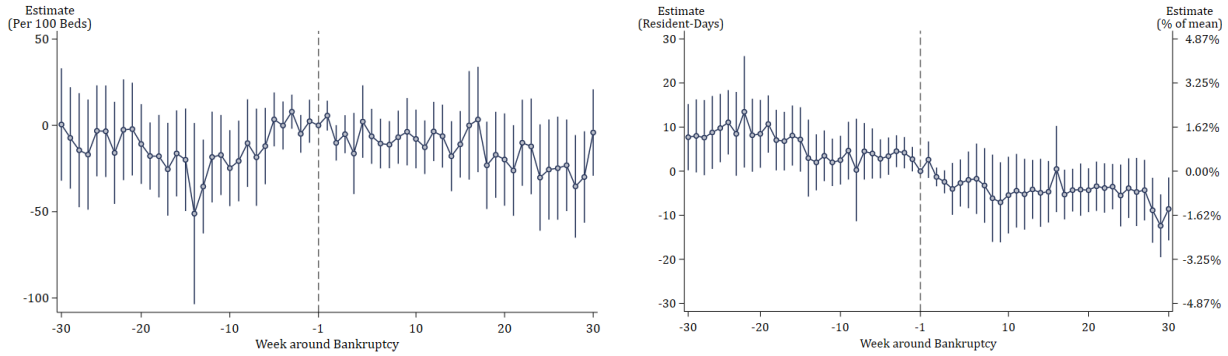
$$
\begin{aligned}
y_{f,w,c} = & \underbrace{\delta}_{\text{Early Pre-Period}} \cdot 1\{w < B_f - 30\} \\
& + \underbrace{\theta_1}_{\text{Short-Term Effect}} \cdot 1\{B_f \leq w \leq B_f + 30\} \\
& + \underbrace{\theta_2}_{\text{Long-Term Effect}} \cdot 1\{w > B_f + 30\} + \alpha_{w,c} + \rho_f + \epsilon_{f,w,c}
\end{aligned} \tag{5}
$$

In this regression, $y_{f,w,c}$ is an outcome, such as staff hours, at facility f in relative year-week w and match cohort c. We include facility fixed effects ρ_f and relative week-by-match cohort fixed effects $\gamma_{w,c}$. The variable B_f is equal to the week in which facility f files for bankruptcy. We measure the dynamic effects of a bankruptcy filing using three indicator variables: one indicating a bankruptcy after week $w + 30$, one indicating a bankruptcy in the period $[w - 30, w)$, and one indicating a bankruptcy prior to week $w - 30$. The baseline period is therefore the 30 weeks leading up to bankruptcy. In this sense, we identify short-term and long-term responses to bankruptcy, as well as any early pre-period difference from the baseline period. We choose 30 as this approximately corresponds to a half-year of effects. Bankruptcies typically occur at the chain level, which is the level standard errors are clustered.

Table 4 presents the estimates of coefficients θ_1 (the short-run effect) and θ_2 (the long-run effect) in the specification above. Figure 2 plots the high-frequency coefficient estimates and 95% confidence intervals for total weekly nursing staff hours per 100 beds and resident-days. As the figure illustrates, the effects of bankruptcy on both total nursing staff hours and resident occupancy are statistically indistinguishable from zero, and economically insignificant when compared to the outcome variable means. Similarly, we find no evidence of meaningful effects on the share of staffing by nursing role, or skill mix, as shown in Figure 3.

Ultimately, these null effects point to maintained overall staffing levels and nursing role composition following a Chapter 11 filing. However, simply examining total staffing levels may result in an incomplete characterization of employment responses. In particular, it does not account for changes in worker turnover and tenure, which we examine next.

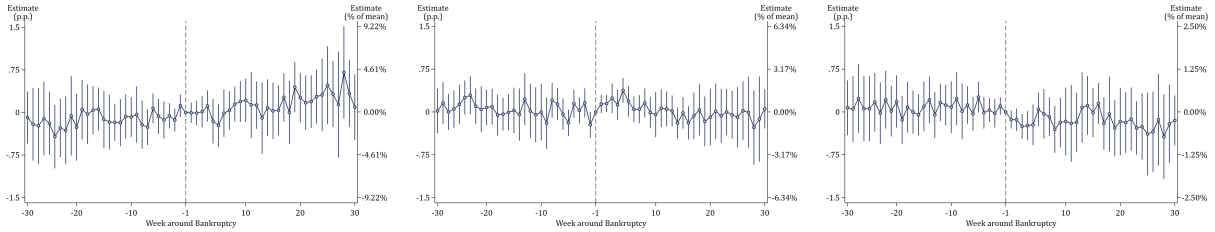
Figure 2: Little change in total weekly hours and patient occupancy



(a) Hours per 100 Beds (b) Resident-Days

Note. This figure plots the coefficients δ, θ_1 and θ_2 estimated from Equation 5 and their 95% confidence intervals. The left panel shows total weekly nursing staff hours per 100 beds. The right panel shows total weekly resident-days (occupancy). Standard errors are clustered by week and chain-year pairs. Point estimates are in Table 4.

Figure 3: No meaningful changes to hours worked by skill mix



(a) RN Share (b) LPN Share (c) CNA Share

Note. This figure examines the share of hours provided by different RNs, LPNs, and CNAs. The outcome variables are the share of total weekly hours provided by each nursing staff role. Standard errors are clustered by week and chain-year pairs. 95% confidence intervals are shown.

5.2 The Effect of Bankruptcy on Staffing Turnover

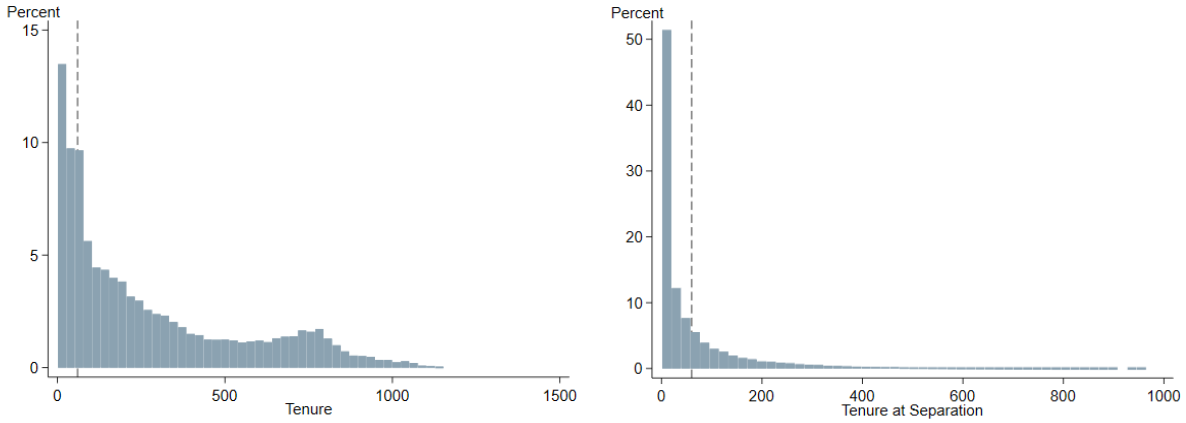
An important dimension of nursing home quality is the tenure of a facility's staff members. High turnover—and correspondingly having a large share of new staff—has long been considered a concerning indicator of low-quality care (Carter and Phillips, 1988; Gandhi, Yu, and Grabowski, 2021).[22] Nursing home staff must be trained in and implement processes that are specific to each facility and its residents. Correspondingly, it's unsurprising that facilities with high staff turnover perform worse on quality measures (Castle, Engberg, and Men, 2007), and those employing a large fraction of low-tenure staff are more likely to be cited for violating infection control protocols (Loomer et al., 2021). Moreover, nursing home residents have very individualized needs and are highly dependent on staff for activities of daily living—such as eating, bathing, dressing, toileting, and moving—so we might expect that the common finding that consistent care teams yield better health outcomes (Wasson et al., 1984; Nyweide et al., 2013; Sabety, Jena, and Barnett, 2021) to apply particularly strongly in the nursing home industry. An instrumental variables analysis by Antwi and Bowblis (2018) indeed suggests a causal relation between nurse turnover and increased annual survey deficiencies.

Consistent assignment of nursing staff to residents has been increasingly emphasized as a policy goal (Roberts, Nolet, and Bowers, 2013). Turnover and tenure are such important measures of quality that the Affordable Care Act mandates that CMS collect and publicize "information on employee turnover and tenure." Starting in January 2021, CMS began publishing turnover measures on Nursing Home Compare—a tool that many consumers use to compare and choose a nursing home—and starting in July 2021, turnover will affect facilities' five-star rating—the most salient summary quality measures on Nursing Home Compare.

The detailed nature of our data allow us to measure the tenure of each staff member working each week at each facility. Figure 4a presents the distribution of nursing staff tenure for staff member shifts in the last year of our sample, and Figure 4b presents the distribution of tenure for nursing home staff when they separate from a facility. In our analysis, we distinguish low-tenure staff (i.e. new staff) as those who have worked fewer

[22] Castle and Engberg (2005) succinctly summarizes the many ways in which the literature has suggested turnover might affect quality of care: "turnover will interfere with continuity of care; increase the number of inexperienced workers; weaken standards of care; cause psychologic distress for some residents; be expensive for the facility, therefore diverting dollars from care; and increase the work load for remaining staff."

Figure 4: Employee Tenure



(a) Distribution of Tenure

(b) Distribution of Tenure at Separation

Note. The distribution of tenure in 4a is computed using only workers from the last year of the sample (2019) in order to minimize the number of staff whose tenure is censored by the start of the sample.

than 60 days at the facility. This cutoff corresponds to approximately the 25th percentile of employee tenure, which is 59 days. Appendix B.3 demonstrates the robustness of our results to alternative definitions of low-tenure staff. In any turnover-related regression, we only include observations in which the facility reports in the 13 weeks ($\approx$ 90 days) prior. This way, we can accurately measure whether a worker has had 60 days of experience at the facility or not.

We first turn to exploring staff turnover as measured by worker exits and entries. Table 4 reports the coefficient estimates corresponding to the early pre-period, short- and long-term effects of bankruptcy for all nursing staff. Figure 5 plots the week-by-week dynamics of new hires and separations. Panel (a) examines exits per 100 beds, and Panel (b) examines new workers per 100 beds. Following bankruptcy, we estimate a 14% short-run and 13% long-run increase in weekly exits, relative to the mean. Consistent with our earlier finding of maintained total staffing levels, Panel (b) shows that these increases are met with comparable increases in weekly new entries. Moreover, these effects are similar across nursing staff roles, as reported in Table 5.

How does this documented turnover affect the amount of care provided by experienced workers? In Table 6, we explore the effects of bankruptcy on the tenure of nursing home staffing. The estimates of Panel A show both short-term and long-term losses in tenured

Table 4: The Effect of Bankruptcy on Staffing Levels and Turnover

	Hours	Employees	Resident-Days	New Workers	Exits
$0 \leq t \leq 30$	-0.043	0.091	-4.691	0.129***	0.200***
	(8.752)	(0.356)	(3.043)	(0.040)	(0.035)
$t \geq 31$	-21.020	-0.732	-6.490**	0.232***	0.189***
	(16.323)	(0.461)	(3.075)	(0.075)	(0.048)
FE: Week×Match Group	Yes	Yes	Yes	Yes	Yes
FE: Facility	Yes	Yes	Yes	Yes	Yes
R^2	0.89	0.89	0.97	0.35	0.40
Mean	2,054.77	63.29	674.22	1.39	1.41
Observations	521,594	521,594	508,379	482,316	482,316

Note. The dependent variables from left to right are: total weekly hours per 100 beds, total number of employees working at the facility in a given week per 100 beds, total weekly patient occupancy (resident-days), hours per patient week, weekly new workers per 100 beds, and weekly exits per 100 beds. The results are shown for all nursing staff. Each observation is a facility-week. Standard errors are provided in parentheses and are clustered by nursing home chain. Significance at the 10%, 5%, and 1% level are indicated using *, **, and ***, respectively.

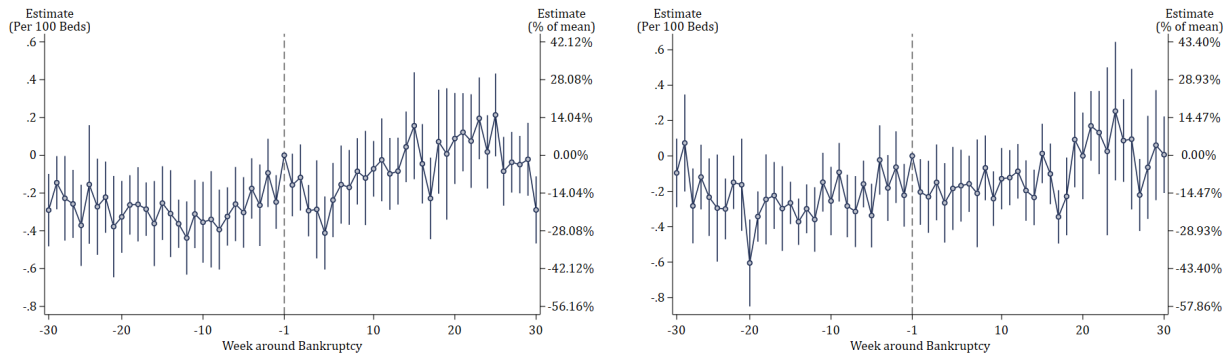
worker care of large magnitudes. The estimates reveal a dramatic shift in composition toward inexperienced workers. Specifically, we document an increase in the share of low-tenure hours of 2.2 percentage points in the short term and 6.8 percentage points in the long term. These magnitudes are 11% and 34% of the mean share of low-tenure hours, respectively. Figure 6 presents the estimates visually including the early pre-period coefficient, demonstrating a lack of observed trends prior to bankruptcy. Figures B1, B2, and B3 illustrate the high-frequency dynamics of tenure for each nursing staff role: RN, LPN, and CNA. The figures show that, as Table 5 indicates, the shift in composition towards less experienced workers occurs across nursing staff roles. Moreover, these effects appear to begin earliest for RNs, who have the highest level of certification among nursing staff roles and are viewed as key determinants of quality.

Next, we turn to examining changes in staffing by employment contract. Table 7 reports the coefficient estimates for effects on wage workers and contract workers. The results indicate that following bankruptcy, facilities tend to shift from wage to contract workers. In particular, weekly contract worker hours rise by 13.6 in the long-term, a 31% increase relative to the mean of 43.4. This shift results in a large long-term increase in the share of total staffing hours supplied by contract labor: the coefficient estimate of 0.975 amounts to a 39% increase relative to the mean of 2.49. It is important to note that contract nurs-

ing staff can in fact be more costly to facilities than wage workers. This provides further evidence that turnover is voluntary, as facilities replace departing workers with more expensive contract labor. Indeed, Tables B2 and B3 in the Appendix show that average hourly nursing wages increase after bankruptcy. This increase is concentrated among RNs, the highest-certification nursing role. In particular, the average wage paid to RNs increases by 7% following bankruptcy.

Altogether, our findings indicate that after filing for Chapter 11, facilities maintain total weekly nursing staff hours but experienced heightened worker turnover. This leads to a substantial increase in the share of inexperienced nursing staff. The findings that (1) exiting workers are quickly replaced by new hires, (2) facilities shift to more costly contract labor, and (3) RN wages increase provide strong evidence that the effects are worker-driven. Moreover, the persistent effects on turnover and tenure suggest an "unraveling" of experienced employees.

Figure 5: Dynamic Effects of Bankruptcy on Nursing Staff Turnover



(a) Exits per 100 Beds

(b) New Workers per 100 Beds

Note. This figure examines staffing turnover around bankruptcy. The left panel shows total weekly nursing staff exits per 100 beds. The right panel shows total weekly new nursing staff per 100 beds. Standard errors are clustered by week and chain-year pairs. 95% confidence intervals are shown. See Table 5 for point estimates.

Table 5: The Effect of Bankruptcy on Nursing Staff Turnover

	RN		LPN		CNA	
	New Workers	Exits	New Workers	Exits	New Workers	Exits
$0 \leq t \leq 30$	0.028***	0.042***	0.040***	0.054***	0.076**	0.116***
	(0.007)	(0.006)	(0.010)	(0.011)	(0.030)	(0.024)
$t \geq 31$	0.027	0.031***	0.066***	0.055***	0.150***	0.118***
	(0.017)	(0.009)	(0.019)	(0.012)	(0.046)	(0.033)
FE: Week×Match Group	Yes	Yes	Yes	Yes	Yes	Yes
FE: Facility	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.26	0.27	0.29	0.30	0.32	0.37
Mean	0.19	0.21	0.27	0.28	0.91	0.93
Observations	482,316	482,316	482,316	482,316	482,316	482,316

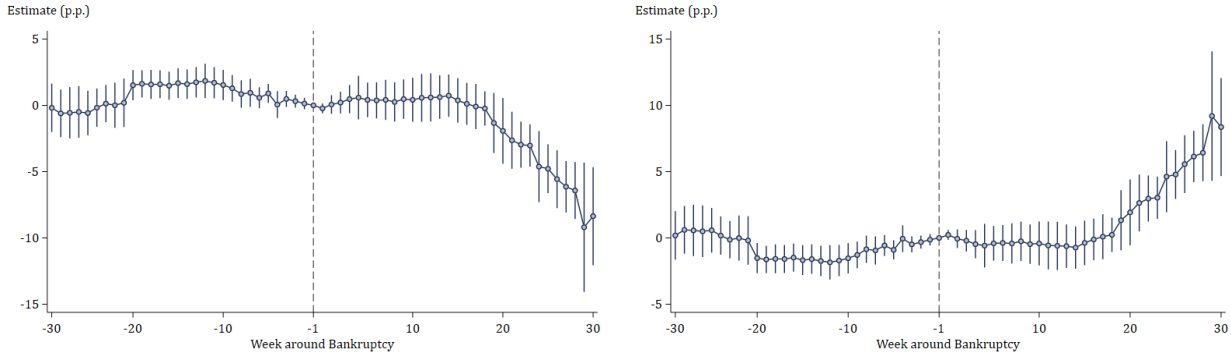
Note. The dependent variable New Workers represents the number of new workers in a facility-week per 100 beds. The dependent variable Exits represents the number of exiting workers in a facility-week per 100 beds. The results are shown for nursing staff. Each observation is a facility-week. Standard errors are provided in parentheses and are clustered by nursing home chain. Significance at the 10%, 5%, and 1% level are indicated using *, **, and ***, respectively.

Table 6: The Effect of Bankruptcy on the Tenure of Nursing Staff

	$\geq$ 60 Days Tenure			$<$ 60 Days Tenure		
	Hours	Hour share	Employees	Hours	Hour share	Employees
$0 \leq t \leq 30$	-39.503***	-2.187***	-1.173***	38.757***	2.187***	1.268***
	(15.174)	(0.527)	(0.392)	(11.874)	(0.527)	(0.381)
$t \geq 31$	-138.229***	-6.767***	-4.515***	117.150***	6.767***	3.845***
	(33.222)	(2.419)	(1.031)	(40.449)	(2.419)	(1.291)
FE: Week×Match Group	Yes	Yes	Yes	Yes	Yes	Yes
FE: Facility	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.80	0.46	0.82	0.47	0.46	0.55
Mean	1,660.62	80.33	48.07	391.14	19.67	15.18
Observations	482,316	482,316	482,316	482,316	482,316	482,316

Note. This table examines staffing by workers of different experience levels, measured in days. The dependent variable Hours represents weekly hours per 100 beds. The dependent variable Hour Share represents share of total weekly hours. The dependent variable Employees represents number of working employees per 100 beds. The results are shown for all nursing staff. Each observation is a facility-week. Standard errors are provided in parentheses and are clustered by nursing home chain. Tenure by hour share is illustrated in Figure 6. Significance at the 10%, 5%, and 1% level are indicated using *, **, and ***, respectively.

Figure 6: Dynamic Effects of Bankruptcy on Nursing Staff Tenure



(a) $\geq$ 60 Days Tenure Hour Share

(b) $<$ 60 Days Tenure Hour Share

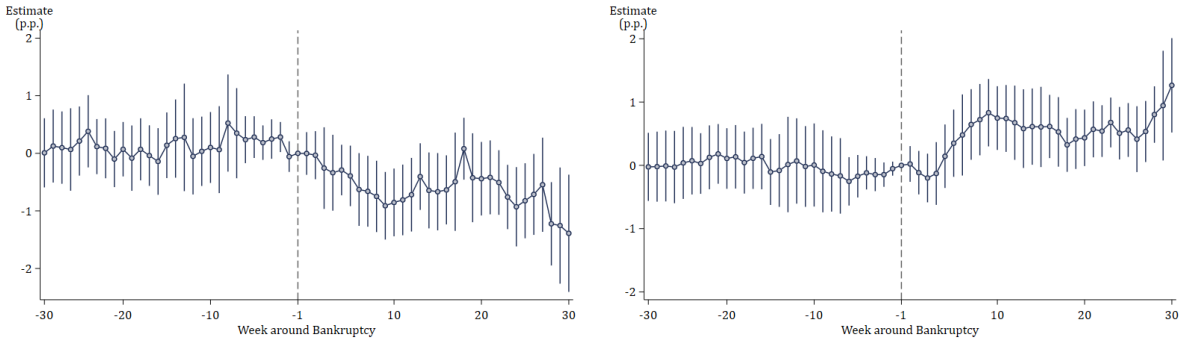
Note. This figure examines staffing by workers of different experience levels. The left panel shows the share of weekly staffing hours provided by workers with at least 60 days of experience at the facility. The right panel shows the share of weekly staffing hours with fewer than 60 days of experience at the facility. Standard errors are clustered by chain, and 95% confidence intervals are shown. Table 6 contains the coinciding point estimates. Appendix B.1 contains the event studies for all tenure variables and for each nursing staff role.

Table 7: Staffing Responses to Bankruptcy by Employment Contract

	Wage Workers			Contract Workers		
	Hours	Hour Share	Employees	Hours	Hour Share	Employees
$0 \leq t \leq 30$	-10.430	-0.725***	-0.356	8.865***	0.519***	0.419***
	(9.149)	(0.249)	(0.305)	(3.315)	(0.188)	(0.141)
$t \geq 31$	-33.532***	-1.082**	-1.132***	13.603***	0.975***	0.519***
	(11.397)	(0.499)	(0.321)	(3.944)	(0.316)	(0.154)
FE: Week×Match Group	Yes	Yes	Yes	Yes	Yes	Yes
FE: Facility	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.86	0.58	0.88	0.67	0.58	0.68
Mean	1,903.83	92.38	58.24	43.37	2.49	2.07
Observations	521,594	521,594	521,594	521,594	521,594	521,594

Note. This Table examines staffing by workers of different employment contracts.The results are shown for all nursing staff. Each observation is a facility-week. Standard errors are provided in parentheses and are clustered by nursing home chain. Significance at the 10%, 5%, and 1% level are indicated using *, **, and ***, respectively. See Figure 7 for event studies.

Figure 7: Staffing Responses to Bankruptcy by Employment Contract



(a) Share of Wage Worker Hours

(b) Share of Contract Worker Hours

Note. This figure examines staffing by workers of different employment contracts. The left panel shows total weekly hours (per 100 beds) supplied by wage nursing staff. The right panel shows total weekly hours (per 100 beds) supplied by contract nursing staff. Standard errors are clustered by chain, and 95% confidence intervals are shown. See Table 7 for point estimates.

6 Quality of Care and Patient Health

The previous section analyzed nursing staff responses to filing for Chapter 11 bankruptcy, documenting increased worker turnover and shifts towards inexperienced labor. As the continuity of care and composition of nursing staff may directly affect the quality of care delivered to patients, we now explore the implications of bankruptcy for patient health and safety. We first study detailed health inspection data at the facility level. We then turn to restricted-use Medicare claims and nursing home assessment data, which allow us to study changes in outcomes at the patient level.

6.1 Health Inspections

We obtain detailed nursing home inspection data from CMS in order to study how patient health and safety are affected by bankruptcy. Inspections are conducted by healthcare professionals who visit facilities unannounced in order to check whether the facility is compliant with federal requirements. Onsite inspections strive to provide a comprehensive assessment of the nursing home, reviewing practice and policy in areas such as quality of care, resident rights, and physical environment. For the purpose of systematically rating nursing homes based on these inspections, identified deficiencies are also assigned points based on their scope and severity.

In Table 8, we explore the quantity of deficiencies on a given inspection date and the total point value of these deficiencies. We then turn to the quantity of deficiencies that fall under the CMS severity level of "actual harm" or "immediate jeopardy to resident health or safety." Next, we use the specified deficiency tags in the inspection data to observe the number of deficiencies that fall under the Quality of Care category. The category is defined by CMS and includes things like pain management, dialysis, bedrails, catheters, and treatment to prevent/heal pressure ulcers.[23] Since inspections occur at irregular intervals with sometimes more than 12 months elapsing between inspections, we conduct this analysis at the facility-inspection level, regressing the inverse hyperbolic sine of these four measures on *Bankrupt*, an indicator for whether the given inspection date is after the Chapter 11 filing. We study how violations change prior to and following the bankruptcy filing, specifically, we include the three inspections before bankruptcy and the three inspections after bankruptcy.

[23] See https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/GuidanceforLawsAndRegulations/Downloads/List-of-Revised-FTags.pdf.

Table 8: Implications of Provider Bankruptcy for Patient Health and Safety

	Deficiencies	Points	Harm	Jeopardy	Low Quality Care
Bankrupt	0.937***	12.356*	0.079	0.080	0.272***
	(0.329)	(6.435)	(0.067)	(0.049)	(0.057)
FE: Facility	Yes	Yes	Yes	Yes	Yes
FE: Quarter	Yes	Yes	Yes	Yes	Yes
Observations	2,950	2,950	2,950	2,950	2,950
R^2	0.25	0.22	0.22	0.22	0.34
Mean	4.96	43.42	0.28	0.12	0.58
Std. Dev	4.99	87.60	0.94	0.74	1.12

Note. The dependent variables from left to right are: total number of deficiencies, total number of points incurred (where more points indicates higher severity), number of actual harm (or worse) severity deficiencies, number of immediate jeopardy severity deficiencies, and number of deficiencies that fall under the quality of care category. Standard errors are provided in parentheses and are clustered by chain and quarter of inspection. Significance at the 10%, 5%, and 1% level are indicated using *, **, and ***, respectively.

Each observation is a facility-inspection. The specification is

$$y_{f,s} = \delta \times \text{Bankrupt}_{f,s} + \gamma_q + \rho_f + \epsilon_{f,s} \tag{6}$$

where ρ_f are facility fixed effects and γ_q are inspection quarter fixed effects. Standard errors are two-way clustered by nursing home chain and quarter.

Table 8 presents the results. We find that health inspection deficiencies and point values increase substantially following bankruptcy. In particular, bankrupt facilities incur more deficiencies that may present actual harm or immediate jeopardy to patients, as well as deficiencies that indicate low quality of care as defined by CMS. Interpreting the magnitudes roughly as percentage increases, total deficiencies increase by 11% and deficiencies associated with quality of care increase by 15% following bankruptcy.

6.2 Health Outcomes

We leverage patient-level Medicare claims and resident assessment data from the Long Term Care Minimum Data Set (MDS) 3.0 to assess whether bankruptcy observably affects patients' health outcomes. These data detail a variety of patient health outcomes—such as resident hygiene, behavioral issues, and use of physical and chemical restraints.

To parallel our previous analyses, we aggregate outcomes across patients at a facility during each month and employ the following matched difference-in-differences specification:

$$y_{f,t,c} = \sum_{\tau} \beta^{\tau} \times \mathbf{1}(t = B_f + \tau) + \rho_f + \alpha_{t,c} + \epsilon_{f,t,c} \tag{7}$$

where $y_{f,t,c}$ is an outcome for facility f in month-year t of relative time in match cohort c. For some outcomes, such as the facility's census or number of admissions or discharges, these are a total over all patients. For other outcomes, such as use of antipsychotics, this is an average. We include facility fixed effects ρ_f and cohort- relative month fixed effects $\alpha_{t,c}$. The coefficients $\{\beta^{\tau}\}_{\tau}$ provide the event-study coefficients of interest. We plot these for the 12 months prior to bankruptcy and the twelve months after bankruptcy.[24] In addition, we included the pooled treatment effects and standard errors in the Appendix. As with previous analyses, standard errors are clustered at the chain level since bankruptcies typically occur at the chain level.

Figure 8 illustrates that patient care degrades along a number of important dimensions in response to a SNF filing for Chapter 11 bankruptcy. Facilities report employing both physical and chemical restraints on patients more frequently.[25] The use of restraints is highly suggestive that the facility's staff is struggling to productively interact with and care for patients. This is further evidenced by a rise in residents exhibiting behavioral problems.[26] These challenges plausibly stem from new staff lacking familiarity and know-how on how to interact productively with residents. Likewise, because more than half of residents face cognitive decline—such as Alzheimer's and related dementias—residents may also react poorly to inconsistent caregivers.

It is important to emphasize that the use of either physical or chemical restraints is a cause for concern. A primary objective in long-term care is to respect residents' autonomy, as well as to encourage them to actively participate in activities of daily living. Therefore, the use of restraints clearly indicates poor quality care. For example, CMS penalizes use of

[24] Note that we index the month of bankruptcy as month zero and therefore the estimates go from $\tau = -12$ to $\tau = 11$.

[25] Note that the term "chemical restraint" is a euphemism for inappropriate use of drugs such as antipsychotics to sedate patients. We include all antipsychotic use and schizophrenia diagnoses as indicators of chemical restraint because nursing homes have been shown to frequently improperly diagnose schizophrenia to justify the use of antipsychotics (Thomas, Gebeloff, and Silver-Greenberg, 2021).

[26] Behavioral problems include threatening, screaming, curing at others, hitting, kicking, pushing, scratching, grabbing, or abusing others sexually.

either physical or chemical restraints in their quality rating system for nursing homes.

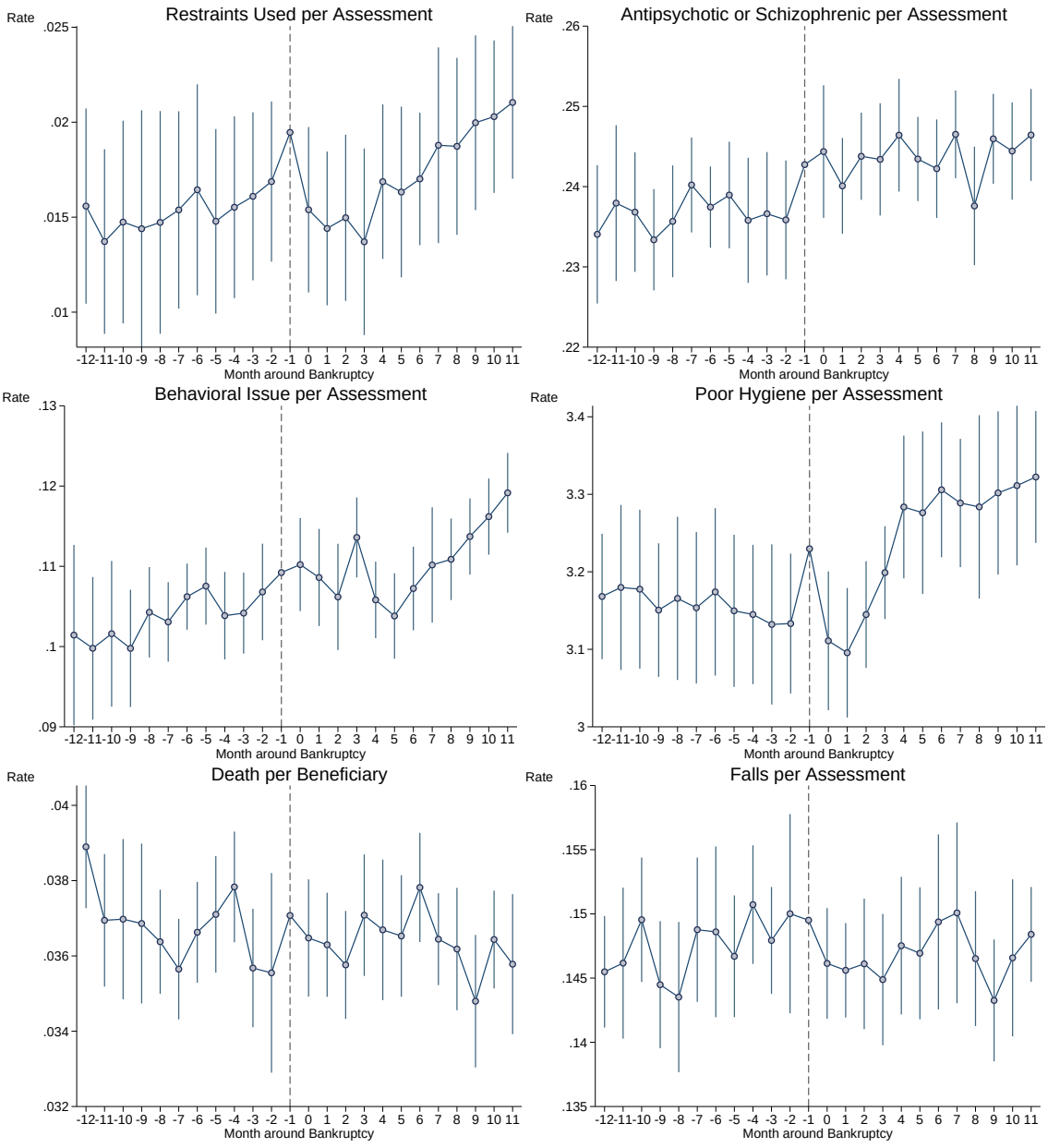
In addition to the use of restraints, we also observe some indication that some areas of residential care may decline. For example, we observe a marked increase in residents having poor hygiene. High scores on this measure indicate either that residents have little independence in the activity or that it was not done at all. While such degradations may seem minor, they may still be important to well-being of patients, particularly those for whom the facility provides long-term residential care.

It is worth noting that for three of the four aforementioned outcomes, the worsening of care occurs on a timeline that parallels the staff turnover we observe in the previous sections. While not conclusive, this suggests that the instability in post-bankruptcy staffing may underlie the worsening care.

Notably, while we do observe multiple dimensions of worsening care, we do not observe any evidence that bankruptcy results in greater mortality or falls, which are common adverse outcomes for nursing home patients. This suggests limits to the adverse consequences of bankruptcy in that care does not degrade badly enough or in a way that would result in major adverse outcomes, such as mortality.

As an additional analysis in Figure C3 and Table C2, we consider how the composition of facilities' residents may have changed due to filing for bankruptcy. While we do not see a statistically significant reduction in census in the year following bankruptcy, we do see a nearly 1 percentage point reduction in Traditional Medicare patients. Facilities also experience slightly fewer admissions and discharges, suggesting their post-bankruptcy patient stays at the facility are slightly longer.

Figure 8: Effects of Bankruptcy on Patient Health
at the SNF Level



Note. This figure examines health outcomes over relative month t among patient assessments recorded in the MDS. Regressions include match-id by relative time and skilled nursing facility fixed effects. The values have been shifted up by the mean of the dependent variable to provide scale. Standard errors are clustered by skilled nursing facility chain, and 95% confidence intervals are shown. See Table C1 for point estimates.

7 Conclusion

This paper leverages administrative and survey data from the healthcare sector to study the implication of healthcare provider bankruptcies in the US nursing home industry. We find that filing for bankruptcy results in substantial turnover in nursing home staff, which our survey of nursing home staff suggests harms quality of care.

Using administrative data we affirm the survey results, finding that quality of care declines after bankruptcy, with facilities performing worse on health inspections and showing signs of poor care as measured by residents' health assessments. These results suggest that bankruptcies are not costless. However, when considering how to mitigate these costs, a key provision is likely patient ability to substitute to nearby facilities to compensate for the lower quality of care delivered by bankrupt facilities.

References

Adelino, M., K. Lewellen, and W. B. McCartney. 2022. Hospital financial health and clinical choices: evidence from the financial crisis. *Management Science* 68:2098–119.

Adelino, M., K. Lewellen, and A. Sundaram. 2015. Investment decisions of nonprofit firms: Evidence from hospitals. *The Journal of Finance* 70:1583–628.

Agha, L., K. M. Ericson, K. H. Geissler, and J. B. Rebitzer. 2022. Team relationships and performance: Evidence from healthcare referral networks. *Management science* 68:3735–54.

Agha, L., B. Frandsen, and J. B. Rebitzer. 2019. Fragmented division of labor and healthcare costs: Evidence from moves across regions. *Journal of Public Economics* 169:144–59.

Aghamolla, C., P. Karaca-Mandic, X. Li, and R. T. Thakor. 2021. Merchants of death: The effect of credit supply shocks on hospital outcomes. Working Paper, National Bureau of Economic Research.

Antill, S. 2022. Do the right firms survive bankruptcy? *Journal of Financial Economics* 144:523–46.

Antill, S., and M. Hunter. 2021. Consumer choice and corporate bankruptcy. Working Paper, Harvard Business School.

Antwi, Y. A., and J. R. Bowblis. 2018. The impact of nurse turnover on quality of care and mortality in nursing homes: Evidence from the great recession. *American Journal of Health Economics* 4:131–63.

Araujo, A., R. Ferreira, S. Lagaras, F. Moraes, J. Ponticelli, and M. Tsoutsoura. 2021. The labor effects of pro-labor bias in bankruptcy. Working Paper, National Bureau of Economic Research.

Baghai, R. P., R. C. Silva, V. Thell, and V. Vig. 2021. Talent in distressed firms: Investigating the labor costs of financial distress. *The Journal of Finance* 76:2907–61.

Berk, J. B., R. Stanton, and J. Zechner. 2010. Human capital, bankruptcy, and capital structure. *The Journal of Finance* 65:891–926.

Brown, J., and D. A. Matsa. 2016. Boarding a sinking ship? an investigation of job applications to distressed firms. *The Journal of Finance* 71:507–50.

Callaway, B., and P. H. Sant'Anna. 2020. Difference-in-differences with multiple time periods. *Journal of Econometrics* .

Carter, M., and C. Phillips. 1988. Staff turnover as an indicator of quality of care in australian nursing homes -abstract. *Proceedings of the Annual Conference of the Australian Association of Gerontology* 23:100–.

Castle, N. G., and J. Engberg. 2005. Staff turnover and quality of care in nursing homes. *Medical Care* 43:616–26.

Castle, N. G., J. Engberg, and A. Men. 2007. Nursing Home Staff Turnover: Impact on Nursing Home Compare Quality Measures. *The Gerontologist* 47:650–61.

Centers for Medicare & Medicaid Services. 2019. CMS Improving Nursing Home Compare in April 2019.

Clarke, S. P., and N. E. Donaldson. 2008. Nurse Staffing and Patient Care Quality and Safety. In *Patient Safety and Quality: An Evidence-Based Handbook for Nurses*, Advances in Patient Safety, chap. 25. Rockville (MD): Agency for Healthcare Research and Quality (US).

Ellias, J. 2022. Employee bankruptcy trauma. Harvard Law School.

Falato, A., and N. Liang. 2016. Do creditor rights increase employment risk? evidence from loan covenants. *The Journal of Finance* 71:2545–90.

Friedrich, B. U., and M. B. Hackmann. 2021. The returns to nursing: Evidence from a parental-leave program. *The Review of Economic Studies* 88:2308–43.

Gaddis, S. M. 2018. *An introduction to audit studies in the social sciences*. Springer.

Gandhi, A., Y. Song, and P. Upadrashta. 2020. Have private equity owned nursing homes fared worse under covid-19? Working paper.

———. 2022. Private equity, consumers, and competition. Working paper.

Gandhi, A., H. Yu, and D. C. Grabowski. 2021. High nursing staff turnover in nursing homes offers important quality information. *Health Affairs* 40:384–91.

Gortmaker, J., J. Jeffers, and M. Lee. 2022. Labor reactions to credit deterioration: Evidence from linkedin activity. Working Paper.

Graham, J. R., H. Kim, S. Li, and J. Qiu. 2023. Employee costs of corporate bankruptcy. *The Journal of Finance* 78:2087–137.

Gupta, A., S. T. Howell, C. Yannelis, and A. Gupta. 2021. Does private equity investment in healthcare benefit patients? evidence from nursing homes. Working Paper 28474, National Bureau of Economic Research.

Harrington, C., J. F. Schnelle, M. McGregor, and S. F. Simmons. 2016. The Need for Higher Minimum Staffing Standards in U.S. Nursing Homes. *Health Services Insights* 9:13–9. ISSN 1178-6329. doi:10.4137/hsi.s38994.

Hortaçsu, A., G. Matvos, C. Shin, C. Syverson, and S. Venkataraman. 2011. Is an automaker's road to bankruptcy paved with customers' beliefs? *American Economic Review* 101:93–7.

Hortaçsu, A., G. Matvos, C. Syverson, and S. Venkataraman. 2013. Indirect costs of financial distress in durable goods industries: The case of auto manufacturers. *The Review of Financial Studies* 26:1248–90.

Liu, T. 2021. Bargaining with private equity: implications for hospital prices and patient welfare. *Available at SSRN 3896410* .

Loomer, L., D. C. Grabowski, H. Yu, and A. Gandhi. 2021. Association between nursing home staff turnover and infection control citations. *Health Services Research* n/a.

Matsa, D. A. 2011. Running on empty? financial leverage and product quality in the supermarket industry. *American Economic Journal: Microeconomics* 3:137–73.

Nyweide, D. J., D. L. Anthony, J. P. W. Bynum, R. L. Strawderman, W. B. Weeks, L. P. Casalino, and E. S. Fisher. 2013. Continuity of Care and the Risk of Preventable Hospitalization in Older Adults. *JAMA Internal Medicine* 173:1879–85.

Olenski, A. 2023. Reallocation and the (in)efficiency of exit in the u.s. nursing home industry. *working paper* .

Phillips, G., and G. Sertsios. 2013. How do firm financial conditions affect product quality and pricing? *Management Science* 59:1764–82. ISSN 00251909. doi:10.1287/mnsc.1120.1693.

Roberts, T., K. Nolet, and B. Bowers. 2013. Consistent Assignment of Nursing Staff to Residents in Nursing Homes: A Critical Review of Conceptual and Methodological Issues. *The Gerontologist* 55:434–47.

Sabety, A. 2023. The value of relationships in healthcare. *Journal of Public Economics* Revise and Resubmit.

Sabety, A. H., A. B. Jena, and M. L. Barnett. 2021. Changes in Health Care Use and Outcomes After Turnover in Primary Care. *JAMA Internal Medicine* 181:186–94.

Schwab, S. 2023. The value of specific information: Evidence from disruptions to the patient-physician relationship. *Management Science* Revise and Resubmit.

Soergel, A. 2020. Nursing homes are getting billions in covid aid – where is it going? *AARP* https://www.aarp.org/caregiving/health/info-2020/nursing-home-covid-federal-aid-transparency.html.

Sun, L., and S. Abraham. 2021. Estimating dynamic treatment effects in event studies with heterogeneous treatment effects. *Journal of Econometrics* 225:175–99. Themed Issue: Treatment Effect 1.

Thomas, K., R. Gebeloff, and J. Silver-Greenberg. 2021. Phony diagnoses hide high rates of drugging at nursing homes. *The New York Times* .

Wasson, J. H., A. E. Sauvigne, R. P. Mogielnicki, W. G. Frey, C. H. Sox, C. Gaudette, and A. Rockwell. 1984. Continuity of Outpatient Medical Care in Elderly Men: A Randomized Trial. *JAMA* 252:2413–7.

A Survey Appendix

A.1 Further Details

A.1.1 Stage 1: Effect of Tenure on Task Efficiency and Quality

The first stage of the experiment asks participants to report how long they believe it would take hypothetical nursing workers to perform tasks for a nursing home patient, as well as their belief of the likelihood of a bad outcome or mistake occurring during the task. There are three hypothetical patients, or three questions in this stage. All participants receive identical information about each patient's health condition.[27] The participant is asked to report how long they believe it would take him or herself to complete the task, a hypothetical nurse "Ms. Smith" with two years of experience to complete the task, and a hypothetical nurse "Ms. Williams" of either one year or one week of experience to complete the task. We randomly vary the experience level of Ms. Williams across these two conditions (one year or one week of experience) with equal probability.

Next, we show participants a list of potential adverse outcomes that can occur with the task at hand. Example adverse outcomes include incorrect taking of vital signs or forgetting to measure or mis-measuring weight. We then ask participants to report how likely they believe it is that an adverse outcome will occur, on a scale from 0 (no chance of occurring) to 100 (certain to occur), if the task is performed by him or herself, Ms. Smith, or Ms. Williams.

A.1.2 Stage 2: Effect of Bankruptcy on Job Search and Attrition

The second stage of the experiment randomizes the financial health of a hypothetical skilled nursing facility, "Facility A" and asks participants to respond to questions about the hypothetical scenario. The state in which the facility is located and the baseline wage that the participant is earning at the facility will match the participant's actual most recent experience working at a skilled nursing facility. We ask participants how likely he or she is to search for another job. We then ask participants to guess what percentage of workers they

[27] Note, we ask for each participant's job history and show patient information reflecting their previous experience: RN, CNA, or LPN. However, conditional on a job type (e.g., RN), all participants see the same hypothetical patient information. Our randomization of Ms. William's experience is independent of this.

think will voluntarily leave Facility A in the next year. Before answering these questions, the participant is presented with randomly assigned text describing the financial health of the facility across five conditions:

The control group is shown: Facility A's revenue is large enough to pay for both its operating expenses (e.g., wages) and other financial obligations (e.g., annual debt payments).

The "Distressed Profitable" treatment group is shown: Facility A's revenue is large enough to pay for its operating expenses (e.g., wages), but is not enough to also fully pay its other financial obligations (e.g., annual debt payments). Facility A has a 25% chance of filing for Chapter 11 bankruptcy in the next year.

The "Distressed" treatment group is shown: Facility A has a 25% chance of filing for Chapter 11 bankruptcy in the next year.

The "Bankrupt Profitable" treatment group is shown: Facility A's revenue is large enough to pay for its operating expenses (e.g., wages), but is not enough to also fully pay its other financial obligations (e.g., annual debt payments). While Facility A is currently open, it recently filed for Chapter 11 bankruptcy and is currently in bankruptcy proceedings.

The "Bankrupt" treatment group is shown: While Facility A is currently open, it recently filed for Chapter 11 bankruptcy and is currently in bankruptcy proceedings.

We randomly assign one-third of participants to the control group. We randomly assign the remaining participants with equal probability to one of the four treatment groups. We thus allocate participants as follows: Control, one-third; Distressed Profitable, one-sixth, Distressed, one-sixth, Bankrupt Profitable, one-sixth, Bankrupt, one-sixth.

Our main analysis groups together Bankrupt and Bankrupt Profitable: we let the indicator Bankrupt_i indicate whether a participant is in either of these two groups. Likewise, our main analysis groups together Distressed and Distressed Profitable: we let the indicator Distressed_i indicate whether a participant is in either of these two groups. In the Appendix, we explore separate indicators for the two variations of the bankrupt treatment and the two variations of the distressed treatment.

A.1.3 Sample Selection

We exclude individuals that fail attention checks. Additionally, we exclude individuals that have never worked in the healthcare industry at a skilled nursing facility as an RN, LPN,

or CNA. We also exclude participants who do any of the following: (i) report a probability above 100, (ii) report a time to complete a task above four hours, (iii) report a historical wage greater than $100 per hour, or (iv) give answers that are self-contradictory in the following manner: For each participant, we average their reported time for Ms. Williams to complete tasks across the three scenarios/patients. We do the same for Ms. Smith. At the end of the first stage of the survey, we ask participants whether, on average, they think Ms. Smith is slower than Ms. Williams, faster than Ms. Williams, or the same speed. If the answer to this question is not "same speed" and is inconsistent with the participant's reported times, we drop the participant. For example, we drop a participant if their average reported completion time for Ms. Williams is 45 minutes, their average reported time for Ms. Smith is 20 minutes, yet they say on average Ms. Williams is faster than Ms. Smith.

We apply the analogous filter for the reported likelihood of an adverse patient outcome or mistake. For example, we drop a participant if their average reported likelihood of a mistake is 50% for Ms. Williams and 25% for Ms. Smith, yet they say that Ms. Smith makes more mistakes.

A.2 Further Results

Table A1: Concerns Influencing Willingness to Work at Facility

	Bankrupt		Distressed		All Treated	
	mean	sd	mean	sd	mean	sd
SNF will close down	5.56	1.58	5.47	1.63	5.52	1.60
Sign of poor-quality SNF	4.80	1.50	4.88	1.54	4.84	1.51
SNF will reduce my wage	5.15	1.50	5.35	1.58	5.25	1.54
Will be unpleasant	5.06	1.44	4.87	1.70	4.97	1.57

Note. Participants in the treated groups rank four potential concerns about working at a bankrupt or distressed facility on the following scale from 7 to 1: strongly agree, agree, somewhat agree, neither agree nor disagree, somewhat disagree, disagree, and strongly agree. The full text of the four concerns are: (i) I am concerned that Facility A's financial problems will cause it to close down, forcing me to find another job. (ii) I am concerned that Facility A's financial problems are a sign of a poor-quality SNF. (iii) I am concerned that Facility A's financial problems will cause it to reduce my wage. (iv) I am concerned that Facility A's financial problems will make working there unpleasant.

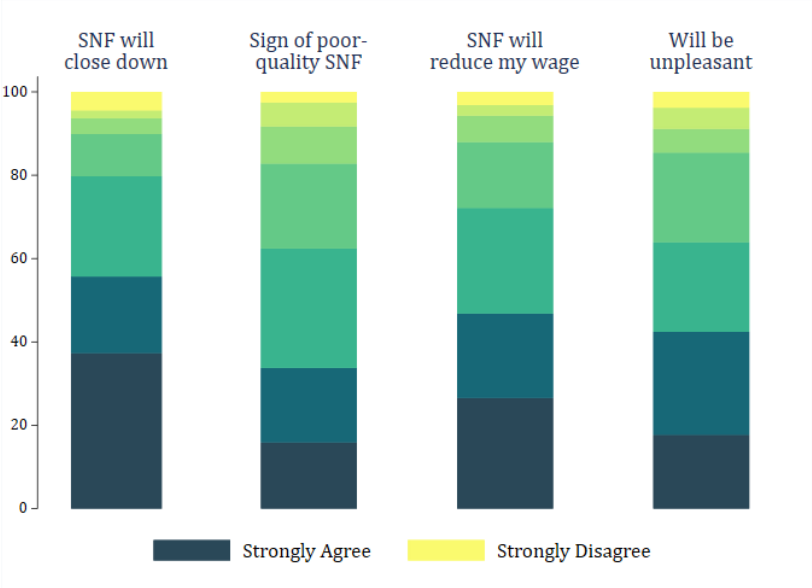


Figure A1: Concerns Influencing Willingness to Work at Facility

Note. Participants in the treated groups rank four potential concerns about working at a bankrupt or distressed facility on the following scale from 7 to 1: strongly agree, agree, somewhat agree, neither agree nor disagree, somewhat disagree, disagree, and strongly agree. The full text of the four concerns are: (i) I am concerned that Facility A's financial problems will cause it to close down, forcing me to find another job. (ii) I am concerned that Facility A's financial problems are a sign of a poor-quality SNF. (iii) I am concerned that Facility A's financial problems will cause it to reduce my wage. (iv) I am concerned that Facility A's financial problems will make working there unpleasant.

A.2.1 Concerns Influencing Willingness to Work: Participant Free-Text Responses

All responses have been kept in their original form, including spelling or grammatical errors. Responses are presented in descending order by length.

Summary. In the Bankrupt firm treatment group, most participants expressed in their own words concerns about either (i) job security and the potential of the facility closing down (ii) the facility's poor operational and financial management or (iii) concerns about wages, receiving pay, and benefits, with many participants expressing that they would certainly leave. Some participants also reported concerns regarding the uncertainty around the outcome of bankruptcy. Other participants expressed that the financial condition of the facility itself wasn't a direct consideration, but that their primary concern was the facility being short-staffed. Many participants specifically reported concerns about the consequences of other workers leaving (e.g., on team dynamics), and particularly that the loss of experienced workers meant that those who remained would be left to train new hires and become overworked. A number of participants emphasized the importance of their relationships with the facility's residents.

Many participants in the Distressed firm treatment group expressed concerns about wages, with some stating that so long as the facility provided adequate pay, the firm's financial distress would not cause them to search. Some participants also reported concerns about the possibility that the facility would shut down. Meanwhile, others expressed that a 25% chance of bankruptcy was not high enough to leave, and that they would not search for a new job until problems started occurring. Many expressed loyalty to their residents and the importance of patient care regardless of the facility's financials.

Bankrupt Group

- Any job I work is based on financial needs and passion. I have a passion for caring for others and certainly would feel sympathetic to the faculty and patients, however in the end, I have a family to care for and bills that have to be paid. A good raise would certainly extend my stay, and possibly less than $5 raise would be considered, but ultimately, it would be a see and tell situation. Even with a raise, I would likely be looking around elsewhere for a backup plan.
- Just because they have financial problems does not mean that it was a bad facility. It does not mean that the workers are not dependable and good workers. It does not mean that the residents are bad. Some companies just go through financial hardships and they work their way out of it. I would give a chance to see if that would happen before I would leave if I enjoyed my job my coworkers and enjoyed working with the residents

- Facility A clearly has serious challenges with management - either someone is making bad financial decisions, overhead is too high or patient selection is ineffective. Since they've already filed for bankruptcy, the writing is on the wall with this facility and I wouldn't stick around to find out how quickly the doors will close.
- If I chose to stay it would be hard because during bankruptcy so many things could happen and leave you with no job and a roof over your head. If I would stay they would have to offer me a significant amount of money and the residents would have to be so very special that I didn't want to go
- With this type of news, filing for chapter 11, it's highly unlikely I would remain. I don't see much influence for me to stay. I may show up one day and the doors are locked. I can't have that happen so to be proactive and initiate another job, is in my best interest.
- finding a position elsewhere if facility A closes, would want to locate a position just in case. would like to know if there are any potential buyers for the facility and who they are, past facilities and their success in business, ratings, etc.
- For a nursing facility to file for bankruptcy or have any type of financial troubles is an immediate red flag. It could mean poor leadership or weak business management. I would have no interest in working for any company like that
- with increased costs of operating any healthcare facility now, I do not see financials as the biggest factor in people leaving. I think worker shortage and lack of teamwork as a bigger factor for people leaving the work place.
- It depends on the amount of time I've put in for work at the facility and how close I am with the residents. It's hard to leave a facility once you've been there for so long
- I would not leave a facility just because it filed for bankruptcy. I evaluate the facility on the quality of care and the teamwork ability of the employees.
- They have been good to me so I would be reluctant to look for a nother job because you form a relationship with your coworkers and become like family
- If Facility A goes bankrupt, I'm for sure without a job, and even though the hourly wage is good, I'd rather not have to worry about losing my job.
- North Carolina's minimum wage is awful as it is but being a CNA and the pay is even not worth being one. Been ready to leave this job long ago
- If unable to manage finances how are they able to properly manage everything else that is required for a facility to be ran safely.
- If finances are in trouble supplies may be inadequate. Staffing is likely to be the legal minimum leaving an impossible workload.
- The possibility of it closing down due to it's financial problems and then I would have to search for a job anyway
- im afraid they will cut the amount of workers they use to save money and they will be overworked and short staffed
- I would work at Facility A if the pay is good and that it would help me pay anything like rent or something else.
- I'd be afraid the experienced workers would find other jobs and we would be training mostly brand new employees.
- My concern would be that there would not be enough supplies to maintain adequate care needed for the residents.

- Cause the money is there to pay the wages and alit of facilities have problems but there not always on going
- The residents that live there are a joy to work with as well as my coworkers and the hourly pay is decent.
- Read all the responses above. This is not a surprise in the healthcare field. Let alone in ALF's or SNF's
- They may not tell people they are losing their jobs until the last minute to prevent them from quitting.
- Not receiving paycheck on time. Not receiving enough hours. Not receiving any health benefits.
- If they can't afford or manage the money to run a skilled place how will I know I can get paid
- Loyalty to staff, management and clients. I can always (later) find another job in nursing.
- The patients or residents are not getting the proper care they need due to short staffing
- I would be fearful of losing my employment there. I need health benefits for my children.
- I enjoy my job, co-workers, and residents I would stick by them as long as I could
- To try and make the situation better, but if they bankrupt I would not stay
- Would want to see if someone would buy the Facility and turn things around
- That the residents living there will always need help with daily living.
- I love my job my clients and workers I've been with them for 8 years
- Being unsure of the potential outcome once bankruptcy is completed.
- That the facility is filing bankruptcy and possibly closing down.
- The residents in the facility still need to be taken care of
- The residents and the relationships I get to build there.
- Just the overall treatment of workers and also the wages
- for the care of the residents that you become bonded to
- The patients that you grow close to and need good care
- I would willingly stay if I was promised an incentive.
- Job security, financial security, and quality of care.
- I hope I can contribute to making it a better place
- It may be that there is poor leadership at the top?
- The supplies and staff needed to provide good care
- The residents still need people to care for them.
- It is having financal issues and could shut down.
- I feel that they will cut my hours and pay rate.
- i have no concerns at this time for facility A
- None because they are having financial issues
- Closeness to home, relationships to coworkers
- Concern for the residents care and wellbeing

- Loyalty. And tonprovide good patient care
- Instability and fear of financial worries
- concerned they would cut down on staff
- I love the people and co workers there
- Not finding someone who truly cares
- The residents still need help
- Better pay better faciliry
- Starting over at a new job
- To stay for the residents
- The residents and staff.
- Getting a pay check
- Fear of losing job
- That there closing
- Chance of closing
- I love the work
- The atability
- Wage per hour
- Nothing much
- I don't know
- Higher wage
- No concerns
- Nothing
- Finance
- The pay
- Wages
- N/a
- B

Distressed Group

- Jobs for nurses are a dime a dozen. I will not stay at a facility that is financially unstable - unless they are paying me so much that I couldn't possibly leave. Even then, my attitude would suck and I'd view it as a short-term position until the facility failed.
- I have concerns that it may have to close down leaving me without a job. I am also concerned that it will cause stress in our working environment which isn't fair to the residents if we cannot do our jobs properly.

- For me to work at a nursing home first and foremost the patients have to be well cared for they must always be number one priority. Next the past must be decent and comparable to other facilities in the area.
- If I was assured the facility would be able to keep the doors open, and that wages and benefits are still being paid. I would also worry about shortcuts being taken with patient care and medical supplies.
- The location and distance between work and home. Flexibility and benefits. Opportunities for advancement. Positive staff/resident and work environment and good working relationships
- As long as they don't start making shortcuts to patient care I'm good. When staff cuts, lack of supplies, crappy food trays, etc start happening I am gone no matter what the pay!
- I would want to make certain My wages would not decrease and conditions are good to work in. I also make definitely sure that we would have enough help for the residents
- My main concern is the facility may not be fully forthcoming and things may be worse than suspected. It is possible I shoe up to work one day and the door is locked.
- If it's going under chances are management is going to treat the employees bad and residents will feel that and they'll become hostile especially memory care
- Patients still need care no matter if the facility declares bankruptcy or not. If to many workers leave, the patients don't receive the care that is needed.
- The bankruptcy issue therefore that would affect my pay eventually and then closing down so then I will that will leave me with not having a job
- Because it's only a 25 percent chance of filling for bankruptcy. So there's still a very good chance of 75 percent that it won't happen.
- My concerns would be having to drive a distance for another job as well as the bond that I have with the residents at the facility.
- I don't understand. Why would concerns influence me to work at this facility. Wouldn't concerns cause me to leave?
- Relationship with residents and staff. May be convenient to my home. Knowing the systems in that facility.
- The pay rate and the fact that it's only a 25
- There's only a 25
- Being afraid of a pay cut in order for them to obtain their own bills or a potential shutdown
- Job security and the possible reduced level of care as a result of poor financial management.
- I don't like to change jobs frequently... Prefer to establish trust with patients in a SNF.
- The people I work with, the nurse patient ratio, the type of duties I need to perforn
- Once my hourly wage was raised I didn't have any concerns with staying at facility A.
- reduced wages, unpleasant working environment, decrease in quality of care provided
- It might b a decent place to work but it wouldnt pay as much as other better places
- How well it works for the client and how well they at and train the new employees
- I would be concerned that they may be closed down if they can't pay their bills.
- Residents not receiving proper care and employees being overworked and underpaid
- I would work there until problems start occurring then I would find another job

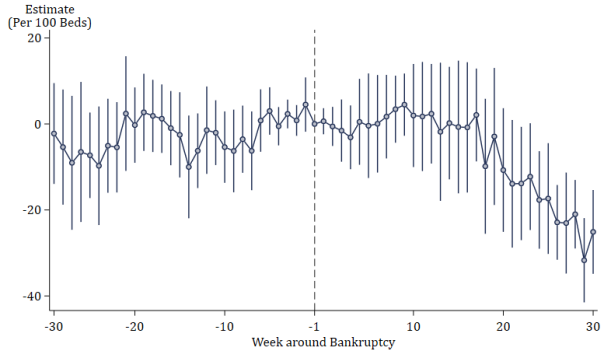
- The money in working in that facility. Having the help they truly need for it.
- I'm afraid they try to cut down expenses and doing that make my work harder
- The residents still need help regardless if they are closing soon or not
- I don't want to suddenly be without a job or with a very diminishes wage
- Feeling of helping people. Making a positive impact on people lives
- Low pay & possible bankruptcy percentage increase in upcoming years.
- It pays good and the fact I just love taking care of residents
- Not much they don't seem like the greatest company to work for
- The money bit of they are in financial trouble I'm leaving
- I care about the patients on my unit and my coworkers.
- I want to stick out out but not otf they can't pay me
- Loyalty and waiting to see what the outcome would be
- If they pay more I would definitely work with them
- Not sure I would stay, depends on circumstances
- I lovw the job and the people i work with
- Their financial situation is a red flag
- The fact they are in financial trouble.
- Worried about the system shutting down.
- They have patients who need cared for
- Not enough staff, not enough supplies
- The facility going into bankruptcy
- Good facility and work environment
- financial status and job stability
- The need of care for the patients
- 25
- I would stay for the residents.
- They seemed very promising.
- It's a lot going on their.
- No other options available
- The care of the residents
- Their financial problems
- The care of the patients
- Care of the patients
- Everyone needs help
- It was close by

- Needed income
- pay my bills
- Nothing
- Unsure
- Shift
- N/a

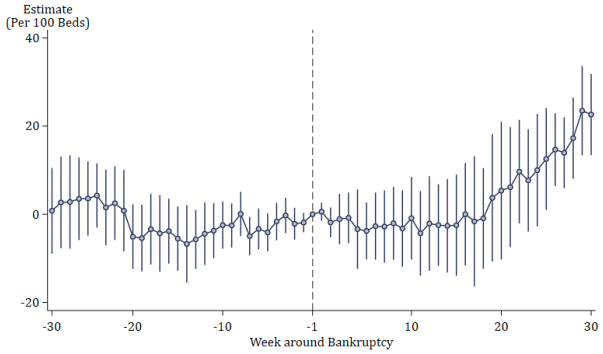
B Staffing Analysis Appendix

B.1 Tenure Figures for each Nursing Staff Role

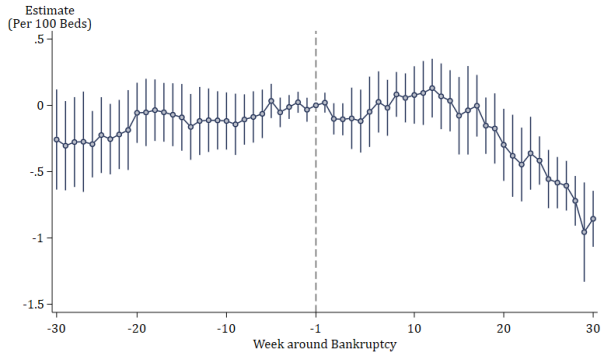
Figure B1: Dynamic Effects of Bankruptcy on Registered Nurse (RN) Staffing Tenure



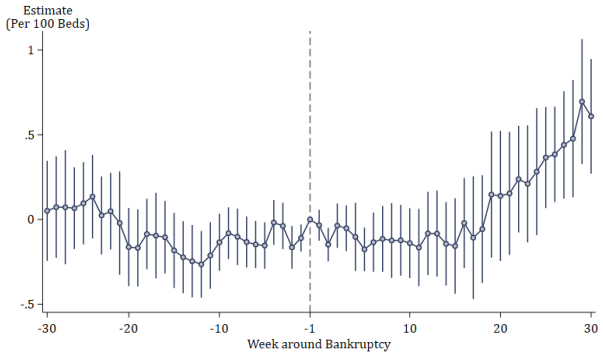
(a) ≥ 60 Days Tenure RN Hours



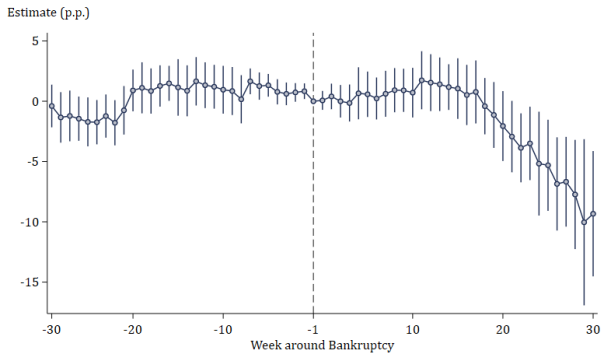
(b) < 60 Days Tenure RN Hours



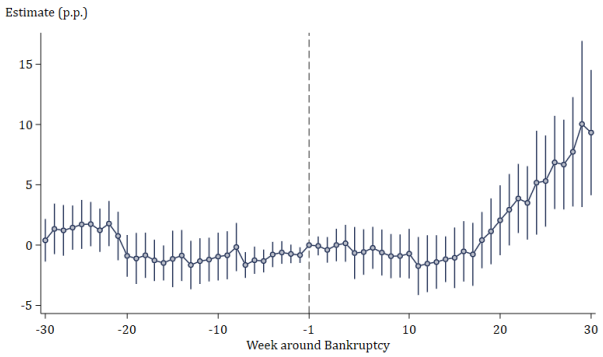
(c) ≥ 60 Days Tenure RNs



(d) < 60 Days Tenure RNs



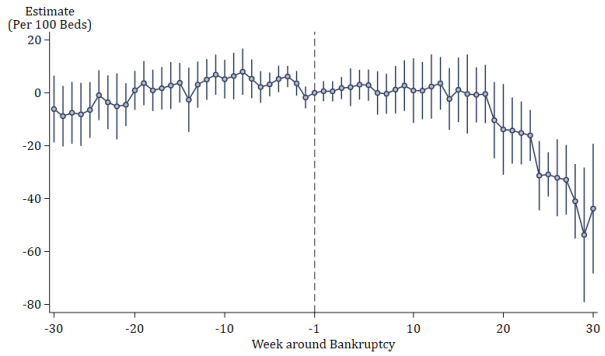
(e) ≥ 60 Days Tenure Hour Share



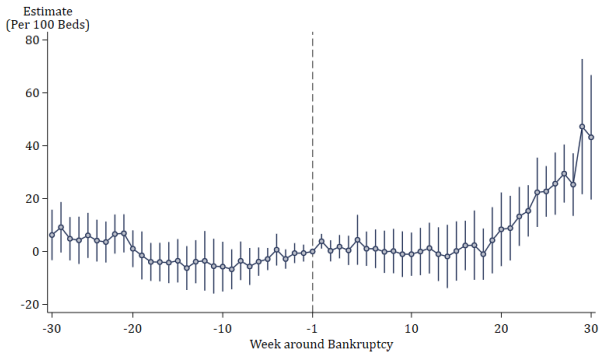
(f) < 60 Days Tenure Hour Share

Note. This figure examines staffing by workers of different experience levels. The left panel shows total weekly (per 100 beds) RNs with at least 60 days of experience at the facility. The right panel shows total weekly (per 100 beds) RNs with fewer than 60 days of experience at the facility. Standard errors are two-way clustered by week and chain-year pairs, and 95% confidence intervals are shown.

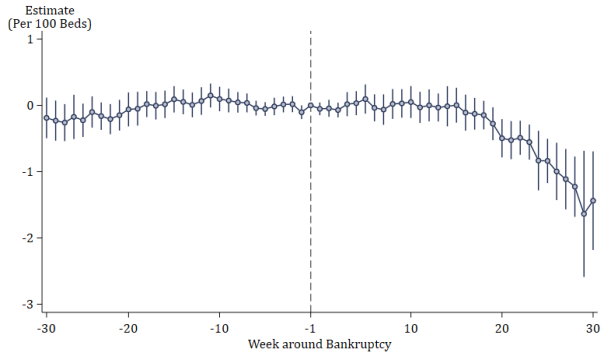
Figure B2: Dynamic Effects of Bankruptcy on Licensed Practical Nurse (LPN) Staffing Tenure



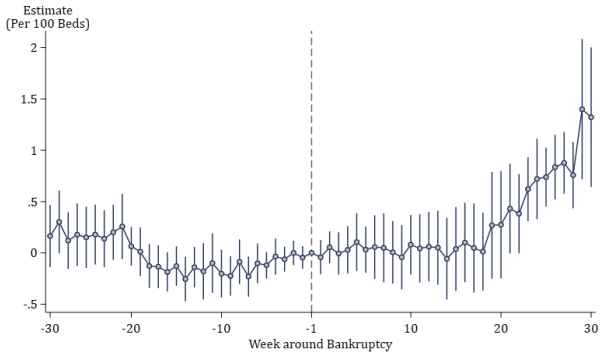
(a) ≥ 60 Days Tenure LPN Hours



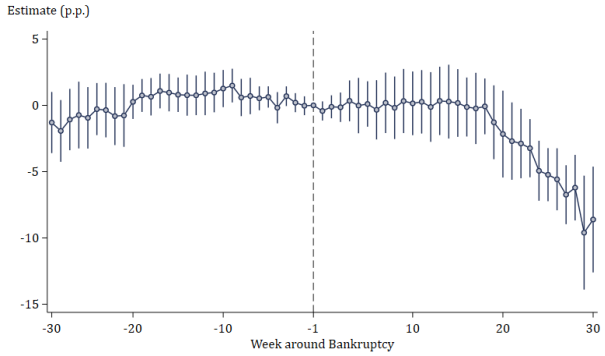
(b) < 60 Days Tenure LPN Hours



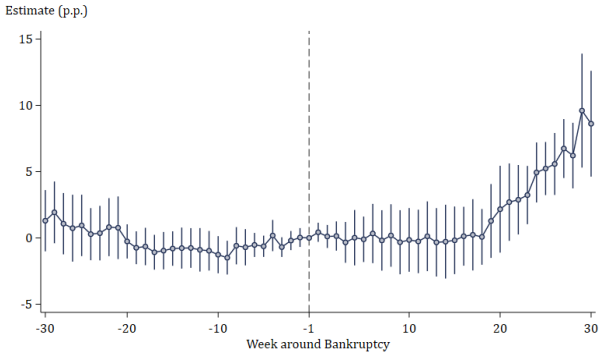
(c) ≥ 60 Days Tenure LPNs



(d) < 60 Days Tenure LPNs



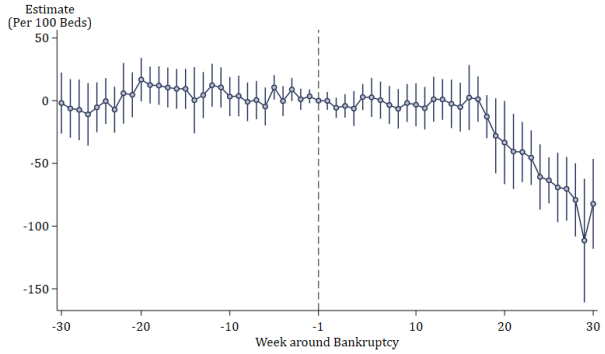
(e) ≥ 60 Days Tenure Hour Share



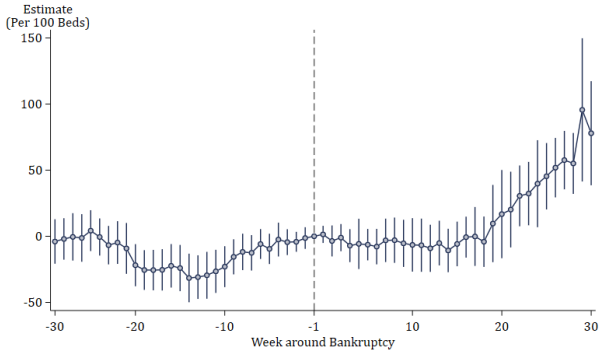
(f) < 60 Days Tenure Hour Share

Note. This figure examines staffing by workers of different experience levels. The left panel shows total weekly (per 100 beds) LPNs with at least 60 days of experience at the facility. The right panel shows total weekly (per 100 beds) LPNs with fewer than 60 days of experience at the facility. Standard errors are two-way clustered by week and chain-year pairs, and 95% confidence intervals are shown.

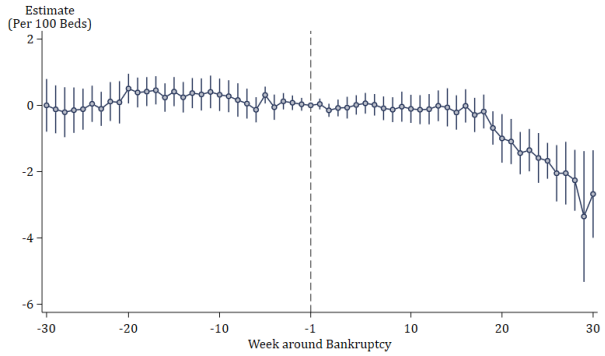
Figure B3: Dynamic Effects of Bankruptcy on Certified Nursing Assistant (CNA) Staffing Tenure



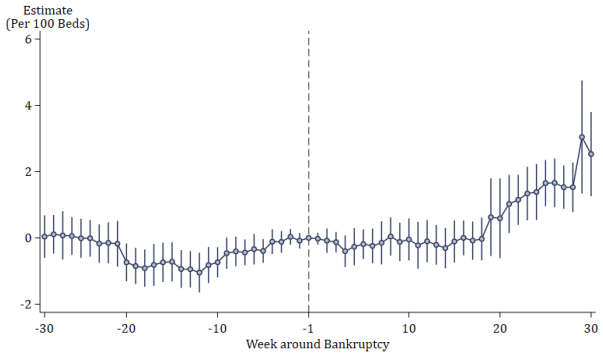
(a) $\geq$ 60 Days Tenure CNA Hours



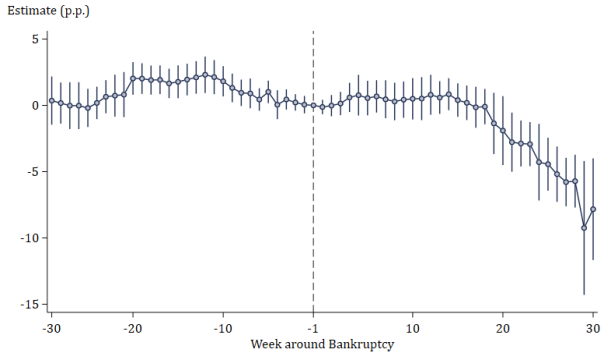
(b) $<$ 60 Days Tenure CNA Hours



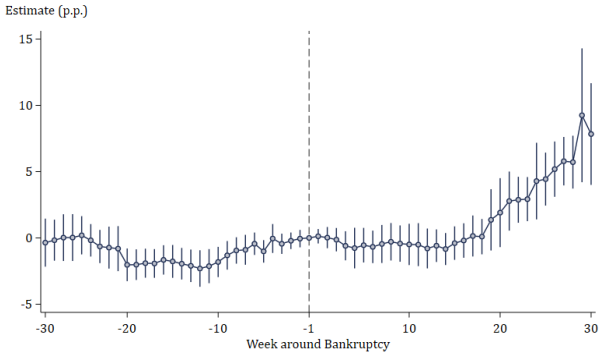
(c) $\geq$ 60 Days Tenure CNAs



(d) $<$ 60 Days Tenure CNAs



(e) $\geq$ 60 Days Tenure Hour Share



(f) $<$ 60 Days Tenure Hour Share

Note. This figure examines staffing by workers of different experience levels. The left panel shows total weekly (per 100 beds) CNAs with at least 60 days of experience at the facility. The right panel shows total weekly (per 100 beds) CNAs with fewer than 60 days of experience at the facility. Standard errors are two-way clustered by week and chain-year pairs, and 95% confidence intervals are shown.

B.2 Staffing Levels and Wages

Table B1: The Effect of Bankruptcy on Staffing Levels by Nursing Role

	RN		LPN		CNA	
	Hours	Hour Share	Hours	Hour Share	Hours	Hour Share
$0 \leq t \leq 30$	0.567	0.257	-1.945	-0.026	0.152	-0.231
	(3.651)	(0.189)	(2.792)	(0.136)	(5.425)	(0.144)
$t \geq 31$	-11.252	-0.024	-4.546	0.034	-7.124	-0.010
	(9.739)	(0.442)	(4.385)	(0.312)	(8.515)	(0.227)
FE: Week×Match Group	Yes	Yes	Yes	Yes	Yes	Yes
FE: Facility	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.90	0.74	0.86	0.80	0.87	0.68
Mean	330.99	16.27	478.40	23.67	1,239.72	60.06
Observations	521,594	521,594	521,594	521,594	521,594	521,594

Note. The dependent variables from left to right are: total weekly hours per 100 beds, total number of employees working at the facility in a given week per 100 beds, total weekly patient occupancy (resident-days), hours per patient week, weekly new workers per 100 beds, and weekly exits per 100 beds. The results are shown for all nursing staff. Each observation is a facility-week. Standard errors are provided in parentheses and are clustered by nursing home chain. Significance at the 10%, 5%, and 1% level are indicated using *, **, and ***, respectively.

Table B2: The Effect of Bankruptcy on Nursing Staff Wages

	All Nurses	RN	LPN	CNA
Bankrupt	0.756**	2.807**	-0.044	-0.003
	(0.305)	(1.352)	(0.626)	(0.253)
FE: Year	Yes	Yes	Yes	Yes
FE: Facility	Yes	Yes	Yes	Yes
Observations	4,217	4,217	4,217	4,217
R^2	0.81	0.67	0.77	0.81
Mean	21.45	36.64	27.97	15.56
Std. Dev	4.47	7.40	5.56	3.54

Note. The dependent variables are average hourly wages by nursing staff type. Each observation is an annual filing in the Healthcare Cost Report Information System (HCRIS). Standard errors are provided in parentheses and are clustered by nursing home chain. Significance at the 10%, 5%, and 1% level are indicated using *, **, and ***, respectively.

Table B3: The Effect of Bankruptcy on Nursing Staff Wages (Logs)

	All Nurses	RN	LPN	CNA
Bankrupt	0.031**	0.069*	-0.004	-0.007
	(0.015)	(0.035)	(0.021)	(0.017)
FE: Year	Yes	Yes	Yes	Yes
FE: Facility	Yes	Yes	Yes	Yes
Observations	4,217	4,217	4,217	4,217
R^2	0.82	0.70	0.77	0.82
Mean	3.05	3.58	3.31	2.72
Std. Dev	0.20	0.19	0.19	0.21

Note. The dependent variables are the natural log of average hourly wages by nursing staff type. Each observation is an annual filing in the Healthcare Cost Report Information System (HCRIS). Standard errors are provided in parentheses and are clustered by nursing home chain. Significance at the 10%, 5%, and 1% level are indicated using *, **, and ***, respectively.

B.3 Robustness: Alternative Definitions of Low Tenure

This section demonstrates the robustness of our tenure result to alternative tenure definitions. The main text presents results in which low-tenure staff are defined as those that have worked fewer than 60 days at the facility, as this is approximately the 25th percentile of employee tenure of 59 days. Table B4 shows the results hold with alternative tenure cutoffs of 30 days and 90 days.

Table B4: Robustness: The Effect of Bankruptcy on the Tenure of Nursing Staff

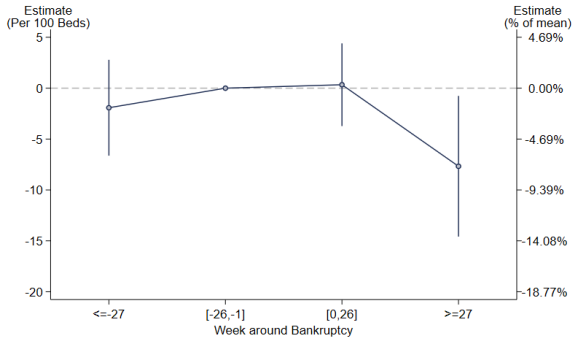
	$\geq$ 30 Days Tenure			$<$ 30 Days Tenure		
	Hours	Hour share	Employees	Hours	Hour share	Employees
$0 \leq t \leq 30$	-31.203***	-1.726***	-1.022***	29.820***	1.726***	1.091***
	(11.700)	(0.336)	(0.336)	(7.315)	(0.336)	(0.272)
$t \geq 31$	-86.304***	-3.725***	-3.006***	63.832***	3.725***	2.265***
	(18.938)	(1.353)	(0.580)	(22.708)	(1.353)	(0.762)
FE: Week×Match Group	Yes	Yes	Yes	Yes	Yes	Yes
FE: Facility	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.84	0.36	0.85	0.37	0.36	0.47
Mean	1,841.33	89.35	54.31	209.89	10.65	8.92
Observations	482,316	482,316	482,316	482,316	482,316	482,316

	$\geq$ 90 Days Tenure			$<$ 90 Days Tenure		
	Hours	Hour share	Employees	Hours	Hour share	Employees
$0 \leq t \leq 30$	-47.040***	-2.408***	-1.273***	45.133***	2.408***	1.303***
	(16.341)	(0.662)	(0.483)	(12.416)	(0.662)	(0.396)
$t \geq 31$	-190.621***	-9.591***	-5.895***	168.917***	9.591***	5.189***
	(46.448)	(3.268)	(1.407)	(54.558)	(3.268)	(1.670)
FE: Week×Match Group	Yes	Yes	Yes	Yes	Yes	Yes
FE: Facility	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.80	0.63	0.81	0.63	0.63	0.66
Mean	1,472.59	71.04	42.08	578.93	28.96	21.14
Observations	482,316	482,316	482,316	482,316	482,316	482,316

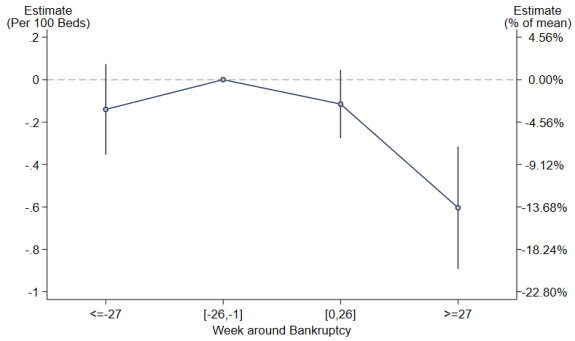
Note. This table examines staffing by workers of different experience levels, measured in days. The dependent variable Hours represents weekly hours per 100 beds. The dependent variable Hour Share represents share of total weekly hours. The dependent variable Employees represents number of working employees per 100 beds. The results are shown for all nursing staff. Each observation is a facility-week. Standard errors are provided in parentheses and are clustered by nursing home chain. Significance at the 10%, 5%, and 1% level are indicated using *, **, and ***, respectively.

B.4 Occupational and Physical Therapists

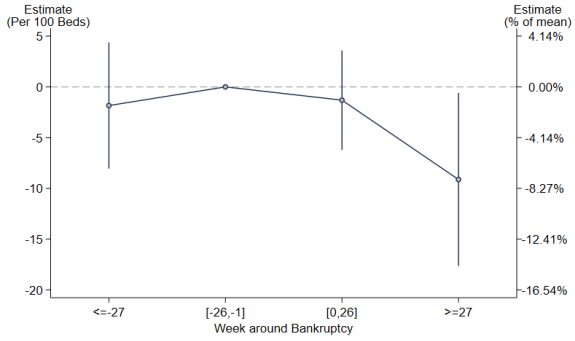
Figure B4: Dynamic Effects of Bankruptcy on Occupational Therapist (OT) and Physical Therapist (PT) Staffing



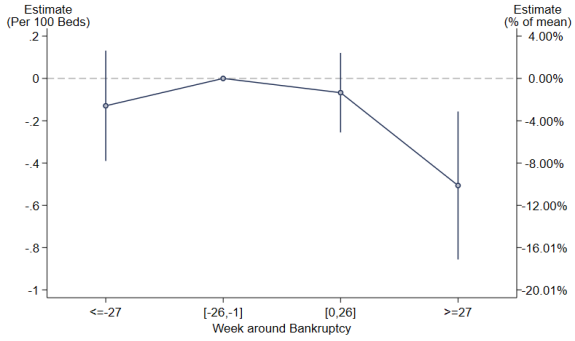
(a) Hours per 100 Beds, OT



(b) Workers per 100 Beds, OT



(c) Hours per 100 Beds, PT



(d) Workers per 100 Beds, PT

Table B5: The Effect of Bankruptcy on the Tenure of Occupational Therapists

Occupational Therapists

	≥ 60 Days Tenure			< 60 Days Tenure		
	Hours	Hour share	Employees	Hours	Hour share	Employees
$0 \leq t \leq 26$	-0.763	-1.255	0.040	1.718	1.255	-0.132
	(2.366)	(2.417)	(0.071)	(1.993)	(2.417)	(0.087)
$t \geq 27$	-7.097**	-2.683	-0.242**	1.904	2.683	-0.276**
	(3.547)	(3.747)	(0.122)	(3.237)	(3.747)	(0.134)
FE: Week	Yes	Yes	Yes	Yes	Yes	Yes
FE: Facility	Yes	Yes	Yes	Yes	Yes	Yes
Week Clusters	169	169	169	169	169	169
Chain × Year	182	168	182	182	168	182
R^2	0.73	0.24	0.69	0.20	0.24	0.28
Mean	81.54	74.45	2.78	24.99	25.55	1.60
Observations	84,670	78,282	84,670	84,670	78,282	84,670

Physical Therapists

	≥ 60 Days Tenure			< 60 Days Tenure		
	Hours	Hour share	Employees	Hours	Hour share	Employees
$0 \leq t \leq 26$	-2.307	-1.765	0.006	1.995	1.765	-0.037
	(2.432)	(1.949)	(0.079)	(1.903)	(1.949)	(0.083)
$t \geq 27$	-10.514**	-4.111	-0.378**	4.641	4.111	-0.017
	(4.481)	(3.658)	(0.156)	(3.827)	(3.658)	(0.161)
FE: Week	Yes	Yes	Yes	Yes	Yes	Yes
FE: Facility	Yes	Yes	Yes	Yes	Yes	Yes
Week Clusters	169	169	169	169	169	169
Chain × Year	182	169	182	182	169	182
R^2	0.72	0.24	0.69	0.22	0.24	0.34
Mean	92.38	74.33	3.17	28.52	25.67	1.83
Observations	84,670	78,345	84,670	84,670	78,345	84,670

Note. This table examines staffing by workers of different experience levels, measured in days. The dependent variable Hours represents weekly hours per 100 beds. The dependent variable Hour Share represents share of total weekly hours. The dependent variable Employees represents number of working employees per 100 beds. Each observation is a facility-week. Standard errors are provided in parentheses and are clustered by nursing home chain. Significance at the 10%, 5%, and 1% level are indicated using *, **, and ***, respectively.

B.5 Correlation between Firm-Specific and Industry Tenure

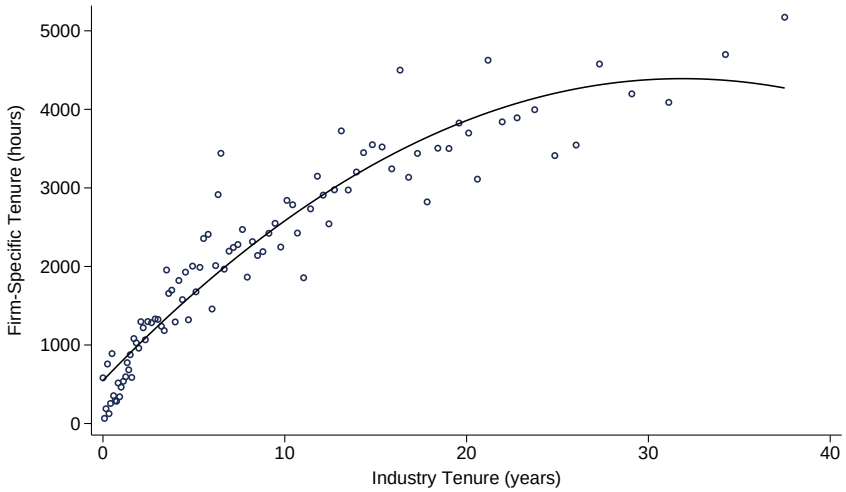


Figure B5: Firm-Specific and Industry Tenure for CNAs in Illinois (from Gandhi, Olenski, Ruffini, and Shen (2023)

Note. This figure demonstrates the relationship between firm-specific tenure in PBJ and self-certified lifetime experience of CNAs. The data are from 2022. The CNA experience data were collected for an Medicaid reimbursement reform in Illinois intended to incentivize facilities to employ experienced CNAs.

C Facility Closures and Changes in Ownership

This paper studies the effects of bankruptcy on employees and patients. In doing so we focus on Chapter 11 reorganizations, during which debtors continue to operate while bankruptcy proceedings take place. However, it is possible for firms to shut down as a result of the restructuring even after filing for Chapter 11.

While one way to detect closures might be to observe conversions to Chaper 7 liquidation, this method might underestimate closures since liquidations can also occur in Chapter 11. Instead, we detect closures by observing attrition from the operations data. Since not all facilities were required to submit staffing data in 2020Q1 due to COVID-19, we count attrition up to 2019. We find that a small percentage of facilities close during the sample period. Specifically, 6% of facilities (34 total) have Payroll Based Journal (PBJ) staffing data that end sometime before the last week of 2019.

Most commonly, providers continue operating after filing for Chapter 11 bankruptcy. However, we do observe a small increase in ownership changes after bankruptcy. We investigate this by obtaining the ownership files from CMS, which track the owners of each facility over time. Figure C1 provides the empirical distribution of ownership changes during the sample period. The majority of facilities do not change ownership at all, and close to 30% of facilities undergo a complete (100%) change in ownership.

We formally investigate ownership changes around bankruptcy through a difference-in-differences analysis of monthly percent ownership changes at the facility level. The dynamic event study of Figure C2 shows a delayed increase in ownership changes, with a noticeable five percentage point average effect at eight months post-filing. This delay seems reasonable given that bankruptcy proceedings take time.

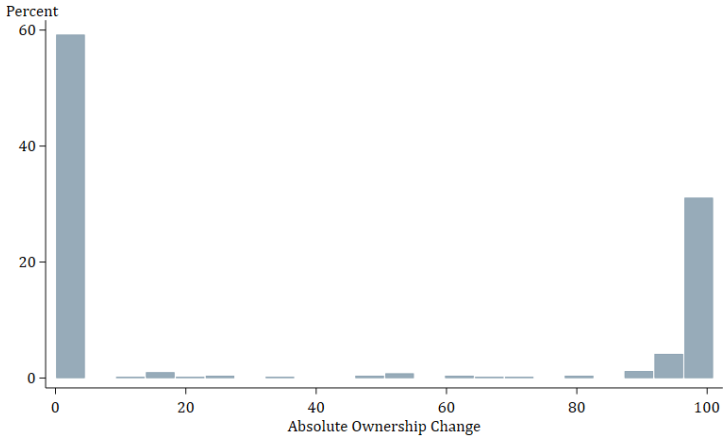


Figure C1: Empirical Ownership Change Distribution

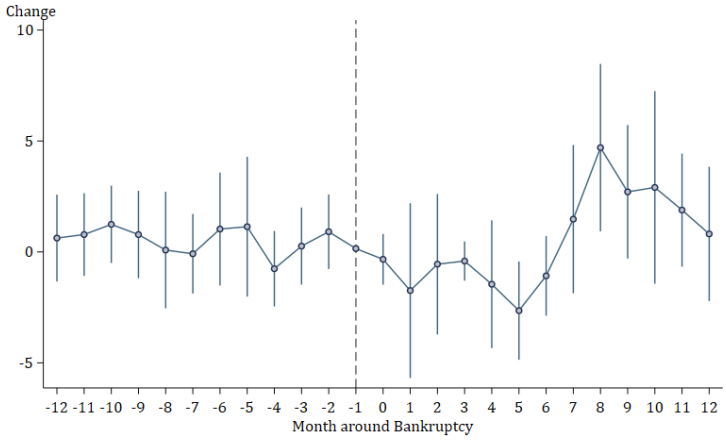


Figure C2: Dynamic Estimates of Ownership Change around Bankruptcy

D Data Appendix

D.1 Matching Bankruptcies to SNFs

We begin with the universe of corporate Chapter 11 bankruptcy filings over the period from January 1, 2010 to March 31, 2020. We exclude the period before 2010 due to data limitations. We exclude the period after March 2020 to avoid COVID-driven bankruptcies. We focus on Chapter 11 bankruptcies because Chapter 7 cases lead to 100% employee attrition by definition. We collect 66,121 corporate Chapter 11 bankruptcies over this period from Bankruptcydata.com.

We exclude a small fraction of bankruptcies in which the EIN is missing or a unique case identifier is not provided. This leaves us with 59,266 bankruptcies. We focus on the first filing date for any EIN to avoid studying refilings, in which employees may already be primed by the earlier bankruptcy. This excludes 4,000 bankruptcies, leaving us with 55,266 bankruptcies.

We then merge these bankruptcies to NPIs using a map provided by CMS. The map from CMS has the EIN for every type-2 provider (e.g., business) with an NPI. In some instances, the map also has the EIN of the parent company of the provider. Finally, the map sometimes contains historical EINs or parent EINs for NPIs that have changed their EIN or parent EIN over time. We focus attention on NPIs associated with SNFs. To do this, we first merge our CMS-provided map with a list of all NPIs associated with SNFs in the Minimum Data Set (MDS).

We match bankruptcies to SNF NPIs by EIN in steps. Specifically, we order EINs in the CMS-provided map as follows: 1. current EIN; 2. current parent EIN; 3. historical EINs, going from most recent to least recent; 4. historical parent EINs, going from most recent to least recent. We match NPIs to bankruptcies using the first EIN in this ranking, the current EIN. For NPIs that do not match any bankruptcy by this step, we match those NPIs to bankruptcies by the second EIN in the ranking (parent EIN). We repeat this process moving down the above ordering. In each step, we match the following number of NPIs: 1. 535 NPIs match by current EIN; 19 NPIs match by current parent EIN; 48 NPIs match by historical EIN; 1 NPI matches by historical parent EIN. We thus match 603 NPIs by EIN.

Our list of SNF-associated NPIs also includes all provider IDs, the identifier from the POS and PBJ datasets, associated with each NPI. In instances where multiple provider-ids

are associated with an NPI, we manually check that the addresses and names match in the NPPES and POS databases. We exclude a small handful of incorrect NPI - provider ID associations in which the names and addresses do not match, likely due to a typo when the healthcare provider inputted the provider ID. This process identifies 568 provider IDs associated with the 603 NPIs that we match to bankruptcies.[28]

Next, we group together jointly administered bankruptcy cases. For jointly administered cases, Bankruptcydata.com has a variable indicating the name of the lead case. We call two bankruptcies jointly administered if they have the same value for the lead case. Likewise, the Federal Judicial Center (FJC) database has a coded variable identifying the lead case for any jointly administered case. We supplement the Bankruptcydata.com lead-case classification with the FJC lead-case classification. In instances where there is a conflict, we resolve the conflict by checking PACER. Specifically, when we are unsure what the lead case is for a particular bankruptcy, we go to the PACER page for that bankruptcy and check either the list of associated cases or motions for joint administration or the filing petition to find the full set of cases that are jointly administered in that case. Within a collection of jointly administered cases, we rely on the same method to determine which is the lead case. Finally, we manually inspect the final set of bankruptcies to ensure that Bankruptcydata.com and FJC do not miss any instances in which two cases are jointly administered. This involves checking cases filed in the same court with similar filing dates or similar names, then going to PACER and verifying the set of jointly administered cases by the same method described above. Within a set of jointly administered cases, we define the filing date as the earliest filing date of any of the jointly administered cases. In most instances, all jointly administered cases share the same filing date.

We then verify that each NPI is associated with at most one collection of jointly administered bankruptcies. This process reveals that one chain, Bloomfield Nursing Operations, sold off all of its facilities to Preferred Care (a chain that later filed for bankruptcy) prior to Bloomfield's bankruptcy. We thus drop the Bloomfield Nursing bankruptcy. Likewise, we confirm that each facility was not involved in an earlier bankruptcy under a different lead case. This leads to a slightly lower number of NPIs.

Next, we go through large bankruptcies to ensure we did not miss anything. In some cases, a large bankrupt firm will have many subsidiaries, each of which file their own bankruptcy

[28]Sometimes a provider ID will have two NPIs associated with it in the NPPES. We verify that these two NPIs have the same name and address. Likewise, sometimes an NPI will have two provider IDs associated with it. We verify that these two provider IDs have the same name and address.

with their own EIN. In such cases, our EIN merge will correctly assign the subsidiaries' facilities to the large bankrupt firm. However, in other cases, a large bankrupt firm will operate many facilities itself. In these instances, if the parent EIN field is missing for the individual facilities, we could miss some facilities. To check for this, we manually inspect all of the 55,266 bankruptcies in Bankruptcydata.com that (i) list healthcare as their industry and (ii) have at least 100 million in liabilities. Using company descriptions from Bankruptcydata.com, first-day declarations, disclosure statements, and reorganization plans, we determine which of these companies operate SNFs. For the companies that operate SNFs, we use a combination of these same bankruptcy documents and SEC filings to locate the names and addresses of their facilities. For example, for HCR Manorcare, we use the master lease agreement to identify names and addresses of 245 facilities it operates. We then manually find these facilities in POS to obtain their provider IDs. We likewise use the following documents to identify facilities, which we then match to provider IDs in POS: a disclosure statement from CC Care listing facility names and addresses; a motion for joint administration from Preferred Case listing facility names; a disclosure statement from Orianna listing facility names; a disclosure statement from Senior Care Centers listing facility names.

Finally, we fuzzy merge our sample of bankruptcies by names and addresses to POS and manually inspect highly similar strings to ensure that names and addresses are identical (up to abbreviations). This adds a small number of matches. We assign these to jointly-administered-case clusters by inspecting bankruptcy documents as described above.

In the end, we identify 187 clusters of jointly-administered cases, covering 869 provider IDs and 598 NPIs. The lower number of NPIs is likely due to the fact that in our manual process of matching large bankruptcies, we only link to provider IDs to save time.

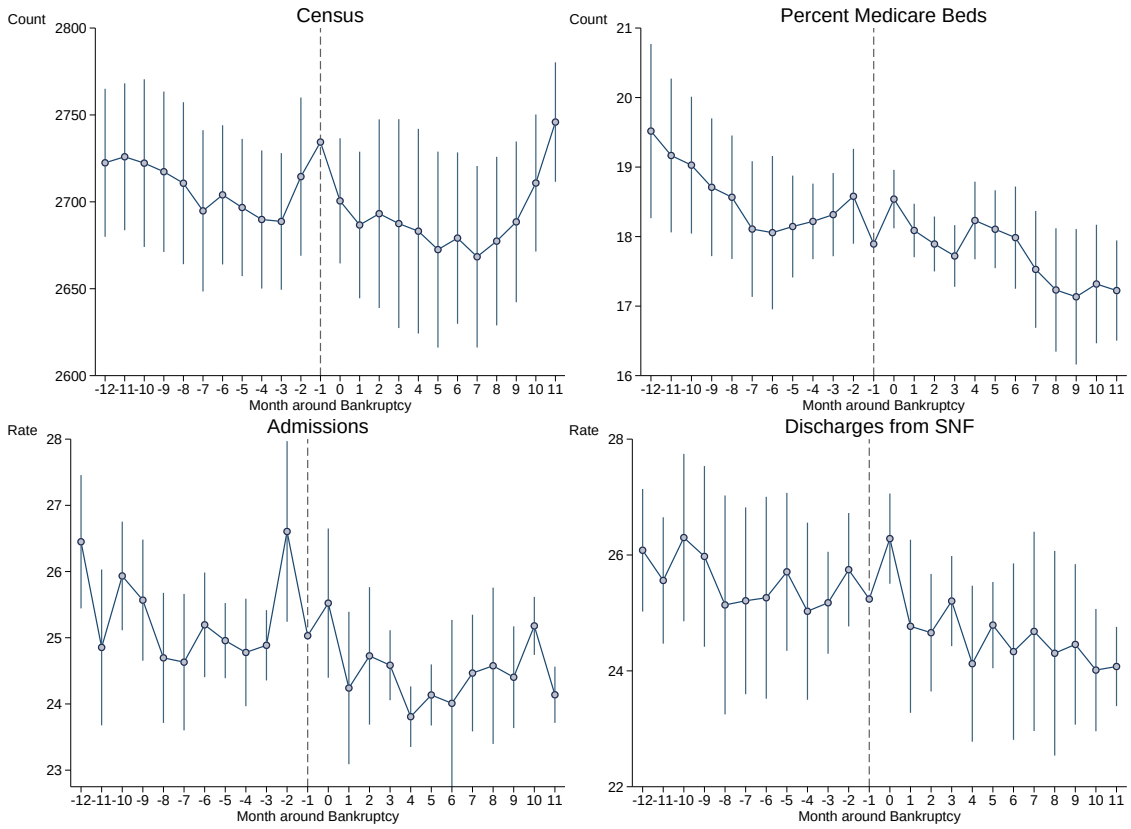
E Additional Health Outcome Results

Table C1: Bankruptcy and Patient Outcomes

		Relative Month
Type	Mean	$0 \leq t \leq 11$
Restraints Used per Assessment	0.020	0.0026 (0.0029) 13.1%
Antipsychotic or Schizophrenic per Assessment	0.24	0.0072** (0.0024) 3.0%
Behavioral Issue per Assessment	0.11	0.0075** (0.0026) 6.9%
Poor Hygiene per Assessment	3.3	0.089 (0.074) 2.7%
Death per Beneficiary	0.036	-0.00070 (0.00043) -1.9%
Falls per Assessment	0.16	-0.00042 (0.0016) -0.26%

Note. Estimates pool the coefficients from $0 \leq t \leq 11$ and are relative to $-12 \leq t \leq -1$. Regressions include match-id by relative time and skilled nursing facility fixed effects, and are clustered at the chain level. Two stars indicates significance at the 5% level and one star indicates significance at the 10% level.

Figure C3: Bankruptcy and Facility Census



Note. This figure examines health outcomes over month t among individuals who were enrolled in Traditional Medicare. Regressions include fixed effects for calendar month and the skilled nursing facility. The values have been shifted up by the mean of the dependent variable to provide scale. Standard errors are two-way clustered by month and chain-year pairs, and 95% confidence intervals are shown. MDS stands for the minimum data set and indicates that outcomes were derived from the MDS, not the Medicare claims data. Table C2 contains point estimates.

Table C2: Bankruptcy and Facility Census

		Month
Type	Mean	$0 \leq t \leq 11$
Census	2842.6	-13.8
		(32.4)
		-0.49%
Percent Medicare Beds	18.1	-0.92*
		(0.53)
		-5.1%
Admissions	24.9	-0.73**
		(0.33)
		-3.0%
Discharges from SNF	24.9	-0.97**
		(0.40)
		-3.9%

Note. Regression estimates correspond to Figure C3. Estimates pool the coefficients from $0 \leq t \leq 11$ and are relative to $-12 \leq t \leq -1$. Regressions include match-id by relative time and skilled nursing facility fixed effects, and are clustered at the chain level.