

Will I Ever Be Satisfied? Job Quality and Unionization*

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Abstract

We study the relationship between hard-to-observe aspects of job quality and unionization in the U.S. economy. Establishments where workers report a decline in job quality are more likely to experience a unionization effort, even within the same firm. This dissatisfaction with job quality does not reflect differences or widening gaps in pay, but rather differences and widening gaps in working conditions such as career opportunities, culture, management, and work-life balance. Given the hard-to-observe nature of job quality, union organizing would appear to reflect grassroots movements from within. Though the traditional exit-voice hypothesis postulates that unionization reduces employee turnover, our analysis finds the causation may run the opposite way, as workers who seek to unionize tend to have longer firm tenure even before seeking out representation. Finally, even after workers successfully vote to unionize, job quality does not appear to improve.

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*The findings, conclusions, views, and opinions are solely those of the authors and do not necessarily represent the views of the U.S. Department of the Treasury or the United States government. All mistakes are our own.

1 Introduction

A consensus is burgeoning that workers consider aspects of work beyond their wage when making their labor supply decisions. Workers predominantly exit their jobs for non-pecuniary reasons (Akerlof et al., 1988) and workers place substantial value, perhaps more than one-half the average wage, on the quality of job amenities (Maestas et al., 2018). Whether it is anticipated work schedules (Mas and Pallais, 2017), a flexible work arrangement (Chen et al., 2019), or a reduced risk of harassment (Folke and Rickne, 2022), workers value many dimensions of work that are hard to observe from the outside, for researchers and jobseekers alike (Johnson, 1978; Menzio and Shi, 2011; Sockin and Sojourner, Forthcoming). Despite the importance of non-wage aspects of jobs, how such characteristics drive and respond to union representation remains an open question. In trying to understand why workers unionize and how unionization affects jobs, prior research has focused either on a narrow set of employers or a narrow set of predictors. In this study, we harness a relatively new source of information, Glassdoor, that has detailed workers’ levels of job satisfaction with aspects of their work, as well as their pay, at U.S. firms and establishments since mid-2008. By combining such data with representation filings with the National Labor Relations Board (NLRB), we can directly monitor job quality before and after unionization to identify its predictors and effects.

Our first research question examines in what kinds of workplaces do workers seek to unionize. Our key outcome here is whether workers in a given firm and place filed a petition with the NLRB asking for a union election. The NLRB requires at least 30 percent of the employees in a potential bargaining unit to sign a petition expressing support for a union before it will hold an election on whether to unionize. We observe firm-places where some subset of workers filed for an election. Due to data constraints and for convenience, we refer to the combination of firm and place, where a place is akin to a city or town, as an “establishment,” although it more or less represents the average for the collection of establishments in that firm and place. We contrast the evolution of employees’ job satisfaction and pay at soon-to-file establishments in the years preceding the establishments’ NLRB filings, compared with the evolution of job satisfaction and pay in otherwise-similar establishments that did not file for an election. From this, a key dichotomy emerges. While differential trends in hourly pay do not predict a representation filing, the worsening of employee satisfaction compared with the past three-to-five years does. In other words, job quality used to be better at such establishments, but has since deteriorated.

Our work advances our understanding of labor relations by developing new evidence on why workers seek union representation. Despite the plethora of research on the effects

of unionization on workers and firms¹, which establishments ultimately file for or achieve representation remains an open debate. The most related work to ours, [Dinlersoz et al. \(2017\)](#), highlights this divide, arguing the literature on unions’ effects has expanded “without a precise understanding of the union selection process.” With data on establishments, but not employee sentiment at establishments, [Dinlersoz et al. \(2017\)](#) investigate what establishment-level characteristics predict union activity and find that age, size, and productivity are key determinants, with unions targeting more-productive establishments in pursuit of greater benefits to doing so, e.g., higher wages. Relatedly, [Hirsch and Berger \(1984\)](#) find that industries that are more concentrated and capital-intensive, have larger establishments, and exhibit greater risk of injury on the job have greater union membership. Indeed, [Sojourner et al. \(2010\)](#) suggest there is a greater likelihood of unionization in nursing homes that are larger and [Farber \(2014\)](#) shows union organizing has shifted over time toward larger potential bargaining units.

Prior work would suggest that the pursuit of greater pay is not the driving factor behind unionization efforts. In interviews with 114 union members, [Seidman et al. \(1951\)](#) found that not a single member stated that they had joined the union for higher wages. According to surveys, workers want, more than anything, their voices to be heard ([Freeman and Rogers, 1999](#)).² This accords with a view of workers valuing more than their paycheck: [Sockin \(2022\)](#) finds that one-third of job amenities have a greater influence on job satisfaction than pay does, and [Akerlof et al. \(1988\)](#) conclude that most job-related quits are motivated by non-pecuniary reasons. Our work solidifies this view. Through a panel analysis of employee sentiment over time for soon-to-file and never-file establishments, we show workers who seek union representation are increasingly unsatisfied with work compared with their never-filing counterparts, and that this dis-satisfaction grows in the lead up to a petition filing. This deterioration in employee sentiment may help explain, or perhaps reflect, why worsening product quality precedes unionization attempts, e.g., patient outcomes at hospitals ([Dube et al., 2016](#)).

Our second research question asks about the effects of union certification, an imperfect proxy for unionization, on employee satisfaction and pay. Among establishments with elections, we look at the within-establishment change in outcomes after the election using difference-in-difference and regression discontinuity design principles. In contrast, with establishments that don’t have unionization elections, satisfaction changes more negatively among establishments with successful elections. To isolate the effect of union strength and

¹See [Freeman and Medoff \(1984\)](#) and [Laroche et al. \(2017\)](#) for comprehensive reviews of this literature.

²In line with this view, [Juravich et al. \(2006\)](#) find that within a sample of 175 union first contracts, 96 percent established a grievance procedure with third party arbitration. Additionally, 73 percent dictated some form of anti-discrimination protections and 70 percent just cause for disciplines and discharges.

given that the probability of certification shifts discontinuously above 50 percent vote share, we contrast average outcome changes between establishments that had different votes shares along the lines of Wang and Young (2021). Union certification seems to reduce average firm pay (DiNardo and Lee, 2004; Frandsen, 2021) and somewhat-noisy estimates suggest it does not reliably improve job satisfaction, even when unions win strong majorities.

Though the broad consensus has been that there is a negative relation between unions and job satisfaction, recent evidence has called this interpretation into question. A meta-analysis by Laroche (2016) concludes that while cross-sectional comparisons indeed find a significantly negative relation, estimates derived from panel data are considerably weaker—pointing to selection into unionization as the driving force rather than causation.³ Consistent with this view, our analysis uncovers evidence that workers in establishments where satisfaction is declining select into unionization. Additionally, the correlation between job satisfaction and union membership may have reversed from negative to positive around the 2000s (Blanchflower and Bryson, 2020; Artz et al., 2022); however, our findings are at odds with this claim, since establishments with dissatisfied workers are more likely to file for unionization and unions do not appear to boost satisfaction.

Our work extends the literature using regression discontinuity analysis to analyze union certification with heterogeneous effects based on the degree of union support to new outcomes. DiNardo and Lee (2004) initiated a budding literature on the causal effects of union certification with the introduction of a regression discontinuity framework. The outcomes studied through this research design have focused predominantly on either pecuniary compensation, such as wages (DiNardo and Lee, 2004; Frandsen, 2021) and fringe benefits (Knepper, 2020), or on establishment-level outcomes, such as equity value (Lee and Mas, 2012), hours and service quality (Sojourner et al., 2015), innovation (Bradley et al., 2017), and survival probability (Frandsen, 2021; Wang and Young, 2021). Limited attention has been paid to outcomes related to working conditions or job quality.⁴

Our third question focuses on understanding why unionized workers tend to be both longer tenured and more dissatisfied with their jobs than non-union workers. Compared with non-union workers, are unionized workers more likely to use their voices to stay and fight to improve their jobs rather than exiting for another job? While prior research has looked

³There are exceptions thought that find lower satisfaction among union members even within a panel setting (e.g., Heywood et al., 2002).

⁴An exception is Sojourner and Yang (2022) who show that unionization increases the probability of an establishment is inspected by the Occupational Safety and Health Administration. Other work has examined unions and non-wage employee outcomes, but not in a causal setting. Union workers are more likely to have health insurance coverage (Petach and Wyant, 2022), claim workers' compensation (Hirsch et al., 1997) and unemployment benefits (Budd and McCall, 1997), have a lower incidence and extent of hours worked overtime (Trejo, 1993), and receive paid vacation (Farber et al., 2021).

at this phenomenon primarily cross-sectionally, we uncover new evidence that soon-to-file establishments already have higher shares of long-tenured and dis-satisfied workers. It does not appear that unionization induces or even strengthens the relationship. Dissatisfaction and lack of exit seem to drive unionization more than the other way around.

Freeman (1978) pioneered this literature, uncovering the puzzle that unionized workers report lower levels of job satisfaction yet quit less often. Freeman (1980) posited that because unions support employee voice—by encouraging workers to express discontent during negotiations and make formal grievances—this offers unionized workers an alternative to express discontent with working conditions rather than separating from their jobs. Indeed, Kochan and Helfman (1981) highlight that this dissatisfaction pertains largely to working conditions, e.g., supervisors, prospects for promotion, job content, and resource adequacy, as unionized workers in fact tend to be more satisfied with pecuniary aspects of work and job security. Bryson et al. (2010) find evidence consistent with this voice hypothesis: even among workers who are all covered by collective bargaining, those with union membership exhibited less satisfaction. Other theories beyond worker voice though have been put forth, such as the politicization of the workforce and flatter earnings profiles for union workers (Borjas, 1979), genuine dissatisfaction reflecting poor industrial relations (Bender and Sloane, 1998), or union members exhibiting different expectations, values, and reference points for assessing their jobs (Hammer and Avgar, 2005). On the other hand, Pfeffer and Davis-Blake (1990) argue the causal relation could instead be positive, as unions reduce wage inequality (e.g., DiNardo et al., 1996; Card, 2001; Farber et al., 2021) and increase worker control and commitment. We find evidence that the lack of quits, i.e., longer average tenure with the firm, coupled with job dissatisfaction predates and perhaps drives unionization efforts. Perhaps workers with few good outside options try to unionize to improve their worsening inside options, a theory we hope to investigate more soon.

The rest of this paper is organized as follows. Section 2 describes the Glassdoor and NLRB data, Section 3 investigates which establishments try to unionize, Section 4 explores how employee outcomes change when establishments do unionize, Section 5 considers possible mechanisms driving our findings, and Section 6 concludes.

2 Data Description

To tackle these research questions, we combine data from two sources. The first comes from Glassdoor, an online labor market platform that collects workers’ voluntary reports of their pay and their job satisfaction. The second comes from the NLRB, the federal agency responsible for legally recognizing most U.S. private-sector employees’ unions, and contains

records on union election processes. The latter allows us to identify which establishments file unionization petitions, the former to study how job satisfaction evolves therein.

2.1 Glassdoor

Glassdoor is as an information-sharing online platform, whereby visitors can learn about other workers’ perceptions of their employers. Respondents are incentivized to contribute to the platform through a “give-to-get” mechanism, whereby providing their own informational content unlocks access to that disclosed by others.⁵ Workers can contribute primarily in two ways. The first is a pay report, the second an employer review. From the former we gauge hourly pay, the latter employee satisfaction and job quality. Data for both the pay and review datasets span the years 2008 through 2022. Workers can provide this information about their employers while they are still currently employed with them, or retroactively as former employees. Although we will account for differences between current and former employees in our regression analysis, former employees may inject bias or noise into our estimates for a handful of reasons.⁶ At the same time though, former employees may have chosen to separate from their employers exactly because working conditions on the job deteriorated. While our benchmark specifications include former employees, our takeaway results hold as well when only current employees are considered (Table D1).

When submitting a pay report, respondents provide the following relevant information: employer, job title, employment status, base income, pay frequency at which that income is received, whether and how much is received in variable income, place of employment, and years of experience. An image is shown in Figure A3. We restrict the sample to three categories of employment status, full-time, part-time, and contract, and account for differences between them in our analysis by including an indicator for employed full time. Our principal measure of earnings we use throughout is the base hourly wage, which we construct based on base income, employment status, and pay frequency.⁷ To mute the influence of outliers, we truncate the bottom and top 0.5 percent of hourly wages. Place is a free response field that largely aligns with U.S. city—a level of aggregation sufficiently

⁵For an in-depth discussion of this mechanism and evidence for it reducing possible bias in online reviews, see [Marinescu et al. \(2021\)](#).

⁶For one, former employees are no longer on the job and may not have experience any decline in satisfaction or job quality that precedes a petition filing. Two, former employees may exhibit recall bias with regards to recollecting their previous pay or job satisfaction. And three, sentiment reported by former employees may in part reflect frustration from those who have been laid off rather than genuine experience on the job.

⁷For workers that report an hourly pay frequency, no imputation is required. For full-time employees that report an annual pay frequency, we divide base income by 2000 hours. For full-time employees that report a monthly pay frequency, we assume they work 2000 hours over 12 months. We exclude pay reports that do not fall in any of these groups.

granular enough to identify establishments that file NLRB petitions. Finally, we assign each pay report to a calendar year-quarter based on the date it is submitted.

As a proprietary dataset of voluntarily-provided wages, it is critical that we have confidence that our pay analysis has external validity. In aggregate, Glassdoor data do over-represent young, college-educated males from professional services industries (Liu et al., 2022); however, since we will account for differences between industries and job titles throughout our analysis, the concern is more whether the data are representative when dis-aggregated. Other work has found this to be the case. When compared with representative datasets, Glassdoor pay data exhibit highly similar patterns between industries and regions (Karabarbounis and Pinto, 2018), occupations (Gibson, 2021), and industry-occupation pairings (Sockin and Sockin, 2019). With this in mind, in each of our analyses, we account for the employer’s industry. Not all employers though are assigned an industry in Glassdoor and we exclude those for which it is not—though this is immaterial for our results.⁸ Further, though income is reported voluntarily, Oyer (2004) finds that workers overestimate their earnings by only about 5 percent/As such, we believe the Glassdoor pay data capture meaningful differences in pay between establishments.

When submitting an employer review, respondents include the following information: employer, employment status, overall rating of job satisfaction, sub-ratings for five categories of job quality (career opportunities, compensation and benefits, culture and values, senior management, and work-life balance), and free-response descriptions of the positive (‘Pros’) and negative (‘Cons’) aspects of their jobs. An image is shown in Figure A4. Workers can volunteer, but are not required to include, their job title and their place of employment. Since we are interested in comparing employee satisfaction between specific establishments, not just their parent firms, observing the place of employment is necessary; as such, we exclude the 42 percent of employer reviews for which the place is not included. Since we are interested in comparing similar workers between establishments, yet workers may strategically conceal their job title (Sockin and Sojourner, Forthcoming), we consider specifications with and without job title fixed effects. Unionization may also affect the decision to disclose such identifying information, a possibility we explore in Section 5. As with pay reports, we restrict the sample to full-time, part-time, and contract employment status, and account for differences between these categories in our analysis. Our principal measures of interest are workers’ overall and sub-category ratings, which are submitted on a 1–5 stars Likert scale, where more stars constitutes more satisfaction. We focus most of our satisfaction analysis on

⁸About 95 percent of observations for filing establishments and 80 percent for non-filing ones are assigned an industry. In unreported results, incorporating employers with missing industries as a separate category alters the main estimates for before and after a petition is filed little.

the overall satisfaction measure because it offers a simple, holistic measure. Workers do not have to report a rating for each sub-category, but most do. Given the difficulty in measuring employee sentiment at scale, evidence with regards to the external validity of these employer reviews is limited. That said, [Sockin \(2022\)](#) shows that industries and occupations with greater satisfaction and more positive discussion of workplace amenities in Glassdoor also exhibit greater satisfaction and more positive sentiment toward amenities in representative surveys.

It is worth noting that in both datasets, we observe for each worker their firm and place, but not necessarily their exact establishment *per se*. Each place in our sample, as the combination of a city and state, has geographical precision. For instance, within the New York City metropolitan statistical area alone, there are 941 places recorded in our sample. Nationally, we observe 42,640 places. Each place though is more coarse than a specific latitude and longitude. So, a single firm may have many establishments within the same place, for instance, a popular fast-food franchise in an urban city. However, for ease of reference, we will refer to the combination of a firm and place as an “establishment” and recognize that this may indeed reflect a collection of a firm’s establishments. If a firm has multiple establishments in the same place, then our “establishment” effectively averages across them.

2.2 National Labor Relations Board

The NLRB election data detail all cases when U.S. private sector employees try to unionize through the official process and how that process ultimately unfolded. If at least 30 percent of employees in a work group petition the NLRB saying they are interested in bargaining collectively with their employer in a particular union, the NLRB will hold a vote among the whole work group (i.e., the bargaining unit). Voter turnout among NLRB elections was historically around 92 percent dating back to the 1970s, but has fallen sharply since the mid-1990s, reaching 84 percent by the mid-2000s ([Farber, 2010](#)). If a majority of those who do vote want to bargain via through that union, the NLRB certifies the union as collective bargaining agent for the work group, creating a legal duty on the employer to bargain with the union in good faith over the group’s terms and conditions of employment. Within the NLRB data, each election includes the following information: a petition filing date for each bargaining unit that goes to election, the employer name, worksite address, the date when the election is tallied, and the numbers of votes that were in favor of and against the union. From the latter, we measure the pro- and anti-union vote shares and whether a majority voted for the union.

To construct a crosswalk between the NLRB election data and Glassdoor, we rely on three identifiers: the employer, the city, and the state. The NLRB data include the name of the employer and from the worksite address, we obtain the latter two. We proceed in linking the two datasets in a number of steps. First, since Glassdoor and the NLRB have different nomenclatures, we use textual analysis to align employer names and city names between the two.⁹ Not every employer name in the NLRB data can be successfully mapped to one in Glassdoor; the share of NLRB petitions filed each year with a matched employer name is fairly stable at around 40–50 percent and is slightly higher at the beginning and end of the sample window (Figure A1: panel a). Second, the same employer may have multiple filings in the NLRB data for the same place (even in the same year). Since we are interested in the lead up to and the outcomes following a petition filing, we focus only on the first petition filing for each employer-place. Restricting to first filings reduces the share of NLRB filings each year with a matched employer name by around 10–20 percentage points. Third, we match on the location, i.e., the exact city and state, which accounts for 95 percent of the matched petitions in our sample. For the remaining 5 percent, we could not match precisely on the petition’s city; however, we could match instead on the major city associated with the petition city’s metropolitan area.

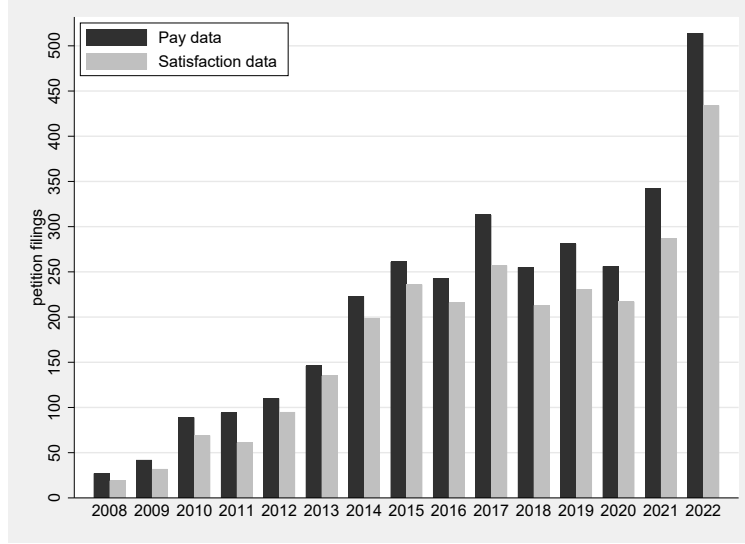
The number of first petitions ultimately represented in our pay and satisfaction samples is presented in Figure 1, organized according to NLRB petition filing year. As Glassdoor coverage has increased over time, so too does the number of matched petitions. At the beginning of the sample, there are fewer than 100 petitions included, compared with 250 or more towards the end of the sample. As a share of all petitions filed each year, near zero are represented in 2008 (as there are few pre-filing reports available) and grows roughly linearly to about one-quarter by 2022 (Figure A1: panel b).¹⁰

In total, there are 3,110 petitions matched at the establishment level to the pay or satisfaction data, summary statistics for which are presented in Table 1. All but 11 matched election records have observed vote data. On average, 88.6 workers vote in an election, 65 percent of voters support unionization, and a majority voted to support unionization in 70 percent of elections. Matched establishments average 16 pay reports with a median of 3 and 9 satisfaction reports with a median of 2.

⁹We accomplish this primarily through *fuzzymatch* algorithms, and secondarily through manual additions.

¹⁰Because we condition on having pre-filing data in Glassdoor, this mechanically excludes more petitions submitted in early years because Glassdoor first started collecting data in 2008.

Figure 1: Petition Filings Matched with Glassdoor Data by Year Filed



Notes: This figure displays the total number of petition filings with the NLRB that can be matched with Glassdoor pay data (dark gray, left bars) and Glassdoor satisfaction data through employer reviews (light gray, right bars). Sample of matched filings restricted to those with observations available before the calendar half-year in which the petition was filed.

Table 1: Summary Statistics for Matched Elections

Measure	N	Mean	Standard deviation	Min	p10	Median	p90	Max
Year filed	3,279	2017.00	3.61	2008.00	2012.00	2018.00	2022.00	2022.00
Year tallied	2,992	2017.00	3.60	2008.00	2012.00	2017.00	2022.00	2023.00
Votes cast	3,268	86.26	562.40	1.00	5.00	25.00	175.00	30019.00
Share vote for union	3,268	0.65	0.27	0.00	0.28	0.67	1.00	1.00
1(Majority union)	3,279	0.70	0.46	0.00	0.00	1.00	1.00	1.00
N: pay data	2,988	21.83	95.01	1.00	1.00	3.00	36.00	2684.00
N: satisfaction data	2,524	12.22	42.28	1.00	1.00	3.00	22.00	809.00
1(Matched on exact state-city)	3,279	0.95	0.22	0.00	1.00	1.00	1.00	1.00

Notes: This table provides petition-level summary statistics for filing establishments matched with Glassdoor.

2.3 Our Sample

For each matched NLRB petition, we trace employees' reports on Glassdoor for the corresponding establishment over time. Beyond these establishments, since we seek to understand which establishments select into union petition filing and the dynamics of their outcomes after filing, we also trace employees' reports on Glassdoor for all other, non-filing establishments. With the resulting data, we measure the occurrence or absence of an NLRB election in each establishment between 2008 and 2022. In total, we observe 15.1 million pay reports spanning 2.89 million establishments, 300,000 of which are pay reports for filing establishments, and 6.7 million satisfaction reviews spanning 1.74 million establishments, 153,000 of

which are reviews for filing establishments. Summary statistics for our main outcomes and observables in these two datasets are presented in Table 2. Additional summary statistics for secondary measures in each dataset are available in Table A1.

Looking at first at the pay data, we see that workers at filing establishments are paid on average slightly less than their non-filing counterparts, with a mean of \$25.8 per hour compared with \$27.4 per hour. Whether this difference is significant after accounting for observable characteristics and reflects pre- or post-filing dynamics we explore in the subsequent sections. Filing-establishment employees are also somewhat less likely to receive variable income, at an incidence rate of 17 percent compared with 20 percent, largely due to a difference in sales commissions (Table Table A1). With regards to observables, while workers are remarkably similar with regards to their years of accumulated human capital, employees at filing establishments are materially less likely to be salaried but more likely to be employed full time, with differences of 8 and 5 percentage points, respectively.

Table 2: Summary Statistics for Glassdoor Sample

Measure	Filing establishments					Non-filing establishments				
	N	Mean	Standard deviation	Min	Max	N	Mean	Standard deviation	Min	Max
<i>Panel A. Pay data</i>										
Hourly wage	390	25.82	14.29	7	125	14,800	27.44	18.22	7	125
Years of experience	390	5.95	6.79	0	50	14,800	5.94	6.96	0	50
1(Hourly pay frequency)	390	0.55	0.50	0	1	14,800	0.47	0.50	0	1
1(Full time)	390	0.87	0.34	0	1	14,800	0.82	0.38	0	1
1(Current employee)	390	0.64	0.48	0	1	14,800	0.62	0.48	0	1
Observations per establishment	390	55.40	285.59	1	6556	14,800	5.27	50.34	1	31950
<i>Panel B. Satisfaction data</i>										
Overall rating	153	3.18	1.39	1	5	6,573	3.48	1.41	1	5
Career opportunities rating	129	2.97	1.41	1	5	5,741	3.20	1.47	1	5
Compensation and benefits rating	129	3.18	1.33	1	5	5,737	3.25	1.39	1	5
Culture and values rating	122	3.03	1.50	1	5	5,470	3.41	1.53	1	5
Senior leadership rating	127	2.74	1.49	1	5	5,680	3.15	1.56	1	5
Work-life balance rating	129	3.01	1.42	1	5	5,736	3.38	1.45	1	5
1(Full time)	153	0.73	0.44	0	1	6,573	0.65	0.48	0	1
1(3+ years tenure)	110	0.48	0.50	0	1	4,951	0.36	0.48	0	1
1(Current employee)	153	0.54	0.50	0	1	6,573	0.53	0.50	0	1
Observations per establishment	153	25.12	106.42	1	2051	6,573	3.94	24.43	1	10049

Notes: This table provides summary statistics for pay and satisfaction data in Glassdoor, partitioned according to whether the establishment files a petition from 2008 to 2022.

Turning next to the job satisfaction data, the disparities we observe between filing and non-filing establishments, even in the raw data, are striking. While pay appear to be similar between the two, job satisfaction is not. Overall job satisfaction averages 3.18 stars for filing establishments and 3.48 stars for non-filing establishments. Given a sample standard deviation in overall ratings of 1.4 stars, this raw difference at one-fifth of a standard deviation is considerable. Delving into the sub-categories of job quality workers provide ratings for

as well reveals an important dichotomy. The overall satisfaction gap between filing and non-filing establishments does not appear universally. While we observe large differences in employees’ assessments of career opportunities, culture and values, senior leadership, and work-life balance, those for compensation and benefits are much more similar. As in the pay data, workers at filing establishments are more likely to be employed full-time. They are also markedly more likely to have spent three or more years with their employer, a finding we explore in more detail in Section 5.3. Finally, the breakdown between current and former employees is similar in both datasets while filing establishments have on average more observations per establishment—though, as evidenced by the sample standard deviations, this largely reflects thicker right tails.

3 How do trends in pay and satisfaction differ in establishments where employees soon seek to unionize?

We describe how establishments that will go on to file a petition for union representation with the NLRB in the next few years differ with respect to satisfaction and hourly wage from establishments that will not. For purposes of notation, let $\mathbb{F}$ represent the set of all filing establishments. We focus on the three years preceding the first filing, excluding all reports from filing establishments that arrive before then or after first petition filing. For comparison, the sample also includes all reports from all never-filing establishments.

We model employee reports of log hourly wage or satisfaction for employee i reporting on firm k in industry s and place p in year-quarter t ($Y_{k,p,t,i}$). The model does not normalize away the group difference in a given period, so it’s not a differences-in-differences model. Instead, it captures the trend in the average difference between the soon-to-file establishments in the years leading up to each one’s filing and never-filing establishments in the same calendar time. More formally, we estimate

$$Y_{k,p,t,i} = \beta \mathbb{1}\{(k, p) \in \mathbb{F}\} + \gamma W_{t,i} + \lambda_{i(k),t} + \lambda_{p,t} + \epsilon_{k,p,t,i}, \quad (1)$$

where $W_{t,i}$ is a vector of observable characteristics for the employee that includes an indicator for whether full-time or part-time and an indicator for whether a current or former employee. This vector also includes a fourth-order polynomial in years of experience when considering pay outcomes because pay reports, but not satisfaction reports, elicit experience. To account for differences in the occupational composition of employees across establishments, as well as potential disparities in job quality between workers within the same establishment, a second specification includes a set of indicators for employee job title

in W , narrowing the comparison to focus only on variation between employees with the same job title at different establishments and excluding between-job-title-variation. We pull out additive industry by time shocks and place by time shocks to outcomes using industry-year-quarter fixed effects ($\lambda_{i(k),t}$) and place-year-quarter fixed effects ($\lambda_{p,t}$).

Because we are concerned with differences across establishments and because the frequency distribution of Glassdoor reports per establishment has a long right tail, we use a weighted regression where each establishment is given equal weight. We cluster all standard errors at the employer level. Our interpretation of the model relies on a maintained assumption that other unobserved influences on pay or satisfaction besides the coming petition filing are conditionally mean zero, i.e. unobservable shocks to outcomes are not coincident with petition filing.

Results for employees' log wage and overall job satisfaction levels under these two specifications are presented in Table 3. Despite managers believing that wages and benefits are the principal factor behind a union organizing drive (Freeman and Kleiner, 1990a), workers at soon-to-file establishments are not paid lower wages than workers in never-filing establishments. When comparing workers within the same job title, workers at soon-to-file establishments average 4 percent higher wages than their never-filing counterparts in the three years prior to filing. While our primary measure for comparing employee pay is hourly base wage, we find minimal differences with regards to other aspects related to pay.¹¹ This also accords with the positive association between union representation activity and payroll per employee documented by Dinlersoz et al. (2017).

Despite higher pay, employees in soon-to-file establishments report lower overall satisfaction in the years leading up to filing than employees in never-filing establishments do (Table 3). Even when comparing workers with the same job titles, the disparity persists. Thus, while employees at soon-to-file establishments are not paid less, they express less satisfaction with their jobs overall. The gap in overall satisfaction is substantively large. The -0.129 point estimate implies 14 percent of a standard deviation lower satisfaction and has a 95 percent confidence interval of -10 percent to -17 percent of a standard deviation. For context, establishments where employees' hourly pay is twice as large tend to have less than four-tenths of a standard deviation greater overall satisfaction (Table C7). This gap in employee satisfaction shows up with another measure of overall sentiment as well. In

¹¹Some employees are compensated through variable pay, aspects of compensation that vary markedly across firms (Sockin and Sockin, 2021). Employees in soon-to-file establishments and never-filing establishments report similar levels of variable pay including cash bonuses, profit sharing, and sales commissions when accounting differences across job titles (Table C3). Frequency of being paid also does not differ systematically between soon-to-file and never-filing establishments. While soon-to-file establishments have a significantly smaller share of employees who are salaried, accounting for job title fixed effects reverses this relation (Table C6).

Table 3: Employee Outcomes and Whether Their Establishment Will Soon File a Petition

	Log wage		Overall rating	
1(Filing establishment)	0.008 (0.009)	0.046*** (0.006)	-0.173*** (0.035)	-0.125*** (0.028)
Job title FE		✓		✓
N	14,814,029	14,392,473	6,532,550	5,358,346
Filings	2,717	2,679	2,243	2,010
Std. dev. DV	0.589	0.589	1.411	1.401

Notes: This table summarizes the relationship between log pay or job satisfaction and whether the establishment files a unionization petition within the next three calendar years. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

addition to the 1–5 stars Glassdoor ratings, employees also describe the ‘Pros’ and ‘Cons’ of working at their establishments with written text when submitting their reviews. Employees at soon-to-file establishments dedicate on average 2.1–2.9 percentage points more of their total text to the ‘Cons’ section than employees in never-filing establishments (Table C2).

The positive compensation gap and negative satisfaction gap between soon-to-file and never-filers hold up in models that also include employer characteristics as predictors, though the gaps’ estimated magnitudes diminish (Table C5). Specifically, we add employer characteristics, such as employer age and employer size proxied for by the number of employees, the number of years in operation, and the number of places with establishments.¹² Bigger firms have higher wages and lower satisfaction. Older firms have lower wages and satisfaction. We also test for geographic differences the pay and overall satisfaction gaps but uncover no substantial differences, suggesting these gaps are quite homogeneous across the United States (Table C4). We also consider a specification with review count fixed effects to account for the frequency of small sample sizes among filing establishments and the results do not change (Table D3). Finally, we evaluate a tighter comparison with non-filing establishments. There we enhance our fixed effects to be at the industry x place x year-quarter level. Further, we exclude observations from places with no petition filing in our sample, which excludes about one-fifth of the sample. The results are similar to our benchmark specification (Table D2), except that hourly pay is now on average 2 log points lower at filing establishments when job title fixed effects are not included. Compared with never-filing establishments, employees reporting from soon-to-file establishments are significantly less likely be salaried, reflecting the types of jobs at such establishments, but more likely to be a current employee and employed full-time (Table C6). These observable differences though do not drive our

¹²Employer age and size are from an employer lookup table hosted by Glassdoor. The number of places covered by an employer

results.

So far, we have compared soon-to-file establishments with never-filers looking between all establishments and controlling for differences between industries and between places. However, the richness of the Glassdoor data allow us to make an even finer comparison since we observe satisfaction data for multiple establishments within the umbrella of the same parent firm, some of which filed a representation petition and most of which did not. Even though we have showed that the results persist after accounting for the size of each establishment’s parent firm (Table C5), firms may differ for a plethora of reasons beyond size. By adding firm fixed effects, we absorb all commonalities associated with the parent firm and thereby limit the contrast in outcomes to be among soon-to-file versus never-filing establishments of the same employer. In this case, still, while soon-to-file establishments exhibit similar levels of pay to never-filers, those that file display significantly lower levels of job satisfaction (Table 4). Thus, even within firm, places where employees file for unionization tend to be places with lower satisfaction, not lower pay.

Table 4: Workers’ Outcomes Across Establishments within Firms

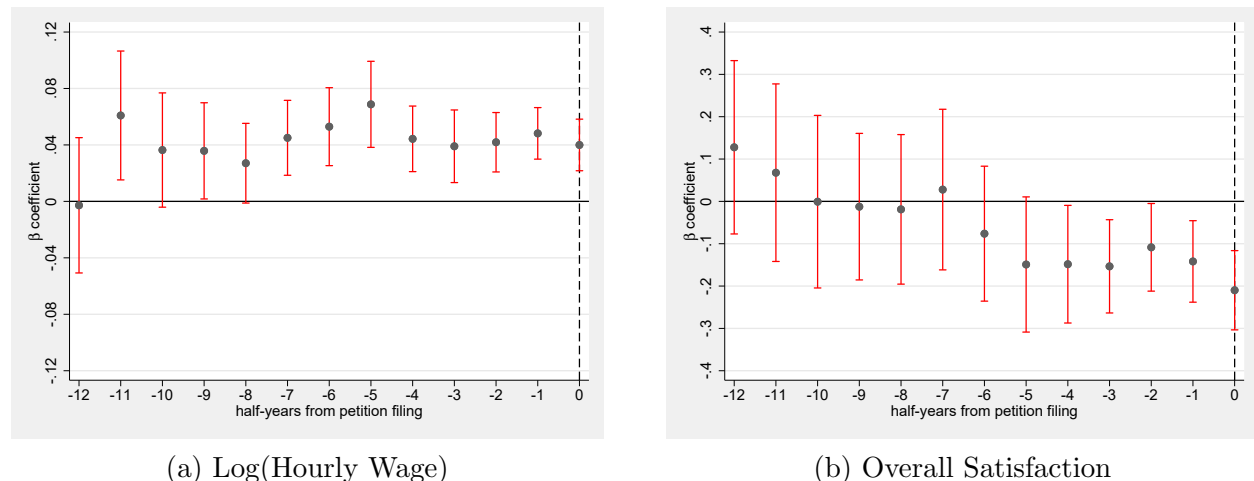
	Log wage		Overall rating	
1(Filing establishment)	-0.003 (0.006)	0.012*** (0.005)	-0.106*** (0.023)	-0.110*** (0.025)
Firm FE	✓	✓	✓	✓
Job title FE		✓		✓
N	14,670,779	14,248,228	6,403,575	5,229,441
Filings	2,688	2,648	2,199	1,957
Std. dev. DV	0.590	0.590	1.409	1.400

Notes: This table summarizes the relationship between log pay or job satisfaction and whether the establishment files a unionization petition within the next three calendar years when firm fixed effects are included. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

The dynamics of these gaps, allowing heterogeneity in the gap by time to filing, is illuminating. Wage tends to be stably higher in soon-to-file establishments across the period leading up to filing (Figure 2). In contrast, soon-to-file and never-filing establishments start with similar average overall satisfaction levels during the period from six to four years prior to the filing. Then, overall satisfaction in soon-to-file establishments starts to deteriorate about three years before filing. By the time of the filing, filing-establishment employees report about a fifth of a standard deviation lower average satisfaction than similar workers in never-filing establishments.¹³

¹³Figure ?? shows analogous figures without controls for job title. Table C1 confirms that the slope of satisfaction over time leading up to a filing is significantly negative. Table D4 shows that this significantly

Figure 2: Trends in Hourly Wage and Overall Satisfaction Leading up to a Union Petition Filing Compared Against Trends in Similar Establishments



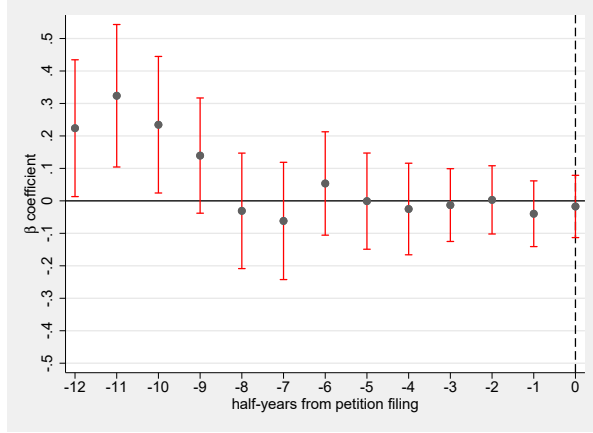
Notes: This figure summarizes the dynamics of log pay and overall job satisfaction in the six calendar years leading up to a petition filing for filing establishments. Standard errors are clustered by firm. Red vertical bars indicate 95% confidence intervals around each point estimate.

As with overall job satisfaction, satisfaction with all five aspects deteriorates in the years leading up to a filing in soon-to-file establishments relative to never-filing establishments (Figure 3). Table B1 suggested differences across aspects but what differs is the aspects' starting gap five or six years before filing. For compensation and benefits, soon-to-file establishments start out with higher satisfaction than never-filers. But their compensation and benefits satisfaction advantage completely erodes by the time of the filing. Averaging across the preceding three years, compensation satisfaction is higher among soon-to-file establishments (Table B1). This could be misleading, but the dynamic analysis makes the deterioration apparent. In all aspects, employee satisfaction falls in soon-to-file establishments compared with never-filing ones over the years leading up to the unionization effort.

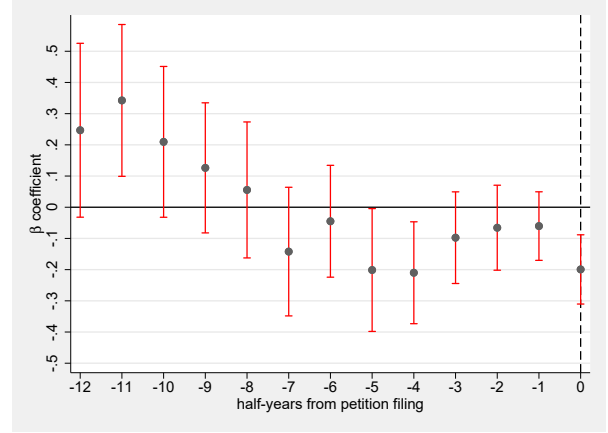
From the trends in Figure 3, it is telling to comprehensively compare job quality between soon-to-file and never-filing establishments over time. Six years before the petitions are filed, jobs at filing establishments *were better*. Workers at these establishments reported better career opportunities, culture, and compensation and benefits, and similar quality leadership and work-life balance. Fast forward to the time of the petition filing and such jobs *are worse*. Workers report similar career opportunities and compensation and benefits, but worse culture, leadership, and work-life balance. Temporally, it appears that the deterioration in job quality tends to happen over the span of a few years before the filing, rather than immediately before. Speculatively, soon-to-file employees had time to address the deterioration

negative slope does not reflect a shifting composition of filing establishments in our sample over time.

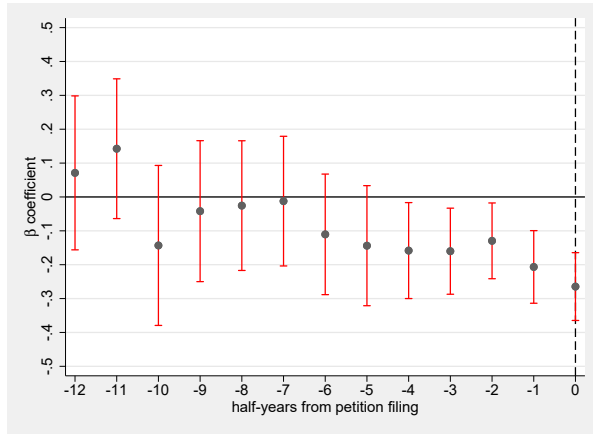
Figure 3: Trends in Satisfaction with Aspects of Job Leading up to a Union Petition Filing



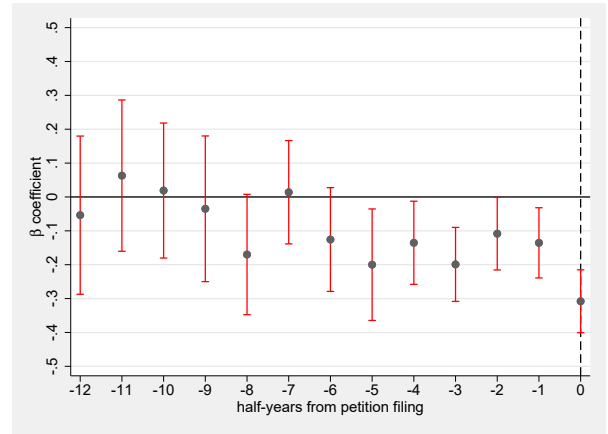
(a) Career opportunities



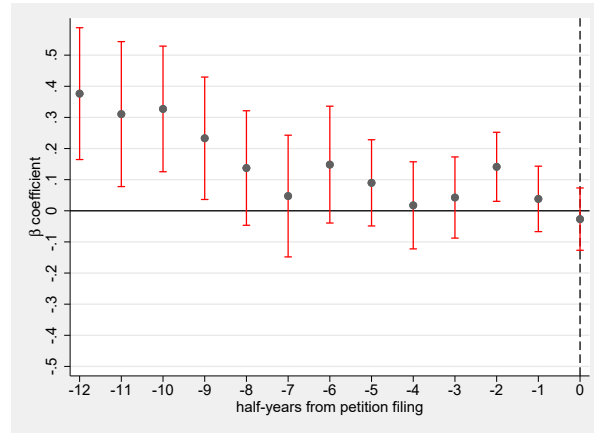
(b) Culture & values



(c) Senior leadership



(d) Work-life balance



(e) Compensation & benefits

Notes: This figure summarizes the dynamics of aspects of job quality in the six calendar years leading up to a petition filing for filing establishments. Standard errors are clustered by firm. Red vertical bars indicate 95% confidence intervals around each point estimate.

through other means but their sentiment did not improve. This evidence is consistent with employees who feel a loss or a betrayal of expectations seeking to unionize. It may also explain why such workers tend to be longer-tenured, since their jobs used to be attractive, high-quality jobs—a pattern we explore further in Section 5.3.

Once the NLRB determines that a filed petition validly demonstrates support for unionization from at least 30 percent of the work group, it establishes a voting process to determine if a majority want to unionize. Next, we study what happens after these elections.

4 Does union certification affect pay and satisfaction?

If workers seek out union representation because they have grown increasingly dissatisfied with their employer’s working conditions, naturally the question arises whether unions can successfully turn things around. Can union representation reverse the decline we observed in employee satisfaction in the lead up to a petition filing? If so, it would add improving job quality to the positive effects unions can have, beyond reducing wage inequality (e.g., DiNardo et al., 1996; Card, 2001; Farber et al., 2021), increasing retirement benefits (Knepper, 2020), and establishing grievance systems (Freeman and Kleiner, 1990b). Given that filing establishments already have decreasing levels of satisfaction, this boon could be especially important to such workplaces. If they cannot however, then it speaks to the limitations of unionization in recent years. Employee morale may fall even further if the union increases awareness of poor working conditions through employee voice (Freeman and Medoff, 1984), politicizes the workforce (Borjas, 1979), or induces a hostile workplace through employers pushing back against union activity.¹⁴

Given that the probability of NLRB certification of a union and ultimately reaching a collective bargaining agreement jumps when the share voting for a union exceeds 50 percent (DiNardo and Lee, 2004), we measure the effects of NLRB certification on employee outcomes by partitioning elections into those that are successful and those that are not. First, in a difference-in-differences design, we compare outcome dynamics among winning elections versus never-filers. Second, in a regression discontinuity design, we contrast how satisfaction evolved between establishments where vote shares fell slightly above or below the 50 percent vote share threshold. As in the lead up to a filing, we consider both pay and satisfaction as outcomes of interest. The distribution of elections in our sample by the share supporting a union is presented in Figure A2. Although we observe an accumulation of elections with

¹⁴Bronfenbrenner (2022) finds, among 286 NLRB elections from 2016–2021, that employers frequently engage in coercive practices in response to unionizing drives. For instance, 74 percent hired management consultants to lead anti-union campaigns, 85 percent forced workers to attend mandatory meetings during work hours, and 44 percent used meetings to interrogate workers about union support.

vote shares just below the threshold, suggesting possible employer manipulation to defeat the unionization drive, the degree of lopsidedness around the threshold is much more timid than in other regression discontinuity analyses (e.g., [Knepper, 2020](#); [Frandsen, 2021](#)), in part since we only consider first petitions and cannot include elections before 2008. A [McCrary \(2008\)](#) test for manipulation around the discontinuity indeed reveals no statistically discernible mass missing from either side of the threshold.¹⁵

We begin with a difference-in-differences design, allowing for differential effects by whether the election was successful in achieving a majority vote share for the union or not. Here, the underlying assumption is that, absent the NLRB filing, pay and satisfaction at establishments that filed petitions would have evolved similarly to pay and satisfaction at establishments that never filed. Though this might seem to contradict the decline in job satisfaction we relayed in [Section 3](#), it is important to note that the differences between filers and never-filers appear relatively stable over the years immediately preceding a filing; the deterioration tends to happen further back. The sample includes establishments with elections unions won, establishments with elections that unions did not win, and never-filers. We also assume that the timing of the union election is not systematically related to establishment-specific shocks, e.g., a boost or decline in productivity caused by a different, contemporaneous shock. Let $\sigma(k, p)$ represent the share voting for a union in the election for establishment $(k, p) \in \mathbb{F}$. Our specification is given by

$$Y_{k,p,t,i} = \beta_1 \mathbb{1}\{\sigma(k, p) \in \mathbb{F}\} \times \mathbb{1}\{t \geq \tau_{k,p}\} + \beta_2 s \mathbb{1}\{\sigma(k, p) > 0.5\} \times \mathbb{1}\{t \geq \tau_{k,p}\} \\ + \gamma W_{t,i} + \lambda_{k,p} + \lambda_{\iota(k),t} + \lambda_{p,t} + \epsilon_{k,p,t,i},$$

where $\tau_{k,p}$ is the tally or election date for establishment $(k, p) \in \mathbb{F}$. Here, β_1 captures the average post-election effect on pay or job satisfaction after a losing election, whereas β_2 captures the marginal difference in average post-election effects between losing and winning elections. We report both for pay and job satisfaction in [Table 5](#). We incorporate establishment fixed effects ($\lambda_{k,p}$) so that β captures within-establishment variation from employee outcomes before and after a losing or winning petition is filed. As before, we pull out additive industry by quarter ($\lambda_{\iota(k),t}$) and place by quarter ($\lambda_{p,t}$) shocks. We consider an additional specification where job title effects are included as well to remove between-job variation.

First, relative to establishments with elections where unions failed to achieve a majority, after accounting for trends over time and between establishments and places, average pay grows 2.4 percent slower, suggesting union certification may modestly lower average pay

¹⁵We implement the estimation procedure of [Cattaneo et al. \(2020\)](#) for the two vote-share bandwidths, $[0.15, 0.85]$ and $[0.3, 0.7]$, we consider.

within the establishment. Second, the estimated effect of union certification on overall job satisfaction is also slightly negative though the 95 percent confidence intervals are considerable, e.g., $[-0.18, 0.14]$ for the specification that includes job titles. The null change in overall satisfaction though may mask differences that arise within aspects of job quality. In Table B4, we test whether the sub-category ratings shift after a successful election. Here, we observe a meaningful decline in employee satisfaction with compensation and benefits and senior leadership. The former likely reflects the decline in pay, as unionization has been shown to improve fringe benefits (Knepper, 2020). The latter may reflect the contentious nature of petition filing, especially for close elections, where employers will take actions to squash the unionization attempt.¹⁶

Table 5: Post-Election Outcomes by Election Result, Difference-in-Differences

	Log wage		Overall rating	
	Across job titles	Within job titles	Across job titles	Within job titles
1(After petition is filed)	0.008 (0.014)	0.012 (0.010)	-0.025 (0.057)	-0.029 (0.061)
1(After petition is filed) $\times$ 1(Majority union)	-0.020 (0.016)	-0.024* (0.012)	-0.034 (0.071)	-0.021 (0.080)
N	13,152,770	12,738,823	5,503,122	4,406,957
Filings	2,590	2,569	2,149	1,961
Std. dev. DV	0.585	0.585	1.425	1.409

Notes: This table summarizes the change in log pay or job satisfaction after a unionization election for elections that achieved majority support for a union. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

Looking at winning elections versus never-filers though may not capture the causal effects from winning union representation if achieving a majority vote share is also correlated with unobservable workplace characteristics that may affect pay or job satisfaction. For instance, if the NLRB election improves coworker relations by banding together against management in efforts to achieve majority support, post-election satisfaction may reflect this newfound social capital within the firm rather than the effects of unionization per se. To this end, following the literature studying the causal effects of unionization (e.g., DiNardo and Lee, 2004; Knepper, 2020; Sojourner and Yang, 2022), we look at elections according to their pro-union vote share and narrow in on the discontinuity created by the 50 percent threshold.

¹⁶For instance, with regards to how one employer responded to unionizing efforts, a federal judge wrote the company “showed a general disregard for the employees’ fundamental rights” and called for the firm to halt its anti-union behaviors, including retaliating against employees for unionizing, promising improved compensation for renouncing the union, surveilling union-supporting workers on the job, discriminating against pro-union job candidates, and relocating union organizers to new stores (Bogage, 2023).

Because we are interested in the change in employee outcomes conditional on each election’s vote share, our approach is most akin to that of [Frandsen \(2021\)](#)—though our approach captures first-differences through a panel regression with establishment fixed effects as opposed to measuring first-differences over time directly. In the spirit of [Wang and Young \(2021\)](#), we partition our sample of elections according to their pro-union vote share into eight 12.5-percentage-point wide bins $\Sigma_{1...8}$.

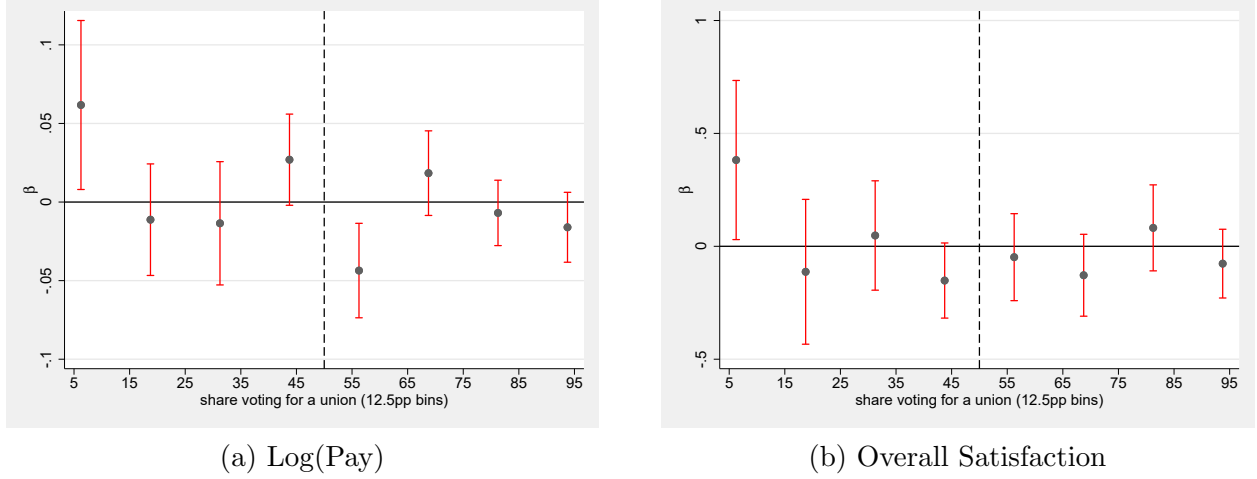
We examine how average pay and job satisfaction shifted within establishment after the election by estimating

$$Y_{k,p,t,i} = \beta_b \mathbb{1}\{\sigma(k,p) \in \Sigma_b\} \times \mathbb{1}\{t \geq \tau_{k,p}\} + \gamma W_{t,i} + \lambda_{k,p} + \lambda_{\iota(k),t} + \lambda_{p,t} + \epsilon_{k,p,t,i}, \quad (2)$$

where we restrict the pre- and post-election periods to each span twelve quarters. We then plot the coefficients for each bin β_b in [Figure 4](#). Zooming in on the discontinuity, for hourly pay in panel (a), we observe a noticeable decline for the bin of elections just above, compared with the one just below, the 50-percent threshold. Hourly wages fall significantly for those where unions just won and may even rise where unions just lost. This evidence suggests union certification causes average pay to fall, consistent with the findings of others (e.g., [DiNardo and Lee, 2004](#); [Frandsen, 2021](#)). This relies on the assumption that whether an election falls just below or just above the threshold for a majority is quasi-randomly assigned. However, [Frandsen \(2021\)](#) shows there is considerable bunching below the threshold. In work in progress, we are working to adjust our estimation procedure to account for this selection issue. When we examine the average change in job satisfaction around the discontinuity in panel (b), we find little difference between the elections above and those below the threshold consistent with no effect of union certification.

Away from the discontinuity, the lowest-vote-share bin is a clear outlier in changes in both pay and overall job satisfaction. Both log pay and overall satisfaction jump markedly in establishments where workers vote strongly against unions. Elections in this bin are noteworthy in that fewer than 12.5 percent of votes were ultimately cast for a union, though at least 30 percent of workers in these bargaining units signed the petition calling for an election for union representation. This means that between filing the petition and tallying the votes, (many) workers must have had a change of heart against unionizing. This may be unprovoked, or it could reflect employers offering concessions to their workers to dissuade them from unionizing, which can be an unfair labor practice in violation of the law. Such concessions could arrive as a “bribe” after filing but before the election, or as a promise-keeping reward after the election. In work in progress, we are working to examine the text of workers’ reviews to better understand this dynamic. This outlier also motivates truncation

Figure 4: Change in Overall Rating by Share Voting for a Union



Notes: This figure summarizes the average change in pay or job satisfaction following the filing of a petition, partitioning elections according to the share who voted for a union. Standard errors are clustered by firm. Red vertical bars indicate 95% confidence intervals around each point estimate.

of the sample window to exclude elections that are not competitive enough for the outcome to be uncertain, since underlying our regression discontinuity analysis is the assumption of local continuity in (first-differences of) the outcome around the threshold (Knepper, 2020; Frandsen, 2021).

To capture the causal effect of union certification, we implement a regression discontinuity design combined with a differences-in-differences estimation. In particular, we reconsider equation 2, but instead of allowing the post-election coefficient to non-parametrically vary by election bin, we partition the sample by whether it is above and below the 50-percent threshold and include running variables in the vote share. Our RD-DiD equation is then

$$\begin{aligned}
 Y_{k,p,t,i} = & \beta \mathbb{1}\{\sigma(k,p) - 0.5 > 0\} \times \mathbb{1}\{t \geq \tau_{k,p}\} \\
 & + \beta_{run}^{below} \mathbb{1}\{\sigma(k,p) - 0.5 \leq 0\} \times \mathbb{1}\{t \geq \tau_{k,p}\} \times \sigma(k,p) \\
 & + \beta_{run}^{above} \mathbb{1}\{\sigma(k,p) - 0.5 > 0\} \times \mathbb{1}\{t \geq \tau_{k,p}\} \times \sigma(k,p) \\
 & + \gamma W_{t,i} + \lambda_{k,p} + \lambda_{l(k),t} + \lambda_{p,t} + \epsilon_{k,p,t,i},
 \end{aligned}$$

where we restrict the sample of elections to those for which $\sigma(k,p) \in [0.15, 0.85]$ and consider a secondary, tighter bandwidth of comparison, $[0.30, 0.70]$, as well. We incorporate a piece-wise linear function in the running variable, $\sigma(k,p)$, along each side of the cutoff as in other regression discontinuity studies (e.g., Schmieder et al., 2012; Luca, 2016). We include non-filers to identify trends in pay and satisfaction by industry and place over time, and incorporate establishment fixed effects to extra the change within establishment post-election.

Our coefficient of interest β captures the additive effect on pay or job satisfaction at the discontinuity, in other words, the causal effect from forming a union or voting to collectively bargain over forming a union. The estimates, with and without job title fixed effects, are presented in Table 6.

Reassuringly, in line with other studies that have investigated the causal impact unions have on employee wages in a regression discontinuity framework (e.g., DiNardo and Lee, 2004; Frandsen, 2021), average pay at establishments that unionize falls compared with average pay at establishments that just fail to unionize. Even when comparing similar workers with the same jobs, the effect remains sizable at a 4–7 percent decline. Turning to our focal measure, overall job satisfaction, we find no discernibly negative or positive effect. When accounting for differences between job titles, the effects are negative but imprecise. Even when we consider each of the sub-category ratings of job quality as the dependent variable, we detect no discernible improvements in these aspects of job quality among establishments with successful elections when accounting for differences between jobs. Thus, although a decline in job satisfaction precipitates a petition filing, achieving a successful election does little to improve employee sentiment and, if anything, may sour it further.

Table 6: Post-Election Outcomes by Election Result, Regression Discontinuity

	Log wage		Overall rating	
<i>I. Vote share within 15% and 85%</i>				
Post-election x 1(Majority union)	-0.060*** (0.023)	-0.037** (0.018)	-0.055 (0.098)	-0.161 (0.113)
Job title FE		✓		✓
Filings	1,771	1,757	1,480	1,350
<i>II. Vote share within 30% and 70%</i>				
Post-election x 1(Majority union)	-0.094*** (0.034)	-0.069*** (0.025)	-0.010 (0.131)	-0.068 (0.148)
Job title FE		✓		✓
Filings	1,119	1,105	930	853

Notes: This table summarizes the relationship between log pay or job satisfaction and whether the unionization petition is successful under a regression discontinuity approach. The running variable is the difference between the share voting for a union and one-half. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

Following the literature that analyzes NLRB elections using this regression discontinuity analysis design, we implement a number of robustness exercises to test our modelling decisions. Since ex ante randomness in landing on either side of the threshold underpins

the regression discontinuity framework, and there is less uncertainty for very small bargaining units, we consider a specification in Table D5 where we restrict the sample to only elections with at least twenty votes (e.g., DiNardo and Lee, 2004; Sojourner et al., 2015; Frandsen, 2021) and draw the same conclusions. Next, we allow pay and satisfaction to vary non-linearly with our running variable (pro-union vote share) around the discontinuity by considering a specification that includes a piece-wise quadratic in the running variable (e.g., Gelman and Imbens, 2019; Knepper, 2020). The takeaways again are similar (Table D6). We also consider as an alternative a tally-based running variable that, rather than using the share of votes away from having a majority, uses the total number of votes away from having a majority (e.g., Frandsen, 2021). Again, we draw similar conclusions when we compare elections that just achieved a majority compared with ones that fell just short using both 5-vote and 8-vote bandwidths (Table D7).

5 Mechanisms and Sensitivity

5.1 Job Satisfaction and Whether Election is Successful

In this work, we have studied job satisfaction in the years leading up to and the years following a union representation filing. For our analysis of post-filing outcomes, we partitioned the sample by whether the filing was successful and narrowed in on outcomes for petitions for which the share voting for a union fell around the threshold for a petition being successful. A natural consideration absent from our study of post-filing outcomes though is the possibility that job satisfaction itself, or its deterioration, can affect the outcome of representation elections. In a meta-analysis of studies looking at individual-level voting behavior, Heneman III and Sandver (1983) conclude that nearly all studies reveal a negative relation between job satisfaction and pro-union voting behavior. However, none of the studies included in the meta-analysis that used election-level data considered employee satisfaction, likely due to data limitations, an advantage of the data used here. If this were the case, this could pose a threat to a causal interpretation of our difference-in-difference and regression discontinuity results. Petitions with vote shares slightly above the majority threshold for union success would differ (in a typically unobservable way) from petitions with vote shares just below the threshold, in that one could have worse(ning) job quality than the other.

Given that we observe employee satisfaction in the lead up to petitions and the vote shares for each petition, we can directly test if there is a correlation between the two. To this end, we first require establishment-level employee outcomes for each filing establishment.

Residualizing out differences between industries and places, we estimate

$$Y_{k,p,t,i} = \gamma W_{t,i} + \lambda_{l(k),t} + \lambda_{p,t} + \varepsilon_{k,p,t,i}, \quad (3)$$

again using a weighted regression where each establishment is given equal weight. Taking the fitted values from equation 3, we predict for each observation $\hat{Y}_{k,p,t,i}$. Collapsing to the establishment level by taking the average residual across workers, $\hat{Y}_{k,p}$, expresses establishment-specific pay and establishment-specific satisfaction beyond what one would predict given observable characteristics of the employee and employer. We again consider an alternative, tighter specification that accounts for differences between jobs by including job title fixed effects. Restricting attention to filing establishments $(k,p) \in \mathbb{F}$, we investigate whether the outcome of the petition is related to this measure of residual job satisfaction by estimating

$$\sigma_{k,p} = \beta \overline{\hat{Y}_{k,p}} + \lambda_{l(k)} + \lambda_{t(k,p)} + \lambda_{s(p)} + \mu_{k,p}, \quad (4)$$

where $\sigma_{k,p}$ is a petition-level result related to the share voting for a union. We incorporate fixed effects for the filing year-quarter to account for trends over time ($\lambda_{t(k,p)}$) and differences in attitudes towards union representation that are correlated with industry ($\lambda_{l(k)}$) and U.S. state ($\lambda_{s(p)}$). We present the results in Table 7.

We look first at the share of voters supporting the union in the election, weighting each election by total votes cast. Weighting by vote total minimizes measurement error stemming from elections with very few voters, but gives outsize influence to elections with many voters.¹⁷ We observe that while disparities in pay do not appear to predict whether workers will vote for union representation, job satisfaction does—though the magnitude is small. Establishments where employees exhibit one standard deviation greater satisfaction with their jobs on average are roughly 1.5 percentage points more likely to vote against union representation. Sub-category ratings reveal that this relation largely reflects how workers respond to experiencing greater satisfaction with senior management (Table B6).¹⁸ When we instead consider as an outcome whether a majority voted against unionization, where we weight each petition equally, again we find no discernible effects. Thus, while employees who are more satisfied with management are slightly more likely to vote against a union, it does not change decisions on the margin at the threshold.

¹⁷With regards to the latter, the results are similar if we exclude any petitions accounting for more than 0.5 percent of the cumulative vote total across all petitions (Table D8).

¹⁸It is perhaps not surprising that the more satisfied workers are with their current management, the less likely they are to feel they need a union to represent their interests in dealing with management.

Table 7: Workers’ Pre-Petition Outcomes And Share Voting Against a Union

	Share voting against union		Majority against union	
Standardized overall rating before filing	0.013** (0.006)	0.014* (0.007)	-0.003 (0.011)	-0.004 (0.009)
Standardized log(pay) before filing	-0.002 (0.007)	-0.002 (0.006)	-0.005 (0.010)	-0.007 (0.011)
Job title FE		✓		✓
Elections	1,947	1,776	1,957	1,786
R-squared	0.58	0.59	0.14	0.14
Outcome mean	0.358	0.351	0.292	0.297

Notes: This table summarizes the relationship between pay or job satisfaction and the share of votes in the certification election that are against the union. Elections are weighted by their vote totals in the first two columns and equally weighted in the latter two. Each regression includes industry, state, and election year-quarter fixed effects. Standard errors are clustered by state. Significance levels: * 10%, ** 5%, *** 1%

5.2 Identity Concealment

One possibility is that union representation increases workers’ willingness to openly disclose negative aspects of their work. In this case, the further decline, if any, in reported job quality we document following a winning election in Table 6 may reflect a composition shift towards workers with more-negative sentiment towards their firm or an increased willingness for workers to openly speak out about their jobs which would capture a within-worker shift, rather than a real reduction in average job quality. Workers with negative information to share may be reluctant to disclose out of fear of employer retaliation and thus, may turn to identity concealment as a means by which to mitigate this risk while still speaking out (Sockin and Sojourner, Forthcoming).

We investigate this possibility by analyzing an indicator for whether the worker chooses to conceal their job title as the outcome. When considering both all reviews and just reviews relaying negative sentiment, the likelihood that a respondent discloses their job title does not change meaningfully following a filing (Table 8). A change in reporting due to an effect of certification on concerns about retaliation risk does not appear to contribute to the effect, if any, certification has on satisfaction. It should be noted though that unhappy workers at soon-to-file establishments may not have feared employer retaliation any more so than workers at never-filing establishments, given that, as shown in the first two columns, their rates of concealment when relaying negative sentiment were comparable in the lead up a petition being filed.

Table 8: Job Title Concealment and Petition Filing

	Before filing		After filing			
	All reviews	1-3 stars reviews	All reviews	1-3 stars reviews	All reviews	1-3 stars reviews
1(Filing establishment)	0.011*	-0.000				
	(0.006)	(0.008)				
1(After petition is filed)			-0.017	-0.006		
			(0.015)	(0.020)		
1(After petition is filed) $\times$ 1(Majority union)			0.011	-0.005		
			(0.018)	(0.023)		
Post-election x vote share for union					0.090	-0.065
					(0.100)	(0.132)
Post-election x vote share for union x 1(Majority union)					-0.075	0.057
					(0.161)	(0.235)
Post-election x 1(Majority union)					-0.001	-0.001
					(0.026)	(0.040)
N	6,532,550	2,884,071	5,503,122	2,274,591	5,487,537	2,267,891
Filings	2,243	1,731	2,149	1,637	1,480	1,129
Std. dev. DV	0.307	0.335	0.322	0.349	0.322	0.349

Notes: This table summarizes whether employees from filing establishments conceal their job title in their employer reviews differently from employees at non-filing establishments before and after the petition. For regression discontinuity analysis, the range of vote shares included is 15–85 percent for the union. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

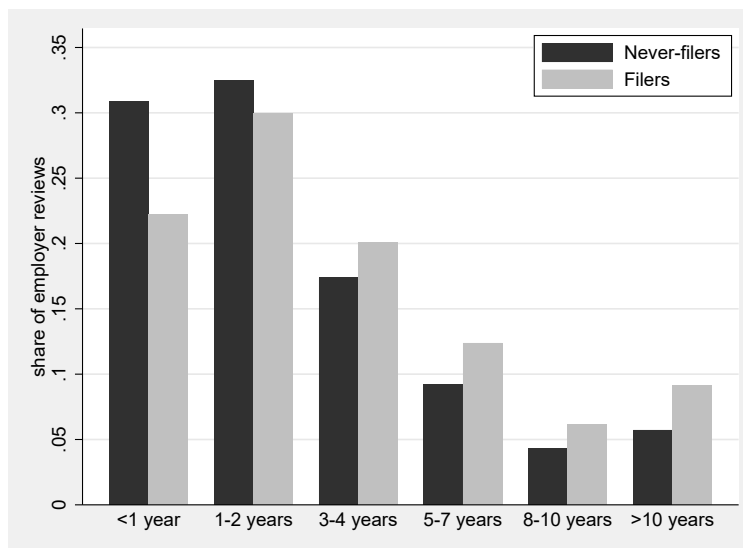
5.3 Long Tenure-Dissatisfaction Puzzle

Earlier we highlighted the puzzling pattern that unionized workers tend to report more job dissatisfaction but quit less often (Freeman, 1978). Building off the exit-voice theory of Hirschman (1970), this gave rise to a theory that, by promoting employee voice for improvements within a current employer, unions make staying and fighting a more attractive alternative to quitting (Freeman, 1980; Bryson et al., 2010). This finding is especially surprising given the close link between job satisfaction and turnover (Akerlof et al., 1988). The literature’s understanding of this puzzle though stems from studies of unionized workers after they have already unionized. Because our setting gives insight to pre-filing outcomes, by looking at workers before they (attempt to) unionize, and causal post-filing outcomes, by looking at close elections where unions only modestly achieve a majority, this study can shed unique light on this puzzle. In particular, we offer novel evidence on whether long-tenure workers select into unionization, unionization induces longer tenure, or both.

We caveat though that our measure for a worker’s firm tenure from employer reviews, while informative, is coarse. Employees report their tenure in discrete bins: less than 1 year, 1–2 years, 3–4 years, 5–7 years, 8–10 years, and more than 10 years. Looking at the distribution of workers across these six tenure bins for establishments that file an NLRB

petition and for those that do not in Figure 5 reveals a clear disparity between the two. Whereas 30.8 percent of workers at never-filing establishments report having tenure with the firm of less than one year, only 22.2 percent of workers at filing firms do. Such a gap is also present for 1-2 years of firm tenure though it is smaller at a difference of 2.5 percentage points. These disparities in short tenure translate into a greater frequency of each category of longer tenure among workers at filing establishments. Whether this disparity reflects pre- or post-unionization dynamics is unclear just from partitioning by filing and thus motivates the analysis in Table 9. For ease of exposition, we partition workers into either long tenure or not by whether they report having been employed with the firm for at least three years. We then repeat the pre-filing and post-election analyses of Sections 3 and 4, but use as the outcome an indicator for an employee being long-tenured.

Figure 5: Distribution of Employer Reviews by Firm Tenure



Notes: This figure displays the share of Glassdoor reviews within each firm tenure bin partitioned by whether the establishment never files a petition over our sample period (dark gray, left bars) or does file a petition (light gray, right bars).

Pre-filing employees at soon-to-file establishments are substantially more likely to be long-tenured than those at never-filing establishments, *even well before* the union petition filing. Employees at filing establishments are 5 percentage points more likely to be long-tenured in the three years leading up to a petition filing, 14 percent above the sample average for never-filers. Thus, the puzzle of longer tenure and more job dissatisfaction was present among filers before the unionization effort. Looking at the possible effects unionization has on employee tenure, we find little evidence that unionization induces longer tenure. Both through the difference-in-differences and regression discontinuity approaches, workplaces where workers voted to unionize do not exhibit an increased propensity for workers to be long-tenured after

the election.

This suggests that unions causing workers to remain in their jobs longer despite being dissatisfied is not the principal driver behind this puzzling relation. Instead, places with long-tenured workers who are increasingly dissatisfied seek out union representation. What forces then might be at play if not for the substitution between exit and voice? Perhaps such workers have comparatively low bargaining power, are particularly immobile, or underestimate their outside options. Perhaps such firms make long-term promises that they do not keep or shift their priorities toward new hires or newer establishments, stunting satisfaction among long-tenured employees in the process. Further research into these possible channels we believe may prove fruitful.

Table 9: Whether Employee Has Tenure of 3+ Years and Petition Filing

	Before filing		After filing			
1(Filing establishment)	0.048*** (0.009)	0.050*** (0.009)				
1(After petition is filed)			0.001 (0.024)	0.006 (0.026)		
1(After petition is filed) $\times$ 1(Majority union)			-0.015 (0.028)	-0.014 (0.030)		
Post-election x vote share for union					-0.192 (0.156)	-0.137 (0.174)
Post-election x vote share for union x 1(Majority union)					0.164 (0.252)	0.030 (0.284)
Post-election x 1(Majority union)					0.005 (0.043)	0.017 (0.047)
Job title FE		✓		✓		✓
N	4,907,811	4,025,813	4,068,301	3,254,100	4,056,802	3,244,469
Filings	1,842	1,675	1,906	1,718	1,311	1,186
Std. dev. DV	0.482	0.480	0.485	0.483	0.485	0.483

Notes: This table summarizes the incidence of whether employees from filing establishments have been employed with the firm for at least three years in their employer reviews compared with employees at non-filing establishments before and after the petition. For regression discontinuity analysis, the range of vote shares included is 15–85 percent for the union. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

6 Conclusion

Since the onset of the COVID-19 pandemic, there has been a resurgence in workers seeking out union representation, with petition filings rising 57 percent between the first half of Fiscal Year 2021 and the first half of Fiscal Year 2022 (NLRB, 2022). What might be fueling this rebound?

Our work offers evidence that it is not necessarily the quest for greater pay, but rather a souring of satisfaction and implicitly a reduction in job quality that predicts filing for unionization. This finding echoes news coverage of recent unionization drives at high-profile companies. At one Chipotle establishment, the worker who initiated the NLRB petition filing referred to their establishment as being “understaffed, employees aren’t properly trained, and it’s not, like, the cleanest” (Furman, 2022). Workers at multiple Amazon warehouses have walked out on the job demanding better working conditions, such as addressing discrimination, improving workplace safety, and extending short break times.¹⁹ The union representing Starbucks establishments that have unionized includes on their website a list of demands; rather than mentioning pay, this list includes fifteen non-economic proposals related to aspects of work such as respect and dignity, health and safety, and hours and scheduling.²⁰

More broadly, the United States has seen a structural decline in unionization over the last half-century (Farber et al., 2021). In 2022, 11.3 percent of all wage and salary workers and only 6.8 percent of those in the private sector were represented by a union.²¹ In the 1940s and 1950s though, the unionized share of the U.S. workforce hovered around one-third (Farber et al., 2021). There’s a debate about how much of the decline is due to falling worker demand for unionization, increasing employer opposition, or other factors (Nunn et al., 2019). Some aspects of job quality have improved, which may be expected to reduce worker demand for unionization. For example, since that passage of the Occupational Safety and Health Act of 1970, the incidence rate of non-fatal occupational injuries and illnesses in the private sector has fallen nearly four-fold (Brown, 2020). Moreover, production and non-supervisory workers’ average weekly hours in the private sector have fallen from upwards of 38 hours per week in the mid-1960s to about 34 hours since the 2000s.²² On the other hand, Kochan et al. (2019) report evidence from surveys across decades that worker demand for unionization has not fallen. Though consistent data on job quality dating back to the times of high U.S. unionization rates are hard to come by, determining whether and to what extent rising job quality has contributed to the decline in unionization may prove a fruitful line of research.

Alternatively, more vigorous and sometimes unlawful managerial opposition to unionization offers another potential explanation (McNicholas et al., 2019; Wang and Young, 2021). Some employers go to great lengths to prevent their establishments from unionizing, possibly since there is evidence that unionization reduces profits (Lee and Mas, 2012). Opposition

¹⁹See, for instance, Blumberg (2022) and Press (2022).

²⁰See <https://sbworkersunited.org/noneconomic-proposals>.

²¹See <https://www.bls.gov/news.release/pdf/union2.pdf>.

²²Bureau of Labor Statistics average work week hours.

can include using costly anti-union consultants, law firms, psychologists, and communications specialists to persuade workers not to support the union. More than three-quarters of employers hire outside consultants when confronted with a union organizing drive (Logan, 2006) and McNicholas et al. (2019) estimate that over the 2014-2017 period, employers spent at least \$340 million annually hiring union-avoidance consultants. The fierce resistance from employers may include illegal activity as well, such as violating workers’ rights (e.g., Borage, 2023). If anything, firms may even have an incentive to combat unionization illegally since the penalty for violating the National Labor Relations Act and its enforcement regimes may not create a sufficient incentive for employers to comply (Freeman and Kleiner, 1990a; Stansbury, 2021).

This work highlights the potential of union-substitution strategies, such as monitoring employee satisfaction and investing in job quality, to deter unionization as a viable alternative to union-suppression strategies (Fiorito et al., 1987). Evidence suggest that employers may be starting to consider such tactics, for instance, tracking “team member sentiment” as one indicator for gauging the risk of a union forming at different establishments (Peterson, 2020). Monitoring employee satisfaction in real time can detect whether sentiment is deteriorating within an establishment; and if satisfaction is in decline, investing in job quality can help to reverse it. Even simply making workers feel more respected can meaningfully improve employee satisfaction (Sockin, 2022). On the other hand, hiring anti-union consultants in the midst of an organizing drive does little to improve the underlying working conditions within the establishment. To quote Heneman III and Sandver (1983), “Programs to assess and improve employee satisfaction thus could have long-term payoffs in defeating the union during an election. Although no relevant data are available, such activities might also lessen the probability of an election ever occurring.” Now that such data are available, this study illustrates the potential efficacy of union-substitution strategies.

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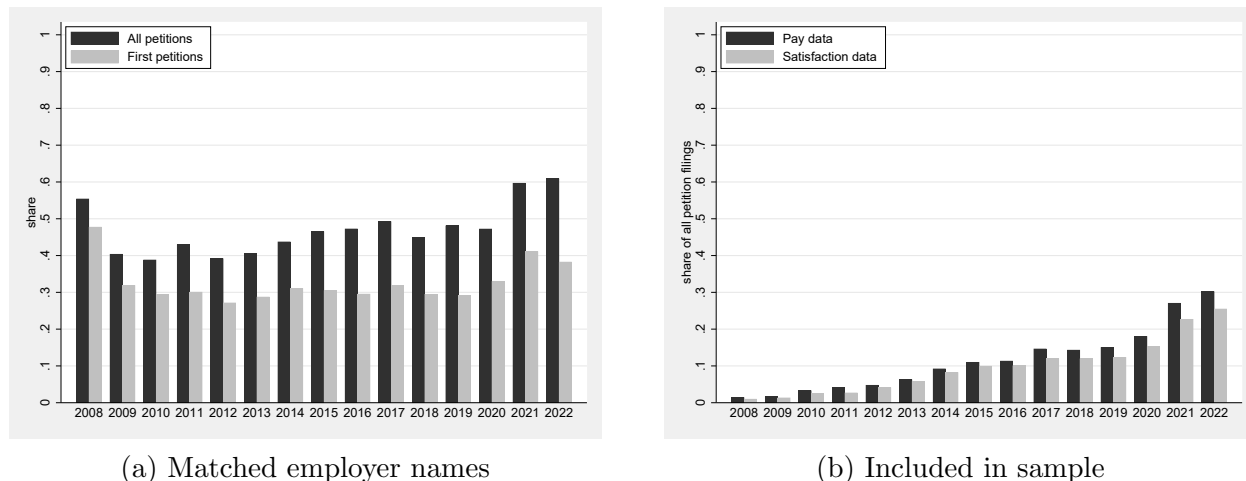
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Internet Appendix for Will I Ever Be Satisfied? Job Quality and Unionization

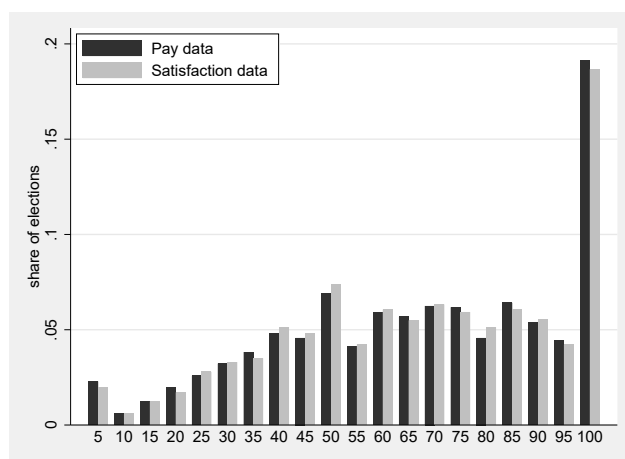
A Additional Summary Information

Figure A1: Petition Filings Matched with Glassdoor Data by Year Filed



Notes: This figure displays the share of NLRB filings matched with Glassdoor data. Panel (a) reveals the share for which the employer (not necessarily employer-city) can be matched in Glassdoor, while panel (b) reveals the share of each year's petitions included in our sample, i.e., for which both the employer-city can be matched and data are available within the three calendar years before the petition is filed.

Figure A2: Petition Filings Matched with Glassdoor Data by Election Vote Share



Notes: This figure displays the distribution of NLRB filings matched with Glassdoor data by the share who voted for a union in the election. Filings are partitioned into twenty 5-percentage-points bins, where the vote shares displayed on the x-axis reflect the upper limit on each bin.

Figure A3: Pay Report Form


Enter Pay Details

It only takes a minute! Adding your anonymous review will help other job seekers like yourself. To start, what is your base pay as a Graduate Student?



Graduate Student
 University of Pennsylvania
 Philadelphia, PA (US)

Edit

Base Pay *

Per *

Year

Currency *

US Dollar (USD)

Next

Notes: This figure displays the form for submitting a Glassdoor pay report.

Table A1: Summary Statistics for Glassdoor Sample, Additional Measures

Measure	Filing establishments					Non-filing establishments				
	N	Mean	Standard deviation	Min	Max	N	Mean	Standard deviation	Min	Max
<i>Panel A. Pay data</i>										
1(Receives cash bonus)	390	0.12	0.32	0	1	14,800	0.13	0.34	0	1
1(Receives stock bonus)	390	0.01	0.09	0	1	14,800	0.01	0.10	0	1
1(Receives profit sharing)	390	0.01	0.11	0	1	14,800	0.01	0.12	0	1
1(Receives sales commission)	390	0.03	0.17	0	1	14,800	0.06	0.23	0	1
1(Receives tips or gratuities)	390	0.02	0.14	0	1	14,800	0.02	0.13	0	1
Firm employees in thousands	390	40.61	83.18	0	618	14,700	20.56	72.71	0	10000
Firm age in years	359	59.68	43.72	0	386	12,100	50.17	44.25	0	430
Establishments per firm	390	445.96	916.92	1	5270	14,800	346.37	872.07	1	8343
<i>Panel B. Satisfaction data</i>										
Pros share of review text	153	0.44	0.18	0	1	6,573	0.48	0.19	0	1
Firm employees in thousands	153	41.80	84.15	0	618	6,532	22.58	75.79	0	10000
Firm age in years	141	59.61	44.04	0	386	5,373	48.99	43.29	0	430
Establishments per firm	153	458.71	941.77	1	5270	6,573	392.69	944.37	1	8343

Notes: This table provides summary statistics for pay and satisfaction data in Glassdoor, partitioned according to whether the establishment files a petition from 2008 to 2022.

Figure A4: Employer Review Form

Rate a Company

It only takes a minute! And your anonymous review will help other job seekers.



Company
University of Pennsylvania

Overall Rating *



Are you a current or former employee?

☒ Current Employee ☐ Former Employee

Employment Status *

Full-time

Your Job Title at University of Pennsylvania

Graduate Student

Review Headline *

This is a sample review.--

Pros *

Share some of the best reasons to work at University of Pennsylvania

5 word minimum

Cons *

Share some of the downsides of working at University of Pennsylvania

5 word minimum

Advice for management?

Share suggestions for how management can improve working at University of Pennsylvania

Ratings (Optional)

Career Opportunities



Compensations & Benefits



Culture & Values



Diversity & Inclusion



Senior Management



Work/ Life Balance



Keep it Real

Thank you for contributing to the community. Your opinion will help others make decisions about jobs and companies.

Please stick to the [Community Guidelines](#) and do not post:

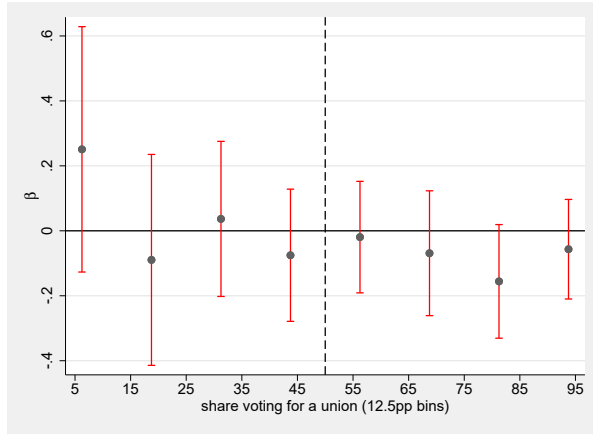
- Aggressive or discriminatory language
- Profanities
- Trade secrets/confidential information

Thank you for doing your part to keep Glassdoor the most trusted place to find a job and company you love. See the [Community Guidelines](#) for more details.

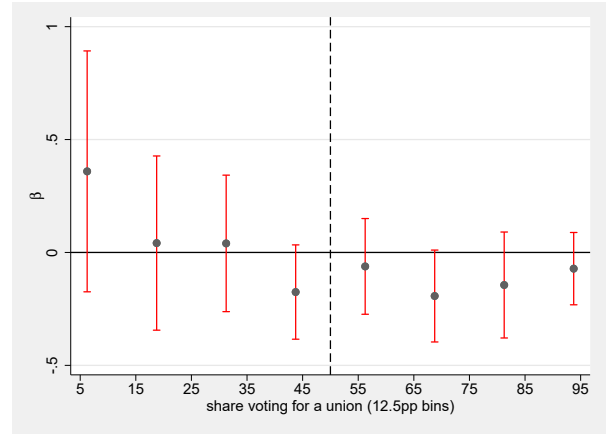
Notes: This figure displays the form for submitting a Glassdoor employer review.

B Results for Satisfaction Sub-Categories

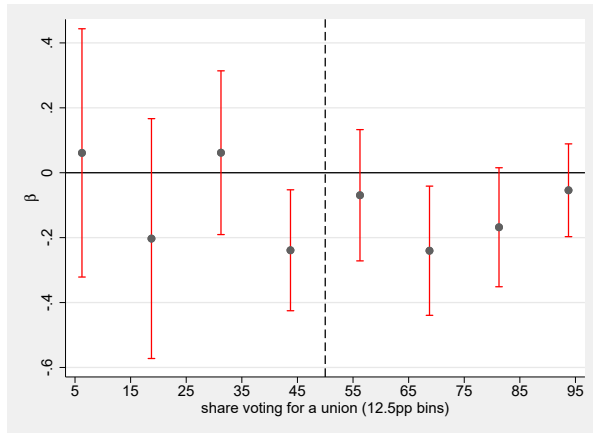
Figure B1: Change in Employee Outcomes by Share Voting for a Union



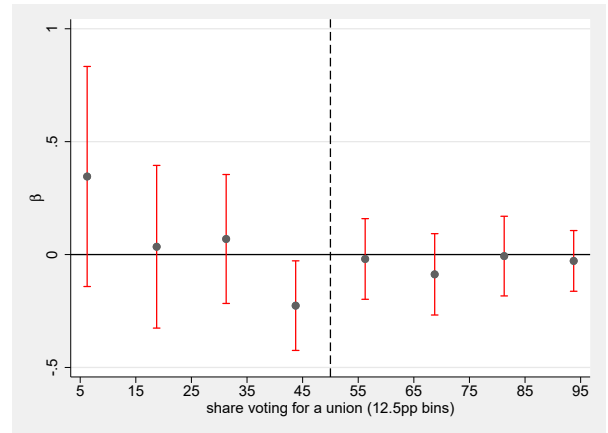
(a) Career opportunities



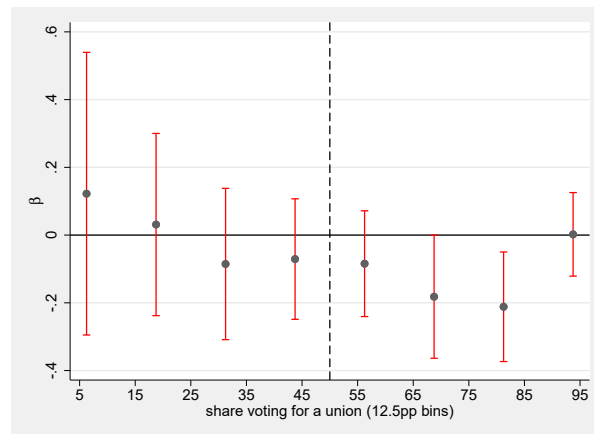
(b) Culture & values



(c) Senior leadership



(d) Work-life balance



(e) Compensation & benefits

Notes: These figures summarize the average change on aspects of job quality following the filing of a petition, partitioning elections according to the share who voted for a union. Standard errors are clustered by firm. Red vertical bars indicate 95% confidence intervals around each point estimate.

Table B1: Employee Satisfaction With Aspects of Job and Whether Employees Soon File a Unionization Petition

	Career opportunities	Compensation & benefits	Culture & values	Senior management	Work-life balance
<i>Panel A. Without job title FE</i>					
1(Filing establishment)	-0.080** (0.035)	0.070 (0.065)	-0.153*** (0.056)	-0.240*** (0.034)	-0.184*** (0.026)
N	5,692,017	5,687,259	5,429,517	5,629,488	5,686,417
Filings	2,169	2,170	1,909	2,161	2,168
Std. dev. DV	1.465	1.389	1.524	1.558	1.445
<i>Panel B. With job title FE</i>					
1(Filing establishment)	-0.011 (0.027)	0.088** (0.039)	-0.090** (0.038)	-0.159*** (0.031)	-0.141*** (0.023)
N	4,617,434	4,611,612	4,441,459	4,564,054	4,610,230
Filings	1,931	1,931	1,725	1,923	1,929
Std. dev. DV	1.461	1.390	1.516	1.554	1.445

Notes: This table summarizes the relationship between aspects of job quality and whether the establishment files a unionization petition within the next three calendar years. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

Table B2: Workers' Sub-Category Outcomes Before a Union Petition is Filed, Time Trend

	Career opportunities	Compensation & benefits	Culture & values	Senior management	Work-life balance
1(Before petition is filed)	-0.131*** (0.043)	0.011 (0.057)	-0.222*** (0.055)	-0.283*** (0.043)	-0.225*** (0.038)
1(Before petition is filed) $\times$ half-years from filing	-0.017*** (0.006)	-0.018** (0.007)	-0.021*** (0.008)	-0.018*** (0.007)	-0.014* (0.007)
N	5,700,808	5,696,062	5,436,944	5,638,183	5,695,222
Filings	2,351	2,350	2,047	2,340	2,350
Std. dev. DV	1.465	1.389	1.524	1.558	1.445

Notes: This table summarizes the relationship between aspects of job quality and whether the establishment files a unionization petition within the next six calendar years, allowing for a linear trend over time. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

Table B3: Workers' Outcomes Across Establishments within Firms

	Career opportunities	Compensation & benefits	Culture & values	Senior management	Work-life balance
<i>Panel A. Without job title FE</i>					
1(Filing establishment)	-0.068*** (0.025)	-0.038 (0.023)	-0.094*** (0.026)	-0.090*** (0.028)	-0.048* (0.026)
Firm FE	✓	✓	✓	✓	✓
N	5,566,285	5,561,722	5,308,555	5,503,952	5,560,820
Filings	2,118	2,121	1,869	2,109	2,120
Std. dev. DV	1.465	1.390	1.523	1.556	1.447
<i>Panel B. With job title FE</i>					
1(Filing establishment)	-0.049* (0.026)	-0.035 (0.025)	-0.090*** (0.028)	-0.085*** (0.029)	-0.066** (0.027)
Firm FE	✓	✓	✓	✓	✓
N	4,492,375	4,486,736	4,319,864	4,439,214	4,485,267
Filings	1,876	1,878	1,679	1,868	1,876
Std. dev. DV	1.461	1.390	1.516	1.552	1.447

Notes: This table summarizes the relationship between aspects of job quality and whether the establishment files a unionization petition within the next three calendar years when firm fixed effects are included. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

Table B4: Post-Election Outcomes by Election Result, Difference-in-Differences

	Career opportunities	Compensation & benefits	Culture & values	Senior management	Work-life balance
<i>Panel A. Without job title FE</i>					
1(After petition is filed)	0.031 (0.061)	-0.006 (0.055)	-0.016 (0.070)	-0.041 (0.065)	-0.036 (0.065)
1(After petition is filed) × 1(Majority union)	-0.083 (0.072)	-0.065 (0.064)	-0.044 (0.083)	-0.053 (0.076)	0.002 (0.075)
N	4,769,866	4,766,518	4,529,000	4,715,515	4,765,785
Filings	2,075	2,073	1,999	2,066	2,073
Std. dev. DV	1.471	1.384	1.536	1.565	1.452
<i>Panel B. With job title FE</i>					
1(After petition is filed)	-0.019 (0.066)	-0.042 (0.062)	-0.022 (0.078)	-0.106 (0.068)	-0.035 (0.072)
1(After petition is filed) × 1(Majority union)	-0.052 (0.082)	-0.055 (0.074)	-0.087 (0.094)	-0.012 (0.082)	0.001 (0.084)
N	3,765,815	3,761,330	3,606,535	3,720,014	3,760,278
Filings	1,880	1,874	1,810	1,866	1,875
Std. dev. DV	1.464	1.382	1.524	1.557	1.449

Notes: This table summarizes the change in aspects of job quality after a unionization election for elections that achieved majority support for a union. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

Table B5: Sub-Category Outcomes by Election Result, Regression Discontinuity

	Career opportunities	Compensation & benefits	Culture & values	Senior management	Work-life balance
<i>Panel A. Without job title FE</i>					
<i>I. Vote share within 15% and 85%</i>					
Post-election x 1(Majority union)	0.110 (0.101)	-0.066 (0.096)	0.061 (0.125)	0.001 (0.109)	-0.035 (0.112)
Filings	1,428	1,426	1,371	1,421	1,428
<i>II. Vote share within 30% and 70%</i>					
Post-election x 1(Majority union)	0.162 (0.132)	0.012 (0.132)	0.258 (0.165)	0.156 (0.144)	0.021 (0.156)
Filings	896	895	862	892	895
<i>Panel B. With job title FE</i>					
<i>I. Vote share within 15% and 85%</i>					
Post-election x 1(Majority union)	-0.006 (0.117)	-0.130 (0.106)	-0.093 (0.136)	-0.140 (0.131)	-0.054 (0.117)
Filings	1,301	1,297	1,247	1,287	1,297
<i>II. Vote share within 30% and 70%</i>					
Post-election x 1(Majority union)	0.006 (0.156)	-0.154 (0.142)	0.017 (0.180)	-0.072 (0.173)	-0.042 (0.164)
Filings	821	818	789	812	818

Notes: This table summarizes the relationship between aspects of job quality and whether the unionization petition is successful under a regression discontinuity approach. The running variable is the difference between the share voting for a union and one-half. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

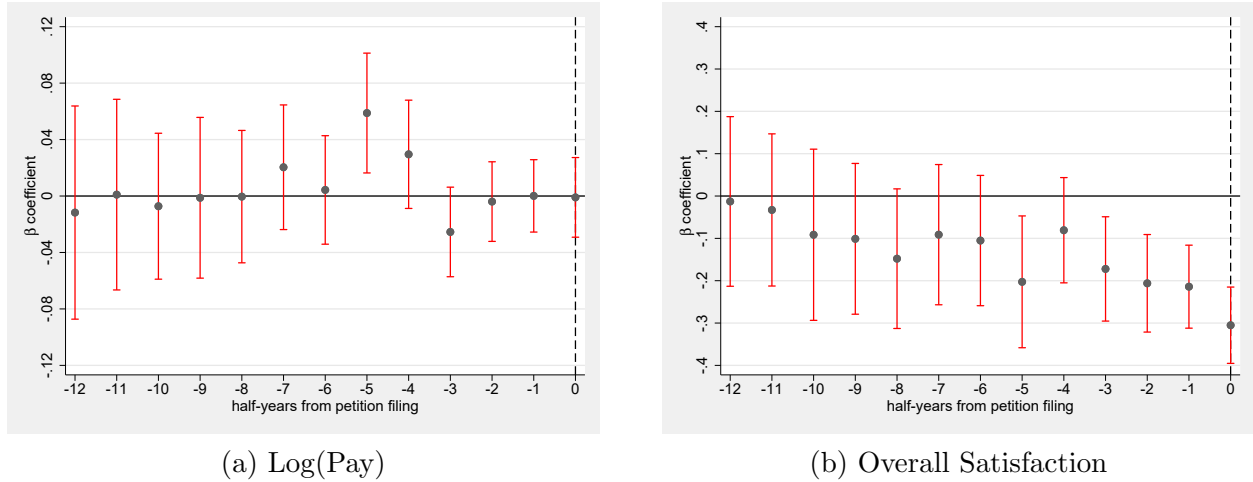
Table B6: Workers' Pre-Petition Sub-Category Outcomes And Share Voting Against a Union

	Career opportunities	Compensation & benefits	Culture & values	Senior management	Work-life balance
<i>Panel A. Without job title FE</i>					
Standardized rating before filing	0.012 (0.009)	0.005 (0.009)	0.014* (0.007)	0.022*** (0.007)	0.002 (0.006)
Standardized log(pay) before filing	-0.003 (0.007)	-0.003 (0.007)	-0.005 (0.007)	-0.002 (0.007)	-0.002 (0.007)
Elections	1,886	1,888	1,702	1,880	1,886
Outcome mean	0.357	0.357	0.413	0.356	0.357
<i>Panel B. With job title FE</i>					
Standardized rating before filing	0.014 (0.009)	0.005 (0.010)	0.018** (0.007)	0.021*** (0.006)	0.009 (0.006)
Standardized log(pay) before filing	-0.006 (0.008)	-0.006 (0.008)	-0.008 (0.008)	-0.005 (0.008)	-0.005 (0.008)
Elections	1,717	1,720	1,559	1,713	1,718
Outcome mean	0.350	0.350	0.417	0.350	0.351

Notes: This table summarizes the relationship between aspects of job quality and the share of votes in the certification election that are against the union. Each election is weighted by its vote total. Standard errors are clustered by state. Significance levels: * 10%, ** 5%, *** 1%

C Additional Results

Figure C1: Trends in Hourly Wage and Overall Satisfaction Leading up to Petition Filing without Control for Job Title



Notes: These figures summarize the dynamics of log pay and overall job satisfaction in the six calendar years leading up to a petition filing for filing establishments when job title fixed effects are not incorporated. Standard errors are clustered by firm. Red vertical bars indicate 95% confidence intervals around each point estimate.

Table C1: Workers' Outcomes Before a Union Petition is Filed, Time Trend

	Log wage		Overall rating	
1(Before petition is filed)	0.003 (0.011)	0.048*** (0.008)	-0.222*** (0.043)	-0.175*** (0.038)
1(Before petition is filed) $\times$ half-years from filing	-0.001 (0.002)	0.001 (0.001)	-0.017*** (0.006)	-0.020*** (0.007)
Job title FE		✓		✓
N	14,833,691	14,411,679	6,541,775	5,365,426
Filings	2,873	2,836	2,413	2,184
Std. dev. DV	0.589	0.589	1.411	1.401

Notes: This table summarizes the relationship between pay or job satisfaction and whether the establishment files a unionization petition within the next six calendar years, allowing for a linear trend over time. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

Table C2: Text-Based Measure of Workers Satisfaction Before a Union Petition is Filed

	Pros share of review text	
1(Filing establishment)	-0.029*** (0.004)	-0.021*** (0.003)
Job title FE		✓
N	6,532,550	5,358,346
Filings	2,243	2,010
Std. dev. DV	0.185	0.184

Notes: This table summarizes the relationship between the share of an employee's review text apportioned to the 'Pros' section and whether the establishment files a unionization petition within the next three calendar years. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

Table C3: Additional Measures of Earnings Before a Union Petition is Filed

		Type of VP				
	Any VP	Cash bonus	Stock bonus	Profit sharing	Sales commission	Tips or gratuities
<i>Panel A. Without job title FE</i>						
1(Filing establishment)	-0.027 (0.019)	-0.014*** (0.005)	0.003 (0.005)	-0.004*** (0.002)	-0.027*** (0.004)	0.009 (0.015)
N	14,951,961	14,951,961	14,951,961	14,951,961	14,951,961	14,951,961
Filings	2,722	2,722	2,722	2,722	2,722	2,722
Std. dev. DV	0.404	0.340	0.105	0.118	0.234	0.135
<i>Panel B. With job title FE</i>						
1(Filing establishment)	-0.006 (0.009)	0.001 (0.005)	0.004 (0.004)	-0.002 (0.002)	-0.011*** (0.003)	0.001 (0.005)
N	14,527,098	14,527,098	14,527,098	14,527,098	14,527,098	14,527,098
Filings	2,684	2,684	2,684	2,684	2,684	2,684
Std. dev. DV	0.404	0.340	0.105	0.117	0.234	0.136

Notes: This table summarizes the relationship between the receipt of variable pay and whether the establishment files a unionization petition within the next three calendar years. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

Table C4: Workers' Outcomes Before a Union Petition is Filed by U.S. Region

	Log wage		Overall rating	
1(Filing establishment)	0.017 (0.014)	0.052*** (0.010)	-0.188*** (0.048)	-0.117*** (0.042)
1(Filing establishment) x Midwest	0.000 (0.021)	-0.009 (0.014)	0.017 (0.062)	-0.044 (0.062)
1(Filing establishment) x Northeast	-0.024 (0.018)	-0.016 (0.013)	0.026 (0.060)	-0.006 (0.063)
1(Filing establishment) x South	-0.009 (0.021)	0.000 (0.017)	0.018 (0.059)	0.008 (0.059)
Job title FE		✓		✓
N	14,795,130	14,374,209	6,524,817	5,351,870
Filings	2,710	2,672	2,241	2,008
Std. dev. DV	0.589	0.588	1.411	1.401

Notes: This table summarizes the relationship between log pay or job satisfaction and whether the establishment files a unionization petition within the next three calendar years by U.S. Census region. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

Table C5: Workers' Outcomes Before a Union Petition is Filed, Accounting for Firm Bigness

	Log wage		Overall rating	
1(Filing establishment)	-0.008 (0.009)	0.029*** (0.006)	-0.090** (0.045)	-0.057* (0.030)
Log firm employment	0.015*** (0.001)	0.011*** (0.001)	-0.015*** (0.003)	-0.017*** (0.002)
Log firm age	-0.017*** (0.002)	-0.007*** (0.001)	-0.010** (0.005)	-0.006 (0.004)
Log firm locations	-0.026*** (0.002)	-0.012*** (0.001)	-0.031*** (0.003)	-0.025*** (0.003)
Job title FE		✓		✓
N	12,044,632	11,680,679	5,316,699	4,349,958
Filings	2,242	2,211	1,884	1,693
Std. dev. DV	0.603	0.603	1.397	1.389

Notes: This table summarizes the relationship between log pay or job satisfaction and whether the establishment files a unionization petition within the next three calendar years, incorporating three proxies for firm size. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

Table C6: Workers' Outcomes Before a Union Petition is Filed, Worker Composition

	Pay Data		Stacked Pay and Satisfaction Data	
	Years experience	Salaried	Full time	Current employee
<i>Panel A. Without job title FE</i>				
1(Filing establishment)	-0.138 (0.136)	-0.036*** (0.013)	0.051*** (0.012)	0.059*** (0.006)
N	14,951,961	14,814,029	21,650,871	21,650,871
Filings	2,722	2,717	3,049	3,049
Std. dev. DV	6.987	0.499	0.421	0.490
<i>Panel B. With job title FE</i>				
1(Filing establishment)	0.087 (0.094)	0.010* (0.006)	0.042*** (0.006)	0.050*** (0.006)
N	14,527,098	14,392,473	20,322,010	20,322,010
Filings	2,684	2,679	2,953	2,953
Std. dev. DV	6.943	0.499	0.414	0.490

Notes: This table summarizes the relationship between worker observables and whether the establishment files a unionization petition within the next three calendar years. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

Table C7: Correlation of Average Job Satisfaction and Average Pay Across Establishments

	Overall rating	
Log(pay)	0.395*** (0.007)	0.277*** (0.005)
Firm FE		✓
N	1,066,629	1,066,629
Std. dev. DV	1.060	1.060

Notes: This table summarizes the relationship between job satisfaction and log pay across establishments in our sample. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

D Robustness

Table D1: Pre- and Post-Petition Outcomes Looking Only at Current Employees

	Before filing		After filing			
1(Filing establishment)	-0.178*** (0.035)	-0.116*** (0.030)				
1(After petition is filed) × 1(Majority union)			-0.092* (0.050)	-0.110* (0.061)		
Post-election x vote share for union					0.125 (0.492)	-0.177 (0.504)
Post-election x vote share for union x 1(Majority union)					-0.344 (0.764)	0.575 (0.863)
Post-election x 1(Majority union)					-0.049 (0.121)	-0.185 (0.143)
Job title FE		✓		✓		✓
N	3,675,202	3,004,502	2,985,470	2,362,397	2,976,376	2,354,848
Filings	1,697	1,470	1,627	1,424	1,112	977
Std. dev. DV	1.286	1.274	1.296	1.280	1.296	1.280

Notes: This table summarizes the relationship between log pay or job satisfaction and whether the establishment files a unionization petition within the next three calendar years using only workers still employed at each establishment. For regression discontinuity analysis, the range of vote shares included is 15–85 percent for the union. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

Table D2: Workers' Outcomes Across Establishments within Firms, Tighter Comparison

	Log wage		Overall rating	
1(Filing establishment)	-0.005 (0.009)	0.041*** (0.006)	-0.188*** (0.037)	-0.139*** (0.032)
Job title FE		✓		✓
N	12,093,391	11,717,532	5,101,494	4,132,506
Filings	2,361	2,322	1,917	1,681
Std. dev. DV	0.588	0.587	1.415	1.404

Notes: This table summarizes the relationship between log pay or job satisfaction and whether the establishment files a unionization petition within the next three calendar years. Each regression includes worker observables and industry x locality x year-quarter fixed effects. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

Table D3: Workers' Outcomes Before a Union Petition is Filed, Observation Count FE

	Log wage		Overall rating	
1(Filing establishment)	0.007 (0.009)	0.044*** (0.006)	-0.141*** (0.037)	-0.104*** (0.030)
Job title FE		✓		✓
N	14,814,029	14,392,473	6,532,550	5,358,346
Filings	2,717	2,679	2,243	2,010
Std. dev. DV	0.589	0.589	1.411	1.401

Notes: This table summarizes the relationship between log pay or job satisfaction and whether the establishment files a unionization petition within the next three calendar years, incorporating fixed effects for each establishment's Glassdoor observation count. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

Table D4: Employee Outcomes Leading Up to a Unionization Petition, Time Trend with Semi-Balanced Panel, Across Jobs

	Log wage		Overall rating	
1(Before petition is filed)	0.020 (0.012)	0.055*** (0.008)	-0.206*** (0.041)	-0.174*** (0.037)
1(Before petition is filed) $\times$ half-years from filing	0.000 (0.002)	0.001 (0.001)	-0.015** (0.006)	-0.019*** (0.006)
Job title FE		✓		✓
N	14,832,326	14,410,358	6,541,072	5,364,837
Filings	2,098	2,083	1,930	1,771
Std. dev. DV	0.589	0.589	1.411	1.401

Notes: This table summarizes the relationship between pay or job satisfaction and whether the establishment files a unionization petition within the next six calendar years, allowing for a linear trend over time and excluding filing establishments that are observed in fewer than six of the twelve half-years preceding the filing. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

Table D5: Post-Election Outcomes using Regression Discontinuity, Only Elections With 20 or More Votes

	Log wage		Overall rating	
Post-election x 1(Majority union)	-0.105*** (0.040)	-0.062** (0.029)	-0.012 (0.139)	-0.217 (0.159)
Job title FE		✓		✓
N	13,071,173	12,658,880	5,469,614	4,379,096
Filings	801	790	668	607
Std. dev. DV	0.585	0.585	1.425	1.409

Notes: This table summarizes the relationship between log pay or job satisfaction and whether the unionization petition is successful under a regression discontinuity approach, excluding elections with fewer than 20 votes. The running variable is the difference between the share voting for a union and one-half. The range of vote shares included is 30–70 percent for the union. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

Table D6: Post-Election Outcomes using Regression Discontinuity, Allowing for Quadratic in Running Variable Around Threshold

	Log wage		Overall rating	
Post-election x 1(Majority union)	-0.111*** (0.040)	-0.077** (0.030)	0.057 (0.158)	0.015 (0.182)
Job title FE		✓		✓
N	13,113,426	12,700,287	5,487,537	4,393,909
Filings	1,771	1,757	1,480	1,350
Std. dev. DV	0.585	0.585	1.425	1.409

Notes: This table summarizes the relationship between log pay or job satisfaction and whether the unionization petition is successful under a regression discontinuity approach, incorporating a piece-wise quadratic in the running variable around the discontinuity. The running variable is the difference between the share voting for a union and one-half. The range of vote shares included is 15–85 percent for the union. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

Table D7: Post-Election Outcomes using Regression Discontinuity, Votes from Majority Threshold as Running Variable

	Log wage		Overall rating	
<i>I. Within ± 8 votes of majority union</i>				
Post-election x 1(Majority union)	-0.038*	-0.035**	0.058	0.050
	(0.020)	(0.016)	(0.083)	(0.097)
Job title FE		✓		✓
Filings	1,637	1,620	1,315	1,205
<i>II. Within ± 5 votes of majority union</i>				
Post-election x 1(Majority union)	-0.053**	-0.046**	0.099	0.048
	(0.023)	(0.019)	(0.099)	(0.113)
Job title FE		✓		✓
Filings	1,327	1,310	1,058	972

Notes: This table summarizes the relationship between log pay or job satisfaction and whether the unionization petition is successful under a regression discontinuity approach, where the running variable is the difference between the total votes for a union and the number of votes needed to secure a majority. Standard errors are clustered by firm. Significance levels: * 10%, ** 5%, *** 1%

Table D8: Share Voting Against a Union, Censoring Large Vote Totals

	Overall rating		Senior Management	
Standardized rating before filing	0.015***	0.014**	0.023***	0.021***
	(0.005)	(0.007)	(0.007)	(0.006)
Standardized log(pay) before filing	0.000	-0.003	-0.000	-0.003
	(0.007)	(0.006)	(0.007)	(0.007)
Job title FE		✓		✓
Elections	1,940	1,771	1,873	1,700
R-squared	0.35	0.36	0.35	0.37
Outcome mean	0.406	0.409	0.406	0.408

Notes: This table summarizes the relationship between aspects of job quality and the share of votes in the certification election that are against the union, excluding elections that represent more than 0.5 percent of the cumulative vote total across elections. Each election is weighted by its vote total. Standard errors are clustered by state. Significance levels: * 10%, ** 5%, *** 1%