Employee Disputes and Innovation Performance: Evidence from the Pharmaceutical Industry

In this study, we use a hand-collected dataset of employee lawsuits to understand the effect of employee litigation on firms' innovation output. We gather more than 2,293 employee disputes between 2000 and 2015 and test the relationship between employee lawsuits and the Food and Drug Administration (FDA) product approvals in the pharmaceutical industry. We find that employee disputes lower the total number of FDA-approved products. We document that firms with frequent employee allegations maintain low innovation outcomes. Additional results show that case characteristics are an important determinant of FDA approvals. For example, the involvement of labor unions and case duration delay time-to-approval of submitted products may explain the deteriorated innovation outcomes. Overall, our findings highlight the importance of employee treatment in the workplace environment, which is ultimately related to firms' innovation performance.

1. Introduction

This study investigates the impact of employee and labor-related lawsuits on firms' innovation outcomes. Work-related litigation has risen 400% in the past 20 years.[1] In 2014, U.S. firms faced approximately 88,000 discrimination charges.[2] By 2015, the chance of a U.S. firm becoming the target of employee litigation was 12%, and almost 20% of allegations ended in a settlement. This study focuses on employee allegations for two reasons. First, employees are considered the most valuable asset of a firm (Coff, 1997). Second, employee satisfaction is essential for better corporate performance (Edmans, 2011). We test if labor-related allegations lower the number of FDA approved products and whether employee litigation influence future FDA and patent approvals.

A lawsuit can generate direct costs (attorney fees, court fees, settlements, and judgments) and indirect costs (reputational loss, workplace motivation loss) that affect firm performance in the long run. Many studies examine the relationship between employee treatment, diversity, and innovation outcome (Chen et al.,2016; Acharya et al., 2013; Gao and Zhang, 2016; Mayer et al., 2016) by studying KLD Research & Analytics, Inc. (KLD ratings), or state-adopted labor protection laws. KLD ratings, however, are limited in their ability to measure the employee-related environment. Employment litigation is a more direct measure that can be used to illustrate the overall work environment of the firm. Despite the growing body of research into firm litigation,

no prior studies have investigated the direct relationship between employee lawsuits and innovation in the pharmaceutical industry.

This study focuses on the human-capital-intensive industries of healthcare, medical equipment, and pharmaceutical (Ertugrul, 2013). Firms in these sectors require a high level of skill, expertise, and knowledge capital (Wang, 2009). In addition, these firms are highly monitored. Therefore, we can better identify the innovation outcomes in these industries by collecting the total drug patents, total drug approvals, total pre-market approvals, and total medical device approvals by the FDA (Food and Drug Administration).

Litigation can harm a firm's innovation activity through two primary channels. First, firms face direct costs associated with litigation. Some direct costs are straight forward, such as defense fees, legal fees, and settlement fees. Others, such as risk mitigation or training seminars, require firms to consume financial resources voluntarily. An increase in these costs can cause financial pressure. Litigation costs are financed with internal cash flow, or firms are required to raise external capital. However, this is not the only means that a firm can fund their defense. Firms raise funds from a third party (Chen and Abrams, 2012), or they obtain insurance to help reduce the costs of litigation. In all scenarios, a firm must use additional capital and allocate its resources to meet legal fees, government fees, or other damages. The second channel by which litigation influences a firm's innovation outcome is indirect costs. A frequently sued firm may experience indirect costs, such

as lower morale, tenuous work environment, or trouble recruiting/retaining human capital. Employee-friendly environments outperform their rivals concerning value creation, profitability, and productivity (Faleye and Trahan (2007)). Because of the costs associated with litigation, we believe innovation activity will suffer when firms are the target of frequent employee allegations.

Our sample consists of 1,627 unique firms from the S&P Capital IQ database. We hand-collect 2,293 distinct employee litigations between 2000 and 2015, along with other case characteristics, such as case outcomes. Using the collected data, we examine the influence of labor disputes on firms' innovation performance and find robust evidence that employee allegations lower the total number of FDA product approvals. Our results find that firms use their financial resources to fund both the direct costs (i.e., attorney fees and court fees, settlements, and judgments) and indirect costs (i.e., reputational loss, workplace motivation loss) related with employee litigation.

The second part of our study investigates potential explanations for the effect of employee lawsuits on the innovation process. First, we consider the "duration" of employee lawsuits. A discrimination case (i.e., race, age, disability, national origin, sex, color, or religion) can take up to 275 days to resolve. A prolonged court battle can mean increased direct and indirect costs. We also test if case characteristics are a factor in the innovation processes. We find that union-filed lawsuits lengthen the FDA approval process compared to cases filed by an individual employee.

Our results are similar to Bradley et al., (2015), who document an adverse effect of unionization on innovation outcomes.

Next, we test the relationship between lawsuits, employment decisions, and FDA product approvals. If the number of FDA products decreases because firms are facing labor allegations, the decrease in approvals may be due to employee turnover and indirect cost. Our results show that employment flow is related to FDA approval. We document that the sensitivity of net FDA approvals to the absolute value change in employment is higher in subsequent litigation. Therefore, frequently-sued firms experience fewer approvals because they experience more year-over-year employment change.

Our paper makes three main contributions. First, we provide the first large-sample evidence on firms' innovation outcome and innovation efficiency by examining employee lawsuits. Second, this paper adds to the growing literature on innovation related to employee treatment in the workplace. Third, our study highlights the additional underlying factors associated with the FDA approval process for medical products. Our study focuses on the cost factor associated with litigation and analyzes the relationship between litigation and innovation by using a broad sample of different employee lawsuit datasets, beyond product liability and securities litigation.

This paper proceeds as follows: We provide a summary of existing literature on lawsuits and firm performance in Section 2. Section 3 describes our research hypothesis. Section 4 presents our data. In Section 5, we discuss our findings, and we conclude our work in Section 6.

2. Literature Review

Innovation culture is necessary for firm survival (Zingales, 2000). In our study, we measure how labor-related issues impact corporate innovation performance. We focus on employee relations because employees are valuable assets of the firm (Coff, 1997). Previous studies have found employee treatment to make a vital contribution to firm performance (Edmans, 2011; Faleye and Trahan, 2011), capital structure decisions (Bae et al., 2011; Vervijmeren and Derwall, 2010), and acquisition performance (Ertugrul, 2013).

Employee satisfaction is a crucial determinant of sustainable growth in corporations. For example, Rhoades and Eisenberger (2002) and Whitner (2001) document that employee willingness to stay with a firm is positively related to the firm's support, recognition, pay, promotion, and job security. Committed employees have lower absenteeism and turnover (Somers 1995), and happy employees tend to be more productive than unhappy ones (Oswald et al., 2009). Employee satisfaction is also related to intrinsic motives (e.g., enjoyment) and extrinsic motives (e.g., monetary benefit). Sauermann and Cohen (2010) document that intrinsic motives are a critical factor in the innovation

process. Holmstrom (1989) and Holmstrom and Milgrom (1991) also show that non-monetary incentives encourage innovation and must be used to satisfy employees.

Firm innovation is a combination of both employee-level motives and the outcome of firms' direct investment in research and development. While employee treatment is essential for innovation outcomes, some researchers argue that firms' R&D activities play a crucial role in innovation. Innovation could be driven entirely by R&D (Arundel, 2007), while R&D is generally agreed to be a significant determinant of the innovation process (Hausman et al., 1984; Pakes and Griliches, 1980; Acs and Audretsch, 1988). Firms may not only generate new information but also grasp existing information by R&D (Cohen and Levinthal, 1989). Not only is R&D important during the innovation process, but it is also heavily used to develop research personnel (Coad and Rao, 2009), which contributes to the quality of the workplace environment. Innovation is a long and tedious process with a high level of risk involved (success or failure). Therefore, tolerance for failure would promote innovation (Manso, 2011). The relationship between innovation and other firm characteristics can be described by market size (Scherer, 1965), industry concentration (Levin et al., 1985; Lunn, 1986), competition (Aghion and Howitt, 2005), corporate governance (Meulbroek et al., 1990), types of financing decision (Benfratello et al., 2008; Hsu et al., 2014), and bankruptcy laws (Acharya and Subramanian, 2009).

Our work is similar to Adhikari et al. (2017), Chen et al. (2016), and Mayer et al. (2015), who analyze the relationship between employee treatment and firm innovation performance by using the KLD metrics database. However, our work adds value to those studies as we utilize several hand-collected databases of employee lawsuits, violations, and other work-related disputes to measure pharmaceutical firm innovation. Our composite measure of litigation consists of factors such as case motivation, case outcome, and case duration. Therefore, we not only measure the influence of employee treatment on innovation outcomes, but also how particular case characteristics affect the FDA product approval process.

3. Methodology and Hypothesis Development

We propose that employee disputes affect firm innovation. Any work-related issue could deter innovation, and previous research shows that employee treatment is associated with changes in firm value by increasing stock returns (Edmans, 2011), lowering debt ratios (Bae et al., 2011), and changing labor productivity (Faleye et al., 2011). Concerning employment litigation affecting workplace productivity, we propose two channels, direct and indirect costs.

First, we test the general relationship between employee litigation and innovation.

H.1: All other things equal, employee lawsuits are negatively associated with firm innovation. $(\beta_1 < 0)$

$$\text{Innovation} = \beta_0 + \beta_1 \text{Litigation} + \sum \beta_s \text{ Controls} \qquad (1)$$

The primary explanatory variable is employment litigation is calculated using two methods.ar

First, we define Lawsuit as a binary variable equal to one if a firm is the subject of a lawsuit in a

given year and zero otherwise. The second measure is Ln(TotalLawsuit), which is defined as the

log transformation of the total number of lawsuits initiated by employees.

The dependent variable, Innovation, is a firm's innovation outcome as measured by the number of

product approvals a firm has received from the FDA. This relation, if negative, indicates that when

a firm experiences more litigation, the firms' innovation outcome is reduced. Each test includes a

set of firm-level control variables consistent with prior literature.

A simple count of litigation may not capture the full severity of litigation. To consider the

seriousness of each dispute, we identify the plaintiff (charging party) of each case, the allegation

(i.e., harassment, change in a working contract), case duration, and the case outcome. These

variables indicate the severity of litigation. For example, the differing severity of cases can have a

unique effect on workplace culture, and longer case durations could affect the workplace by

reducing employee morale, increasing employee turnover, or serving as a distraction from

efficiency.

After establishing the general negative relationship, we investigate the channels of how litigation

can affect workplace culture.

H.2: All other things equal, the direct (indirect) costs associated with litigation are negatively associated with firm innovation. ($\beta_1<0$)

Litigation affects a firm through direct and indirect costs. Direct costs are the hard-dollar costs associated with litigation, such as lawyer fees, court costs, and/or settlement costs. These costs are prevalent and substantial. Litigation affects a firm through direct and indirect costs; therefore, we expect a negative relationship between innovation performance and employee allegations. The uniqueness of our data allows us to measure some direct costs associated with litigation, such as settlement costs.

The other cost associated with employment litigation is indirect costs. Indirect costs are costs that come from negative press, degraded reputation, or damages to workplace morale. The work environment is a combination of culture, benefits, compensation, among other factors that create a suitable work environment. Workplace litigation can destabilize the workplace environment and cause unrest to current and future employees. Because innovation is a human capital intensive task, any cost or disruption that affects the workplace environment can have an impact on a firm's innovation output.

Because several firm characteristics can affect the FDA approval process, each test includes related control variables. Controls for firm size as measured by total assets, Tobin's Q (growth opportunities), RnD, book leverage (Silver and Tian, 2011), tangibility, and free cash flow are

included. We also include ROA to control for a firm's profitability, Herfindahl Index for market competition, and firm age (Aghion and Tirole, 1994; Robinson, 2008). Firm-year fixed effects and state-year fixed effects are included to eliminate any unobserved heterogeneity.

4. Data Description

4.1 Firm Data

We employ the S&P Capital IQ database to identify the publicly traded and calculate firm-specific control variables. Our final sample includes 1,627 unique firms between the years 2000 to 2015.

4.2 Litigation Data

We hand-collect more than 2,000 employee disputes that have an initial court hearing between 2000 and 2015. The primary source of labor litigation used in the study is sourced from the National Labor Relations Board (NLRB). The NLRB data includes allegations, charging parties, case reasons, and decisions[5]. In 2015 alone, the NLRB reported approximately 20,200 Unfair Labor Practices cases filed by individuals, unions, or employers,[6] and more than 7,300 labor disputes that ended in a settlement. Approximately 6,900 cases were withdrawn, and almost 4,700 cases were dismissed in court.[7]

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[5] For NLRB Litigation-Case data http://www.nlrb.gov/opengov/nlrb-data-datagov
[6] NLRB; https://www.nlrb.gov/news-outreach/graphs-data/charges-and-complaints/charges-and-complaints
[7] NLRB; https://www.nlrb.gov/news-outreach/graphs-data/charges-and-complaints/disposition-unfair-labor-practice-charges

[Table 1]

Table 1 displays summary statistics for firms in the sample. Panel A documents the lawsuit characteristics at the firm level. Eight percent of the firms in the sample have faced at least one allegation, and the maximum number of litigations in a given year is 45. Unions opened more cases in the sample compared to individuals.

4.3 Violations, Inspections, and Other Disputes

We test empirically if workplace disputes influence corporate innovation. In addition to litigation, other types of violations, inspections, and complaints could influence a firm's innovation output. We collect labor enforcement data from the US Department of Labor.[8] First, we collect workplace enforcement data from the Occupational Safety and Health Administration (OSHA) to identify workplace safety inspections and violations. Second, we collect Wage and Hour Compliance Action Data surrounding wage-related disputes, including civil penalties. Third, we collect Employee Benefits and Security Enforcement Data for benefit-related allegations that result in penalty assessments. Finally, we collect discrimination lawsuits, settlement fees, and attorney fees from Bloomberg's BNA Employment Discrimination Verdicts and Settlements database and S&P Capital IQ news releases.

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[8] US Department of Labor Enforcement Data: http://ogesdw.dol.gov/views/data_catalogs.php

4.4 FDA Product Database

We measure a firm's innovation outcome by counting the number of new FDA-approved products. The FDA product submission database includes unique data about pharmaceutical and drug-related approvals.[9] The final sample includes 28,275 total FDA approvals. Among the 28,275 FDA approvals, there are 3,228 drug patents, 10,889 drug approvals, 8,247 pre-market approvals, and 5,911 medical device approvals. Panel E of Table 1 documents the summary statistics for FDA-approved products. We also collect information on clinical testing data from S&P Capital IQ. More information on all of the data used in this study can be found in Appendix A.

5. Empirical Results

5.1 Frequency of Employee Lawsuits and Firm Innovation

We test the relation between employee lawsuits and innovation by running a multivariate test.

In Table 2, our dependent variable is the total number of FDA-approved products at year t+1. We regress a firm's innovation outcome on the total number of lawsuits by controlling for varying firm-level fixed effects.

[Table 2]

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[9] https://open.fda.gov/

In column (1), we include year fixed effects where the firm's total assets capture the firm size. Results indicate that a greater number of employee lawsuits lowers the total number of FDA-approved products.[10] Our results indicate that a one-percent increase in employee lawsuits lowers the FDA approvals by 16.2%. In column (2), we test the relationship using the number of employees and receive similar results. In column (3), we perform firm and year fixed effects by controlling for total assets. We find that a one-percent increase in the total number of lawsuits lowers FDA approvals by 22.5%. The adverse impact of lawsuits on innovation performance remains the same when we control for the number of employees in column (4). Next, we calculate the time-series average of FDA approvals, lawsuits, and other explanatory variables to capture cross-sectional variation. In column (5) and column (6), we document time-series averages of variables and report that a one-percent increase in the total number of employee lawsuits is associated with 7.9% and 8.1% decrease in the total number of FDA approvals, respectively.

In columns (7) and (8), we investigate the primary relationship using state-year fixed effects based on the firm headquarters. State-level laws are relevant to labor protections. Prior studies have found that state-level labor protection laws affect a firm's capital structure (Serfling, 2016). State laws are also associated with increases in innovation outcomes (Acharya et al., 2013) by promoting diversity (Gao and Zhang, 2016). Businesses are required to adopt labor law if the federal or state

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[10] To conserve space, we report total FDA-approved products. Our results remain the same when we run separate regressions for total drug patents, total drug approvals, pre-market approvals, and medical device approvals.

government in the jurisdiction enacts them. To eliminate unobserved heterogeneity due to state-level laws, we include state fixed effects and document a negative relationship between employee lawsuit and innovation outcome. While our primary focus is the sign and the magnitude of lawsuits, some control variables explain the FDA-approved products. In most cases, we document that firm size, leverage, Tobin's Q, and firm age is associated with a higher number of FDA approvals.

The FDA approval process is rigorous and can take many years. Therefore, it may be useful not only to examine the number of final FDA-approved products, but also the various stages of FDA approval. To conduct this analysis, we employ a unique dataset of phase I, II, and III clinical drug trials. Phase I trials refer to a new drug, treatment, or combination, and the length of the phase I study is several months. Approximately 70% of Phase I drugs proceed to the next stage. Phase II clinical trials focus on the safety and efficacy of treatment. Phase II can take up to 2 years and has a 33% success rate. Phase III clinical trial is the final phase and further tests the efficacy and adverse reactions of a specific treatment. The length of Phase III is from 1 to 4 years.

Panel B of Table 2 documents the relationship between the success of phase I, II, and III drug trials and employee lawsuits. In Panel A, we find that employee litigation lowers the number of clinical trials in each of phases I, II, and III. We also show that employee lawsuits are negatively related to the number of licensed patents by pharmaceutical firms.

In Panel C, we calculate the difference between the clinical testing stages to identify if employee lawsuits decrease the innovation output by lowering the gap between the first and last stages of clinical examination. In column (1), our dependent variable is the absolute difference between the number of phase 3 drugs and the number of phase 1 drugs. We find that employee litigations lower the range of phase III and I drugs. Pharmaceutical firms that experience more employment litigation have worse clinical testing results. The relationship remains the same when we test the differences between phase II and I testing as well as phase III and II.

Lastly, in Panel D, we conduct an ordered logistic model for better evaluation of the employment litigation and clinical testing process. The dependent variable is coded as one – two – three for phase I, II, and III drugs, respectively. From columns (1) to (3), we report the marginal effect for each stage. In column (1), a one-percent increase in employee lawsuits indicates pharmaceutical firms are 1.2% less likely to have a drug under phase I testing. In column (2), an increase in employee lawsuits will decrease firms' chance of having a phase II drug by 5.5%. In column (3), an increase in employee lawsuits will reduce a firm's likelihood of having a phase III drug by 13.5%. In column (4), we run ordered logit for all phases. A higher number of employee litigations is related to a lower likelihood that pharmaceutical firms have drugs in higher stages of clinical testing.

5.2 The channels by which innovation affects firms

The previous results of this study have documented the negative relation between employee lawsuits and innovation. The following sections investigate potential explanations for the firms' reduced innovation outcome. First, we focus on the severity of the lawsuits, and we identify whether a union or individual is responsible for filing a case. Next, we examine if the case outcome is a determinant in the FDA product approval process. If a charging party (union or individual) or a case outcome (favorable or unfavorable) plays a role in the innovation process, then our results could highlight the mechanism by which a firm's innovation output is reduced.

In Table 3, we conduct both OLS and survival analysis regressions, where the dependent variable is time to FDA approval. First, we regress FDA approval time on case time-to-resolution.

[Table 3]

In column (1), we conduct OLS regression and find that longer court case durations are associated with increases in the FDA approval process duration. In columns (2), (3), and (4), we generate binary variables equal to one when the case duration is less than one year, two years, or three years respectively. The variables are assigned a value of zero if the case is shorter or longer than the respective time band. Our findings suggest that the most significant association is with cases longer than three years of time-to-resolution, followed by case duration up to two years. In column (5), we conduct survival analysis and report a consistent relationship between case time-to-resolution and a longer average FDA approval time. For robustness, we perform the same set of tests by

restricting the sample to only firms with employee allegations, reducing the sample to 2,293 observations. Unreported, the results of the analysis remain consistent with prior results.

Case allegation is a critical factor in the FDA approval process. We generate binary variables to investigate this relationship for each accusation type. These variables allow a study to determine if some case types are more pronounced during the approval process. We present survival analysis results that document how allegation types influence the approval process.

[Table 4]

In Table 4, we report whether the nature of the allegations delays the drug approval process. In columns (1) – (3), (5) - (7) & (9), we show that coercive actions, coercive statements, harassment, changing working conditions, discharge delay, unfair discipline, and changes in working contracts are associated with a lower hazard ratio, which indicates a longer FDA time-to-approval. The results do not report a significant correlation between bad-faith bargaining, refusal to furnish information, concerted activities, and FDA drug approval. Overall, the results of Table 5 show that some case allegations may be more severe and may have mixed effects on innovation, a process that requires active employee participation, teamwork, and productivity.

The results between case characteristics and the FDA approval process are documented in the preceding cross-sectional analysis (Table 2 - 5) because firms can face multiple allegations in one year, and each complaint can be motivated by different reasons or parties, and result in a unique

case outcome. The results presented in the prior tables indicate, on average, a relationship between employee mistreatment and adverse innovation outcomes.

Table 6 reports an alternative analysis using panel data. We divide the total number of charging parties by the total number of allegations to calculate the percentage of cases opened by unions or individuals. We apply then report similar results to Table 5, showing the effect of the percentage of cases opened by each party on the FDA approval process. Each test includes firm-year fixed effects.

[Table 5]

Table 5 exhibits the firm-year variation between the case outcome and the pharmaceutical firms' innovation outcome. Column (1) reports that an increase in the ratio of union-filed cases decreases FDA approved products. These results are consistent with the prior literature of Bradley et al. (2015) and Adhikari et al. (2017), who find that unionization lowers the innovation performance. In columns (3) – (5), we examine case outcomes as a proportion of total allegations. In column (3), we document that the percentage of dismissed cases lowers the total number of FDA approvals, which is consistent with earlier findings. When claims are dismissed, the trial process continues to impose costs on the firm. In column (4), the settlement ratio is positively associated with FDA product approvals, which is consistent with the cross-sectional analysis.

5.3 Litigation, Net Employment Flows, and FDA approvals

In this section, we examine the potential channels of how employee treatment can affect corporate innovation performance. Firms that experience a higher number of employee lawsuits may be impacted during the FDA product submission process. If the number of FDA approvals decreases because firms are facing labor allegations, it is reasonable to assume that a decrease in innovation outcome may be due to the net employment flows of dissatisfied employees. Labor and employment adjustment costs that arise from employment litigation can be damaging. In Table 9, we run a set of analyses and measure the sensitivity of FDA approvals to the size of employment flows.

[Table 6]

In column (1), we regress the total number of total FDA approvals received by a firm on the change of employees. The difference in employees is measured as a percentage change. We find that FDA approvals are negatively affected by the percentage of changes in total employment. In column (2), we calculate the absolute value of changes in the number of employees. The results indicate that more volatile employee flows lowers the total number of FDA approvals. Our results show that year-over-year variation in employment is negatively associated with FDA product approvals.

In column (3), we multiply net employment flows and a binary lawsuit variable. The sensitivity of net employee flows could be higher following lawsuits, resulting in frequently-sued firms obtaining fewer FDA approvals since they face variation in year-over-year employment. The

negative and significant interaction term represents lower FDA approval for the firms that are subjected to employee lawsuits, given their volatility in employment. In column (4), the dependent variable is the decline in FDA approvals. We measure the decrease in FDA approvals by calculating the change between year t and t-1, where all positive values are replaced with zero. The results show that net employment flows are positively related to a decline in the number of approved products. In the same test, the results document that a decrease in total litigation is negatively associated with a reduction in total approved products. The results of column (5) and (6) are consistent with the prior results; variations in both year-over-year employment and year-over-year number of lawsuits yield more volatile FDA approvals.

Collectively, the results of Table 6 show that firms with employee lawsuits face more volatile FDA approvals. Specifically, higher fluctuations in employment may affect FDA approval numbers if firms find it challenging to adjust employment. One of the critical determinants of the innovation process is human capital, such as highly skilled researchers and engineers. Hall (2002) suggests that 50% of R&D expenses are the salaries of highly-skilled employees. Therefore, frequently-sued firms would receive fewer FDA approvals because they discharge more workers or face more variation in year-over-year employment.

5.4 Robustness Check and Alternative Explanations

Employment litigation is an accurate measure of workplace treatment. However, cases may not be filled for several potential reasons, including intimidation, prohibitive costs, or apathy. Therefore, we examine the consistency of the results using an alternate proxy for employee disputes. We collect labor enforcement cases from the US Department of Labor, including Occupational Safety and Health Administration (OSHA) enforcement data, Wage and Hour Compliance Action Data, Employee Benefits and Security Enforcement data, and discrimination lawsuits from Bloomberg's BNA Employment Discrimination Verdicts and Settlements database. By aggregating these cases, we can investigate workplace treatment with the same intent as employment litigation, but these cases may differ in the case motivation, genesis, or filing requirements.

[Table 7]

Table 7 documents alternative explanations for employee treatment and FDA innovation outcomes. In columns (1) – (5), we find that the total workplace safety inspections and violations, total discrimination lawsuits, the total number of wage-related violations, the total dollar amount of wage-related penalties, and the total benefit-related inspections all reduce the total number of FDA-approved products. Columns (6) and (7) include the log transformation of settlement fees and attorney fees stemming from discrimination cases. Both of these measures are the result of direct costs associated with ligation. The study finds that an increase in dollar amount spent on

legal allegations lowers the total number of FDA approvals. In conclusion, Table 10 suggests that our findings are robust to alternative proxies of employee disputes.

The results thus far have indicated that poor employee treatment decreases the innovation performance of a firm. However, endogeneity concerns are not entirely alleviated. To address endogeneity, we perform a collection of analyses. First, a change analysis is presented to reduce issues related to reverse causality. We document that litigation lowers innovation for pharmaceutical firms; however, innovation could also affect employee lawsuits. For example, firms could spend their resources on R&D expenditures and cut basic employee programs. Evidence for this path exists in the study of Moussu and Ohana (2016), who documented that highly-leveraged firms fail to provide training, such as in health and safety. Similarly, Cohn and Wardlaw (2016) suggested that safety-related activities are implemented by firms through budgetary and policy initiatives and can be explained in OSHA inspections. Therefore, the ignoring of workplace-related programs, such as training, safety, or supervision, may result in more significant litigation risk. To eliminate reverse causality concerns and possible period selection bias, we test the change in FDA products and change in employee lawsuits. In Table 11, we regress the change in FDA-approved products between year t-1 and year t on the change in lawsuits between year t-1 and year t, between year t-2 and year t-1, and between year t-3 and year t-2. In column (2), we use the difference in lawsuits between year t-1 and year t as the dependent variable and regress it on the changes in FDA-approved products between year t-1 and year t,

between year t-2 and year t-1, and between year t-3 and year t-2. All control variables are differenced.

[Table 8]

Because all variables have been converted to first differences, we focus on time-series variation, rather than cross-sectional variation (Chen et al., 2016). In column (1), we report a causal effect of employee litigation on FDA approvals. However, in column (2), we find no evidence that past changes in FDA approvals lead to changes in employee allegations. We document insignificant coefficients for lagged changes in FDA approvals to the current change in labor lawsuits. In column (3), we conduct a dynamic estimation that includes lagged lawsuits t-1, t-2, and t-3, and lawsuits t+1. While coefficients of lagged lawsuits t-1, t-2, and t-3 are positive and significant, lawsuit t+1 is insignificant. We find that employee disputes affect pharmaceutical firm innovation in subsequent years but not inversely.

In addition to change-in-change analysis, we also conduct 2SLS methodology with instrumental variables. Employee lawsuits are endogenously chosen and might be related to unobserved factors that also determine FDA approval performance. For example, firms with several employee litigations might be poorly managed, resulting in a poor FDA approval history. Similarly, pharmaceutical firms with higher levels of innovation might be better managed and more

profitable, allowing them to have the resources to take necessary steps (i.e., safety training or retirement plans) to reduce employee allegations.

In Table 9, we examine an exogenous shock to litigation. Qiu et al., (2018) measure the effect of "wrongful termination laws" on corporate risk management. Wrongful termination laws include good-faith exceptions, implied contract exceptions, and public policy exceptions.

The good-faith exception protects employees from termination for any reason other than for a "just cause." The implied contract exception protects employees from termination if the employer has stated that the worker will not be discharged without good cause. Ultimately, the public policy exception protects employees from termination for refusing to violate an established public policy. We create a binary variable, Wrongful Termination Laws, equal to one if the firm is located in a state that has passed wrongful termination laws (during/before), and zero otherwise.

[Table 9]

The results of Table 9 show that firms located in states that have wrongful termination laws have more lawsuits compared to firms that no wrongful termination laws. In the second stage, we show that predicted employee lawsuits lower the number of FDA approved products.

For a final robustness check, we employ alternative models and alternative samples and revisit our first hypothesis. First, we gather the top 200 large pharmaceutical firms each year, based on market capitalization between 2000 and 2015. Second, we utilize pharmaceutical firms that are in the S&P

1500 between 2000 and 2015. By doing so, we measure the potential impact of firm size (market capitalization) on employee allegations. Third, we generate a matched sample among pharmaceutical firms. Each pharmaceutical firm with an employee allegation (treatment group) is matched with another pharmaceutical firm without employee allegations (control group) based on size, book-to-market, and year. Fourth, we run the Tobit model since the response variables (number of FDA approvals) are censored. Fifth, we run the Negative Binominal Model since patents are a good example of count data and are commonly chosen to estimate over-dispersed event count models.

[Table 10]

Table 10 documents alternative samples and tests that examine the relationships between employee lawsuits and FDA product approvals. In column (1), we employ the top 200 large pharmaceutical firms, based on market capitalization, and find that employee lawsuits lower corporate innovation performance. In column (2), the results remain consistent using a subsample of pharmaceutical firms that are listed in the S&P 1500 during our sample span. In column (3), we document that employee disputes lead to a decreased number of FDA approved products. In columns (4) and (5), both the Tobit and Negative Binominal Models confirm our initial hypothesis, that employee litigations lower corporate innovation.

5.4 Litigation, Employee Productivity and Innovation Efficiency

This study documents the relationship between employee allegations and pharmaceutical firm innovation. However, this result does not explain whether the innovation output produced by employees is efficient. We extend our analysis and test the link between litigation, employee productivity, and innovation efficiency of pharmaceutical firms. Innovation efficiency is defined as a firm's ability to generate an economic return on capital, which increases its value. This study employs three sets of variables to capture innovation efficiency. We measure turnover efficiency as the innovation per sale, calculated as the number of FDA approved products normalized by sales. We define these measures as product value measures.

Next, we measure employee productivity using two distinct measures. The first measure is revenue per employee, calculated as the ratio of revenue to the number of employees (Cronqvist et al., 2009). The second measure is estimated using the Cobb–Douglas production function of the form:

$$Y_{it} = AL_{it}^{\beta}K_{it}^{\alpha} \qquad (2)$$

This measure was previously employed by Felaye et al. (2006, 2013). In this equation, Y_{it} refers to net sales for the firm i in year t; L_{it} is the number of employees; K_{it} is the net property, plant, and equipment; and A, α, β are the parameters. We use the residuals from an estimation of equation (2) as a measure of firm-level total factor productivity. We control for industry factors by estimating a separate equation for each two-digit Standard Industrial Classification code (SIC)

industry group (Felaye et al., 2006, 2013). Employee productivity can help us to examine the indirect cost of litigation, such as low employee morale.

Lastly, we define product efficiency using product-related news. First, we collect post-market evaluation data and the number of drugs that have failed post-market evaluations. For other product-related news, we employ the total number of FDA drug and medical device recalls between 2000 and 2015. Product recalls document the relationship between lowered employee treatment (or morale) and innovation quality.

[Table 11]

The results of Table 11 - Panel A indicate that litigation lowers the total FDA products per sale, and per employee. The results suggest that FDA approved products per 1000 employees decrease by 1.2%. In Panel B, we measure how lawsuits affect employee productivity. We document a negative and significant relationship between labor litigation and employee productivity, as measured by sales per employee and equation (2). In the first part of the study, we primarily focus on the direct costs associated with litigation (defense fees, settlement fees, etc.). Panel C of Table 11 allows us to investigate the impact of employee treatment on indirect costs. Lawsuits can adversely affect employee morale, motivation, or turnover. Not only may lawsuits affect current employee turnover, but they may also make it difficult for the company to attract new talent.

In the last panel, we use a dataset of FDA product recalls and FDA Postmarket Drug and Biologic Safety Evaluations between 2000 and 2015. In 2015 alone in the United States, there were 9,178 incidents of recall by the Food and Drug Administration (FDA), along with 17,232 warning letters.[11] The risk and likelihood of a product recall have dramatically increased in recent years, as FDA standards have risen. However, these letters provide an invaluable gauge of innovation quality. In column (1) of Panel C, we document that employee lawsuits increase the number of FDA approved products that fail post-market safety evaluations and total recalled products. Parallel to innovation, employee litigation can have a direct and indirect impact on the quality of a firm's product. Both involuntary and voluntary recall indicate that firms' products can have the potential for serious injury, death, temporary illness, or violate FDA regulations.

6. Conclusion

This study examined a determinant of corporate innovation, employee treatment. Results presented employee disputes as deteriorating activities for pharmaceutical firms. Innovation requires time, money, and human capital: we examine whether frequently-sued pharmaceutical firms suffer from reduced innovation output. Employment litigation is a significant risk for many corporations, as legal allegations generate both direct costs (attorney fees, settlement fees, penalties, etc.) and

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[11] https://www.fda.gov/downloads/ICECI/EnforcementActions/UCM484400.pdf

indirect costs (firm reputation, loss of motivation, and employee morale), which influence firm innovation.

The results of this study showed that employee litigation reduces FDA product approvals as measured by total drug patents granted by the FDA, total drug approval, total pre-market approval, and total medical device approvals. These results may support the argument; litigation costs are not only a burden on a firm's financial resources, but also the employee working environment. Overall, the results suggest a significant negative relationship between unfavorable employee treatment and innovation focus, which is related to the firms' core business.

The second part of our study investigates the potential explanations of how employee litigation influences innovation performance. The study considers case duration, charging parties, and case outcomes as explanatory variables. First, if employee lawsuits take longer time-to-resolution, we expect that the cost of funding allegations could delay the innovation process. We show that longer case duration slows the FDA approval process, and results are more profound for lawsuits that take longer than three years. We also test if case characteristics are a determinant of the innovation process. We find that union-filed lawsuits lengthen the FDA approval process, compared to an individual- (employee-) filed case. Our results suggest that the nature of the charging parties (individual or union) is positively related to the product approval process.

Lastly, we test the relation between lawsuits, employment decisions, and FDA product approvals. If FDA approval decreases because firms are facing labor allegations, it is reasonable to expect that this decrease in approvals may be due to the net employment flows of dissatisfied employees. Labor and employment adjustment costs that arise from employee lawsuits can be substantial, with higher firing costs potentially influencing the quality and quantity of firms' products. Our results show that firms with a more significant number of lawsuits face more volatile FDA approvals. Higher fluctuations in employment may affect FDA approvals if firms find it challenging to adjust employment. Also, we document that the sensitivity of net FDA approvals to the absolute value change in employment is higher in subsequent litigation. Overall, this study contributes to the literature by examining another determinant of innovation and highlights the importance of employee treatment.

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Table 1
Summary Statistics

Variables	Mean	Std.Dev	Min	Max
Panel A. Litigations				
Total Case	0.05	0.68	0.00	31.00
Lawsuit	0.04	0.13	0.00	1.00
Panel B. Charging Party				
Total Case (Case Opened by Individual)	0.01	0.19	0.00	7.00
Total Case (Case Opened by Union)	0.03	0.53	0.00	25.00
Panel C. Case Outcome				
Total Dismissal	0.01	0.18	0.00	7.00
Total Settlement	0.00	0.10	0.00	5.00
Total Withdrawal	0.03	0.49	0.00	25.00
Panel D. Inspections and Violations				
OSHA Inspections	0.13	0.82	0.00	30.00
Discrimination Lawsuit	0.01	0.12	0.00	5.00
Wage Related Case	1.07	44.41	0.00	4,419.00
Wage Related Penalty	666.68	20374.76	0.00	1,354,849.00
%SuitRatio	0.00	0.08	0.00	4.00
Employee Benefits Security	0.00	0.02	0.00	1.00
Attorney Fees	30,169.92	1,559,436.00	0.00	102,000,122.00
Settlement Fees	43,221.12	100,122.00	0.00	604,991.00
Panel E. FDA Products				
Total Approval	2.45	11.59	0.00	307.00
Total Drug Patent	0.28	2.29	0.00	96.00
Total Drug Approval	0.94	7.82	0.00	250.00
Total Pre-Market Approval	0.71	3.25	0.00	76.00
Total Medical Device Approvals	0.51	5.60	0.00	292.00
Total Recalled Product	0.47	5.34	0.00	296.00
Total Post Market Safety Evals.	0.11	3.32	0.00	112.00
Panel F. Control Variables				
Log(Asset)	3.84	2.21	-0.56	8.02
Log(Emp)	-1.86	2.20	-5.52	2.64
Tobin's Q	4.83	5.81	0.85	24.72
RnD	0.26	0.34	0.00	1.26
Book Leverage	0.28	0.44	0.00	1.70
Tangibility	0.13	0.13	0.00	0.45
ROA	-0.60	1.07	-4.21	0.17
HHI Index	0.16	0.08	0.06	0.34
Log(Firm Age)	2.26	0.78	0.69	3.47
Free Cash Flow	-0.57	1.00	-3.93	0.16

Table 1 exhibits the summary statistics at firm level. Our sample consists of 1,627 unique firms from the S&P Capital IQ database between 2000 and 2015. Panel A represents the litigation characteristics at firm level. Panel B exhibits charging party characteristics. Panel C exhibits case outcomes. Panel D represents the other employee related violations, inspections and complaints. Panel E exhibits FDA approved products used in the study. Panel F represents the firms level control variables used in the study. Detailed definitions of variables are reported in the appendix. Detailed definitions of variables are reported in the appendix.

Table 2
Employee Level Litigation and Innovation

Panel A.

Dependent Variable								
Sample	FDA$^{(Total\ Approval)}_{t+1}$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log(TotalLawsuit)$_t$	-0.162	-0.376	-0.225	-0.118	-0.079	-0.081	-0.162	-0.161
	[0.001]***	[0.001]***	[0.001]***	[0.001]***	[0.001]***	[0.001]***	[0.001]***	[0.001]***
Log(Asset)	0.127		0.123		0.030		0.127	
	[0.001]***		[0.001]***		[0.001]***		[0.001]***	
Log(Emp)		0.130		0.156		0.044		0.311
		[0.001]***		[0.001]***		[0.001]***		[0.001]***
Tobin's Q	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	[0.001]***	[0.001]***	[0.001]***	[0.070]*	[0.551]	[0.911]	[0.001]***	[0.883]
RnD	0.001	0.001	0.001	0.001	0.001	0.001	0.001	-0.014
	[0.001]***	[0.001]***	[0.001]***	[0.001]***	[0.751]	[0.827]	[0.139]	[0.584]
Book Leverage	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.003
	[0.001]***	[0.001]***	[0.001]***	[0.076]*	[0.602]	[0.990]	[0.001]***	[0.001]***
Tangibility	0.100	0.114	0.165	-0.169	0.096	0.007	0.100	0.439
	[0.422]	[0.362]	[0.174]	[0.194]	[0.065]*	[0.901]	[0.073]*	[0.001]***
ROA	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	[0.375]	[0.377]	[0.431]	[0.256]	[0.834]	[0.394]	[0.539]	[0.307]
HHI Index	-1.913	-1.897	-1.676	-2.373	-0.026	-0.004	-1.913	-6.259
	[0.001]***	[0.001]***	[0.001]***	[0.001]***	[0.884]	[0.983]	[0.001]***	[0.001]***
Log(Firm Age)	0.174	0.179	0.176	0.149	0.006	0.005	0.174	0.333
	[0.001]***	[0.001]***	[0.001]***	[0.001]***	[0.803]	[0.850]	[0.001]***	[0.001]***
Free Cash Flow	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.002
	[0.418]	[0.421]	[0.549]	[0.993]	[0.767]	[0.677]	[0.616]	[0.311]
N	9,847	9,847	9,847	9,847	1,847	1,847	9,847	9,847
R^2	21%	11%	11%	11%	7%	7%	12%	12%

Table 2 reports the multivariate regression results between FDA approvals and total number of employee lawsuits controlling for firm-level variables. From column (1) to column (8), our dependent variable is log transformation of total number of FDA approval. In column (1) and (2), we run year fixed effects, but omit the coefficients. In column (3) and (4), we run year and firm fixed effects, but omit the coefficients. In column (5) and (6), we perform firm-time series average of the all variables. In column (7) and (8), we run state and year fixed effects, but omit the coefficients. In Panel B, Panel C, and Panel D, we test the relationship between different phase of drug approvals and emp. lawsuits. Std. errors are clustered at firm level. Detailed definitions of variables are reported in the appendix. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel B. Phase I - II - III Approvals

Dependent Variable				
Sample	Ln(PhaseI)$_{t+1}$	Ln(PhaseII)$_{t+1}$	Ln(PhaseIII)$_{t+1}$	Ln(LicencedPatent)$_{+1}$
	(1)	(2)	(3)	(4)
Log(TotalLawsuit)$_t$	-0.022	-0.045	-0.041	-0.112
	[0.001]***	[0.001]***	[0.001]***	[0.001]***
CONTROLS	YES	YES	YES	YES
Year/Firm Fixed Effect	YES	YES	YES	YES
N	9,847	9,847	9,847	9,847
R^2	7%	7%	7%	8%

Panel C. Difference Between Drug Phases

Dependent Variable				
Sample	absDiff (PhaseIII-PhaseI)	absDiff (PhaseII-PhaseI)	absDiff (PhaseIII-PhaseII)	Cumulative Phase
	(1)	(2)	(3)	(4)
Log(TotalLawsuit)$_t$	0.078	0.011	0.181	-0.778
	[0.001]***	[0.001]***	[0.001]***	[0.001]***
CONTROLS	YES	YES	YES	YES
Year/Firm Fixed Effect	YES	YES	YES	YES
N	9,847	9,847	9,847	9,847
R^2	7%	8%	8%	8%

Panel D. Ordered Logistic

Dependent Variable				
Sample	Phase I	Phase II	Phase III	All Phases
	(1)	(2)	(3)	(4)
Log(TotalLawsuit)$_t$	-0.012	-0.055	-0.135	-0.445
	[0.001]***	[0.001]***	[0.001]***	[0.001]***
CONTROLS	YES	YES	YES	YES
Year/Firm Fixed Effect	YES	YES	YES	YES
N	9,847	9,847	9,847	9,847
R^2	8%	8%	8%	7%

Table 3
Litigation Duration and Innovation: Full Sample

	OLS	OLS	OLS	OLS	Survival
Panel A.					
Dependent Variable					
Sample	Log(Duration)$^{(Days\ to\ Approval)}$				
	OLS	OLS	OLS	OLS	Survival
	(1)	(2)	(3)	(4)	(5)
Log(Case Duration)$_t$	0.224				-0.480
	[0.001]***				[0.001]***
One Year		0.204			
		[0.001]***			
Two Year			1.287		
			[0.001]***		
Three Year				1.453	
				[0.001]***	
Log(Asset)	-0.063	-0.062	-0.064	-0.064	0.038
	[0.001]***	[0.001]***	[0.001]***	[0.001]***	[0.001]***
Tobin's Q	0.006	0.006	0.006	0.006	-0.007
	[0.001]***	[0.001]***	[0.001]***	[0.001]***	[0.001]***
RnD	0.267	0.265	0.269	0.268	-0.405
	[0.001]***	[0.001]***	[0.001]***	[0.001]***	[0.001]***
Book Leverage	0.034	0.035	0.034	0.034	-0.015
	[0.001]***	[0.001]***	[0.001]***	[0.001]***	[0.001]***
Tangibility	0.489	0.503	0.399	0.414	-0.338
	[0.001]***	[0.001]***	[0.001]***	[0.001]***	[0.001]***
ROA	-0.003	-0.003	-0.003	-0.003	0.011
	[0.793]	[0.804]	[0.771]	[0.772]	[0.379]
HHI Index	-0.112	-0.118	-0.137	-0.134	-0.047
	[0.574]	[0.554]	[0.493]	[0.501]	[0.752]
Log(Firm Age)	0.033	0.034	0.030	0.031	-0.060
	[0.001]***	[0.001]***	[0.001]***	[0.001]***	[0.001]***
Free Cash Flow	0.151	0.150	0.153	0.153	-0.141
	[0.001]***	[0.001]***	[0.001]***	[0.001]***	[0.001]***
N	22,584	22,584	22,584	22,584	22,584
R^2	2%	2%	2%	2%	

Table 3 reports the survival analysis between FDA product approval duration and case duration in employee lawsuits for the full sample of firms. Our dependent variable is log transformation of number of days between FDA product approval date minus filing date. From column (1) to (4), we run OLS regression with year and firm fixed effects. In column (5), we run survival analysis. We employ Cox proportional hazard ratio test. Std. errors are clustered at firm level. Detailed definitions of variables are reported in the appendix. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 4
Motivation of Cases and Case Duration

Panel A.

Dependent Variable

Sample	Log(Duration)(Days to Approval)									
	Survival (1)	Survival (2)	Survival (3)	Survival (4)	Survival (5)	Survival (6)	Survival (7)	Survival (8)	Survival (9)	Survival (10)
Coercive Actions	-0.112 [0.001]***									
Coercive Statement		-0.922 [0.023]**								
Harassment			-1.223 [0.001]***							
Bad Faith Bargaining				0.334 [0.998]						
Changes in Working Condition					-0.887 [0.044]**					
Discharge						-0.223 [0.001]***				
Discipline							0.356 [0.011]**			
Refusal to Furnish Information								0.445 [0.970]		
Change in Working Contract									-0.332 [0.001]***	
Concerted Activities										0.442 [0.129]
CONTROLS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	2,293	2,293	2,293	2,293	2,293	2,293	2,293	2,293	2,293	2,293

Table 4 reports the survival analysis between FDA product approval duration and case reasons. We run survival analysis where dependent variable is log transformation of number of days between FDA product approval date minus filing date. We run Cox proportional hazard ratio test. Std. errors are clustered at firm level. Detailed definitions of variables are reported in the appendix. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 5
Proportional Litigation Severity and Innovation Outcome

Panel A.					
Dependent Variable					
Sample	FDA$^{(Total\ Approval)}_{t+1}$				
	OLS	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)	(5)
Union%	-0.241				
	[0.001]***				
Individual%		-0.119			
		[0.155]			
Dismiss%			-0.220		
			[0.020]**		
Settle%				0.067	
				[0.001]***	
Withdrawal%					0.232
					[0.177]
CONTROLS	YES	YES	YES	YES	YES
N	9,847	9,847	9,847	9,847	9,847
R^2	21%	21%	21%	21%	21%

Table 5 reports the multivariate regression results between FDA approvals and litigation characteristics. From column (1) to column (5), our dependent variable is log transformation of total number of FDA approval. We run OLS regression with year and firm fixed effects, but omit the coefficients. Std. errors are clustered at firm level. Detailed definitions of variables are reported in the appendix. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 6
Net Employment Flows and Innovation Outcome

Panel A.

Dependent Variable

Sample	FDA$^{\text{(Total Approval)}}$	FDA$^{\text{(Total Approval)}}$	FDA$^{\text{(Total Approval)}}$	Decline$^{\text{(Total Approval)}}$	absΔFDA$^{\text{(Total Approval)}}$	absΔFDA$^{\text{(Total Approval)}}$
	(1)	(2)	(3)	(4)	(5)	(6)
ΔEmployment	-0.209					
	[0.001]***					
abs(ΔEmployment)		-0.220	-0.242	0.152	0.140	0.141
		[0.001]***	[0.334]	[0.001]***	[0.001]***	[0.001]***
Lawsuit			-0.215			0.024
			[0.001]***			[0.445]
Lawsuit*abs(ΔEmployment)			-1.124			0.019
			[0.001]***			[0.001]***
Decline in Lawsuit				-0.087		
				[0.001]***		
abs(ΔLawsuit)					0.112	
					[0.001]***	
CONTROL	YES	YES	YES	YES	YES	YES
N	9,094	9,094	9,094	9,094	9,094	9,094
R^2	23%	23%	21%	21%	23%	19%

Table 6 reports the multivariate regression results between FDA approvals and firm employment practices. From column (1) to column (3), our dependent variable is log transformation of total number of FDA approval. In column (4), our dependent variable is decline in number of FDA approved products. We measure decline in FDA products by calculating the yearly change in FDA products between t and t-1 where positive values are replaced by zero. In column (5) and (6), our dependent variable is the absolute value change in FDA approved products between year t and t-1. We run OLS regression with year and firm fixed effects, but omit the coefficients. Std. errors are clustered at firm level. Detailed definitions of variables are reported in the appendix. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 7

Other Work Related Disputes and Innovation Outcome

Dependent Variable							
Sample	FDA$^{\text{(Total Approval)}}_{t+1}$						
	OLS	OLS	OLS	OLS	OLS	OLS	OLS
	(1)	(2)	(3	(4)	(5)	(6)	(7)
Log(OSHA$^{\text{Inspections}}$)	-0.05 [0.001]***						
Log(Lawsuit$^{\text{Discrimination}}$)		-1.597 [0.001]***					
Case Reason$^{\text{Wage}}$			-0.026 [0.001]***				
Penalty Amount$^{\text{Wage}}$				-0.003 [0.001]***			
Employee Benefits Security					-0.046 [0.001]***		
Settlement Fees						-0.334 [0.031]**	
Attorney Fees							-0.667 [0.029]**
CONTROLS	YES	YES	YES	YES	YES	YES	YES
N	9,847	9,847	9,847	9,847	9,847	9,847	9,847
R^2	21%	21%	21%	21%	21%	22%	21%

Table 7 reports the multivariate regression results between FDA approvals and other workplace-related violation and inspections. From column (1) to column (7), our dependent variable is log transformation of total number of FDA approval. We run OLS regression with year and firm fixed effects, but omit the coefficients. Std. errors are clustered at firm level. Detailed definitions of variables are reported in the appendix. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 8
Change in Employee Litigation and Change in FDA Approval: The Causal Effects

Panel A.			
Dependent Variable			
Sample	Change in FDA Approval Between year t-1 and year t	Change in Employee Lawsuit Between year t-1 and year t	FDA$^{(Total\ Approval)}$
	(1)	(2)	(3)
Change in Lawsuit between t-1 and t	-0.012 [0.001]***		
Change in Lawsuit between t-2 and t-1	-0.002 [0.041]**		
Change in Lawsuit between t-3 and t-2	-0.013 [0.012]**		
Change in FDA Approval between t-1 and t		0.928 [0.334]	
Change in FDA Approval between t-2 and t-1		-0.112 [0.541]	
Change in FDA Approval between t-3 and t-2		0.033 [0.678]	
Ln(TotalLawsuit)$_{t+1}$			0.312 [0.684]
Ln(TotalLawsuit)$_{t}$			-0.788 [0.040]*
Ln(TotalLawsuit)$_{t-1}$			-0.990 [0.001]***
Ln(TotalLawsuit)$_{t-2}$			-0.657 [0.001]***
CHANGE IN ALL CONTROL VARS	YES	YES	YES
N	8,012	8,012	9,647
R^2	12%	4%	7%

Table 8 presents the results of panel regressions in which we regress the FDA approvals (employee lawsuits) on a set of innovation determinants and the employee lawsuits (FDA approvals) and examines the causal effect between the change in FDA approvals and the change in the employee lawsuits. All variables are first difference from prior year. In Panel A, in column (1), the change in FDA approvals between year t1 and year t is regressed on the changes in the employee lawsuit between year t1 and year t, between year t2 and year t1, and between year t3 and year t2 and the changes in other control variables between year t1 and year t. In column (2), the change in the employee lawsuit between year t1 and year t is regressed on the changes in FDA approvals between year t1 and year t, between year t2 and year t1, and between year t3 and year t2 and the changes in other control variables between year t1 and year t. In column (3), we use dynamic model with different lag and lead values of employee lawsuits. Std. errors are clustered at firm level. Detailed definitions of variables are reported in the appendix. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 9
Employee Lawsuit and Innovation Outcome: 2SLS Analysis

Dependent Variable		
Sample	Log(TotalLawsuit)	FDA(Total Approval)
	-1	-2
Predicted Employee Lawsuit		-0.193
		[0.001]***
Log(Asset)	0.195	
	[0.001]***	
Tobin's Q	0.012	0.041
	[0.001]***	[0.001]***
RnD	0.122	0.556
	[0.667]	[0.443]
Book Leverage	0.441	0.578
	[0.001]***	[0.001]***
Tangibility	0.198	0.776
	[0.422]	[0.462]
ROA	-0.001	0.001
	[0.001]***	[0.333]
HHI Index	-1.444	-1.833
	[0.001]***	[0.001]***
Log(Firm Age)	1.242	1.159
	[0.001]***	[0.001]***
Free Cash Flow	-0.001	-0.001
	[0.992]	[0.991]
Instruments		
Wrongful Termination Laws	0.445	
	[0.001]***	
Sargan Test	1.13	
N	9,912	9,912
R2	11%	11%

In Table 9, we create Wrongful Termination Laws as a binary variable and is equal to one if the firm is located in a state that has the all wrongful termination laws passed (during/before) in our sample, and zero otherwise. In the first stage, we document that firms located in states that have wrongful termination laws have many lawsuits compared to firms that no wrongful termination laws. In the second stage, we show that predicted employee lawsuits lower the number of FDA approved products. Std. errors are clustered at firm level. Detailed definitions of variables are reported in the appendix. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 10

Employee Lawsuits and Innovation: Alternative Tests and Alternative Samples

Panel A.

Dependent Variable					
Sample	FDA$^{(Total Approval)}_{t+1}$				
	Top 200	S&P 1500	Matched Sample	Tobit	Negative Binominal
	(1)	(2)	(3)	(4)	(5)
Log(TotalLawsuit)$_t$	-0.192	-0.347	-0.334	-0.162	-0.161
	[0.001]***	[0.001]***	[0.001]***	[0.001]***	[0.001]***
Log(Asset)	0.156	0.129	1.552	0.127	0.311
	[0.001]***	[0.001]***	[0.001]***	[0.001]***	[0.001]***
Tobin's Q	0.001	0.021	0.221	0.001	0.001
	[0.001]***	[0.001]***	[0.887]	[0.001]***	[0.883]
RnD	0.022	0.055	0.001	0.001	-0.014
	[0.001]***	[0.067]*	[0.355]	[0.139]	[0.584]
Book Leverage	0.334	0.111	0.056	0.001	0.003
	[0.001]***	[0.001]***	[0.001]***	[0.001]***	[0.001]***
Tangibility	0.125	0.117	0.200	0.100	0.439
	[0.422]	[0.998]	[0.131]	[0.073]*	[0.001]***
ROA	-0.224	0.001	0.223	0.001	0.002
	[0.375]	[0.177]	[0.089]*	[0.539]	[0.307]
HHI Index	-1.566	-1.899	-1.677	-1.913	-6.259
	[0.001]***	[0.001]***	[0.001]***	[0.001]***	[0.001]***
Log(Firm Age)	1.174	1.155	1.173	0.174	0.333
	[0.001]***	[0.001]***	[0.001]***	[0.001]***	[0.001]***
Free Cash Flow	-0.001	-0.001	-0.001	0.000	-0.002
	[0.556]	[0.455]	[0.555]	[0.616]	[0.311]
N	2,991	2,185	2,240	9,847	9,847
R^2	9%	8%	16%	9%	12%

Table 10 reports the multivariate regression results between FDA approvals and employee litigations by different sample and regression methods. In column (1), we work with top 200 pharmaceutical firms each year based on market cap between 2000 and 2015. In column (2), we use pharmaceutical firms that are in S&P 1500 between 2000 and 2015. In column (3), we create matched sample by assigning each lawsuit firm to a non-lawsuit firm based on size, book-to-market, and year. In column (4), we run Tobit regression. In column (5), we run Negative Binominal Regression. Std. errors are clustered at firm level. Detailed definitions of variables are reported in the appendix. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 11
Employee Lawsuits and Innovation: Employee Productivity and Product Performance

Panel A. Product Value

Dependent Variable		
Sample		
	[FDA Products/Sale]	[FDA Products/Employee]
	1	2
Log(TotalLawsuit)$_t$	-0.554	-0.012
	[0.001]***	[0.001]***
CONTROLS	YES	YES
N	9,746	9,840
R^2	1%	1%

Panel B. Employee Productivity

Dependent Variable		
Sample		
	Sales/Emp.	Emp. Productivity
	1	2
Log(TotalLawsuit)$_t$	-0.033	-0.122
	[0.001]***	[0.045]**
CONTROLS	YES	YES
N	9,746	9,840
R^2	2%	2%

Panel C. Product Recall

Dependent Variable		
Sample		
	Log(Post Market Evals.)	Log(FDA)^{Recall}
	1	2
Log(TotalLawsuit)$_t$	0.556	0.065
	[0.001]***	[0.029]**
CONTROLS	YES	YES
N	9,746	9,840
R^2	1%	1%

Table 11 reports the multivariate regression results between employee litigations and innovation efficiency. In Panel A of column (1), our dependent variable is total FDA approved products normalized by total sales. In column (2), our dependent variable is total FDA approved products normalized by total number of employee. In Panel B of column (1), our dependent variable is ratio of revenue to the number of employees, and in column (2), our dependent variable is employee productivity following Felaye et al., (2016). In Panel C of column (1), our dependent is log transformation of total number of products failed post market evaluations. In column (2), our dependent variable log transformation of total number of recalled products. In all columns, we run OLS regression with year and firm fixed effects, but omit the coefficients. Detailed definitions of variables are reported in the appendix. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Appendix A : Definition of Variables

Variables	Definition	Source
Panel A. Lawsuit Characteristics		
Total Case	Total number of labor related litigations in given year	NLRB
Lawsuit	Binary variable equal to one if firm had at least one labor related lawsuit, zero otherwise	NLRB
Log(TotalLawsuit)$_t$	Log transformation of total number of lawsuit	NLRB
Union	Binary variable and equal to one if case is opened by a labor union, zero otherwise	NLRB
Individual	Binary variable and equal to one if case is opened by an individual, zero otherwise	NLRB
Dismissal	Binary variable and equal to one if case is dismissed, zero otherwise	NLRB
Withdrawal	Binary variable and equal to one if case is withdrawal, zero otherwise	NLRB
Settlement	Binary variable and equal to one if case is settlement, zero otherwise	NLRB
Log(Case Duration)	Log transformation of case duration, measured as the case closure date minus case filing date	NLRB
One Year	Binary variable and is equal to one if case duration is less than 365 days or, zero otherwise	NLRB
Two Year	Binary variable and is equal to one if case duration is equal to one if case duration is between 365 days and 730 days, zero otherwise	NLRB
Three Years	Binary variable and is equal to one if case duration is equal to one if case duration is between 730 days and 1,095 days, zero otherwise	NLRB
abs(ΔLawsuit)	Absolute value of change in total lawsuit between year t and t-1	NLRB
Panel B. FDA Variables		
FDA$^{(Total\ Approval)}$	Log transformation of total FDA approved products : total drug patents granted by the FDA, total drug approval, total pre-market approval, and total medical device approvals	FDA
Log(Duration)$^{(Days\ to\ Approval)}$	Log transformation of FDA approval duration, measured as the product approval date minus product filing date	FDA
absΔFDA$^{(Total\ Approval)}$	Absolute value of change in total number of FDA approval between year t and t-1	FDA
Decline$^{(Total\ Approval)}$	Change in total number of FDA approval between year t and t-1, positive values are replaced by zero	FDA
Log(Post Market Evals.)	Log transformation of total number of product failed post market evaluations	FDA
Log(FDA)^{Recall}	Log transformation of total number of FDA related product recall	FDA
Panel C. Employee Disputes		
Log(OSHA^{Inspections})	Log transformation of total number of Occupational Safety and Health Administration inspections.	Dept. of Labor
Case Reason^{Wage}	Log transformation of total number of concluded Wage and Hour Division compliance actions	Dept. of Labor
Penalty Amount^{Wage}	Log transformation of amount of civil penalty from Wage and Hour Division compliance actions	Dept. of Labor
Employee Benefits Security	Total number of employee benefits and security disputes	Dept. of Labor
Log(Lawsuit^{Discrimination})	Log transformation of total number of discrimination cases filed against the firm	Bloomberg BNA
Attorney Fees	Log transformation of attorney fees from news releases	S&P Capital IQ

Settlement Fees	Log transformation of settlement fees from news releases	S&P Capital IQ

Panel C. Control Variables

Book Leverage	Long-term debt divided by book value of assets	S&P Capital IQ
Log(TotalAsset)	Log transformation of total assets	S&P Capital IQ
Log(NumEmp)	Log transformation of number of employee	S&P Capital IQ
ROA	Income before extraordinary items plus depreciation and amortization divided by book value of assets	S&P Capital IQ
Tangibility	Ratio of fixed assets to book assets [ppent/at]	S&P Capital IQ
Tobin's Q	Market value of assets divided by book value of assets	S&P Capital IQ
Log(FirmAge)	Log transformation of firm age	S&P Capital IQ
HHI Index	Herfindahl index based on the firm's sales in a given 4-digit SIC industry.	S&P Capital IQ
Free Cash Flow	Operating income before depreciation minus taxes plus interest expense plus dividends paid	S&P Capital IQ
RnD	Firms' R&D expenditure normalized by total assets	S&P Capital IQ
ΔEmployment	Change in number of total employee between year t and t-1.	S&P Capital IQ
abs(ΔEmployment)	Absolute value of change in number of total employee between year t and t-1.	S&P Capital IQ
FDA Products/Sale	Total FDA approved products normalized by total sale	FDA& S&P Capital IQ
FDA Products/Employee	Total FDA approved products normalized by total employee	FDA& S&P Capital IQ
Sales/Employee	Ratio of revenue to the number of employees	S&P Capital IQ
Employee Productivity	Employee Productivity following Felaye et. al., (2006)	S&P Capital IQ
Ln(Pension-Per-Employee)	Pension expense per employee lagged five years	S&P Capital IQ
Political Party	(Total Vote to Republican Party-Total Vote to Democratic Part)/ Total Vote	uselectionatlas.org