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Are employee-friendly workplaces conducive to innovation?

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ABSTRACT

We find strong evidence that firms with employee-friendly workplaces achieve greater innovative success, particularly in industries where innovation is more difficult to achieve. Furthermore, employee-friendly firms were also more inclined to sustain R&D investment during the recent crisis. These findings are consistent with the view that an employee-friendly workplace helps to develop tolerance for failure, which encourages engagement in innovation. We find no support for alternative explanations, such as employee-friendly workplaces helping to attract and retain talented employees and reducing career concerns of executives, which could nurture innovation.

JEL classification: G30, J28, M14, O31

Keywords: Employee-friendly workplace, Employee relations, Employee satisfaction, Innovation

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We find strong evidence that firms with employee-friendly workplaces achieve greater innovative success, particularly in industries where innovation is more difficult to achieve. Furthermore, employee-friendly firms were also more inclined to sustain R&D investment during the recent crisis. These findings are consistent with the view that an employee-friendly workplace helps to develop tolerance for failure, which encourages engagement in innovation. We find no support for alternative explanations, such as employee-friendly workplaces helping to attract and retain talented employees and reducing career concerns of executives, which could nurture innovation.

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"The health and wellbeing of employees makes an essential contribution to business success. I believe that employees are at their most productive and creative when they are in an environment that supports their health and wellbeing."

–Professor Dame Carol Black, National Director for Health and Work

1. Introduction

In 2015, Google was named the world's best company to work for by *Fortune* Magazine and the Great Place to Work® Institute for the 6th time since 2007, for its strong commitment to providing its employees with a supportive and satisfying workplace. Google's employee-friendly workplace practices are considered crucial to incubating various innovative and successful projects. Concurrently, Google is notable for its innovation. According to 'The Most Innovative Companies' list compiled by the Boston Consulting Group, Google was the world's second most innovative company in 2014 and has placed in the top three since 2006. Is this combination of employee-friendly workplace practices and innovative success merely a coincidence? We examine whether a firm's commitment to providing a high quality workplace for its employees spurs innovation.

Innovation is important for encouraging economic growth (Solow, 1957; Aghion and Howitt, 1992; Grossman and Helpman, 1990; Romer, 1990) and establishing firms' competitive advantages (Porter, 1990, 1992). Relatedly, improving workplace standards has become increasingly important to operating in today's competitive environment because firms are under greater pressure to innovate for which talented employees are a key driving force (Zingales, 2000). Although studies have examined the influence of employee welfare on stock returns (Edmans, 2011; Edmans et al., 2014), leverage (Verwijmeren and Derwall, 2010; Bae et al., 2011) and cash holdings (Ghaly et al., 2015), relatively little attention has been paid to whether and how employee-friendly workplaces foster innovation. Investigating this question provides crucial implications for the firm's workplace practices and policies concerning employee relations and for their contribution to the firm's broader strategy and innovation in particular.

The main challenges for firms in pursuing and managing innovation activities are the unpredictability of outcomes and the high probability of failure (Holmström, 1989). By implementing employee-friendly policies, firms are able to increase employee job satisfaction, strengthen their relationships with employees, and enhance employee trust in management, thereby offsetting the negative influence of high-risk innovative activities on employees. Thus, an employee-friendly workplace likely promotes greater tolerance for failure and encourages employee engagement in experimentation and innovation.

Existing research asserts the important role of psychological capital for achieving effective job performance (Fredrickson, 2001; Luthans and Jensen, 2002; Luthans et al., 2006; Luthans and Youssef, 2007; Youssef and Luthans, 2007).[1] These studies argue that a positive, employee-friendly workplace helps develop employees who are *hopeful*, meaning they are more capable of finding positive meaning in adversity and creating redeeming value in failure, and *resilient*, being able to recover from failure in ways that strengthen effectiveness. By cultivating these psychological strengths of *hope* and *resilience* in employees, firms with employee-friendly workplaces are likely to be more tolerant of failure and more capable of overcoming adversity in pursuing innovation. In addition, satisfied employees are more likely to internalize the firm's innovation objectives, which strengthens their motivation to overcome difficulties and failure during the innovation process. Drawing upon recent insights that tolerance for failure is a key driver of innovation (Azoulay et al., 2011; Tian and Wang, 2014), we hypothesize that firms with employee-friendly workplaces invest more heavily in innovation and achieve greater innovation success.

We use the term "workplace quality" to capture how employee-friendly a workplace is. We apply two measures of workplace quality. The first is based on the '100 Best Companies

[1] Drawn from positive psychology, the concept of 'psychological capital' refers to psychological strengths, such as hope and resilience, in the context of workplace applications. This differs from human capital, which is defined as the experience, education, skills, knowledge, and ideas that people bring to their jobs. However, like human capital, psychological capital can be viewed as an asset that can be developed and managed by organizations to achieve superior performance in today's competitive environment. See Luthans et al. (2006).

to Work for in America' list and the second is the employee relations score from the KLD database. Research and Development (R&D) expenditures and patent and citation counts measure a firm's innovation investment and productivity, respectively. We find that workplace quality is positively associated with R&D expenditures, patents and citations. Controlling for R&D expenditures, we show that greater innovation output is not merely the result of increased investment in innovation. The findings are robust to alternative econometric methods, model specifications, subsamples, and measures of workplace quality. More importantly, we apply both propensity score matching and instrumental variables methods to address potential endogeneity concerns. Overall, our identification tests results suggest that workplace quality has a positive causal effect on firm innovation.

To investigate whether employee-friendly workplaces nurture innovation by strengthening tolerance for failure, we rely on heterogeneity in the effect of workplace quality on innovation across firms with different degrees of innovation failure risk (Tian and Wang, 2014). We expect the impact of workplace quality on innovation to be stronger when failure risk is higher and thus tolerance for failure is more needed. Consistent with this view, the positive effect of workplace quality on innovation is indeed more prominent in industries in which innovation is more difficult to achieve. This finding reveals an important insight into the mechanism through which employee-friendly workplaces nurture innovation.

To provide more direct evidence that firms with employee-friendly workplaces are failure-tolerant, we examine the resilience of firms to the disruptive change in their business environment seen in the crisis of 2007-2009. In times of economic distress characterized by higher uncertainty (Bloom, 2014) and risk of failure (Bhattacharjee et al., 2009), companies may reduce investments in innovation to help ensure firm survival. However, if employee-friendly workplaces improve the firm's ability to deal with increased uncertainty and failure risk, we would expect such firms to be more likely to sustain R&D investments during the recession. Following the insights from recent studies (Mian and Sufi, 2011; Mian et al., 2013; Mian and Sufi, 2014), we exploit state differences in the house price collapse to capture the cross-sectional variation in the severity of economic distress and investigate the effect of workplace quality on the sensitivity of R&D investment to distress. We find that firms with low workplace quality cut R&D investments significantly following house price shocks. However, high workplace quality firms maintained their R&D investment, suggesting greater failure-tolerance.

It is important to consider alternative interpretations for the positive relation between workplace quality and innovation. First, an employee-friendly workplace may nurture innovation by improving the recruitment and retention of talented employees (Huselid, 1995; Sheridan, 1992; Turban and Greening, 1996; Edmans, 2012). Under this alternative, the positive effect of workplace quality on innovation should be more prominent in firms with higher levels of intangible capital embedded in their key employees and in industries with higher labor mobility. Our results do not support this hypothesis. Second, employee-friendly workplaces may alleviate executives' career concerns that impede investment in innovation. Executives who are committed to providing employees with a quality workplace environment may gain allegiance from subordinates and face lower risk of termination after poor performance, encouraging their engagement in risky, long-term innovative activities. To test this alternative, we investigate executive turnover-performance sensitivity. We do not find lower sensitivity for firms with more employee-friendly workplaces. Third, the decisions to support innovation activities and implement employee-friendly policies may be influenced by the CEO's incentives, such as compensation. Thus, we include controls for CEO pay-performance sensitivity (delta) and sensitivity of CEO wealth to stock volatility (vega). We find that the positive effect of workplace quality on innovation is robust to these inclusions and conclude that differences in CEO incentive contracts do not explain the positive effect of workplace quality on innovation.

The remainder of the paper is organized as follows. Section 2 describes how our research relates to the existing literature. Section 3 explains the sample selection and documents summary statistics. Section 4 presents the baseline results and shows that the results are robust and not driven by endogeneity. Section 5 provides evidence that employee-friendly workplaces engender failure tolerance and thus encourage engagement in innovation. Section 6 discusses and tests alternative hypotheses, and Section 7 concludes.

2. Relation to the existing literature

Our paper contributes to two strands of literature. First, it adds to the debate of whether an employee-friendly orientation is beneficial to firms. Traditional theorists, such as Taylor (1911), view employees as unskilled labor with no special status, just like other inputs such as raw materials. Under this view, employee welfare represents wasteful expenditure since it is against management's goal of maximizing output while minimizing cost. However, the role of employees has changed dramatically as technology and the nature of the firm have evolved. Modern firms tend to be human capital-intensive organizations that operate in a highly competitive environment emphasizing quality and innovation (Zingales, 2000; Edmans, 2011; Eisfeldt and Papanikolaou, 2013). Concurrently, technology advancements have increased the demand for a highly motivated, rapidly evolving workforce in order to keep up-to-date with the most in-demand skills. Therefore, by improving the retention, motivation, and productivity of employees, the key source of value creation in modern firms, employee-friendly workplaces can contribute to firm performance. Consistent with this human capital–centered view, Edmans (2011) and Edmans et al. (2014) find that employee satisfaction is associated with positive abnormal stock returns. Our paper contributes to the debate by showing that an employee-friendly workplace is associated with greater innovation, which benefits shareholders.

Second, our paper contributes to the recent and growing literature on the relations between innovation and various firm characteristics. Firms pursue more influential innovation, as measured by patent citations, in the years following private equity investments (Lerner et al., 2011). Firms with higher institutional ownership are associated with more innovation because higher institutional ownership reduces the manager's career concern, which is an impediment to investment in risky innovative activities (Aghion et al., 2013). Becker-Blease (2011) shows that protection against unwanted acquisition attempts is beneficial for firm innovation as it shields managers from short-term performance concerns and permits a more long-term, value-enhancing investment strategy that stimulates innovation. Sapra et al. (2014) develop a theoretical model that predicts a U-shaped relation between innovation and takeover pressure and find empirical support for the predicted relation using the staggered passage of state antitakeover laws to capture the variation in the threat of takeovers. Fang et al. (2014) find that stock liquidity impedes firm innovation because high liquidity leads to increased threats of hostile takeover and a greater presence of non-dedicated institutional investors, pressuring managers to boost current profits and reduce investment in long-term innovation projects. Tian and Wang (2014) and Chemmanur et al. (2014) show that firms backed by more failure-tolerant venture capitalists are significantly more innovative than firms backed by less failure-tolerant venture capitalists.[2]

These existing studies have focused primarily on firm characteristics in relation to external capital markets. Far fewer studies have examined the role of a firm's internal systems for nurturing innovation. Hirshleifer, Low and Teoh (2012) find that firms operated by overconfident CEOs are associated with larger investments in innovation and greater innovation productivity. Manso (2011) shows theoretically that managerial incentive contracts that exhibit tolerance for early failure and reward long-term success are best for motivating innovation. Our paper contributes to this line of research by showing that developing the proper internal systems with good employee relations and a satisfying workplace fosters innovation.

A contemporaneous study that examines the relation between employee treatment and innovation is Chen et al. (2014). Our paper differs in several ways. First, we focus on uncovering the details of possible mechanisms through which employee-friendly workplaces spur firm innovation to shed further light on the effect of workplace quality and, in turn, causality (Rajan and Zingales, 1998). Second, we consider and address the potential sample selection bias due to missing values on the employee relations score, which confirms the validity of our conclusions. Finally, our sample period encompasses the recent crisis of 2007-2009,[3] which allows us to elaborate on the failure tolerance mechanism by examining the resilience of firms to disruptive changes.

[2] Other notable studies examine the relations between innovation and market characteristics, as opposed to firm characteristics, including product market competition (Aghion et al., 2005), labor laws (Acharya et al., 2013), bankruptcy laws (Acharya and Subramanian, 2009), financial market development (Hsu et al., 2014), and general market conditions (Nanda and Rhodes-Kropf, 2013).
[3] Our sample consists of 8,911 firm-year observations from 1998 to 2010, while their sample covers 4,453 firm-years from 1992 to 2006.

Our study is also related to Flammer and Kacperczyk (2015), who find that CSR has a positive impact on innovation. However, CSR comprises numerous dimensions. While some dimensions may be beneficial for innovation, it is unclear whether others are of similar benefit. Combining several dimensions may give an incomplete understanding of how innovation is fostered within firms. Therefore, this paper's focus is on workplace quality, which represents a specific dimension of CSR in relation to employee relations that has an intuitive and anecdotal link to innovation. We find that greater employee welfare is beneficial to innovation. The results are consistent with the view that an employee-friendly workplace stimulates innovation by promoting psychological capital in the form of hope and resilience via tolerance for failure.

3. Sample selection, empirical specification and summary statistics

3.1. Sample selection

Our patent and citation data are collected from three sources. We start with the latest version of the NBER Patent Citation database, which provides information for all utility patents granted by the US Patent and Trademark Office (USPTO) over the period of 1976-2006. We then supplement this information to include the period 2007-2010 that is provided by Kogan et al. (2012).[4] Finally, we obtain the technological class of the patents from the Harvard Business School (HBS) patent and inventor database.[5] To measure a firm's overall workplace quality, we use the '100 Best Companies to Work for in America' list compiled by the Great Place to Work® Institute, as well as the employee relations score from the KLD database.[6] To construct control variables, we obtain board of director information from Riskmetrics and firms' accounting information from Compustat. All accounting variables are winsorized at the 1st and 99th percentiles to reduce the potential impact of outliers. Our sample includes firms that are at the intersection of these databases, comprising 1,500 firms yielding 8,911 firm-year

[4] This dataset provided by Kogan et al. (2012) is available at https://iu.box.com/patents.
[5] The HBS patent and inventor database is available at http://dvn.iq.harvard.edu/dvn/dv/patent.
[6] The Best Companies list has been published in *Fortune* magazine annually since 1997. Therefore, our sample of the list also begins in 1997.

observations between 1998 and 2010.[7] Firm-year observations with missing data on the employee relations variable or any other controls are deleted. Financial firms are excluded.

3.2. Empirical specification

To examine whether workplace quality affects firm innovation, we estimate the following baseline empirical specification:

$$ln(Innovation_{i,\, t+1}) = \alpha + \beta \times Workplace\ quality_{i,\, t} + \gamma Z_{i,\, t} + Industry_{i} + Year_{t} + \varepsilon_{i,\, t} \quad (1)$$

The measures of *Innovation* and *Workplace quality* are discussed in detail below. *Z* is a vector of firm characteristics that affect a firm's innovation activities based on the extant literature. *Industry* represents industry fixed effects defined based on two-digit SIC codes and *Year* captures year fixed effects.

3.2.1. Measuring innovation

We use both input- and output-oriented measures of firm innovation. The resources devoted to innovation activities are measured by the natural logarithm of R&D expenditures. Firm-years with missing R&D information are assigned a zero value.[8] Innovation output is measured by patents and citations, which capture how effectively a firm has utilized its innovation inputs. Our first measure of innovation output is the number of patent applications filed in a year that are eventually granted.[9] Simple patent counts may be insufficient to capture innovation productivity, as patents vary considerably in their technological and economic significance. Therefore, we also use the citation count to measure patent quality. For each firm,

[7] Independent variables are lagged one year relative to the dependent variable to mitigate the endogeneity concern. Hence, our sample of one-year-ahead patents and citations begins in 1998 coinciding with the availability of the Best Companies list in 1997. We do not restrict our sample to firms with patents for consistency with prior literature.

[8] To avoid losing firm-year observations with no R&D expenditures in the logarithmic transformation, we add one to the actual value before calculating the natural logarithm. This adjustment is also applied when calculating the natural logarithms of patent count and citations.

[9] When constructing this measure, we use a patent's application year rather than the grant year because the application year provides a better indicator of the actual timing of innovation (Griliches et al., 1988).

the citation-based measure is constructed as the total number of non-self citations ultimately received by the patents applied for in a given year.

The NBER patent database has several imperfections. First, it takes time for a patent application to be granted; hence, there is a truncation bias in the number of patents towards the end of the sample period. Second, patents granted near the end of the period tend to have fewer citations because they have less time to accumulate them. We include year fixed effects in our regressions to address potential time truncation issues. Industry fixed effects are also included to account for variation in patenting and citation intensities across industries (Hall et al., 2001; Seru, 2014).

To address these truncation issues further, we follow Hall et al. (2001) and Seru (2014) and adjust both patents and citations. The variable *Patent* divides the number of patents for each firm by the average patent count of all firms in the same technology class (i.e., a finer industry classification used by the USPTO to assign patents) and year. For citations, each patent's non-self citation count is scaled by its mean across all patents in the same technology class and year. The variable *Citation* is then the sum of these adjusted citation counts across all patents applied for by a firm in a given year. Since the distribution of patent counts (citations) in the sample is right-skewed we use the natural logarithm of one plus *Patent (Citation)* in the regressions.

3.2.2. Measuring workplace quality

Our first measure of workplace quality is the list of the '100 Best Companies to Work for in America' (denoted, *BC*), also used by Edmans (2011, 2012), Edmans et al. (2014) and Ghaly et al. (2015). It is regarded as a thorough measure of workplace quality and is arguably the most respectable and prominent measure available (Edmans, 2011, 2012).[10] However, the Best Companies list is not free from limitations. For instance, by publicizing only the top 100

[10] A firm's ranking on the Best Companies list depends on two sources. Two-thirds of the score is based on employee responses to a 57-question survey that covers topics such as attitudes towards management, job satisfaction, fairness, and camaraderie. According to the institute, a great place to work is one in which "employees trust the people they work for, have pride in what they do, and enjoy the people they work with." The remaining one-third of the score depends on the institute's evaluation of factors such as a company's demographic makeup, pay and benefits program, and culture.

firms, it includes only firms in the right tail of workplace quality, which affects the generalizability of results to the wider distribution.[11] In addition, the list incorporates employee perceptions of workplace quality, which fuels reverse causality concerns. Employees may be happier working for an innovative firm that provides them with opportunities to work on fashionable and exciting products.

To mitigate the above concerns, we also measure workplace quality using the employee relations score from the KLD database (denoted, *ER*), which has been applied extensively in the CSR literature (Verwijmeren and Derwall, 2010; Bae et al., 2011; Deng et al., 2013; Ghaly et al., 2015). Following Bae et al. (2011), *ER* is constructed using five strength categories of employee relations: union relations, cash profit-sharing, employee involvement, retirement benefits, and health and safety. KLD assigns a binary rating for each category for each firm. *ER* is the sum of the ratings across the five categories with a higher value indicating a more employee-friendly workplace.

There are two important advantages to the employee relations score. The KLD database has covered approximately 650 companies since 1991 and more than 3000 firms since 2003. The considerably wider coverage than the Best Companies list addresses concerns about generalizability. Second, *ER* derives from KLD's evaluation of each firm's employee-related practices and policies, independent from employees' perceptions. This implies reverse causality is less likely since firms do not base their employee relations practices directly on patent and citation counts. Hence, we use the employee relations score as our primary measure of workplace quality.

3.2.3. Control variables

Following the extant literature (Hall and Ziedonis, 2001; Aghion et al., 2013; Tian and Wang, 2014), we control for firm characteristics that may affect future innovation productivity. In the baseline regressions, the control variables include firm size measured as the natural

[11]Relatedly, the Great Place to Work® Institute does not survey all companies. Firms must apply to be considered for the list, and approximately 400 firms do so each year, raising concerns about potential selection bias. However, such selection issues either have no effect or bias the results downward. See Edmans (2011) for a more detailed explanation.

logarithm of firm market capitalization (*Ln(MV)*); growth opportunities measured as Tobin's Q (*Q*); Leverage measured as the ratio of total debt to total assets (*Lev*); capital intensity measured as net property, plant and equipment scaled by total assets (*PPE/TA*); profitability measured as the return on assets (*ROA*); and investment in innovation measured as R&D expenditures scaled by total assets (*R&D/TA*). To account for the potential impact of corporate governance on the level of innovative activity (O'Connor and Rafferty, 2012; Sapra et al., 2014), we include the fraction of independent directors on the board (*Board independence*) as well as the entrenchment index (*E index*) compiled by Bebchuk et al. (2009). Detailed variable definitions are provided in the Appendix.

3.3. Summary statistics

Table 1 provides summary statistics for our variables. An average firm generates approximately 2 patents and 14 non-self citations per year and has a market capitalization of 9,369 million US dollars, Tobin's Q of 2.0, leverage of 22.0%, PPE-to-assets ratio of 29.9%, return on assets of 14.8%, fraction of independent directors of 72.0%, E index value of 2.8, and R&D-to-assets ratio of 2.8%. Approximately 4.0 % of the firm-year observations are included on the Best Companies list. An average firm has an employee relations score of 0.5, with a maximum (minimum) of 5 (0).

Insert Table 1 about here

In Table 2, we compare means and medians across subsamples of firms with high and low levels of workplace quality. In panel A, firms are divided into high and low *ER* samples according to the sample median, which is zero. Consistent with our conjecture, firms with employee-friendly policies have higher patents and citations on average. A firm in the high *ER* group has, on average, approximately five times as many patents and citations, which are statistically significant differences. Panel B separates firms according to the most recent Best Companies list. On average, a firm making the Best Companies list has approximately six times as many patents and seven times as many citations. With respect to the control variables, firms with employee-friendly workplaces are larger and show better performance in terms of Tobin's Q and *ROA*.

Insert Table 2 about here

4. Workplace quality and innovation activity

4.1. Baseline results

Table 3 shows the relation between workplace quality and firm innovation, as measured by R&D expenditures (Panel A), patents (Panel B) and citations (Panel C). The table shows estimators using a range of methods: excluding and including controls, Fama-MacBeth regressions, and between estimators.[12] When analyzing patents and citations, we include R&D expenditures as an additional control to examine whether workplace quality increases innovation output for a given level of investment input. Across all regressions, the coefficients on *ER* are positive and statistically significant at the 5% level or better, providing strong and consistent evidence that firms with employee-friendly workplaces invest more in innovation and generate more patents and citations, regardless of how workplace quality is measured.

Insert Table 3 about here

In terms of economic significance, the coefficients on *ER* in column (2) indicate that a one standard deviation increase in *ER* is associated with 30.0% higher R&D expenditures, 6.9% more patents, and 7.1% more citations, other variables constant. The coefficients on *BC* in column (6) suggest that firms on the Best Companies list have 69.5% higher R&D expenditures, 37.7% more patents and 47.8% more citations.

4.2. Robustness tests

[12] We estimate using Fama-MacBeth and between estimators methods to make best use of the cross-sectional variation in the employee relations score on firm innovation. Variation in innovation is largely driven by cross-sectional variation in the employee relations score. The lack of within-firm time series variation works against finding a significant effect of the employee relations score on innovation in firm fixed effects regressions, which mainly estimate the effect of time series variation in the employee relations score within a firm on innovation (Zhou, 2001).

We take six steps to ensure the robustness of our baseline results.[13] First, we test whether the results are robust to the use of alternative econometric methods. We use a Tobit model to account for the nonnegative nature of our dependent variables and also run Poisson regressions that allow for the discrete nature of patent and citation counts. The results hold in all tests. Second, we end our sample period in 2008 to adjust the sample in case patent and citation data for the final two years may be incomplete. The results are unaffected. Third, we construct an alternative employee relations score by incorporating KLD's concern indicators. Following Ghaly et al. (2015), we sum the KLD ratings for the five strength categories and subtract those for the five concern categories, creating a 'net' employee relations score. The results are robust to this alternative measure of workplace quality.

Fourth, we control for additional CEO and board characteristics. Galasso and Simcoe (2011) and Hirshleifer et al. (2012) show that CEO overconfidence is an important determinant of firm innovation. Following the rationale provided by Malmendier and Tate (2008) and the methodology of Campbell et al. (2011), we use the *Holder 67* variable as an indicator of CEO overconfidence.[14] Chen et al. (2015) show that firms with more gender-diverse boards achieve greater innovative success. We therefore also include *Fraction of female directors* to capture board gender diversity. To mitigate the possibility that further CEO and board characteristics may be driving our results, we control for *CEO age*, *CEO tenure*, *CEO gender*, *Board tenure diversity,* and *Board age diversity.*[15] Our results are robust to the inclusion of all of these controls.

The use of an extensive set of controls mitigates omitted variable bias. However, some variables such as Tobin's Q, Leverage and *ROA*, may be determined jointly with innovation

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[13] The results are not reported for brevity, but are available from the author on request.
[14] *Holder 67* identifies a CEO as overconfident if he or she postpones the exercise of company stock options that are at least 67 percent in the money. Following Campbell et al. (2011), we estimate the average CEO stock option moneyness for each year using the Execucomp data as follows. We first calculate the average realizable value per option by dividing the total realizable value of the exercisable options by the number of exercisable options. Next, we subtract the average realizable value from the fiscal year-end stock price to obtain the average exercise price of the options. The estimated moneyness of the options is then calculated as the stock price divided by the estimated average exercise price minus one. As we are interested in the CEO's decisions to hold options that could have been exercised, we include only exercisable options held by the CEO.
[15] *Fraction of foreign directors* is defined as the ratio of the number of non-US directors to board size. *Age (Tenure) diversity* is calculated as the standard deviation of director age (tenure) divided by the average age (tenure) of directors on the board.

activities, thereby biasing our results. Therefore, in Table 3 we also report parsimonious specifications that include only workplace quality, and industry and year effects. Our fifth robustness test replaces all firm-level controls with industry-level controls (computed as industry averages), or alternatively with industry-year effects. These are arguably less contaminated by endogenetity concerns and we find that our results remain positive and significant.

Finally, we test whether the results are robust to alternative clustering and definitions of industry dummies. Regressions in Table 3 include two-digit SIC industry and year dummies and standard errors are clustered by firm. We confirm that our findings are robust to Fama-French 49 industry classification dummies, three-digit NAICS industry dummies, the exclusion of year dummies, clustering by industry and year, and double clustering by industry and year, and firm and year.

4.3. Do missing data on the employee relations score affect the results?

Data on the employee relations score are missing for a number of firms in the KLD database. This may create a potential sample selection bias if firms that do not have employee relations data also generate high or low innovation.[16] We address this concern in three ways. We compare the industry distribution of the deleted sample due to missing information with those of the initial and final samples. We find scant difference in the industry distributions across the three samples, implying no evidence that firms in certain industries are more likely to be deleted than others. Second, we adopt a multiple imputation approach that replaces each missing value with a set of imputed values[17], estimates the innovation regressions for each of the imputed datasets, and combines the results following Rubin (1987) for inference. The results are qualitatively similar to those reported.

[16] We are grateful to the referee for drawing our attention to this possible bias and suggesting possible robustness tests.

[17] Following Yuan (2011), we impute missing values based on the regression of the employee relations score on the other controls, industry, and year effects, as well as a simulated normal deviate. See Yuan (2011) for more details about the multiple imputation procedure.

We also adopt a Heckman (1979) two-step analysis to control for the potential sample selection bias in regressions. In the first step, we estimate a probit model where the dependent variable is one if the data on the employee relations score are available and zero if they are missing. The independent variables include the identifying variable, *Post KLD coverage expansion*, in addition to the original control variables in innovation regressions. *Post KLD coverage expansion* is a dummy that equals one for the period after KLD expanding its coverage in 2003 and zero otherwise. This expansion represents a noticeable jump in the likelihood of non-missing employee relation scores that is plausibly exogenous to firm innovation.[18] In the second step, we re-estimate the effect of workplace quality on firm innovation, after including the inverse Mills ratio (*Lambda*) derived from the first-step probit regression as an additional independent variable. The results suggest that the coefficients on *Post KLD coverage expansion* in probit regressions are positive and significant, consistent with our prediction. More importantly, the impact of *ER* on firm innovation remains positive and significant after we control for *Lambda* in the second-step regressions, confirming that potential sample-selection bias does not drive our results.

4.4. Does endogeneity drive the results?

Our estimates may be biased due to the endogeneity problems which could occur when certain characteristics not captured by the model are correlated with both a firm's innovation output and its workplace practices (unobserved heterogeneity), or when profitable, innovative firms are more likely to invest in employee-friendly workplaces (reverse causality). To address these potential concerns, we employ two approaches: propensity score matching to address the matching concern based on observable firm characteristics and instrumental variables regressions to address reverse causality.

We use propensity score matching to compare firms that have employee-friendly workplaces (treatment group) with otherwise indistinguishable firms that do not have employee-friendly workplaces (control group). An employee-friendly workplace is defined as

[18] In 2003 KLD expanded its coverage universe to include more than 3000 US companies from previously approximately 1000 companies.

either a firm with an employee relations score above the sample median or a firm that is on the Best Companies list. We construct the control group using the nearest-neighbor method with propensity scores derived from a probit model where the dependent variable is a dummy variable that takes the value one for firms with employee-friendly workplaces according to the definitions above. The explanatory variables include the same firm characteristics included in the previous tables as well as industry and year effects. To ensure that firms in the treatment and control groups are sufficiently similar, we require that the maximum difference between the propensity score of a treatment firm and its matched control firm does not exceed 0.001 in absolute value. Untabulated results show that the average treatment effect (ATT) estimates are consistent with those reported. Specifically, firms with *ER* values above the median produce 14.4% more patents and 14.8% more citations. Firms on the Best Companies list generate 22.1% more patents and 21.1% more citations.

We employ the instrumental variables approach to extract the exogenous component of workplace quality and use it to explain innovation outcomes. We use two instrumental variables to capture the exogenous variation in a firm's tendency to provide employee-friendly workplaces. Having two instrumental variables for one endogenous regressor allows us to conduct an overidentification test of whether the instruments satisfy the exclusion restriction. Our first instrument, *Implied Contract (IC)*, is a dummy variable equal to one if the firm is headquartered in a state that has the implied-contract exception and zero otherwise.[19] The second instrument, *ln(UI benefits)*, is the natural logarithm of state-level unemployment insurance (UI) benefits.[20] On the one hand, the staggered adoption of the implied-contract exception and UI benefits across states provide plausibly exogenous variation that is positively related to employee treatment, as argued by Acharya et al. (2013) and Flammer and Luo (2016). On the other, both instruments are expected to be uncorrelated with firm innovation, except through their impact on employee treatment. To verify this condition, we add the instruments

[19] The implied-contract exception is a wrongful discharge law that implicitly prohibits employers from terminating employment contracts without just cause.

[20] The data on state-level UI benefits are collected from the U.S. Department of Labor's 'Significant Provisions of State UI Laws'. Following Agrawal and Matsa (2013) and Flammer and Luo (2016), we measure the generosity of a state's UI benefits as the product of the maximum benefit amount and the maximum duration allowed.

to the OLS regressions of innovation both separately and together and find that they are not significant.

Insert Table 4 about here

Columns (1) and (3) of Table 4 present the results of the first-stage regression where the dependent variable is *ER*. Consistent with our predictions for the instruments, their coefficient estimates are positive and significant at the 10% level or better. In addition, we conduct three tests to verify their validity. We first test the joint significance of the two instruments and find that the values of the *F-test* are large and highly significant (*p-value*=0.000). Second, the *p-values* of the Cragg-Donald's Wald *F* weak-instrument test statistic are very close to zero, rejecting the null hypothesis that the instruments are weak (Cragg and Donald, 1993; Stock and Yogo, 2005). Third, the *p-values* for Hansen's *J* over-identification test are large (0.153 or higher), suggesting that the two instruments are valid (Hansen, 1982). More importantly, in the second-stage analysis (columns (2), (4), and (5)), we find that *ER* continues to be a positive and significant determinant of innovation after accounting for the potential endogeneity of firm innovativeness, confirming our prior results in Table 3.

5. Workplace quality and tolerance for failure

5.1. Failure risk of innovation and the workplace quality effect

To investigate whether the positive effect of workplace quality on innovation is due to improved tolerance for failure, we follow the method of Tian and Wang (2014) to explore the variation in firms' failure risk of innovation. If employee-friendly environments affect employees' attitude towards failure and fosters innovation we expect the marginal effect of workplace quality on innovation to be stronger when the failure risk of innovation is higher so that failure tolerance is much more needed and valued.

We classify our patent sample into three categories: 1) pharmaceutical, medical instrumentation, healthcare, and chemicals (hereafter pharmaceutical); 2) computers, communications, electrical and business equipment, software programing, and internet applications (hereafter computers and software); and 3) other miscellaneous patents (hereafter low-tech).[21] The rationale is that patents vary in their level of difficulty and reward (Hall et al. 2005). According to Tian and Wang (2014), patents for new pharmaceutical drugs are the most difficult to generate, followed by patents for new software programs. Low-tech patents are the least difficult to produce. The development process for a new pharmaceutical drug involves multiple steps and countless costly experiments, whereas the time and resources required for developing a new software program is lower and the probability of success may be higher (Tian and Wang, 2014). Thus, under our failure tolerance view, we expect the positive effect of workplace quality to be more prominent in industries that produce new pharmaceutical drugs, followed by computers and software, and be least prominent or even insignificant for low-tech industries.

Insert Table 5 about here

We estimate patent and citation regressions for each industry category separately and report our results in Table 5. Due to the limited coverage of the Best Companies list, we rely on the employee relations score for the subsample analysis in this and subsequent tables. For brevity, we report only the coefficients on *ER* in Table 5, although we control for other firm characteristics. There is a monotonic decrease in the impact of workplace quality on innovation as one moves from the high (pharmaceutical) to low (low-tech) innovation failure risk categories. These results suggest that an employee-friendly workplace is much more important for firms in the pharmaceuticals industry than for those in the software and low-tech industries, consistent with our failure tolerance view.

5.2. Are firms with employee-friendly workplaces more failure-tolerant? Evidence from the change in R&D expenditures during the recent crisis

To gain further insight into the impact of workplace quality on innovation, we investigate how firms with employee-friendly workplaces reacted to the recent economic and financial crisis of 2007-2009 by exploring the change in their R&D expenditures. Higher uncertainty (Bloom, 2014) and inflated risk of failure (Bhattacharjee et al., 2009) that characterize

[21] If a firm has no patents, we classify it into one of the above categories based on the type of patents that are most frequently produced in the firm's industry following Tian and Wang (2014).

economic crises raise significant challenges that may impair firms' ability to undertake risky investments in innovation. As a result, companies may delay or cut R&D projects to ensure firm survival. If employee-friendly workplaces help companies gain superior trust from their employees, which improves firms' ability to deal with increased uncertainty and failure risk, then we would expect that such firms are more likely to sustain their R&D investments during the recession.

Recent studies suggest that regions that suffered larger drops in house prices were more severely affected by the crisis, resulting in a larger drop in consumption and employment (Mian and Sufi, 2011; Mian et al., 2013; Mian and Sufi, 2014). Accordingly, we exploit state differences in the house price collapse to capture the cross-sectional variation in the severity of the recession.[22] We are particularly interested in the interactive effect of whether workplace quality attenuates the effect of the severity of the recession on the change in R&D expenditures, which is less likely to be affected by omitted factors. Specifically, we estimate the following regression:

$$\Delta Ln(1{+}R\&D)_{i,s} = \alpha + \beta ER_{i,s} + \delta House\ price\ shock_{s} + \eta\, House\ price\ shock_{s} \times ER_{i,s} + \gamma Z_{i,s} + Industry_{i,s} + \varepsilon_{i,s} \quad (2)$$

where *i* indexes firms, *s* indexes states. $\Delta Ln(1+R\&D)$ is the change in R&D expenditures from 2007-2009. *House price shock* is the percentage drop in the Zillow Home Value Index (ZHVI)[23] from December 2006 until December 2009 in the company's state. *ER* is the employee relations score from the KLD database. As in previous regressions, we control for the same set of firm characteristics, all measured in 2007. Our timings are consistent with recent studies of the recession (Mian and Sufi, 2014; Flammer and Ioannou, 2015).

Insert Table 6 about here

We estimate equation (2) and report the results in column (3) of Table 6. The coefficient on the interaction term (*House price shock* × *ER*) is positive, weakening the negative impact

[22] This approach is analogous to a difference-in-differences analysis in which we compare R&D investments of firms in more affected regions ('treatment group') with those of firms in less affected regions ('control group').

[23] Zillow provides estimates of the price of more than 110 million individual houses in the US, based on information from several sources, including prior sales, county records, tax assessments, real estate listings, and mortgage information. These house-level valuations are aggregated into the Zillow Home Value Index (ZHVI). We find that, on average, the ZHVI dropped by 10.8% from December 2006 until December 2009.

of *House price shock* on the change in R&D expenditures. Moreover, in columns (1) and (2), we classify firms into high and low groups based on the sample median of *ER* and find that a large drop in house price significantly reduces R&D expenditures only for low-*ER* firms. Therefore, both the subsample analysis and the interaction term approach suggest that firms with employee-friendly workplaces are more inclined to sustain R&D investments following house price shocks, consistent with such firms being more failure-tolerant.

6. Alternative hypotheses

In this section, we discuss alternatives to the tolerance for failure hypothesis, which could explain why firms with higher workplace quality are associated with substantially greater patents and citations.

6.1. Retention and recruitment

One prominent alternative is that employee-friendly policies enhance a firm's ability to retain and recruit talented employees, the key source of innovation and value creation in modern corporations. By catering to the interests of employees, firms are likely to improve employee job satisfaction, foster employee commitment to organizational values, and ensure that talented employees remain with the firm (Huselid, 1995; Sheridan, 1992; Edmans, 2012). An employee-friendly orientation can also serve as a valuable recruitment tool to attract a higher quality workforce (Turban and Greening, 1996; Edmans, 2012).

Under this explanation, workplace quality captures a firm's ability to retain and attract talented employees. If an employee-friendly orientation fosters innovation by improving retention and recruitment, then we expect the effect of workplace quality to be stronger in firms with higher levels of intangible capital embedded in their key employees (i.e., organization capital) and in industries with greater labor mobility. When there is more investment in key employees or more labor market flexibility, retaining and recruiting talented employees become more important to a firm's survival and success. To test this hypothesis, we divide the sample according to the firm's organization capital and industry-specific labor mobility.

6.1.1. Organization capital

Organization capital (*OC*) is a type of intangible capital that is embedded in a firm's key employees (Prescott and Visscher, 1980; Eisfeldt and Papanikolaou, 2013). Firms with high levels of organization capital invest heavily in hiring and training key employees. However, such key talent can move across firms. If workplace quality nurtures innovation by strengthening the retention of key talent, we should expect the retention benefits of an employee-friendly orientation to be more pronounced in high *OC* firms. Therefore, we re-estimate the regressions for patents and citations for firms grouped according to their levels of organization capital divide at the sample median. Following the extant literature (Lev and Radhakrishnan, 2005; Lev et al., 2009; Eisfeldt and Papanikolaou, 2013), we measure a firm's organization capital using capitalized selling, general and administrative (SG&A) expenses scaled by total assets.[24]

Columns (1) and (2) of Table 7 show a positive relation between *ER* and the number of patents in both the high- and low-*OC* groups. We find a similar pattern for citations in columns (4) and (5). We also interact *ER* with *OC* in columns (3) and (6) and the coefficients on the interaction terms (*OC* × *ER*) are both insignificant, supporting the results of the subsample analysis. The retention explanation requires a more pronounced effect in high-*OC* firms. We find no such evidence and there is no indication that an employee-friendly workplace fosters innovation by improving the retention of key talent.

[24] To estimate a firm's level of organization capital, we first capitalize SG&A expenditures using the perpetual inventory method and then scale this value by total assets. SG&A expenses include expenses primarily aimed at improving a firm's body of knowledge and business processes, such as IT investment; consulting, advertising and marketing expenses; and employee training costs. Eisfeldt and Papanikolaou (2013) cross-validate this measure of organization capital by showing that high-*OC* firms have higher managerial quality, spend more on IT, and are more likely to list 'loss of key personnel' as a risk factor in their 10-K filings.

Using the perpetual inventory method, we compute a firm's stock of organization capital by recursively cumulating the deflated value of SG&A expenditures:

$$OC'_{i,t} = (1 - \delta_O) \times OC'_{i,t-1} + (SG\&A_{i,t} / cpi_t), \quad (2)$$

where δ_O is the depreciation rate, and cpi_t is the US consumer price index. To implement the law of motion in equation (2), we choose an initial stock and depreciation rate. The initial stock of organization capital is defined:

$$OC'_0 = \frac{SG\&A_i}{(g + \delta_O)},$$

where the average real growth rate of firm-level SG&A expenditures g is set to 10% following Eisfeldt and Papanikolaou (2013). In addition, we use a depreciation rate of 15%, which is equal to the depreciation rate used by the US Bureau of Economic Analysis (BEA) in its estimation of R&D capital in 2006. Our results are robust to depreciation rates between 10% and 50%. Finally, we scale *OC'* by total assets to obtain *OC*, and we use the sample median of the scaled variable to split the sample into high- and low-*OC* firms.

Insert Table 7 about here

6.1.2. Labor mobility

If an employee-friendly workplace is conducive to innovation through the improved retention and recruitment of key talent, then a natural implication is that the benefits should be particularly important in industries where the labor supply is more mobile and so employees have more flexibility to leave a firm. Following Donangelo (2014), we measure industry-specific labor mobility (*LM*) as the average occupation dispersion of employed workers in an industry.[25] The rationale is that labor mobility is driven by the level of occupation-specific human capital. Workers in occupations that are concentrated in a few industries are associated with low *LM*, while workers in occupations that are dispersed across the economy are associated with high *LM*.

Table 8 presents the results of regressions for groups of firms depending on their industry-specific labor mobility. Firms are classified into high- and low-*LM* groups according to the sample median. We find that a more employee-friendly workplace is associated with greater innovation in both the high- and low-*LM* groups, independent of which innovation measure we use. Interacting *ER* with *LM* in columns (3) and (6) yields insignificant interaction terms (*LM* × *ER*), confirming that there is no significant difference in the impact of *ER* on innovation between firms with different levels of industry-specific labor mobility.

Insert Table 8 about here

Overall, the positive effect of *ER* is pervasive across firms with different levels of organization capital and industry-specific labor mobility. This contradicts the argument that

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[25] Using data from the Bureau of Labor Statistics, the measure of labor mobility is constructed by Donangelo (2014) in two stages, first at the occupation level and then at the industry level. In the first stage, the concentration of workers in occupation *j* is estimated by:

$$CONC_{j,t} = \left(\frac{emp_{i,j,t}}{\sum_i emp_{i,j,t}}\right)^2,$$

where $emp_{i,j,t}$ is the number of workers assigned to occupation *j* who are employed in industry *i* at time *t*. In the second stage, the aggregate occupation-level concentration measure *CONC* is computed by industry and weighted by the wage expense associated with each occupation:

$$LM_{i,t} = \left(\sum_j CONC_{j,t} \times \frac{emp_{i,j,t} \times wage_{i,j,t}}{\sum_j emp_{i,j,t} wage_{i,j,t}}\right)^{-1},$$

where $wage_{i,j,t}$ is a measure of the average annual wage paid to workers in industry *i* that are assigned to occupation *j* in year *t*. Finally, the estimated *LM* in the above equation is standardized.

workplace quality and innovation are related via improved retention and recruitment of key employees. This alternative requires more prominent positive effects for firms with high *OC* or high *LM*, which we do not observe.

6.2. Risk of termination

A second explanation relates to executives' career concerns. Executives who are committed to employee well-being may gain allegiance from subordinates and face lower risk of termination after poor performance. Employee-friendly workplaces may therefore alleviate executives' career concerns that impede investment in innovation, and in so doing, encourage their engagement in risky long-term innovative activities. To test this alternative, we investigate executive turnover-performance sensitivity. Table 9 presents the results of probit regressions in which the dependent variable is a dummy that takes the value one if there is a CEO turnover in a given firm-year.[26] The main coefficients of interest are on the interaction terms between past firm performance and the employee relations score. We measure performance using both accounting performance (*ROA* and *Industry-adjusted ROA*[27]) in columns (1) and (2) and stock market performance (*Stock return* and *Abnormal stock return*) in columns (3) and (4). Consistent with the extant literature, we find that the coefficients on the performance variables are negative and highly significant across all specifications, suggesting that firms with poor performance are more likely to replace their executives. However, we find no difference in the sensitivity of CEO turnover to prior firm performance for firms with different levels of employee welfare. The interaction term between *ER* and the performance variable is not statistically significant in any specification. Thus, we find no evidence to suggest that an executive in an employee-friendly workplace faces any lower risk of termination after

[26] We do not distinguish between forced and voluntary turnover in this paper, and the reasons are twofold. First, Kaplan and Minton (2012) state that forced and voluntary turnover cases exhibit similar patterns. Some seemingly voluntary turnover cases are actually not voluntary. Second, Jenter and Lewellen (2010) note that the existing algorithms used to classify forced and voluntary turnover cases will inevitably cause misclassification of some turnover cases, resulting in a downward bias in the estimated turnover-performance sensitivity. Therefore, they argue that researchers should treat all turnover cases as potentially forced. Further, Gao et al. (2014) show that the results are similar when using forced and voluntary turnover samples.

[27] Industry-adjusted ROA is calculated as a firm's ROA minus the average ROA of all firms in the same two-digit SIC industry.

poor performance, which contradicts the view that workplace quality influences innovation by alleviating executives' career concerns.

Insert Table 9 about here

6.3. CEO compensation and incentives

We investigate firms' decisions to support innovation activities and implement employee-friendly policies. It is likely that both decisions are affected by CEO incentives, such as compensation, causing an omitted variable concern. Table 10 shows the results of regressions that control for CEO Delta (*ln(*1+*CEO Delta)*), and Vega (*ln(*1+*CEO Vega)*), which we construct following Hirshleifer et al. (2012). The coefficients on *ER* and *BC* remain positive and statistically significant across all regressions, suggesting that differences in CEO incentive contracts do not explain the positive effect of workplace quality on innovation.

Insert Table 10 about here

7. Conclusion

Using both the Best Companies list and the employee relations score based on the KLD database, we find that firms that implement employee-friendly policies and foster satisfying workplaces invest more in innovation and achieve greater innovative success, as measured by both patent and citation counts for given R&D expenditures. These findings are robust to alternative econometric methods, model specifications, subsamples, definitions of workplace quality and addressing endogeneity concerns. Consistent with the view that employee-friendly workplaces engender failure tolerance and thus encourage engagement in experimentation and innovation, we find that the positive effect of workplace quality on innovation is more prominent in industries with higher innovation failure risk. We also provide evidence that firms with employee-friendly workplaces are more resilient to shocks, confirming their relative tolerance for failure. Considering alternative explanations, we find no indication that an employee-friendly workplace fosters innovation by improving the retention and recruitment of key talent, alleviating executives' career concerns or that the relationship is influenced by CEO incentives.

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Table 1
Summary statistics

This table reports summary statistics of main variables. *ln(1+R&D)* is the natural logarithm of one plus a firm's R&D expenditures. *ln(1+Patent)* is the natural logarithm of one plus a firm's total number of patents (*Patent*) filed (and eventually granted) in a given year. *ln(1+Citation)* is the natural logarithm of one plus the total number of non-self citations (*Citation*) received on a firm's patents filed (and eventually granted) in a given year. *ER* is the employee relations score constructed based on the KLD database. *BC* is a dummy for whether the firm is in the most recent list of the "100 Best Companies to Work For in America". *ln(MV)* is the natural logarithm of market capitalization. *Q* is market value of equity plus total assets minus book value of equity, all divided by total assets. *Lev* is the sum of short-term and long-term debts divided by total assets. *PPE/TA* is net property, plant and equipment divided by total assets. *ROA* is earnings before interest, taxes, depreciation, and amortization divided by total assets. *R&D/TA* is R&D expenditures divided by total assets. *Board independence* is the number of independent directors divided by board size. *E index* is the entrenchment index compiled by Bebchuk et al. (2009).

Variable	Obs.	Mean	Std. dev.	Min	Median	Max
Innovation measures						
ln(1+R&D)	8,911	2.252	2.496	0.000	1.253	8.260
ln(1+Patent)	8,911	0.392	0.851	0.000	0.000	3.951
ln(1+Citation)	8,911	0.668	1.423	0.000	0.000	6.077
Patent	8,911	1.998	7.114	0.000	0.000	50.994
Citation	8,911	13.780	57.335	0.000	0.000	434.503
Workplace quality measures						
ER	8,911	0.450	0.760	0.000	0.000	5.000
BC	8,911	0.040	0.195	0.000	0.000	1.000
Main controls						
ln(MV)	8,911	7.916	1.481	4.936	7.780	11.964
MV (million $)	8,911	9,369	22,411	139	2,392	157,047
Q	8,911	1.992	1.219	0.783	1.586	7.416
Lev	8,911	0.220	0.164	0.000	0.219	0.666
PPE/TA	8,911	0.299	0.224	0.014	0.236	0.881
ROA	8,911	0.148	0.082	-0.086	0.139	0.406
Board independence	8,911	0.720	0.150	0.000	0.750	1.000
E index	8,911	2.779	1.309	0.000	3.000	6.000
R&D/TA	8,911	0.028	0.046	0.000	0.002	0.211

Table 2
Univariate analysis

This table presents summary statistics for subsamples of firms with different levels of workplace quality. In panel A, firms are divided into high and low employee relations groups according to the sample median of the employee relations score (*ER*), which is zero. In panel B, firms are divided into two groups based on whether the firm is in the most recent Best Companies list. *ln(1+R&D)* is the natural logarithm of one plus a firm's R&D expenditures. *ln(1+Patent)* is the natural logarithm of one plus a firm's total number of patents (*Patent*) filed (and eventually granted) in a given year. *ln(1+Citation)* is the natural logarithm of one plus the total number of non-self citations (*Citation*) received on a firm's patents filed (and eventually granted) in a given year. *ER* is the employee relations score constructed based on the KLD database. *BC* is a dummy for whether the firm is in the most recent list of the "100 Best Companies to Work For in America". *ln(MV)* is the natural logarithm of market capitalization. *Q* is market value of equity plus total assets minus book value of equity, all divided by total assets. *Lev* is the sum of short-term and long-term debts divided by total assets. *PPE/TA* is net property, plant and equipment divided by total assets. *ROA* is earnings before interest, taxes, depreciation, and amortization divided by total assets. *R&D/TA* is R&D expenditures divided by total assets. *Board independence* is the number of independent directors divided by board size. *E index* is the entrenchment index compiled by Bebchuk et al. (2009). t-tests (Wilcoxon-Mann-Whitney tests) are conducted to test for differences between the means (medians) for firms with high and low employee relations scores. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Employee relations score

	High ER (>0): A (N=2,845)		Low ER (=0): B (N=6,066)		Test of difference (A-B)	
Variable	Mean	Median	Mean	Median	Mean	Median
ln(1+R&D)	3.230	3.610	1.794	0.000	1.436***	3.610***
ln(1+Patent)	0.697	0.000	0.249	0.000	0.448***	0.000***
ln(1+Citation)	1.109	0.000	0.461	0.000	0.648***	0.000***
Patent	4.442	0.000	0.851	0.000	3.591***	0.000***
Citation	30.795	0.000	5.800	0.000	24.995***	0.000***
ER	1.408	1.000	0.000	0.000	1.408***	1.000***
BC	0.124	0.000	0.000	0.000	0.124***	0.000***
ln(MV)	8.640	8.598	7.576	7.484	1.064***	1.114***
MV (million $)	18,044	5,420	5,300	1,780	12,745***	3,640***
Q	2.184	1.675	1.901	1.552	0.282***	0.123***
Lev	0.223	0.216	0.219	0.220	0.004	-0.004
PPE/TA	0.330	0.276	0.285	0.221	0.045***	0.055***
ROA	0.156	0.147	0.144	0.136	0.012***	0.012***
Board independence	0.739	0.769	0.711	0.733	0.028***	0.036***
E index	2.764	3.000	2.786	3.000	-0.022	0.000
R&D/TA	0.038	0.013	0.024	0.000	0.014***	0.013***

Panel B: The Best Companies list

Variable	BC=1: A (N=353) Mean	BC=1: A (N=353) Median	BC=0: B (N=8,558) Mean	BC=0: B (N=8,558) Median	Test of difference (A-B) Mean	Test of difference (A-B) Median
ln(1+R&D)	4.129	5.186	2.175	0.788	1.954***	4.397***
ln(1+Patent)	1.168	0.140	0.360	0.000	0.807***	0.140***
ln(1+Citation)	1.848	0.000	0.619	0.000	1.229***	0.000***
Patent	9.850	0.151	1.674	0.000	8.177***	0.151***
Citation	78.839	0.000	11.097	0.000	67.742***	0.000***
ER	1.734	2.000	0.397	0.000	1.337***	2.000***
BC	1.000	1.000	0.000	0.000	1.000***	1.000***
ln(MV)	9.425	9.503	7.853	7.733	1.571***	1.770***
MV (million $)	35,572	13,400	8,288	2,282	27,284***	11,118***
Q	3.182	2.806	1.942	1.564	1.240***	1.242***
Lev	0.148	0.136	0.223	0.224	-0.076***	-0.088***
PPE/TA	0.255	0.192	0.301	0.238	-0.046***	-0.045***
ROA	0.195	0.187	0.146	0.138	0.049***	0.050***
Board independence	0.712	0.727	0.720	0.750	-0.008	-0.023
E index	2.334	2.000	2.797	3.000	-0.463***	-1.000***
R&D/TA	0.056	0.038	0.027	0.000	0.029***	0.038***

Table 3

Workplace quality and innovation

This table presents the results of regressions of firm innovation on workplace quality. Dependent variables include: *ln(1+R&D)* is the natural logarithm of one plus a firm's R&D expenditures. *ln(1+Patent)* is the natural logarithm of one plus a firm's total number of patents filed (and eventually granted) in a given year. *ln(1+Citation)* is the natural logarithm of one plus the total number of non-self citations received on a firm's patents filed (and eventually granted) in a given year. Independent variables include: *ER* is the employee relations score constructed based on the KLD database. *BC* is a dummy for whether the firm is in the most recent list of the "100 Best Companies to Work For in America". *ln(MV)* is the natural logarithm of market capitalization. *Q* is market value of equity plus total assets minus book value of equity, all divided by total assets. *Lev* is the sum of short-term and long-term debts divided by total assets. *PPE/TA* is net property, plant and equipment divided by total assets. *ROA* is earnings before interest, taxes, depreciation, and amortization divided by total assets. *Board independence* is the number of independent directors divided by board size. *E index* is the entrenchment index compiled by Bebchuk et al. (2009). All independent variables are lagged one year relative to the dependent variable. All regressions include industry and year effects unless otherwise specified. Industry effects are constructed based on two-digit SIC codes. We present results based on standard errors clustered by firm for all OLS specifications. The standard errors for Fama-MacBeth regressions are computed using the Newey-West adjustment for heteroskedasticity and autocorrelation. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Workplace quality and R&D expenditures

	Dependent Variable = *ln(1+R&D)*							
	OLS	OLS	Fama MacBeth	Between Estimator	OLS	OLS	Fama MacBeth	Between Estimator
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ER	0.747***	0.395***	0.376***	0.465***	–	–	–	–
	(0.067)	(0.056)	(0.034)	(0.068)				
BC	–	–	–	–	1.690***	0.695***	0.645***	0.861***
					(0.268)	(0.200)	(0.091)	(0.311)
ln(MV)	–	0.528***	0.550***	0.528***	–	0.585***	0.600***	0.586***
		(0.037)	(0.025)	(0.032)		(0.037)	(0.022)	(0.031)
Q	–	0.109***	0.095**	0.232***	–	0.090**	0.080**	0.227***
		(0.039)	(0.033)	(0.051)		(0.039)	(0.032)	(0.052)
Lev	–	-0.223	-0.448**	-0.571**	–	-0.276	-0.496***	-0.615**
		(0.251)	(0.201)	(0.272)		(0.256)	(0.194)	(0.276)
PPE/TA	–	-1.355***	-1.356***	-1.139***	–	-1.214***	-1.177***	-0.999***
		(0.288)	(0.135)	(0.274)		(0.298)	(0.147)	(0.277)
ROA	–	-3.020***	-2.352**	-5.051***	–	-3.096***	-2.517**	-5.242***
		(0.503)	(0.961)	(0.645)		(0.513)	(0.968)	(0.653)
Board independence	–	1.192***	1.213***	1.394***	–	1.251***	1.247***	1.442***
		(0.218)	(0.077)	(0.293)		(0.221)	(0.087)	(0.297)
E index	–	-0.044	-0.059**	-0.055	–	-0.044	-0.058**	-0.053
		(0.028)	(0.022)	(0.034)		(0.029)	(0.020)	(0.034)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	No	No	Yes	Yes	No	No
N	8,911	8,911	8,911	8,911	8,911	8,911	8,911	8,911
Adjusted R^2	0.589	0.686	0.711	0.652	0.559	0.677	0.704	0.642

Panel B. Workplace quality and patent counts

	Dependent Variable = *ln(1+Patent)*							
	OLS	OLS	Fama MacBeth	Between Estimator	OLS	OLS	Fama MacBeth	Between Estimator
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ER	0.237***	0.091***	0.113***	0.180***	–	–	–	–
	(0.030)	(0.024)	(0.028)	(0.022)				
BC	–	–	–	–	0.726***	0.377***	0.282**	0.482***
					(0.133)	(0.098)	(0.094)	(0.100)
ln(MV)	–	0.190***	0.247***	0.187***	–	0.197***	0.258***	0.207***
		(0.014)	(0.066)	(0.010)		(0.013)	(0.066)	(0.010)
Q	–	-0.008	-0.081***	-0.040**	–	-0.018	-0.091***	-0.050***
		(0.018)	(0.023)	(0.018)		(0.018)	(0.024)	(0.018)
Lev	–	0.064	0.130	0.105	–	0.068	0.125	0.104
		(0.095)	(0.076)	(0.088)		(0.096)	(0.076)	(0.090)
PPE/TA	–	0.192	-0.040	0.207**	–	0.228*	0.020	0.263***
		(0.128)	(0.100)	(0.088)		(0.130)	(0.092)	(0.089)
ROA	–	-0.429**	0.230	-0.042	–	-0.430**	0.197	-0.045
		(0.172)	(0.239)	(0.224)		(0.173)	(0.235)	(0.227)
Board independence	–	0.478***	0.358***	0.261***	–	0.484***	0.354***	0.274***
		(0.104)	(0.098)	(0.094)		(0.103)	(0.097)	(0.096)
E index	–	-0.057***	-0.031***	-0.057***	–	-0.057***	-0.031***	-0.056***
		(0.015)	(0.007)	(0.011)		(0.015)	(0.007)	(0.011)
R&D/TA	–	2.182***	3.826**	1.969***	–	2.269***	3.969**	2.244***
		(0.380)	(1.345)	(0.356)		(0.377)	(1.360)	(0.359)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	No	No	Yes	Yes	No	No
N	8,911	8,911	8,911	8,911	8,911	8,911	8,911	8,911
Adjusted R^2	0.370	0.475	0.551	0.448	0.356	0.477	0.545	0.432

Panel C. Workplace quality and patent citations

	Dependent Variable = *ln(1+Citation)*							
	OLS	OLS	Fama MacBeth	Between Estimator	OLS	OLS	Fama MacBeth	Between Estimator
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ER	0.307***	0.094**	0.129***	0.264***	–	–	–	–
	(0.041)	(0.037)	(0.032)	(0.038)				
BC	–	–	–	–	1.010***	0.478***	0.310**	0.630***
					(0.176)	(0.129)	(0.118)	(0.172)
ln(MV)	–	0.260***	0.341***	0.298***	–	0.266***	0.353***	0.329***
		(0.019)	(0.106)	(0.018)		(0.018)	(0.106)	(0.017)
Q	–	0.035	-0.098**	-0.034	–	0.024	-0.108***	-0.048
		(0.031)	(0.033)	(0.031)		(0.030)	(0.034)	(0.031)
Lev	–	-0.069	-0.004	0.158	–	-0.059	-0.007	0.153
		(0.145)	(0.103)	(0.151)		(0.146)	(0.104)	(0.153)
PPE/TA	–	0.370**	-0.059	0.516***	–	0.408**	0.012	0.597***
		(0.186)	(0.163)	(0.151)		(0.188)	(0.150)	(0.153)
ROA	–	-1.047***	0.034	-0.399	–	-1.051***	-0.001	-0.403
		(0.301)	(0.393)	(0.384)		(0.301)	(0.393)	(0.389)
Board independence	–	0.695***	0.525**	0.181	–	0.699***	0.522***	0.202
		(0.162)	(0.177)	(0.162)		(0.162)	(0.173)	(0.164)
E index	–	-0.078***	-0.031**	-0.095***	–	-0.078***	-0.032**	-0.093***
		(0.021)	(0.011)	(0.019)		(0.021)	(0.012)	(0.019)
R&D/TA	–	4.087***	7.084**	3.921***	–	4.142***	7.268**	4.338***
		(0.600)	(2.478)	(0.611)		(0.597)	(2.510)	(0.615)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	No	No	Yes	Yes	No	No
N	8,911	8,911	8,911	8,911	8,911	8,911	8,911	8,911
Adjusted R^2	0.421	0.503	0.549	0.428	0.415	0.504	0.543	0.414

Table 4
Workplace quality and innovation: Instrumental variables

This table presents estimates of the instrumental variables method using two-stage least square (2SLS) regressions. Columns (1) and (3) present the first-stage regression results in which the dependent variable is the employee relations score *ER*. The instrumental variables are: *IC* is a dummy variable equal to one if the firm is headquartered in a state that has the implied-contract exception, and zero otherwise. *ln(UI benefits)* is the natural logarithm of state-level unemployment insurance benefits. Columns (2), (4), and (5) report the second-stage regression results. The dependent variables are: *ln(1+R&D)* is the natural logarithm of one plus a firm's R&D expenditures. *ln(1+Patent)* is the natural logarithm of one plus a firm's total number of patents filed (and eventually granted) in a given year. *ln(1+Citation)* is the natural logarithm of one plus the total number of non-self citations received on a firm's patents filed (and eventually granted) in a given year. All other control variables are the same as those in the baseline models. Industry and year effects are included. Industry effects are constructed based on the Fama-French 49-industry classification. Statistical significance is based on the heteroskedasticity robust firm-clustered standard errors reported in brackets. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

	Dependent Variables				
	ER 1st Stage (1)	*ln(1+R&D)* 2nd Stage (2)	*ER* 1st Stage (3)	*ln(1+Patent)* 2nd Stage (4)	*ln(1+Citation)* 2nd Stage (5)
IC	0.151***	–	0.135***	–	–
	(0.039)		(0.039)		
ln(UI benefits)	0.074*	–	0.070*	–	–
	(0.040)		(0.040)		
ER	–	2.326***	–	0.384**	0.332
		(0.764)		(0.186)	(0.348)
ln(MV)	0.188***	0.162	0.190***	0.134***	0.214***
	(0.017)	(0.150)	(0.017)	(0.046)	(0.068)
Q	-0.022	0.140***	-0.054***	0.009	0.047
	(0.016)	(0.047)	(0.017)	(0.023)	(0.038)
Lev	-0.189*	0.221	-0.143	0.091	-0.057
	(0.106)	(0.331)	(0.106)	(0.096)	(0.147)
PPE/TA	0.332***	-1.924***	0.352***	0.088	0.271
	(0.112)	(0.418)	(0.111)	(0.153)	(0.226)
ROA	-0.120	-2.388***	0.181	-0.434***	-0.901***
	(0.190)	(0.558)	(0.198)	(0.157)	(0.275)
Board independence	0.179*	0.837***	0.150	0.434***	0.666***
	(0.106)	(0.323)	(0.105)	(0.117)	(0.179)
E index	0.001	-0.040	0.001	-0.056***	-0.078***
	(0.013)	(0.036)	(0.013)	(0.015)	(0.021)
R&D/TA	–	–	1.971***	0.944	2.472***
			(0.368)	(0.589)	(0.921)
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	8,868	8,868	8,868	8,868	8,868
F-statistics	8.890***	–	7.050***	–	–
CD Wald F-statistics	36.260***	–	28.270***	–	–
Hansen's *J* test *p-value*	–	0.363	–	0.254	0.153

Table 5

Cross-industry comparison of the workplace quality effect

In this table, we estimate the patent and citation regressions separately for three industry categories. The 'Pharmaceutical drugs and chemicals' category includes industries that mainly produce patents on pharmaceutical products, medical equipment, healthcare, and chemicals. The 'Computers, electrical, and software' category includes industries that mainly produce patents on computers, communication technologies, electrical and business equipment, software programing, and internet applications. The 'Low-tech' category includes industries that produce other miscellaneous patents. The dependent variable is the number of patents, *ln(1+Patent)*, for Panel A and the number of citations, *ln(1+Citation)*, for Panel B. The main variable of interest is *ER*, the employee relations score constructed based on the KLD database. For simplicity, only the coefficient on the main variable of interest is reported for each regression. Other firm characteristics are controlled for. All OLS regression models include industry and year effects while Fama-MacBeth and between estimator specifications include industry effects. Industry dummies are constructed based on two-digit SIC codes. We present results based on standard errors clustered by firm for all OLS specifications. The standard errors for Fama-MacBeth regressions are computed using the Newey-West adjustment for heteroskedasticity and autocorrelation. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Pharmaceutical drugs and chemicals (N=1,199)	Computers, electrical, and software (N=2,236)	Low-tech (N=5,476)
	(1)	(2)	(3)
Panel A: Dependent Variable = ln(1+Patent)			
OLS	0.108**	0.074*	0.038
	(0.045)	(0.039)	(0.025)
Fama-MacBeth	0.167***	0.140***	0.042*
	(0.055)	(0.039)	(0.022)
Between Estimator	0.245***	0.192***	0.095***
	(0.073)	(0.049)	(0.027)
Panel B: Dependent Variable = ln(1+Citations)			
OLS	0.142**	0.056*	0.034
	(0.065)	(0.041)	(0.038)
Fama-MacBeth	0.213**	0.158***	0.036
	(0.085)	(0.058)	(0.032)
Between Estimator	0.417***	0.368***	0.138***
	(0.119)	(0.086)	(0.046)

Table 6

Workplace quality and the change in R&D expenditures during the recent recession

This table presents OLS regressions results of the change in R&D expenditures from 2007-2009, denoted as Δ*Ln(1+R&D)*, on the severity of house price collapse in firms with high and low employee relations scores. Independent variables include: *House price shock* is the percentage drop in the Zillow Home Value Index (ZHVI) from December 2006 until December 2009 in the company's state. *ER* is the employee relations score constructed based on the KLD database. *ln(MV)* is the natural logarithm of market capitalization. *Q* is market value of equity plus total assets minus book value of equity, all divided by total assets. *Lev* is the sum of short-term and long-term debts divided by total assets. *PPE/TA* is net property, plant and equipment divided by total assets. *ROA* is earnings before interest, taxes, depreciation, and amortization divided by total assets. *R&D/TA* is R&D expenditures divided by total assets. *Board independence* is the number of independent directors divided by board size. *E index* is the entrenchment index compiled by Bebchuk et al. (2009). All independent variables are measured in 2007. Industry effects are constructed based on two-digit SIC codes. We present results based on standard errors clustered by firm. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable = Δ*Ln(1+R&D)*		
	High ER (>0)	Low ER (=0)	House price shock × ER
	(1)	(2)	(3)
House price shock	0.086	-0.079**	-0.069*
	(0.065)	(0.039)	(0.036)
ER	–	–	-0.016
			(0.010)
House price shock × ER	–	–	0.073**
			(0.035)
ln(MV)	0.005	0.003	0.006
	(0.008)	(0.006)	(0.005)
Q	0.063***	0.037***	0.041***
	(0.014)	(0.012)	(0.009)
Lev	0.054	0.022	0.025
	(0.088)	(0.058)	(0.044)
PPE/TA	-0.115	-0.128**	-0.130***
	(0.113)	(0.055)	(0.048)
ROA	-0.550***	-0.082	-0.192*
	(0.186)	(0.166)	(0.114)
Board independence	-0.215	-0.095	-0.112**
	(0.139)	(0.065)	(0.056)
E index	0.008	0.007	0.008
	(0.012)	(0.006)	(0.005)
Industry FE	Yes	Yes	Yes
N	225	449	674
Adjusted R^2	0.067	0.069	0.093

Table 7
Organization capital and the workplace quality effect

This table presents OLS regressions results of patents and citations on workplace quality in groups of firms in which levels of organization capital are above and below the sample median. The dependent variables are the number of patents, *ln(1+Patent)*, and the number of citations, *ln(1+Citation)*, respectively. Independent variables include: *OC* is a firm's stock of organization capital, estimated as the capitalized SG&A expenditures using the perpetual inventory method, scaled by total assets. *ER* is the employee relations score constructed based on the KLD database. *ln(MV)* is the natural logarithm of market capitalization. *Q* is market value of equity plus total assets minus book value of equity, all divided by total assets. *Lev* is the sum of short-term and long-term debts divided by total assets. *PPE/TA* is net property, plant and equipment divided by total assets. *ROA* is earnings before interest, taxes, depreciation, and amortization divided by total assets. *R&D/TA* is R&D expenditures divided by total assets. *Board independence* is the number of independent directors divided by board size. *E index* is the entrenchment index compiled by Bebchuk et al. (2009). All independent variables are lagged one year relative to the dependent variable. All regressions include industry and year effects. Industry effects are constructed based on two-digit SIC codes. We present results based on standard errors clustered by firm. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable = *ln(1+Patent)*			Dependent Variable = *ln(1+Citation)*		
	High OC	Low OC	OC × ER	High OC	Low OC	OC × ER
	(1)	(2)	(3)	(4)	(5)	(6)
ER	0.084**	0.103***	0.080**	0.089*	0.110**	0.067*
	(0.037)	(0.032)	(0.033)	(0.052)	(0.047)	(0.039)
OC × ER	–	–	0.010	–	–	0.030
			(0.023)			(0.036)
OC	0.049*	0.294**	0.077***	0.066*	0.458**	0.101***
	(0.025)	(0.118)	(0.020)	(0.038)	(0.178)	(0.031)
ln(MV)	0.235***	0.175***	0.202***	0.317***	0.244***	0.276***
	(0.020)	(0.020)	(0.014)	(0.029)	(0.029)	(0.020)
Q	-0.024	-0.013	-0.011	0.004	0.041	0.031
	(0.024)	(0.026)	(0.019)	(0.040)	(0.048)	(0.032)
Lev	-0.045	0.234*	0.071	-0.234	0.250	-0.063
	(0.140)	(0.135)	(0.098)	(0.212)	(0.207)	(0.150)
PPE/TA	0.381*	0.237	0.209	0.666**	0.436*	0.378**
	(0.201)	(0.184)	(0.132)	(0.310)	(0.256)	(0.190)
ROA	-0.664**	-0.579***	-0.522***	-1.440***	-1.107***	-1.177***
	(0.264)	(0.213)	(0.175)	(0.456)	(0.379)	(0.306)
Board independence	0.349**	0.534***	0.475***	0.544**	0.747***	0.697***
	(0.144)	(0.146)	(0.108)	(0.216)	(0.236)	(0.168)
E index	-0.053***	-0.070***	-0.057***	-0.074**	-0.092***	-0.077***
	(0.020)	(0.020)	(0.015)	(0.030)	(0.028)	(0.021)
R&D/TA	1.309***	3.154***	1.916***	2.656***	6.152***	3.697***
	(0.439)	(0.764)	(0.390)	(0.672)	(1.296)	(0.612)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	4,260	4,273	8,533	4,260	4,273	8,533
Adjusted R^2	0.524	0.453	0.479	0.550	0.476	0.506

Table 8
Industry labor mobility and the workplace quality effect

This table presents OLS regressions results for groups of firms in industries in which levels of labor mobility are above and below the sample median. The dependent variables are the number of patents, *ln(1+Patent)*, and the number of citations, *ln(1+Citation)*, respectively. Independent variables include: *LM* is the measure of labor mobility following Donangelo (2014). *ER* is the employee relations score constructed based on the KLD database. *ln(MV)* is the natural logarithm of market capitalization. *Q* is market value of equity plus total assets minus book value of equity, all divided by total assets. *Lev* is the sum of short-term and long-term debts divided by total assets. *PPE/TA* is net property, plant and equipment divided by total assets. *ROA* is earnings before interest, taxes, depreciation, and amortization divided by total assets. *R&D/TA* is R&D expenditures divided by total assets. *Board independence* is the number of independent directors divided by board size. *E index* is the entrenchment index compiled by Bebchuk et al. (2009). All independent variables are lagged one year relative to the dependent variable. All regressions include industry and year effects. Industry effects are constructed based on two-digit SIC codes. We present results based on standard errors clustered by firm. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable = *ln(1+Patent)*			Dependent Variable = *ln(1+Citation)*		
	High LM	Low LM	LM × ER	High LM	Low LM	LM × ER
	(1)	(2)	(3)	(4)	(5)	(6)
ER	0.110***	0.077***	0.088***	0.103**	0.088**	0.090**
	(0.036)	(0.025)	(0.024)	(0.052)	(0.043)	(0.038)
LM × ER	–	–	0.042	–	–	0.048
			(0.026)			(0.039)
LM	0.065	-0.234***	-0.065***	0.141**	-0.444***	-0.095**
	(0.041)	(0.052)	(0.025)	(0.061)	(0.087)	(0.037)
ln(MV)	0.232***	0.147***	0.191***	0.318***	0.210***	0.265***
	(0.018)	(0.016)	(0.014)	(0.025)	(0.024)	(0.019)
Q	-0.014	0.011	0.004	0.007	0.077*	0.053
	(0.023)	(0.022)	(0.019)	(0.037)	(0.040)	(0.033)
Lev	0.051	0.008	0.076	-0.175	-0.104	-0.062
	(0.135)	(0.108)	(0.096)	(0.195)	(0.194)	(0.149)
PPE/TA	0.322*	0.138	0.202	0.514**	0.294	0.374*
	(0.172)	(0.185)	(0.137)	(0.252)	(0.269)	(0.200)
ROA	-0.674***	-0.310	-0.436**	-1.287***	-1.056***	-1.071***
	(0.251)	(0.210)	(0.177)	(0.427)	(0.377)	(0.310)
Board independence	0.598***	0.375***	0.492***	0.818***	0.583***	0.700***
	(0.150)	(0.120)	(0.105)	(0.224)	(0.198)	(0.168)
E index	-0.056***	-0.040***	-0.049***	-0.071**	-0.055**	-0.069***
	(0.020)	(0.015)	(0.015)	(0.029)	(0.023)	(0.021)
R&D/TA	1.600***	3.632***	2.107***	3.309***	6.383***	3.978***
	(0.441)	(0.727)	(0.383)	(0.679)	(1.187)	(0.610)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	3,982	4,011	7,993	3,982	4,011	7,993
Adjusted R^2	0.520	0.488	0.486	0.560	0.517	0.511

Table 9

Executive turnover and workplace quality

This table presents estimates of probit regressions of executive turnover on the employee relations score and firm performance. The measures of performance are return on assets (*ROA*), industry-adjusted return on assets (*Industry-adjusted ROA*), *Stock return*, and stock return minus the value-weighted stock market return (*Abnormal stock return*) over the past year. Other controls are included: *ln(MV)* is the natural logarithm of market capitalization. *Q* is market value of equity plus total assets minus book value of equity, all divided by total assets. *Lev* is the sum of short-term and long-term debts divided by total assets. *PPE/TA* is net property, plant and equipment divided by total assets. *ROA* is earnings before interest, taxes, depreciation, and amortization divided by total assets. *R&D/TA* is R&D expenditures divided by total assets. *Board independence* is the number of independent directors divided by board size. *E index* is the entrenchment index compiled by Bebchuk et al. (2009). All independent variables are lagged one year relative to the dependent variable. All regressions include industry and year effects. Industry effects are constructed based on two-digit SIC codes. We present results based on standard errors clustered by firm. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
ER	0.040	0.018	0.008	0.011
	(0.044)	(0.022)	(0.023)	(0.023)
ROA	-0.271	–	–	–
	(0.350)			
Industry-adjusted ROA	–	-0.056	–	–
		(0.366)		
Stock return	–	–	-0.155**	–
			(0.063)	
Abnormal stock return	–	–	–	-0.173**
				(0.068)
ER × ROA	-0.157	–	–	–
	(0.265)			
ER × Industry-adjusted ROA	–	-0.189	–	–
		(0.291)		
ER × Stock return	–	–	0.052	–
			(0.063)	
ER × Abnormal stock return	–	–	–	0.025
				(0.078)
ln(MV)	0.027**	0.026**	0.028**	0.028**
	(0.013)	(0.013)	(0.013)	(0.013)
Q	-0.024	-0.032	-0.026	-0.024
	(0.022)	(0.022)	(0.018)	(0.018)
Lev	-0.036	-0.029	-0.023	-0.024
	(0.121)	(0.121)	(0.120)	(0.120)
PPE/TA	0.180	0.160	0.147	0.148
	(0.120)	(0.119)	(0.116)	(0.116)
Board independence	0.284**	0.280**	0.279**	0.279**
	(0.130)	(0.130)	(0.131)	(0.131)
E index	0.014	0.014	0.016	0.017
	(0.014)	(0.014)	(0.014)	(0.014)
R&D/TA	-0.228	-0.132	-0.172	-0.182
	(0.472)	(0.473)	(0.476)	(0.476)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	8,863	8,863	8,860	8,860

Pseudo R^2	0.018	0.017	0.019	0.019

Table 10

Workplace quality and innovation:
Controlling for CEO delta and vega

This table presents estimates of OLS regressions of the number of patents and citations on workplace quality, controlling for CEO delta and vega. The dependent variables are the number of patents, *ln(1+patent)*, and the number of citations, *ln(1+citation)*, respectively. Independent variables include: *ER* is the employee relations score constructed based on the KLD database. *BC* is a dummy for whether the firm is in the most recent list of the "100 Best Companies to Work For in America". *ln(MV)* is the natural logarithm of market capitalization. *Q* is market value of equity plus total assets minus book value of equity, all divided by total assets. *Lev* is the sum of short-term and long-term debts divided by total assets. *PPE/TA* is net property, plant and equipment divided by total assets. *ROA* is earnings before interest, taxes, depreciation, and amortization divided by total assets. *R&D/TA* is R&D expenditures divided by total assets. *Board independence* is the number of independent directors divided by board size. *E index* is the entrenchment index compiled by Bebchuk et al. (2009). *ln (1+CEO Delta)* is the natural logarithm of one plus CEO delta, where CEO delta is defined as dollar change in wealth associated with a 1% change in the firm's stock price (in $000s). *ln (1+CEO vega)* is the natural logarithm of one plus CEO vega, where CEO vega is defined as dollar change in wealth associated with a 0.01 change in the standard deviation of the firm's returns (in $000s). All independent variables are lagged one year relative to the dependent variable unless otherwise specified. All regressions include industry and year effects. Industry effects are constructed based on two-digit SIC codes. We present results based on standard errors clustered by firm. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable = *ln(1+Patent)*		Dependent Variable = *ln(1+Citation)*	
	(1)	(2)	(3)	(4)
ER	0.079***	–	0.080**	–
	(0.024)		(0.037)	
BC	–	0.420***	–	0.527***
		(0.108)		(0.147)
ln(MV)	0.208***	0.216***	0.275***	0.280***
	(0.019)	(0.017)	(0.027)	(0.024)
Q	-0.006	-0.015	0.036	0.025
	(0.019)	(0.018)	(0.033)	(0.032)
Lev	0.060	0.064	-0.050	-0.042
	(0.091)	(0.092)	(0.146)	(0.146)
PPE/TA	0.219	0.249*	0.401**	0.432**
	(0.138)	(0.141)	(0.202)	(0.205)
ROA	-0.421**	-0.417**	-1.014***	-1.013***
	(0.182)	(0.181)	(0.316)	(0.313)
Board independence	0.513***	0.509***	0.772***	0.764***
	(0.109)	(0.108)	(0.169)	(0.168)
E index	-0.057***	-0.057***	-0.076***	-0.076***
	(0.015)	(0.015)	(0.022)	(0.022)
R&D/TA	2.338***	2.396***	4.247***	4.270***
	(0.409)	(0.402)	(0.642)	(0.633)
ln (1+CEO delta)	-0.019	-0.025*	-0.006	-0.013
	(0.013)	(0.013)	(0.021)	(0.021)
ln (1+CEO vega)	-0.012	-0.011	-0.015	-0.013
	(0.015)	(0.013)	(0.022)	(0.020)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	7,712	7,712	7,712	7,712
Adjusted R^2	0.480	0.485	0.508	0.511

Appendix A. Variable definition

Variable	Definition	Source
Dependent variables		
ln(1+R&D)	Natural logarithm of one plus the amount of research and development (R&D) expenditure (in millions), measured at the end of the fiscal year *t*.	Compustat
ln(1+Patent)	Natural logarithm of one plus the total number of patents filed by firm *i* (and eventually granted) measured at the end of the fiscal year *t*.	NBER Patent Database
ln(1+Citation)	Natural logarithm of one plus the total number of non-self citations received on firm *i*'s patents filed (and eventually granted) measured at the end of the fiscal year *t*.	NBER Patent Database
Patent	Total number of patents filed by firm *i* (and eventually granted) measured at the end of the fiscal year *t*.	NBER Patent Database
Citation	Total number of non-self citations received on firm *i*'s patents filed (and eventually granted) measured at the end of the fiscal year *t*.	NBER Patent Database
Workplace quality		
ER	Employee relations score, measured as the sum of the strength scores of the KLD employee relations dimension.	KLD
BC	Best company dummy equals one if a firm is included in the most recent list of the "100 Best Companies to Work For in America", and zero otherwise.	Great Place to Work®
Firm controls		
ln(MV)	Natural logarithm of total market capitalization.	Compustat
Q	Tobin's q, computed as market value of equity plus total assets minus the book value of equity, all divided by total assets, where market value of equity is the product of fiscal year-end closing price and number of shares outstanding.	Compustat
Lev	Leverage, computed as ratio of the sum of short-term and long-term debts to total book value of assets.	Compustat

PPE/TA	Asset tangibility, computed as the ratio of property, plant and equipment to total book value of assets.	Compustat
ROA	Return on assets, computed as earnings before interest, taxes, depreciation, and amortization divided by total assets.	Compustat
R&D/TA	R&D intensity, computed as the R&D expenditure to total book value of assets.	Compustat
Board independence	The number of independent directors divided by the board size.	IRRC
E index	Entrenchment index based on six antitakeover provisions: staggered boards, limits to shareholder bylaw amendments, poison pills, golden parachutes, and supermajority requirements for mergers and charter amendments. The index measures the number of antitakeover provisions in place.	RiskMetrics; Bebchuk et al. (2009)

Supporting Documentation
NOT FOR PUBLICATION
Results Available From the Author on Request

ROBUSTNESS TEST
Section 4.2

This table presents the results of the robustness checks discussed in Section 4.2. Dependent variables are *Ln(1+R&D)*, *Ln(1+Patent)*, and *Ln(1+Citation)* respectively, except for Poisson regressions where the dependent variables are the number of patents and citations. For brevity, only the coefficient estimates on the workplace quality indicators, *ER* and *BC*, are reported. Except where explicitly stated otherwise, all regressions include the same set of controls as in Table 3. Industry effects based on two-digit SIC codes and year effects are included unless otherwise stated. Standard errors are clustered at the firm level unless otherwise stated. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	ER			BC		
	Ln(1+R&D)	Ln(1+Patent)	Ln(1+Citation)	Ln(1+R&D)	Ln(1+Patent)	Ln(1+Citation)
Alternative econometric methods						
(1) Use Tobit regression	0.516***	0.138***	0.144***	0.318	0.347***	0.254***
	(0.087)	(0.011)	(0.019)	(0.226)	(0.020)	(0.035)
(2) Use Poisson regression	–	0.107*	0.122*	–	0.166	0.157
(dependent variables are patent and citation counts)		(0.064)	(0.067)		(0 .132)	(0.139)
Robustness checks using OLS regressions						
(3) Exclude 2009 and 2010 from sample	0.381***	0.123***	0.122***	0.763***	0.403***	0.496***
	(0.062)	(0.031)	(0.046)	(0.189)	(0.107)	(0.140)
(4) Use the net employee relations score	0.244***	0.036**	0.032*	–	–	–
	(0.036)	(0.016)	(0.018)			
(5) Control for additional CEO and board characteristics						
(including *Holder 67*, Fraction of female directors, *CEO age*, *CEO*	0.396***	0.089***	0.103***	0.622***	0.381***	0.510***
tenure, *CEO gender*, *Board tenure diversity*, *Board age diversity*)	(0.058)	(0.024)	(0.037)	(0.202)	(0.106)	(0.142)
(6) Replace firm-level controls with Industry-average controls	0.746***	0.233***	0.297***	1.679***	0.709***	0.970***
	(0.067)	(0.029)	(0.040)	(0.268)	(0.131)	(0.171)
(7) Regress innovation on the workplace quality indicator and	0.397***	0.084***	0.081**	0.672***	0.346***	0.407***
industry-year effects (2-digit SIC)	(0.058)	(0.024)	(0.035)	(0.210)	(0.097)	(0.120)

(8) Use industry effects based on the Fama-French 49 classification	0.353***	0.075***	0.070*	0.584***	0.357***	0.448***
	(0.053)	(0.023)	(0.036)	(0.161)	(0.095)	(0.128)
(9) Use industry effects based on the 3-digit NAICS classification	0.382***	0.099***	0.112***	0.567***	0.370***	0.483***
	(0.053)	(0.025)	(0.037)	(0.170)	(0.097)	(0.130)
(10) Exclude year effects	0.405***	0.096***	0.124***	0.720***	0.421***	0.584***
	(0.055)	(0.025)	(0.040)	(0.198)	(0.099)	(0.136)
(11) Cluster by year	0.395***	0.091***	0.094***	0.695***	0.377***	0.478***
	(0.019)	(0.026)	(0.028)	(0.076)	(0.061)	(0.080)
(12) Cluster by 2-digit SIC industries	0.395***	0.091***	0.094***	0.695**	0.377***	0.478***
	(0.086)	(0.024)	(0.035)	(0.269)	(0.092)	(0.123)
(13) Cluster by firm and year	0.395***	0.091***	0.094**	0.695***	0.377***	0.478***
	(0.054)	(0.034)	(0.044)	(0.193)	(0.102)	(0.130)
(14) Cluster by 2-digit SIC industries and year	0.395***	0.091**	0.094**	0.695***	0.377***	0.478***
	(0.091)	(0.035)	(0.047)	(0.260)	(0.101)	(0.135)

ROBUSTNESS TEST

Section 4.3

This table reports the tests results discussed in Section 4.3 for whether missing values on the employee relations score affect our findings. Panel A compares the industry distribution of the deleted sample due to missing information on the employee relations score with those of the initial and final samples. Panel B presents the multiple imputation results. Industry and year effects are included. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Panel A: Sample distributions across Fama and French 12 industries

	Initial sample		Deleted sample due to missing values on ER		Final sample	
	Obs.	Percent	Obs.	Percent	Obs.	Percent
Consumer NonDurables	884	7.0%	245	6.6%	639	7.2%
Consumer Durables	398	3.2%	132	3.5%	266	3.0%
Manufacturing	2,101	16.6%	651	17.4%	1,450	16.3%
Oil, Gas, and Coal Extraction and Products	623	4.9%	211	5.6%	412	4.6%
Chemicals and Allied Products	550	4.4%	125	3.3%	425	4.8%
Business Equipment -- Computers, Software, and Electronic Equipment	2,386	18.9%	710	19.0%	1,676	18.8%
Telephone and Television Transmission	223	1.8%	86	2.3%	137	1.5%
Utilities	925	7.3%	275	7.4%	650	7.3%
Wholesale, Retail, and Some Services (Laundries, Repair Shops)	1,927	15.2%	558	14.9%	1,369	15.4%
Healthcare, Medical Equipment, and Drugs	1,064	8.4%	290	7.8%	774	8.7%
Other -- Mines, Constr, BldMt, Trans, Hotels, Bus Serv, Entertainment	1,567	12.4%	454	12.1%	1,113	12.5%
Total	12648	100.0%	3737	100.0%	8,911	100.0%

Panel B: Multiple imputation

Dependent Variables	Number of imputation = 5			Number of imputation = 10		
	Ln(1+R&D)	*Ln(1+Patent)*	*Ln(1+Citation)*	*Ln(1+R&D)*	*Ln(1+Patent)*	*Ln(1+Citation)*
	(1)	(2)	(3)	(4)	(5)	(6)
ER	0.308***	0.065***	0.064**	0.324***	0.079***	0.086***
	(0.044)	(0.018)	(0.029)	(0.046)	(0.018)	(0.031)
Ln(MV)	0.520***	0.206***	0.312***	0.517***	0.203***	0.308***
	(0.031)	(0.012)	(0.017)	(0.031)	(0.012)	(0.017)
Q	0.066**	-0.025*	-0.001	0.067**	-0.024*	0.000
	(0.030)	(0.013)	(0.023)	(0.030)	(0.013)	(0.023)
Lev	-0.214	0.050	-0.071	-0.224	0.049	-0.072
	(0.196)	(0.069)	(0.115)	(0.196)	(0.069)	(0.115)
PPE/TA	-1.243***	0.064	0.165	-1.254***	0.058	0.156
	(0.233)	(0.091)	(0.142)	(0.233)	(0.091)	(0.142)
ROA	-2.667***	-0.185	-0.521**	-2.670***	-0.187	-0.524**
	(0.360)	(0.117)	(0.221)	(0.351)	(0.116)	(0.220)
Board independence	1.059***	0.413***	0.671***	1.064***	0.414***	0.670***
	(0.169)	(0.072)	(0.120)	(0.169)	(0.072)	(0.120)
E index	-0.035	-0.033***	-0.044***	-0.036	-0.033***	-0.044***
	(0.024)	(0.011)	(0.017)	(0.024)	(0.011)	(0.017)
R&D/TA	–	1.866***	4.651***	–	1.837***	4.606***
		(0.283)	(0.521)		(0.281)	(0.519)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	12,648	12,648	12,648	12,648	12,648	12,648
Average adjusted R^2	0.661	0.442	0.464	0.662	0.443	0.464

ROBUSTNESS TEST

Section 4.3. Heckman two-step analysis of firm innovation

This table reports the coefficients and standard errors obtained from a Heckman two-step analysis of firm innovation, as measured by R&D expenditures, patent and citation counts. In the first stage, we estimate a probit model where the dependent variable, *ER availability*, is one if the data on the employee relations score are non-missing and zero otherwise. The independent variables include *Post KLD coverage expansion*, in addition to other firm characteristics. *Post KLD coverage expansion* is a dummy equals one for the period after KLD expanding its coverage in 2003, and zero otherwise. In the second stage, we examine the impact of a firm's employee relations score on its innovation. The inverse Mills ratio (*Lambda*) derived from the first stage selection model is included in the second stage as a regressor. Robust t-statistics adjusted for firm-level clustering are reported in brackets. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Second stage: firm innovation is the dependent variable

	Ln(1+R&D)	Ln(1+Patent)	Ln(1+Citation)
	4	2	3
ER	0.388***	0.073***	0.069*
	(0.055)	(0.024)	(0.039)
Ln(MV)	0.547***	0.233***	0.372***
	(0.038)	(0.014)	(0.021)
Q	0.095**	0.017	0.076**
	(0.037)	(0.019)	(0.035)
Lev	-0.198	0.228**	0.293*
	(0.244)	(0.095)	(0.155)
PPE/TA	-1.332***	0.407***	0.821***
	(0.283)	(0.130)	(0.197)
ROA	-2.823***	-0.457***	-1.032***
	(0.470)	(0.170)	(0.315)
Board independence	1.209***	0.124	0.071
	(0.210)	(0.100)	(0.163)
E index	-0.043*	-0.085***	-0.117***
	(0.026)	(0.015)	(0.021)
R&D/TA	–	2.028***	3.846***
		(0.370)	(0.634)
Lambda	0.274***	0.370***	0.960***
	(0.077)	(0.031)	(0.066)
Industry FE	Yes	Yes	Yes
N	8911	8911	8911
Adjusted R^2	0.685	0.395	0.385

First-stage: probit model of firms with non-missing employee relations scores

	ER availability	ER availability
Post KLD coverage expansion	2.355***	2.356***
	(0.072)	(0.073)
All controls	Yes	Yes
Industry FE	Yes	Yes
N	12,605	12,605
Pseudo R^2	0.527	0.527

ROBUSTNESS TEST

Section 4.4. Propensity score matching

This table presents estimates of difference in the number of patents, *ln(1+Patent)*, and number of citations, *ln(1+Citation)* between the treatment and control groups based on the employee relations score and the Best Companies list. The matched sample is constructed using a nearest-neighbour propensity score match with scores given by probit models in Panel A. The dependent variables are the *ER dummy*, a dummy variable that takes a value of one if a firm has an employee relations score above the sample median; and BC, a dummy variable for whether the firm is in the most recent list of the "100 Best Companies to Work For in America". Independent variables in the probit models include: *ln(MV)* is the natural logarithm of market capitalization. *Q* is market value of equity plus total assets minus book value of equity, all divided by total assets. *Lev* is the sum of short-term and long-term debts divided by total assets. *PPE/TA* is net property, plant and equipment divided by total assets. *ROA* is earnings before interest, taxes, depreciation, and amortization divided by total assets. *R&D/TA* is R&D expenditures divided by total assets. *Board independence* is the number of independent directors divided by board size. *E index* is the entrenchment index compiled by Bebchuk et al. (2009). Robust t-statistics adjusted for firm-level clustering are reported in brackets. *, **, and *** indicates significance at the 10%, 5% and 1% levels, respectively.

Panel A: Probit regressions

	ER dummy	BC
	(1)	(2)
ln(MV)	0.553***	0.755***
	(0.048)	(0.108)
Q	-0.077	0.033
	(0.059)	(0.092)
Lev	-0.347	-1.409
	(0.398)	(1.094)
PPE/TA	1.348***	-0.803
	(0.413)	(1.123)
ROA	0.206	2.252
	(0.763)	(1.658)
Board independence	0.737*	0.788
	(0.384)	(0.791)
E index	0.032	0.041
	(0.046)	(0.114)
R&D/TA	8.265***	9.393***
	(1.474)	(2.416)
Industry FE	Yes	Yes
Year FE	Yes	Yes
N	8,857	8,857
Pseudo R^2	0.177	0.283

Panel B: Average treatment effect on the treated (ATT)

ER dummy		BC	
ln(1+Patent)	ln(1+Citation)	ln(1+Patent)	ln(1+Citation)
(1)	(2)	(3)	(4)
0.144***	0.148***	0.221**	0.211**
(5.360)	(3.250)	(2.100)	(1.980)