

Corporate Labor Misconduct Risk: Evidence from 10-K Disclosures and Enforcement ^{*}

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July 15, 2026

Abstract

We develop novel firm-level textual measures of corporate labor misconduct risk for U.S.-listed firms by combining 10-K risk disclosures with data on labor-related violations and a comprehensive labor-risk dictionary. The measures capture distinct dimensions of misconduct related to benefit and wage violations, employment discrimination, and workplace safety breaches. They capture economically meaningful variation in labor misconduct risk, predicting subsequent enforcement actions, aligning with regulatory and industry patterns, and being associated with future stock return volatility. While realized stock returns show no significant labor risk premium, option-implied expected returns reveal a strong size pattern: the premium is positive for large firms but negative for small firms. Consistent with this, labor risk predicts enforcement outcomes across both size segments, indicating that markets incorporate labor risk into expected returns with heterogeneous pricing across firm size.

Keywords: Labor misconduct risk; Textual analysis; 10-K disclosures; Corporate misconduct; Option-implied expected returns

JEL Classification: G12, G14, J28, J71, K31

^{*}We would like to thank Michael Anthropolos, Vimal Balasubramaniam, Thomas Bourveau, Ioannis Branikas, Ioannis Floros, Ana-Maria Fuertes, Irina Gazizova, Jillian Grennan, Moqi Groen-Xu, Alexandros Kostakis, Katerina Kyriazidou, Spyros Lagaras, Christodoulos Louka, Kai Li, Christos Makridis, Maria Marchica, Thomas Mosk, Filippos Papakonstantinou, Dimitris Petmezas, Ilaria Piatti, Aneesh Raghunandan, Ruidi Shang, Elena Simintzi, George Skoulakis, Konstantinos Stathopoulos, Kate Volkova, and participants at the 2025 CRETE Conference, 2025 International Risk Management Conference, 2025 7th JRC Summer School on Sustainable Finance, 2026 FMA European Conference, 2026 FMARC Conference, and Bayes Business School, Demokritos, Ghent University, Università Cattolica Milan, University of Cyprus, and the University of Piraeus seminars for useful discussions and comments. This work has been partly supported by the University of Piraeus Research Center.

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1 Introduction

Corporate labor misconduct risks (hereafter, labor risks) arise from a firm’s labor practices, workforce management, and employee treatment. These risks have gained prominence amid social movements and increasingly stringent labor regulations, as they can disrupt operations, trigger legal penalties, damage a firm’s reputation, and influence investor decisions, ultimately affecting firm value.¹ Despite their importance, measuring firm-level labor misconduct risk remains challenging. Common proxies, such as ESG social scores, employee surveys, and social-media indicators, are informative but often cover only subsets of firms and may reflect reporting incentives or firm characteristics (Soltes, 2019; Drempetic et al., 2020; Raghunandan, 2021; Gorton et al., 2022; Gong and Thomas, 2023), leaving open how to measure firm-level labor risks, and consequently, how such risks are reflected in their stock prices.

In this paper, we develop novel firm-level textual measures of corporate labor misconduct risk for all U.S.-listed firms from 2007 to 2024 by combining 10-K risk-factor disclosures with data on labor-related violations and penalties. We focus on the most commonly penalized types of misconduct—*benefit plan*, *wage and hour*, *workplace safety* violations, and *employment discrimination*—and construct respective measures that capture distinct aspects of labor risk. We show that these measures capture economically meaningful variation in labor misconduct risk, rather than generic disclosure language, and then use them to study how such risks are reflected in stock prices. We find that while labor misconduct risk is not priced in realized stock returns, option-implied expected returns exhibit a pronounced size-dependent pattern: the premium is positive for large firms but negative for small firms. Our approach leverages the complementary strengths of disclosures and re-

¹Examples include the #MeToo and #BlackLivesMatter movements and key legislative actions such as the Affordable Care Act, the Genetic Information Nondiscrimination Act, and the Fair Minimum Wage Act. Investors’ growing interest is illustrated by Norway’s Wealth Fund voting for a shareholder proposal at Microsoft’s 2025 AGM requiring a report on human rights risks. Responsible investor associations, such as the Workforce Disclosure Initiative and the Human Capital Management Coalition, have also called for increased disclosure of employment practices.

alized violations to disentangle distinct dimensions of labor misconduct risk in a credible way. 10-K filings are mandatory, standardized, and legally enforceable, providing incentives for accurate reporting (Lopez-Lira, 2021), while prior work shows that risk-factor disclosures are not boilerplate (Campbell et al., 2014); penalty data, in turn, provide objective evidence of realized misconduct across different violation categories.

To construct our measures, we identify labor-related disclosures in the “Item 1A Risk Factors” section using a comprehensive labor risk dictionary derived from regulatory sources, manual review, and the unsupervised Word2Vec model (Mikolov et al., 2013; Li et al., 2021; Harford et al., 2026) to capture relevant terms and word sequences, following Qiu and Wang (2021).

We then construct firm-level textual labor risk measures by applying cosine similarity—defined as the dot product of normalized document vectors (see Kwon and Lee, 2003)—a widely used textual method in finance (e.g., Hanley and Hoberg, 2010, Hoberg and Maksimovic, 2015, and Cohen et al., 2020), to the retained 10-K paragraphs for each firm-year. In analogy with Florakis et al. (2022), who use a similar cosine-similarity framework to measure cybersecurity risk, we adapt this approach to labor-related misconduct risk using 10-K disclosures and enforcement-based benchmarks. Each year, we construct a benchmark by identifying the firm with the highest realized labor risk in the prior year, defined as the firm receiving the largest penalty among systematic violators in the Violation Tracker database. We then measure the similarity between firms’ 10-K disclosures and this benchmark, with firms whose disclosures are more similar to the benchmark exhibiting higher labor misconduct risk.² Unlike textual measures based on the frequency of labor-related terms, which measure the intensity of labor disclosure, our approach leverages labor penalties to construct the benchmark and captures the similarity of

²Labor penalties provide a clean and objective indicator of labor risk because they reflect realized legal violations. This differs from using lawsuit announcements, where the outcome is unknown in advance and can be affected by subsequent events such as court testimonies or new evidence. This uncertainty is particularly relevant for certain labor violations, such as employment discrimination (McDonnell and King, 2018).

firms’ disclosure patterns to those of firms with documented labor violations. Using penalty data classified by primary offense type, we construct both dimension-specific measures—covering benefit plan, wage and hour, employment discrimination, and workplace safety violations—and an aggregate measure. The resulting measures are robust to an alternative benchmark definition based on multiple penalized firms, indicating that the measures are not sensitive to the choice of benchmark firm.

We compute labor risk measures for 8,177 publicly listed U.S. firms over 2007–2024. Depending on the dimension, average scores range from 0.28 to 0.32, with about 80% of firms exhibiting relatively mild labor risks, indicating that most firms face moderate misconduct. Our measures are distinct from those capturing risks related to labor shortages and the ability to attract and retain skilled employees, managerial integrity, workforce ESG metrics, or voluntary turnover.

We find that firms with higher labor risks tend to be larger, more leveraged, and have higher institutional ownership, consistent with [Mattera \(2018\)](#) and [Raghunandan \(2021\)](#). These patterns align with evidence that corporate labor misconduct in large firms is less likely to be reported ([McDonnell and King, 2018](#); [Soltes, 2019](#)) and that some use reputation-management strategies to obscure underlying labor issues ([Vanderkam, 2011](#); [Raghunandan, 2021](#); [Gong and Thomas, 2023](#); [Raghunandan and Rajgopal, 2024](#)). Larger firms can also better absorb penalties, which are typically small relative to firm size, thus reducing the expected financial cost of non-compliance ([Raghunandan, 2021](#)), while institutional investors focus on financial performance rather than social issues ([McCahery et al., 2016](#)), and leverage may incentivize labor-cost reductions at the expense of labor compliance, as suggested by the agency and debt overhang theories ([Jensen and Meckling, 1976](#); [Myers, 1977](#)).

Our results differ from prior studies showing that large firms tend to exhibit high employee satisfaction—as reflected in “Best Companies to Work For” rankings—often interpreted as strong labor relations ([Edmans, 2011](#); [Boustanifar and Kang, 2022](#); [Edmans et al., 2024](#)). This suggests that rankings based on employee sentiment convey different information than labor misconduct measures based on

regulatory disclosures and labor-law violations. Consistent with this, the publicly listed firms in the Fortune 100 and Glassdoor Best Companies to Work For lists do not rank among the firms with the lowest labor risk scores in the sample, corroborating evidence by [Heese et al. \(2022\)](#) that companies in Best Companies to Work For often exhibit some type of corporate misconduct. Similar patterns hold for ESG workforce satisfaction metrics, consistent with the slack-resources hypothesis, whereby higher ESG ratings may be due to the fact that larger firms have greater resources to promote ESG activities ([Waddock and Graves, 1997](#); [Drempetic et al., 2020](#)).

We provide additional evidence that our measures capture labor risk, mitigating concerns that they may reflect boilerplate disclosure. Firms with higher labor risk scores are more likely to experience subsequent enforcement outcomes, proxied by labor-related penalties and worker-initiated inspections, suggesting that the measures capture latent labor risk perceived by workers rather than merely regulatory intensity. Additional validity checks show that the measures behave as expected: time trends align with increasing legal stringency and workplace incidents; industry patterns replicate prior evidence, with retail trade, coal mining, and construction exhibiting the highest risk, and finance, insurance, entertainment, and broadcasting the lowest ([Coleman and Kerkerling, 2007](#); [Bernhardt et al., 2013](#); [Cohn and Wardlaw, 2016](#); [Raghunandan, 2021](#)); they capture substantial firm-level variation; and they are positively associated with future stock return volatility, confirming that they convey risk-relevant information for financial markets.

Next, we examine whether labor risk is priced in the cross-section of U.S. common stocks over March 2007–January 2024. Using realized returns, we find no significant evidence of a labor risk premium. In contrast, option-implied expected returns, proxied by [Chabi-Yo et al. \(2023\)](#) measure, reveal a strong and statistically significant premium.³ Given that realized returns are known to be noisy proxies for

³The [Chabi-Yo et al. \(2023\)](#) measure can be calculated for all U.S. optionable stocks and accounts for higher-order moments of the risk-neutral return distribution. Alternative measures of option-implied expected returns (e.g., [Martin and Wagner, 2019](#)) would require substantially restricting our sample, as they can be computed only for stocks included in a given index and do

expected returns (Pastor et al., 2022; Sautner et al., 2023), we focus on option-implied expected returns as a forward-looking, market-based measure of expected returns. The sign of the premium depends on firm size. Equal-weighted portfolios yield a negative labor risk premium, whereas value-weighted portfolios yield a positive one, suggesting that size plays a central role in the pricing of labor risk. Consistent with this, double sorts on firm size and labor risk show that the premium is negative among small firms but positive among large firms.

To shed more light on the economics behind the opposite sign of the labor risk premium between small and large firms, we examine whether labor risk predicts future enforcement outcomes across size segments. We find that higher labor risk is associated with a greater likelihood of subsequent enforcement actions, with a stronger effect among large firms. This indicates that the labor risk measure captures variation in subsequent labor-related violations in both segments. The relation between labor risk and option-implied expected returns nevertheless differs by firm size. Among large firms, higher labor risk is associated with higher expected returns, consistent with investors requiring compensation for exposure to labor-related risk. Among small firms, higher labor risk is associated with lower expected returns despite its positive relation with future enforcement outcomes. This pattern suggests heterogeneous incorporation of labor-risk information in expected returns across size segments. Consistent with this interpretation, we find that firms with greater (lower) analyst coverage exhibit positive (negative) labor risk premia, linking the sign of the premium to differences in firms' information environments.

Option-implied moments provide further evidence on how labor risk is reflected in market equity option prices across the two size segments. Among large firms, implied volatility increases with labor risk, indicating that labor-related uncertainty is incorporated into option prices. For small firms, this relation is weaker, despite the fact that labor risk predicts enforcement outcomes in this segment as well. Together, these findings suggest that labor-risk information is reflected more strongly

not incorporate the higher-order moments of the return distribution.

in expected returns and perceived uncertainty among large firms than among small firms. Finally, implied skewness becomes less negative as labor risk increases across both size groups, indicating that labor risk is not associated with increased downside tail risk.

Related literature and contributions. This paper contributes to several strands of the literature. First, it contributes to the literature on textual analysis in finance ([Harford et al., 2026](#), and references therein) by introducing firm-level measures of corporate labor misconduct risk. Existing work primarily relies on employee-generated data, such as Glassdoor reviews, to construct textual measures ([Campbell and Shang, 2022](#); [Au et al., 2024](#)). We instead combine mandatory 10-K risk disclosures with externally verified labor-related penalties to construct firm-level, dimension-specific measures of labor misconduct risk for the universe of U.S. listed firms.

Our approach complements existing measures along two dimensions. First, 10-K risk-factor disclosures are mandatory filings subject to legal liability, ensuring broad and credible coverage ([Campbell et al., 2014](#); [Lopez-Lira, 2021](#)). Second, labor-related violations and penalties provide direct, externally validated evidence of misconduct ([McDonnell and King, 2018](#); [Raghunandan, 2021](#); [Heese et al., 2022](#); [Gong and Thomas, 2023](#); [Raghunandan and Rajgopal, 2024](#)), allowing us to construct dimension-specific risk measures. In contrast, employee-review-based measures capture an important but distinct dimension—employees’ perceptions—based on voluntary participation, and therefore cover a smaller set of firms while reflecting sentiment-based information about workplace conditions that may not fully reflect underlying misconduct exposure.⁴Relative to [Campbell and Shang \(2022\)](#), who construct aggregate misconduct measures using Glassdoor and enforcement data, we focus specifically on labor misconduct risk, decompose it into distinct regulatory dimensions, and examine its asset pricing implications. More broadly, we contribute

⁴Firms receiving strong workplace ratings may still face labor-related litigation and enforcement actions, underscoring the distinction between employee sentiment and misconduct exposure ([Winkler and Fuller, 2019](#); [Heese et al., 2022](#); [Gong and Thomas, 2023](#)).

to the literature on corporate culture (see [Gorton et al., 2022](#)) by developing a risk-based textual measure of labor relations, and to the literature on corporate misconduct ([Dyck et al., 2024](#) and references therein), which has largely focused on the detection and determinants rather than the measurement of underlying risk exposures, with the emphasis being on financial reporting misconduct ([Amiram et al., 2018](#)).

We also contribute to the literature examining whether labor-related risks are priced in stock returns. Prior studies document a negative relation between labor-related incidents and firm value or returns. For example, [Cohn and Wardlaw \(2016\)](#) and [Au et al. \(2024\)](#) find that workplace injuries and sexual harassment incidents are associated with lower firm value and future returns, while [Cline et al. \(2018\)](#) document that managerial misconduct announcements lead to declines in market capitalization. Conversely, a related literature documents that positive workplace attributes are associated with superior stock performance ([Edmans, 2011](#); [Green et al., 2019](#); [Boustanifar and Kang, 2022](#); [Edmans et al., 2024](#)). Relatedly, [Li and Nagar \(2013\)](#) find that firms introducing same-sex domestic partnership benefits earn positive abnormal returns.⁵ We extend this literature by introducing new firm-level measures of corporate labor misconduct risk and examining their asset pricing implications. Using option-implied expected returns, we find that labor risk is priced, whereas realized returns show no significant relation. This highlights the limitations of realized returns as proxies for expected returns, and parallels the evidence in [Sautner et al. \(2023\)](#), who document that climate-risk exposures are priced only when using option-implied measures. We further document a pronounced size pattern: the labor risk premium is positive for large firms but negative for small firms. This pattern indicates heterogeneous incorporation of labor risk into expected returns across the firm size distribution, consistent with our evidence that the labor risk measures capture real exposure to subsequent labor-related enforcement risk in

⁵A substantial literature examines labor mobility and stock prices (e.g., [Harford et al., 2026](#), and references therein). This differs from our study because labor mobility does not necessarily imply corporate labor misconduct. Employees may leave to accept higher pay or pursue career advancement, which does not indicate unsafe or unfair working conditions.

both segments.

Finally, we contribute to the ESG asset pricing literature by providing new evidence on the pricing of social risk through novel firm-level measures of corporate labor misconduct risk, a core social-risk exposure. While environmental risks have received substantial attention (see [Faccini et al., 2023](#) and references therein), empirical evidence on the social dimension remains limited, largely due to measurement challenges. Our findings show that this dimension is incorporated into expected stock returns, consistent with theoretical predictions on ESG-related asset pricing ([Pastor et al., 2021](#); [Pedersen et al., 2021](#); [Zerbib, 2022](#)).

2 Data

We obtain our data from three different sources over 2006-2024 (daily, monthly, annual, depending on the data source).

2.1 Good Jobs First Violation Tracker

We utilize the Good Jobs First Violation Tracker, also previously employed in the literature (e.g., [Raghunandan, 2021](#); [Campbell and Shang, 2022](#); [Heese et al., 2022](#); [Gong and Thomas, 2023](#), [Raghunandan and Rajgopal, 2024](#)) to identify firms convicted of labor misconduct and the incurred penalty. Good Jobs First, a Washington, DC-based nonprofit organization founded in 1998, is a leading entity tracking state and local economic development subsidies and documenting corporate misconduct. Since 2000, it has been the sole provider of data on penalties paid by U.S.-based firms for corporate crimes and misconduct. The majority of Good Jobs First Violation Tracker entries reflect administrative enforcement actions and penalties issued by federal and state labor agencies. These actions are administrative in nature and do not constitute court-filed lawsuits. For the cases resolved through litigation, the database does not report underlying lawsuit filing dates. For our analysis, we use counts of violations and associated penalty amounts related to

corporate labor misconduct.⁶

Good Jobs First classifies violations based on their offense type. We download violations and penalties relating to employee terms and conditions. These include employment or workplace safety related offenses, further grouped into ten categories based on their primary offense type.⁷ We focus on four categories—*benefit plan*, *wage and hour*, *workplace safety*, and *employment discrimination*—which exhibit the highest penalty amounts. These are also the only categories with a continuous time series of penalties, ensuring no missing observations for our subsequent labor risk measures.

The benefit plan category includes violations of employee benefit, retirement 401(k), and health/ welfare plans under the Employee Retirement Income Security Act (ERISA) obligations. They commonly refer to discrepancies in Form 5500 reporting, fiduciary breaches, and prohibited transactions. The employment discrimination category includes violations of federal or state anti-discrimination laws by discriminating or harassing against protected characteristics (e.g. race, color, religion, age, sexual orientation). The wage and hour category encompasses violations related to unpaid overtime and compensation below the federal minimum wage, among other infractions. Finally, the workplace safety category includes violations of workplace safety and occupational health standards which can result in injuries, illnesses and fatalities in the workplace. Most of these violations, depending on their type, are settled by federal agencies, including the U.S. Department of Labor’s Employee Benefits Security Administration (EBSA), Equal Employment

⁶As of May 23, 2023, the Violation Tracker database includes information on penalties resulting from agency inspections, agreements between plaintiffs and defendants, or court decisions for 557,000 civil and criminal cases involving over 400 federal regulatory agencies. The total penalties in the database amount to \$917 billion. The database provides the firms (both parent companies and their subsidiaries) involved in violations, specifying the type of violation for primary and secondary offenses, the year of penalty issuance, and the amounts imposed. For firms with subsidiaries, penalties are reported at the parent company level, and a firm may incur multiple penalties within a single year. More information is available at <https://violationtracker.goodjobsfirst.org/>

⁷The ten employee-related categories span workplace safety and health, labor relations, compensation and benefits, leave entitlements, discrimination, immigration and work authorization, whistleblower protection, and employment screening. In addition, two labor-related cases are classified under the environmental violations and consumer protection violations categories based on the secondary offense.

Opportunity Commission (EEOC), U.S. Department of Labor’s Wage and Hour Division (WHD), Occupational Safety and Health Administration (OSHA), and the Mine Safety and Health Administration (MSHA).

Table 1 reports the annual penalty amounts for all U.S. firms for each category, number of penalties, the number of private lawsuits and the number of agency enforcement actions. The greatest (lowest) total penalty amount occurs in the wage and hour category (workplace safety) with an amount of about \$9.1 billion (\$682 million). The workplace safety category shows the greatest total number of violations, and the highest (lowest) total penalty per violation occurs for the benefit plan (workplace safety) category with an amount of about \$14 million (\$30,000) per violation. The number of penalties that rise from private litigation is smaller than those from enforcement by public authorities, except in the case of benefit plan violations. For our analysis, in the case of companies with subsidiaries, we use penalty data at the parent-company level since these have already aggregated the penalties of the individual subsidiaries.

2.2 OSHA enforcement data

We utilize data on workplace inspections conducted by the Occupational Safety and Health Administration (OSHA). OSHA is a U.S. federal agency responsible for enforcing workplace safety and health regulations, investigating workplace incidents, and issuing monetary penalties for detected violations. OSHA conducts both programmed and unprogrammed inspections. Programmed inspections are proactive and target establishments in industries with elevated risks of injury, illness, or hazardous exposure. Unprogrammed inspections are reactive and are initiated in response to specific events, including employee complaints, accidents, fatalities, or referrals.

We obtain daily OSHA inspection records from the OSHA Enforcement Data website, https://enforcedata.dol.gov/views/data_catalogs.php. We focus on unprogrammed inspections triggered by employee complaints, which are reported

at the facility level. To match the inspections with their corresponding firms, we match the OSHA inspections with the Good Jobs First facility names using the fuzzy matching token set ratio similarity technique. First, we standardize facility names in both databases by removing punctuation, stop words, incorporation words and special characters. Then, we calculate the token set ratio similarity between each OSHA and Good Jobs First facility name, by comparing the unique and common words between the two names. Finally, we keep only the pairs that belong to the same U.S. state and have a token set ratio that exceeds 95 out of 100.

2.3 SEC 10-K filings, stock, and other data

We obtain firms' 10-K filings, which the U.S. Securities and Exchange Commission (SEC) requires all publicly listed U.S. companies to file annually. These documents provide a comprehensive overview of a company's business, risks, and operating and financial results for the fiscal year. Our analysis focuses on the Risk Factors Section (Item 1 A) which outlines the most significant current and future risks, which may be specific to the firm, its industry, or the broader economy. The Section has been mandatory since 2006 for all U.S. public listed companies, except those classified as "smaller reporting companies"—firms with a public float under \$250 million or annual revenues under \$100 million. This delivers a sample of 8,177 publicly listed U.S. firms to analyze. We extract the Risk Factors Sections from all available 10-K filings (forms 10-K, 10-KSB, 10-K405, and 10-KSB40, excluding amendments) during the examined period by accessing the SEC Electronic Data Gathering, Analysis, and Retrieval (EDGAR) Filings API.

We obtain daily and monthly stock returns and stock characteristics for all U.S. common stocks (share codes 10 and 11) listed on the NASDAQ, NYSE, and AMEX exchanges (exchange codes 1, 2, or 3) over the examined period from CRSP and Compustat via the WRDS database. We adjust stock returns for delisting to avoid survivorship bias as in [Bali et al. \(2016\)](#). ESG ratings/subscores and voluntary employee turnover are sourced from Refinitiv/LSEG, equity risk factors are retrieved

from Kenneth French’s website, the number of equity analysts who provide earnings per share (EPS) forecasts from the I/B/E/S summary file via WRDS, the skilled labor risk factor —that is, the potential failure in attracting and retaining skilled labor from Yue Qiu’s website, the integrity score -that is a textual measure of the respective corporate cultural value from Kai Li’s website, and the labor shortage score -that is, a textual measure of the firm’s labor shortage exposure from Qiyang He’s website.

We match the 149,562 downloaded 10-K disclosures with 8,177 firms from the CRSP common stock dataset using the central index number (CIK), a unique identifier shared by both WRDS and the SEC for firm filings. To match firms with employee-related violations, we link the firm’s CUSIP from the WRDS database to the ISIN provided by Good Jobs First. Of the 8,177 publicly listed U.S. firms, 1,289 have been convicted of 24,645 employee-related offenses, collectively paying \$15.24 billion in settlement penalties between 2006 and 2024.

2.4 Option-implied data

We measure option-implied expected stock returns using the generalized lower bound (GLB) of [Chabi-Yo et al. \(2023\)](#), which is available for all optionable stocks. The data are obtained from Grigory Vilkov’s data library <https://osf.io/7xcqw/>. We further obtain 30-day implied volatilities from the OptionMetrics IvyDB volatility surface file, which provides interpolated implied volatilities for standardized call and put options across maturities and deltas. At-the-money implied volatility is computed as the average of the implied volatilities of 30-day call and put options with deltas of +0.50 and 0.50, respectively. Implied skewness at the 30-day horizon is also obtained from G. Vilkov’s data library.

3 The labor risk measures

3.1 Labor risks dictionary: Construction

We retain paragraphs in 10-K disclosures (Risk Factors Section) that discuss firm labor risks. Since the SEC does not require firms to include a dedicated section on labor risks, we develop a labor risks dictionary to identify relevant paragraphs. Our dictionary comprises specific words and sequences of words related to labor risks; in textual analysis, keywords alone may not be sufficient to identify the paragraphs of interest ([Hoberg and Maksimovic, 2015](#)).

We construct the dictionary of words related to labor risks by drawing terms from: (i) employee-related violations and protective laws listed in [Federal Contract Compliance Manual - key words and phrases](#) issued by the U.S. Department of Labor, (ii) a random sample of 10-K risk disclosures, and (iii) application of the Word2Vec model ([Mikolov et al., 2013](#)), an unsupervised neural-network model, to the full sample of 10-K risk disclosures to ensure that no relevant terms are omitted from our labor risk dictionary.

Regarding (i), the Federal Contract Compliance Manual outlines keywords and phrases used to evaluate compliance with labor regulations, offering guidance to the Office of Federal Contract Compliance Programs on issues such as workplace discrimination, diversity, and compensation practices. Regarding (ii), each year, we randomly sample 10-K risk disclosures from ten firms, compiling a dataset of 160 disclosures in total. We read these disclosures and select words which fall in any of the two following topics related to labor risks discussed in these disclosures: employee-related violations and workforce attrition occurring from labor risks. Regarding (iii), the Word2Vec model ([Mikolov et al., 2013](#)), used in finance research to create dictionaries in other applications (e.g., [Li et al., 2021](#); [Harford et al., 2026](#)), delivers words (output words) which are contextually similar to a pre-specified set of words (seed words). To this end, it converts each word in 10-K risk disclosures into numerical vectors, termed word "embeddings", and then it evaluates their similarity

to the seed words. To construct the word embeddings of each word in the 10-K risk disclosures, we apply Word2Vec to the entire corpus of the 10-K filings by providing the words detected from steps (i) and (ii) as seed words; Appendix A.2 provides more details on the model and its implementation. Finally, we check whether the output words relate to labor risks and enhance our dictionary accordingly. Table 2 reports the words and phrases included in our dictionary of words. There are in total 250 items.

We construct the dictionary of word sequences as follows. To define the beginning and ending word of the sequence, we follow Qiu and Wang (2021). We read the randomly sampled disclosures in step (ii) and create eight word lists based on the semantic similarity among words. To ensure that each word list is complete, we feed a Word2Vec model -trained on all available 10-K disclosures- with the words contained in the respective list, and use the model’s output words to enrich the respective word list. Then, we form word sequences where the beginning and ending word are drawn from a pair from the eight lists, allowing up to five words between them. The pair of lists is chosen so that it relates to any of the two labor risk topics identified in step (ii). We construct word sequences by also reversing the starting and ending word.⁸

Table 3 describes the eight final word lists. One clarification is warranted. The categories “talent acquisition & retention” and “employee attrition” in principle measure labor mobility, which per se does not necessarily imply corporate labor misconduct or legal violations; employees may leave to accept higher pay or pursue career advancement even when working conditions are safe and fair. However, elevated labor mobility can also reflect underlying labor misconduct in certain firms, as employees may choose to exit in response to unfair or unsafe workplace practices. We

⁸We define eight word lists related to talent acquisition and retention, employee attrition, employee roles, senior management positions, claims and disputes, employee-related violations, employment facilities, and health and safety, respectively. We then form pairwise combinations of these lists to identify the two labor-risk topics from Step (ii). Workforce attrition is captured through combinations linking recruitment and retention word list with employee role, attrition, and senior management lists. Employee-related violations are captured through combinations linking the violation list with claims and disputes, and workplace-facility terms with health and safety lists.

therefore include these two categories to capture cases in which labor mobility risks are symptomatic of broader labor misconduct. The subsequent analysis in Section 3.3 demonstrates that the measures of corporate labor misconduct risk based on our dictionary are distinct from labor mobility risks.

After identifying the labor risk-related paragraphs, we standardize them so that they can be processed by textual analysis. This process involves removing HTML tags, punctuation, numbers, and references to geographic locations, dates, and names. We remove stop words using Python’s Natural Language Toolkit (NLTK) stop-word list, exclude words with fewer than three characters, and convert all text to lowercase. Each paragraph is converted into a list of words. To group words with similar meanings, we apply lemmatization.

3.2 Labor risk measures: Construction

We construct firm-level labor risk measures by comparing each firm’s retained labor risk-related risk disclosure at time t to that of the ex-post "riskiest" firm identified during the $[t - 1 \text{ days}, t - 365 \text{ days}]$ period. The identification of the ex-post riskiest firm follows a two-step process. First, we select firms whose number of employee-related violations exceeds the cross-sectional average during this time interval. Second, among these firms, the ex-post riskiest firm is the one with the highest total penalty. Our definition of the riskiest firm incorporates not only the penalty amounts but also the number of employee-related violations, aligning with the notion that such firms represent systematic violators of employee-related regulations due to management decisions, inefficient operations, or corporate culture. Furthermore, the identification of the riskiest firm at time t is based solely on information available at that time (i.e., the number of violations and related penalties), ensuring that there is no look-ahead bias in the construction of our labor risk measures.

To compare a firm’s risk disclosures on day t with those of the riskiest firm, we employ the cosine similarity method (Kwon and Lee, 2003). For each firm and

year, we evaluate the similarity between the disclosures of firms A and B (where B represents the riskiest firm) by calculating the angle (cosine) between their word frequency vectors, WF_A and WF_B , where $WF_A = [WF_{1,A}, WF_{2,A}, \dots, WF_{n,A}]$ and $WF_B = [WF_{1,B}, WF_{2,B}, \dots, WF_{n,B}]$, with the vector elements $WF_{j,A}$ and $WF_{j,B}$ representing the frequency of word $j, j = 1, \dots, n$ in the disclosures (i.e. the retained paragraphs) of firms A and B , respectively, and n denotes the total number of unique words across both disclosures. The cosine similarity is calculated as:

$$\text{Cosine similarity}(WF_A, WF_B) = \cos(\theta_{A,B}) = \frac{\overrightarrow{WF_A} * \overrightarrow{WF_B}}{\|\overrightarrow{WF_A}\| * \|\overrightarrow{WF_B}\|}, \quad (1)$$

where

$$\overrightarrow{WF_A} * \overrightarrow{WF_B} = (WF_{1,A} * WF_{1,B}) + \dots + (WF_{n,A} * WF_{n,B}) \quad (2)$$

$$\|\overrightarrow{WF_A}\| * \|\overrightarrow{WF_B}\| = \sqrt{WF_{1,A}^2 + \dots + WF_{n,A}^2} * \sqrt{WF_{1,B}^2 + \dots + WF_{n,B}^2} \quad (3)$$

Cosine similarity values range from 0 to 1, where 0 indicates no similarity and 1 indicates identical disclosures. The greater (smaller) the $\cos(\theta_{A,B})$, the greater (smaller) the labor risk of firm A relative to the riskiest firm B .⁹

We construct four individual textual labor risk measures arising from benefit plan, wage and hour, workplace safety violations, and employment discrimination, respectively. We construct each textual measure by identifying the riskiest firm using the number of violations and the penalties incurred within the respective Good Jobs First category.

This dissection of labor risks highlights the multidimensional nature of labor risks and allows us to assess the effect of each dimension on stock prices. We also construct an aggregate labor risk measure by identifying the riskiest firm using the sum of the total number of violations and the total amount of penalties incurred across all Good Jobs First categories of labor-related offenses.

⁹Note that in a given year, the riskiest firm may differ for each firm in the firms' cross-section. This is because the identification of the riskiest firm depends on the timing of firm A 's disclosure within a given year. Since disclosures may occur at different points in time (t) across firms throughout the year, a given firm is compared with the firm identified as the riskiest over the interval $[t - 1, \text{days}, t - 365, \text{days}]$.

Our baseline measures use the firm with the highest labor-related penalties in the previous year as the benchmark in order to anchor the textual similarity scores to disclosures associated with the most severe realized misconduct event in a given year. Using a broader set of violating firms instead would average across firms with potentially heterogeneous disclosure practices, violation severity, and regulatory contexts, thereby producing a more diffuse signal. Nevertheless, reliance on a single benchmark firm may raise concerns that the measures reflect idiosyncratic disclosure language, peer disclosure practices, firm-specific reporting style, or unusually large enforcement events associated with that firm. To address these concerns, we construct alternative labor risk scores using all firms with labor-related violations in the prior year, where each firm’s score is calculated as the penalty-weighted average of its cosine similarity scores with respect to each firm in the benchmark set. The resulting measures are highly correlated with the baseline measures (0.81–0.92 across labor risk categories), indicating that the baseline measures are not sensitive to the choice of benchmark firm.

3.3 Labor risk measures: Scores and firm characteristics

Table 4 reports the pooled summary statistics of the constructed labor risk measures at the firm-year level (Panel A), and their pairwise correlations, along with other variables of interest (Panel B). The distribution of the values of each labor risk measure is symmetric. Depending on the dimension of labor risk, the average labor risk score ranges between 0.28 and 0.32, and about 80% of firms exhibit cosine similarity scores between 0.13 and 0.49 when compared to the riskiest firm’s disclosure, indicating that most firms face relatively mild labor risks.

The low pairwise correlations (below 0.6) among our labor risk measures suggest that each labor risk measure captures a unique aspect of corporate labor misconduct risk. The relatively low correlations (below 0.35) between our measures with the social (S) part of the ESG score, workforce social ESG subscore, [Harford et al. \(2026\)](#)’s textual labor shortage risk measure, and [Qiu and Wang \(2021\)](#)’s textual

skilled labor risk measure-the latter also derived from 10-K filings- suggest that our approach captures labor risk dimensions distinct from those accounted for by the ESG social scores, labor shortages, and the ability to attract and retain skilled employees. The negative correlation with [Li et al. \(2021\)](#)’s textual integrity measure (ranging between -0.04 and -0.08) suggests that high labor risk firms exhibit weaker ethical culture, while the positive correlation with Refinitiv/LSEG voluntary turnover (ranging between 0.12 and 0.24) implies weaker employee retention, consistent with evidence that workplace discrimination ([Böckerman and Ilmakunnas, 2009](#)) and sexual harassment ([Folke and Rickne, 2022](#)) lead employees to resign. Again, the size of these correlations suggests that the information contained in our labor risk measures is distinct from that in the integrity and voluntary turnover measures.

Finally, we examine how labor risk scores relate to certain firm characteristics (size, return on assets, institutional ownership, and leverage). At the end of each year, we sort stocks into quintiles based on their labor risk scores for each measure (Aggregate, Benefit Plan, Employment Discrimination, Wage and Hour, and Workplace Safety). Table 5 reports average labor scores and firm characteristics for each quintile. Both firm characteristics and labor risk measures correspond to the same fiscal year-end, even if the former are released later. This is legitimate since we wish to characterize the fundamental profile associated with labor risk in the same year, and not to design a trading strategy as in the subsequent asset pricing analysis, where look-ahead bias would be a concern. We find that firms with higher labor risk tend to be larger, exhibit higher institutional ownership, and are more leveraged, whereas the relation with profitability is non-linear; the same patterns prevail even if firm characteristics are measured with a lag.

These results are consistent with [Mattera \(2018\)](#) and [Raghunandan \(2021\)](#), who document that many prominent large firms engage in wage and hour violations as a cost-saving strategy. Penalties imposed by the U.S. Department of Labor’s Wage and Hour Division under the Fair Labor Standards Act vary by violation type and

intent, but are generally modest on a per-violation basis, particularly outside cases involving willful or repeated misconduct. By contrast, penalties imposed by the Securities and Exchange Commission (SEC) follow explicitly tiered statutory limits that escalate with the severity of misconduct and can reach hundreds of thousands of dollars per violation for firms—and potentially more when tied to the gains from misconduct. This low penalty structure makes labor violations relatively inexpensive for large firms, enabling them to absorb settlements without meaningful financial strain. Our findings are also consistent with [Green et al. \(2019\)](#), who document that employee satisfaction is negatively related to institutional ownership, suggesting that a higher institutional presence does not necessarily translate into better workplace conditions. Institutional investors tend to prioritize governance and financial performance in their monitoring activities rather than social issues, which limits external oversight of labor practices ([McCahery et al., 2016](#)). Regarding the positive association of labor risks and leverage, agency ([Jensen and Meckling, 1976](#)) and debt-overhang ([Myers, 1977](#)) theories suggest that highly leveraged firms face stronger short-term pressures from creditors, which can incentivize managers to cut costs, underinvest in employee protections, and reduce compliance with labor regulations.

A remark is in order. The positive association between size, profitability, and labor risk may appear inconsistent with previous evidence that larger and more profitable firms generally offer superior wages and non-wage benefits ([Brown and Medoff, 1989](#); [Liu et al., 2023](#)). However, higher pay does not preclude labor violations. Prior research shows that labor misconduct in large firms often goes unreported ([McDonnell and King, 2018](#); [Soltes, 2019](#)) and that some large firms use reputation management strategies—such as selective disclosure, review manipulation, symbolic diversity initiatives, or membership in socially responsible coalitions—to obscure underlying labor risks ([Vanderkam, 2011](#); [Raghunandan, 2021](#); [Gong and Thomas, 2023](#)).

Given the positive association between firm size and labor risks, we also re-

estimate our labor risk measures by scaling penalties by firm size (logarithm of its market cap). The patterns in firm characteristics remain qualitatively similar.

3.4 Relation to popular workplace quality metrics

Our findings diverge from earlier studies reporting that large firms with high institutional ownership tend to exhibit high employee satisfaction, which is often interpreted to imply low labor risks, as reflected in “Best Companies to Work For” rankings (Edmans, 2011; Green et al., 2019; Edmans et al., 2024). Our findings also differ from studies which document that larger firms have higher ESG scores (Drempetic et al., 2020), also interpreted to signal that these firms have lower labor risks. This discrepancy suggests that such rankings may not fully incorporate the information embedded in 10-K disclosures or employee-related violations and penalties—the foundation of our labor risk measures.

We test this conjecture by a number of tests applied to popular workplace quality metrics. First, we examine the labor misconduct profile of the publicly listed firms included in the Fortune 100 Best Companies to Work For (BCTW) list and their labor risk scores.¹⁰ Between 2007 and 2024, 115 publicly traded firms appeared on the list; notably, 71 of them faced at least one employment-related violation during this period, and 21 did so in the same year they were featured—suggesting that such incidents did not preclude inclusion. This echoes the evidence in Heese et al. (2022)

¹⁰The list is compiled annually by the Great Place to Work Institute and published by Fortune Magazine. For the Fortune 100 Best Companies to Work For, companies must have at least 1,000 U.S. employees to be eligible, must be Great Company to Work Certified, and government agencies are excluded. The scoring methodology has changed over the years. According to the 2025 methodology, firms are scored based on survey data. The Institute administers a 60-question Trust Index Survey to employees. For organizations with 5,000 employees or fewer, all employees must be surveyed. For organizations with more than 5,000 employees, a random sample of at least 5,000 employees is surveyed. Survey responses are anonymous. The survey aims to measure key aspects of workplace culture, including credibility (communication and honesty of management), respect (treatment and opportunities), fairness (equitable treatment, compensation, diversity), and pride/camaraderie (teamwork, recognition, celebrations). There are also two open-ended questions for qualitative feedback. A proprietary algorithm aggregates these responses, weighting key statements and accounting for consistency across employee groups to produce the Trust Index™ score. In addition to the survey, companies complete a “Culture Audit,” responding to six essay questions about organizational practices, pay and benefits programs, and philosophy; however, only survey responses determine ranking. Details on the 2025 methodology are available at <https://www.greatplacetowork.com/best-workplaces/100-best/2025>.

where 80% of the firms in Fortune 100 and Fortune 500 had committed various types of corporate misconduct in their sample.

Next, we examine whether BCTW identifies the same firms as our compliance-based labor risk measure. If the two approaches capture a similar underlying dimension of workplace quality, firms included in the Fortune ranking would be expected to be among the lowest labor risk scores in the sample. We compare, year by year, the average labor risk scores of the publicly listed in the Fortune 100 BCTW firms with those of the 100 firms exhibiting the lowest labor risk in our sample. We test the null hypothesis that the annual average labor risk scores of the two samples are equal. Table 6 presents the results for aggregate (Panel A), benefit plan (Panel B), employment discrimination (Panel C), wage and hour (Panel D), and workplace safety (Panel E) labor risks. Across all dimensions—aggregate, benefit plan, employment discrimination, wage and hour, and workplace safety—the Fortune 100 firms show significantly higher labor risk scores and are not among the firms with the lowest labor risk scores. Their annual mean scores typically lie in the middle-to-upper portion of the labor risk distribution, whereas the lowest-risk firms consistently occupy the lower tail of the distribution. These patterns indicate limited overlap between firms identified by employee-sentiment rankings and those identified by our compliance-based labor risk measures.¹¹

We obtain similar results by repeating the analysis for the publicly listed firms included in Glassdoor’s Best Places to Work US list and firms with a high Refinitiv ESG Workforce score; results are reported in Appendix A.3. The latter finding echoes the discussion that the positive correlation between social scores and firm’s fundamentals like size and profitability may be due to the more resources these firms can allocate to operating systems and processes that enable them to prepare detailed ESG reports and address the data requirements of stakeholders and rating agencies and promote their ESG activities (slack resource theory, Waddock and

¹¹Prior research highlights that “Best Companies to Work For” lists often rely on voluntary employee feedback that may be shaped by managerial influence (Gorton et al., 2022) and emphasize visible amenities (e.g., free meals, on-site gyms) over deeper dimensions of employee well-being and organizational integrity (Vanderkam, 2011; Edmans, 2012).

Graves, 1997, Drempetic et al., 2020).

Finally, we examine the position of the average publicly listed firm included in any given workplace quality metric in the cross-sectional distribution of our sample. This approach avoids relying on a specific benchmark portfolio of firms and instead evaluates where these firms stand relative to the full sample. For each year and workplace quality metric, we rank firms by their labor risk measure’s value and compute their percentile ranks, with lower (higher) percentiles corresponding to lower (higher) labor risk. Then, we calculate the mean and median percentile rank and the share of firms that belong in the bottom decile of the corresponding distribution. Table 7 reports the time-series averages of each statistic across years for Fortune’s 100 BCTW (Panel A), Glassdoor’s BCTW (Panel B) and the 100 firms with highest ESG workforce in each year (Panel C). Consistent with the evidence from our previous analysis, firms in these workplace quality classifications do not systematically occupy the low risk tail of the distribution. Across all panels and labor risk dimensions, their average ranks, across years, are located at the mid-to-upper range of our distribution, while fewer than 13% of these firms fall in the bottom decile.

3.5 Labor risks and subsequent enforcement

We next examine whether firms with higher labor misconduct risk scores are more likely to experience observable enforcement outcomes, including labor-related penalties and OSHA inspections triggered by employee complaints. This analysis is intended to characterize how different dimensions of labor risk materialize in regulatory data, rather than to serve as definitive tests of measure validity, as firms may reform in the meantime.

We assess this relation using logit regressions that estimate the likelihood of future enforcement outcomes conditional on firms’ labor risk scores. We first proxy enforcement action by recorded labor-related penalties. Following Campbell and Shang (2022), we consider forecasting horizons of one and three years to address

uncertainty in the lead-lag structure between misconduct and observed penalties, as enforcement actions may occur well after the underlying violation. Most labor misconduct cases are resolved by regulatory agencies—such as the Equal Employment Opportunity Commission, the Department of Labor’s Wage and Hour Division, OSHA, or the Mine Safety and Health Administration—within three years on average. We then repeat the analysis by considering OSHA inspections triggered by worker complaints as a proxy for enforcement action. These are not tied to regulator-initiated targeting and have been found to reveal corporate misconduct (Dyck et al., 2010). Using facility-level OSHA data, we focus on inspections initiated by complaints from workers or their representatives. Since the exact inspection date is reported, we examine a one-year forecasting horizon. Note that even though the OSHA data relate to complaints regarding workplace safety, it is possible that other types of labor risk measures can be found to predict these complaints. The correlations between our labor risk scores in Table 4 indicate that high labor risks for a certain offense type may also suggest high labor risks in other types.

To fix ideas, we estimate the following logit regressions:

$$P(Y_{i,t+h} = 1|X_{i,t}) = \Lambda(\alpha + \beta_1 \text{LaborRisk}_{i,t} + \gamma' X_{i,t} + \delta_x), \quad (4)$$

where $\Lambda(\cdot)$ is the logistic cumulative distribution function $\Lambda(z) = \frac{1}{1+e^{-z}}$. $Y_{i,t+h}$ is an indicator variable that equals one if a firm experiences at least one labor-related penalty within one or three years ahead, or at least one complaint-triggered inspection in the subsequent calendar year, and zero otherwise. $\text{LaborRisk}_{i,t}$ is the firm’s labor misconduct risk score measured at time t . The vector $X_{i,t}$ includes the following firm-specific controls: firm size, return on assets, leverage, and institutional ownership. We also control for labor misconduct by including an indicator for misconduct (penalties or complaints-triggered inspections) incurred in the year prior to the risk-score assignment. For each analysis, regressions also include industry and time fixed effects (δ_x). All accounting variables from Compustat are lagged by six months from their corresponding fiscal year-end, while the value of

institutional ownership is the one publicly available at the most recent quarter (i.e. two months after quarter-end) prior to the risk-score assignment, so that we avoid any look-ahead bias.

Table 8 presents the results. We find that higher labor misconduct risk scores are positively and statistically significantly associated with a higher likelihood of subsequent enforcement outcomes, including labor-related penalties and complaint-triggered inspections. This relation holds for all labor risk dimensions except benefit plan and employment discrimination misconduct when we extend the misconduct window at $t + 3$.

Two remarks are in order regarding two potential concerns. First, a potential concern is that the measures may reflect variation in regulatory enforcement intensity—i.e., differences in the likelihood that firms are inspected—rather than underlying labor misconduct risk, since penalties are observed only when firms are inspected. The fact that our measures predict OSHA inspections triggered by worker complaints—initiated by employees rather than regulators—alleviates this concern. This evidence suggests that the measures capture latent labor risk perceived by workers, rather than regulatory enforcement intensity alone. Second, firms often mimic disclosure language from their peers as a strategy to reduce litigation risk and comply with disclosure norms following judicial assessments of industry peers’ risk factor disclosures (Cazier et al., 2021). As a result, similarity in labor-risk disclosures may reflect peer disclosure practices rather than similarity in underlying labor misconduct risk. Accordingly, the textual similarity labor risk measures may partly capture peer effects or disclosure conventions rather than true exposure to labor misconduct risk. To mitigate this concern, we include industry fixed effects in all specifications. Consequently, the documented predictive relation is identified from variation among firms within the same industry, rather than from differences across industries. The finding that labor risk predicts future enforcement even after conditioning on industry membership suggests that the measures contain information beyond broad industry-level disclosure practices.

4 Labor risk measures: Validation

We conduct a series of validation exercises to assess the informativeness of our labor risk measures. We begin by examining excerpts from firms’ retained disclosures and then present evidence based on pattern analysis and regression-based tests.

4.1 Excerpts from disclosures

Table 9 compares excerpts from the labor-related paragraphs of firms with high and low labor risk scores illustrating how the scores of our measures reflect the firms’ description of labor risks. Firms with high scores discuss such risks extensively in their 10-K filings (Panel A). For example, Walmart Stores Inc. (2010 Wage and Hour score: 0.99) notes that it is a defendant in cases involving violations of state and federal wage and hour laws; International Paper Co. (2014 Benefit Plan score: 0.92) highlights risks associated with meeting pension obligations; and Alpha Natural Resources Inc. (2012 Workplace Safety score: 0.66) reports exposure to class actions related to health and safety incidents. In contrast, firms with low scores contain no discussion of labor-related risks in their 10-K filings (Panel B).

Overall, disclosures of high-scoring firms directly reflect the labor-related risks captured by our measures, whereas those of low-scoring firms focus on unrelated issues. These patterns provide initial support for the validity of our dictionary (Section 3.1) and represent a first step toward alleviating concerns that the measures primarily reflect boilerplate disclosure.

4.2 Patterns

We plot the evolution of the cross-sectional average of our labor risk measures over time to check whether their patterns align with major changes in the U.S. employee-related legal framework and significant employee-related events that garnered media attention in Figures 1 and 2, respectively. Both figures demonstrate an

upward trend in labor risk scores over time, reflecting the introduction of stricter labor laws and increased awareness of employee treatment issues. We can see that significant regulatory changes are followed by increases in the corresponding labor risk scores.¹⁷ For example, the wage and hour labor risks increase noticeably in 2011 and 2012, following the 2009 Wages and Fair Labor Standards Act amendment. Similarly, the employment discrimination, wage and hour, and aggregate labor risk scores rise over the next four years following the implementation of the Affordable Care Act in 2014. Labor risks resulting from employment discrimination scores also spike on the enactment and implementation of the 2008 GINA and its amendments.

Similarly, labor risk scores increase after significant employee-related events. For example, the average wage violation score increased sharply in 2009 after Walmart’s record \$640 million penalty for wage violations in 2008. Likewise, in 2015, the benefit plan score increased after Daimler Truck’s record penalty for benefit plan violations in 2014. Workplace safety scores show significant increases in 2011 and 2014, linked to the BP Deepwater Horizon oil spill in 2010 and the explosion of the West Fertilizer Plant in Texas in 2013, which killed 11 and 15 people, respectively. The employment discrimination score increases in 2018, reflecting the impact of the #MeToo movement. Finally, the wage violation score increases after 2014, coinciding with decisions by multiple States to raise their minimum wage above the federal level. By 2022, 30 states and the District of Columbia had minimum wages that exceeded the federal baseline.

Then, we examine whether certain industries have higher average labor risk scores, as expected. We use the four-digit Standard Industrial Classification (SIC), which provides a sufficiently granular partition based on firms’ actual business activ-

¹⁷Key advancements in the U.S. employee-related legal framework over the past 15 years include: (1) the 2008 Genetic Information Non-Discrimination Act (GINA), prohibiting genetic discrimination in health insurance and employment; (2) the 2009 Wages and Fair Labor Standards Act amendment, establishing minimum wage and overtime regulations; (3) the 2010 Affordable Care Act (ACA), mandating employer-provided health insurance; (4) the 2011 implementation of GINA regulations; (5) the 2014 enforcement of ACA provisions; (6) the 2016 Equal Employment Opportunity Commission’s amendments to GINA regulations; (7) the 2019 Fair Minimum Wage Act amendments, which redefined eligibility for overtime pay; and (8) the 2023 implementation of Pregnant Workers Fairness Act, mandating reasonable workplace accommodations for pregnancy-related limitations.

ities, allowing us to analyze the industry anatomy of labor risks. Table 10 presents the industries with the five highest and five lowest average labor risk scores. Retail trade, coal mining, and construction rank among those with the highest scores, whereas finance, insurance, entertainment, and broadcasting exhibit the lowest. These findings align with [Bernhardt et al. \(2013\)](#) who identify retail and hospitality as low-wage industries prone to systematic violations of labor laws, particularly with respect to minimum wage and overtime payments. They also align with [Cohn and Wardlaw \(2016\)](#) who document low injury rates in trading and entertainment industries, and with [Raghunandan \(2021\)](#) who documents low wage theft in the finance, insurance, and information industries. Our results are also in line with [Coleman and Kerkerling \(2007\)](#) who document that the coal industry, despite improving safety compliance over time, still has a higher incidence of nonfatal and fatal accidents compared to other sectors.¹³

4.3 Regression-based tests

To validate that our labor risk measures capture firm-level variation in exposure to labor risks, we first conduct an analysis of variance. Each measure is analyzed conditional on different sets of fixed effects to assess their relative contributions to the total variation. Table 11 reports the explanatory power (adjusted R-squared, R^2) from models including alternative specifications: time fixed effects, time and industry fixed effects, their interaction, and a specification that additionally includes firm fixed effects.

Time-fixed effects—capturing regulatory and macroeconomic changes—explain a sizable share of the variation, with R^2 values between 21.3% and 40.6%. Adding industry-fixed effects raises explanatory power to 35.0%–44.4%, consistent with het-

¹³We repeat the analysis using the Fama–French 49 (FF49) industry classification, which aggregates 4-digit SIC industries into 49 broader groups commonly used in asset pricing tests. The patterns for the bottom-5 industries are somewhat different. This is expected since FF49 industries pool economically distinct sub-industries with heterogeneous labor exposures, thereby masking the variation captured at the 4-digit SIC level. Consequently, we rely on the finer SIC classification for this type of analysis, which better aligns with the economic notion of labor risk based on firms’ underlying activities. For the subsequent asset pricing analysis, in line with the asset pricing literature, we have used the FF49 industry classification.

erogeneity in labor risk exposure across industries (e.g., mining versus technology). Including time-by-industry interactions adds little, increasing R^2 by at most 4.6% (for the employment discrimination measure), suggesting limited joint effects once individual factors are controlled for. In contrast, introducing firm-fixed effects increases explanatory power markedly, with firm-level heterogeneity accounting for 67.5%–79.1% of total variation. These results suggest that our measures do not reflect generic boilerplate language in disclosures and are meaningful since they are consistent with labor risk being shaped not only by regulatory or industry factors but also by firm-level characteristics such as workforce management, compliance practices, and legal exposure.

Finally, we test whether our labor risk measures are associated with stock return volatility, as any valid risk measure should be (Engle, 2004). Following Hassan et al. (2019), we estimate the following panel regression

$$Volatility_{i,t+30} = \alpha + \beta Labor\ risk_{i,t} + \gamma X_{i,t} + \delta_x + \epsilon_{i,t}, \quad (5)$$

where $Volatility_{i,t+30}$ denotes firm i 's realized or implied volatility over the subsequent 30 days, measured following the observation of the labor risk value at time t . $Labor, risk_{i,t}$ represents the firm-level labor risk exposure measure under consideration (aggregate, benefit plan, employment discrimination, wage and hour, or workplace safety). The vector $X_{i,t}$ includes firm-specific controls: the natural logarithm of total assets, return on assets, and leverage. Regressions include industry and time fixed effects (δ_x) in line with Hassan et al. (2019).¹⁴All annual firm characteristics from Compustat are lagged by 6 months from their corresponding fiscal year-end to ensure that there is no look-ahead bias. Table 12 reports results using 30-day realized volatility (Panel A) and at-the-money implied volatility (Panel B) as the dependent variable. We find that our labor risk measures are significantly

¹⁴Our variance decomposition shows that the labor-risk measures are primarily driven by persistent firm-level heterogeneity. Therefore, we use industry (rather than firm) fixed effects in the regressions to preserve this economically meaningful cross-sectional variation instead of absorbing it with firm fixed effects.

correlated with both volatility proxies in nearly all specifications.

5 Corporate labor misconduct and stock returns

5.1 Univariate portfolio sorts

We examine whether labor risks are priced in the U.S. stock market. We classify stocks in portfolios based on their labor risk values for each of the constructed labor risk measures. We form a long-short spread portfolio by going long on the portfolio with the highest labor risk values and short on the portfolio with the lowest values at any given point in time. If the spread portfolio (high labor risk minus low labor risk) yields a statistically significant alpha, this would indicate that the respective labor risk measure is priced. We consider two alternative proxies of expected returns: realized returns and the [Chabi-Yo et al. \(2023\)](#) option-implied expected returns. The latter is a real-time, forward-looking and market-based estimate of expected excess returns.

We compute equal- and value-weighted monthly post-ranking portfolio returns using a monthly rebalancing frequency. Given that most 10-K filings are released by the end of March each year, we start the analysis in March 2007 to ensure that our portfolios are well populated. The quintile portfolio scheme ensures that our stock portfolios are well populated with approximately 645 (438) firms on average per portfolio when using realized (option-implied) returns. To ensure that our results are robust to the choice of model used to estimate alpha, we estimate alphas using three alternative asset pricing models: (i) the CAPM, which includes the market factor; (ii) the [Fama and French \(1993\)](#) three-factor model (FF3), which adds the size and book-to-market factors; and (iii) the [Fama and French \(2015\)](#) five-factor model (FF5), which also includes the profitability and investment factors. This helps mitigate concerns that any significance in alpha may be driven by the correlation between a firm’s labor risks and its profitability and investments; [Ahn et al. \(2024\)](#) document that material ESG alpha vanishes once one accounts for

profitability and investments in the benchmark model.

Table 13 reports the average returns and alphas (in % per month), their t-statistics for CAPM, FF3 and FF5 models under monthly rebalancing using realized (Panel A) and option-implied expected returns (Panel B) as proxies for expected returns. Realized returns generate statistically insignificant average returns and alphas in both equal- and value-weighting schemes across all labor risk measures. On the other hand, when we use option-implied expected returns, average returns and alphas are statistically significant. However, their sign depends on the portfolio weighting scheme. Equal- (value-) weighted scheme generates negative (positive) and statistically significant average returns and alphas across all labor risk measures except for the benefit plan (aggregate) measure, with t-statistics exceeding, in many cases, the stricter threshold of 3 proposed by [Harvey et al. \(2016\)](#). Interestingly, the fact that the aggregate labor risk measure is not priced in value-weighted portfolios, whereas its individual components are, suggests that aggregating different types of labor misconduct may mask economically relevant heterogeneity.

Under the equal- (value-) weighting scheme, the average monthly alpha for the aggregate measure ranges from -0.18% to -0.17% (0.00% to 0.01%). The corresponding ranges are 0.01% to 0.02% (0.07% to 0.08%) for benefit plan violations, -0.07% (0.04%) for employment discrimination, -0.10% to -0.09% (0.04%) for wage and hour violations, and -0.13% (0.03%) for workplace safety violations, depending on the model used. We have repeated the analysis using realized returns by confining the sample to optionable stocks, and the results are similar to those reported using the full sample. We conduct additional robustness checks, including alternative portfolio schemes (deciles and terciles) and rebalancing frequencies (annual and quarterly) for the post-ranking portfolio returns. Unreported results confirm our findings; labor risks are priced only when we use option-implied returns as a proxy for expected returns, with the corresponding premium reversing from negative under equal-weighting, to positive under value-weighting. Next, we shed more light on the economics of the different sign of the labor risk premium across

equal and value-weighted portfolios.

5.2 The role of size: Bivariate portfolio sorts

The change in the sign of the labor risk premium from negative to positive when forming equal- and value-weighted portfolios suggests that firm size drives the result, as value-weighted portfolios place greater weight on large firms. To examine this directly, we perform dependent bivariate portfolio sorts first on firm size and then on labor risk. Specifically, stocks are first sorted into terciles based on market capitalization and, within each size tercile, into quintiles based on their labor risk scores. For each size group, we construct a long–short portfolio that buys the highest labor-risk quintile and shorts the lowest. If firm size drives the sign of the premium, the resulting spread portfolio (high minus low labor risk) should yield a negative premium among small firms and a positive premium among large firms.

We compute value-weighted monthly post-ranking portfolio returns with monthly rebalancing using the option-implied expected returns of [Chabi-Yo et al. \(2023\)](#). The (3×5) bivariate sort produces well-populated portfolios with an average of 146 firms per portfolio. Table 14 reports average returns and alphas (in percent per month) for small, medium, and large market-cap portfolios (Panels A–C) along with their CAPM, FF3, and FF5 t-statistics. Consistent with the size-driven pattern conjectured earlier, the spread portfolios in the small and medium size groups generate negative and statistically significant alphas across all labor risk measures. Monthly alphas range roughly between -0.24% and -0.05% . In contrast, the large-firm portfolios yield positive alphas, which are statistically significant for the benefit plan, employment discrimination, and wage and hour measures. These results indicate that labor risk commands a positive premium among large firms but a negative premium among smaller firms. Unreported results using alternative rebalancing frequencies (annual and quarterly) yield similar conclusions.

5.3 An economic mechanism via enforcements and information

Given the documented positive association between labor risk and future enforcement outcomes (Section 3.5), we examine whether this relation varies by firm size and whether such heterogeneity helps interpret the cross-sectional pricing patterns in option-implied expected returns across size segments.

First, we investigate whether labor misconduct risk predicts future enforcement actions across size segments. Large firms with elevated labor misconduct risk may face greater regulatory scrutiny and legal enforcement, leading to higher expected costs and potentially higher required returns (Raghunandan, 2021). If this relation holds uniformly across size segments, differences in the labor risk premium must be driven by other mechanisms such as investor attention.

We test the proposed mechanism using a logit regression that examines whether labor misconduct risk predicts future enforcement outcomes, including labor-related penalties and workplace inspections triggered by employee complaints. Building on the specification (4) in Section 3.5, we augment the regression by interacting labor risk with firm size:

$$P(Y_{i,t+h} = 1 | X_{i,t}) = \Lambda(\alpha + \beta_1 \text{LaborRisk}_{i,t} + \beta_2 \text{Size}_{i,t} + \beta_3 (\text{LaborRisk}_{i,t} \times \text{Size}_{i,t}) + \gamma' X_{i,t} + \delta_x), \quad (6)$$

where $\text{LaborRisk}_{i,t}$ denotes the firm's labor misconduct risk score at time t , $\text{Size}_{i,t}$ is the natural logarithm of market capitalization measured at the risk score assignment date, and $\text{LaborRisk}_{i,t} \times \text{Size}_{i,t}$ captures the interaction between the two variables. All other variables are defined as in regression (4). The regression in equation (6) allows us to examine whether the relation between labor risk and enforcement outcomes varies with firm size. This heterogeneity is informative for interpreting the differences in the opposite signs of the labor risk premium across size segments documented in Section 5.

Table 15 reports the results from the logit regression across the two enforcement

proxies and labor measures. The estimated effect of labor risks on the probability of future enforcement b_1 and the cross-derivative of the probability of enforcement with respect to labor risk and size are reported. Note that in non-linear models like logit models, the interaction effect cannot be evaluated by the sign and statistical significance of the coefficient b_3 on the interaction term. Instead, the interaction effect requires computing the cross derivative. In this case, the magnitude of the interaction effect depends on all the covariates in the model and their specific values at which the cross-derivative is evaluated. The standard error for the interaction effect is derived by the delta method (Ai and Norton 2003). We report and test the average interaction effect across observations. The null hypothesis is that the interaction effect equals zero against the alternative that it is positive.

We find that higher labor risk scores are associated with a greater likelihood of subsequent enforcement outcomes for both small and large firms, with the association being stronger for larger firms. These results indicate that labor risk captures real exposure to future enforcements across the entire size distribution. The relation between labor risk and option-implied expected returns nevertheless differs by firm size. Among large firms, higher labor risk is associated with higher expected returns, consistent with investors requiring compensation for exposure to labor-related risk. Among small firms, higher labor risk is associated with lower expected returns despite its positive relation with future enforcement outcomes. This pattern suggests heterogeneous incorporation of labor-risk information in expected returns across size segments. This may be associated with the information environment of each segment.

Next, to explore whether the pricing of labor risk varies with the information environment, we examine bivariate dependent portfolio sorts, sorting stocks first on analyst coverage and then on labor risks. To isolate variation in investor attention, we focus on equal-weighted portfolios. This choice is motivated by the fact that equal-weighted portfolios better capture differences in the incorporation of labor-risk information across firms with varying levels of analyst coverage, whereas

value-weighted portfolios mechanically place greater weight on large firms and are therefore less informative about firm-level information frictions.

Table 16 shows the results. The labor risk premium is negative among firms with low analyst coverage and positive among firms with high coverage, consistent with heterogeneous incorporation of labor-risk information across information environments. Overall, these findings provide supportive evidence that the pricing of labor risk varies with the extent of investor attention.

5.4 How do equity option markets perceive labor risks?

We examine option-implied moments of stocks sorted by firm size and labor risk to shed further light on how labor misconduct risk is reflected in option markets. Table 17 reports patterns in implied volatility and implied skewness across portfolios formed on size and labor risk. In the large-firm segment, implied volatility increases with labor risk, and the spread between the highest- and lowest-risk portfolios is positive and statistically significant. This pattern indicates that labor misconduct risk is associated with higher perceived uncertainty among large firms and is consistent with the positive labor risk premium observed in this segment. In contrast, within the small-firm segment, implied volatility displays no systematic relation to labor risk, suggesting that the link between labor risk and perceived uncertainty is weaker in option prices for these firms. This weaker relation aligns with the absence of a positive premium—and the negative premium—in expected returns for small firms, and is consistent with labor-risk information being only partially incorporated into prices in this segment.

Implied skewness becomes less negative as labor risk increases in both size segments. For large firms, this pattern suggests that labor misconduct risk is associated primarily with higher overall uncertainty rather than greater exposure to extreme downside risk, consistent with the positive labor risk premium reflecting compensation for increased uncertainty. While a similar implied skewness pattern is observed among small firms, its implications for expected returns are less clear. Because the

relation between labor risk and implied skewness is qualitatively similar across size segments, differences in skewness alone cannot account for the opposite signs of the labor risk premium. Overall, these findings indicate that labor risk is not primarily associated with left-tail risk and that variation in skewness does not explain the cross-sectional differences in pricing.

Together with our logit regressions showing that labor risk predicts future enforcement across all firms, these results indicate that labor risk is reflected in option-implied uncertainty for large firms, whereas its relation to perceived uncertainty is weaker for smaller firms. This suggests a heterogeneous incorporation of labor-risk information into prices across the firm size distribution, in line with our previous evidence.

6 Conclusions

We develop firm-level measures of corporate labor misconduct risk by combining textual analysis of 10-K filings with externally verified labor-related penalties, producing comprehensive indicators across multiple dimensions of labor misconduct for U.S.-listed firms. These measures predict subsequent enforcement actions, align with regulatory and industry patterns, and are associated with higher future stock return volatility. We document differences between compliance-based measures of labor misconduct risk and commonly used indicators such as commercial ESG “S” scores and workplace rankings. This evidence is consistent with recent findings documenting disconnects between ESG scores and underlying firm activities ([Cohen et al., 2026](#)), and highlights that alternative measurement approaches capture distinct aspects of labor-related information.

Labor risk is priced in option-implied expected returns, whereas no significant relation is observed in realized returns, echoing the differences between ex-ante and ex-post measures of expected returns and the noisiness of realized returns ([Pastor et al., 2022](#); [Sautner et al., 2023](#)). Importantly, pricing varies with firm size: the

premium is positive among large firms and negative among small firms. While labor risk predicts enforcement outcomes across all firms, this pattern indicates heterogeneous pricing of labor-related risk across the firm size distribution.

Our findings have implications for firms, investors, and regulators. By relying on audited disclosures and externally verified information, our measures provide a complementary perspective on labor-related risks grounded in regulatory reporting and enforcement data, enhance transparency in assessing such risks, and may inform mechanisms that incentivize compliance with labor regulations, potentially improving firms' financial performance (e.g., shareholder proposals aimed at mitigating labor risks; [Flammer, 2015](#)). At the same time, our results do not invalidate existing measures of corporate labor misconduct risk based on commercial scores, employee surveys, interviews, or social media data. Instead, they highlight that compliance-based measures of labor misconduct capture dimensions that are distinct from those reflected in employee sentiment-based and commercial ESG score rankings.

Finally, our evidence suggests that corporate labor misconduct risk is reflected in option-implied expected returns in a manner that varies with firm size. Although direct penalties are small relative to large firms' size, associated indirect costs—such as regulatory scrutiny, operational disruptions, and reputational damage—can be substantial ([Raghunandan, 2021](#)). A potential explanation for the observed size heterogeneity is that labor-related enforcement and its consequences may be more correlated and systematically priced among large, highly visible firms, whereas enforcement outcomes for small firms are more idiosyncratic and attract less investor attention; [Choi et al. \(2023\)](#) provide similar evidence for enforcement waves related to financial misconduct. Greater disclosure transparency and more visible enforcement outcomes among smaller firms may help improve investors' ability to assess labor-related risks. Understanding the mechanisms underlying this size-dependent pricing of labor risk—such as differences in information processing, investor attention, or the correlation structure of regulatory shocks—remains an important

avenue for future research.

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Table 1: Total penalty amount and number of penalties per offense group

Years/ Offense group	Benefit Plan	Employment Discrimination	Wage and Hour	Workplace Safety
2006	\$123.4	\$93.4	\$251.5	\$5.6
2007	\$136.6	\$141.8	\$296.0	\$30.6
2008	\$185.9	\$86.4	\$920.1	\$21.0
2009	\$258.6	\$84.8	\$763.1	\$16.6
2010	\$354.0	\$67.1	\$353.5	\$26.4
2011	\$150.6	\$133.2	\$323.7	\$244.4
2012	\$313.4	\$76.8	\$235.5	\$19.4
2013	\$163.1	\$206.3	\$363.7	\$16.2
2014	\$260.0	\$66.1	\$297.5	\$15.0
2015	\$715.8	\$38.9	\$677.6	\$15.0
2016	\$165.5	\$37.0	\$1,116.9	\$16.3
2017	\$102.2	\$145.7	\$519.7	\$14.6
2018	\$350.2	\$157.2	\$242.7	\$16.7
2019	\$118.1	\$77.7	\$289.8	\$21.0
2020	\$167.2	\$83.5	\$410.0	\$71.8
2021	\$56.7	\$129.2	\$352.7	\$18.2
2022	\$202.5	\$148.3	\$485.6	\$32.3
2023	\$88.4	\$333.4	\$480.9	\$45.4
2024	\$55.5	\$62.9	\$749.9	\$35.6
Total penalty amount	\$3,967.8	\$2,169.8	\$9,130.6	\$682.1
Total (# of penalties)	277	735	2,750	20,401
Subtotal (# of private lawsuits)	175	114	844	1
Subtotal (# of agency enforcement actions)	102	621	1,906	20,400

Notes: This table reports, by employment-related offense, the annual and total penalty amounts (USD millions) and the total number of penalties, agency enforcement actions and private lawsuits, over the sample period (2006 - 2024). The total number of penalties include both agency enforcement actions, typically resolved through administrative or government enforcement settlements, and private lawsuits which are court-filed actions brought by private parties in the form of class-action lawsuits and multi-district litigation proceedings. In our sample, agency enforcement actions contain no court-docket information and therefore are considered as non-court resolutions. *Benefit Plan*, *Employment Discrimination*, *Wage and Hour* and *Workplace Safety* are the employment-related offense types as reported by Good Jobs First database.

Table 2: Dictionary of labor risk related words

Benefit Plan	pension plan, ERISA, employee benefit plan, benefit plan, employer-sponsored health insurance, employee-sponsored retirement, employer-sponsored insurance
Wage & Hour	labor law, the wage and hour division of the U.S. department of labor, fair labor standards act, department of labor, FLSA, wage law, minimum wage changes, change in minimum wage, overtime pay, labor dispute, meyers-milias-brown act, davis-bacon act, unfair labor practices
Employment Discrimination	americans with disabilities act, front pay, employee discrimination, whistleblower, equal employment opportunity, national labor relations act, gender-based discrimination, sexual harassment, sexual advances, sexual favors, offensive work environment, hostile work environment, pregnancy discrimination, workplace retaliation, employer retaliation, disability discrimination, discriminatory barriers, exclusion of qualified women, violation of employee selection procedures, bona fide occupational qualification, bona fide seniority, employees' right, intentional discrimination, employment discrimination
Workplace Safety	workplace safety and health act, WSHA, employee health and safety, employee accident, employee injury, workplace accident, workplace injury, employee safety concerns, employee health concerns, occupational safety and health administration, osha
Workforce Attrition	work stoppages, employees strike, staff strike, workforce strike, exclusive bargaining representative, employee relations policy, employees unionization, collective bargaining agreement, unionization campaign, collective bargaining negotiation, work-to-rule campaign, labor union agreement, union contract, labor management agreement, employee strikes, labor-related disruption, labor-related, management change, leadership change, executive succession, management succession, management transition, labor shortages, employees relationship, competition for talent, incentive compensation policy, talent management, enhance workforce engagement, our culture, corporate culture, compensation plan, compensation package, work environment, employee life insurance, key person life insurance, workplace environment, equity compensation, equity-based compensation, employee stock program, compensation package, compensation arrangements, employment agreement, compensation tool, stock-based compensation, stock-option policy, diverse corporate culture, business culture

Notes: This table reports the words used to identify paragraphs discussing labor risks. These words are obtained from (i) the Office of Federal Contract Compliance Program manual, (ii) reading the randomly selected 10 risk disclosures from each year, and (iii) applying the Word2Vec model to 10-K risk disclosures, using the selected words in steps (i) and (ii) as seed words. Each row represents the labor risk topic discussed. *Benefit plan*, *Employment discrimination*, *Wage & hour* and *Workplace safety* reflect the employment-related offense types as reported by Good Jobs First database, while *Workforce Attrition* reflects the loss of key employees which is the major impact of labor risks to the firm's operations.

Table 3: Word lists to construct word sequences

Talent Acquisition & Retention	attract, recruit, retain, employ, hire, motivate, train, replace, depend, compete, availability, leave, terminate, acquire, maintain, integrate, add, rely, join
Employees Attrition	leave, depart, retire, resign, turnover, remain, attrition, succession, replace, depend, loss of
General & Specific Roles of Employees	personnel, employee, staff, officer, workforce, individual, professional, associate, people, driver, physician, worker, engineer, developer, specialist, team member, consultant, technician, nurse, scientist, teacher, expert, leader, operator, contractor, subcontractor, designer, crew, clinician, surgeon, geologist
Senior Management Positions	executive, management, officer, chairman, president, director, manager, senior employee / personnel / team member / professional, founder, ceo, co-founder, chief,
Claims & Disputes	violation, claim, discrimination, dispute, allegation, regulation, rule, law, legislation, lawsuit, compliance, policy, penalty, legal actions, liability, harassment, complaint, litigation, malpractice, investigation
Employee-Related Violations	sexual, wage, employees age / race / gender / color / religion / origin / disability / compensation, employee / personnel / staff / workers compensation, employees overtime, labor-related, labor, employment, whistle blower, discrimination, harassment, equal-right, equal opportunity, human rights, employees pay, medical and life insurance, maternity / paternal leave, religious accommodation, sexual orientation, salary, work environment, employee / personnel / staff benefit, employee / personnel / staff allowance, employment-related, work environment, premium pay
Employment Facilities	establishment, facility, workplace, premises, workplace, factory, plant, building
Health & Safety	injury, accident, loss of life, death, fatality, explosion

Notes: This table reports the word lists used to construct word sequences. *Talent Acquisition, Attrition, General Employees & Specific Roles, Senior Management, Claims & Disputes, Employee-Related Violations, Employment Facilities and Health & Safety* are the different groups containing semantically similar words. These words are obtained from (i) reading the randomly selected 10 risk disclosures from each year and (ii) the output words of a Word2Vec model, trained with all available risk disclosures, using the selected words in step (i) as seed words.

Table 4: Descriptives for labor risk measures

Panel A: Summary statistics								
Labor risk measure	Mean	SD	Min.	P10	Median	P90	Max	Obs.
Aggregate	0.28	0.10	0.00	0.16	0.27	0.42	1.00	60,722
Benefit plan	0.30	0.13	0.00	0.13	0.30	0.46	0.98	60,722
Employment discrim.	0.32	0.12	0.00	0.16	0.33	0.48	1.00	60,722
Wage and hour	0.30	0.12	0.00	0.14	0.30	0.47	1.00	60,722
Workplace safety	0.32	0.13	0.00	0.14	0.33	0.49	1.00	60,722
Panel B: Correlation with variables of interest								
	(i)	(ii)	(iii)	(iv)	(v)			
(i) Aggregate	1.00							
(ii) Benefit plan	0.57 ***	1.00						
(iii) Employment discrim.	0.67 ***	0.58 ***	1.00					
(iv) Wage and hour	0.70 ***	0.54 ***	0.60 ***	1.00				
(v) Workplace safety	0.59 ***	0.49 ***	0.58 ***	0.55 ***	1.00			
(vi) Skilled labor risk	0.36 ***	0.27 ***	0.25 ***	0.27 ***	0.19 ***			
(vii) Integrity	-0.08 ***	-0.04 ***	-0.05 ***	-0.05 ***	-0.06 ***			
(viii) Labor shortage risk	0.16 ***	0.07 ***	0.09 ***	0.15 ***	0.12 ***			
(ix) Social score	0.15 ***	0.05 ***	0.09 ***	0.09 ***	0.09 ***			
(x) Workforce score	0.06 ***	-0.01 *	0.03 ***	0.02 **	0.03 ***			
(xi) Voluntary Turnover	0.24 ***	0.12 ***	0.17 ***	0.17 ***	0.22 ***			

Notes: This table reports the summary statistics and the correlation coefficients of the constructed labor risk measures, with their statistical significance. Panel A reports the mean (Mean), standard deviation (SD), minimum (Min.), 10th percentile (P10), median (Median), 90th percentile (P90), maximum (Max) and observations (Obs.) for *Aggregate*, *Benefit plan*, *Employment discrimination*, *Wage & hour* and *Workplace safety*, respectively. Summary statistics are reported at the firm-year for the pooled sample. Panel B reports correlation coefficients of the constructed labor risk measures with firm-level characteristics and their statistical significance. Columns (i), (ii), (iii), (iv) and (v) present the correlation coefficients with *Aggregate labor risk*, *Benefit plan*, *Employment discrimination*, *Wage and hour* and *Workplace safety*, respectively. The first five rows present the five labor risk measures. *Skilled labor risk*, *Integrity*, and *Labor shortage risk* are the [Qiu and Wang \(2021\)](#), [Li et al. \(2021\)](#) and [Harford et al. \(2026\)](#) textual measures, respectively. *Social* and *Workforce* scores are Refinitiv/LSEG ESG ratings/subscores obtained from WRDS. *Voluntary Turnover* is the Refinitiv/LSEG annual voluntary employee turnover rate, computed as voluntary departures divided by the average number of full time employees during the fiscal year, obtained by WRDS. One, two, and three asterisks indicate statistical significance at the 10%, 5% and 1% levels, respectively. The sample period spans 2007-2024.

Table 5: Labor risk measures and portfolio characteristics

	P1 (L)	P2	P3	P4	P5 (H)
Panel A: Aggregate labor risk					
Aggregate	0.15	0.23	0.28	0.33	0.41
Market Size	6.93	7.06	7.20	7.32	7.50
Institutional ownership	0.63	0.68	0.70	0.73	0.76
ROA	0.01	-0.01	-0.02	-0.01	0.02
Leverage	0.21	0.21	0.22	0.23	0.26
Panel B: Benefit plan					
Benefit plan	0.15	0.24	0.30	0.35	0.43
Market Size	7.15	7.17	7.16	7.21	7.33
Institutional ownership	0.66	0.70	0.70	0.72	0.73
ROA	0.02	0.00	-0.01	-0.01	0.00
Leverage	0.23	0.23	0.22	0.23	0.23
Panel C: Employment discrimination					
Employment discrimination	0.17	0.27	0.32	0.38	0.46
Market Size	7.00	7.10	7.19	7.25	7.49
Institutional ownership	0.65	0.68	0.71	0.72	0.75
ROA	0.01	0.00	-0.01	-0.01	0.01
Leverage	0.22	0.23	0.22	0.22	0.24
Panel D: Wage and hour					
Wage and hour score	0.16	0.25	0.30	0.35	0.44
Market Size	7.04	7.15	7.20	7.29	7.34
Institutional ownership	0.65	0.69	0.71	0.72	0.74
ROA	0.01	-0.01	-0.01	-0.01	0.01
Leverage	0.22	0.22	0.22	0.23	0.25
Panel E: Workplace safety					
Workplace safety score	0.17	0.27	0.32	0.37	0.47
Market Size	7.00	7.08	7.18	7.28	7.47
Institutional ownership	0.65	0.68	0.70	0.72	0.75
ROA	0.01	-0.01	-0.01	-0.00	0.02
Leverage	0.21	0.21	0.22	0.23	0.27
Average # of firms	497	497	497	497	497

Notes: This table reports for each portfolio, the average labor risk score, the value of firm characteristics, and the average number of firms over the period 2007-2024. Firm characteristics include *market size*, *institutional ownership*, *return on assets (ROA)* and *leverage*. Both firm characteristics and labor risk measures correspond to the same fiscal year-end. Quintile portfolios are constructed by sorting firms on each one of their labor risk measures. Portfolios are rebalanced annually. We exclude firms with month-end price less than \$5 to avoid microstructure noise. Panels A, B, C, D and E present the portfolios sorted on *Aggregate labor risk*, *Benefit plan*, *Employment discrimination*, *Wage and hour* and *Workplace safety*, respectively. Columns P1(L) and P5(H) are the portfolios with the lowest and highest labor risk scores.

Table 6: Fortune 100 Best Companies to Work For vs. 100 firms with lowest scores in our sample

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Panel A: Aggregate Labor risk																		
Fortune BPTW mean	0.25***	0.26***	0.26***	0.25***	0.25***	0.24***	0.24***	0.23***	0.26***	0.31***	0.31***	0.32***	0.35***	0.35***	0.37***	0.37***	0.35***	0.40***
Sample mean (low 100 firms)	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.07	0.09	0.10	0.10	0.11	0.11	0.10	0.09	0.10	0.12
Sample range [P05, P95]	[0.10, 0.35]	[0.09, 0.35]	[0.09, 0.36]	[0.10, 0.37]	[0.11, 0.37]	[0.11, 0.37]	[0.11, 0.37]	[0.11, 0.34]	[0.12, 0.39]	[0.14, 0.43]	[0.15, 0.46]	[0.15, 0.49]	[0.15, 0.50]	[0.16, 0.50]	[0.15, 0.50]	[0.15, 0.50]	[0.16, 0.50]	[0.19, 0.54]
Panel B: Benefit Plan																		
Fortune BPTW mean	0.23***	0.16***	0.23***	0.31***	0.30***	0.22***	0.28***	0.19***	0.32***	0.24***	0.31***	0.32***	0.30***	0.32***	0.34***	0.30***	0.41***	0.43***
Sample mean (low 100 firms)	0.04	0.01	0.04	0.06	0.05	0.03	0.03	0.03	0.09	0.07	0.10	0.08	0.13	0.07	0.09	0.12	0.12	0.13
Sample range [P05, P95]	[0.07, 0.35]	[0.02, 0.29]	[0.08, 0.40]	[0.12, 0.43]	[0.09, 0.42]	[0.07, 0.37]	[0.07, 0.37]	[0.05, 0.45]	[0.16, 0.48]	[0.12, 0.47]	[0.16, 0.48]	[0.14, 0.46]	[0.19, 0.49]	[0.13, 0.43]	[0.16, 0.48]	[0.21, 0.50]	[0.23, 0.57]	[0.24, 0.56]
Panel C: Employment Discrimination																		
Fortune BPTW mean	0.26***	0.30***	0.23***	0.27***	0.34***	0.24***	0.31***	0.31***	0.30***	0.33***	0.34***	0.37***	0.37***	0.43***	0.38***	0.42***	0.41***	0.46***
Sample mean (low 100 firms)	0.02	0.05	0.04	0.06	0.08	0.05	0.08	0.06	0.10	0.09	0.09	0.12	0.10	0.13	0.10	0.13	0.14	0.15
Sample range [P05, P95]	[0.06, 0.35]	[0.11, 0.43]	[0.07, 0.39]	[0.10, 0.39]	[0.13, 0.49]	[0.08, 0.49]	[0.13, 0.47]	[0.11, 0.43]	[0.16, 0.48]	[0.16, 0.48]	[0.16, 0.48]	[0.19, 0.53]	[0.16, 0.48]	[0.19, 0.54]	[0.15, 0.50]	[0.20, 0.55]	[0.24, 0.52]	[0.25, 0.59]
Panel D: Wage and Hour																		
Fortune BPTW mean	0.28***	0.23***	0.26***	0.25***	0.23***	0.25***	0.12***	0.31***	0.27***	0.32***	0.31***	0.33***	0.33***	0.35***	0.42***	0.38***	0.44***	0.43***
Sample mean (low 100 firms)	0.07	0.02	0.05	0.06	0.06	0.03	0.01	0.06	0.07	0.07	0.10	0.12	0.10	0.11	0.14	0.11	0.15	0.14
Sample range [P05, P95]	[0.11, 0.45]	[0.06, 0.39]	[0.09, 0.36]	[0.10, 0.37]	[0.11, 0.39]	[0.07, 0.43]	[0.04, 0.26]	[0.11, 0.43]	[0.11, 0.43]	[0.14, 0.50]	[0.15, 0.46]	[0.19, 0.51]	[0.17, 0.43]	[0.16, 0.51]	[0.21, 0.59]	[0.20, 0.49]	[0.23, 0.60]	[0.22, 0.56]
Panel E: Workplace Safety																		
Fortune BPTW mean	0.18***	0.31***	0.31***	0.31***	0.31***	0.23***	0.13***	0.18***	0.34***	0.35***	0.34***	0.35***	0.30***	0.42***	0.41***	0.44***	0.38***	0.36***
Sample mean (low 100 firms)	0.01	0.08	0.07	0.07	0.09	0.08	0.02	0.03	0.09	0.11	0.09	0.11	0.12	0.14	0.12	0.15	0.07	0.10
Sample range [P05, P95]	[0.04, 0.43]	[0.14, 0.49]	[0.13, 0.46]	[0.12, 0.50]	[0.16, 0.51]	[0.13, 0.52]	[0.04, 0.27]	[0.05, 0.39]	[0.15, 0.51]	[0.16, 0.47]	[0.16, 0.51]	[0.17, 0.50]	[0.20, 0.51]	[0.23, 0.53]	[0.18, 0.52]	[0.22, 0.50]	[0.13, 0.50]	[0.17, 0.57]
Firms in Fortune BPTW	23	23	26	26	31	32	29	30	30	28	31	34	33	31	35	45	50	48

Notes: This table reports the annual average labor risk scores for the publicly listed firms of the Fortune 100 Best Companies to Work For (BCTW) and our sample's 100 firms with the lowest labor risk score in each year, for each year in the period 2007 - 2024. It also reports the 5th-95th percentile range of the full sample's labor risk scores, for the respective year. Scores are reported for *Aggregate labor risk* (Panel A), *Benefit plan* (Panel B), *Employment discrimination* (Panel C), *Wage and hour* (Panel D) and *Workplace safety* (Panel E). Using a two-sided Welch (1947) t-test, we test the null hypothesis that each year, the annual average labor risk of firms in BCTW equals that of our sample's 100 firms with the lowest labor risk. To preserve independence between the two samples, we exclude from the year's lowest labor risk cohort, the firms included in BCTW that year. One, two, and three asterisks indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 7: Percentile ranking summary statistics

Labor risk measures	Mean percentile rank	Median percentile rank	Share in bottom decile
Panel A: Fortune BCTW			
Aggregate	0.56	0.55	0.06
Benefit plan	0.52	0.54	0.09
Employment discr.	0.56	0.57	0.07
Wage and hour	0.53	0.53	0.08
Workplace safety	0.53	0.54	0.09
Panel B: Glassdoor BCTW			
Aggregate	0.57	0.61	0.07
Benefit plan	0.53	0.54	0.11
Employment discr.	0.57	0.63	0.09
Wage and hour	0.55	0.59	0.08
Workplace safety	0.55	0.58	0.09
Panel C: ESG workforce			
Aggregate	0.54	0.57	0.09
Benefit plan	0.50	0.50	0.13
Employment discr.	0.52	0.54	0.11
Wage and hour	0.51	0.53	0.10
Workplace safety	0.52	0.54	0.09

Notes: This table reports the time-series average of the annual mean percentile rank, median percentile rank, and annual share of firms in the bottom decile, for publicly listed firms in the Fortune's and Glassdoor's Best Companies to Work For (BCTW) (Panels A and B, respectively) and the 100 firms with the highest ESG workforce in each year (Panel C). The statistics are reported for each labor risk measure (Aggregate, Benefit plan, Employment discrimination, Wage and hour and Workplace safety) during the period 2007 - 2024, except for Glassdoor's BCTW (Panel B) which covers the period 2009-2024. For each workplace quality classification, labor risk measure, and year t , we rank all firms $i = 1, \dots, N_t$ in the sample in ascending order, so that lower (higher) ranks correspond to lower (higher) labor risk and convert ranks into percentile ranks ($Percentile_{i,t} = (Rank_{i,t} - 1)/(N_t - 1)$). We define three dummy variables to identify which firms belong to each one of the three workplace quality classifications: the first equals 1 when a firm is in Fortune's BCTW and zero otherwise, the second equals 1 when a firm is in Glassdoor's BCTW and zero otherwise, and the third equals 1 when a firm belongs in each year's 100 firms with highest ESG workforce score and zero otherwise. We compute, for each year t and workplace quality classification k , the following three statistics: (a) the annual mean percentile rank for the firms in that year and classification $N_{k,t}$ defined as $mean_{k,t} = \frac{1}{N_{k,t}} \sum_{i \in k,t} Percentile_{i,t}$, (b) the median percentile rank defined as $median_{k,t} = median(Percentile_{i| i \in k,t})$, and (c) the share of firms that belong in the bottom decile $D_{i,t} = 1(Percentile \leq 0.10)$ of all firms in that year defined as $\frac{\sum_{i \in k,t} D_{i,t}}{N_t}$. We then compute and report their time-series average across all available years.

Table 8: Labor risk scores and future misconducts

	(i)	(ii)	(iii)	(iv)	(v)
Panel A: Misconduct Settlements at $t + 1$					
(i) Aggregate score	0.127***	-	-	-	-
(ii) Benefit plan score	-	0.042**	-	-	-
(iii) Employment discrim. score	-	-	0.061***	-	-
(iv) Wage and hour score	-	-	-	0.083***	-
(v) Workplace safety score	-	-	-	-	0.113***
Number of observations:	45,672	45,672	45,672	45,672	45,672
<i>Pseudo R</i> ² :	0.398	0.398	0.397	0.397	0.398
Panel B: Misconduct Settlements at $t + 3$					
(i) Aggregate score	0.091***	-	-	-	-
(ii) Benefit plan score	-	0.015	-	-	-
(iii) Employment discrim. score	-	-	0.027	-	-
(iv) Wage and hour score	-	-	-	0.065***	-
(v) Workplace safety score	-	-	-	-	0.079***
Number of observations:	45,672	45,672	45,672	45,672	45,672
<i>Pseudo R</i> ² :	0.438	0.437	0.437	0.438	0.438
Panel C: OSHA Inspections from Complaints at $t + 1$					
(i) Aggregate score	0.136***	-	-	-	-
(ii) Benefit plan score	-	0.046*	-	-	-
(iii) Employment discrim. score	-	-	0.071***	-	-
(iv) Wage and hour score	-	-	-	0.106***	-
(v) Workplace safety score	-	-	-	-	0.111***
Number of observations:	45,672	45,672	45,672	45,672	45,672
<i>Pseudo R</i> ² :	0.458	0.457	0.457	0.458	0.458
Clustered standard errors	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes

Notes: Entries report the estimated coefficients from logit regressions of employee-related misconduct penalties at $t + 1$ (Panel A), $t + 3$ (Panel B) and Occupational Safety and Health Administration (OSHA) inspections at $t + 1$ (Panel C) on the labor risk measures (*Aggregate*, *Benefit plan*, *Employment discrimination*, *Wage & hour*, and *Workplace safety*), over the period January 2007 to December 2024. Future employee-related penalties are measured both at time $t + 1$ and $t + 3$, while future inspections only at time $t + 1$. They are measured by a dummy variable which equals one when there is a corporate labor misconduct-related penalty or inspection one year $t + 1$ and three years $t + 3$, respectively, from the labor risk score assignment day. Otherwise the dummy variable equals zero. We use five alternative model specifications, one for each labor risk measure. We control for market size, return on assets, leverage and institutional ownership. We also control for contemporaneous employee-related misconduct settlements and inspections respectively, using again a dummy variable which equals one when the firm has experienced an employee-related settlement or inspection one year prior to the labor risk score assignment day, and zero otherwise. All annual firm characteristics from Compustat are measured for the fiscal year ending immediately prior to the labor risk score's assignment (i.e. 10-K filing date), while the value of institutional ownership is the one publicly available at the most recent quarter (i.e. 60 days after quarter-end) prior to the risk-score assignment, ensuring no look-ahead bias. All explanatory variables are cross-sectionally standardized at each point in time. In all model specifications, we control for both time and industry fixed effects. Standard errors are clustered at the firm level. One, two, and three asterisks indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 9: Excerpts from 10-K labor risk disclosures

Firm	Year	Sic	Labor risk score	Example snippets
Panel A: Excerpts for firms with high labor risk score				
Wal Mart Stores Inc	2010	5331	Wage & hour: 0.99	We are currently a defendant in numerous cases containing class-action allegations in which the plaintiffs have brought claims under federal and state wage and hour laws. In addition, we are a defendant in <i>Dukes v. Wal-Mart Stores, Inc.</i> , a class-action lawsuit brought on behalf of all past and present female employees in all of our retail stores and wholesale clubs in the United States. The class as certified in <i>Dukes</i> currently includes present and former female associates. The plaintiffs in this case allege that we have engaged in a pattern and practice of discriminating against women in promotions, pay, training and job assignments and seek, among other things, injunctive relief, front pay, back pay, punitive damages and attorneys' fees.
International Paper Co	2014	2631	Benefit plan: 0.92	Our pension plans are currently underfunded, and over time we may be required to make cash payments to the plans, reducing the cash available for our business. We record a liability associated with our pension plans equal to the excess of the benefit obligation over the fair value of plan assets
Alpha Natural Resources, Inc.	2012	1220	Workplace safety: 0.66	In particular, we are subject to two purported class actions that allege violations of the federal securities laws, derivative actions against current and former Massey directors and officers and actions brought by certain of the families of the twenty-nine miners that died in the UBB explosion and certain employees and contractors alleging injuries as a result of the UBB explosion.
Panel B: Excerpts for firms with low labor risk score				
UGI Corp	2014	4932	Benefit plan: 0.01	Economic recession, volatility in the stock market and the low interest rate environment have had a significant impact on our pension liability and funded status. Declines in the stock or bond market and valuation of stocks or bonds, combined with continued low interest rates, could further impact our pension liability and funded status and increase the amount of required contributions to our pension plans.
Connecticut Water Service Inc	2008	4941	Wage & hour: 0.02	Our success depends significantly on the continued individual and collective contributions of our management team. The loss of the services of any member of our senior management team or the inability to hire and retain experienced management personnel could harm our operating results.
Sinoenergy Corp	2009	3537	Aggregate score: 0.06	Because we are dependent on our management, the loss of our key executive officers and the failure to hire additional qualified key personnel could harm our business.

Notes: This table reports the firm's name, disclosure's year, industry SIC code, labor risk score and text from retained 10-K labor risk disclosure. Panel A (B) report text from both high (low) labor risk disclosures.

Table 10: Labor risk scores across industries

Industry (4-digit SIC)	Mean	SD	Obs.	Industry (4-digit SIC)	Mean	SD	Obs.
Top-5 Industries				Bottom-5 Industries			
Panel A: Aggregate							
Variety Stores	0.476	0.179	170	Television Stns	0.178	0.063	153
Misc. Shopping Goods Stores	0.424	0.103	149	Non-Operating Establishments	0.189	0.087	284
Family Clothing Stores	0.416	0.113	214	Savings Institution, Federally Chartered	0.198	0.078	544
Shoe Stores	0.416	0.100	103	Radio Broadcasting Stns	0.200	0.086	146
Apparel & Accessory Stores	0.416	0.120	117	Savings Institution, Not Federally Chartered	0.205	0.079	312
Panel B: Benefit plan							
Special Trade Contractors (Construction)	0.362	0.127	94	Motion Picture Theaters	0.210	0.110	77
Water, Sewer, Pip., Comm. & Power Line Constr.	0.356	0.110	158	Non-Operating Establishments	0.217	0.109	284
Computer Programming & Data Processing	0.355	0.126	2,967	Accident & Health Ins.	0.219	0.132	80
Home Health Care Services	0.347	0.127	112	Television Stns	0.225	0.130	153
Employment Agencies	0.346	0.108	135	Crude Petroleum & Gas	0.229	0.112	1409
Panel C: Employment discrimination							
Special Trade Contractors (Construction)	0.391	0.118	94	Motion Picture Theaters	0.229	0.107	77
Water, Sewer, Pip., Comm. & Power Line Constr.	0.383	0.101	158	Non-Operating Establishments	0.230	0.106	284
Apparel & Other Finished Fabric Products	0.379	0.127	340	Television Stns	0.231	0.097	153
Computer Programming & Data Processing	0.379	0.119	2,967	Savings Institution, Federally Chartered	0.244	0.113	544
Shoe Stores	0.374	0.122	103	Accident & Health Ins.	0.245	0.120	80
Panel D: Wage and hour							
Special Trade Contractors (Construction)	0.400	0.161	94	Television Stns	0.206	0.102	153
Variety Stores	0.395	0.162	170	Accident & Health Ins.	0.216	0.102	80
Shoe Stores	0.385	0.125	103	Radio Broadcasting Stns	0.224	0.105	146
Misc. Shopping Goods Stores	0.385	0.131	149	Savings Institution, Federally Chartered	0.227	0.112	544
Apparel & Accessory Stores	0.383	0.146	117	Non-Operating Establishments	0.228	0.117	284
Panel E: Workplace safety							
Special Trade Contractors (Construction)	0.426	0.121	94	Savings Institutions, Federally Chartered	0.237	0.114	544
Bituminous Coal & Lignite Mining	0.426	0.152	128	Radio Broadcasting Stns	0.239	0.113	146
Shoe Stores	0.411	0.130	103	Motion Picture Theaters	0.246	0.150	77
Variety Stores	0.404	0.180	170	Savings Institutions, Not Federally Chartered	0.254	0.117	312
Mining & Quarrying of Non-Metallic Minerals	0.392	0.120	135	Non-Operating Establishments	0.255	0.108	284

Notes: This table reports the mean (Mean), standard deviation (SD) and observations (Obs.) of the firms' constructed labor risk measures for the top-5 and bottom-5 industries. We rank industries by the average values of the labor risk score measures. Statistics are reported at the firm-year level across different 4-digit SIC industries. Industries with less than 75 firm-year observations are excluded. Panels A, B, C, D and E present the results for *Aggregate*, *Benefit plan*, *Employment discrimination*, *Wage & hour* and *Workplace safety*, respectively. The sample period spans 2007-2024.

Table 11: Variance decomposition of labor risk measures

Measures	Aggregate (i)	Benefit plan (ii)	Employment discr. (iii)	Wage and hour (iv)	Workplace safety (v)
Incremental R^2					
Time Fixed Effects	21.3%	40.6%	32.9%	39.5%	31.8%
Industry Fixed Effects	35.0%	43.2%	37.0%	44.4%	37.7%
Industry x Time Fixed Effects	37.2%	47.5%	41.6%	47.9%	41.1%
Firm Fixed Effects	79.1%	68.6%	67.5%	70.7%	67.5%
Residual Variance	20.9%	31.4%	32.5%	29.3%	32.5%
Sum	100.0%	100.0%	100.0%	100.0%	100.0%

Notes: This table provides a variance decomposition of the constructed labor risk measures over the period January 2007 to December 2024. Columns (i), (ii), (iii), (iv) and (v) report the percentage of variance (Incremental R^2) explained by panel regressions of *Aggregate*, *Benefit plan*, *Employment discrimination*, *Wage and hour* and *Workplace safety*, respectively, on a set of fixed effects. Additional fixed effects are added in each row. The first row includes only time fixed effects while the subsequent rows add industry fixed effects, the interaction between industry and time fixed effects, and firm fixed effects. For industry fixed effects, we employ the Fama-French 49 industry classification. We also report the unexplained portion of variance (residual variance) when using the model with all sets of fixed effects. All regressions are estimated at the firm-year level.

Table 12: Association of labor risk measures with stock volatility

	(i)	(ii)	(iii)	(iv)	(v)
Panel A: Realized Volatility					
(i) Aggregate score	0.010***	-	-	-	-
(ii) Benefit plan score	-	0.009***	-	-	-
(iii) Employment discrim. score	-	-	0.014***	-	-
(iv) Wage and hour score	-	-	-	0.006***	-
(v) Workplace safety score	-	-	-	-	0.012***
Number of observations:	52,769	52,769	52,769	52,769	52,769
Adj. R ² :	0.146	0.146	0.147	0.146	0.147
Panel B: Implied Volatility					
(i) Aggregate score	0.006	-	-	-	-
(ii) Benefit plan score	-	0.017***	-	-	-
(iii) Employment discrim. score	-	-	0.017***	-	-
(iv) Wage and hour score	-	-	-	0.006*	-
(v) Workplace safety score	-	-	-	-	0.007*
Number of observations:	40,853	40,853	40,853	40,853	40,853
Adj. R ² :	0.210	0.210	0.210	0.210	0.210
Clustered standard errors	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the estimated β coefficients in equation (5) of panel regressions of annualized realized and implied volatility on each constructed labor risk measure, over the period 2007 - 2024. We estimate realized volatility for each firm, using the standard deviation of each firm's daily returns, 30 days following the score's assignment, and option-implied volatility using each firm's 30-day-to-maturity at-the-money option implied volatility, estimated at or immediately after the day of the score's assignment and obtained from the Optionmetrics IvyDB US volatility surface file. Panels A and B report the results of the panel regressions using 30-day realized and implied volatility as dependent variable, respectively, and Columns (i), (ii), (iii), (iv) and (v) report the regression results using *Aggregate labor risk*, *Benefit plan*, *Employment discrimination*, *Wage and hour*, and *Workplace safety*, respectively, as independent variable. In all model specifications, we control for the following firm-level variables: *the natural logarithm of the firm's total assets*, *ROA* and *leverage*. All annual firm characteristics are measured for the fiscal year ending immediately prior to the labor risk score's announcement (i.e. 10-K filing date), ensuring no look-ahead bias. We also use industry and year fixed effects. For industry fixed effects, we employ the Fama-French 49 industry classification. Standard errors are clustered at the firm level. All firm-level variables, implied and realized volatility are winsorized at the 1st and 99th percentiles. One, two, and three asterisks indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 13: Univariate portfolio sorts on labor risks

Full sample (2007 - 2024)	Aggregate	Benefit plan	Employment discr.	Wage and hour	Workplace safety
	[P5]-[P1]	[P5]-[P1]	[P5]-[P1]	[P5]-[P1]	[P5]-[P1]
Panel A: Realized Returns					
Equal weighting					
Average returns	0.027	-0.050	0.141	-0.066	0.097
	[0.177]	[-0.330]	[1.005]	[-0.403]	[0.771]
Market model alpha	-0.159	-0.209	-0.002	-0.238	-0.050
	[-1.247]	[-1.456]	[-0.018]	[-1.576]	[-0.479]
FF3 alpha	-0.166	-0.215*	-0.021	-0.268**	-0.072
	[-1.492]	[-1.779]	[-0.197]	[-2.356]	[-0.739]
FF5 alpha	-0.237**	-0.118	-0.023	-0.258***	-0.170*
	[-2.092]	[-1.088]	[-0.211]	[-2.596]	[-1.778]
Value weighting					
Average returns	0.022	0.016	0.176	-0.025	-0.073
	[0.145]	[0.098]	[1.049]	[-0.138]	[-0.465]
Market model alpha	-0.009	-0.113	0.108	-0.107	-0.117
	[-0.062]	[-0.747]	[0.682]	[-0.584]	[-0.691]
FF3 alpha	-0.012	-0.093	0.069	-0.144	-0.136
	[-0.083]	[-0.614]	[0.502]	[-0.879]	[-0.855]
FF5 alpha	0.035	0.097	0.187	-0.065	-0.078
	[0.236]	[0.707]	[1.351]	[-0.394]	[-0.546]
Panel B: Option-Implied Returns					
Equal weighting					
Average returns	-0.182***	0.016	-0.074***	-0.103***	-0.135***
	[-4.754]	[0.917]	[-5.447]	[-3.111]	[-4.862]
Market model alpha	-0.177***	0.014	-0.075***	-0.097***	-0.131***
	[-4.896]	[0.882]	[-5.652]	[-3.161]	[-4.880]
FF3 alpha	-0.175***	0.016	-0.073***	-0.095***	-0.130***
	[-4.986]	[0.959]	[-5.710]	[-3.143]	[-4.997]
FF5 alpha	-0.171***	0.017	-0.070***	-0.090***	-0.127***
	[-5.030]	[0.995]	[-5.536]	[-3.200]	[-5.064]
Value weighting					
Average returns	0.005	0.077***	0.043***	0.040**	0.032***
	[0.354]	[4.455]	[3.594]	[2.325]	[2.817]
Market model alpha	0.006	0.075***	0.044***	0.044***	0.032***
	[0.454]	[4.306]	[3.720]	[2.594]	[2.643]
FF3 alpha	0.007	0.075***	0.045***	0.045***	0.032***
	[0.492]	[4.378]	[3.859]	[2.669]	[2.719]
FF5 alpha	0.004	0.069***	0.044***	0.042***	0.029**
	[0.318]	[4.131]	[4.077]	[2.616]	[2.374]

Notes: Entries report the average return and alpha of the spread portfolio, estimated from monthly post-ranking returns, over the full sample, April 2007 to January 2024, using realized and option-implied expected returns (Chabi-Yo et al., 2023) as expected return proxy (Panels A and B, respectively); the unit is % per month. Starting at the end of March 2007, we sort stocks at the end of each month, in ascending order in portfolios, based on each of the labor risk measure's score (aggregate, benefit plan, employment discrimination, wage and hour, and workplace safety). Then we compute the post-ranking equal- and value-weighted portfolio average monthly return. We use a quintile portfolio scheme that yields 645 (438) firms on average per portfolio when using realized (option-implied) returns. The spread portfolio's return is the difference between the returns of portfolio 5 (high labor risk) and portfolio 1 (low labor risk). We use a monthly rebalancing period scheme and three alternative model specifications: The market model, Fama-French three-factor model (FF3, Fama and French, 1993) and Fama-French five-factor model (FF5, Fama and French, 2015), Newey and West (1987) t-statistics with four lags are reported within parentheses. One, two, and three asterisks indicate significance at the 10%, 5% and 1% significance level, respectively.

Table 14: Bivariate portfolio sorts on size and labor risks

Full sample (2007 - 2024) Option-Implied Returns	Aggregate [P5]-[P1]	Benefit plan [P5]-[P1]	Employment discr. [P5]-[P1]	Wage and hour [P5]-[P1]	Workplace safety [P5]-[P1]
Panel A: Low market cap					
Average returns	-0.246*** [-5.129]	-0.052** [-2.603]	-0.154*** [-4.575]	-0.201*** [-4.863]	-0.180*** [-4.650]
Market model alpha	-0.239*** [-5.298]	-0.052** [-2.714]	-0.149*** [-4.901]	-0.191*** [-5.144]	-0.175*** [-4.988]
FF3 alpha	-0.236*** [-5.517]	-0.049** [-2.711]	-0.145*** [-5.141]	-0.191*** [-5.195]	-0.172*** [-5.137]
FF5 alpha	-0.232*** [-5.390]	-0.047** [-2.593]	-0.134*** [-5.100]	-0.184*** [-5.217]	-0.167*** [-5.293]
Panel B: Medium market cap					
Average returns	-0.200*** [-5.909]	-0.050** [-2.568]	-0.094*** [-4.972]	-0.134*** [-5.162]	-0.148*** [-4.821]
Market model alpha	-0.194*** [-6.036]	-0.048** [-2.458]	-0.098*** [-5.398]	-0.129*** [-5.241]	-0.144*** [-4.794]
FF3 alpha	-0.190*** [-6.424]	-0.046** [-2.423]	-0.095*** [-5.581]	-0.127*** [-5.395]	-0.141*** [-4.877]
FF5 alpha	-0.189*** [-6.815]	-0.047** [-2.554]	-0.093*** [-5.538]	-0.122*** [-5.609]	-0.137*** [-5.029]
Panel C: Large market cap					
Average returns	0.002 [0.185]	0.067*** [4.312]	0.043*** [3.419]	0.039** [2.312]	0.018* [1.734]
Market model alpha	0.004 [0.342]	0.066*** [4.197]	0.046*** [3.505]	0.042** [2.577]	0.017 [1.625]
FF3 alpha	0.004 [0.336]	0.066*** [4.258]	0.047*** [3.711]	0.043** [2.611]	0.018* [1.695]
FF5 alpha	0.002 [0.181]	0.061*** [3.963]	0.049*** [3.825]	0.039** [2.455]	0.017 [1.577]

Notes: Entries report the average return and alpha of the spread portfolio for low, medium and large market cap stocks (Panels A, B and C, respectively), estimated from monthly post-ranking returns, over the full sample, April 2007 to January 2024, using option-implied expected returns (Chabi-Yo et al., 2023) as expected return proxy; the unit is % per month. Starting at the end of March 2007, we sort stocks at the end of each month in ascending order in portfolios, based on their market cap. Within each market cap portfolio, we sort stocks in ascending order in portfolios based on each of the labor risk measure's value (aggregate, benefit plan, employment discrimination, wage and hour, and workplace safety). Then, we compute the post-ranking value-weighted portfolio average monthly return until the next rebalancing point. We use a combination of tercile and quintile portfolios (3x5) for market cap and labor risk that yields approximately 146 firms on average per portfolio. The spread portfolio's return is the difference between the returns of portfolio 5 (high labor risk) and portfolio 1 (low labor risk). We use monthly rebalancing period scheme and three alternative model specifications: The market model, the Fama-French three-factor model (FF3, Fama and French, 1993) and the Fama-French five-factor model (FF5, Fama and French, 2015), Newey and West (1987) t-statistics with four lags are reported within parentheses. One, two, and three asterisks indicate significance at the 10%, 5% and 1% significance level, respectively.

Table 15: Labor risk scores, future misconducts and size effect

	(i)	(ii)	(iii)	(iv)	(v)
Panel A: Misconduct Settlements at $t + 1$					
$Labor\ risk_{i,t}$	0.082**	0.0524**	0.041*	0.058**	0.127***
$Labor\ risk_{i,t} \times size$	0.006***	0.001	0.003**	0.004***	0.002*
Number of observations:	45,672	45,672	45,672	45,672	45,672
$Pseudo\ R^2$:	0.398	0.397	0.397	0.397	0.398
Panel B: Misconduct Settlements at $t + 3$					
$Labor\ risk_{i,t}$	0.036	-0.006	-0.007	0.035	0.079**
$Labor\ risk_{i,t} \times size$	0.008***	0.002	0.004**	0.005***	0.002
Number of observations:	45,672	45,672	45,672	45,672	45,672
$Pseudo\ R^2$:	0.438	0.437	0.437	0.438	0.438
Panel C: OSHA Inspections from Complaints at $t + 1$					
$Labor\ risk_{i,t}$	0.095**	0.042	0.062**	0.085**	0.119***
$Labor\ risk_{i,t} \times size$	0.004***	0.001	0.002*	0.003***	0.002**
Number of observations:	45,672	45,672	45,672	45,672	45,672
$Pseudo\ R^2$:	0.458	0.457	0.457	0.458	0.458
Clustered standard errors	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes

Notes: Entries report the estimated β coefficients in equation (6) of the constructed labor risk measures and the average across firms interaction effect between the constructed labor risk measures and firm's market size, over the period January 2007 to December 2024. We use five alternative model specifications, one for each labor risk measure. Columns (i) - (v) report the results for *Aggregate*, *Benefit plan*, *Employment discrimination*, *Wage & hour*, and *Workplace safety*, respectively. Panels A, B and C report the results for the logit regressions of employee-related misconduct penalties at $t + 1$, $t + 3$ and Occupational Safety and Health Administration (OSHA) inspections at $t + 1$ on each labor risk measure, respectively. Future employee-related penalties and inspections are measured by a dummy variable which equals one when there is a corporate labor misconduct-related penalty or inspection one year $t + 1$ and three years $t + 3$, respectively, from the labor risk score assignment day. Otherwise the dummy variable equals zero. For each firm, we compute the interaction effect between each labor risk measure β_1 and firm's market size β_2 , which is the cross derivative of the logit regression $P(\cdot)$ with respect to these variables $\frac{\partial^2 P(\cdot)}{\partial \beta_1 \partial \beta_2}$. We then report for each labor risk measure, the average value across firms and test the null hypothesis that $H_0 : \frac{\partial^2 P(\cdot)}{\partial \beta_1 \partial \beta_2} = 0$ ($H_a : \frac{\partial^2 P(\cdot)}{\partial \beta_1 \partial \beta_2} > 0$) by applying the Delta method. We control for market size, return on assets, leverage, and institutional ownership. We also control for contemporaneous employee-related misconduct settlements and inspections respectively, using a dummy variable which equals one when the firm has experienced an employee-related settlement or inspection one year prior to the labor risk score assignment day, and zero otherwise. All annual firm characteristics from Compustat are measured for the fiscal year ending immediately prior to the labor risk score's assignment (i.e. 10-K filing date), while the value of institutional ownership is the one publicly available at the most recent quarter (i.e. 60 days after quarter-end) prior to the risk-score assignment, ensuring no look-ahead bias. All explanatory variables are cross-sectionally standardized at each point in time. In all model specifications, we control for both time and industry fixed effects. Standard errors are clustered at the firm level. One, two, and three asterisks indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 16: Bivariate portfolio sorts on analyst coverage and labor risks

Full sample (2007 - 2024) Option-Implied Returns	Aggregate	Benefit plan	Employment discr.	Wage and hour	Workplace safety
Panel A: 1 - Low analyst coverage					
1 (Low labor risk)	1.596%*** [9.002]	1.482% *** [9.504]	1.539%*** [9.493]	1.543%*** [9.185]	1.557%*** [9.155]
5 (High labor risk)	1.399%*** [9.191]	1.488% *** [8.941]	1.442%*** [9.161]	1.404%*** [9.311]	1.421%*** [9.091]
5-1 (labor risk spread)	-0.197%*** [-4.532]	0.006% [0.252]	-0.097%*** [-5.921]	-0.140%*** [-4.196]	-0.136%*** [-4.818]
Panel B: 2 - Medium analyst coverage					
1 (Low labor risk)	1.418%*** [9.232]	1.341% *** [9.680]	1.369%*** [9.862]	1.401%*** [9.132]	1.400%*** [9.583]
5 (High labor risk)	1.267%*** [9.206]	1.344%*** [9.267]	1.299%*** [9.299]	1.303%*** [9.244]	1.263%*** [9.321]
5-1 (labor risk spread)	-0.151%*** [-4.046]	0.002% [0.116]	-0.070%*** [-3.266]	-0.098%*** [-2.832]	-0.137%*** [-5.349]
Panel C: 3 - High analyst coverage					
1 (Low labor risk)	0.952%*** [9.032]	0.912% *** [8.657]	0.924%*** [8.798]	0.929%*** [8.644]	0.945%*** [8.808]
5 (High labor risk)	0.944%*** [8.258]	0.998% *** [8.659]	0.969%*** [8.667]	0.976%*** [8.405]	0.940%*** [8.563]
5-1 (labor risk spread)	-0.008% [-0.534]	0.086%*** [3.565]	0.045%*** [2.372]	0.047%*** [2.195]	-0.005% [-0.467]
Panel D: 3-1 - Analyst coverage spread					
5-1 (labor risk spread)	0.189%*** [4.289]	0.080% *** [2.665]	0.142%*** [5.148]	0.187%*** [4.731]	0.132%*** [4.047]

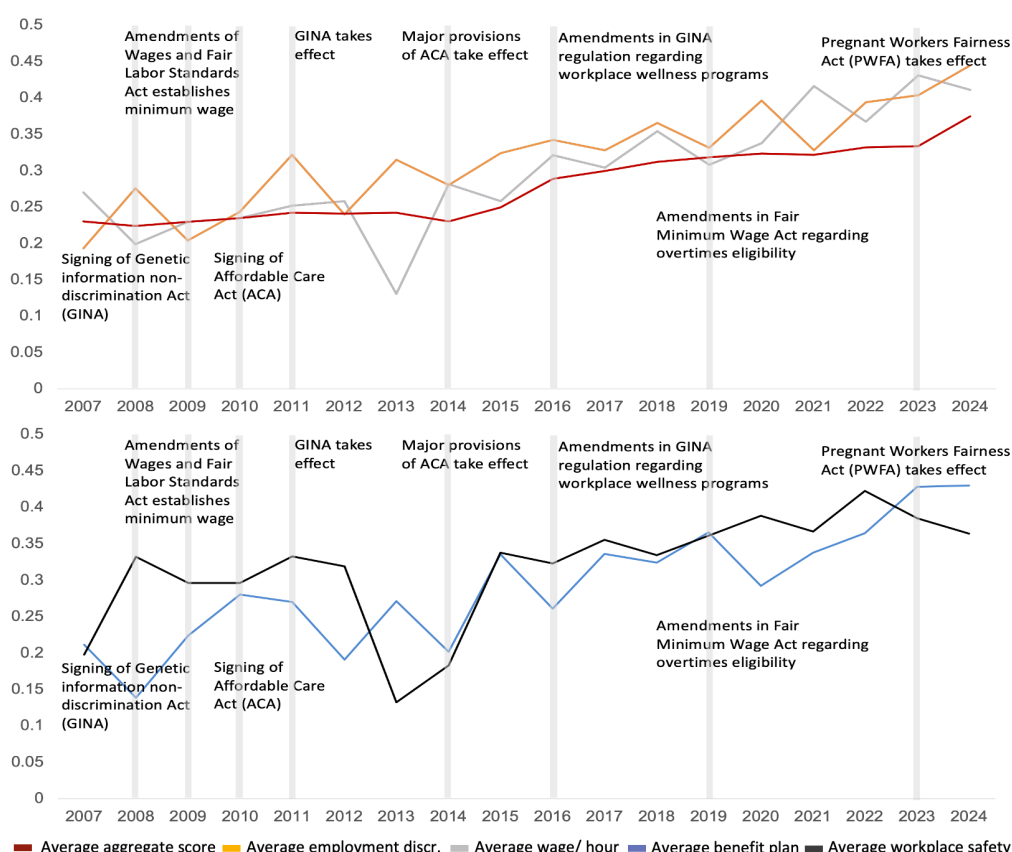
Notes: This table reports average monthly expected returns for portfolios formed from dependent double sorts on analyst coverage and labor risk over April 2007 to January 2024, using option-implied expected returns (Chabi-Yo et al., 2023) as the stock expected return proxy. Starting at the end of March 2007, we sort stocks at the end of each month in ascending order in portfolios, based on their analyst coverage. Within each analyst coverage portfolio, we sort stocks in ascending order in portfolios based on each of the labor risk measure's value (aggregate, benefit plan, employment discrimination, wage and hour, and workplace safety). Then, we compute the post-ranking equal-weighted portfolio average monthly return until the next rebalancing point. We use a combination of tercile and quintile portfolios (3x5) for analyst coverage and labor risk that yields approximately 146 firms on average per portfolio. Panels A, B and C report the results for low, medium and high analyst coverage stocks, respectively. For each Panel, the table reports the average return of the low, high and spread portfolio. Panel D reports the spread portfolio returns between high and low analyst coverage stocks. The spread portfolio's return is the difference between the returns of portfolio 5 (high labor risk) and portfolio 1 (low labor risk). Newey and West (1987) t-statistics with four lags are reported within parentheses. One, two, and three asterisks indicate significance at the 10%, 5% and 1% significance level, respectively.

Table 17: Labor risk scores, implied volatility and implied skewness

Period (2007 - 2024) Monthly rebalancing	Aggregate	Benefit plan	Employment discr.	Wage and hour	Workplace safety
30 days at-the-money option implied volatility					
Panel A: Low market cap (Portfolio 1)					
1 (Lowest labor risk)	0.836	0.839	0.842	0.846	0.863
2	0.878	0.873	0.872	0.887	0.894
3	0.894	0.878	0.887	0.875	0.896
4	0.877	0.868	0.873	0.873	0.856
5 (Highest labor risk)	0.825	0.852	0.836	0.830	0.801
5-1 (labor risk spread)	-0.011	0.014	-0.007	-0.016	-0.063***
Panel B: Large market cap (Portfolio 3)					
1 (Lowest labor risk)	0.322	0.317	0.318	0.320	0.324
2	0.332	0.330	0.330	0.335	0.335
3	0.338	0.338	0.338	0.337	0.344
4	0.345	0.345	0.345	0.343	0.342
5 (Highest labor risk)	0.344	0.352	0.350	0.347	0.336
5-1 (labor risk spread)	0.022***	0.035***	0.032***	0.027***	0.012***
30 days option implied skewness					
Panel C: Low market cap (Portfolio 1)					
1 (Lowest labor risk)	-0.141	-0.139	-0.149	-0.137	-0.124
2	-0.117	-0.107	-0.114	-0.098	-0.114
3	-0.107	-0.096	-0.094	-0.113	-0.089
4	-0.090	-0.107	-0.100	-0.109	-0.099
5 (Highest labor risk)	-0.123	-0.128	-0.120	-0.121	-0.152
5-1 (labor risk spread)	0.018	0.011	0.029**	0.017	-0.028***
Panel D: Large market cap (Portfolio 3)					
1 (Lowest labor risk)	-0.673	-0.672	-0.675	-0.674	-0.678
2	-0.659	-0.665	-0.653	-0.652	-0.639
3	-0.659	-0.645	-0.651	-0.654	-0.651
4	-0.637	-0.641	-0.647	-0.653	-0.648
5 (Highest labor risk)	-0.637	-0.641	-0.638	-0.632	-0.648
5-1 (labor risk spread)	0.037***	0.031***	0.036***	0.042***	0.030***

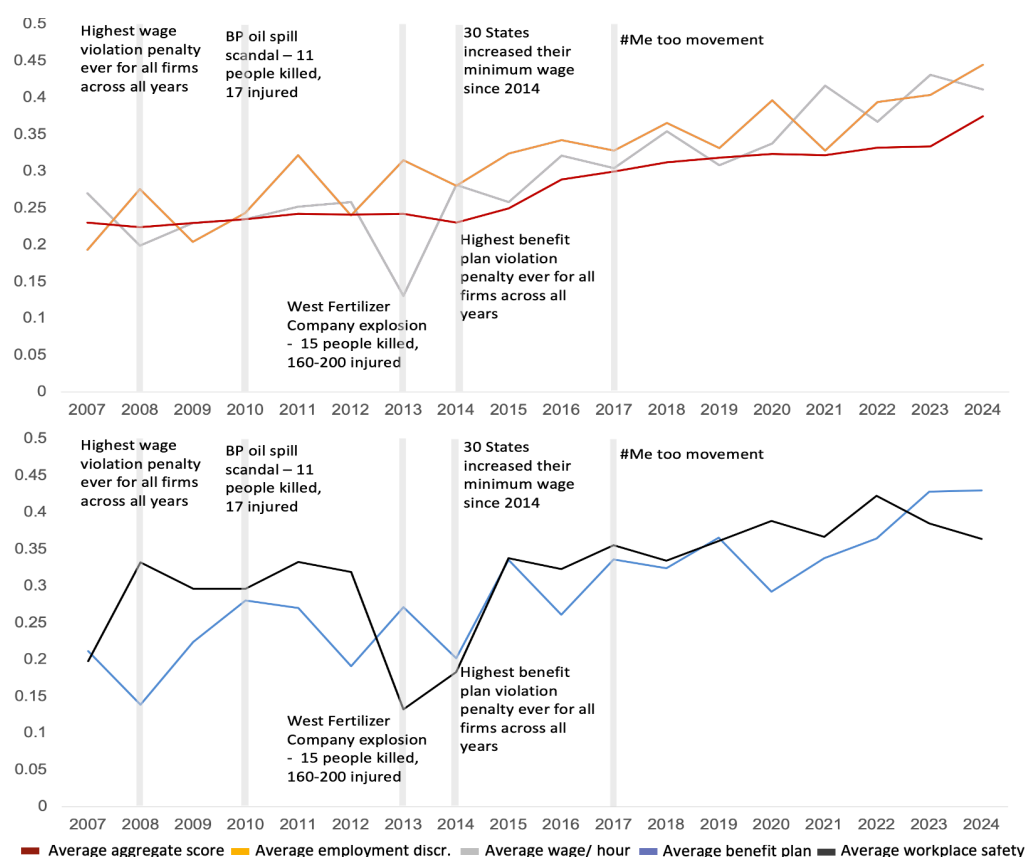
Notes: Entries report the average 30 days at-the-money option implied volatility and implied skewness for both low and large market cap stocks across labor risk portfolios formed within each size bucket using each labor risk measure (aggregate, benefit plan, employment discrimination, wage and hour, and workplace safety) and their corresponding labor risk spread portfolios. Starting at the end of March 2007, we sort stocks at the end of each month in ascending order in portfolios, based on their market cap. Within each market cap portfolio, we sort stocks in ascending order in portfolios based on each of the labor risk measure's value. Then, on each rebalancing date, we compute the equal-weighted portfolio-level average implied volatility and implied skewness, and report their time-series average. We use monthly rebalancing and limit our analysis only to stocks with option-implied expected returns (Chabi-Yo et al., 2023). As in Table 14, we use a 3×5 sort, with tercile portfolios for market capitalization and quintile portfolios for labor risk. Panels A and B (C and D) report average option implied volatility (option implied skewness) over the full sample, April 2007 to January 2024. In each size bucket, portfolio 1 (5) is the portfolio with lowest (highest) labor risk. The spread portfolio's average option implied volatility (negative implied skewness) is the difference between the average option implied volatility (option implied skewness) of portfolio 5 and portfolio 1. We test the null hypothesis that the spread portfolio's average option implied volatility and skewness equals zero using a two-sided t-test. Newey and West (1987) t-statistics with four lags are reported within parentheses. One, two, and three asterisks indicate significance at the 10%, 5% and 1% significance level, respectively.

Figure 1: Labor risk scores and advances in the U.S. legal framework



Notes: This figure shows the evolution of the constructed labor risk measures (i.e. *Aggregate*, *Benefit plan*, *Employment discrimination*, *Wage & hour*, and *Workplace safety*) over the period 2007-2024. For each respective labor risk measure, we plot a time-series of the average labor risk value across firms, calculated on any given year. Grey shaded bands mark years in which major U.S. legal advancements were signed or became effective. These include the Genetic Information Non-Discrimination Act (GINA) signed in 2008, effective from 2011 and amended in 2016, the amendments of Wages and Fair Labor Standards Act in 2009 and 2019, the Affordable Care Act (ACA) signed in 2010 and in effect from 2014, and the Pregnant Workers Fairness Act (PWFA) effective from 2023.

Figure 2: Labor risk scores and major related events



Notes: This figure shows the evolution of the constructed labor risk measures (i.e. *Aggregate*, *Benefit plan*, *Employment discrimination*, *Wage and hour*, and *Workplace safety*) over the period 2007-2024. For each respective labor risk measure, we plot a time-series of the average labor risk value across firms, calculated on any given year. Grey shaded bands mark years in which major employee-related events happened. These include the highest wage violation penalty ever assigned in 2008, BP oil spill scandal in 2010, West Fertilizer Company explosion in 2013, minimum wage (and related penalties) increase in 30 U.S. States and the highest benefit plan violation penalty ever assigned in 2014, and the "Me too" movement in 2017.

A Appendix

A.1 Variable definitions

Table A1: Variables definitions

Variable	Description	Source
Aggregate labor risk	The cosine similarity between a firm's retained labor risk disclosure and the labor risk disclosure of the riskiest firm whose the number of all employee-related violations exceeds the cross-sectional average during the prior year and has the highest total penalties from all violations	Self-constructed
Benefit plan	The cosine similarity between a firm's retained labor risk disclosure and the labor risk disclosure of the riskiest firm whose the number of <i>benefit plan</i> -related violations exceeds the cross-sectional average during the prior year and has the highest total penalties from <i>benefit plan</i> -related violations	Self-constructed
Employment discrimination	The cosine similarity between a firm's retained labor risk disclosure and the labor risk disclosure of the riskiest firm whose the number of <i>employment discrimination</i> -related violations exceeds the cross-sectional average during the prior year and has the highest total penalties from <i>employment discrimination</i> -related violations	Self-constructed
Wage and hour	The cosine similarity between a firm's retained labor risk disclosure and the labor risk disclosure of the riskiest firm whose the number of <i>Wage & hour</i> -related violations exceeds the cross-sectional average during the prior year and has the highest total penalties from <i>Wage & hour</i> -related violations	Self-constructed
Workplace safety	The cosine similarity between a firm's retained labor risk disclosure and the labor risk disclosure of the riskiest firm whose the number of <i>Workplace safety</i> -related violations exceeds the cross-sectional average during the prior year and has the highest total penalties from <i>Workplace safety</i> -related violations	Self-constructed
Market cap	The absolute value of shares outstanding [<i>shrout</i>] multiplied by the month-end price [<i>altprc</i>] divided by one thousand	CRSP
Market size	The natural logarithm of market cap	CRSP

Table A1 (continued)

Variable	Description	Source
$\log(\text{Assets})$	The natural logarithm of total assets $[at]$	Compustat
Leverage (Debt/Assets)	Long-term debt $[dltt]$ plus debt in current liabilities $[dlc]$ scaled by total assets $[at]$	Compustat
ROA	Income before extraordinary items $[ib]$ scaled by total assets $[at]$	Compustat
Skilled labor risk	The textual measure of Qiu and Wang (2021) defined as the firm's total number of sentences that include the keywords related to skilled labor risk	10-K, Yue Qiu's website
Integrity	The textual measure of Li et al. (2021) defined as the firm's weighted count of the number of words associated with integrity, divided by the total number of words in the earnings call transcript	Earnings call transcripts, Kai Li's website
Labor shortage	The textual measure of Harford et al. (2026) defined as the firm's number of labor-shortage-related sentences divided by the total number of sentences in the earnings call transcript	Earnings call transcripts, Qiyang He's website
Social Score	ESG social pillar rating	LSEG/ Refinitiv
Workforce Score	ESG social pillar workforce subscore	LSEG/ Refinitiv
Voluntary Turnover	Voluntary employee departures divided by the average number of full time employees during the fiscal year	LSEG/ Refinitiv
Institutional Ownership	The percentage of common shares held by institutional investors as of quarter-end, divided by total shares outstanding	LSEG/ Refinitiv
Analyst coverage	The number of analysts providing annual earnings per share forecasts for the next fiscal year	I/B/E/S
30 days at-the-money option implied volatility	Average of the 30-day call and put option implied volatilities at deltas +0.50 and -0.50, respectively, from the OptionMetrics IvyDB volatility surface	OptionMetrics
30 days option implied skewness (30)	30-day option implied risk-neutral skewness	Grigory Vilkov data library website

Table A1 (continued)

Variable	Description	Source
30 days option implied excess re- turns GLB (30)	30-day option-implied expected excess return, based on the generalized lower bounds approach of Chabi-Yo et al. (2023)	Grigory Vilkov data library website

Notes: This table reports the key variables used in our analysis. All names within square brackets refer to Compustat and CRSP item names.

A.2 Word2Vec model and implementation

The Word2Vec model (Mikolov et al., 2013) identifies words that occur in similar contexts. To this end, it generates numerical representations of words in the form of vectors, known as embeddings, such that words used in similar contexts receive similar embeddings. We compute the embeddings of every word in the Risk Factors Section (Item 1 A) of the 10-K filings by using the continuous bag-of-words (CBOW) variant of Word2Vec. For each word ("target"), the "context" is defined as the neighboring words within a fixed window around that word.

To fix ideas, CBOW assigns a conditional probability (termed softmax) to a "target" word w given its "context" c

$$P(w \mid c) = \frac{\exp(\text{score}(w, c))}{\sum_{v \in V} \exp(\text{score}(v, c))}, \quad (\text{A.1})$$

where c is constructed by averaging the input embeddings of the surrounding context words, $\text{score}(\cdot)$ equals the dot product between c and that word's output embedding, V denotes the set of all available words in the 10-K risk disclosures, and v indexes each of these words. The model estimates embeddings by maximizing the likelihood of observing target words given their contexts. Equivalently, it minimizes the negative log-likelihood

$$L = \sum_{(w,c)} -\log P(w \mid c), \quad (\text{A.2})$$

computed over all target–context pairs obtained by sliding a fixed-size window across the corpus. This procedure yields embeddings in which words that appear in similar contexts in 10-K risk disclosures receive similar numerical representations.

We implement the model using Python’s `gensim` library and obtain embeddings for all words in the corpus. We compute the softmax probability in equation (A.1) using negative sampling. We then expand both the labor risk dictionary and the keyword lists used to construct word sequences. Specifically, using the words identified in Section 3.1 as seed words, we retrieve additional related terms based on cosine similarity. We compute cosine similarity in two ways. First, for each seed word, we measure similarity between its embedding and that of every other word in the corpus. Second, for each topic used to construct the word sequences (defined as a set of seed words), we construct a topic embedding by averaging the embeddings of its constituent words and compute similarity between this average vector and all other word embeddings. In both cases, we retain the most similar words and manually screen them to remove irrelevant terms.

The implementation requires specifying several hyperparameters: embedding dimension (vector size), context window size, minimum word frequency, and number of training iterations. The embedding dimension determines the size of the vector representation; the window size defines the number of neighboring words used to form the context; the minimum frequency threshold excludes infrequent words; and the number of iterations corresponds to the number of passes over the corpus during training. To ensure that our obtained vocabulary is comprehensive, we estimate the model under alternative parameter values and compute the cosine similarity of the embeddings of the seed words and the embeddings delivered by each set of values of the parameters. We set the embedding dimension to 300, following Li et al. (2021), consider window sizes of 5 and 10, use minimum frequency thresholds of 15, 200, and 1000, and set the number of iterations to 5.

A.3 Relation to Glassdoor’s Best Companies to Work and ESG social pillar

Similar to the Fortune magazine’s Best Companies to Work For in the U.S. rankings, Glassdoor also publishes its own best companies to work rankings, as part of its Employees’ Choice Awards, based on employees’ feedback submitted through anonymous company reviews on Glassdoor. The Glassdoor Best companies to Work rankings consider reviews and ratings from current and former employees submitted one year prior to the rankings’ announcements, termed eligibility period.

Employees rate their overall satisfaction with the employer, the CEO and workplace attributes, including career opportunities, compensation and benefits, culture and values, diversity and inclusion, senior management and work-life balance. In addition, employees indicate whether they would recommend the employer to a friend and whether they have a positive, negative, or neutral view of the firm’s six month business outlook. The rankings are then determined using Glassdoor’s proprietary award algorithm, which evaluates the quantity, quality, and consistency of employee reviews during the eligibility period. For a company to be eligible, it must have at least 1,000 employees and 75 ratings across the nine workplace attributes from U.S. based employees. Eligible firms must also have an overall Glassdoor rating of at least 3.5 and workplace factor of at least 2.5 across all categories during the eligibility period. As a result, the number of firms contained in the list varies across years. Details on the methodology of the 2026 Best Places to Work rankings are available at <https://www.glassdoor.co.uk/Award/index.htm>

Table A2 presents the results for aggregate (Panel A), benefit plan (Panel B), employment discrimination (Panel C), wage and hour (Panel D), and workplace safety (Panel E) labor risks. Across all dimensions—aggregate, benefit plan, employment discrimination, wage and hour, and workplace safety—the Glassdoor Best Companies to Work publicly listed firms are not concentrated among the lowest labor risk firms in the sample. Their annual mean scores typically lie in the middle-to-upper portion of the labor risk distribution, whereas the lowest-risk firms

consistently fall below the fifth percentile.

Next, we examine the ranking of firms under the social pillar of the ESG framework. To this end, we employ the firm-level Refinitiv workforce score, which measures a company's effectiveness in providing job satisfaction, a healthy and safe workplace, maintaining diversity and equal opportunities, and offering development opportunities for its workforce. Refinitiv weights the workforce score to compute the firm's overall S score.

We compare year by year the average labor risk scores of the 100 publicly listed firms with the highest workforce scores to those of the 100 firms with the lowest labor risk in our sample. For this exercise, we use only firms that have both a labor risk and a workforce score. Table [A3](#) presents the results for aggregate (Panel A), benefit plan (Panel B), employment discrimination (Panel C), wage and hour (Panel D), and workplace safety (Panel E) labor risks. The portfolio of firms with the highest workforce scores does not coincide with the portfolio of firms exhibiting the lowest labor risk. Across all labor risk dimensions, firms with the highest workforce scores exhibit on average a higher labor risk score than the portfolio of firms with the lowest labor risk and occupy substantially higher positions in the labor risk distribution than the lowest-risk firms in our sample. This suggests that popular ESG workforce scores capture dimensions of workplace quality that differ from those reflected in compliance-based labor misconduct measures, consistent with the evidence from the Fortune 100 and Glassdoor's Best Companies to Work rankings.

Table A2: Glassdoor's Best Companies to Work For vs. 100 firms with lowest scores in our sample

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Panel A: Aggregate Labor Risk																
Glassdoor BCTW mean	0.27***	0.27***	0.26***	0.25***	0.25***	0.24***	0.25***	0.32***	0.33***	0.32***	0.33***	0.33***	0.34***	0.36***	0.37***	0.41***
Sample mean (low 100 firms)	0.05	0.06	0.06	0.07	0.07	0.07	0.07	0.09	0.10	0.10	0.11	0.11	0.10	0.09	0.10	0.12
Sample range [P05 , P95]	[0.09 , 0.36][0.10 , 0.37][0.11 , 0.37][0.11 , 0.37][0.11 , 0.37][0.11 , 0.34][0.12 , 0.39][0.12 , 0.39][0.14 , 0.43][0.15 , 0.46][0.15 , 0.49][0.16 , 0.50][0.16 , 0.51][0.15 , 0.50][0.15 , 0.50][0.16 , 0.50][0.19 , 0.54]															
Panel B: Benefit Plan																
Glassdoor BCTW mean	0.24***	0.32***	0.26***	0.23***	0.29***	0.20***	0.30***	0.28***	0.32***	0.33***	0.34***	0.30***	0.35***	0.39***	0.46***	0.44***
Sample mean (low 100 firms)	0.04	0.06	0.05	0.03	0.04	0.03	0.09	0.07	0.10	0.08	0.13	0.07	0.09	0.12	0.12	0.13
Sample range [P05 , P95]	[0.07 , 0.40][0.12 , 0.43][0.09 , 0.42][0.06 , 0.37][0.07 , 0.44][0.05 , 0.46][0.16 , 0.48][0.12 , 0.47][0.16 , 0.48][0.14 , 0.46][0.20 , 0.49][0.13 , 0.43][0.16 , 0.48][0.21 , 0.50][0.23 , 0.57][0.24 , 0.56]															
Panel C: Employment Discrimination																
Glassdoor BCTW mean	0.24***	0.29***	0.35***	0.26***	0.34***	0.31***	0.30***	0.37***	0.35***	0.36***	0.33***	0.42***	0.35***	0.42***	0.47***	0.47***
Sample mean (low 100 firms)	0.04	0.06	0.08	0.05	0.08	0.06	0.10	0.09	0.09	0.12	0.10	0.13	0.10	0.13	0.14	0.15
Sample range [P05 , P95]	[0.07 , 0.39][0.10 , 0.39][0.13 , 0.49][0.08 , 0.49][0.13 , 0.47][0.11 , 0.43][0.16 , 0.48][0.16 , 0.48][0.17 , 0.48][0.19 , 0.53][0.17 , 0.51][0.20 , 0.54][0.15 , 0.50][0.20 , 0.55][0.24 , 0.52][0.25 , 0.59]															
Panel D: Wage and Hour																
Glassdoor BCTW mean	0.27***	0.27***	0.26***	0.24***	0.13***	0.30***	0.27***	0.39***	0.31***	0.34***	0.32***	0.35***	0.41***	0.41***	0.47***	0.45***
Sample mean (low 100 firms)	0.05	0.06	0.06	0.04	0.01	0.06	0.07	0.07	0.10	0.12	0.10	0.11	0.14	0.11	0.15	0.14
Sample range [P05 , P95]	[0.09 , 0.36][0.10 , 0.37][0.11 , 0.39][0.07 , 0.43][0.04 , 0.25][0.11 , 0.43][0.11 , 0.43][0.14 , 0.50][0.15 , 0.46][0.19 , 0.52][0.17 , 0.43][0.17 , 0.51][0.21 , 0.60][0.20 , 0.49][0.23 , 0.60][0.22 , 0.56]															
Panel E: Workplace Safety																
Glassdoor BCTW mean	0.33***	0.32***	0.33***	0.35***	0.19***	0.24***	0.30***	0.37***	0.34***	0.35***	0.38***	0.41***	0.39***	0.45***	0.38***	0.34***
Sample mean (low 100 firms)	0.07	0.07	0.10	0.08	0.02	0.03	0.09	0.11	0.09	0.11	0.12	0.14	0.12	0.15	0.07	0.10
Sample range [P05 , P95]	[0.13 , 0.46][0.12 , 0.50][0.16 , 0.52][0.13 , 0.53][0.04 , 0.27][0.05 , 0.39][0.15 , 0.51][0.16 , 0.48][0.16 , 0.51][0.17 , 0.51][0.20 , 0.51][0.23 , 0.53][0.18 , 0.52][0.22 , 0.59][0.13 , 0.59][0.17 , 0.57]															
Firms in Glassdoor BCTW	27	22	23	24	28	29	19	22	18	38	31	36	47	57	51	51

Notes: This table reports the annual average labor risk scores for Glassdoor's Best Companies to Work For (BCTW) and our sample's 100 firms with the lowest labor risk score in each year, for each year in the period 2009 - 2024. It also reports the 5th-95th percentile range of the full sample's labor risk scores, for the respective year. Scores are reported for *Aggregate labor risk* (Panel A), *Benefit plan* (Panel B), *Employment discrimination* (Panel C), *Wage and hour* (Panel D) and *Workplace safety* (Panel E). Using a two-sided [Welch \(1947\)](#) t-test, we test the null hypothesis that each year, the annual average labor risk of firms in BCTW equals that of our sample's 100 firms with the lowest labor risk. To preserve independence between the two samples, we exclude from the year's lowest labor risk cohort, the firms included in BCTW that year. One, two, and three asterisks indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table A3: 100 firms with highest ESG workforce score vs. 100 firms with lowest scores in our sample

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Panel A: Aggregate Labor risk																		
Top 100 workforce mean	0.23***	0.22***	0.25***	0.26***	0.27***	0.25***	0.25***	0.24***	0.25***	0.30***	0.30***	0.33***	0.34***	0.35***	0.35***	0.36***	0.35***	0.39***
Sample mean (low 100 firms)	0.16	0.14	0.12	0.13	0.13	0.13	0.14	0.13	0.12	0.13	0.12	0.12	0.12	0.13	0.12	0.13	0.12	0.14
Sample range [P05 , P95]	[0.10 , 0.39]	[0.10 , 0.37]	[0.10 , 0.38]	[0.10 , 0.39]	[0.11 , 0.40]	[0.10 , 0.39]	[0.11 , 0.37]	[0.11 , 0.38]	[0.12 , 0.39]	[0.15 , 0.44]	[0.15 , 0.46]	[0.16 , 0.50]	[0.16 , 0.51]	[0.16 , 0.50]	[0.16 , 0.51]	[0.17 , 0.51]	[0.16 , 0.51]	[0.19 , 0.55]
Panel B: Benefit Plan																		
Top 100 workforce mean	0.22***	0.19***	0.19***	0.26***	0.25***	0.20***	0.25***	0.25***	0.31***	0.28***	0.32***	0.31***	0.39***	0.28***	0.33***	0.38***	0.40***	0.42***
Sample mean (low 100 firms)	0.14	0.10	0.08	0.13	0.10	0.08	0.10	0.07	0.14	0.10	0.12	0.10	0.15	0.09	0.12	0.15	0.15	0.16
Sample range [P05 , P95]	[0.08 , 0.36]	[0.07 , 0.32]	[0.05 , 0.35]	[0.11 , 0.44]	[0.07 , 0.42]	[0.07 , 0.42]	[0.07 , 0.43]	[0.05 , 0.54]	[0.15 , 0.48]	[0.12 , 0.48]	[0.16 , 0.48]	[0.14 , 0.47]	[0.20 , 0.50]	[0.13 , 0.42]	[0.16 , 0.48]	[0.21 , 0.50]	[0.23 , 0.57]	[0.24 , 0.56]
Panel C: Employment Discrimination																		
Top 100 workforce mean	0.22***	0.26***	0.26***	0.26***	0.34***	0.30***	0.31***	0.24***	0.33***	0.31***	0.33***	0.39***	0.36***	0.39***	0.36***	0.40***	0.40***	0.43***
Sample mean (low 100 firms)	0.13	0.15	0.11	0.13	0.15	0.13	0.18	0.13	0.15	0.13	0.13	0.14	0.13	0.15	0.12	0.17	0.17	0.18
Sample range [P05 , P95]	[0.08 , 0.36]	[0.08 , 0.44]	[0.08 , 0.43]	[0.11 , 0.44]	[0.12 , 0.51]	[0.10 , 0.52]	[0.15 , 0.48]	[0.10 , 0.43]	[0.16 , 0.48]	[0.16 , 0.47]	[0.17 , 0.48]	[0.19 , 0.54]	[0.18 , 0.49]	[0.20 , 0.54]	[0.16 , 0.51]	[0.23 , 0.55]	[0.24 , 0.52]	[0.25 , 0.58]
Panel D: Wage and Hour																		
Top 100 workforce mean	0.26***	0.21***	0.25***	0.26***	0.27***	0.23***	0.15***	0.24***	0.27***	0.31***	0.30***	0.37***	0.31***	0.35***	0.40***	0.37***	0.44***	0.41***
Sample mean (low 100 firms)	0.18	0.12	0.12	0.13	0.13	0.09	0.06	0.13	0.11	0.11	0.12	0.14	0.13	0.13	0.16	0.14	0.17	0.16
Sample range [P05 , P95]	[0.12 , 0.46]	[0.09 , 0.39]	[0.10 , 0.38]	[0.10 , 0.39]	[0.11 , 0.41]	[0.06 , 0.41]	[0.05 , 0.28]	[0.10 , 0.43]	[0.11 , 0.45]	[0.14 , 0.48]	[0.16 , 0.46]	[0.19 , 0.53]	[0.17 , 0.43]	[0.17 , 0.51]	[0.21 , 0.60]	[0.20 , 0.49]	[0.24 , 0.60]	[0.23 , 0.56]
Panel E: Workplace Safety																		
Top 100 workforce mean	0.18***	0.30***	0.31***	0.34***	0.36***	0.35***	0.17***	0.19***	0.37***	0.32***	0.34***	0.35***	0.37***	0.39***	0.38***	0.43***	0.40***	0.34***
Sample mean (low 100 firms)	0.06	0.18	0.15	0.15	0.17	0.17	0.06	0.07	0.15	0.15	0.13	0.13	0.15	0.18	0.16	0.19	0.09	0.12
Sample range [P05 , P95]	[0.03 , 0.41]	[0.13 , 0.47]	[0.13 , 0.48]	[0.12 , 0.56]	[0.14 , 0.56]	[0.13 , 0.55]	[0.05 , 0.31]	[0.05 , 0.42]	[0.16 , 0.52]	[0.17 , 0.48]	[0.17 , 0.51]	[0.17 , 0.52]	[0.20 , 0.52]	[0.23 , 0.53]	[0.20 , 0.53]	[0.25 , 0.60]	[0.13 , 0.59]	[0.17 , 0.58]
Number of firms	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Notes: This table reports the annual average labor risk scores for the 100 firms with the highest ESG Workforce score and our sample's 100 firms with the lowest labor risk score in each year, for the period 2007 - 2024. It also reports the 5th-95th percentile range of the full sample's labor risk scores, for the respective year. Our sample includes only firms which have both a labor risk and an ESG Workforce score. Scores are reported for *Aggregate labor risk* (Panel A), *Benefit plan* (Panel B), *Employment discrimination* (Panel C), *Wage and hour* (Panel D) and *Workplace safety* (Panel E). Using a two-sided [Welch \(1947\)](#) t-test, we test the null hypothesis that each year, the annual average labor risk of firms with the highest ESG Workforce score equals that of our sample's 100 firms with the lowest labor risk. To preserve independence between the two samples, we exclude from the year's lowest labor risk cohort, the top 100 firms with the highest ESG Workforce on that year. One, two, and three asterisks indicate statistical significance at the 10%, 5% and 1% levels, respectively.