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Workforce Policies and Operational Risk: Evidence from U.S. Bank Holding Companies

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Abstract

Using supervisory data on operational losses from large U.S. bank holding companies (BHCs), we show that BHCs with socially responsible workforce policies suffer lower operational losses per dollar of total assets. The association significantly varies by the type of workforce policies and the type of operational losses. It is driven not only by small frequent losses but also by severe tail operational risk events. Further, the risk-reducing effects of the socially responsible workforce policies are stronger for larger BHCs with more employees. Our findings have important implications for banking organization performance, risk, and supervision.

I. Introduction

Employees constitute one of the most valuable corporate resources, and employee human capital has first-order implications for firm value and economic growth (e.g., Carlin and Gervais (2009), Edmans (2011), Gennaioli, La Porta, Silanes, and Shleifer (2012), Krüger (2015), Vomberg, Homburg, and Bornemann (2015), Riley, Michael, and Mahoney (2017), and Fauver, McDonald, and Taboada (2018)). The existing literature, however, provides little insight into the direct channels through which corporate workforce policies that affect human capital also impact corporate outcomes. We use the U.S. banking industry as our empirical setting to take a step toward filling this important void. We present novel evidence on how socially responsible workforce policies attenuate operational risks at large U.S. financial institutions.

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Operational risk refers to losses resulting from inadequate or failed internal processes, people, and systems or from external events (Basel Committee on Banking Supervision (2006)). Examples include losses from fraud, employment practices and workplace safety, unfulfilled obligations to clients, faulty product design, system failures, process management and transaction failures, and relations with counterparties and vendors. Operational risk has grown in importance over recent years as large operational losses wreaked havoc on the banking industry (e.g., Afonso, Curti, and Mihov (2019), Berger et al. (2022)).[1] Value-at-risk model estimates suggest that the largest U.S. banking organizations are in fact susceptible to the occurrence of multibillion-dollar losses in a single calendar quarter (Curti and Mihov (2019), Curti, Frame, and Mihov (2021)).

By definition and its very nature, operational risk can often be traced and attributed to human error or failure. This begs the question, if employees play a large part in the cause of these operational losses, could workforce policies impact operational risk and be a viable strategy to reduce operational losses? Conversely, strategies to reduce the operational risk that ignore a company's workforce and the aspect of workers executing their job responsibilities may disregard an important source of operational risk and, as a result, be ineffective.

This is because process-driven and policy-centric controls and governance structures, even when implemented according to best standards and practices, are imperfect and have inherent weaknesses. They largely remain exposed to employee-associated error precursors such as inadequate information, time pressure, mental and physical fatigue, seniority, distractions and mental state (lack of confidence/overconfidence), or just poor decision-making. In addition, operational risk management strategies are constrained and cannot manage many eventualities or situations employees face at work (e.g., circumstances where awareness programs and training of the workforce may be an effective approach to reduce operational risks associated with the known and unknown). In this study, we bridge the literatures on corporate employee treatment, operational risk, and risk management by examining whether socially responsible workforce policies at financial institutions could attenuate these organizations' operational risk outcomes.

A considerable advantage of our research is the use of detailed supervisory data on operational losses. These data are reported to the Federal Reserve System by large U.S. bank holding companies (BHCs) for stress testing purposes. De Fontnouvelle et al. (2006) and Abdymomunov, Curti, and Mihov (2020) caution that public sources of data often omit significant operational loss events. In contrast to the publicly available data commonly used in the operational risk literature, we utilize confidential supervisory data that are significantly richer and more comprehensive. We pair these data with Refinitiv's Environment, Social, and Governance (ESG) indicators measuring the relative performance, commitment, and effectiveness of banking organizations toward workforce aspects of corporate social responsibility (CSR). Although combining these data restricts our sample to only 26 large BHCs, these institutions account for close to 74% of U.S. banking industry assets.

[1] For example, JPMorgan Chase lost more than $6.2 billion amid a rogue trading scandal in 2012. See *Bloomberg*: "The London Whale" (P. Hurtado, Oct. 16, 2013).

Our results can be summarized as follows: We document a significant association between BHC workforce policies and operational risk: BHCs with socially responsible workforce policies along dimensions such as employee health and safety, diversity, training and development, and work environment flexibility experience lower operational losses. A one-standard-deviation improvement in our BHC workforce policy measure is associated with a 6.6% decrease in quarterly operational losses. In dollar terms, this translates into a $173,730 decrease in quarterly operational losses per $1 billion of BHC assets on average, or $28 million per quarter for the median BHC in our sample (with $160 billion in total assets and $19.5 billion in book equity).

This result is robust to instrumental variable (IV) and difference-in-differences (DiD) estimations, which mitigate potential endogeneity and reverse causality concerns. In our IV regressions, we instrument BHC workforce policies with the Di Noia (2002) gender equality index (GEI) of the state where a BHC is headquartered or, alternatively, the median GEI value of neighboring states. Conditional on controls, our instruments should have little effect on BHC operational losses, other than through their relation to BHC workforce policies. In our DiD specifications, we use the staggered enactment of paid sick leave (PSL) state laws as an exogenous shock to the adoption of mandatory socially responsible workforce policies. The advantage of the IV and DiD estimation approaches is that they provide plausible frameworks to identify the causal effects of workforce policies.

We conduct additional exercises in order to better understand the negative relation between operational losses and the use of socially responsible workforce policies at banking organizations. First, we show it is driven not only by a reduction in small frequent losses but also by a reduction in severe tail operational risk events. Tail risk poses difficulties for banking organization capital planning and management and is particularly relevant for BHC risk of failure. Second, we show that the effects of workforce policies are predominantly related to certain types of operational losses such as Internal Fraud (IF), Employment Practices and Workplace Safety (EPWS), and Clients, Products, and Business Practices (CPBP). In contrast, they are not significantly related to losses from External Fraud (EF), Damage to Physical Assets (DPA), Business Disruption and Systems Failure (BDSF), and Execution, Delivery, and Process Management (EDPM).

Third, we analyze four different types of workforce policies that comprise our composite workforce policy measure. These capture the BHCs' commitment and effectiveness toward employee health and safety, diversity and opportunity, training and development, and work environment flexibility. In a "horse race" of the four components, we find that banking organizations' training and development policies are the driving factor behind the reduction in operational losses. In an additional analysis, we also identify significant synergies among the different types of workforce policies in reducing operational losses.

Finally, we show that the negative relation between socially responsible workforce policies and operational losses is more pronounced at larger BHCs with more employees. This finding ties in with a large body of literature (e.g., Alchian and Demsetz (1972), Oi (1983), Barron, Black, and Loewenstein (1987), Brown and Medoff (1989), and Idson and Oi (1999)), which has shown that larger firms demand higher productivity from their employees, while they also face higher costs

in monitoring their employees' effort and productivity. Socially responsible workforce policies may benefit larger firms by relaxing schedule constraints of "squeezed" productive employees, enhancing employee efficiency through training, boosting employee dedication, and helping firms recruit better talent in a competitive market.

Our article contributes to the literatures on corporate employee treatment and operational risk at financial institutions as well as to the risk management literature. We discuss our contribution to these literatures in Section II. Importantly, the results of our analysis are also relevant for supervisory policy. Given the potential of operational risk to have devastating consequences on financial institutions, operational risk management has received significant supervisory attention (e.g., Basel Committee on Banking Supervision (2001), (2018)). We provide evidence that workforce policies are a relevant dimension for U.S. BHCs' operational risk outcomes. They should be considered when assessing BHC operational risk profiles and can be used for operational risk management purposes as an operational risk mitigation strategy. Moreover, increased supervisory attention might be warranted at institutions lacking in certain aspects of workforce policies (e.g., training programs).

The rest of this article is organized as follows: Section II discusses related literature, while Section III develops the empirical hypotheses tested in our study. Section IV describes our data, the construction of variables, and descriptive statistics. Section V presents our results. Finally, Section VI concludes.

II. Related Literature

Our study contributes to the emerging literature on the implications of corporate employee treatment (e.g., Bae, Kang, and Wang (2011), Ghaly, Dang, and Stathopoulos (2015), Huang, Li, Meschke, and Guthrie (2015), Chen, Chen, Hsu, and Podolski (2016), and Fauver, McDonald, and Taboada (2018)) and the broader CSR literature (e.g., Adhikari (2016), Ferrel, Liang, and Renneboog (2016), and Liang and Renneboog (2017)). Two competing views with respect to the value of employee-friendly corporate cultures have generally emerged from prior work.

On the one hand, the reciprocity view argues that corporate commitment to employees is value enhancing (e.g., Akerlof (1982)). Treating employees well is a way for managers to motivate workers to exert a higher level of effort leading to better performance. Consistent with that view, Edmans (2011) and Edmans et al. (2014) document that employee satisfaction is linked with superior long-term returns and higher firm valuation. Further, studies have found that employee-friendly policies (e.g., wellness programs, work flexibility, and training on the job) improve employee operational productivity (Bartel (1994), Koch and McGrath (1996), Acemoglu and Pischke (1998), Baicker, Cutler, and Song (2010), Bloom, Liang, Roberts, and Ying (2014), and Gubler, Larkin, and Pierce (2018)). Above-market compensation has been similarly linked to better worker performance (e.g., Cappelli and Chauvin (1991), Holzer, Katz, and Krueger (1991), Mas (2006), and Propper and Van Reenen (2010)).

On the other hand, the agency view argues employee-friendly cultures reflect the misalignment of managerial and shareholder incentives (Jensen and Meckling

(1976)). Managers treat employees well to derive private benefits, which could be value destroying. Consistent with that view, several studies document agency problems lead managers to pay employees more (e.g., Pagano and Volpin (2005) and Cronqvist et al. (2009)). Although we do not take a stand on the overall value implications of employee-friendly cultures, our study contributes to this literature by highlighting a new direct channel of how treating employees well through socially responsible workforce policies may create value – by reducing operational losses. In doing so, we provide an in-depth account of the specific mechanisms and drivers from loss and workforce policy-type perspectives.

We also contribute to the literature on operational risk at financial institutions. The early studies in this area aim to define, estimate, and model operational risk (e.g., de Fontnouvelle, Dejesus-Rueff, Jordan, and Rosengren (2006), Jarrow (2008), and Dahen and Dionne (2010)). Cummins et al. (2006) study the impact of operational losses on U.S. banks' market values. More recently, Chernobai et al. (2012) and Cope et al. (2012) broadly focus on operational risk determinants. Wang and Hsu (2013) specifically focus on the operational risk effects of board of directors composition. Chernobai et al. (2021), Curti et al. (2021) and Frame et al. (2021) argue that bank size and complexity are associated with higher operational risk, while Abdymomunov et al. (2020) show that an adverse macroeconomic environment is conducive to more operational losses. Our study is the first to examine the direct operational loss implications of workforce policies at financial institutions. Importantly, we show that workforce policies are associated with tail operational risks, which have prime implications for financial stability. We additionally highlight BHC size (of employee base) as a characteristic that amplifies the effects of workforce policies on operational risk.

Third, our study is related to the empirical literature on risk management.[2] Nance, Smith, and Smithson (1993) and Almeida et al. (2017) study the use of derivatives and purchase obligations, respectively, as risk management tools. Bonaimé et al. (2013) document substitution effects between hedging and payout decisions at firms. Garfinkel and Hankins (2011) find that risk management considerations are a significant driver behind mergers. Pérez-González and Yun (2013) study the firm value implications of active risk management practices. Ellul and Yerramilli (2013) study the relation between risk controls and tail risk at BHCs. We contribute to this literature by showing that corporate workforce policies are related to operational risk outcomes of financial institutions and can thus be used to manage operational risk. Our research directly supports the existing international supervisory guidance on operational risk management suggesting the usefulness of employee training programs (e.g., Basel Committee on Banking Supervision (2011)).

III. Hypothesis Development

Socially responsible workforce policies at financial institutions may impact operational risk through multiple channels. First, this could occur through corporate

[2]Theoretical work in this area includes, among others, Froot, Scharfstein, and Stein (1993), Froot and Stein (1998), Fehle and Tsyplakov (2005), Purnanandam (2008), Rampin and Viswanathan (2010), Bolton, Chen, and Wang (2011), Gamba and Triantis (2014), and Rampini, Sufi, and Viswanathan (2014).

commitment to the safety and health of employees. Gong et al. (2021) suggest that workplace safety and health incidents are in fact very costly to corporate bottom lines: U.S. employers paid $59.6 billion on serious nonfatal injuries for direct worker compensation costs in 2020 alone. In this regard, safety policies may mitigate losses from injuries at the workplace and ensuing potential legal risks (e.g., employee lawsuits). Health programs could improve employees' general mental and physical states lessening operational error precursors such as mental and physical fatigue, stress, and distractedness. Consistent with this argument, Gubler et al. (2018) show that socially responsible health policies that improve workers' wellness boost employee operational productivity. It is also plausible that socially responsible health policies may limit employee operational errors due to increased employee motivation and work capabilities. Last, wellness policies may also reduce operational losses by curtailing absenteeism and ensuring adequate staffing of company job functions (Baicker, Cutler, and Song (2010)).

Mitigating employee fatigue, stress, and absenteeism problems might also occur through more flexible work environment policies (e.g., Kelly et al. (2014)). A flexible work environment, specifically in the context of work from home vis-à-vis the office, is associated with significant performance increases, improved work satisfaction, and reduced worker attrition (Bloom, Liang, Roberts, and Ying (2014)). Flexible work arrangements should thus limit operational mistakes and subsequent losses via enhanced employee mental presence, focus, and talent retention.

Diversity and equal opportunity policies can also be related to operational losses. For example, discrimination lawsuits often define corporate crises and may carry significant financial costs (James and Wooten (2006)). Additionally, whereas litigation expenses represent the most obvious financial cost of improper employment practices such as discrimination lawsuits, expenses associated with back pay settlements to plaintiffs, punitive damages, and organizational policy and structure changes can also present significant financial burden (Terpstra and Kethley (2002)). Diversity and equal opportunity policies could thus decrease employer legal liability from improper employment practices such as discrimination through fostering fair and inclusive work environments. Separately, employee diversity and inclusion policies may decrease employee inefficiencies and errors by fostering employee loyalty and dedication and improving talent recruitment and decision-making (e.g., Hunt, Layton, and Prince (2015)).

Training and development policies could help attenuate operational losses as well. In a general context, training programs have been already suggested to increase labor productivity (e.g., Bartel (1994), Koch and McGrath (1996), Acemoglu and Pischke (1998), and Esteban-Lloret, Aragón-Sánchez, and Carrasco-Hernández (2018)), which also implies a reduction in cost inefficiencies stemming from employee errors and incompetence. In the specific context of operational risk, training may improve employee readiness to deal with common operational issues or unfamiliar problems. It could also reduce operational losses linked to improper practices with respect to customers (e.g., mis-selling of financial products) or other counterparties (e.g., violation of contractual obligations). Employee development policies may encourage workers to exert effort and be attentive to their responsibilities, reducing operational errors. Additionally, employee satisfaction associated with socially responsible workforce policies might reduce operational risk through

other dimensions as well. For example, employee satisfaction might discourage workers from committing fraud.

Hypothesis 1. Banking organizations with socially responsible workforce policies have lower operational risk.

IV. Data Sample and Variable Definitions

A. Data on Operational Losses and Sample Formation

This study uses unique and rich confidential supervisory data on operational losses collected by the Federal Reserve from large financial institutions for stress testing purposes. The data follow the reporting requirements of the FR Y-14Q form and were provided by financial institutions that participated in the 2017 Dodd-Frank Act Stress Test (DFAST) program with consolidated assets of $50 billion or more.[3] The availability of data requisite for the calculations of workforce measures described in Section IV.C reduces the number of institutions in our sample from the 38 originally available in our data to 26. Although our operational loss data come from a small number of institutions, these institutions account for the majority of U.S. banking industry assets (74% as of 2017:Q4). The data provide information such as loss amounts, loss dates, loss event types, and loss descriptions.

The reporting threshold for individual operational losses varies across financial institutions. To mitigate the impact of this heterogeneity in loss reporting thresholds, we follow prior research (e.g., Abdymomunov, Curti, and Mihov (2020)) and discard losses below $20,000, the highest reporting threshold for institutions in the DFAST program. The final sample consists of 336,443 individual loss events from 26 banking organizations over the period 2002:Q1–2017:Q4. Our data are substantially richer than publicly available data used in prior research: operational losses compiled from public sources omit the majority of loss events included in the supervisory data we analyze in this study (de Fontnouvelle, Dejesus-Rueff, Jordan, and Rosengren (2006) and Abdymomunov, Curti, and Mihov (2020)).

To examine the relation between operational risk and the use of socially responsible workforce policies, we aggregate loss data at the bank-quarter level. We use the quarter of the date when an operational loss event occurred or began for aggregation purposes. Our final sample is an unbalanced panel of 1,225 bank-quarter observations in accordance with individual BHC data availability.

B. Operational Risk Measures

Panel A of Table 1 presents variable definitions. Our main measure of operational risk is the total dollar value of operational losses that occur at a BHC in a given quarter. We scale losses by BHC total assets following prior literature on operational risk (Abdymomunov and Mihov (2019)) and other studies on bank risk

[3]Additional information about FR Y-14Q reporting requirements, instructions, and forms can be found at http://www.federalreserve.gov/apps/reportforms/. Subsequent to the Economic Growth, Regulatory Relief, and Consumer Protection Act of 2018, financial institutions with under $100 billion in total assets are no longer required to file the FR Y-14Q reports, effective May 2018.

TABLE 1

Definitions

Table 1 presents variable definitions in Panel A and operational loss event type definitions in Panel B.

Panel A. Variables

Dependent Variables: Operational Loss Metrics	
LTA	Operational losses that occur at a BHC over a calendar quarter as a proportion of the BHC's total assets, multiplied by 1,000
LPE	Operational losses that occur at a BHC over a calendar quarter divided by the BHC's number of employees (U.S. dollars per employee)
LOSS	The financial impact sum of operational losses incurred by a BHC over a calendar quarter in millions of U.S. dollars
FREQ	Frequency of operational losses that occur at a BHC over a calendar quarter
SEV	The average loss severity of operational losses that occur at a BHC over a calendar quarter in millions of U.S. dollars
N_TAIL_(90, 95, 99)	Frequency of losses incurred by a BHC over a calendar quarter that have a ratio of loss amount to BHC assets higher than the 90th, 95th, or 99th quantile of the unconditional distribution of the ratio
N_NONTAIL_(90, 95, 99)	Frequency of losses incurred by a BHC over a calendar quarter that have a ratio of loss amount to BHC assets lower than the 90th, 95th, or 99th quantile of the unconditional distribution of the ratio
TAIL_LTA_(90, 95, 99)	The amount (as a proportion of the BHC's total assets, multiplied by 1,000) of losses incurred by a BHC over a calendar quarter that have a ratio of loss amount to BHC assets higher than the 90th, 95th, or 99th quantile of the unconditional distribution of the ratio
NONTAIL_LTA_(90, 95, 99)	The amount (as a proportion of the BHC's total assets, multiplied by 1,000) of losses incurred by a BHC over a calendar quarter that have a ratio of loss amount to BHC assets lower than the 90th, 95th, or 99th quantile of the unconditional distribution of the ratio
TAIL_LOSS_(90, 95, 99)	The amount (in millions of U.S. dollars) of losses incurred by a BHC over a calendar quarter that have a ratio of loss amount to BHC assets higher than the 90th, 95th, or 99th quantile of the unconditional distribution of the ratio
NONTAIL_LOSS_(90, 95, 99)	The amount (in millions of U.S. dollars) of losses incurred by a BHC over a calendar quarter that have a ratio of loss amount to BHC assets lower than the 90th, 95th, or 99th quantile of the unconditional distribution of the ratio
ln(.)	A natural log transformation operator applied to a variable
Independent Variables: Workforce Measures	
WORKFORCE	A measure of a BHC's commitment and effectiveness toward using socially responsible workforce policies along 4 dimensions (health and safety, diversity and opportunity, training and development, and work environment flexibility)
HEALTH	A measure of a BHC's commitment and effectiveness toward providing a healthy and safe workplace
DIVERSITY	A measure of a BHC's commitment and effectiveness toward maintaining workforce diversity and equal opportunities
TRAINING	A measure of a BHC's commitment and effectiveness toward providing workforce training and education
FLEXIBILITY	A measure of a BHC's commitment and effectiveness toward providing high-quality employment benefits and flexible job conditions
Independent Variables: Other Variables	
N_EMPLOYEES	The number of employees at a BHC (in thousands). ln(N_EMPLOYEES) is a natural log transformation of N_EMPLOYEES. N_EMPLOYEES_(0/1) is an indicator variable, which equals 1 when the number of BHC employees is greater than the sample median number of BHC employees, and 0 otherwise
LEVERAGE	A BHC's total assets divided by book value of equity
NII_II	The ratio of BHC noninterest income to interest income
ROE	A BHC's return on equity
GOVERNANCE	A measure of a BHC's quality of governance (systems and processes, which ensure that its board members and executives act in the best interests of its long-term shareholders)
SALARY	The average employee salary at a BHC calculated as the sum of BHC employee salaries and benefits divided by the number of BHC employees (in millions of U.S. dollars). ln(SALARY) is a natural log transformation of SALARY
ASSETS_(0/1)	An indicator variable, which equals 1 when BHC assets are greater than the sample median BHC assets, and 0 otherwise
Instrumental Variables and Difference-in-Differences Indicators	
(NBR)_STATE_GEI	STATE_GEI is the Di Noia (2002) gender equality index of the state where a BHC is headquartered. NBR_STATE_GEI is the median Di Noia (2002) gender equality index for the neighboring states of the state where a BHC is headquartered
PSL_STATE	An indicator variable equal to 1 if a BHC is headquartered in a state that ever enacted paid sick leave during our sample period, and 0 otherwise
PSL_ENACTED (EFFECTIVE)	PSL_ENACTED is an indicator variable equal to 1 if a BHC is headquartered in a state that enacted paid sick leave (during or after the year of enactment), and 0 otherwise. PSL_EFFECTIVE is an indicator variable equal to 1 if a BHC is headquartered in a state where a paid sick leave act took effect (during or after the year when the law became effective), and 0 otherwise

(continued on next page)

TABLE 1 (continued)
Definitions

Panel B. Event Type Categories	
Internal Fraud (IF)	Acts of a type intended to defraud, misappropriate property, or circumvent regulations, which involves at least one internal party
External Fraud (EF)	Acts of a type intended to defraud, misappropriate property, or circumvent the law, by a third party
Employment Practices and Workplace Safety (EPWS)	Acts inconsistent with employment, health or safety laws or agreements, from payment of personal injury claims, or from diversity/ discrimination events
Clients, Products, and Business Practices (CPBP)	An unintentional or negligent failure to meet a professional obligation to specific clients, or from the nature or design of a product
Damage to Physical Assets (DPA)	Damage to physical assets from natural disasters or other events
Business Disruption and System Failures (BDSF)	Disruption of business or system failures
Execution, Delivery and Process Management (EDPM)	Failed transaction processing or process management, from relations with trade counterparties and vendors

and performance (e.g., James (1991), Ahmed, Takeda, and Thomas (1999), and Ellul and Yerramilli (2013)). For presentation purposes, we multiply the loss-to-assets ratio by 1,000 and call it LTA. In some of our analyses, we also use log-transformed operational dollar losses scaled by BHC number of employees, ln(LPE), log-transformed operational dollar losses, ln(LOSS), log-transformed frequency of operational loss events, ln(FREQ), and log-transformed average operational loss severity, ln(SEV), that occur at an institution in a given quarter.

Table 2 presents descriptive statistics. On average, the BHCs in our sample lose $194 million or the equivalent of 0.026% of their assets per quarter to operational risk. Further, the standard deviations of both dollar losses ($1.30 billion) and asset-scaled operational losses (0.089%) are high relative to the means, indicating substantial cross-sectional and time-series variation of operational losses. On average, 275 operational loss events with an average severity of $0.397 million occur at an institution over a given quarter.

A known property of operational losses is the heavy tails of the empirical loss distributions, where few losses account for a significant portion of total dollars lost to operational risk (Chernobai and Rachev (2006), Jobst (2008)). Thus, although our main analyses focus on quarterly operational losses at BHCs, we also investigate tail operational risk. To measure tail operational risk, we first scale all the (336,443) individual events in our sample by BHC total assets. Then we calculate a high quantile (e.g., 95th) of the resulting empirical distribution and categorize all loss events with loss-to-assets ratios above the quantile as "tail losses." We use 3 different tail quantiles for robustness: the 90th, 95th, and 99th. We then "collapse" the sample of losses at the BHC-quarter level and calculate three sets of tail loss measures. First, we count the number of tail events that occur at a given institution during a given quarter (N_TAIL_90, N_TAIL_95, and N_TAIL_99). Second, we calculate the tail operational dollar losses that occur at a BHC over a given calendar quarter as a proportion of the BHC's total assets, multiplied by 1,000 (TAIL_LTA_90, TAIL_LTA_95, and TAIL_LTA_99). Third, we calculate tail operational dollar losses that occur at a BHC over a given calendar quarter (TAIL_LOSS_90, TAIL_LOSS_95, and TAIL_LOSS_99). Using our 95th quantile tail definition,

TABLE 2
Descriptive Statistics

Table 2 presents descriptive statistics. The sample includes 1,225 quarterly observations of 26 large BHCs over the period 2002:Q1–2017:Q4 for which requisite data are available. Panel A reports descriptive statistics on operational risk measures. Panel B reports descriptive statistics on workforce, control, and interaction variables. Variable definitions are reported in Panel A of Table 1.

	N	Mean	Std. Dev.	P25	P50	P75
Panel A. Operational Loss Metrics						
LTA	1,225	0.257	0.893	0.032	0.075	0.189
LPE	1,225	1.533	6.639	0.202	0.438	1.083
LOSS	1,225	194.202	1,308.803	4.058	14.133	77.508
FREQ	1,225	274.647	421.097	34.000	82.000	312.250
SEV	1,225	0.397	1.031	0.090	0.149	0.277
N_TAIL_90	1,225	27.464	26.161	12.000	19.000	34.000
N_TAIL_95	1,225	13.732	13.277	5.000	10.000	18.000
N_TAIL_99	1,225	2.746	3.081	1.000	2.000	4.000
TAIL_LTA_90	1,225	0.238	0.887	0.023	0.060	0.161
TAIL_LTA_95	1,225	0.230	0.886	0.018	0.053	0.146
TAIL_LTA_99	1,225	0.207	0.882	0.006	0.033	0.111
TAIL_LOSS_90	1,225	179.069	1,299.365	3.324	10.593	60.561
TAIL_LOSS_95	1,225	175.140	1,297.298	2.700	8.620	57.652
TAIL_LOSS_99	1,225	164.300	1,292.367	0.552	4.929	41.771
N_BODY_90	1,225	247.183	413.020	17.000	58.000	266.000
N_BODY_95	1,225	260.915	416.854	25.000	71.000	292.000
N_BODY_99	1,225	271.901	419.999	32.000	81.000	306.250
BODY_LTA_90	1,225	0.019	0.022	0.004	0.011	0.027
BODY_LTA_95	1,225	0.028	0.028	0.009	0.017	0.038
BODY_LTA_99	1,225	0.050	0.046	0.020	0.035	0.067
BODY_LOSS_90	1,225	15.132	28.266	0.440	2.142	11.285
BODY_LOSS_95	1,225	19.062	34.409	0.905	3.546	15.084
BODY_LOSS_99	1,225	29.902	51.981	2.071	6.987	26.981
Panel B. WORKFORCE and Other Variables						
WORKFORCE	1,225	0.188	0.149	0.057	0.152	0.269
HEALTH	1,225	0.136	0.168	0.000	0.044	0.283
DIVERSITY	1,225	0.025	0.068	0.000	0.000	0.023
TRAINING	1,225	0.140	0.123	0.078	0.087	0.175
FLEXIBILITY	1,225	0.143	0.141	0.000	0.121	0.244
N_EMPLOYEES	1,225	73.976	93.638	16.931	31.945	62.600
ln(N_EMPLOYEES)	1,225	3.678	1.088	2.887	3.495	4.153
LEVERAGE	1,225	9.669	2.182	8.141	9.338	10.961
NII_II	1,225	1.618	15.340	0.590	0.804	1.874
ROE	1,225	0.022	0.030	0.016	0.023	0.032
GOVERNANCE	1,225	0.430	0.057	0.412	0.445	0.462
SALARY	1,225	0.028	0.017	0.021	0.024	0.029
ln(SALARY)	1,225	0.028	0.016	0.021	0.024	0.029
STATE_GEI	1,225	59.174	7.318	56.800	62.800	62.800
NBR_STATE_GEI	1,225	40.721	4.218	37.700	42.100	42.800

Table 2 shows that a BHC experiences 14 tail operational losses per quarter on average, which account for 0.023% of the BHC's assets on average. We also construct analogical measures for nontail losses (N_NONTAIL_90, N_NONTAIL_95, N_NONTAIL_99, NONTAIL_LTA_90, NONTAIL_LTA_95, NONTAIL_LTA_99, NONTAIL_LOSS_90, NONTAIL_LOSS_95, and NONTAIL_LOSS_99). Nontail losses for a BHC in a given quarter are losses that are not classified as tail.

C. Workforce Policy Measures and Control Variables

This study uses Refinitiv's ESG indicators to measure banking organizations' relative performance, commitment, and effectiveness toward workforce aspects of CSR. With over 150 content research analysts who are trained to collect ESG data, Refinitiv offers one of the most comprehensive ESG databases beginning in 2002

covering close to 9,000 companies globally. The ESG metrics are collected from corporate and public reporting such as annual reports, CSR reports, company websites, stock exchange filings, and global media sources. Refinitiv captures over 450 company-level ESG metrics, 186 of which are consistent and comparable across firms. They are updated at the annual frequency and grouped into 10 themes (workforce, emissions, innovation, human rights, product responsibility, etc.) under the three ESG pillars (environmental, social, and corporate governance). For the purpose of our analyses, we use the workforce metrics within the social pillar and follow Refinitiv's scoring methodology to evaluate BHCs.[4] The workforce score for socially responsible policies is calculated as follows.

We require that an ESG indicator is nonmissing for at least 80% of the BHCs in our sample in order for the indicator to be included in the calculation of our score. This restriction leaves us with a total of 16 indicators. The Appendix lists the indicators and their definitions and provides summary statistics of the untransformed indicators. Following Refinitiv's original methodology, in cases of missing indicators, we compute the workforce policy scores discussed below using nonmissing indicators only.

For every one of the 16 indicators, we then calculate its *z*-score across BHCs and time. (A *z*-score is calculated as the raw score minus the sample mean, divided by the sample standard deviation.) We next calculate a composite score by summing all *z*-scored indicators. Finally, we linearly transform this continuous score to be between 0 and 1 by adding the absolute value of its minimum and then dividing the resulting amount by the difference of its maximum and minimum values. Although this transformation puts the score in the [0, 1] range, it preserves the relative distance between values; that is, two BHCs with the same sum will obtain the same score. We call the variable WORKFORCE. Higher values of the score are associated with more socially responsible workforce policies.

Figure 1 plots our workforce policy score. There appears to be moderate variability in the score with a gradual improvement in the social responsibility of policies over time. To better understand the source of variation in workforce policies, we additionally decompose the total variation in WORKFORCE (around the grand mean) into within variation over time for each BHC (around individual BHC mean) and cross-BHC variation. The decomposition indicates that the within-BHC variation accounts for around 70% of the total variation, suggesting that the cross-BHC variation accounts for a moderate portion of the variation in the workforce score and that changes in the score over time are relatively significant. Because the ESG data are updated annually, we apply the same value of the score to all quarters in a given year for a given BHC when we merge Refiniv data with other BHC data at the quarterly level (our results are robust to linearly interpolating between yearly values).

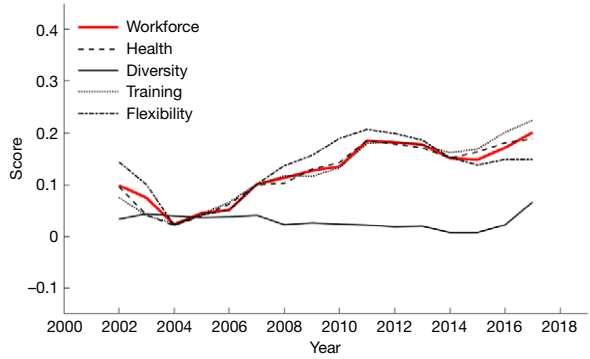
Our multivariate regression analyses also include a number of control variables. To capture the workforce size and, more generally, BHC size, we include the log-transformed number of BHC employees (ln(N_EMPLOYEES)). To control for leverage, we include the ratio of total assets to equity (LEVERAGE). We include

[4]Additional information about Refinitiv's ESG indices and scoring methodology can be found at https://www.refinitiv.com/en/financial-data/indices/esg-index.

FIGURE 1

Workforce Policy Scores over Time

Figure 1 plots workforce policy scores over time. The sample comprises an unbalanced panel of 26 large U.S. BHCs over the period of 2002 to 2017. WORKFORCE measures a BHC's commitment and effectiveness toward using socially responsible workforce policies. HEALTH is a measure of a BHC's commitment and effectiveness toward providing a healthy and safe workplace. DIVERSITY is a measure of a BHC's commitment and effectiveness toward maintaining workforce diversity and equal opportunities. TRAINING is a measure of a BHC's commitment and effectiveness toward providing workforce training and education. FLEXIBILITY is a measure of a BHC's commitment and effectiveness toward providing high-quality employment benefits and flexible job conditions.



the noninterest-to-interest income ratio (NII_II) to account for nontraditional business activities and the return on equity to control for BHC profitability (ROE). We also include Refinitiv's ESG governance rating to capture the quality of BHC governance (GOVERNANCE). The rating measures a company's systems and processes, which ensure that its board members and executives act in the best interests of its long-term shareholders. It further reflects a company's capacity to use best management practices in creating proper incentives, checks, and balances. Last, we control for the log-transformed average level of BHC employee compensation (ln(SALARY)) to account for BHC differences in the workforce compensation. SALARY measures the average salary and benefits across all officers and employees of the holding company and its consolidated subsidiaries.[5] All control variables are sourced from FR Y-9C at the quarterly frequency with the exception of GOVERNANCE, which is sourced from Refinitiv at the annual frequency. Because the governance ratings are not available quarterly but rather annually, we assign the governance rating a BHC receives in a given year to all 4 quarters of that year. Although we do not winsorize variables in our analysis, our results are robust to winsorization at the 1% and 99% levels.

V. Regression Results

A. Operational Losses

To examine whether socially responsible workforce policies are related to operational risk outcomes at banking organizations, we employ multivariate

[5]This includes guards and contracted guards, temporary office help, dining room and cafeteria employees, and building department officers and employees.

regressions that enable us to control for confounding effects. Specifically, we estimate the following regression model using ordinary least squares (OLS):

$$(1) \qquad \text{OP\_RISK}_{i,t} = \beta_i + \beta_t + \beta_1 \text{WORKFORCE}_{i,t} + \beta_2 \text{CTRLS}_{i,t} + \varepsilon_{i,t},$$

where i indexes BHCs and t indexes quarters. We note that OP_RISK, WORKFORCE, and CTRLS are measured contemporaneously. The idea is that the explanatory variables assessed at quarter t best capture a BHC's operational risk environment at the time when operational losses occur (i.e., during quarter t). Our results are robust to lagging the explanatory variables. OP_RISK is one of five operational risk measures: LTA, ln(LPE), ln(LOSS), ln(FREQ), and ln(SEV). LTA measures the operational losses that occur at a BHC over a given calendar quarter as a proportion of the BHC's total assets, multiplied by 1,000. ln(LPE) is a natural log transformation of the operational losses that occur at a BHC over a given calendar quarter divided by the BHC's number of employees. ln(LOSS) is a natural log transformation of operational dollar losses that occur at a BHC over a given calendar quarter. ln(FREQ) is a natural log transformation of the frequency of operational losses that occur at a BHC over a given calendar quarter. ln(SEV) is a natural log transformation of the average operational loss severity at a BHC over a given calendar quarter. WORKFORCE measures the use of socially responsible workforce policies at banking organizations. CTRLS represents a vector of control variables described in Section IV.C. We include BHC fixed effects (β_i) to absorb potential cross-sectional differences in operational losses due to time-invariant BHC-specific factors and quarter fixed effects (β_t) to absorb period-specific shocks common across BHCs. We cluster standard errors at the quarter level to account for within-quarter correlation of the error terms (e.g., due to industry-level operational risk shocks).[6] Table 3 presents the results.

The regression specification in column 1 uses our main measure of operational losses, LTA, as the dependent variable. The estimated coefficient on WORKFORCE is negative and significant at the 5% level, suggesting that institutions with socially responsible workforce policies suffer lower operational losses per dollar of total assets. In columns 2 and 3, we use ln(LPE) and ln(LOSS) as the dependent variables, respectively. The estimated coefficients on WORKFORCE remain negative and significant at least at the 5% level, suggesting the robustness of our results to redefinition of the operational loss measure.[7] Columns 4 and 5 decompose operational losses into loss frequency and loss severity components. The results indicate that the use of socially responsible workforce policies is negatively related to both the frequency and severity of operational losses. A one-standard-deviation improvement in our BHC workforce measure is associated with a 6.6% decrease in operational losses (based on column 3). In dollar terms, this translates into a $173,730 decrease in quarterly operational losses per $1 billion of BHC assets on average (based on column 1), or $28 million per quarter for the median BHC in our sample (with $160 billion in total assets and $19.5 billion in book equity).

[6]Our results are also robust to clustering at the BHC level as well as double-clustering at the BHC and quarter levels (i.e., 2-dimensional clustering).

[7]In unreported tests, we confirm the robustness of our results in column 2 to alternative measures of BHC size such as log-transformed assets, liabilities, and gross income.

TABLE 3

Operational Losses

Table 3 reports coefficients from panel regressions of operational loss measures on BHC workforce policy and control variables. The estimation sample comprises an unbalanced panel of 1,225 quarterly losses that occurred at 26 large U.S. BHCs over the period 2002:Q1–2017:Q4. LTA measures the operational losses that occur at a BHC over a given calendar quarter as a proportion of the BHC's total assets, multiplied by 1,000. ln(LPE) is a natural log transformation of the operational losses that occur at a BHC over a given calendar quarter divided by the BHC's number of employees, multiplied by 1,000. ln(LOSS) is a natural log transformation of operational dollar losses that occur at a BHC over a given calendar quarter. ln(FREQ) is a natural log transformation of the frequency of operational losses that occur at a BHC over a given calendar quarter. ln(SEV) is a natural log transformation of the average operational loss severity at a BHC over a given calendar quarter. WORKFORCE measures a BHC's commitment and effectiveness toward using socially responsible workforce policies. The definitions of all variables are reported in Panel A of Table 1. All specifications include BHC and quarter-fixed effects. The error terms are clustered at the quarter level. *p*-values are presented in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	LTA	ln(LPE)	ln(LOSS)	ln(FREQ)	ln(SEV)
	1	2	3	4	5
WORKFORCE	−1.166**	−0.009**	−0.445***	−0.642***	−0.001**
	(0.049)	(0.048)	(0.000)	(0.000)	(0.026)
ln(N_EMPLOYEES)	−0.145	−0.003	0.069	0.815***	−0.000
	(0.590)	(0.137)	(0.252)	(0.000)	(0.753)
LEVERAGE	0.008	0.000*	0.023***	−0.036***	0.000*
	(0.702)	(0.083)	(0.002)	(0.005)	(0.081)
NII_II	−0.000	−0.000	−0.000	0.001***	−0.000
	(0.792)	(0.552)	(0.550)	(0.001)	(0.647)
ROE	0.371	0.001	0.167	0.180	0.000
	(0.429)	(0.780)	(0.357)	(0.538)	(0.663)
GOVERNANCE	−0.708	−0.004	0.013	−1.635***	−0.001
	(0.286)	(0.245)	(0.936)	(0.000)	(0.306)
ln(SALARY)	−3.300	−0.037	−1.351*	2.239**	−0.007
	(0.105)	(0.245)	(0.069)	(0.025)	(0.294)
BHC FE	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes
N	1,225	1,225	1,225	1,225	1,225
Adj. R^2	0.100	0.085	0.392	0.938	0.096

B. Endogeneity and Reverse Causality

One may naturally be concerned about the possibility that endogeneity or reverse causality is driving our empirical associations in Section V.A. A particular identification concern is that omitted variables related to both operational losses and workforce policies at BHCs might be driving our documented results. For example, certain aspects of a BHC's workforce policies (e.g., training) might be related to the quality of a BHC's risk management framework (beyond our control for BHC governance quality and company fixed effects). Alternatively, it could be that operational losses at BHCs might lead these organizations to change their workforce policies in an effort to reduce future operational risk. Addressing and discussing these identification concerns are important given the ex ante unclear effects of socially responsible workforce policies on operational risk. In this section, we extend our baseline regressions with 2 additional estimation techniques (IV and DiD) to assess the robustness of our baseline results.

1. Instrumental Variables

To identify the impact of interest, we need a source of exogenous variation in socially responsible workforce policies. In our IV approach, we exploit an argument that the social and economic environment in which a company operates permeates CSR practices. Specifically, we consider the gender equality milieu of the state

where a BHC is headquartered and the BHC's top managers are likely located. Of the BHCs in our sample, 7 are located in New York, 3 are located in Ohio, 2 are located in Illinois, and 2 are located in North Carolina. Alabama, California, Georgia, Massachusetts, Michigan, Minnesota, New Jersey, Pennsylvania, Rhode Island, Texas, Utah, and Virginia have one BHC each. BHCs that operate in locations with a gender-progressive environment are more likely to use socially responsible workforce policies.

Based on the premise that BHC gender equality milieu provides an exogenous variation in the socially responsible workforce policies of banking organizations, we estimate a 2-stage least squares (2SLS) system. We use the state gender equality index from Di Noia (2002) as an IV for socially responsible workforce policies employed by BHCs. The index combines several indicators of economic, political, and legal gender equality and uses state-level data from the Census Bureau and other governmental agencies to assess the extent to which women have the same access to economic resources, legal rights, or positions of political power as men in each of the 50 states.

Although the index varies across states, it is calculated prior to the beginning of our sample and does not vary over time. To identify the 2SLS system coefficients, we consequently do not include BHC fixed effects in our specifications. The validity of our instrumental variable, STATE_GEI, depends on the exclusion restriction that, conditional on the included controls, a state's past gender equality milieu does not directly affect the current operational risk of banking organizations headquartered in that state other than through the effect on the BHCs' socially responsible workforce policies. The omission of BHC fixed effects should not raise significant concerns unless the past gender equality environment in a state is related to persistent operational risk factors at the BHC level. We deem that possibility unlikely, but nonetheless address it with a second instrument we describe below.

Our IV strategy also implicitly relies on the persistence of the institutions that determine gender equality over time. Otherwise, past state gender equality should be only weakly correlated with BHC workforce policies, a situation that would result in weak instrumental variables. Table 4 presents the results.

Column 1 reports the first-stage estimation results. The estimated coefficient of STATE_GEI is positive and highly significant. BHCs in states with high gender equality tend to use more socially responsible workforce policies. The adjusted R^2 is high and the F-statistic is above the threshold of 10 prescribed by Stock et al. (2002). That result suggests our IV estimations do not suffer from weak-instrument problems. Column 3 presents second-stage results and shows that the estimated coefficient on WORKFORCE retains its negative sign and is significant at the 1% level. The results confirm that banking organizations with socially responsible workforce policies have lower operational losses.

We next take a step further to refine our first instrument, whereby we specifically use the median neighboring states' gender equality index, NBR_STATE_GEI, as an alternative IV. The refinement mitigates notional concerns that the gender equality milieus of BHC headquarters states may somehow directly affect banking organizations' operational losses through channels other than workforce policies, whose effects are not captured by our control variables. The conjecture here is that the social attitudes and economic trends in a given state are influenced

TABLE 4

Instrumental Variables

Table 4 reports coefficients from instrumental variable regressions of operational losses on BHC workforce policy and control variables. The estimation sample comprises an unbalanced panel of quarterly losses that occurred at 26 large U.S. BHCs over the period 2002:Q1–2017:Q4. LTA measures the operational losses that occur at a BHC over a given calendar quarter as a proportion of the BHC's total assets, multiplied by 1,000. WORKFORCE measures a BHC's commitment and effectiveness toward using socially responsible workforce policies. STATE_GEI is the Di Noia (2002) gender equality index of the state where a BHC's headquarters is located. NBR_STATE_GEI is the median Di Noia (2002) gender equality index of for the neighboring states of the state where a BHC's headquarters is located. We use STATE_GEI and NBR_STATE_GEI as instrumental variables for WORKFORCE. The definitions of all variables are reported in Panel A of Table 1. Columns 1 and 2 present first-stage results. Columns 3 and 4 present second-stage results. All specifications include quarter fixed effects. The error terms are clustered at the quarter level. *p*-values are presented in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	First Stage		Second Stage	
	WORKFORCE		LTA	
	1	2	3	4
STATE_GEI	0.003***			
	(0.000)			
NBR_STATE_GEI		0.004***		
		(0.000)		
WORKFORCE			−1.303***	−0.501***
			(0.005)	(0.006)
ln(N_EMPLOYEES)	0.055***	0.054***	0.199*	0.156
	(0.000)	(0.000)	(0.081)	(0.240)
LEVERAGE	0.005***	0.007***	0.013	0.006
	(0.003)	(0.000)	(0.497)	(0.787)
NII_II	0.000	0.000	−0.000	−0.000
	(0.613)	(0.667)	(0.331)	(0.188)
ROE	0.058	0.180*	0.895	0.717
	(0.579)	(0.081)	(0.120)	(0.244)
GOVERNANCE	0.299***	0.271***	−0.606	−0.858
	(0.000)	(0.000)	(0.368)	(0.254)
ln(SALARY)	0.886***	0.888***	0.802	0.076
	(0.000)	(0.000)	(0.645)	(0.969)
BHC FE	No	No	No	No
Quarter FE	Yes	Yes	Yes	Yes
N	1,225	1,225	1,225	1,225
Adj. R^2	0.572	0.565	0.082	0.081
F-statistic	24.342	23.751		

by the choices of neighboring states, which are usually socially, politically, and economically related. Even though neighboring states' gender equality scores should be related to BHCs' socially responsible workforce policies through social and political spillovers, their effects on BHC workforce policies are unlikely to be driven by firm-specific omitted variables. Columns 2 and 4 report the first-stage and second-stage estimation results, respectively, and show the robustness of our results to this second instrument. Overall, our IV analysis mitigates concerns regarding omitted BHC-level variable problems that could be biasing the estimated relation between BHC workforce policies and operational losses.

2. Difference-in-Differences Estimations

As an additional alternative strategy to identify the effect of socially responsible workforce policies on BHC operational losses, we use the staggered passage of PSL laws in the United States. Specifically, in a DiD setting, we contrast the operational losses of BHCs that were subject to PSL laws to those that were not. Our

TABLE 5
States With Paid Sick Leave Acts

Table 5 reports the enactment and effective years of PSL laws in U.S. states and the District of Columbia over the period 2002–2017.

State	Year Enacted	Year Effective
District of Columbia	2008	2008
Connecticut	2011	2012
California	2014	2015
Massachusetts	2014	2015
Oregon	2015	2016
Vermont	2016	2017
Arizona	2016	2017
Washington	2016	2018
Rhode Island	2017	2018

proxy for a firm's exposure to the passage of a state law is the location of the firm's headquarters. The idea here is that the passage of PSL laws lead to an increase in paid sick leave by BHCs. Furthermore, the passage of PSL likely spilled over into the adoption of more socially responsible corporate policies in addition to PSL. Importantly, PSL laws are arguably exogenously adopted (with respect to banking organizations' operational risk), which provides support for their usage. For example, it is unlikely that BHCs lobbied lawmakers for PSL laws with the idea to reduce operational losses, and it is equally unlikely that lawmakers passed PSL laws as a response to operational issues at BHCs. Furthermore, existing literature provides evidence the PSL law implementations are also unrelated to population demographic characteristics or healthcare usage as well as disease outbreaks such as influenza (e.g., Callison and Pesko (2017), Pichler, Wen, and Ziebarth (2021)).

Table 5 shows the timing of the state-level PSL laws. Enactment dates differ from effective dates. Because there is uncertainty regarding when a BHC adopts PSL policies between the enactment and effective dates of the law, our main analysis uses enactment dates, the earlier of the two types of dates. In our analyses, PSL_STATE is an indicator variable equal to 1 if a state ever enacted PSL during our sample period, and 0 otherwise. PSL_ENACTED is an indicator variable equal to 1 if a BHC is headquartered in a state that enacted PSL (during or after the year of enactment), and 0 otherwise. Eight states (Connecticut, California, Massachusetts, Oregon, Vermont, Arizona, Washington, and Rhode Island) and the District of Columbia passed PSL laws during our sample period (2002–2017). From the 26 BHCs in our sample, 3 are headquartered in one of these "treated" states. On average, 3% of BHCs in a given quarter in our sample are headquartered in a state that implemented a PSL law and the median is zero, as expected. However, this percentage ranges from 0% to 12% across years.

We use the staggered implementation of PSL laws to study their effect on BHC operational losses using a DiD design. We use two types of DiD specifications. First, using specifications with quarter fixed effects, we regress BHC operational losses, LTA, on PSL_STATE, PSL_ENACTED, and control variables. Second, using more conservative specifications with both quarter and BHC fixed effects, we regress LTA on PSL_ENACTED and control variables. In this second type of specifications, BHC fixed effects control for within-BHC time-invariant factors including BHC headquarter state; we consequently do not include PSL_STATE

TABLE 6

Paid Sick Leave Acts and Operational Losses

Table 6 presents the effect of state PSL acts on BHC operational loss measures. In Panel A, the estimation sample comprises an unbalanced panel of quarterly losses that occurred at 26 large U.S. BHCs over the period 2002:Q1–2017:Q4. In Panel B, the estimation sample is restricted to include 3 large U.S. BHCs headquartered in states that enacted PSL over the period 2002:Q1–2017:Q4, matched with 3 large U.S. BHCs headquartered in states that did not enact PSL over our sample period. LTA measures the operational losses that occur at a BHC over a given calendar quarter as a proportion of the BHC's total assets, multiplied by 1,000. PSL_STATE is an indicator variable equal to 1 if a BHC is headquartered in a state that ever enacted PSL during our sample period, and 0 otherwise. PSL_ENACTED is an indicator variable equal to 1 if a BHC is headquartered in a state that enacted PSL (during or after the year of enactment), and 0 otherwise. PSL_EFFECTIVE is an indicator variable equal to 1 if a BHC is headquartered in a state where a PSL act took effect (during or after the year when the law became effective), and 0 otherwise. PSL_PRE is an indicator variable equal to 1 if a BHC is headquartered in a state that enacted PSL during the 2 years prior to enactment, and 0 otherwise. Control variables are included, but not reported for brevity. Panel B, columns 3 and 4 use the estimators from de Chaisemartin and D'Haultf (2020) and Borusyak et al. (2021), respectively. All other specifications are estimated via OLS. The specifications in Panel A, columns 1 and 3 include quarter fixed effects. All other specifications include BHC and quarter fixed effects. The error terms in all specifications are clustered at the quarter level. *p*-values are presented in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	LTA			
	1	2	3	4
Panel A. Full Sample				
PSL_STATE	0.048 (0.632)		0.031 (0.741)	
PSL_ENACTED	−0.161** (0.010)	−0.131* (0.085)		
PSL Effective			−0.163*** (0.001)	−0.103 (0.145)
BHC controls	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
BHC FE	No	Yes	No	Yes
N	1,225	1,225	1,225	1,225
Adj. R^2	0.081	0.088	0.081	0.088
Panel B. Matched Sample				
PSL_ENACTED	−0.265*** (0.004)	−0.327*** (0.004)	−0.264*** (0.003)	−0.089* (0.095)
PSL Pre		−0.152 (0.263)		
BHC controls	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
BHC FE	Yes	Yes	Yes	Yes
N	297	297	297	297
Adj. R^2	0.239	0.240		

in our specifications. We cluster our standard errors at the quarter level as in equation (1). Panel A of Table 6 presents the results.

Columns 1 and 2 show that the coefficients of PSL_ENACTED are negative and significant at least at the 10% level. The enactment of PSL is associated with a $131,000 decrease in quarterly operational losses per $1 billion of BHC assets on average (based on column 2). This effect is about 25% smaller compared to the effect of one-standard-deviation improvement in WORKFORCE from our baseline specification in column 1 in Table 3. This suggests a nontrivial impact of PSL laws on operational losses.

Columns 3 and 4 show that the PSL law effects are directionally robust when we use effective dates, albeit statistically weaker. In column 4, the PSL coefficient estimate is still negative but smaller in absolute terms and marginally insignificant with a *p*-value of 0.14 (e.g., due to PSL policy adoption by BHCs prior to the law

effective dates). These results indicate that state-level PSL laws are overall associated with a reduction in BHCs' operational losses, evidence consistent with our main results that BHCs employing socially responsible workforce policies suffer lower operational losses per dollar of total assets. The coefficients of PSL_STATE, on the other hand, are reassuringly indistinguishable from zero in columns 1 and 3. This indicates no significant differences in the level of operational losses for BHCs that operate in states that enact PSL laws versus states that do not when the effect of PSL laws is partialed out.

A limitation of our DiD analysis is the relatively small proportion of treated relative to nontreated observations in our estimation sample. This is due to two factors: i) the relatively recent enactment of PSL laws and ii) the relatively few BHCs headquartered in states that passed PSL laws. To mitigate concerns with this imbalance, we conduct a robustness test where every BHC headquartered in a "treated" state is matched to a BHC in a "nontreated" state. The matching is done across all control variables at the beginning of our sample.[8] The resulting subsample has a total of 297 observations (12% of which were treated). Column 1 in Panel B of Table 6 presents the results. The coefficients of PSL_ENACTED are negative and statistically significant at the 1% level.

We next check the parallel trends condition in our DiD framework. Specifically, we include in our regressions an indicator variable equal to 1 in each of the 2 years preceding PSL enactment, and 0 otherwise (PSL_PRE). The variable should pick up the existence of significant trends in BHC operational losses prior to PSL enactment. An insignificant PSL_PRE coefficient would thus indicate that the parallel trends assumption is satisfied (i.e., that there is no significant trend in BHC operational losses). We indeed find that to be the case – PSL_PRE coefficient is insignificant in column 1 in Panel B of Table 6. Visually, Figure 2 provides supporting evidence. This figure plots the difference of averaged residuals from treatment and (never treated) control groups relative to PSL enactment. The residuals are from a regression model of LTA on control variables (ln(N_EMPLOYEES), LEVERAGE, NII_II, ROE, GOVERNANCE, and ln(SALARY)), and BHC and quarter fixed effects. Given our small sample and the ensuing heterogeneity across treatment and control units, including time-varying controls is important to make the "common trends" assumption plausible. Specifically, by including time-varying controls, we partial out the effect of controlled dimensions which may nontrivially differ across treatment and control units. Again, there is no indication of a violation of the parallel trends assumption in our DiD framework.

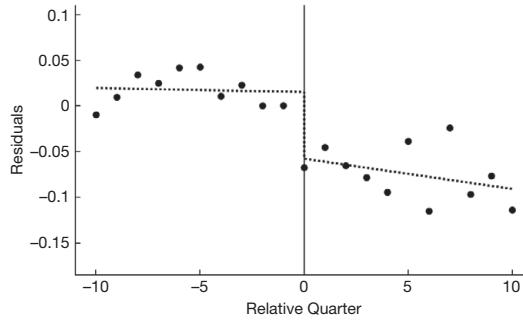
Similar to most of the prior literature using staggered DiD designs, we estimate ours via OLS. Columns 3 and 4 show our results are also robust when using alternative DiD estimators. In column 3, we reestimate our results using the Borusyak, Jaravel, and Spiess (2021) estimator, which is robust to treatment effect heterogeneity. In column 4, we reestimate our results using the de Chaisemartin and D'Haultf (2020) estimator, which is robust to the presence of negative average treatment effects weights when the treatment effect is heterogeneous over time

[8]We first standardize matching variables by demeaning and dividing by their standard deviations. We then calculate the Euclidean distance across the variables for all BHC pairs. We choose the BHC matches with the smallest Euclidean distance (without replacement).

FIGURE 2

PSL Acts and Operational Losses

Figure 2 plots the difference of averaged residuals from treatment and (never treated) control groups relative to PSL enactment. The residuals are from a regression model of LTA on control variables (ln(N_EMPLOYEES), LEVERAGE, NII_II, ROE, GOVERNANCE, and ln(SALARY)), and BHC and quarter fixed effects. The figure also presents linear fits of this difference in the 10 quarters before and after PSL enactment. The estimation sample is restricted to 3 large U.S. BHCs headquartered in states that enacted PSL over the period 2002:Q1–2017:Q4, matched with 3 large U.S. BHCs headquartered in states that did not enact PSL over our sample period. LTA measures the operational losses that occur at a BHC over a given calendar quarter as a proportion of the BHC's total assets, multiplied by 1,000. The definitions of all variables are reported in Panel A of Table 1.



or across groups.[9] Our results remain robust to these recent alternative estimation techniques.

3. A Commentary on Reverse Causality

An additional identification concern could be that there is reverse causality stemming from operational losses to BHC workforce policies (e.g., operational losses may trigger new training programs or health and safety policies, or diversity policies to address existing operational risks). We note, however, that reverse causality is unlikely to be the driver of our results. To the extent that such reverse causality implies a positive correlation between operational risk and the use of socially responsible workforce policies, it should only bias our results against the negative relationship that we find.[10] We thus rule out this second identification problem but note that our IV and DiD estimations also serve to address any remaining reverse causality concerns.

C. Operational Loss Event Types

Operational risk is an amalgamation of various types of subcomponent risks (Chernobai, Jorion, and Yu (2012)). Consistent with Basel II Accord classification,

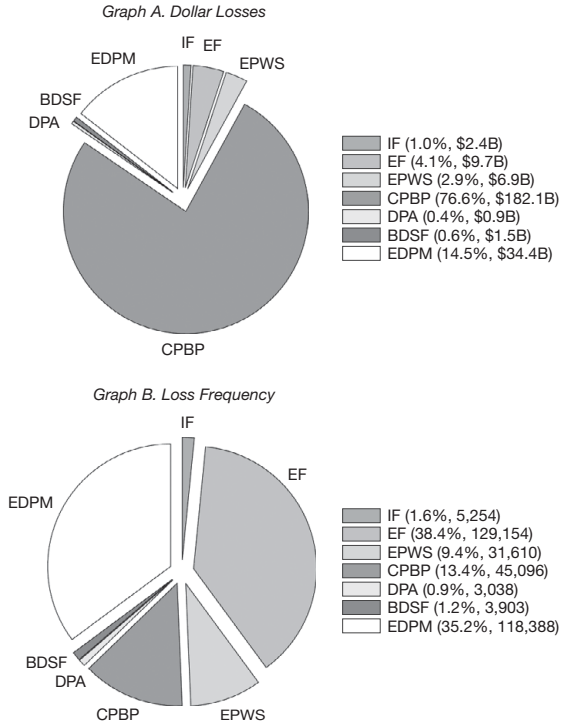
[9]de Chaisemartin and D'Haultfoeuille (2020), Borusyak et al. (2021), and Goodman-Bacon (2021) show that in staggered DiD, linear regressions with period and group fixed effects estimate weighted sums of the average treatment effects (ATEs) in each group and period, with weights that may be negative. This can be problematic when the treatment effect is not constant across groups and over time. For example, the linear regression coefficient may be negative while all the ATEs are positive due to the negative weights.

[10]An additional argument that invalidates reverse causality concerns given our empirical setup is that bank managers do not know about operational losses until such losses are discovered (or accounted for). There are usually significant time lags (in the order of several years) between the occurrence and discovery of material operational losses that could plausibly result in feedback loops (Abdymomunov et al. (2020)).

FIGURE 3

Operational Losses by Event Type

The sample in Figure 3 includes 336,443 operational losses in seven event types incurred by 26 large U.S. BHCs over the period 2002:Q1–2017:Q4. Graph A presents the allocation of dollar losses (percentage of total losses and U.S. dollar loss amounts in billions) among the seven operational risk event types. Graph B presents the allocation of loss frequencies (the percentage of the total number of losses and loss frequencies) among the seven operational risk event types. The nomenclature for event types is as follows: Internal Fraud (IF), External Fraud (EF), Employment Practices and Workplace Safety (EPWS), Clients, Products, and Business Practices (CPBP), Damage to Physical Assets (DPA), Business Disruption and System Failures (BDSF), and Execution, Delivery, and Process Management (EDPM). Event type definitions are provided in Panel B of Table 1.



the losses in our sample are categorized into seven event types: IF, EF, EPWS, CPBP, DPA, BDSF, and EDPM. Panel B of Table 1 provides definitions and Figure 3 presents the allocation of dollar losses and loss counts across the seven event type categories. The figure indicates that the most significant portion of losses in our sample, 77%, can be traced to event type CPBP. On the other side of the spectrum, BDSF is the smallest event type, accounting for only 1% of the losses.

We previously document a significantly negative relation between operational losses and workforce policies after aggregating losses across all seven event types and ignoring the heterogeneity of operational risks in the different loss categories. In this section, we reestimate equation (1) for each loss event type separately. Considering the nature of the losses in each category and the channels discussed in Section III, we expect that workforce policies should be primarily relevant for losses in IF, EPWS, CPBP, and EDPM. On the other hand, we expect insignificant relation to losses in EF, DPA, and BDSF. Table 7 presents the results.

TABLE 7

Operational Loss Event Types

Table 7 reports coefficients from panel regressions of operational loss measures on BHC workforce policy and control variables. The estimation sample comprises an unbalanced panel of 1,225 quarterly losses that occurred at 26 large U.S. BHCs over the period 2002:Q1–2017:Q4. Operational losses are categorized into Internal Fraud (IF), External Fraud (EF), Employment Practices and Workplace Safety (EPWS), Clients, Products, and Business Practices (CPBP), Damage to Physical Assets (DPA), Business Disruption and System Failures (BDSF), and Execution, Delivery, and Process Management (EDPM). LTA measures the operational losses (in a given category) that occur at a BHC over a given calendar quarter as a proportion of the BHC's total assets, multiplied by 1,000. WORKFORCE measures a BHC's commitment and effectiveness toward using socially responsible workforce policies. The definitions of all variables are reported in Panel A of Table 1. All specifications include BHC and quarter fixed effects. The error terms are clustered at the quarter level. *p*-values are presented in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	LTA						
	IF	EF	EPWS	CPBP	DPA	BDSF	EDPM
	1	2	3	4	5	6	7
WORKFORCE	−0.013**	−0.011	−0.024***	−1.124*	−0.004	0.000	0.009
	(0.031)	(0.229)	(0.009)	(0.059)	(0.111)	(0.994)	(0.853)
ln(N_EMPLOYEES)	0.003	0.034***	0.003	−0.203	−0.004**	0.000	0.023
	(0.145)	(0.003)	(0.404)	(0.442)	(0.039)	(0.663)	(0.454)
LEVERAGE	−0.000	−0.003***	0.000	0.012	0.000	0.000	−0.002
	(0.913)	(0.002)	(0.464)	(0.558)	(0.963)	(0.539)	(0.627)
NII_II	−0.000	0.000	0.000	−0.000	0.000	0.000	0.000***
	(0.186)	(0.272)	(0.513)	(0.156)	(0.231)	(0.819)	(0.000)
ROE	0.034	0.017	0.021	0.212	0.001	−0.001	0.087
	(0.157)	(0.740)	(0.183)	(0.654)	(0.696)	(0.848)	(0.356)
GOVERNANCE	−0.018	0.005	−0.004	−0.132	0.007*	0.002	−0.566
	(0.212)	(0.842)	(0.928)	(0.778)	(0.063)	(0.655)	(0.215)
ln(SALARY)	−0.050	−0.024	−0.073	−3.348*	0.034	0.006	0.155
	(0.207)	(0.729)	(0.166)	(0.097)	(0.111)	(0.850)	(0.366)
BHC FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,225	1,225	1,225	1,225	1,225	1,225	1,225
Adj. R^2	0.094	0.297	0.254	0.080	0.067	−0.002	0.110

The coefficient of WORKFORCE is negative and significant, at least at the 10% level, in 3 (out of 4 expected) cases: for IF in column 1, for EPWS in column 3, and for CPBP in column 4. Importantly, as shown in Figure 3, IF, EPWS, and CPBP account for 82% of total operational losses. Consistent with expectations, WORKFORCE is insignificantly related to losses from EF in column 2, DPA in column 5, and BDSF in column 6. Contrary to our expectations, WORKFORCE is not related to losses from EDPM in column 7. Overall, we consider these results to largely confirm (in 3 out of 4 cases) that socially responsible workforce policies are negatively related to operational losses from loss event types that are more likely to depend on the BHCs' workforce and workforce policies (e.g., through channels related to employee health and safety, discrimination practices, skills training, and employee satisfaction).

D. Tail (and Nontail) Operational Losses

A high but stable stream of operational losses may have adverse implications for banking organizations' profitability and performance. Such losses are, however, rarely a concern from a financial stability perspective as they are easy to anticipate and reserve for. On the other hand, massive tail losses pose first-order problems from loss reserving and capital management perspectives and can be critical for BHC risk of failure (Afonso, Curti, and Mihov (2019), Abdymomunov, Curti, and

Mihov (2020), and Curti, Frame, and Mihov (2021)). In this section, we examine whether socially responsible workforce policies at banking organizations are related to the incidence of tail operational risk at banking organizations.

As discussed in Section IV.B, we calculate three different sets of variables measuring BHC tail operational losses over a given quarter. We proceed to test these variables' relation to WORKFORCE in regression specifications similar to equation (1). Table 8 presents the results.

In columns 1–3 of Table 8, we use log-transformed count-based measures using an OLS model. WORKFORCE has a negative and significant (at the 1% level) coefficient across all three specifications. This suggests socially responsible workforce policies are associated with lower incidence of tail operational risks at banking organizations. A 1-standard-deviation increase in WORKFORCE is associated with 7.3%–7.7% decrease in the number of tail operational loss events a BHC suffers over a given quarter. This reduction is financially meaningful and important from a financial stability perspective as the average tail loss at the 90th percentile (tail loss) definition is $7 million and as high as $60 million for the 99th percentile definition.

Columns 4–6 of Table 8 indicate that our results are largely robust to using count models such as a negative binomial regression. The estimated coefficients on WORKFORCE are negative and statistically significant at least at the 10% level for our tail definitions at the 90th and 95th percentiles. The coefficient is negative but marginally insignificant at conventional levels (p-value of 0.12) for our tail definition at the 99th percentile.

Last, columns 7–12 of Table 8 focus on tail loss measures that better capture loss amounts (rather than event frequency). All six coefficients are negative and statistically significant at conventional levels. A one-standard-deviation improvement in our BHC workforce policy measure is associated with a 23.6%–35.6% decrease in tail operational losses per quarter (based on columns 10–12). In dollar terms, this translates into a $164,645–$168,519 decrease in quarterly operational losses from tail events per $1 billion of BHC assets on average (based on columns 7–9). Overall, we conclude that socially responsible workforce policies are associated with lower tail operational risk.

For completeness, we next also examine whether socially responsible workforce policies are related to the incidence of nontail (or "body") operational risk at banking organizations. To test this relation, we define nontail losses to be losses that are not classified as tail for a BHC during a given quarter. We have 12 nontail loss measures that are conceptual counterparts to our 12 tail loss measures. Panel B of Table 8 presents the results. WORKFORCE has a negative and significant coefficient across all body loss measure definitions and regression specifications. These results suggest that not only are socially responsible workforce policies associated with lower incidence of tail operational risks at banking organizations but also with a lower incidence of nontail operational losses.

E. Workforce Policy Components

Section IV.C outlines the construction of our workforce policy measure, WORKFORCE. It is composed of 16 indicators that fall into 4 broad categories –

TABLE 8

Tail and Nontail Losses

Table 8 reports coefficients from panel regressions of tail (Panel A) and nontail (Panel B) operational loss measures on BHC workforce policy and control variables. The estimation sample comprises an unbalanced panel of 1,225 quarterly losses that occurred at 26 large U.S. BHCs over the period 2002:Q1–2017:Q4. N_Tail_90, 95, 99 measure the frequency of tail operational losses at the 90th, 95th, and 99th quantiles, respectively, that occur at a BHC over a given calendar quarter. ln(N_TAIL) is a natural log transformation of N_TAIL. TAIL_LTA_90, 95, 99 measure the tail operational losses at the 90th, 95th, and 99th quantiles, respectively, that occur at a BHC over a given calendar quarter as a proportion of the BHC's total assets (multiplied by 1,000). ln(TAIL_LOSS) is a natural log transformation of tail operational dollar losses at the 90th, 95th, and 99th quantiles, respectively, that occur at a BHC over a given calendar quarter. ln(N_NONTAIL), NONTAIL_LTA, and ln(NONTAIL_LOSS) are analogically defined measures of nontail operational losses. WORKFORCE measures a BHC's commitment and effectiveness toward using socially responsible workforce policies. The definitions of all variables are reported in Panel A of Table 1. In both Panels A and B, columns 1–3 and 7–12 present OLS regression estimates. Columns 4–6 present negative binomial regression estimates. All specifications include BHC and quarter fixed effects. The error terms are clustered at the quarter level. *p*-values are presented in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Tail Measures

	ln(N_TAIL) OLS			N_TAIL Negative Binomial			TAIL_LTA OLS			ln(TAIL) OLS		
	90	95	99	90	95	99	90	95	99	90	95	99
	1	2	3	4	5	6	7	8	9	10	11	12
WORKFORCE	−0.515***	−0.500***	−0.493***	−0.471***	−0.326*	−0.387	−1.131*	−1.123*	−1.105*	−1.582***	−1.749***	−2.386***
	(0.000)	(0.007)	(0.006)	(0.003)	(0.070)	(0.122)	(0.058)	(0.060)	(0.063)	(0.000)	(0.000)	(0.000)
ln(N_EMPLOYEES)	0.545***	0.409***	−0.106	0.651***	0.502**	0.011	−0.162	−0.172	−0.185	0.709***	0.672***	0.618**
	(0.000)	(0.000)	(0.399)	(0.000)	(0.011)	(0.997)	(0.546)	(0.520)	(0.487)	(0.001)	(0.005)	(0.037)
LEVERAGE	−0.006	−0.011	0.001	−0.012	−0.020	−0.002	0.007	0.007	0.008	0.043	0.041	0.057
	(0.701)	(0.496)	(0.960)	(0.365)	(0.242)	(0.912)	(0.723)	(0.715)	(0.682)	(0.302)	(0.357)	(0.289)
NII_II	0.001	0.001	0.001	0.001	0.000	0.000	−0.000	−0.000	−0.000	0.002	0.002	0.002
	(0.077)	(0.287)	(0.521)	(0.164)	(0.547)	(0.967)	(0.741)	(0.702)	(0.636)	(0.295)	(0.319)	(0.297)
ROE	1.106***	0.664	1.243**	1.159*	0.766	1.416	0.343	0.324	0.285	1.752	1.801	2.440
	(0.004)	(0.140)	(0.030)	(0.054)	(0.240)	(0.146)	(0.467)	(0.493)	(0.546)	(0.203)	(0.217)	(0.174)
GOVERNANCE	−1.255***	−1.094***	−0.763*	−1.451***	−1.566***	−1.278**	−0.672	−0.647	−0.600	−1.735*	−1.709*	−1.341
	(0.000)	(0.004)	(0.094)	(0.000)	(0.000)	(0.014)	(0.304)	(0.319)	(0.346)	(0.073)	(0.098)	(0.281)
ln(SALARY)	1.558	−0.298	−2.312	1.581	−0.040	−2.100	−3.231	−3.233	−3.218	−2.018	−2.906	−6.166
	(0.258)	(0.833)	(0.259)	(0.180)	(0.978)	(0.469)	(0.110)	(0.109)	(0.110)	(0.589)	(0.492)	(0.355)
BHC FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,225	1,225	1,225	1,225	1,225	1,225	1,225	1,225	1,225	1,225	1,225	1,225
Adj.R^2	0.679	0.619	0.485				0.091	0.088	0.081	0.719	0.691	0.563

(continued on next page)

TABLE 8 (continued)

Tail and Nontail Losses

Panel B. Body Measures

	ln(N_BODY) OLS			N_BODY Negative Binomial			BODY_LTA OLS			ln(BODY) OLS		
	90	95	99	90	95	99	90	95	99	90	95	99
	1	2	3	4	5	6	7	8	9	10	11	12
WORKFORCE	−0.567***	−0.663***	−0.652***	−0.719***	−0.721***	−0.697***	−0.036***	−0.044***	−0.062***	−0.745***	−0.732***	−0.720***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln(N_EMPLOYEES)	0.959***	0.920***	0.855***	1.099***	1.037***	0.982***	0.017***	0.028***	0.041***	0.695***	0.809***	0.821***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LEVERAGE	0.008	−0.024*	−0.033***	−0.023*	−0.037***	−0.043***	0.001	0.000	−0.000	0.015	0.013	0.017
	(0.617)	(0.066)	(0.008)	(0.060)	(0.001)	(0.000)	(0.224)	(0.540)	(0.792)	(0.158)	(0.280)	(0.231)
NII_II	0.001**	0.001***	0.001**	0.001*	0.001***	0.009***	0.000***	0.000***	0.000	0.001***	0.001***	0.001
	(0.040)	(0.000)	(0.047)	(0.054)	(0.003)	(0.008)	(0.000)	(0.001)	(0.100)	(0.002)	(0.003)	(0.144)
ROE	0.256	0.437	0.164	0.475	0.536	0.294	0.028**	0.047**	0.086**	0.093	0.360*	0.425
	(0.601)	(0.154)	(0.569)	(0.314)	(0.179)	(0.423)	(0.042)	(0.018)	(0.011)	(0.601)	(0.070)	(0.107)
GOVERNANCE	−1.193**	−1.575***	−1.681***	−1.184***	−1.595***	−1.760***	−0.036	−0.061*	−0.107**	−1.083***	−1.313***	−1.482***
	(0.020)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.129)	(0.066)	(0.038)	(0.000)	(0.000)	(0.000)
ln(SALARY)	1.047	2.088**	2.257**	1.527*	1.963**	−2.041**	−0.069	−0.067	−0.081	1.055	1.715	1.418
	(0.267)	(0.033)	(0.024)	(0.084)	(0.029)	(0.24)	(0.074)	(0.193)	(0.246)	(0.261)	(0.125)	(0.225)
BHC FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,225	1,225	1,225	1,225	1,225	1,225	1,225	1,225	1,225	1,225	1,225	1,225
Adj.R^2	0.947	0.947	0.939				0.739	0.677	0.618	0.962	0.955	0.938

policies related to i) health and safety, ii) diversity and opportunity, iii) training and development, and iv) work environment flexibility. The health and safety category addresses a company's commitment to and effectiveness in providing a healthy and safe workplace (i.e., employee physical and mental health and well-being).[11] The diversity and opportunity category addresses a company's commitment and effectiveness in maintaining workforce diversity and equal opportunities (along dimensions such as gender, age, ethnicity, religion, or sexual orientation). The training and development category addresses a company's commitment and effectiveness in providing workforce training and education (i.e., developing the workforce's skills and competences).[12] Last, the work environment flexibility category addresses a company's commitment and effectiveness in providing high-quality employment benefits and flexible work conditions. The Appendix lists the respective categories associated with indicators.

In this section, we decompose WORKFORCE and calculate a score for each of the 4 component workforce categories: HEALTH, DIVERSITY, TRAINING, and FLEXIBILITY. Each of these scores is calculated using the same methodology as discussed in Section IV.C, but the calculation of each respective score only includes the relevant subset of indicators per given category. Similar to WORKFORCE, higher values of the scores are associated with more socially responsible workforce policies.

Table 9 reports Pearson correlation coefficients among the 4 workforce policy components, which are all positive but vary significantly in magnitude across the pairs. (The table also reports correlations between the 4 workforce

TABLE 9

Correlations

Table 9 reports Pearson correlation coefficients. The sample includes 1,225 quarterly observations of 26 large BHCs over the period 2002:Q1–2017:Q4 for which requisite data are available. LTA measures the operational losses that occur at a BHC over a given calendar quarter as a proportion of the BHC's total assets, multiplied by 1,000. HEALTH is a measure of a BHC's commitment and effectiveness toward providing a healthy and safe workplace. DIVERSITY is a measure of a BHC's commitment and effectiveness toward maintaining workforce diversity and equal opportunities. TRAINING is a measure of a BHC's commitment and effectiveness toward providing workforce training and education. FLEXIBILITY is a measure of a BHC's commitment and effectiveness toward providing high-quality employment benefits and flexible job conditions. *p*-values are presented in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	LTA	HEALTH	DIVERSITY	TRAINING	FLEXIBILITY
LTA	1.000				
HEALTH	−0.019 (0.516)	1.000			
DIVERSITY	0.033 (0.254)	0.094 (0.001)	1.000		
TRAINING	−0.074 (0.010)	0.785 (0.000)	0.244 (0.000)	1.000	
FLEXIBILITY	−0.016 (0.585)	0.713 (0.000)	0.138 (0.000)	0.711 (0.000)	1.000

[11]For example, in conversations with BHC employees, we understand that BHCs invest significantly in the health and well-being of their employees – specifically, on mental wellness (e.g., reduction of stress and access to therapy) and safety protocols (e.g., focusing on sanitary measures). These measures likely reduce not only human error but also employee absences.

[12]Examples suggested by BHC employees here include training programs on client relationships, anti-money laundering, and opening/closing branch safety procedures.

component scores and LTA.) We next reestimate equation (1) with each of the 4 component scores. We also perform a "horse race" of the scores by including all 4 of them simultaneously in a specification (to examine whether a specific type of policy is dominant with regard to reducing BHC operational risk). Panel A of Table 10 presents the results.

Columns 1, 3, and 4 show that workforce policies that work to improve employee health and safety, training and development, and work environment flexibility are all negatively and significantly (at least at the 10% level) related to operational losses. In contrast, column 2 shows that diversity-oriented policies are not significantly related to operational losses. Column 5 shows that when operational losses are simultaneously regressed on all 4 workforce policy scores, BHCs'

TABLE 10

Workforce Policy Components

Table 10 reports coefficients from panel regressions of operational loss measures on BHC workforce policy scores (Panels A and B), BHC workforce policy score interactions (Panel C), and control variables. In Panels A and C, operational losses include losses from all event types. In Panel B, operational losses include losses from Internal Fraud (IF), Employment Practices and Workplace Safety (EPWS), and Clients, Products, and Business Practices (CPBP). The estimation sample comprises an unbalanced panel of 1,225 quarterly losses that occurred at 26 large U.S. BHCs over the period 2002:Q1–2017:Q4. LTA measures the operational losses that occur at a BHC over a given calendar quarter as a proportion of the BHC's total assets, multiplied by 1,000. HEALTH is a measure of a BHC's commitment and effectiveness toward providing a healthy and safe workplace. DIVERSITY is a measure of a BHC's commitment and effectiveness toward maintaining workforce diversity and equal opportunities. TRAINING is a measure of a BHC's commitment and effectiveness toward providing workforce training and education. FLEXIBILITY is a measure of a BHC's commitment and effectiveness toward providing high-quality employment benefits and flexible job conditions. The following control variables are included in all specifications: ln(N_EMPLOYEES), LEVERAGE, NII_II, ROE, GOVERNANCE, and ln(SALARY). Control variable coefficient estimates are omitted for brevity. The definitions of all variables are reported in Panel A of Table 1. All specifications include BHC and quarter fixed effects. The error terms are clustered at the quarter level. *p*-values are presented in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Workforce Policy Components

	LTA				
	1	2	3	4	5
HEALTH	−0.891*				−0.329
	(0.100)				(0.381)
DIVERSITY		0.056			0.465
		(0.913)			(0.282)
TRAINING			−1.170**		−0.963**
			(0.049)		(0.043)
FLEXIBILITY				−0.816***	−0.055
				(0.009)	(0.889)
BHC controls	Yes	Yes	Yes	Yes	Yes
BHC FE	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes
N	1,225	1,225	1,225	1,225	1,225
Adj. R^2	0.097	0.088	0.099	0.094	0.099

Panel B. Workforce Policy Components and Event Types

	LTA (IF)				LTA (EPWS)				LTA (CPBP)			
	1	2	3	4	5	6	7	8	9	10	11	12
HEALTH	−0.012***				−0.024***				−0.845			
	(0.030)				(0.001)				(0.133)			
DIVERSITY		−0.006				−0.009				−0.029		
		(0.212)				(0.156)				(0.953)		
TRAINING			−0.011***				−0.020***				−1.110*	
			(0.037)				(0.006)				(0.060)	
FLEXIBILITY				−0.007				−0.020**				−0.658**
				(0.174)				(0.022)				(0.037)
BHC controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
BHC FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,225	1,225	1,225	1,225	1,225	1,225	1,225	1,225	1,225	1,225	1,225	1,225
Adj. R^2	0.096	0.086	0.091	0.088	0.258	0.246	0.251	0.252	0.077	0.067	0.079	0.072

(continued on next page)

TABLE 10 (continued)
Workforce Policy Components

Panel C. Workforce Policy Component Interactions

	LTA					
	1	2	3	4	5	6
HEALTH	−0.810 (0.134)	0.126 (0.815)	−0.104 (0.859)			
DIVERSITY	1.100* (0.078)			1.442* (0.063)	1.557* (0.096)	
TRAINING		−0.145 (0.778)		−1.149** (0.046)		−0.282 (0.680)
FLEXIBILITY			0.476 (0.401)		−0.700*** (0.011)	0.357 (0.460)
HEALTH_ × _DIVERSITY	−2.548** (0.022)					
HEALTH_ × _TRAINING		−2.248** (0.017)				
HEALTH_ × _FLEXIBILITY			−2.455** (0.028)			
DIVERSITY_ × _TRAINING				−1.832** (0.032)		
DIVERSITY_ × _FLEXIBILITY					−4.103** (0.047)	
TRAINING_ × _FLEXIBILITY						−2.404** (0.048)
BHC controls	Yes	Yes	Yes	Yes	Yes	Yes
BHC FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
N	1,225	1,225	1,225	1,225	1,225	1,225
Adj. R^2	0.098	0.101	0.099	0.101	0.095	0.100

commitment and effectiveness in employee training and development outperforms the remaining three workforce policy dimensions in lowering operational risk at banking organizations. The estimated coefficient of TRAINING remains negative and significant at the 5% level, while the estimated coefficients of HEALTH, DIVERSITY, and FLEXIBILITY are all insignificantly related to operational losses.

In Section V.C, we show that the effects of workforce policies are predominantly related to operational losses in event types IF, EPWS, and CPBP. We next focus on the relation of the 4 workforce component scores specifically to losses in these three specific event types. Panel B of Table 10 presents the results. TRAINING is robustly negatively related to operational losses in all three categories, echoing our previous results and highlighting the effectiveness of training in mitigating operational risks. HEALTH is significantly negatively related to losses in IF and EPWS but is insignificantly related to losses CPBP. FLEXIBILITY is significantly negatively related to losses in EPWS and CPBP but insignificantly related to losses in IF.

DIVERSITY is the only workforce policy component that is insignificantly related to losses in all three operational loss event types. This insignificant association is particularly interesting for losses in EPWS because diversity policies should plausibly decrease banks' legal liability from improper employment practices such as discrimination through fostering fair and inclusive work environments. Such a hypothetical effect, however, may be counteracted by other factors and outcomes such as, for example, higher compensation for victims of improper employment

practices (which should lead to higher operational losses for financial institutions). Overall, directionally opposite effects of diversity policies (on operational losses) may explain the overall insignificant relation between operational losses and diversity-oriented workforce policies.

The final question that we ask in this section is whether the different workforce policy components amplify each other's effect on operational losses. In other words, are there synergies between the different types of socially responsible workforce policies that amplify operational loss reduction? It could be that workforce policies of a specific category (e.g., health and safety) are more effective when they exist in tandem with other types of workforce policies (e.g., diversity and opportunity, training and development, work environment flexibility).

To study this issue, we create and test the significance of interaction terms between the 4 workforce policy dimension scores (i.e., HEALTH × DIVERSITY, HEALTH × TRAINING, HEALTH × FLEXIBILITY, DIVERSITY × TRAINING, DIVERSITY × FLEXIBILITY, and TRAINING × FLEXIBILITY) in regression specifications similar to equation (1). Panel C of Table 10 presents the results. Columns 1–6 show that all interaction terms are negative and significant at least at the 5% level, suggesting the existence of amplification channels between the different dimensions of socially responsible workforce policies. In columns 1, 4, and 5, the stand-alone coefficient of DIVERSITY is positive and significant at the 10% level. This highlights an important point that we touch on in Section III: in certain situations, diversity and equal opportunity policies could also work to increase operational losses (e.g., higher compensation of victims for improper employment practices).

F. Additional Analyses

1. Workforce Policy Effects in the Cross-Section of BHC Size

The previous literature in economics has pointed to firm size as a key theoretical and empirical factor with significant impact on the organization of labor and structure of employment (e.g., Barron, Black, and Loewenstein (1987)). Larger firms have been argued to demand higher effort and productivity from their employees (i.e., "squeeze" their employees more), while at the same time these firms also face higher costs in monitoring their employees' effort and productivity (Alchian and Demsetz (1972), Oi (1983), Barron, Black, and Loewenstein (1987), Brown and Medoff (1989), and Idson and Oi (1999)).[13] To the extent that socially responsible workforce policies relax schedule constraints of productive employees, boost efficiency through on-the-job training, enhance employee motivation and loyalty, help firms recruit better talent in a competitive market, socially responsible workforce policy should have more pronounced effect on operational risk reduction at larger companies.[14]

[13]In the specific context of operational risk, Curti et al. (2021) similarly suggest that banking organization size strains managerial oversight and employee focus, hinders managers' ability to monitor employees, and reduces the effort of managers due to intensified agency problems.

[14]Despite an overall amplification of workforce policy effects at larger banking organizations, however, a potential moderating effect is that larger BHCs are more difficult to manage and so workforce policies may be harder to implement, thus dampening their negative effect on operational risk.

TABLE 11

Workforce Policy Effects in the Cross-Section of BHC Size

Table 11 reports coefficients from panel regressions of operational loss measures on BHC workforce policy and control variables. The estimation sample comprises an unbalanced panel of 1,225 quarterly losses that occurred at 26 large U.S. BHCs over the period 2002:Q1–2017:Q4. LTA measures the operational losses that occur at a BHC over a given calendar quarter as a proportion of the BHC's total assets, multiplied by 1,000. WORKFORCE measures a BHC's commitment and effectiveness toward using socially responsible workforce policies. N_EMPLOYEES_(0/1) equals 1 when the number of BHC employees is greater than the sample median number of BHC employees, and 0 otherwise. ASSETS_(0/1) equals 1 when BHC assets are greater than the sample median BHC assets, and 0 otherwise. The definitions of all variables are reported in Panel A of Table 1. All specifications include BHC and quarter fixed effects. The error terms are clustered at the quarter level. *p*-values are presented in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	LTA	
	1	2
WORKFORCE	−0.329 (0.294)	−0.201 (0.526)
LEVERAGE	−0.003 (0.896)	−0.008 (0.699)
NII_II	−0.000 (0.944)	−0.000 (0.912)
ROE	0.265 (0.556)	0.330 (0.451)
GOVERNANCE	−0.988 (0.131)	−1.151* (0.070)
ln(SALARY)	−3.926* (0.064)	−2.859 (0.106)
WORKFORCE × N_EMPLOYEES_(0 1)	−1.330** (0.013)	
N_EMPLOYEES_(0 1)	0.123 (0.270)	
WORKFORCE × ASSETS_(0 1)		−1.384*** (0.005)
ASSETS_(0 1)		0.334* (0.074)
BHC controls	Yes	Yes
BHC FE	Yes	Yes
Quarter FE	Yes	Yes
N	1,225	1,225
Adj. R^2	0.106	0.106

Our empirical strategy to examine the heterogeneous effects of workforce policies across BHC size is to calculate an interaction term of WORKFORCE with BHC size, the number of BHC employees, and test the interaction term's significance in specifications similar to equation (1). For presentation purposes and ease of interpretation, we discretize the number of BHC employees into an indicator variable (N_EMPLOYEES_(0/1)), which equals 1 if the number of BHC employees is greater than the sample median, and 0 otherwise. Our results are similarly robust if we use ln(N_EMPLOYEES) instead. Column 1 of Table 11 presents the result.

Consistent with the idea that the operational risk effect of socially responsible workforce policies is amplified at larger banking organizations, WORKFORCE × N_EMPLOYEES_(0/1) is negative and significant at the 5% level. Column 2 indicates the robustness of our results to using BHC assets as a measure of size. ASSETS_(0/1) is defined similarly to N_EMPLOYEES_(0/1) and equals 1 if BHC assets are greater than the sample median, and 0 otherwise. The interaction WORKFORCE × ASSETS_(0/1) retains a negative sign and is statistically significant at the 1% level.

2. Operational Losses During the 2008–2009 Financial Crisis

Many BHCs experienced large operational losses during the 2008–2009 financial crisis (Abdymomunov, Curti, and Mihov (2020)). In this section, we ask the question whether BHCs with more socially responsible workforce policies in place during or at the onset of the crisis fared better in terms of operational losses during the crisis. It is also possible that workforce policies were not related to the emergence of operational risk over the crisis period and large operational losses were unavoidable regardless of the workforce policies the BHCs in our sample had in place.

To investigate this issue, we define the financial crisis as the official business cycle contraction period 2007:Q4–2009:Q2 (as published by the National Bureau of Economic Research). We then run cross-sectional regressions of LTA on WORKFORCE and control variables, which we average over the crisis period. To mitigate concerns that significant operational losses during the crisis period temporarily distorted workforce policies during the crisis period, we also run regressions of operational losses during the crisis period on workforce policies and control variables measured at the onset of the crisis (2007:Q3).[15] For these tests, we have data for 17 banking organizations (out of the original 26). Table 12 presents the results.

TABLE 12

Operational Losses During the 2008–2009 Financial Crisis

Table 12 reports coefficients from cross-sectional regressions of operational loss measures on BHC workforce policy and control variables. The estimation sample comprises 17 observations from 17 large U.S. BHCs. In column 1, all variables are averaged over 2007:Q4–2009:Q2. In column 2, operational losses are averaged over 2007:Q4–2009:Q2, while all other variables are measured as of 2007:Q3. LTA measures quarterly operational losses that occur at a BHC as a proportion of the BHC's total assets, multiplied by 1,000. WORKFORCE measures a BHC's commitment and effectiveness toward using socially responsible workforce policies. The definitions of all variables are reported in Panel A of Table 1. We use robust standard errors. *p*-values are presented in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	LTA	
	1	2
WORKFORCE	−3.343**	−4.242***
	(0.019)	(0.009)
ln(N_EMPLOYEES)	0.483**	0.335**
	(0.014)	(0.011)
LEVERAGE	−0.019	−0.069
	(0.729)	(0.179)
NII_II	0.196	−0.154
	(0.443)	(0.413)
ROE	0.739	26.426*
	(0.825)	(0.082)
GOVERNANCE	1.161	3.168
	(0.757)	(0.372)
ln(SALARY)	89.867**	127.000***
	(0.026)	(0.002)
BHC FE	No	No
Quarter FE	No	No
N	17	17
Adj. R^2	0.651	0.714

[15]In this last specification, we construct LTA by averaging dollar operational losses over 2007:Q4–2009:Q2 and scaling them by total assets as of 2007:Q3 (and finally multiplying by 1,000).

Across both specifications, WORKFORCE loads negatively and the coefficients are significant at least at the 5% level. Large banking organizations with socially responsible workforce policies incurred lower operational losses during the crisis period. The results support the claim that cross-sectional differences existed among the largest financial institutions (e.g., across dimensions such as workforce policies) that contributed to different operational risk profiles during the 2008–2009 period of economic and financial stress.

VI. Conclusion

This study makes an important contribution to the growing research on operational risk at financial institutions and suggests that this risk might be a link connecting employee-friendly corporate cultures, specifically socially responsible workforce policies, to firm performance and value. Although our findings do not directly speak to the net effects of workforce policies on firm value, we document a direct channel through which such value effects might occur – lower operational losses. We focus on large financial institutions for which a regulatory framework, the Dodd-Frank Act, provides us with rich and comprehensive data. We use a sample of more than 300,000 individual operational loss events from 26 large financial institutions over the period 2002:Q1–2017:Q4 to test our (Hypothesis 1).

Our results show that banking organizations with socially responsible workforce policies suffer lower operational losses per dollar of total assets. This relation is driven not only by small frequent losses but also by a reduced incidence of tail risks. The association is more pronounced for larger institutions with more employees. Our results also highlight that the relationship significantly varies by the type of operational losses and the type of workforce policies.

We conclude that workforce policies have a significant bearing on banking organizations' operational risk profiles. From a practitioner's perspective, our findings have implications for corporate risk management as well as policy and supervision. Our results suggest that workforce policies are a relevant dimension for U.S. BHCs' operational risk outcomes and should be considered when assessing BHCs' operational risk exposures. Our findings implicitly support supervision approaches that subject financial institutions, which are deficient in certain aspects of workforce policies (e.g., training programs), to enhanced supervisory scrutiny and higher capital requirements. Importantly, workforce policies can be used by risk managers as an operational risk mitigation strategy.

Appendix. Environment, Social, and Governance Indicators

TABLE A1

Environment, Social, and Governance Indicators

Table A1 reports Refinitiv's 16 ESG indicators (name, category, and description) used for the construction of the workforce policy scores WORKFORCE, HEALTH, DIVERSITY, TRAINING, and FLEXIBILITY.

Indicator	Category	Description
Employee Health and Safety Policy	Health	Does the company have a policy to improve employee health and safety?
Supply Chain Health and Safety Policy	Health	Does the company have a policy to improve employee health and safety within its supply chain?
Employees Health and Safety Team	Health	Does the company have an employee health and safety team?
Employees Health and Safety Training	Health	Does the company have employee health and safety training?
Supply Chain Health and Safety Training	Health	Does the company have health and safety training for its supply chain?
Employees Health and Safety OHSAS 18001	Health	Does the company have health and safety management systems in place like the OHSAS 18001 (Occupational Health and Safety Management System)?
HIV-AIDS Program	Health	Does the company report on policies or programs on HIV/AIDS for the workplace or beyond?
Diversity and Opportunity Policy	Diversity	Does the company have a diversity and equal opportunity policy?
Diversity and Opportunity Targets	Diversity	Does the company have diversity and equal opportunity targets?
Skills Training Policy	Training	Does the company have a policy to support the skills training of its employees?
Development Policy	Training	Does the company have a policy to support the career development of its employees?
Management Training	Training	Does the company claim to provide regular staff and business management training for its managers?
Internal Promotion	Training	Does the company claim to favor promotion from within?
Supplier ESG training	Training	Does the company provide training on environmental, social, or governance factors for its suppliers?
Flexible Working Hours	Flexibility	Does the company claim to provide flexible working hours or working hours that promote a work–life balance?
Day Care Services	Flexibility	Does the company claim to provide day care services for its employees?

TABLE A2

Descriptive Statistics

Table A2 presents descriptive statistics for Refinitiv's 16 ESG indicators used for the construction of the workforce policy scores WORKFORCE, HEALTH, DIVERSITY, TRAINING, and FLEXIBILITY.

Indicator	Mean	Std. Dev.
Employee Health and Safety Policy	0.413	0.492
Supply Chain Health and Safety Policy	0.036	0.187
Employees Health and Safety Team	0.076	0.265
Employees Health and Safety Training	0.225	0.418
Supply Chain Health and Safety Training	0.006	0.078
Employees Health and Safety OHSAS 18001	0.024	0.154
HIV-AIDS Program	0.128	0.334
Diversity and Opportunity Policy	0.891	0.312
Diversity and Opportunity Targets	0.123	0.329
Skills Training Policy	0.793	0.405
Development Policy	0.863	0.344
Management Training	0.617	0.486
Internal Promotion	0.261	0.439
Supplier ESG Training	0.070	0.255
Flexible Working Hours	0.517	0.500
Day Care Services	0.398	0.490

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