ORIGINAL PAPER

Are Companies Offloading Risk onto Employees in Times of Uncertainty? Insights from Corporate Pension Plans

Douglas Cumming[1,4] · Fanyu Lu[2] · Limin Xu[2] · Chia-Feng (Jeffrey) Yu[3]

Abstract

We investigate how firms adjust corporate pension plans in response to economic policy uncertainty (EPU). Using a sample of US-listed firms, we find that firms increase pension underfunding levels when facing higher EPU. The result is robust to controlling for pension portfolio returns, discount rates, plan sizes, pension liability, numbers of employees, other macroeconomic factors, difference-in-differences and instrumental variable estimation, and additional evidence of pension risk-shifting. Further analysis reveals that financial distress and information asymmetry induced through EPU are the potential channels. The effect is stronger for firms having CEOs being excessively paid, using cash flow as a performance metric in CEO compensation, paying high dividends, and having short-term institutional investors, whereas the presence of unions, positive corporate culture, and social capital alleviate the effect. Notably, managers, not shareholders, appear to be the party reaping the benefits. Our findings suggest that firms may shift risk to employees in response to heightened uncertainty and institutional characteristics play a moderating role in this crucial business ethics issue.

Introduction

There is increasing attention directed towards the extensive impacts of firms' decisions involving multiple stakeholders (e.g., Langtry, 1994; Sirgy, 2002). Among key stakeholders, employees are considered in the most vulnerable position (Lin, 2016; Martin et al., 2020). Employees are often not empowered to vote against managerial decisions and significant components of employee benefits are not well-shielded by explicit and law-binding contracts (Del Guercio et al., 2008). Crucially, their retirement life hinges on corporate pension plans. Unlike the clearly stated annual salary and legally mandated leave entitlements in explicit terms, employee pensions are akin to an implicit promise, existing

✉ Douglas Cumming
  cummingd@fau.edu

  Fanyu Lu
  fanyu.lu@adelaide.edu.au

  Limin Xu
  limin.xu@adelaide.edu.au

  Chia-Feng (Jeffrey) Yu
  chiafeng.yu@xjtlu.edu.cn

1 College of Business, Florida Atlantic University, 777 Glades Road, Boca Raton, FL 33431, USA

2 Adelaide Business School, University of Adelaide, Adelaide, Australia

3 International Business School Suzhou, Xi'an Jiaotong-Liverpool University, Suzhou, People's Republic of China

4 Birmingham Business School, University of Birmingham, Birmingham, United Kingdom
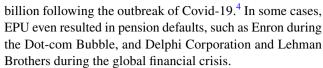
in an opaque manner beyond employees' control until they reach retirement. This is particularly the case in corporate defined benefit (DB) plans, where rank-and-file employees lack influence over pension funding levels or pension asset allocation and investments. The inherent lack of control and transparency of employees in DB pensions is conducive to a stunning shortfall of around $425 billion in 2016[1] and raises ethical concerns about pension underfunding, as emphasized by Davila et al., (2023), Martin et al., (2020) and Sievänen et al., (2013).

From the stakeholder theory perspective, corporate pensions hold vast significance as they reflect social trust in firms (Hyde et al., 2007). Underfunded pension plans jeopardize employees' well-being. If left unattended, the funding gap imposes a looming threat of disrupting the financial sustainability of retirees. In bankruptcy events of firms with underfunded pensions, employees generally face up to 60% reduction in their pension benefits.[2] For example, United Airlines employees suffered a loss of $3.2 billion in pension benefits during its bankruptcy in 2005. Inadequate pension income for retirees could lead to employee reliance on public welfare assistance, consequently placing a massive burden on taxpayers. Thus, pension deficits raise ethical concerns for individuals, businesses, and society.

The purpose of this study is to examine whether firms shift risk to employees via pension adjustments when facing greater economic policy uncertainty (EPU). EPU leads to unpredictable net income, volatile cash flow, and amplified information asymmetry for businesses (Brogaard & Detzel, 2015). Under this circumstance, firms may resort to cost-cutting measures involving employee pension reductions to address immediate financial issues based on the perception that retirement is far off and the lack of control and transparency of employees in DB pensions. Thus, with the time-varying economic and political landscape and the historically high deficits of pension funds, rank-and-file employees are faced with great risk of losing their retirement income security. As anecdotal evidence, the International Monetary Fund reported that firms insufficiently contributed to DB pensions when facing geopolitical tensions and uncertainty in business.[3] The Congressional Research Service estimated that multiemployer pensions faced a deficit of at least $650 billion following the outbreak of Covid-19.[4] In some cases, EPU even resulted in pension defaults, such as Enron during the Dot-com Bubble, and Delphi Corporation and Lehman Brothers during the global financial crisis.

Firms, however, appear to exploit the heightened uncertainty as a pretext for not honouring their commitments to employee pensions. For example, General Electricfaced scrutiny and criticism for reducing its pension contributions as part of its cost-saving measures during COVID-19.[5] The intricate and opaque nature of corporate pensions (Jin et al., 2006), coupled with financial distress and information asymmetry arising from EPU, may render an opportunity for firms to conceal underfunding issues to their advantage. This raises a grave ethical concern as such unethical behaviour could significantly disadvantage hard-working families and erode trust in the corporate sector. Academia and media[6] have called for more attention to the financial health of employee pensions (Anantharaman & Lee, 2014; Davila et al., 2023; Martin et al., 2020). This paper echoes their calls and chooses corporate pension plans for our investigation of firms' risk-shifting to employees in response to heightened EPU.

Strong evidence shows that EPU impacts corporate outcomes, such as limiting capital investment and innovation (Bhattacharya et al., 2017; Gulen & Ion, 2016; Julio & Yook, 2012), and increasing financial distress risk (Brogaard & Detzel, 2015; Kaviani et al., 2020). EPU may lead to reduced socially responsible actions by firms, as suggested by Benlemlih and Yavaş (2023) and Yu et al. (2021), who observe an increase in firms' carbon emissions during high EPU periods. Prior research also documents that DB plans have exhibited substantial underfunding over time.[7] Importantly, underfunded DB plans can be triggered by risk-shifting motives (Goto & Yanase, 2021; Guan & Tang, 2018), based on the asset substitution theory (Eisdorfer, 2008). Employees

---

[1] See: https://www.reuters.com/article/idUS190746813320160415/.

[2] The pension coverage is contingent upon the level of insurance provided by the Pension Benefit Guaranty Corporation (PBGC). The PBGC does not offer a full coverage of most pension plans.
See: https://www.cbsnews.com/news/the-gm-pension-plan-a-100-billion-problem-swept-under-the-rug/.

[3] See: https://www.imf.org/-/media/Files/Publications/covid19-special-notes/enspecial-series-on-covid19pension-schemes-in-the-covid19-crisis-impacts-and-policy-considerations.ashx.

[4] See: https://www.forbes.com/sites/brandonkochkodin/2022/12/21/taxpayers-36-billion-pension-fund-bailout-comes-with-one-thin-string-attached/?sh=115988415dd2.

[5] See: https://www.forbes.com/sites/johnmauldin/2019/10/21/how-ge-screwed-over-its-retirees/?sh=a89efe82b7e1; https://www.sec.gov/Archives/edgar/data/40545/000004054520000039/ge2019rsp.htm.

[6] See: https://www.ai-cio.com/news/corporate-pension-funding-hits-highest-level-since-financial-crisis/
https://www.theguardian.com/business/commentisfree/2023/feb/02/us-pension-funds-implosion-wall-street-private-equity
https://www.reuters.com/world/uk/year-after-budget-crisis-uk-debt-faces-fresh-pensions-headwind-2023-09-22/
https://www.ft.com/content/2956f0d7-dcc1-4293-bac8-6d5b79af4eb7.

[7] Potential explanations include reduced tax rates, insufficient government oversight, employee unawareness of default possibilities, use of instruments, economic recessions, aging populations and worsening unemployment.

are likened to 'inside debtholders' because they hold a fixed claim on the firm for their retirement payments (Anantharaman & Lee, 2014). Due to limited liabilities, firms effectively hold put options written on the pension assets, with a strike price equal to the value of the pension liabilities. Consequently, firms can be incentivized to exercise their pseudo-put options and shift risk to pension beneficiaries via underfunding, especially during high-EPU periods when risk arises from constrained cash flows and limited external funding access (Kaviani et al., 2020). Thus, we conjecture a positive relation between EPU and underfunding levels in corporate DB pension plans.

Using a sample of publicly listed firms in the U.S. from 1998 to 2020, and Baker et al. (2016)'s EPU index, we find that firms increase underfunding levels in corporate pension plans in response to higher EPU. The effect is also economically significant. A one standard deviation increase in EPU level is associated with a 20.56% increase in a firm's pension underfunding level. The positive association remains after controlling for pension portfolio returns, discount rates, plan asset values, plan liabilities, number of employees, and state-level macroeconomic factors. We provide further evidence of firms shifting risk to employees by showing that during heightened EPU periods, firms reduce cash contributions to employee pensions, especially in heavily underfunded pension funds, and poorly funded DB plans also allocate more portfolios to riskier assets.

Our inference is also robust to two-stage least squares (2SLS) and difference-in-difference (DiD) estimation. Following Nguyen and Phan (2017) and Duong et al. (2020), we use partisan polarization, incumbents not seeking re-election, and gubernatorial election outcomes with a marginal difference of 5% or less as instrumental variables (IV) for EPU.[8] These IVs meet relevance and exclusion criteria, as national and gubernatorial political uncertainty leads to higher EPU (Duong et al., 2020; Nguyen & Phan, 2017) but are unlikely to affect corporate pension funding. We also use gubernatorial elections as an exogenous shock to an increase in EPU in a DiD model. The staggered nature of election cycles among states generates cross-sectional uncertainty in election outcomes and economic policies, forming a control group of firms to address macroeconomic factors and exogenous temporal patterns impacting firms' pension funds (Duong et al., 2020). The outcomes of these robustness tests corroborate our inference.

Further analyses are conducted to identify the underlying mechanisms and heterogeneity in our baseline result. Mediation analysis shows that financial distress and information asymmetry induced through EPU are the potential

channels behind the relationship between EPU and pension underfunding. Cross-sectional analysis underscores the conflicts among different stakeholders and identifies disciplining mechanisms that help reduce pension underfunding. We find that the effect of EPU on pension underfunding is stronger in firms that pay their CEO excessively, use cash flow as a critical determinant in CEO compensation structure, are more committed to dividend payouts, and are predominantly influenced by short-term institutional investors. On the contrary, the effect is moderated by the presence of unions, positive corporate culture, and social trust. Finally, we find that top executives, not shareholders, appear to be the party reaping the benefits from risk-shifting.

This study contributes to the literature on corporate pension plans. DB plan management is affected by taxes (Tepper, 1981), managerial incentives (Stefanescu et al., 2018), and earnings pressure (Bergstresser et al., 2006). We complement prior studies by showing that the uncertainty in the economic environment and government policies yields significant negative impacts on employee retirement benefits. Additionally, our mediation analysis shows that beyond financial distress, information asymmetry represents another significant channel acting as the conduit for risk shifting from firms to rank-and-file employees during periods of high EPU.

Moreover, we add to our understanding of various conflicts of interest within a firm amid heightened uncertainty. First, while it is documented that EPU can affect firm choices, such as capital structure (Kelly et al., 2016), firm investment (Gulen & Ion, 2016; Julio & Yook, 2012), corporate innovation (Bhattacharya et al., 2017), mergers and acquisitions (Bonaime et al., 2018; Nguyen & Phan, 2017), and financial distress risk (Brogaard & Detzel, 2015; Kaviani et al., 2020), we extend the literature by exploring how corporate pension and the retirement benefits of rank-and-file employees would be affected by EPU.

Remarkably, we highlight stakeholder conflicts of interest associated with corporate pensions (Pedersen, 2019) during highly uncertain times, together with moderating mechanisms. Excessive managerial compensation, cash from operations as a key metric in managerial contracts, high dividend payouts, and heavy influence by short-term institutional investors worsen pension underfunding under high EPU. We present mitigating measures by showing that firms operating in industries where unions intervene, situated in regions characterized by strong social capital, and fostering a deeply ingrained corporate culture internally, have lessened pension underfunding during high-EPU periods. In a deeper exploration of who benefits from firms shifting risk to employees, our finding resembles the scenario of '*The mantis stalks the cicada, unaware of the oriole behind*'. While conventional wisdom suggests that shareholders benefit from risk-shifting, we add a caveat: within the sphere of corporate pension

---

[8] We extremely appreciate Professor Ghon Rhee for sharing the gubernatorial election data with us.

plans, gains resulting from pension underfunding may be directed towards managers rather than shareholders. This highlights novel conflicts of interest between shareholders, employees, and managers within firms and advances our comprehension of pension management.

The remainder of this paper is structured as follows. Sect. "Literature Review and Hypothesis Development" discusses the literature and develops hypotheses. Section "Methodology" presents the methodology and sample. Section "Empirical Results" shows baseline and robustness tests. Section "Cross-Sectional Analysis" conducts cross-sectional analysis. Section "Additional Analysis" concludes.

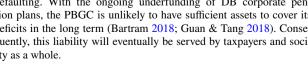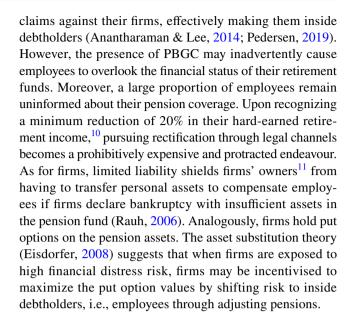## Literature Review and Hypothesis Development

Corporate Pension Plans

The Employee Retirement Income Security Act of 1974 requires employers to adhere to the fiduciary responsibility to contribute and manage pensions to pay employees benefits upon retirement. If pension assets fall below the value of present obligations, the pension is underfunded. This increases firm liability from outstanding retirement commitments and escalates overall risk and costs. Underfunded pensions not only diminish employee satisfaction and productivity but also reflect firms' ethical lapse, which in turn impact corporate capital allocation (Rauh, 2006), borrowing capacity (Balachandran et al., 2019) and performance in the capital market (Jin et al., 2006). When pension underfunding increases, firms also face higher insurance premiums levied by the PBGC.[9] Yet, there are potential advantages for firms to underfund pensions. For instance, less cash contributions to pension plans can free up cash flow for firms to invest in profit-generating projects and ease financial constraints. Thus, the ultimate funding status reflects a trade-off between the costs and benefits of underfunded pensions.

Stakeholder Conflicts and Risk Shifting in Corporate Pension Plans

Pension deficits represent conflicts between employees, shareholders, and managers. Employees and retirees possess

claims against their firms, effectively making them inside debtholders (Anantharaman & Lee, 2014; Pedersen, 2019). However, the presence of PBGC may inadvertently cause employees to overlook the financial status of their retirement funds. Moreover, a large proportion of employees remain uninformed about their pension coverage. Upon recognizing a minimum reduction of 20% in their hard-earned retirement income,[10] pursuing rectification through legal channels becomes a prohibitively expensive and protracted endeavour. As for firms, limited liability shields firms' owners[11] from having to transfer personal assets to compensate employees if firms declare bankruptcy with insufficient assets in the pension fund (Rauh, 2006). Analogously, firms hold put options on the pension assets. The asset substitution theory (Eisdorfer, 2008) suggests that when firms are exposed to high financial distress risk, firms may be incentivised to maximize the put option values by shifting risk to inside debtholders, i.e., employees through adjusting pensions.

EPU, Financial Distress Risk, and Pension Underfunding

First, a rise in EPU is associated with greater information asymmetry. Firms may exploit it and engage in malpractices (Benlemlih & Yavaş 2023). Employee pensions lack protection and are susceptible to fund diversion when the information environment is opaque (Martin et al., 2020; Sievänen et al., 2013). Therefore, heightened EPU may result in a higher level of pension underfunding. Second, the uncertainty regarding economic conditions and government policies negatively affects firms' investment and financing decisions (Gulen & Ion, 2016). Brogaard and Detzel (2015) find that EPU undermines firms' access to favorable debt financing terms, especially for financially distressed firms (Graham & Harvey, 2001). EPU also increases financial market frictions and impedes firms' capacity for equity financing (Brogaard & Detzel, 2015; Pástor & Veronesi, 2013). To the extent that EPU weakens financing opportunities and increases firms' cash flow volatility (Kaviani et al., 2020), EPU constitutes an important source of financial distress risk. Given that unethical business practice is more likely to arise during uncertain times and risk-sifting incentive is stronger when firms are exposed to higher distress risk due to higher EPU, we propose the following hypothesis:

Hypothesis 1 Firms increase their underfunding levels in corporate DB pension plans in response to higher EPU.

---

[9] PGBC is the federal pension insurance institution that safeguards corporate pension benefits. It serves as a safety net to ensure retirees receive their pensions in the event of their sponsors' pension plans defaulting. With the ongoing underfunding of DB corporate pension plans, the PBGC is unlikely to have sufficient assets to cover its deficits in the long term (Bartram 2018; Guan & Tang 2018). Consequently, this liability will eventually be served by taxpayers and society as a whole.

[10] See: https://www.nber.org/papers/w31478

[11] Here, we refer to parties that hold equity ownership of the firms, including shareholders and managers.

Manager–Employee Conflict

Pension deficits indicate managers' potential exploitation of employees (Anantharaman & Lee, 2014; Martin et al., 2020). Martin et al. (2020) suggest that CEOs possessing larger stock option holdings tend to unethically prioritize increasing their own wealth over employees' future financial stability by underfunding and redirecting funds away from pensions. Stefanescu et al. (2018) show that managers extract rent before employee pension freezes and manipulate the actuarial assumptions in pension plans to increase their compensation. A firm's pension underfunding may be exacerbated by opposing interests between CEO and rank-and-file employees, particularly when cash flow from operations is a key performance measure in CEO incentives (Nwaeze et al., 2006). Cheng and Swenson (2018) find that managers are more likely to decrease cash contributions to corporate pension funds when they can receive bonuses from a higher reported operating cash flow. During high-EPU periods, firms face more volatile cash flow from operations (Duong et al., 2020). To avoid their pay being adversely affected, managers with compensation tied to operating cash flow are more incentivised to make lower cash contributions to pensions so that they can report higher operating cash flow.

Moreover, stakeholder conflicts are more likely to arise when CEOs are excessively paid. CEOs with excessive compensation appear to be pursuing personal power and benefits. Remarkably, Benedetti and Chen (2018) suggest that firms with excessively paid CEOs are less likely to be employee-oriented and more likely to harm employee well-being. With high EPU, the conflict between lower-ranked employees and CEOs intensifies as managers aim to maintain their benefits by redirecting funds away from pensions. Therefore, excessively paid CEOs are more likely to underfund employees' retirement plans for their own benefits.

Hypothesis 2 The effect of EPU on corporate pension underfunding is more pronounced for firms that use cash flow from operations as a metric in CEO compensation and firms with excessive CEO pay.

Shareholder–Employee Conflict

Firms paying higher dividends are more committed to their shareholders. Firms may use funds from debtholders to maintain dividend payouts (Boudoukh et al., 2007), which can be regarded as firms shifting risk to debtholders (Onali, 2014). Given that external financing becomes more costly when EPU is heightened (Pástor & Veronesi, 2013), firms may change to borrowing internal funds from employees by reducing contributions to DB pension plans to sustain dividend payments (Srivastav et al., 2014). In other words,

high dividend payments hamper firms' capacity to serve employees' pension obligations.

Institutional investors constitute the largest group in the equity markets in the U.S. (Chen et al., 2007). However, firms with institutional investors trading based on short-term strategies show little concern for the long-term sustainability of firms. For example, Graham et al. (2005) find that firms traded by short-term institutional investors decrease their research and development (R&D) investments and prompt managers to prioritize immediate earnings targets. The involvement of short-term institutional investors exacerbates conflicts between firms and debt holders by pressuring firms to substitute assets, conduct share repurchases, and increase dividend payments (Short et al., 2002). Klein and Zur (2011) suggest that corporate decisions influenced by short-term institutional investors may have a negative impact on the interests of debtholders. Considering that employees' DB pensions are similar to internal debt, with employees as debtholders, we are concerned that employees' long-term retirement benefits could be especially under threat of exploitation during high-EPU periods when firms are traded by short-term institutional investors.

Hypothesis 3 The effect of EPU on corporate pension underfunding is more pronounced for firms with higher dividend payouts and short-term institutional investors.

Institutional Disciplining Mechanisms: Union, Social Capital, and Corporate Culture

Unions wield significant influence over firms' decision-making processes (Klasa et al., 2009). An et al. (2013) show substantial differences between union and non-union workers' responses to the pension funding status. Francis and Reiter (1987) confirm that unions are one key determinant of corporate pension policies, and union-related pension funds are much more well-funded and safer. Given that unions can better protect employees' benefits and reduce firms' tendency to exploit rank-and-file workers, we expect that the presence of unions weakens the effect of EPU on pension underfunding levels.

Social capital is another institutional disciplining mechanism captured by the influence of the density of social networks in a geographical community and the strength of cooperative norms (Guiso et al., 2004; Knack & Keefer, 1997). Hoi et al. (2019) find that companies and corporate executives are susceptible to social influences in local regions (Hilary & Hui, 2009). Cooperative norms limit self-serving behavior (Knack & Keefer, 1997). Hasan et al. (2017) find that firms headquartered in areas with higher social capital scores are less likely to

undertake opportunistic business practices at the expense of stakeholders.

Further, corporate culture is a coordination mechanism of shared values and beliefs within a firm (Henderson & Van den Steen 2015). Corporate culture reinforces corporate solidarity and contributes to positive feelings of unity with employees' greater sense of autonomy. Henderson and Van den Steen (2015) find that firms with positive corporate culture generally empower employees to exert consistent and greater efforts with long-term perspectives (Li et al., 2021). Firms with positive corporate culture focus more on long-term survival and care more about employee treatment. However, wealth transfer through underfunding employee pensions is considered a selfish and unethical business practice. Thus, stakeholder orientation culture would constrain the EPU effects on pension underfunding.

Hypothesis 4 The impact of EPU on corporate pension underfunding is mitigated for firms with more union intervention, located in regions with higher social trust, and operating under a positive corporate culture.

Methodology

Sample and Research Design

Our initial sample includes all publicly listed U.S. firms from 1998 to 2020.[12] We gather pension details from Compustat Pension Annual, firm-specific characteristics from Compustat Fundamental, equity returns from CRSP, CEO compensation from ExecuComp and Incentive Lab, institutional ownership from Thomson Reuters Institutional Holdings database and Bushee's Institutional Investor Classification, and union data from Union Membership and Coverage database. Following Anantharaman and Lee (2014) and Phan and Hegde (2013), we eliminate firms in the utility and financial firms. We exclude firms with negative assets and firm-year observations missing data for control variables. The final sample contains 13,210 firm-year observations from 1,377 individual firms.

We use the following regression model to examine the effect of EPU on firms' pension underfunding status:

Following Anantharaman and Lee (2014) and Pedersen (2019), corporate pension underfunding (*UNDERFUND*) is defined as the difference between pension obligations and pension assets, scaled by total assets. If the pension plan is underfunded (overfunded), the ratio is positive (negative). The higher the ratio, the greater the pension underfunding. The key independent variable is the EPU index, developed by Baker et al. (2016). The EPU index is derived from a weighted average of news components, government spending, inflation, and taxes. Following Duong et al. (2020), we annualize the monthly data by averaging 12-month BBD values for each year and transfer the annual average of the BBD index to its logarithmic form.

We control for pension return (*RET_PENSION)* to address concerns regarding corporate pension plan underfunding being attributed to poor investment performance. We also control for firm characteristics, including cash position (*CASH*), earnings volatility (*EARNVOL*), leverage (*LEVERAGE*), asset tangibility (*PPE*), Altman Z-score (*Z_SCORE*), Market-to-Book (*MTB*), ROA (*ROA*), firm size (*SIZE*), the firm's long-term debt position (*LEV_LONG*), a dummy variable indicating the firm has negative equity (*NEG_EQUITY*), firm's sale growth (*SALES_GROWTH*), institutional ownership (*INSTOWNERSHIP*) and market cap (*MARKET_CAP*). Following Duong et al. (2020), we add firm-fixed effects and cluster robust standard errors at firm level.[13]

Further, according to Gulen and Ion (2016) and Nguyen and Phan (2017), we consider the impacts of other macroeconomic conditions, which include expected and real GDP growth, leading economic index, consumer confidence, GDP forecast dispersion, a standard deviation of cross-sectional profit growth, a standard deviation of cross-sectional stock returns, implied volatility, JLN Index and election year. Additionally, following Bonaime et al. (2018), we include three more macroeconomic variables: the Chicago Fed National Activity Index, the spread between BAA-rated bonds and Federal Fund rates as a proxy for market liquidity, and the cyclically adjusted price-earnings ratio developed by Shiller's CAPE ratio. To avoid the multicollinearity concern of the selected macroeconomic variables, we use the First Principal Component method (Bonaime et al., 2018) to combine these thirteen macroeconomic variables into

$$
\begin{aligned}
\text{Underfund}_{i,t+1} = {} & \beta_0 + \beta_1 \text{EPU}_t + \gamma \text{firm control}_{i,t} + \delta \text{investment opportunities control}_t \\
& + \varphi \text{marcoeconomic control}_t + \text{firm fixed effect} + \varepsilon_{i,t+1}
\end{aligned}
\tag{1}
$$

---

[12] Our sample period starts from 1998 due to the data availability of firm characteristics, pension characteristics, and macroeconomic control variables.

[13] Year-fixed effects can not be controlled as the EPU index remains cross-sectionally invariant (Duong et al., 2020; Gulen & Ion 2016). Including these effects would absorb EPU's explanatory power.

Table 1 Summary statistics

Variable	Observations	Mean	SD	Min	25th Percentile	50th Percentile	75th Percentile	90th Percentile	Max
UNDERFUND	13,200	0.3449	0.5398	− 1.655	0.0569	0.2095	0.515	1.0122	2.1483
EPU	13,200	4.7373	0.3005	4.2673	4.4788	4.7136	4.9464	5.123	5.493
CASH	13,200	0.0855	0.0843	0	0.0236	0.0601	0.1195	0.1962	0.8579
EARNVOL	13,200	1.5494	2.5956	0.0163	0.4106	0.775	1.5786	3.2373	19.4979
LEVERAGE	13,200	0.2801	0.2034	0	0.1458	0.2571	0.3762	0.5228	2.4387
PPE	13,200	0.286	0.1936	0.0017	0.1371	0.2381	0.3876	0.5763	0.9194
Z_SCORE	13,200	1.7722	1.1789	− 2.459	1.121	1.8139	2.4836	3.1157	4.9578
MTB	13,200	1.4173	1.1401	0.2356	0.8161	1.1424	1.6734	2.457	41.7242
ROA	13,200	0.0328	0.1592	− 12.95	0.0114	0.0461	0.0798	0.1183	0.3974
FIRM SIZE	13,200	7.5338	1.6917	− 0.949	6.4462	7.6025	8.7271	9.8651	10.3326
RET_PENSON	13,200	0.0631	0.106	− 0.281	0.0072	0.0837	0.1294	0.1752	0.2997
LEV_LONG	13,200	0.641	1.4385	0	0.0905	0.2285	0.5203	1.27	9.8192
NEG_EQUITY	13,200	0.0633	0.2435	0	0	0	0	0	1
SALES_GROWTH	13,200	0.0505	0.2362	− 1	− 0.0344	0.0405	0.1155	0.2264	9.2515
INSTOWNERSHIP	13,200	0.6744	0.2593	0.0002	0.5267	0.734	0.8722	0.953	1.0671
MARKET_CAP	13,200	7.2506	2.0309	− 1.036	5.9991	7.3547	8.6729	9.9656	10.5902

two components, namely, the macroeconomic uncertainty (*MACRO_UNCERTAINTY*) and investment opportunity (*INVEST_OPP*) components. All continuous variables are winsorised at the 1% and 99% levels. Detailed variable definitions are provided in the Appendix.

Descriptive Statistics

Table 1 provides the descriptive statistics of all variables used in the main analysis. These statistics are similar to those found in previous studies (e.g., Anantharaman & Lee, 2014; Duong et al., 2020; Pedersen, 2019). Approximately only 10% of firms sufficiently cover their retirement liabilities for their employees. The correlation matrix in Table 2 shows that EPU is positively correlated with corporate pension underfunding levels (*UNDERFUND*), which provides an early indication of the influence of EPU on corporate pension underfunding levels.

Empirical Results

Baseline

Table 3 presents the empirical results of our *Hypothesis 1*. First, only EPU and firm fixed effects are included in Column (1). Column (2) further includes firm-level control variables. The coefficients of EPU in Columns (1) and (2) are 0.367 and 0.323, respectively, statistically significant at 1% level, indicating that an increase in EPU is associated with a higher DB pension underfunding in the following year, which is consistent with our risk-shifting prediction. Next, considering the potential confounding effects of macroeconomic conditions such as

recessions, crises, wars, and conflicts, we augment the baseline specifications by adding more macroeconomic indicators. Column (3) confirms the adverse impacts of EPU on the funding status of corporate pension plans after controlling for the aggregate macroeconomic cycles and investment opportunities. The coefficient of EPU on pension underfunding levels is 0.236, suggesting that a one standard deviation increase in EPU is associated with a 20.56 percent increase in pension underfunding.

Following Duong et al. (2020), we further decompose the EPU index into news (*EPU_NEWS*), fiscal and monetary policy (*EPU_GOV*), inflation (*EPU_CPI*), and tax uncertainties (*EPU_TAX*). Columns (4) to (7) show that the news-based component is the most significant metric affecting corporate pension underfunding, consistent with Duong et al. (2020). Uncertainties related to government disagreements about fiscal and monetary policies and inflation do not affect corporate pension underfunding. Not surprisingly, Column (7) shows a significantly positive coefficient for *EPU_TAX*, consistent with prior literature that the tax is one of the determinants in corporate pension plans (Francis & Reiter, 1987; Tepper, 1981). Higher tax uncertainty increases the likelihood that firms will be more reluctant to contribute to pension funds, as future tax codes may yield greater benefits for contributions.

Robustness Tests

Controlling for Discount Rates, Plan Sizes, and Local Economy

In this section, we further control for pension discount rates, plan sizes and local economic conditions. Decreases

Table 2 Correlation matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
UNDER_FUND	1															
EPU	0.122***	1														
CASH	0.068***	0.114***	1													
EARNVOL	0.078***	0.061***	−0.023**	1												
LEVERAGE	0.027**	0.056***	−0.226***	0.106***	1											
PPE	−0.041***	−0.040***	−0.227***	0.080***	0.129***	1										
Z_SCORE	−0.124***	−0.044***	−0.015	−0.050***	−0.245***	−0.024**	1									
MTB	−0.055***	−0.031***	0.216***	−0.151***	0.0285**	−0.123***	−0.240***	1								
ROA	−0.115***	−0.045***	0.047***	−0.079***	−0.126***	−0.034***	0.745***	−0.058***	1							
FIRM SIZE	−0.119***	0.106***	−0.115***	0.097***	0.105***	0.038***	0.098***	0.050***	0.170***	1						
RET_PENSON	−0.067***	−0.047***	0.026**	0.038***	0.005	0.010	0.034***	0.055***	0.085***	0.090***	1					
LEV_LONG	0.080***	0.037***	−0.156***	0.231***	0.448***	0.134***	−0.133***	−0.203***	−0.211***	−0.042***	−0.077***	1				
NEG_EQUITY	0.216***	0.012	0.006	0.153***	0.425***	0.023**	−0.222***	0.033***	−0.203***	−0.080***	−0.021*	0.391***	1			
SALES_GROWTH	−0.065***	−0.123***	−0.049***	−0.059***	−0.024**	−0.011	0.039***	0.075***	0.125***	0.027**	0.032***	−0.069***	−0.066***	1		
INST_OWNER-SHIP	−0.058***	0.074***	0.068***	−0.027*	−0.037***	−0.114***	0.087***	0.068***	0.105***	0.422***	0.046***	−0.154***	−0.158***	0.021*	1	
MARKET_CAP	−0.161***	0.067***	0.003	−0.066***	−0.051***	−0.049***	0.117***	0.295***	0.234***	0.891***	0.060***	−0.295***	−0.191***	0.04***	0.46***	1

***p<0.01, **p<0.05, *p<0.1

Table 3 Baseline Regression (Dependent variable pension underfunding)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
EPU	0.367***	0.323***	0.236***				
	(16.11)	(15.11)	(9.53)				
EPU_NEWS				0.184***			
				(8.35)			
EPU_GOV_DIS					− 0.013		
					(− 0.92)		
EPU_CPI						− 0.019	
						(− 0.85)	
EPU_TAX							0.039***
							(10.48)
CASH		0.309***	0.147	0.161*	0.226**	0.222**	0.164*
		(3.08)	(1.54)	(1.67)	(2.32)	(2.27)	(1.72)
EARNVOL		0.007	0.006	0.006	0.008*	0.008*	0.006
		(1.62)	(1.34)	(1.52)	(1.77)	(1.76)	(1.28)
LEVERAGE		− 0.082	− 0.010	− 0.039	0.008	0.006	0.060
		(− 1.34)	(− 0.18)	(− 0.66)	(0.14)	(0.10)	(1.01)
PPE		− 0.397***	− 0.267**	− 0.291**	− 0.265**	− 0.267**	− 0.195
		(− 3.08)	(− 2.21)	(− 2.38)	(− 2.16)	(− 2.17)	(− 1.62)
Z_SCORE		− 0.008	− 0.005	− 0.006	− 0.008	− 0.008	− 0.006
		(− 1.03)	(− 0.73)	(− 0.73)	(− 1.01)	(− 1.00)	(− 0.82)
MTB		− 0.004	0.005	0.003	0.004	0.004	0.009
		(− 0.43)	(0.79)	(0.46)	(0.64)	(0.63)	(1.33)
ROA		− 0.038	− 0.035	− 0.028	− 0.014	− 0.014	− 0.035
		(− 0.39)	(− 0.43)	(− 0.34)	(− 0.17)	(− 0.17)	(− 0.41)
FIRMSIZE		− 0.036	− 0.039*	− 0.039*	− 0.010	− 0.011	− 0.025
		(− 1.51)	(− 1.70)	(− 1.72)	(− 0.44)	(− 0.48)	(− 1.10)
RET_PENSON		− 0.358***	− 0.478***	− 0.414***	− 0.399***	− 0.405***	− 0.512***
		(− 12.35)	(− 13.50)	(− 12.22)	(− 12.22)	(− 11.99)	(− 14.53)
LEV_LONG		0.003	0.002	0.02	0.001	0.001	0.001
		(0.31)	(0.19)	(0.17)	(0.13)	(0.13)	(0.11)
NEG_EQUITY		0.179***	0.141***	0.145***	0.151***	0.151***	0.129***
		(5.18)	(4.30)	(4.42)	(4.48)	(4.50)	(3.82)
SALES_GROWTH		− 0.000	0.026**	0.034***	0.030***	0.032***	0.018
		(− 0.00)	(2.26)	(2.89)	(2.63)	(2.72)	(1.63)
INSTOWNERSHIP		0.238***	0.127**	0.140***	0.102**	0.104**	0.062
		(4.35)	(2.46)	(2.64)	(1.97)	(2.00)	(1.24)
MARKET CAP		− 0.064***	− 0.065***	− 0.067***	− 0.065***	− 0.066***	− 0.064***
		(− 3.69)	(− 3.93)	(− 4.05)	(− 3.88)	(− 3.87)	(− 3.86)
MACRO_UNCERTAINTY			0.110***	0.110***	0.088***	0.087***	0.080***
(First Principal Component)			(14.18)	(13.68)	(13.13)	(13.32)	(12.35)
INVEST_OPP			− 0.110***	− 0.123***	− 0.137***	− 0.136***	− 0.107***
(First Principal Component)			(− 17.14)	(− 18.26)	(− 17.95)	(− 18.61)	(− 18.81)
CONSTANT	− 1.377***	− 0.464***	− 0.034	0.214	0.918***	0.956***	0.769***
	(− 12.88)	(− 2.66)	(− 0.20)	(1.33)	(5.53)	(4.86)	(5.05)
Adj.R^2	0.063	0.118	0.178	0.178	0.166	0.166	0.179

Table 3 reports the firm fixed effect regressions. T-statistics are reported in parentheses, adjusted for heteroscedasticity, clustered by firms

***$p<0.01$, **$p<0.05$, *$p<0.1$. $N=13{,}210$

Table 4 Controlling for the discount rate and pension size, using regulatory-motivated thresholds of underfunding, and pension freezes

	(1) UNDER-FUND (t+1)	(2) UNDER-FUND (t+1)	(3) UNDER-FUND (t+1)	(4) UNDER-FUND (t+1)	(5) UNDER-FUND_PPA (t+1)	(6) UNDERFUND_80pct (t+1)	(7) UNDER-FUND (t+1)	(8) FREEZE (t+1) (Probit)	(9) FREEZE(t+1) (OLS)
EPU	0.2659***	0.2032***	0.1455***	0.1452***	0.1399***	0.1055***	0.1898***	0.9688***	0.1609***
	(15.15)	(7.44)	(6.10)	(6.09)	(8.99)	(4.71)	(8.07)	(10.53)	(8.46)
UNDERFUND								0.0619	0.0688***
								(0.83)	(4.20)
DISCOUNT RATE	− 0.0597***								
	(− 7.11)								
ASSET_PEN-SION			− 0.430***	− 0.428***					
			(− 8.40)	(− 8.34)					
LIABILITY_PENSION			0.6353***	0.6348***					
			(10.93)	(10.90)					
NO. EMPLOY-EES				− 0.0009					
				(− 1.59)					
STATE_GDP		− 0.0243***	− 0.0197***	− 0.0194***					
		(− 11.64)	(− 10.62)	(− 10.49)					
STATE_UNEMPLOY		0.0107***	0.0053	0.0051					
		(2.67)	(1.49)	(1.44)					
Firm and Macroeconomic	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm fixed effects	YES	YES	YES	YES	YES	YES	YES	NO	YES
N	12,735	13,151	13,151	13,086	13,210	13,210	9447	11,437	11,437
Adj. R^2	0.130	0.195	0.283	0.282	0.137	0.095	0.176	0.0341	0.061

T-statistics are reported in parentheses, adjusted for heteroscedasticity, clustered by firms

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

in discount rates can increase liabilities, resulting in higher underfunding. It is plausible that these decreases coincide with periods of high EPU, and the changes in EPU reflect changes in the pension discount rate. We add *DISCOUNT_RATE* in Column (1) of Table 4 as an additional control variable to ascertain that the relationship between the EPU index and pension plan underfunding is not influenced by the choice of discount rates. Furthermore, the observed impact of pension underfunding could also be attributed to decreased asset value, increased pension liabilities from a growing number of employees or a decline in asset value due to poor local economics. Hence, we control for the state GDP growth rate and state unemployment rate in Column (2), pension asset and liability in Column (3) and the number of employees in Column (4). The positive associations of EPU and underfunding, observed in Columns (2)–(4), signify that pension underfunding rises with EPU irrespective of expected employee numbers, local economic fluctuations, or changes in pension asset or liability values.

Regulatory-motivated Thresholds and Pension Freezes

To further corroborate our baseline result, Columns (5) and (6) of Table 4 utilize regulatory-motivated thresholds based

on the Pension Protection Act (PPA) of 2006 regulation. The PPA introduced a transition rule stating that a funding shortfall amortization does not have to be paid if pension assets equal or exceed 92% of the funding target for 2008, 94% for 2009, 96% for 2010, and 100% after 2011. The PBGC sets the threshold for pension funds "at-risk" at an 80% funding status. The dependent variables *UNDERFUND_PPA* and *UNDERFUND_80pct* are dummy variables equal to 1 if the funding status worsens beyond the thresholds set by the PPA and PBGC.

Furthermore, we acknowledge that a number of corporate pension plans in the U.S. have experienced a freeze (Rauh et al., 2020). To alleviate the concern that our baseline result may be driven by pension freezes, Column (8) of Table 4 considers only the firms that have never frozen their pensions.[14] In Column (5)–(7), the coefficients for EPU are positive and significant at a 1% level, which confirms that our baseline result is robust when using regulatory-motivated thresholds of underfunding as the dependent variable and excluding pension freezes. Amid economic and policy uncertainty, there is also an observed rise in DB pension

[14] The information on pension freeze can be manually obtained from the Department of Labor's Form 5500 and Lexis-Nexis database.

Table 5 DiD and 2SLS regressions

Panel A	EPU (t+1)
UNDERFUND	0.1867
	(0.96)
MACRO_UNCERTAINTY	− 0.1733
(First Principal Component)	(− 1.35)
INVEST_OPP	0.0516
(First Principal Component)	(0.34)
CONSTANT	4.5977***
	(34.95)
Year cluster	YES
N	23
adj. R^2	0.118

Panel B	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Difference-in-Difference			Instrument Variable 2SLS					
				Stage 1	Stage 2	Stage 1	Stage 2	Stage 1	Stage 2
	UNDERFUND (t+1)	UNDERFUND (t+1)	UNDERFUND (t+1)	EPU	UNDERFUND (t+1)	EPU	UNDERFUND (t+1)	EPU	UNDERFUND (t+1)
GUBER_ ELECT	0.0106**								
	(2.08)								
PC5%_MARGIN		0.0258**							
		(1.98)							
NOINCUM			0.0140**						
			(2.11)						
EPU_HAT					1.9048***		0.3201***		2.0527**
(Instrumented)					(16.79)		(3.48)		(2.11)
POLAR				0.8123***					
				(22.68)					
PCT5%_MARGIN						2.4012***			
						(20.91)			
PCT_NOINCUM								0.2223***	
								(2.69)	
Under-identification test: Anderson canon. corr. LM Wald F-statistic					493.779***		422.285***		7.255***
Weak identification test: Cragg-Donald Wald F-statistic					514.541***		437.284***		7.249***
Firm and Macroeconomic	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	13,169	13,169	13,169	13,077	13,077	13,077	13,077	13,038	13,038
Adj. R^2	0.166	0.165	0.166	0.5269	0.2004	0.5239	0.1767	0.5067	0.1662

T-statistics are reported in parentheses, adjusted for heteroscedasticity, clustered by firms.

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

freezes among firms. Column (8) in Table 4 shows the marginal impact of EPU on pension freezes through a probit regression model excluding firm fixed effects. Column (9) shows the OLS outcomes with firm fixed effects. Both columns suggest a significant association between the uncertain environment and an increased possibility of pension freezes.

Difference-in-Difference and 2SLS Estimation

Firstly, to reduce the concern about reverse causality, we examine the impact of the total underfunding level of all firms on the EPU in the following year. As illustrated in Panel A of Table 5. The insignificant coefficient of pension

underfunding levels indicates that the underfunding issue among firms is unlikely to be a causal factor for political changes or an elevation in overall uncertainty.

However, it is still possible that EPU and corporate pension underfunding levels may be jointly correlated with some unobservable factors (Gulen & Ion, 2016), leading to a potential endogeneity concern. Following Duong et al. (2020), we employ a DiD model and use gubernatorial election information as an exogenous shock to EPU. Gubernatorial elections increase uncertainty regarding the economic policies that a newly elected governor might introduce and the subsequent impact these policies could have on corporate decision-making. Gubernatorial elections are exogenous since firms are highly unlikely to relocate their headquarters with every election cycle (Çolak et al., 2017; Jens, 2017).[15] Additionally, unlike presidential elections, which may align with business cycles, gubernatorial elections are staggered, with at least two occurring annually. Consequently, gubernatorial elections disassociate firms' decisions from coinciding directly with specific economic cycles. The exogenous and staggered nature of gubernatorial elections enables us to estimate the following model:

$$Underfund_{i,t+1} = \beta_0 + \beta_1 STATE\_ELECT_{s,i,t} + \gamma\, firm\, control_{i,i,t} + \delta\, investment\, opportunities\, control_t \\ + \varphi\, marcoeconomic\, control_t + firm\, fixed\, effect + \varepsilon_{i,t+1}$$

In Eq. (2), all variables remain consistent with those in Column 3 of Table 3, except for *STATE_ELECT*, which replaces EPU and represents a set of state-level election variables, including the election year (*GUBER_ELECT*) and election outcomes (*PC5%_MARGIN* and *NOINCUM*). *GUBER_ELECT* is set to one if fiscal year t corresponds to a gubernatorial election year in states, where firm i is located, and zero otherwise. *NOINCUM* takes the value of one when the firm is situated in a state-year with gubernatorial elections where the incumbent does not seek re-election due to term limits in that particular year, and zero otherwise. *PC_5%MARGIN* equals one for firms headquartered in states with gubernatorial elections won by a margin of 5% or less, and zero otherwise.

The results from Column (1) in Panel B of Table 5 indicate an increase in underfunding levels of firms' pension plans during gubernatorial election years. Similar trends are observed for firms headquartered in state-years with incumbents not seeking re-election due to term limits and for firms situated in state-years where gubernatorial elections were won by a margin of 5% or less, evidenced by the significant

positive coefficients of *GUBER_ELECT*, *PC5%_MARGIN*, and *NOINCUM*. This aligns with our main finding of the positive association between uncertainty and pension underfunding levels.

We further address endogeneity concerns by employing three instrumental variables (IV) that measure the political uncertainty using national and gubernatorial election data from the Voteview[16] and Congressional Quarterly Press Electronic Library. The first IV is partisan polarisation (*POLAR*), as in McCarty (2019). *POLAR* is calculated as the difference in the first dimension of the *DW-NOMINATE* scores between the Republican and Democratic parties (Nguyen & Phan, 2017). *DW-NOMINATE* scores track legislators' ideologies over time. Similar voting leads to interaction, while differing preferences result in avoidance. The score difference shows the ideological distance and disagreement between legislators.

Nguyen and Phan (2017) and McCarty (2019) suggest that partisan polarization complicates legislative passage, causing policy gridlocks and uncertainty, so it meets the relevance requirement. Meanwhile, political polarization involves divergent political attitudes and extreme ideologies,

(2)

unlikely to affect firm-level pension fund decisions, so it also meets the exclusion requirement. Therefore, *POLAR* serves as a valid IV for EPU.

Column (4) in Panel B of Table 5 reports the first-stage regression results for EPU on the IV (*POLAR*), controlling for firm-specific characteristics and macroeconomic factors. In Column (1), the significant positive coefficient (0.8123) for *POLAR* at the 1% level indicates its relevance. Column (5) reports the second-stage regression with the dependent variable as underfunding levels in corporate pension plans. The coefficient (1.905) for the instrumented *EPU* remains positively significant at the 1% level, consistent with the baseline regression. The result reaffirms our initial finding of a positive association between EPU and corporate DB pension underfunding levels.

We subsequently perform 2SLS regression by incorporating the state-level election outcomes (*PCT5%_MARGIN* and *PCT_NOINCUM*). *PCT5%_MARGIN* denotes the asset held by firms in state-years with gubernatorial election victories concluded with a 5% or narrower margin, scaled by the total assets across states for that year. Meanwhile, *PCT_NOIN-CUM* measures the proportion of assets owned by firms in

---

[15] While firms may strategically decide on their headquarters' location, this decision primarily revolves around minimizing state income taxes (Jens 2017), rather than being directly related to corporate pension considerations.

[16] Source: https://legacy.voteview.com/dwnomin.htm and https://voteview.com/data

Table 6 Further evidence of risk-shifting in pensions

Variables	(1) CASH CONTRIBUTION (t+1)	(2) EQUITY ALLOCATION (t+1)	(3) PENSION BETA (t+1)
EPU×UNDERFUND_HIGH	− 0.0593**	0.0582***	0.0447***
	(− 2.15)	(4.07)	(3.30)
UNDERFUND_HIGH	0.2024	− 0.2506***	− 0.1887***
	(1.62)	(− 3.69)	(− 2.92)
EPU	− 0.0124	− 0.0173*	− 0.0131
	(− 0.59)	(− 1.78)	(− 1.38)
MANDAT_CONTRI_HIGH	0.0503**	0.0143***	0.0187***
	(2.13)	(2.60)	(3.58)
Firm and Macroeconomic controls	YES	YES	YES
N	8396	7913	7563
Adjusted R^2	0.070	0.256	0.120

Table 6 reports the firm fixed effect regressions. T-statistics are reported in parentheses, adjusted for heteroscedasticity, clustered by firms

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

state-years where gubernatorial incumbents, due to term limits, do not seek re-election. The IVs meet the relevance condition. In theory, the entry of new incumbents and heightened uncertainty regarding election outcomes are expected to amplify uncertainty about future economic policies (Jens, 2017). To test the relevance criteria, we regress *PCT5%_MARGIN* and *PCT_NOINCUM* on EPU in the first stage and obtain the fitted value of *EPU_HAT*. As observed in Columns (6) and (8) of Table 5, both *PCT5%_MARGIN* and *PCT_NOINCUM* have a significant association with EPU. These two instruments also satisfy the exclusion criteria. *PCT5%_MARGIN* represents the victory margin during an election, which is less likely manipulated by firms. Similarly, *PCT_NOINCUM* signifies incumbents who cannot seek re-election owing to term limits. It is unlikely that firms have the power to change these laws to serve their own ends, such as perpetuating pension underfunding. Collectively, these instruments satisfy the exclusion restriction. The significant positive coefficients of the Instrumented *EPU_HAT* in Columns (7) and (9) of Table 5 support the initial findings, suggesting heightened EPU is indeed associated with increased underfunding levels after rectifying endogeneity.

Further Evidence of Risk-Shifting in Pensions

Expanding beyond the funding ratio, we also examine actual cash contributions to pension funds and asset allocation strategies as further evidence of risk shifting. The cash contribution data is manually obtained from the Form 5500-CRR database. Following Cheng and Swenson (2018), we further control for operating cash flow, financing cash flow, investment cash flow and interest coverage. These

cash-related variables are relevant because distressed firms may under-fund pension plans simply because they are very cash-constrained. We include the minimum mandatory pension contributions required by PBGC (*MANDAT_CONTRI_HIGH*) as another control variable, following Balachandran et al. (2019). We also switch the macroeconomic variables to the equity and bond market returns. Economically, a favorable market return translates to increased investment returns from pension assets. Then, firms are less motivated to contribute cash to the pension fund since a high investment return can reduce the gap between pension liabilities and assets. *UNDERFUND_HIGH* is a dummy variable, which equals one if the underfunding level is higher than the industry median in a given year and zero otherwise. As shown in Column (1) of Table 6, heightened EPU reduces firms' cash contributions to pensions and exacerbates risk-shifting incentives in firms with heavily underfunded pensions.

Aside from reduced cash contributions, increasing the volatility of underlying assets, also referred to as the gambling effect, serves as another way of risk shifting (Anantharaman & Lee, 2014; Bartram, 2018). The pension deficit decreases when risk-seeking strategies yield exceptional returns for pension portfolios. However, the limited liability policy protects firm owners if these strategies result in underperformance and defaults. The proportion of pension assets allocated to equity (*EQUITY_ALLOCATION)* and pension beta (*PENSION_BETA)* provide an appropriate way to examine the association between EPU and risk-taking in pension plans. When *EQUITY_ALLOCATION* and *PENSION_BETA* are higher, the risk in the pension portfolio is greater. The coefficients of *EPU×UNDERFUND_HIGH* in both Columns (2) and (3) of Table 6 are positive and significant at a 1% level, suggesting that firms with poorly funded DB plans allocate a larger

Table 7 CEO compensation, dividend and institutional investors

Variables	(1) CEO Total Compensation	(2) CEO Compensation Based on Operating Cash Flow	(3) Dividend	(4) Institutional Investor Horizon
	UNDERFUND (t+1)	UNDERFUND (t+1)	UNDERFUND (t+1)	UNDERFUND (t+1)
EPU_HIGH	0.0992***	0.0550***	0.0698***	0.0629***
	(7.72)	(3.11)	(6.71)	(4.62)
EPU_HIGH×CEO_PAY_HIGH	0.0644**			
	(1.98)			
EPU_HIGH×CASHMATRIC		0.1102*		
		(1.71)		
EPU_HIGH×DIVIDEND_HIGH			0.1123***	
			(4.52)	
EPU_HIGH×SHORT_TERM				0.0342**
				(2.28)
CEO_PAY_HIGH	− 0.3207**			
	(− 2.07)			
CASHMETRIC		0.0959*		
		(1.68)		
DIVIDEND_HIGH			− 0.5700***	
			(− 4.84)	
SHORT_TERM				− 0.0047
				(− 0.40)
Firm and Macroeconomic controls	YES	YES	YES	YES
N	9192	3598	12,634	11,743
Adj. R^2	0.221	0.146	0.191	0.135

Table 7 reports the firm fixed effect regressions. T-statistics are reported in parentheses, adjusted for heteroscedasticity, clustered by firms

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

proportion of pension portfolios to risky assets when facing higher EPU. These findings confirm the risk-shifting through pension-asset allocation, especially in times of high EPU.

Cross-Sectional Analysis

Manager–Employee Conflict

Drawing from findings that managers manipulate corporate pension plans for wealth transfer (Cheng & Swenson, 2018; Martin et al., 2020; Stefanescu et al., 2018), *Hypothesis 2* suggests pension plans are utilized by managers to extract rent, especially in firms with overpaid CEOs. Should the conflict between managers and employees drive risk shifting, we expect a heightened impact of EPU on pension underfunding in firms with overpaid CEOs. We also predict that the conflict between CEOs and employees intensifies when CEO compensation is directly tied to cash flow. With an EPU rise, firms experience reduced cash inflow from regular

business operations (Duong et al., 2020). Such reductions affect reported operational cash flows and adversely impact CEOs' benefits (Cheng & Swenson, 2018). Hence, CEOs, particularly those whose pay connects to cash flow metrics, are more incentivized to cut pension contributions.

To test this conjecture, we initialize the CEO pay indicator, *CEO_PAY_HIGH*, assigning a value of one when a CEO's total compensation is higher than the industry median and zero otherwise. Additionally, using data from Incentive Lab, we establish another indicator, *CASH_METRIC*, which equals one if firms utilize cash flow from operations as the performance metric for CEO compensation and zero otherwise. *EPU_HIGH* is assigned a value of one when the EPU index is higher than the third quartile and zero otherwise. We then add their interaction term to our model. Table 7 shows the coefficients of the interaction terms (*EPU_HIGH×CEO_PAY_HIGH*; *EPU_HIGH×CASHMATRIC*) are positive and significant. It aligns with our prediction: firms overcompensating CEOs have higher corporate pension underfunding during high EPU periods. Furthermore, if

Table 8 Disciplining mechanisms

Variables	(1) Union UNDERFUND (t+1)	(2) Social Capital UNDERFUND (t+1)	(3) Corporate Culture UNDERFUND (t+1)
EPU_HIGH	0.3382***	0.1570***	0.0587***
	(4.07)	(11.76)	(4.85)
EPU_HIGH × UNION_HIGH	− 0.2480***		
	(− 2.96)		
EPU_HIGH × SOCIALCAP_HIGH		− 0.0810***	
		(− 6.59)	
EPU_HIGH × CORCULTURE _HIGH			− 0.0408***
			(− 2.92)
UNION_HIGH	0.1254*		
	(1.81)		
SOCIALCAP_HIGH		0.0168	
		(0.90)	
CORCULTURE_HIGH			0.0303***
			(2.94)
Firm and Macroeconomic controls	YES	YES	YES
N	10,548	13,210	8271
Adj. R^2	0.138	0.184	0.104

Table 8 reports the firm fixed effect regressions. T-statistics are reported in parentheses, adjusted for heteroscedasticity, clustered by firms

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

cash flow from operations serves as a performance metric for CEO compensation, employees in such firms suffer heightened levels of pension deficit during times of greater EPU.

Shareholder-Employee Conflict

Hefty dividend payouts may extract wealth from debtholders to shareholders, as a cash dividend payout reduces a firm's ability to pay debts (Onali, 2014). A high dividend payout may work as a risk-shifting mechanism, benefiting shareholders while disadvantaging employees who act as inside debt holders (Pedersen, 2019). We, therefore, predict that firms with high dividend payout contribute less to employees' retirement plans and engage in more pension underfunding when facing higher EPU.

Moreover, institutional investors with varying investment horizons prioritize different firm aspects through their voting influence (McCahery et al., 2016). Bushee (1998) finds that long-term-oriented institutional shareholders have a stronger incentive to monitor firms and pursue projects with the goal of long-run value maximization (Chen et al., 2007; Gaspar et al., 2005), whereas short-term institutions may induce firms to take practices that benefit the firm only in the short-term, such as discouragement of R&D projects (Graham et al., 2005), and even engage in activities that

may harm firm reputation (Kim et al., 2019). Anantharaman et al. (2022) point out that pension manipulation damages a firm's reputation as a responsible and caring employer. We hence predict that firms with short-term-oriented institutional investors contribute less to employees' retirement plans and engage in more pension underfunding when facing higher EPU.

Table 7 examines the above hypotheses. Following Boudoukh et al. (2007), *DIVIDEND* is calculated as common stock dividends plus stock repurchases divided by lagged total assets. *DIVIDEND_HIGH* indicator is equal to one when *DIVIDEND* is higher than the industry median in a given year and zero otherwise. *SHORT_TERM* is a dummy variable equal to one when a short-term institutional investor is present (transient investors from Bushee's classifications). We include the *EPU_HIGH* and *DIVIDEND_HIGH* and *SHORT_TERM* and their interaction terms in the baseline regression model. Columns (3)-(4) in Table 7 show positive and statistically significant coefficients for the interaction terms, suggesting that firms with high dividend payouts maintain increased underfunding in employees' pension plans during high EPU periods, and short-term institutional investors exacerbate risk-shifting to employees in heightened EPU times due to their focus solely on firms' short-term prospects.

Disciplining Mechanisms

Next, our focus shifts to whether institutional characteristics, including unions, social capital, and corporate culture, may moderate firms' pension underfunding. Francis and Reiter (1987) and Guan and Tang (2018) suggest that increased union control in states, industries, or specific periods leads to improved pension funding and less aggressive asset allocation in pensions. Additionally, we contend that the impact of uncertainty on pension underfunding is alleviated in regions with strong social capital, involving cooperative norms and social network influence (Hoi et al., 2019) and within firms fostering a positive corporate culture.

Following Klasa et al. (2009), we obtain the industry unionization rates from the Union Membership and Coverage Database. We use the industry union rate as the proxy for employee power. The data on social capital is obtained from the Northeast Regional Centre for Rural Development dataset, and the data on firm-level corporate culture is provided by Li et al. (2021).[17] We create dummy variables, *UNION_HIGH*, *SOCIALCAP_HIGH*, and *CORCULTURE_HIGH*, assigned a value of one when union coverage, social capital score, and corporate culture, respectively, is higher than the contemporaneous industry median and zero otherwise. The variables of interest are their interaction terms with *EPU_HIGH*. The negative coefficients of the interaction terms, *EPU_HIGH×UNION_HIGH*, *EPU_HIGH×SOCIALCAP_HIGH*, and *EPU_HIGH×CORCULTURE_HIGH* shown in Table 8 suggest that union power, firms operating in areas with higher levels of social capital, and positive corporate culture act as buffers against opportunistic risk-shifting behaviours towards employees during high EPU times.

Additional Analysis

The Underlying Channels

In this section, we examine the possible underlying channels i) information-asymmetry, ii) financial distress through which EPU influences corporate pension plan underfunding. Following Wu and Lai (2020), the mediation models are formulated as Eq. (3) and (4), where M denotes the mediators:

First, we investigate the relationship between EPU and the mediators. Subsequently, we regress corporate pension underfunding levels on EPU, the mediators, firm characteristics, and macroeconomic variables. Should the coefficients for corporate pension underfunding levels be positively significant in both regressions and the mediating variables also show statistical significance, the mediating effect holds.

The impacts of asymmetric information on corporate decisions have undergone extensive study. Yu (2008) highlights increased accounting figure manipulation in opaque information environments. DB pension plans contain asymmetric information due to complexity and sensitivity to actuarial assumptions (Bergstresser et al., 2006). Firm managers have more information than rank-and-file employees and outsiders about the true value of their pension liability and the size of the deficit (Picconi, 2006). Uncertainty with pension liability translates into uncertainty with a firm's total value. Therefore, external financing may be expensive and difficult for firms with higher pension deficits. With the EPU shock, the uncertainty of the entire market environment and a firm's operation increase, exacerbating the difficulty for firms with heavily underfunded pension plans to obtain external financing. Hence, we propose that increased information asymmetry resulting from high EPU will motivate firms to rely more on internal funding. This, in turn, may yield reduced contributions to pension plans, serving as a potential underlying mechanism for our hypothesis.

Following Wu and Lai (2020), an information asymmetry index is constructed from multidimensional elements such as firm size, Tobin's Q, research and development expenses, number of shareholders, analyst coverage and analyst earnings forecast errors. The information asymmetry index (*INFOASY*) is derived from the average percentile rankings of all components within the entire sample. A higher information asymmetry index signifies increased information asymmetry.

Information asymmetry heightens challenges in accessing external funding and exacerbates financial distress. Rauh (2006) suggests that increased opacity in firms leads to higher cash reserves for secure investments, potentially elevating pension underfunding levels. Nguyen and Phan (2017) show that EPU exacerbates financial distress, which may limit a firm's ability to make cash contributions to pension plans. Therefore, financial distress could also be the

$$
\begin{aligned}
M_{i,t} = &\beta EPU_t + \gamma \, firm \, control_{i,t} + \delta \, investment \, opportunities \, control_t \\
&+ \varphi marcoeconomic \, control_t + firm \, fixed \, effect + \varepsilon_{i,t}
\end{aligned}
\tag{3}
$$

$$
\begin{aligned}
Pension \, underfunding_{i,t+1} = &\beta EPU_t + \alpha M_{i,t} + \gamma firm \, control_{i,t} + \delta \, investment \, opportunities \, control_t \\
&+ \varphi \, marcoeconomic \, control_t + firm \, fixed \, effect + \varepsilon_{i,t}
\end{aligned}
\tag{4}
$$

---

[17] We are grateful to Kai Li, Feng Mai, Rui Shen, and Xinyan Yan for sharing corporate culture data.

Table 9 Mediation analysis

	(1) UNDERFUND (t + 1)	(2) EDF	(3) INFOASY	(4) UNDERFUND (t + 1)
EPU	0.2357***	0.1662***	0.0140***	0.0614**
	(9.53)	(31.36)	(2.60)	(2.47)
EDF				1.0938***
				(7.27)
INFOASY				0.5168***
				(6.09)
Firm and Macroeconomic controls	YES	YES	YES	YES
Number of observations	13,210	11,343	11,835	10,645
Adj. R^2	0.177	0.426	0.185	0.224

Table 9 reports the firm fixed effect regressions. T-statistics are reported in parentheses, adjusted for heteroscedasticity, clustered by firms

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

Table 10 CEO compensation and shareholder value-added activities

	(1) CEO PAY	(2) TMT PAY	(3) R & D	(4) CAPEX	(5) DIV_EQ	(6) REP_EQ	(7) STOCK RET
UNDERFUNDING_HIGH	0.0317*	0.0194	− 0.0658	− 0.0097	− 0.0329	− 0.1877	0.0004
	(1.66)	(1.35)	(− 1.41)	(− 0.13)	(− 0.45)	(− 1.43)	(0.05)
EPU_HIGH	0.1023***	0.0736***	− 0.1675***	− 0.2497***	0.0327	− 0.2217	0.0219**
	(5.40)	(5.14)	(− 3.69)	(− 3.51)	(0.48)	(− 1.51)	(2.42)
EPU_HIGH × UNDERFUND_HIGH	0.0411*	0.0333**	0.0768	0.0655	− 0.0762	− 0.2305	− 0.0080
	(1.87)	(2.01)	(1.29)	(0.75)	(− 0.87)	(− 1.45)	(− 0.72)
Firm and Macroeconomic controls	YES	YES	YES	YES	YES	YES	YES
N	10,144	10,144	13,210	13,210	13,210	13,210	13,001
Adj. R^2	0.111	0.164	0.043	0.112	0.023	0.041	0.089

Table 10 reports the firm fixed effect regressions. T-statistics are reported in parentheses, adjusted for heteroscedasticity, clustered by firms

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

underlying economic channel through which EPU worsens pension funding status. Following Anantharaman and Lee (2014), the proxy for financial distress is the expected default frequency (*EDF*), measured as a cumulative standard normal distribution of distant-to-default based on Merton's structural distance-to-default model.

Table 9 shows the results of the mediation models. Column (1) repeats the baseline regression, showing that EPU has a positive and significant association with pension underfunding levels. Column (2) suggests that EPU is associated with a higher degree of financial distress. In Column (3), the information asymmetry index maintains significance at the 1% level to EPU, which affirms that a greater degree of information asymmetry is associated with heightened uncertainty. Column (4) adds both mediating variables (EDF; INFOASY) to the one regression. The coefficients for the financial distress and information asymmetric index are both positive and significant at a 1% level, suggesting that EPU

affects pension underfunding through financial distress risk and information asymmetry channels.

Who Benefits from Employee Pension Underfunding?

According to conventional wisdom, shareholders should benefit from firms' risk-shfiting. However, are managers, given their control over pension plans, more likely to exploit the underfunding to their advantage? In Table 10, we address this question by analysing CEOs and top management teams (TMT) and find that during periods of high uncertainty, firms with greater pension underfunding witness pay rises for both CEOs and TMTs. This aligns with the business ethics literature that illustrates the conflict between top executives and employees (Martin et al., 2020). We further find that the activities aimed at enhancing shareholder value, such as research and development (R&D)

and capital expenditure (CAPEX), do not experience a significant increase when pensions are underfunded. There is also no significant increase in dividends, share repurchases, and equity returns. Our findings suggest that managers, rather than shareholders, derive benefits from underfunding employee pensions, highlighting the importance of monitoring managerial opportunism related to corporate pension schemes.

Conclusion

Using a sample of publicly listed U.S. firms from 1998 to 2020, we find that firms increase pension underfunding levels in response to higher EPU. This result is robust to controlling for pension portfolio returns, discount rates, plan sizes, number of employees, various macroeconomic factors, and DiD models and the 2SLS approach. We provide further evidence of risk-shifting by showing that firms with higher corporate pension underfunding contribute less cash to employee pensions, allocate more assets to riskier equity instruments, have a higher beta of their pension investment portfolios, and are more likely to freeze pensions when facing high EPU.

We also find that the effect of EPU on pension underfunding levels is more pronounced in firms overcompensating CEOs, prioritizing cash flow as a performance metric in CEO compensation, issuing higher dividends, and being influenced by short-term institutional investors. However, the presence of unions, positive corporate or social culture can alleviate the effects of EPU on pension deficits. Our findings are consistent with the notion that EPU aggravates stakeholder conflicts as firms are more likely to engage in risk-shifting via employee pension plans in response to higher uncertainty. We also highlight the importance of institutional characteristics in moderating stakeholder conflicts. Mediation analysis indicates that EPU influences employees' retirement benefits through financial distress risk and information asymmetry. With caution, we find that during periods of high EPU, firms with significantly underfunded pension plans do not appear to engage in activities that could enhance shareholder value. Instead, there are significant increases in CEO and TMT compensation. Contrary to conventional wisdom, which suggests shareholders benefit from risk-shifting, our study indicates cautiously that within the context of corporate pension plans, the advantages stemming from pension underfunding may be directed towards top executives rather than shareholders.

This study provides important insight and policy implications for regulatory bodies to better understand corporate pension plans. To alleviate pension underfunding, our findings suggest that the government should increase the transparency of government policies via media and social platforms. Also, financial incentives such as taxes should be adopted to discourage the participation of short-term institutional investors. Moreover, the coverage of unions, social trust, and corporate culture are essential to maintaining well-managed employee pensions. Thus, the government may pay more attention to firms with low union coverage and weak corporate culture and firms headquartered in regions with low social norms and require stricter pension disclosure and audit for these firms, looking after the disadvantageous cohorts. Finally, policymakers should exert cautious attention to executive compensations and dividend payout when firms have higher levels of pension underfunding.

Declarations

Conflict of interest The authors have nothing to declare.

Research involving Human Participants and/or Animals Not applicable.

Informed Consent Not applicable.

References

An, H., Huang, Z., & Zhang, T. (2013). What determines corporate pension fund risk-taking strategy? *Journal of Banking & Finance, 37*(2), 597–613.

Anantharaman, D., Gao, F., & Manchiraju, H. (2022). Does social responsibility begin at home? The relation between firms' pension policies and corporate social responsibility (CSR) activities. *Review of Accounting Studies, 27*(1), 76–121.

Anantharaman, D., & Lee, Y. G. (2014). Managerial risk taking incentives and corporate pension policy. *Journal of Financial Economics, 111*(2), 328–351.

Baker, S. R., Bloom, N., & Davis, S. J. (2016). Measuring economic policy uncertainty. *The Quarterly Journal of Economics, 131*(4), 1593–1636.

Balachandran, B., Duong, H. N., & Vu, V. H. (2019). Pension deficits and the design of private debt contracts. *Journal of Financial and Quantitative Analysis, 54*(4), 1821–1854.

Bartram, S. M. (2018). In good times and in bad: Defined-benefit pensions and corporate financial policy. *Journal of Corporate Finance, 48*, 331–351.

Benedetti, A. H., & Chen, S. (2018). High CEO-to-worker pay ratios negatively impact consumer and employee perceptions of companies. *Journal of Experimental Social Psychology, 79*, 378–393.

Benlemlih, M., & Yavaş, Ç. V. (2023). Economic policy uncertainty and climate change: evidence from CO2 emission. *Journal of Business Ethics*. https://doi.org/10.1007/s10551-023-05389-x

Bergstresser, D., Desai, M., & Rauh, J. (2006). Earnings manipulation, pension assumptions, and managerial investment decisions. *The Quarterly Journal of Economics, 121*(1), 157–195.

Bhattacharya, U., Hsu, P.-H., Tian, X., & Xu, Y. (2017). What affects innovation more: Policy or policy uncertainty? *Journal of Financial and Quantitative Analysis, 52*(5), 1869–1901.

Bonaime, A., Gulen, H., & Ion, M. (2018). Does policy uncertainty affect mergers and acquisitions? *Journal of Financial Economics, 129*(3), 531–558.

Boudoukh, J., Michaely, R., Richardson, M., & Roberts, M. R. (2007). On the importance of measuring payout yield: Implications for empirical asset pricing. *Journal of Finance, 62*(2), 877–915.

Brogaard, J., & Detzel, A. (2015). The asset-pricing implications of government economic policy uncertainty. *Management Science, 61*(1), 3–18.

Bushee, B. J. (1998). The influence of institutional investors on myopic R&D investment behavior. *Accounting Review, 73*, 305–333.

Chen, X., Harford, J., & Li, K. (2007). Monitoring: Which institutions matter? *Journal of Financial Economics, 86*(2), 279–305.

Cheng, Q., & Swenson, L. (2018). Executive compensation and cash contributions to defined benefit pension plans. *Journal of Business Finance & Accounting, 45*(9–10), 1224–1259.

Çolak, G., Durnev, A., & Qian, Y. (2017). Political uncertainty and IPO activity: Evidence from US gubernatorial elections. *Journal of Financial and Quantitative Analysis, 52*(6), 2523–2564.

Davila, J., Gomez-Mejia, L., & Martin, G. (2023). Family firms and employee pension underfunding: good corporate citizens or unethical opportunists? *Journal of Business Ethics*. https://doi.org/10.1007/s10551-023-05533-7

Del Guercio, D., Seery, L., & Woidtke, T. (2008). Do boards pay attention when institutional investor activists "just vote no"? *Journal of Financial Economics, 90*(1), 84–103.

Duong, H. N., Nguyen, J. H., Nguyen, M., & Rhee, S. G. (2020). Navigating through economic policy uncertainty: The role of corporate cash holdings. *Journal of Corporate Finance, 62*, 101607.

Eisdorfer, A. (2008). Empirical evidence of risk shifting in financially distressed firms. *Journal of Finance, 63*(2), 609–637.

Francis, J. R., & Reiter, S. A. (1987). Determinants of corporate pension funding strategy. *Journal of Accounting and Economics, 9*(1), 35–59.

Gaspar, J. M., Massa, M., & Matos, P. (2005). Shareholder investment horizons and the market for corporate control. *Journal of Financial Economics, 76*(1), 135–165.

Goto, S., & Yanase, N. (2021). Pension return assumptions and shareholder-employee risk-shifting. *Journal of Corporate Finance, 70*, 102047.

Graham, J. R., & Harvey, C. R. (2001). The theory and practice of corporate finance: Evidence from the field. *Journal of Financial Economics, 60*(2–3), 187–243.

Graham, J. R., Harvey, C. R., & Rajgopal, S. (2005). The economic implications of corporate financial reporting. *Journal of Accounting and Economics, 40*(1–3), 3–73.

Guan, Y., & Tang, D. Y. (2018). Employees' risk attitude and corporate risk taking: Evidence from pension asset allocations. *Journal of Corporate Finance, 48*, 261–274.

Guiso, L., Sapienza, P., & Zingales, L. (2004). The role of social capital in financial development. *American Economic Review, 94*(3), 526–556.

Gulen, H., & Ion, M. (2016). Policy uncertainty and corporate investment. *The Review of Financial Studies, 29*(3), 523–564.

Hasan, I., Hoi, C. K., Wu, Q., & Zhang, H. (2017). Does social capital matter in corporate decisions? Evidence from corporate tax avoidance. *Journal of Accounting Research, 55*(3), 629–668.

Henderson, R., & Van den Steen, E. (2015). Why do firms have" purpose"? The firm's role as a carrier of identity and reputation. *American Economic Review, 105*(5), 326–330.

Hilary, G., & Hui, K. W. (2009). Does religion matter in corporate decision making in America? *Journal of Financial Economics, 93*(3), 455–473.

Hoi, C. K. S., Wu, Q., & Zhang, H. (2019). Does social capital mitigate agency problems? Evidence from Chief Executive Officer (CEO) compensation. *Journal of Financial Economics, 133*(2), 498–519.

Hyde, M., Dixon, J., & Drover, G. (2007). Assessing the capacity of pension institutions to build and sustain trust: A multidimensional conceptual framework. *Journal of Social Policy, 36*(3), 457–475.

Jens, C. E. (2017). Political uncertainty and investment: Causal evidence from US gubernatorial elections. *Journal of Financial Economics, 124*(3), 563–579.

Jin, L., Merton, R. C., & Bodie, Z. (2006). Do a firm's equity returns reflect the risk of its pension plan? *Journal of Financial Economics, 81*(1), 1–26.

Julio, B., & Yook, Y. (2012). Political uncertainty and corporate investment cycles. *Journal of Finance, 67*(1), 45–83.

Kaviani, M. S., Kryzanowski, L., Maleki, H., & Savor, P. (2020). Policy uncertainty and corporate credit spreads. *Journal of Financial Economics, 138*(3), 838–865.

Kelly, B., Pástor, Ľ., & Veronesi, P. (2016). The price of political uncertainty: Theory and evidence from the option market. *Journal of Finance, 71*(5), 2417–2480.

Kim, H.-D., Kim, T., Kim, Y., & Park, K. (2019). Do long-term institutional investors promote corporate social responsibility activities? *Journal of Banking & Finance, 101*, 256–269.

Klasa, S., Maxwell, W. F., & Ortiz-Molina, H. (2009). The strategic use of corporate cash holdings in collective bargaining with labor unions. *Journal of Financial Economics, 92*(3), 421–442.

Klein, A., & Zur, E. (2011). The impact of hedge fund activism on the target firm's existing bondholders. *The Review of Financial Studies, 24*(5), 1735–1771.

Knack, S., & Keefer, P. (1997). Does social capital have an economic payoff? A cross-country investigation. *The Quarterly Journal of Economics, 112*(4), 1251–1288.

Langtry, B. (1994). Stakeholders and the moral responsibilities of business. *Business Ethics Quarterly*. https://doi.org/10.2307/3857342

Li, K., Mai, F., Shen, R., & Yan, X. (2021). Measuring corporate culture using machine learning. *The Review of Financial Studies, 34*(7), 3265–3315.

Lin, K.-H. (2016). The rise of finance and firm employment dynamics. *Organization Science, 27*(4), 972–988.

Martin, G. P., Wiseman, R. M., & Gomez-Mejia, L. R. (2020). The ethical dimension of equity incentives: A behavioral agency examination of executive compensation and pension funding. *Journal of Business Ethics, 166*, 595–610.

McCahery, J. A., Sautner, Z., & Starks, L. T. (2016). Behind the scenes: The corporate governance preferences of institutional investors. *Journal of Finance, 71*(6), 2905–2932.

McCarty, N. (2019). *Polarization: What everyone needs to know®.* Oxford University Press.

Nguyen, N. H., & Phan, H. V. (2017). Policy uncertainty and mergers and acquisitions. *Journal of Financial and Quantitative Analysis, 52*(2), 613–644.

Nwaeze, E. T., Yang, S. S., & Yin, Q. J. (2006). Accounting information and CEO compensation: The role of cash flow from operations in the presence of earnings. *Contemporary Accounting Research, 23*(1), 227–265.

Onali, E. (2014). Moral hazard, dividends, and risk in banks. *Journal of Business Finance & Accounting, 41*(1–2), 128–155.

Pástor, Ľ., & Veronesi, P. (2013). Political uncertainty and risk premia. *Journal of Financial Economics, 110*(3), 520–545.

Pedersen, D. J. (2019). Risk shifting and corporate pension plans: Evidence from a natural experiment. *Journal of Financial and Quantitative Analysis, 54*(2), 907–923.

Phan, H. V., & Hegde, S. P. (2013). Corporate governance and risk taking in pension plans: Evidence from defined benefit asset allocations. *Journal of Financial and Quantitative Analysis, 48*(3), 919–946.

Picconi, M. (2006). The perils of pensions: Does pension accounting lead investors and analysts astray? *The Accounting Review, 81*(4), 925–955.

Rauh, J. D. (2006). Investment and financing constraints: Evidence from the funding of corporate pension plans. *Journal of Finance, 61*(1), 33–71.

Rauh, J. D., Stefanescu, I., & Zeldes, S. P. (2020). Cost saving and the freezing of corporate pension plans. *Journal of Public Economics, 188*, 104211.

Short, H., Zhang, H., & Keasey, K. (2002). The link between dividend policy and institutional ownership. *Journal of Corporate Finance, 8*(2), 105–122.

Sievänen, R., Rita, H., & Scholtens, B. (2013). The drivers of responsible investment: The case of European pension funds. *Journal of Business Ethics, 117*, 137–151.

Sirgy, M. J. (2002). Measuring corporate performance by building on the stakeholders model of business ethics. *Journal of Business Ethics, 35*, 143–162.

Srivastav, A., Armitage, S., & Hagendorff, J. (2014). CEO inside debt holdings and risk-shifting: Evidence from bank payout policies. *Journal of Banking & Finance, 47*, 41–53.

Stefanescu, I., Wang, Y., Xie, K., & Yang, J. (2018). Pay me now (and later): Pension benefit manipulation before plan freezes and executive retirement. *Journal of Financial Economics, 127*(1), 152–173.

Tepper, I. (1981). Taxation and corporate pension policy. *Journal of Finance, 36*(1), 1–13.

Wu, K., & Lai, S. (2020). Intangible intensity and stock price crash risk. *Journal of Corporate Finance, 64*, 101682.

Yu, F. F. (2008). Analyst coverage and earnings management. *Journal of Financial Economics, 88*(2), 245–271.

Yu, J., Shi, X., Guo, D., & Yang, L. (2021). Economic policy uncertainty (EPU) and firm carbon emissions: Evidence using a China provincial EPU index. *Energy Economics, 94*, 105071.