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Do Firms Shift Risk to Employees in Uncertain Times? Evidence from Corporate Pension Plans

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Douglas J. Cumming
Florida Atlantic University, University of Birmingham and ECGI

Fanyu Lu
University of Adelaide

Limin Xu
University of Adelaide

Chia-Feng (Jeffrey) Yu
Xi'an Jiaotong-Liverpool University

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Abstract

We investigate whether firms risk-shift via corporate pension plans in response to distress risk induced through economic policy uncertainty (EPU). Using a sample of US-listed firms, we find that firms increase pension underfunding levels when facing higher EPU. Cross-sectional analysis shows that the effect is stronger for firms having CEO being excessively paid, using cash flow as an important metric in CEO compensation, paying high dividends, and in EPU-sensitive industries. In contrast, the presences of unions, long-term institutional investors, positive corporate culture, and social capital alleviate the effect. Our baseline result is robust to controlling for other macroeconomic factors, the instrumental variable estimation, and alternative measurements of pension risk-shifting. Overall, our findings suggest that EPU stimulates firms to shift risk to employees and aggravates stakeholder conflicts.

Keywords: Policy Uncertainty; Pension Underfunding; Risk Shifting; Stakeholder Conflicts.

JEL Classifications: G32, G38, J32, M14

Douglas J. Cumming*
DeSantis Distinguished Professor of Finance and Entrepreneurship
Florida Atlantic University
777 Glades Road
Boca Raton, Florida 33431, USA
phone: (561) 297-3225
e-mail: cummingd@fau.edu

Fanyu Lu
Researcher
University of Adelaide
12/10 Pulteney St
Adelaide SA 5005, Australia
e-mail: fanyu.lu@adelaide.edu.au

Limin Xu
Senior Lecturer
University of Adelaide
12/10 Pulteney St
Adelaide SA 5005, Australia
e-mail: limin.xu@adelaide.edu.au

Chia-Feng (Jeffrey) Yu
Senior Associate Professor
Xi'an Jiaotong-Liverpool University
Suzhou Industrial Park
Suzhou, China
phone: +86 (0)51288970204
e-mail: ChiaFeng.Yu@xjtlu.edu.cn

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

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[1*] Correspondence. College of Business, Florida Atlantic University. 777 Glades Road, Boca Raton, Florida, 33431 USA. Tel: +1-561-562-0764. Email: cummingd@fau.edu
[2] Adelaide Business School, University of Adelaide, Australia. Email: fanyu.lu@adelaide.edu.au
[3] Adelaide Business School, University of Adelaide, Australia. Email: limin.xu@adelaide.edu.au
[4] International Business School Suzhou, Xi'an Jiaotong-Liverpool University. Email: chiafeng.yu@xjtlu.edu.cn

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1. Introduction

The potential changes in government policies, such as those caused by presidential campaigns, introduce a significant level of uncertainty concerning interest rates, tax rates, employment, and financial development.[1] This type of uncertainty is known as economic policy uncertainty (EPU) (Baker, Bloom & Davis 2016). A growing number of studies have documented the impacts of EPU on corporate policies. For example, greater EPU causes a surge in the cost of capital (Kelly, Pástor & Veronesi 2016), which further leads to the reduction in capital expenditure (Gulen & Ion 2016; Julio & Yook 2012), and affects merger and acquisition activities (Bonaime, Gulen & Ion 2018; Nguyen & Phan 2017) and investments in innovation projects (Bhattacharya et al. 2017). Nevertheless, it is relatively less known how rank-and-file employees would be affected by EPU. Particularly, given that EPU hinders external financing and induces financial distress risk for firms (Brogaard & Detzel 2015; Bordo, Duca & Koch 2016; Kaviani et al. 2020), the purpose of this study is to examine whether firms adjust corporate pension plans to shift risk to employees when facing high EPU.

While an increasing number of firms have switched to defined contribution (DC) pension plans, defined benefit plans (DB) still cover nearly 40 million beneficiaries in the US.[2] However, employee pension underfunding has grown into a matter of grave magnitude that needs urgent attention.[3] After 2002, underfunding levels surged to approximately 40%, climbing to around $3.5 trillion in 2020. Despite the ongoing reforms of DB plans, DB pension plans of firms still be on the brink of collapse.[4] For instance, the pension funds in General

1 Source: https://www.bbc.com/news/world-43512098; https://www.theguardian.com/us-news/2016/nov/09/trumps-economic-policies-protectionism-low-taxes-and-coal-mines; https://time.com/4386335/donald-trump-trade-speech-transcript/

2 Firms with DC plans do not have long-term liability for employee retirement payments. DB plans are part of a firm's assets and liabilities, so they are connected to corporate finances. Many academics have shown that the funding status of DB plans affects firm operations and value (Franzoni & Marin 2006; Rauh 2006).

3 Source: https://www.ft.com/content/380e322e-c83b-36cc-8d7a-222ad9219a3b

4 The government has reformed the regulation of corporate pension plans over time through legislation such as the Employee Retirement Income Security Act of 1974, the Pension Protection Act of 2006, and the Setting Every Community Up for Retirement Enhancement Act of 2019.

Motors were in a $20 billion shortage when it filed for bankruptcy in 2009. Central States Pension, the largest multi-employer pension plan, is anticipated to collapse in 2025. The US Social Security Administration (2019) has declared that the public pension fund will run out by 2035.[5] Given the severe underfunding status of numerous defined-benefit (DB) pension funds, it is a cruel fact that employees are exposed to a great risk of losing some or all of their pension benefits.

Prior research has dedicated substantial efforts to understanding why DB plans have exhibited substantial underfunding over time. The potential explanations include a reduction in tax rates, a lack of sufficient government direction and oversight, a lack of employee awareness about the possibility of pension plans defaults, the use of financial instruments that contribute to deficits in corporate pension funds (Rauh 2006), economic recessions, and aging populations and worsening unemployment rates (Samwick & Skinner 2004). Importantly, underfunded DB retirement plans can also be caused by risk-shifting motives (Guan & Tang 2018; Goto & Yanase 2021). Specifically, employees may be likened to 'inside debtholders' because they hold a fixed claim on the firm for their retirement payments (Anantharaman & Lee 2014). Due to limited liabilities and the presence of the Pension Benefit Guarantee Corporation (PBGC), shareholders of firms with DB plans effectively hold put options written on the plan assets, with a strike price equal to the value of the pension liabilities. According to the asset substitution theory (Eisdorfer 2008), the shareholders have incentives to maximize the put option values by shifting risk to pension beneficiaries via pension underfunding.

Recently, the fiscal crises, federal elections, and political conflicts in the U.S have led to increasing concerns about the detrimental effects of policy uncertainty (Duong et al. 2020). Such an increase in EPU heightens the financial distress risk of firms (Brogaard & Detzel 2015)

5 Source: https://www.ssa.gov/oact/TRSUM/index.html

through weak cash flow (Riddick & Whited 2009) and the enormous difficulty of access to external funding (Kaviani et al. 2020). An increase in EPU also causes a decline in investment returns in corporate pension plans, which aggravates the underfunding status, and thus increases the default risk of pension plans. Anecdotal evidence also supports this prediction. For instance, the Organization for Economic Co-operation and Development (OECD) has argued that pension plans require a stable financial market and institutional environment [6]. In 2015, the Pension Insurance Corporation in the United Kingdom asserted that the coalition formed by David Cameron and Nick Clegg created a stable government from 2010 to 2015, improving the value of assets in DB pension plans. Similarly, in 2016 Financial Times[7] and Bloomberg [8]claimed that an environment with high uncertainty hampers the funding status of DB plans. Greg Mennis, the director of The Pew Charitable Trusts (2020), wrote that market instability could exert longstanding effects on pension funds[9]. Motivated by the anecdotal evidence, we conjecture a positive relation between EPU and the underfunding level in corporate DB pension plans.

Using a sample of publicly listed firms in the U.S from 1998 to 2020, we investigate the relationship between EPU and the underfunding of DB pension plans. We employ Baker, Bloom and Davis (2016)'s index (BBD index or EPU index) as a proxy for EPU. The EPU index is constructed as a weighted average of the following elements: news components, government spending, inflation, and tax. The underfunding of corporate pension plans is defined as the difference between pension obligations and pension assets, scaled by pension liabilities (Anantharaman & Lee 2014; Pedersen 2019). We find that firms increase the

[6] Yermo & Severinson 2010, OECD Working Paper, https://www.oecdilibrary.org/content/paper/5km91p3jszxw-en.
[7] Source: https://www.ft.com/content/4e62284a-112a-11e6-839f-2922947098f0
[8] Source: https://www.imf.org/~/media/Websites/IMF/imported-flagship-issues/external/pubs/ft/GFSR/2016/02/pdf/_c1pdf.ashx
[9] Source: https://www.pewtrusts.org/en/research-and-analysis/articles/2020/04/23/how-the-market-downturn-could-affect-public-pension-funds

underfunding level 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 between EPU and corporate pension underfunding continues to hold after controlling for various other macroeconomic factors.

One potential concern with our baseline result is that EPU could capture the influences of other macroeconomic indicators (Gulen & Ion 2016). To address this issue, following Nguyen and Phan (2017), we use a partisan polarisation measure (POLAR) as an instrumental variable (IV) for EPU and perform a two-stage least squares (2SLS) regression. The result from the 2SLS model is consistent with our baseline result. To highlight conflicts among various stakeholders, we further show that the association between EPU and the underfunding level of DB plans are stronger in firms that pay their CEO excessively, firms that use cash flow as a critical determinant in CEO compensation structure, and firms that are more committed to dividend payouts. On the contrary, the association is moderated by the presence of unions, long-term institutional investors, positive corporate culture, and social trust.

This study makes several contributions to the literature. First, we add to our understanding of what drives firms' decisions to adjust corporate pension plans. The underfunding status of DB plans is related to firms' capital structure and debt ratings (Shivdasani & Stefanescu 2010), merger and acquisition (Cocco & Volpin 2013), equity returns (Jin, Merton & Bodie 2006), and managerial risk-taking (Anantharaman & Lee 2014). Prior studies also document that cash contributions to DB plans depend on corporate governance, taxes, and insurance premiums (Tepper 1981; Tepper & Affleck 1974). We complement prior studies by showing that the uncertainty in the government policies and political environment yields significant negative impacts on employee retirement benefits.

Second, we add to the literature on firm behavior under EPU. While it is documented that EPU can affect firm choices, such as capital structure (Kelly, Pástor & Veronesi 2016), firm investment (Gulen & Ion 2016; Julio & Yook 2012), corporate innovation (Bhattacharya et al. 2017), merger and acquisition (Bonaime, Gulen & Ion 2018; Nguyen & Phan 2017), and financial distress risk (Brogaard & Detzel 2015; Bordo, Duca & Koch 2016; Kaviani et al. 2020), we extend the literature by exploring how the retirement benefits of rank-and-file employees would be affected by EPU.

Further, we contribute to the literature on stakeholder conflicts of interest associated with corporate pensions (Pedersen 2019; Rauh 2009). Given that DB plan claimants are inside debtholders, a reduction in periodic contributions could be regarded as shifting the risk from shareholders to employees. We find that excessive managerial compensation, using cash from operations as a key metric in managerial compensation contracts, and high dividend payouts are important drivers of pension underfunding, especially during high policy uncertainty periods. This enhances our understanding of DB pension management by highlighting conflicts between shareholders, employees and executives (Anantharaman & Lee 2014).

The remainder of this paper is structured as follows. Section 2 discusses related literature and develops hypotheses. Section 3 presents the methodology and sample. Section 4 presents baseline results and cross-sectional analysis. Section 5 conducts robustness tests. Section 6 concludes.

2. Literature Review and Hypothesis Development

2.1 Corporate pension plans

Corporate defined benefit (DB) pension plans are retirement-income schemes for employees. Employees are entitled to receive a specific amount of income regularly after

retirement, primarily given the factors including employees' years of service, age, tenure, and salary (Anantharaman & Lee 2014). The DB pension funds are supported by employers' contributions and investment returns of pension assets. Employee Retirement Income Security Act of 1974 (ERISA) requires DB pension sponsors to adhere to the fiduciary responsibility rules by paying their employees a certain amount of benefits upon their retirement. The future retirement benefit for employees is, in essence, a form of liability for firms. A firm can discretionally determine the pension contribution amount and pension asset investment strategies. If the fair value of pension assets is higher than the present value of pension obligations, the pension fund is regarded as overfunded. Firms with overfunded pension plans are not required to make further contributions in the current period. However, if the market value of pension assets is less than the present value of future pension obligations, then the pension plan is considered underfunded. ERISA and Pension Benefit Guaranty Corporation (PBGC) mandate firms with underfunded plans to make minimum cash contributions each period based on a given function of pension funding status (Rauh 2006). Underfunding corporate pension plans has become a prevalent problem in the U.S. because firms often make low contributions to their pension plans. As a result, the aggregate funding deficit for Fortune 1000 companies climbed to $232 billion in 2020[10].

Underfunding corporate pension plans has important implications for firms' financial status and value. First, a higher level of pension underfunding indicates a higher level of liability from employees' retirement obligations, a greater risk to the company, and potential costs associated with employee dissatisfaction and reduced productivity. Highly underfunded pension plans can affect corporate financial policies, investment decisions, and performance in the capital market. Shivdasani and Stefanescu (2010) show a positive relation between pension underfunding and debt conservatism. Balachandran, Duong and Vu (2019) find that pension

[10] Source: https://www.wealthmanagement.com/retirement-planning/mixed-reports-retirement-funding

deficits negatively impact firm credit rating, so banks tighten lending terms for firms with high underfunding levels in their DB pension plans. A higher level of pension underfunding causes higher insurance premiums charged by PBGC to cover insufficient DB funds[11]. On the contrary, there exist some benefits from high underfunding. For instance, less cash contribution to pension plans can free up the cash flow available for investment, operating, and emergency reserves, which helps relax financial constraints for firms. Therefore, the ultimate funding status reflects a trade-off between the costs and benefits of underfunded pension plans.

2.2 Stakeholder conflicts and risk shifting in corporate pension plans

Pension deficits represent conflicts between shareholders, managers, and employees (Edmans 2011; Vafeas & Vlittis 2018). A DB pension plan beneficiary is eligible to claim ongoing payments from a firm for the duration of their retirement. DB underfunding is an obligation for firms akin to long-term debt. Current employees and retirees hold claims on sponsoring firms, so they are their firms' debtholders (Anantharaman & Lee 2014; Pedersen 2019). Firms are legally required to reserve and allocate assets to a trust that manages retirement funds and makes financial contributions in each period. Limited liability protects shareholders from transferring their personal assets to compensate debtholders if firms declare bankruptcy with insufficient assets in the pension fund (Rauh 2009). Furthermore, if firms file for bankruptcy, the Pension Benefit Guarantee Corporation (PBGC) will take over the underfunded plans.[12] If firms escape bankruptcy, a potentially high return from risky investments can reduce their future pension contributions and alleviate the cash-strapped sponsors from the need to drain considerable corporate liquid resources to fund the pension

[11] Source: https://www.pbgc.gov/prac/prem/premium-rates

[12] Even though the pension plans are insured by PBGC, it can only cover up to a statutory amount in an event of default, so most pension beneficiaries still suffer from 25% to 50% loss of their pension income when retire. 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; Mitchell 2020). Consequently, this liability will eventually be served by all firms and society as a whole.

plans (Guan & Tang 2018; Goto & Yanase 2021). Thus, shareholders of DB plan sponsors can be viewed as possessing put options written on the plan assets, which are exercisable in bankruptcy at a strike price equal to the value of the pension liabilities. According to asset substitution theory (Sharpe 1976; Eisdorfer 2008), when the firm is exposed to high financial distress risk, the shareholders will be incentivised to maximize the put option values by shifting risk from shareholders to employees, i.e., by underfunding the pension plans.

2.3 EPU, financial distress risk, and pension underfunding

The real-option theory suggests that policy uncertainty increases the value of delaying decisions in waiting for new information, especially for irreversible decisions (Bernanke 1983). Thus, the uncertainty regarding regulatory frameworks and government policies negatively affects firms' investment and financing decisions (Gulen & Ion 2016). Further, Brogaard and Detzel (2015) find that EPU hampers firms' ability to rely on debt financing with favorable terms, especially for financially distressed firms (Graham & Harvey 2001). Financial institutions impose tightened restrictive covenants of loans on firms with high leverage or during economic recessions to protect themselves from the default risk induced by EPU (Bordo, Duca & Koch 2016). EPU also increases financial market frictions and impedes firms' equity financing ability (Christiano, Motto & Rostagno 2014) so that EPU is positively related to equity risk premium (Pástor & Veronesi 2013; Brogaard and Detzel 2015). To the extent that EPU weakens firm productivity and financing opportunities and increases firms' cash flow volatility and credit spreads (Kaviani et al. 2020), EPU constitutes an important source of financial distress risk. Given that the incentive for the risk-shifting via corporate pension underfunding is stronger when firms are exposed to higher distress risk, we propose the following hypothesis:

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

2.4 The executives

Employees' pension deficits indicate that employees can potentially be exploited by executives (Anantharaman & Lee 2014; Goto & Yanase 2021; Vafeas & Vlittis 2018). Stefanescu et al. (2018) show that executives extract rent before the employee pension plan freezes and manipulate the actuarial assumptions in pension plans to increase their compensation. This agency conflict is more likely to affect a firm's pension underfunding, especially when cash flow from operations is used as a metric in the CEO compensation contracts (Nwaeze, Yang & Yin 2006). Cheng and Swenson (2018) find that executives 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, the performance of the capital market is weak, and firms face more volatile cash flow from operations (Boutchkova et al. 2012). In this case, to avoid their pay being adversely affected, executives with compensation being tied to operating cash flow are more incentivised to make lower cash contributions to employee pension.

Moreover, conflicts between CEOs and employees are more likely to arise when CEOs are excessively paid. CEOs who request excessive compensation appear to be pursuing personal power and benefits (Cronqvist et al. 2009). 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 wellbeing. With high EPU, the conflict between lower-ranked employees and CEOs intensifies as executives aim to maintain their excessive salaries. Therefore, excessively paid CEOs are more likely to underfund employees' retirement plans for their own benefits. Our second hypothesis is thus:

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.

2.5 The dividends and unions

Firms paying higher dividends are more committed to their shareholders (Karpavičius 2014). Firms may borrow funds to maintain dividend payouts (Guttman, Kadan & Kandel 2010), which can be regarded as shareholders shifting risk to debtholders (Onali 2014). Given that external financing becomes more costly when EPU is heightened (Pástor & Veronesi 2013), managers could shift to borrowing internal funds from employees by reducing contributions to DB pension plans to sustain dividend payments (Rauh 2009; Srivastav, Armitage & Hagendorff 2014). In other words, high dividend payments reduce firms' ability to service employees' pension obligations.

Next, unions significantly influence firms' decisions (Klasa, Maxwell & Ortiz-Molina 2009). Prior research has long discussed the association between corporate pension plans and the labor union. Bulow (1982) shows a significant difference between union and non-union workers' responses to corporate pension funding strategy. Francis and Reiter (1987) confirm that union is 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' capacity to exploit rank-and-file workers, we hypothesize that the presence of unions weakens the effect of EPU on pension underfunding levels.

Hypothesis 3: The effect of EPU on corporate pension underfunding is more pronounced for firms with higher dividend payouts and less pronounced for firms operating in industries with higher union coverage.

2.6 The external environment

The industry characteristic is an important aspect of the external environment. Different sectors may have different sensitivity to economic policy uncertainty. For example, the financial and mining sectors are more sensitive to EPU shocks, whereas consumer discretionary,

telecom, and information technology sectors are less affected by EPU (Rehman et al. 2021). As such, the pension plans of firms operating in higher EPU-sensitive sectors should be more responsive to changes in the uncertainty arising from economic policies. This implies stronger effects of EPU on pension underfunding for firms in higher EPU-sensitive sectors.

Social capital is another environmental factor captured by the influence of the density of social networks in a geographical community and the strength of cooperative norms (Guiso, Sapienza & Zingales 2004; Knack & Keefer 1997). Cooperative norms limit narrow self-serving and opportunistic actions (Knack & Keefer 1997). Hasan et al. (2017a) find that firms headquartered in higher social capital scores areas are less likely to undertake self-serving corporate practices. Hoi, Wu and Zhang (2019) find that companies and corporate executives are susceptible to social influences in geographical areas (Hilary & Hui 2009). Bertrand and Schoar (2003) and Hasan et al. (2017b) further find that firms with headquarters residing in areas with higher levels of social capital engage in fewer corporate practices that benefit firm executives and shareholders at the expense of other stakeholders. In line with this argument, we state our next hypothesis below:

Hypothesis 4: The effect of EPU on corporate pension underfunding is less pronounced for firms in industries with lower EPU sensitivity and firms in regions with higher social trust.

2.7 The stakeholder orientation

In recent decades, institutional shareholders have constituted the largest investor group in the equity markets in the U.S (Chen, Harford & Li 2007). The rise of financial institutions as large shareholders offers enhanced monitoring on firms' decision-making processes and improves the effectiveness of corporate governance (Aghion, Van Reenen & Zingales 2013). Moreover, institutional investors with longer-term investment horizons have stronger incentives to monitor firms than short-term institutional investors (Gaspar, Massa & Matos

2005). Under more rigorous scrutiny by long-term institutional investors, firms are more inclined to pursue agendas that enhance long-run value maximization. Employee efficiency and productivity are keys to firms' long-term success. Therefore, long-term institutional investors tend to protect employees from being exploited. We predict that long-term institutional investors reduce the EPU effect on pension underfunding.

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). However, wealth transfer through underfunding employee retirement plans is considered a selfish and unethical practice that firms engage in. Firms with positive corporate culture focus more on long-term survival and care more about employee treatment (Beer et al. 1984). The EPU effects on pension underfunding would be constrained by stakeholder orientation culture. Therefore, our hypothesis is as follows:

Hypothesis 5: The effect of EPU on corporate pension underfunding is less pronounced for firms with greater presence of long-term institutional investors and positive corporate culture.

3. Sample, research design, and descriptive statistics

3.1 Sample selection

Our initial sample includes all publicly listed U.S. firms in the period 1998–2020.[13] We use Compustat Pension Annual as the data source for pension characteristics and Compustat Fundamental for firm-specific characteristics. Data on equity market returns are obtained from the Center for Research in Security Prices (CRSP). CEO compensation data are sourced from the ExecuComp database and Incentive Lab. Institutional Ownership data can be found in Thomson Reuters Institutional Holdings database (13F) and Bushee's Institutional Investor Classification. Union information is available on Union Membership and Coverage database. Following Anantharaman and Lee (2014) and Phan and Hegde (2013), we eliminate firms in the utility industry (Standard Industrial Classification [SIC] code 4900–4999) and financial firms (SIC code 6000–6999). Firms that have negative assets are also excluded. In addition, firm-year observations with missing data for our set of control variables are excluded as well. The final sample contains 13,210 firm-year observations from 1,377 individual firms.

3.2 Research design

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

$$Underfund_{i,t+1} = \beta_0 + \beta_1 EPU_t + \gamma firm\ control_{i,t} + \delta investment\ opportunities\ control_t + \varphi marcoeconomic\ control_t + firm\ fixed\ effect + \varepsilon_{i,t+1}. \quad (1)$$

Following Anantharaman and Lee (2014) and Pedersen (2019), corporate pension underfunding (UNDERFUND) is defined as the difference between pension obligations (*pbpro*) and pension assets (*pplao*), scaled by pension liabilities (*pbpro*). If the pension plan is underfunded (overfunded), the ratio is positive (negative).[14] The higher the ratio, the greater the pension underfunding. The key independent variable is EPU index, developed by Baker,

[13] Our sample period starts from 1998 due to the data availability of firm characteristics, pension characteristics, and macroeconomic control variables.
[14] More than 90% of the sample firms have positive ratios.

Bloom and Davis (2016) (i.e., BBD index).[15] We transform the monthly data into the annual index by averaging the 12-monthly BBD value in the corresponding year. Following Duong et al. (2020), we transfer the annual average of the BBD index to its logarithmic form.

With regard to our control variables, we first control for the return from corporate pension asset investments (*RET_PENSON*) to alleviate the concern that the underfunding of corporate pension plans is due to the poor performance of pension investment assets.[16] 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*) (Anantharaman & Lee 2014; Balachandran, Duong & Vu 2019; Gulen & Ion 2016). In addition, following Anantharaman and Lee (2014) and Cheng and Swenson (2018), we further control for firms' minimum mandate contribution (MANDAT_CONTRI_HIGH), cash flow (*OP_CF, INVEST_CF, FINANCING_CF*), and other cash related variables (*INTEREST_COVERAGE*). Following Duong et al. (2020), we add firm-fixed effects and cluster robust standard errors at firm level[17].

Further, according to Gulen and Ion (2016) and Nguyen and Phan (2017), we consider the impacts of other macroeconomic conditions, which include expected GDP growth (*EX_GDPGROWTH*), real GDP growth (*REAL_GDPGROWTH*), leading economic index

[15] This is a media-based index that estimates the number of articles from large and influential newspapers containing keywords related to EPU such as 'economic', 'uncertainty', 'regulation', 'Congress', 'Federal Reserve', 'White House', 'deficit' and their synonyms (Baker, Bloom & Davis 2016). This BBD index has shown its ability to capture economic uncertainty in the US. For example, the BBD index surged at the time of the Lehman Brothers bankruptcy and during federal elections. We obtain the BBD index from Baker, Bloom and Davis's website.

[16] In robustness tests, we also use cash contribution to pension funds and equity allocation and beta of pension portfolios as alternative measurements of risk-shifting via corporate pension. Our result remains robust.

[17] Our baseline result holds if the regression is cluster by year (unreported). We are not able to control year-fixed effects in the model because the BBD index is cross-sectionally invariant (Duong et al. 2020; Gulen & Ion 2016); consequently, including year fixed effect will absorb the explanatory power of EPU.

(*ECONOMIC_INDEX*) and consumer confidence (*CONSUMER_CONFID*), GDP forecast dispersion (*GDPDIS*), a standard deviation of cross-sectional profit growth (SDPROFIT), a standard deviation of cross-sectional real returns (*SDRETURN*), implied volatility (*VXO*), Jurado, Ludvigson and Ng (2015)'s index (*JLN*) and election year dummy (*ELECYEAR*). Additionally, following Bonaime, Gulen and Ion (2018), we include three more macroeconomic variables: the Chicago Fed National Activity Index (*CFNAI*[18]), the spread between BAA-rated bonds and Federal Fund rates (*Rate_Spread*) [19]as a proxy for market liquidity, and the cyclically adjusted price-earnings ratio developed by Shiller's CAPE ratio (*Shiller's CAPE ratio*[20]). To avoid the multicollinearity concern of the selected macroeconomic variables, we use the First Principal Component method (Bonaime, Gulen & Ion 2018) to combine these thirteen macroeconomic variables into 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.

3.3 Descriptive statistics

Table 1 provides the descriptive statistics of all variables used in the main analysis. From 1998 to 2020, there are approximately 13,000 corporate pension–year observations. The mean and median values for corporate pension underfunding levels are 0.35 and 0.21, respectively, and approximately only 10% of firms sufficiently cover their retirement liabilities for their employees. Table 1 also shows the descriptive statistics for firm characteristics that are known to affect corporate pension plans. These summary statistics are similar to those found in previous studies (e.g. Anantharaman & Lee 2014; Duong et al. 2020; Pedersen 2019).

[18] It measures current economic activity and inflationary pressure based on 85 monthly economic indicators. Data available on https://www.chicagofed.org/research/data/cfnai/historical-data
[19] The proxy for market liquidity using the spread between Baa rated bonds and the Federal Funds rate. Data is available from the St. Louis FED. We average the monthly spread to be a yearly variable.
[20] Data is available on http://www.econ.yale.edu/~shiller/data.htm

[Insert Table 1]

Table 2 presents a correlation matrix, showing that EPU is positively correlated with corporate pension underfunding levels (*UNDERFUND*). This observation provides an early indication of the positive influence of EPU on corporate pension underfunding levels.

[Insert Table 2]

4. Empirical Analysis

4.1 The effect of EPU on corporate pension underfunding

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, and they are 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.

[Insert Table 3]

Next, the BBD index may strongly correlate with other macroeconomic indicators, such as economic recessions, financial crises, wars, and regional conflicts (Baker, Bloom & Davis 2016), which may confound the relationship between EPU and DB pension underfunding. This concern is mitigated by adding more macroeconomic indicators to our regression model (Bloom 2009). The set of macroeconomic indicators is widely used in the literature on EPU (Bonaime, Gulen & Ion 2018; Gulen & Ion 2016; Nguyen & Phan 2017), including the expected GDP growth rate (*EX_GDPGROWTH*) [21] , real GDP growth rate

[21] Data is obtained from the biannual Livingstone Survey of the Federal Reserve Bank of Philadelphia. https://www.philadelphiafed.org/surveys-and-data/real-time-data-research/livingston-historical-data

(*REAL_GDPGROWTH*) [22], *ECONOMIC_INDEX* [23], the Consumer Confidence Index (*CONSUMER_CONFIDENCE*), a dummy variable for election year (*ELECYEAR*), GDP forecast dispersion (*GDPDIS*)[24], the cross-sectional standard deviation of growth in firm profit (*SDPROFIT*), the yearly standard deviation of stock returns (*SDRETURN*), the index of implied volatility (*VXO*), and the index designed by Jurado, Ludvigson and Ng (2015) measuring the conditional volatility of the unforecastable components of different economic data series (JLN Index).[25] In addition, according to Bonaime, Gulen and Ion (2018), we consider three additional macroeconomic variables, including the Chicago Fed National Activity Index (CFNAI), the Rate spread, and the Shiller's CAPE ratio. Next, we use the First Principal Component approach to translate these thirteen macroeconomic variables into two components, namely, the macroeconomic uncertainty (MACRO_UNCERTAINTY) and investment opportunity (INVEST_OPP) components (Bonaime, Gulen & Ion 2018).

We thus augment the baseline specifications by adding these two macroeconomic components to the baseline model in Equation (1). The result is provided in Column (3) in Table 2. The result shows that the unfavourable impacts of EPU on the funding status of corporate pension plans hold after controlling for the aggregate macroeconomic cycles and investment opportunities. As for the interpretation of the coefficient, in Column (3), the coefficient of EPU on pension underfunding levels is 0.236, which suggests that a one standard deviation increase in EPU is associated with a 20.56 percent increase in pension underfunding.

[22] Data is from the World Development Indicators database of the World Bank. https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG

[23] Data is the year-by-year log change reported in the Conference Board Leading Economic Index. https://data-central.conference-board.org/

[24] Data are obtained from the biannual GDP forecasts from Federal Reserve Bank of Philadelphia's biannual Livingstone Survey. https://www.philadelphiafed.org/surveys-and-data/real-time-data-research/livingston-survey

[25] Following Nguyen, NH and Phan (2017), we transform all macroeconomic proxies (apart from the election year variable) to their natural logarithms.

Following Baker, Bloom and Davis (2016), we further decompose the EPU index into news, fiscal and monetary policy, inflation, and tax uncertainties (i.e., news (*EPU_NEWS)*, government fiscal and monetary policies (*EPU_GOV*), inflation (*EPU_CPI*), and tax (*EPU_TAX*)). Columns (4) to (7) in Table 2 show the results. The news-based component is the most significant metric affecting corporate pension underfunding, consistent with Baker, Bloom and Davis (2016)[26]. Uncertainties related to government disagreements about fiscal and monetary policies and inflation do not affect corporate pension underfunding. Not surprisingly, the result in Column (7) in Table 3 shows a significantly positive coefficient for *EPU_Tax*. This result is consistent with prior literature that the tax is one of the determinants in corporate pension plans (Cocco 2013; Francis & Reiter 1987; Tepper 1981). The higher the level of tax uncertainty, the higher the possibility that firms are more reluctant to contribute to employee pension funds since future tax codes may generate higher tax benefits for employers' pension contributions.

4.2 The moderating role of executives

Based on the finding that top executives engage in a wealth transfer from their employees through the manipulation of corporate pension plans (Cheng & Swenson 2018; Stefanescu et al. 2018; Vafeas & Vlittis 2018), our *Hypothesis 2* predicts corporate pension plans have been utilized as a tool for executives to extract rent from employees, especially in the firms that overpay their CEOs (Cheng & Swenson 2018). If the conflict between executives and employees is a source of risk shifting, we should observe that the effect of EPU on the pension underfunding level is strengthened in firms with over-paid CEOs.

To test this conjecture, we first set up a dummy variable, *EPU_HIGH*, which is equal to one when the EPU index is higher than the third quartile and zero otherwise. Next, we also

[26] Baker, Bloom and Davis (2016) argue that the news-based element constitutes the greatest proportion (50%) in the overall EPU index.

include another indicator, *CEO_PAY_HIGH*, equal to one when a CEO's total compensation is higher than the industry (i.e., two-digit SIC code) median in a given year, and zero otherwise. Finally, we add the *EPU_HIGH* and *CEO_PAY_HIGH* indicators and the interaction term between these two to our baseline model. The results are presented in Column (1) of Table 4. The coefficient of the interaction term, *EPU_HIGH* × *CEO_PAY_HIGH*, is positive and significant, consistent with our prediction that firms that overpay CEO, on average, would have higher corporate pension underfunding levels during the high EPU times.

[Insert Table 4]

Next, we also predict that the conflict between CEOs and employees increases when CEO compensation is directly linked to cash flow. This can be seen by noting that when EPU increases, firms will face a lower level of cash inflow from their normal business operations (Duong et al. 2020). In this case, CEOs, especially those whose pay is directly linked to the cash flow metrics, have stronger incentives to reduce pension contributions because the contribution to employee pension plans will reduce the stated operation cash flow, which negatively affects CEOs' benefits (Cheng & Swenson 2018). To test this prediction, we collect CEO compensation data from Incentive Lab. We set up an indicator, *CASH_METRIC*, which equals one if firms use cash flow from operation as the performance metric for CEO compensation and zero otherwise. We further interact this indicator with *EPU_HIGH* indicator. Column (2) of Table 4 shows the results for this interaction term, *EPU_HIGH*×*CASHMATRIC*, which is positively significant. This suggests that if cash flow from operations is a performance metric for CEO compensation, employees working in such companies will face a higher level of pension underfunding in times of greater EPU.

4.3. The moderating roles of dividend and unions

Dividends may mitigate agency conflicts between executives and shareholders (Jensen 1986). However, hefty dividend payouts may extract wealth from debtholders to shareholders in high-leveraged firms because a cash dividend payout reduces a firm's ability to serve debts. High dividend payout thus works as a risk-shifting mechanism that favors shareholders and disfavors employees as inside debt holders (Pedersen 2019). We, therefore, predict that firms with high dividend payout contributes less to employees' retirement plans and engage in more pension underfunding when facing higher EPU.

[Insert Table 5]

Table 5 examines the above hypothesis. 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 1 when *DIVIDEND* is higher than the industry median in a given year and 0 otherwise. We include the *EPU_HIGH* and *DIVIDEND_HIGH* indicators and the interaction term for these two variables in the baseline regression model. The result is presented in Column (1) of Table 5. The coefficient of the interaction term, *EPU_HIGH×DIVIDEND_HIGH*, is significantly positive at the 1% level, suggesting that firms with a high dividend payout maintain a higher level of underfunding in employees' pension plans during periods of high EPU.

Next, we focus on the impact of the union. He et al. (2020) find that strong unionized firms pay almost 50% lower dividends than those firms without unions. The monitoring role of the labour union has a deterrent effect on a firm's excessive dividend payouts by limiting managers operating flexibility (Chen, Kacperczyk & Ortiz-Molina 2012), which also benefits employees. Francis and Reiter (1987) and Guan and Tang (2018) find that the states, industries, or the years with higher union control generally have better pension funding status and less aggressive asset allocation of pension investments. Following Klasa, Maxwell and Ortiz-Molina (2009), we obtain the industry unionization rates from the Union Membership and

Coverage Database[27]. We use the industry union rate[28] as the proxy for employee power, where *UNION_HIGH* is a dummy variable equal to 1 when union coverage is higher than the sample median in the corresponding year, and otherwise 0. The negative coefficient of the interaction term, *EPU_HIGH×UNION_HIGH*, in Column (2) of Table 5 suggests that during the high EPU years, the union power mitigates the negative effects of EPU on corporate pension underfunding.

4.4 The moderating role of the external environment

[Insert Table 6]

In this section, we examine whether EPU effects on pension underfunding are alleviated when firms operate in regions with a high level of social capital. Social capital is characterized as a "coordination mechanism". According to Hoi, Wu and Zhang (2019), social capital refers to joint influences arising from social networks and cooperative norms. The data on social capital is obtained from the Northeast Regional Center for Rural Development dataset [29]. We construct a dummy variable, *SOCIALCAP_HIGH*, which equals one if the score of social capital surrounding corporate headquarters is higher than the industry median in a given year and zero otherwise. The results in Column (1) of Table 6 suggest that firms operating around the areas with a higher level of social capital are more self-restraint in terms of opportunistic behaviours to shift risks to employees.

Next, we examine whether the relation between EPU and pension underfunding is more pronounced for firms in the industry with higher EPU sensitivity. Following Bonaime, Gulen and Ion (2018) and Duong et al. (2020), we computed our EPU-industry sensitivity by

[27] Source: http://www.unionstats.com/

[28] We match the 3-digit Census Industry Classification (CIC) industries codes with the 4-digit SIC codes and then assign the union coverage to our sample firms by year and industry.

[29] Source: https://aese.psu.edu/nercrd/community/social-capital-resources. We obtain the data for the years 1997, 2005, 2009, and 2014. Following Gompers, Ishii and Metrick (2003) and Hilary and Hui (2009), we backfill the social capital data for the other years in the preceding years when data are available. For instance, we fill the missing data from 2015 to 2020 using the figure provided in 2014.

estimating the coefficient of EPU in regression of each Fama-French 48 industry's value-weighted monthly excess stock returns $(R_{i,t} - R_{f,t})$ on EPU Index (EPU_t), [30] market excess return, SMB, and HML factor return over the past 5 years (i.e., 60 months). In Column (2) of Table 6, we add this sensitivity measure to our baseline specification and interact with the high EPU indicator. *INDSENSITIVITY* is a dummy variable equal to 1 if the firm is in an industry with EPU sensitivity larger than the sample median in the corresponding year and 0 otherwise. The variable of interest is EPU_HIGH×INDSENSITIVITY, and its positive coefficient (significant at the 1% level) indicates that the EPU effect on pension underfunding is more pronounced for firms operating in the industries with higher sensitivity to EPU (Column (2) of Table 6).

4.5. The moderating role of stakeholder orientation

Recent literature suggests that institutional investors engage with firms through share voting (Carleton, Nelson & Weisbach 1998; McCahery, Sautner & Starks 2016). Firms with the presence of institutions are generally associated with better operating performance and higher firm value (McConnell & Servaes 1990). Further, Bushee (1998) finds that 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, whereas long-term-oriented institutional shareholders have a stronger incentive to monitor firms and pursue projects with the goal of long-run value maximization (Chen, Harford & Li 2007; Gaspar, Massa & Matos 2005) and dissuade activities that may harm firm reputation (Aghion, Van Reenen & Zingales 2013). There is a direct and substantial connection between employees' pension plans and the firm reputation. For example, Anantharaman, Gao and Manchiraju (2022) point out that pension manipulation damages a firm's reputation as a responsible and caring employer. In addition, corporate pension plans

[30] $R_{f,t}$ is the risk-free rate. The data is based on the one-month US T-bill rate.

are positively associated with employees' job satisfaction at work, affecting their productivity and firm value (Jiao 2010). Therefore, long-term institutional investors are more likely to protect employees' retirement benefits.

Column (1) of Table 7 shows this moderation role of long-term institutional investors of firm risk shifting to corporate pension plans. Following Ghaly, Dang and Stathopoulos (2020), *LONG_TERM* is a dummy variable equal to one when a long-term institutional investor is present (dedicated and quasi-indexer investors from Bushee's classifications). The significant (at 5% level) negative coefficient on the interaction term, *EPU_HIGH×LONG_TERM*, suggests that long-term institutional investors restrict executives' risk-shifting to employees in heightened EPU times since such institutional investors pay attention to firms' long-term prospects.

We then examine whether the association between EPU and the underfunding of corporate pension plans is weaker for firms with good corporate culture. Li et al. (2021) use quantitative analysis of earnings call transcripts with machine learning techniques to score a firm-level measure of the corporate culture. Li et al. (2021) show that corporate culture is positively associated with desired business outcomes, such as improved operational efficiency and focusing on long-term prospects. This implies that short-term opportunistic practices are alleviated by "an invisible hand," i.e., positive corporate culture, especially during challenging times because positive corporate culture facilitates internal behavioral consistency, which empowers executives and rank-and-file employees to make consistent efforts. Therefore, we expect that firms with positive corporate culture are less motivated to risk-shifting to employees through underfunding DB pension plans. The data on firm-level corporate culture is from (Li et al. 2021)[31]. We focus on the most employee-relevant aspect of the total corporate culture

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

scores, which is the score for teamwork. The dummy variable, *CORCULTURE_HIGH*, takes a value of 1 if the corporate culture of teamwork score is higher than the contemporaneous industry median in a given year and 0 otherwise. Results are reported in Column (2) of Table 7. The negative and statistically significant coefficient of the interaction term, *EPU_HIGH×CORCULTURE_HIGH*, supports the prediction that positive corporate culture in teamwork can serve as a buffer against the EPU impact on pension underfunding.

[Insert Table 7]

5. Robustness Tests

5.1 2SLS estimation

EPU and corporate pension underfunding levels may be jointly correlated with some unobservable factors, leading to a potential endogeneity concern. In this section, we employ the instrumental variable approach and run a 2SLS regression analysis to re-examine how EPU affects corporate pension underfunding. Following Nguyen and Phan (2017), we use the partisan polarisation measure (*POLAR*) as the instrument for EPU[32]. The key indicator is *DW-NOMINATE* scores, which have been used to track legislators' ideological positions over time. *POLAR* is calculated as the difference in the first dimension of the DW-NOMINATE scores between the Republican and Democratic parties (Nguyen & Phan 2017). Partisan polarisation makes the passing of legislation more difficult, so it can result in policy gridlocks and variations. Therefore, political polarisation is a valid instrument for EPU. Further, it is unlikely that political polarisation directly affects firm-level decisions regarding pension funds. Consequently, *POLAR* also satisfies the exclusion requirement.

[32] Data were collected from https://legacy.voteview.com/dwnomin.htm and https://voteview.com/data.

[Insert Table 8]

Table 8 presents the 2SLS regression results. Column (1) reports the first-stage regression results for EPU on the IV (*POLAR*), controlling for firm-specific characteristics and macroeconomic factors. Column (1) shows that the coefficient (0.8123) on the IV is positively significant at the 1% level, suggesting that the IV meets the relevance criterion. In addition, the *F*-statistic from the first-stage regression is greater than 10, and the Kleibergen–Paap under-identification test statistic and the Cragg–Donald weak identification test statistic further suggest that the IV is not a weak instrument (Nguyen & Phan 2017).

Column (2) reports the second-stage regression results. The dependent variable is underfunding levels in corporate DB pension plans. Consistent with the results reported in the baseline regression, the coefficient for the instrumented EPU (i.e., 1.905) is positively significant at the 1% level. The significantly positive coefficient of the instrumented EPU confirms our baseline result of the positive association between EPU and corporate DB pension underfunding levels. Therefore, the 2SLS regression analysis assures that the association between EPU and DB pension underfunding levels is robust to endogeneity corrections.

5.2. Alternative measurement of pension risk-shifting: Cash contributions

One concern is that an increase in pension underfunding may not necessarily be due to risk-shifting and wealth-exploitation activities conducted by shareholders and executives, but it could also be due to a decline in asset value. A shock in the equity market can also lead to increased pension underfunding. To address this concern, we show evidence of risk shifting by less cash contribution to pension plans. We switch the dependent variable of pension underfunding to cash contribution. The cash contribution data is manually obtained from the Form 5500-CRR database. We provide a robustness check of our baseline regression by adding more control variables regarding cash positions. Following Cheng and Swenson (2018), we

add the three main cash categories into our baseline regression: operating cash flow, financing cash flow, and investment cash flow. These cash-related variables are relevant because distressed firms may under-fund pension plans simply because they are very cash-constrained. We include mandatory pension contributions required by PBGC (*MANDAT_CONTRI_HIGH*) as another control variable, following Balachandran and Duong (2019), as the amount required for mandatory pension contribution depends on the level of pension deficits.

Following Cheng and Swenson (2018), we also switch the macroeconomic variables to the equity market return and bond market return. In an economic sense, if the market return is good, the investment return from pension assets would be higher. Then, firms are required or less motivated to contribute cash to the pension fund since a high investment return can shorten the gap between pension liabilities and pension assets.

[Insert Table 9]

As can be seen in Column (1) of Table 9, firms indeed contribute less cash to employee pensions when the T-Bond rate is high. Column (1) in Table 9 suggests that it is not EPU itself that directly results in risk-shifting to employee pension plans via less cash contribution, but the heightened EPU exacerbates the risk-shifting incentive in firms whose pension funds are already heavily underfunded, which reinforces our baseline result.

5.3 Alternative measurement of pension risk-shifting: Equity allocation and the beta of pension portfolios

The investment choice of pension plans affects its investment returns, thereby the value of corporate pension funds and the underfunding levels. Firms with excessive pension deficits face a higher likelihood of default, and thus shareholders are considered as put option holders on corporate DB pension assets (Sharpe 1976). Sharpe (1976) and Treynor (1977) propose that the value of put options is maximized when equity holders raise the pension risk. One way to

increase the pension put option value for shareholders is to underfund it via less cash contribution. Another way of increasing the pension put option value is to increase the volatility of the underlying asset, according to Rauh (2009), Anantharaman and Lee (2014), and Bartram (2018). The volatility of pension assets increases when more capital has been allocated to equities and other alternative investment products. The incentive is very similar to asset substitution. Suppose such risk-seeking strategies reward the investment portfolio in the corporate pension plans with outstanding returns. In that case, the pension value improvement reduces firms' need for a cash contribution. However, if the investment portfolios in the pension funds perform poorly and result in default, firm owners are protected by the limited liability policy and thus exercise the put option.

The proportion of pension assets allocated to equity and pension beta (Bartram 2018) provides a unique setting to examine the association between EPU and risk-taking in pension plans. Columns (2) and (3) of Table 9 present the result. The level of pension underfunding (*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. According to Anantharaman and Lee (2014), *EQUITY_ALLOCATION* is measured as the proportion of pension assets invested in equity securities. *PENSION_BETA* is the beta of pension asset investment portfolios, which is measured by 1×pension asset allocation equity+0.175×pension asset allocation debt+ 0.15 ×pension asset allocation real estate + 1.2×pension asset allocation other. When the levels of *EQUITY_ALLOCATION* and *PENSION_BETA* are higher, the risk in the pension portfolio is greater. The variable of interest is the interaction term *EPU* × *UNDERFUNDED_HIGH*. The coefficients of *EPU* × *UNDERFUND_HIGH* in both Columns (2) and (3) are positive and significant at a 1% level, suggesting that firms with poorly funded DB plan allocate a more significant 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.

6. Conclusion

We find that firms increase pension underfunding levels when facing higher EPU. This result is robust to controlling for various macroeconomic variables and the 2SLS approach. We also find that the effect of EPU on pension underfunding levels is more pronounced in firms that excessively pay their CEOs or use cash flow as an important metric in CEO compensation, distribute more dividends or operate in EPU-sensitive industries. However, the presence of unions, long-term institutional investors and positive corporate or social culture can alleviate the effects of EPU on pension deficits. Further analysis shows that firms with higher corporate pension underfunding allocate more assets to riskier equity instruments and have a higher beta of their pension investment portfolios when facing high EPU. Our findings are consistent with the notion that firms risk-shift via corporate pension plans in response to distress risk induced through EPU and EPU aggravates stakeholder conflicts.

This study provides important insight and policy implications for regulatory bodies to better understand the role of policy uncertainty in DB plan deficits. To alleviate the pension underfunding issue, our findings suggest that the government should increase the transparency of government policies via media and social platforms. Financial incentives such as tax deductions may be provided to encourage the participation of long-term institutional investors and unions. Moreover, during high uncertainty times, external factors such as the EPU sensitivity of the industry and social trust are essential in pension management. Thus, the government should focus more on firms in EPU-sensitive sectors and regions with lower social norms by requiring stricter pension disclosure and audit and looking after the disadvantageous

cohorts. Finally, policymakers should exert cautious attention to executive compensation, dividend payout, and corporate culture when firms have higher levels of pension underfunding.

References

Aghion, P, Van Reenen, J & Zingales, L 2013, 'Innovation and institutional ownership', *American Economic Review*, vol. 103, no. 1, pp. 277-304.

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*, vol. 27, no. 1, pp. 76-121.

Anantharaman, D & Lee, YG 2014, 'Managerial risk taking incentives and corporate pension policy', *Journal of Financial economics*, vol. 111, no. 2, pp. 328-351.

Baker, SR, Bloom, N & Davis, SJ 2016, 'Measuring economic policy uncertainty', *The Quarterly Journal of Economics*, vol. 131, no. 4, pp. 1593-1636.

Balachandran, B, Duong, HN & Vu, VH 2019, 'Pension deficits and the design of private debt contracts', *Journal of Financial and Quantitative Analysis*, vol. 54, no. 4, pp. 1821-1854.

Bartram, SM 2018, 'In good times and in bad: Defined-benefit pensions and corporate financial policy', *Journal of Corporate Finance*, vol. 48, pp. 331-351.

Beer, M, Spector, BA, Lawrence, PR, Mills, DQ & Walton, RE 1984, *Managing human assets*. Simon and Schuster.

Benedetti, AH & Chen, S 2018, 'High CEO-to-worker pay ratios negatively impact consumer and employee perceptions of companies', *Journal of Experimental Social Psychology*, vol. 79, pp. 378-393.

Bernanke, BS 1983, 'Irreversibility, uncertainty, and cyclical investment', *The Quarterly Journal of Economics*, vol. 98, no. 1, pp. 85-106.

Bertrand, M & Schoar, A 2003, 'Managing with style: The effect of managers on firm policies', *C*, vol. 118, no. 4, pp. 1169-1208.

Bhattacharya, U, Hsu, P-H, Tian, X & Xu, Y 2017, 'What affects innovation more: policy or policy uncertainty?', *Journal of Financial and Quantitative Analysis*, vol. 52, no. 5, pp. 1869-1901.

Bloom, N 2009, 'The impact of uncertainty shocks', *Econometrica*, vol. 77, no. 3, pp. 623-685.

Bonaime, A, Gulen, H & Ion, M 2018, 'Does policy uncertainty affect mergers and acquisitions?', *Journal of Financial Economics*, vol. 129, no. 3, pp. 531-558.

Bordo, M, Duca, J & Koch, C 2016, 'Economic policy uncertainty and the credit channel: Aggregate and bank level U.S. evidence over several decades', *Journal of Financial Stability*, vol. 26, pp. 90-106.

Boudoukh, J, Michaely, R, Richardson, M & Roberts, MR 2007, 'On the importance of measuring payout yield: Implications for empirical asset pricing', *Journal of Finance*, vol. 62, no. 2, pp. 877-915.

Boutchkova, M, Doshi, H, Durnev, A & Molchanov, A 2012, 'Precarious politics and return volatility', *The Review of Financial Studies*, vol. 25, no. 4, pp. 1111-1154.

Brogaard, J & Detzel, A 2015, 'The asset-pricing implications of government economic policy uncertainty', *Management Science*, vol. 61, no. 1, pp. 3-18.

Bulow, JI 1982, 'What are corporate pension liabilities?', *The Quarterly Journal of Economics*, vol. 97, no. 3, pp. 435-452.

Bushee, BJ 1998, 'The influence of institutional investors on myopic R&D investment behavior', *Accounting Review*, pp. 305-333.

Carleton, WT, Nelson, JM & Weisbach, MS 1998, 'The influence of institutions on corporate governance through private negotiations: Evidence from TIAA-CREF', *Journal of Finance*, vol. 53, no. 4, pp. 1335-1362.

Chen, H, Kacperczyk, M & Ortiz-Molina, H 2012, 'Do nonfinancial stakeholders affect the pricing of risky debt? Evidence from unionized workers', *Review of Finance*, vol. 16, no. 2, pp. 347-383.

Chen, X, Harford, J & Li, K 2007, 'Monitoring: Which institutions matter?', *Journal of Financial Economics*, vol. 86, no. 2, pp. 279-305.

Cheng, Q & Swenson, L 2018, 'Executive compensation and cash contributions to defined benefit pension plans', *Journal of Business Finance & Accounting*, vol. 45, no. 9-10, pp. 1224-1259.

Chhaochharia, V & Grinstein, Y 2009, 'CEO compensation and board structure', *Journal of Finance*, vol. 64, no. 1, pp. 231-261.

Christiano, LJ, Motto, R & Rostagno, M 2014, 'Risk shocks', *American Economic Review*, vol. 104, no. 1, pp. 27-65.

Cocco, JF & Volpin, PF 2013, 'Corporate pension plans as takeover deterrents', *Journal of Financial and Quantitative Analysis*, vol. 48, no. 4, pp. 1119-1144.

Comprix, J & Muller III, KA 2011, 'Pension plan accounting estimates and the freezing of defined benefit pension plans', *Journal of Accounting and Economics*, vol. 51, no. 1-2, pp. 115-133.

Cronqvist, H, Heyman, F, Nilsson, M, Svaleryd, H & Vlachos, J 2009, 'Do entrenched managers pay their workers more?', *Journal of Finance*, vol. 64, no. 1, pp. 309-339.

Duong, HN, Nguyen, JH, Nguyen, M & Rhee, SG 2020, 'Navigating through economic policy uncertainty: The role of corporate cash holdings', *Journal of Corporate Finance*, vol. 62, p. 101607.

Edmans, A 2011, 'Does the stock market fully value intangibles? Employee satisfaction and equity prices', *Journal of Financial Economics*, vol. 101, no. 3, pp. 621-640.

Eisdorfer, A 2008, 'Empirical evidence of risk shifting in financially distressed firms', *Journal of Finance*, vol. 63, no. 2, pp. 609-637.

Francis, JR & Reiter, SA 1987, 'Determinants of corporate pension funding strategy', *Journal of Accounting and Economics*, vol. 9, no. 1, pp. 35-59.

Franzoni, F & Marin, JM 2006, 'Pension plan funding and stock market efficiency', *Journal of Finance*, vol. 61, no. 2, pp. 921-956.

Gaspar, JM, Massa, M & Matos, P 2005, 'Shareholder investment horizons and the market for corporate control', *Journal of Financial economics*, vol. 76, no. 1, pp. 135-165.

Ghaly, M, Dang, VA & Stathopoulos, K 2020, 'Institutional investors' horizons and corporate employment decisions', *Journal of Corporate Finance*, vol. 64, p. 101634.

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

Graham, JR & Harvey, CR 2001, 'The theory and practice of corporate finance: Evidence from the field', *Journal of Financial Economics*, vol. 60, no. 2-3, pp. 187-243.

Guan, Y & Tang, DY 2018, 'Employees' risk attitude and corporate risk taking: Evidence from pension asset allocations', *Journal of Corporate Finance*, vol. 48, pp. 261-274.

Guiso, L, Sapienza, P & Zingales, L 2004, 'The role of social capital in financial development', *American Economic Review*, vol. 94, no. 3, pp. 526-556.

Gulen, H & Ion, M 2016, 'Policy uncertainty and corporate investment', *The Review of Financial Studies*, vol. 29, no. 3, pp. 523-564.

Guttman, I, Kadan, O & Kandel, E 2010, 'Dividend stickiness and strategic pooling', *The Review of Financial Studies*, vol. 23, no. 12, pp. 4455-4495.

Hasan, I, Hoi, CK, Wu, Q & Zhang, H 2017a, 'Does social capital matter in corporate decisions? Evidence from corporate tax avoidance', *Journal of Accounting Research*, vol. 55, no. 3, pp. 629-668.

Hasan, I, Hoi, CK, Wu, Q & Zhang, H 2017b, 'Social capital and debt contracting: Evidence from bank loans and public bonds', *Journal of Financial and Quantitative Analysis*, vol. 52, no. 3, pp. 1017-1047.

He, J, Tian, X, Yang, H and Zuo, L 2020, 'Asymmetric cost behavior and dividend policy', *Journal of Accounting Research*, vol. 58, no. 4, pp. 989-1021.

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*, vol. 105, no. 5, pp. 326-330.

Hilary, G & Hui, KW 2009, 'Does religion matter in corporate decision making in America?', *Journal of Financial Economics*, vol. 93, no. 3, pp. 455-473.

Hoi, CKS, Wu, Q & Zhang, H 2019, 'Does social capital mitigate agency problems? Evidence from Chief Executive Officer (CEO) compensation', *Journal of Financial Economics*, vol. 133, no. 2, pp. 498-519.

Jensen, MC 1986, 'Agency costs of free cash flow, corporate finance, and takeovers, *The American Economic Review*, vol. 76, no. 2, pp. 323-329.

Jiao, Y 2010, 'Stakeholder welfare and firm value', *Journal of Banking & Finance*, vol. 34, no. 10, pp. 2549-2561.

Jin, L, Merton, RC & Bodie, Z 2006, 'Do a firm's equity returns reflect the risk of its pension plan?', *Journal of Financial Economics*, vol. 81, no. 1, pp. 1-26.

Julio, B & Yook, Y 2012, 'Political uncertainty and corporate investment cycles', *Journal of Finance*, vol. 67, no. 1, pp. 45-83.

Jurado, K, Ludvigson, SC & Ng, S 2015, 'Measuring uncertainty', *American Economic Review*, vol. 105, no. 3, pp. 1177-1216.

Karpavičius, S 2014, 'Dividends: Relevance, rigidity, and signaling', *Journal of Corporate Finance*, vol. 25, pp. 289-312.

Kaviani, MS, Kryzanowski, L, Maleki, H & Savor, P 2020, 'Policy uncertainty and corporate credit spreads, *Journal of Financial Economics*, vol. 138, no. 3, pp. 838-865.

Kelly, B, Pástor, Ľ & Veronesi, P 2016, 'The price of political uncertainty: Theory and evidence from the option market', *Journal of Finance*, vol. 71, no. 5, pp. 2417-2480.

Klasa, S, Maxwell, WF & Ortiz-Molina, H 2009, 'The strategic use of corporate cash holdings in collective bargaining with labor unions', *Journal of Financial Economics*, vol. 92, no. 3, pp. 421-442.

Knack, S & Keefer, P 1997, 'Does social capital have an economic payoff? A cross-country investigation', *The Quarterly Journal of Economics*, vol. 112, no. 4, pp. 1251-1288.

Li, K, Liu, X, Mai, F & Zhang, T 2021, 'The role of corporate culture in bad times: Evidence from the COVID-19 pandemic', *Journal of Financial and Quantitative Analysis*, vol. 56, no. 7, pp. 2545-2583.

Li, K, Mai, F, Shen, R & Yan, X 2021, 'Measuring corporate culture using machine learning', *The Review of Financial Studies*, vol. 34, no. 7, pp. 3265-3315.

McCahery, JA, Sautner, Z & Starks, LT 2016, 'Behind the scenes: The corporate governance preferences of institutional investors', *Journal of Finance*, vol. 71, no. 6, pp. 2905-2932.

McConnell, JJ & Servaes, H 1990, 'Additional evidence on equity ownership and corporate value', *Journal of Financial Economics*, vol. 27, no. 2, pp. 595-612.
Nguyen, NH & Phan, HV 2017, 'Policy uncertainty and mergers and acquisitions', *Journal of Financial and Quantitative Analysis*, vol. 52, no. 2, pp. 613-644.

Nwaeze, ET, Yang, SS & Yin, QJ 2006, ‘Accounting information and CEO compensation: The role of cash flow from operations in the presence of earnings’, *Contemporary Accounting Research*, vol. 23, no. 1, pp. 227-265.

Onali, E 2014, ‘Moral hazard, dividends, and risk in banks’, *Journal of Business Finance & Accounting*, vol. 41, no. 1-2, pp. 128-155.

Pástor, Ľ & Veronesi, P 2013, 'Political uncertainty and risk premia', *Journal of Financial Economics*, vol. 110, no. 3, pp. 520-545.

Pedersen, DJ 2019, 'Risk Shifting and Corporate Pension Plans: Evidence from a Natural Experiment', *Journal of Financial and Quantitative Analysis*, vol. 54, no. 2, pp. 907-923.

Phan, HV & Hegde, SP 2013, 'Corporate governance and risk taking in pension plans: Evidence from defined benefit asset allocations', *Journal of Financial and Quantitative Analysis*, vol. 48, no. 3, pp. 919-946.

Rauh, JD 2006, 'Investment and financing constraints: Evidence from the funding of corporate pension plans', *Journal of Finance*, vol. 61, no. 1, pp. 33-71.

Rauh, JD 2009, 'Risk shifting versus risk management: Investment policy in corporate pension plans', *The Review of Financial Studies*, vol. 22, no. 7, pp. 2687-2733.

Rehman, MU, Sensoy, A, Eraslan, V, Shahzad, SJH & Vo, XV 2021, 'Sensitivity of US equity returns to economic policy uncertainty and investor sentiments', *The North American Journal of Economics and Finance*, vol. 57, p. 101392.

Riddick, LA & Whited, TM 2009, 'The corporate propensity to save', *Journal of Finance*, vol. 64, no. 4, pp. 1729-1766.

Samwick, AA & Skinner, J 2004, 'How will 401 (k) pension plans affect retirement income?', *American Economic Review*, vol. 94, no. 1, pp. 329-343.

Sharpe, WF 1976, 'Corporate pension funding policy', *Journal of Financial Economics*, vol. 3, no. 3, pp. 183-193.

Shivdasani, A & Stefanescu, I 2010, 'How do pensions affect corporate capital structure decisions?', *The Review of Financial Studies*, vol. 23, no. 3, pp. 1287-1323.

Srivastav, A, Armitage, S & Hagendorff, J 2014, ‘CEO inside debt holdings and risk-shifting: Evidence from bank payout policies’, *Journal of Banking & Finance*, vol. 47, pp.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*, vol. 127, no. 1, pp. 152-173.

Tepper, I 1981, 'Taxation and corporate pension policy', *Journal of Finance*, vol. 36, no. 1, pp. 1-13.

Tepper, I & Affleck, A 1974, 'Pension plan liabilities and corporate financial strategies', *Journal of Finance*, vol. 29, no. 5, pp. 1549-1564.

Treynor, JL 1977, 'The principles of corporate pension finance', *Journal of Finance*, vol. 32, no. 2, pp. 627-638.

Vafeas, N & Vlittis, A 2018, 'Independent directors and defined benefit pension plan freezes', *Journal of Corporate Finance*, vol. 50, pp. 505-518.

Appendix: Variable Descriptions

Code	Name	Definition
Dependent Variable		
UNDERFUND	Corporate pension underfunding level	Pension liabilities minus the fair value of pension assets divided by pension liabilities: $(PBPRO_t - PPLAO_t)/PBRPO_t$
Main Independent Variable		
EPU	Economic Policy Uncertainty (Overall)	Log transformation of BBD Index (Overall)
EPU_NEWS	Economic Policy Uncertainty (News)	Log transformation of BBD Index (News)
EPU_GOVDIS	Economic Policy Uncertainty (Government disagreement on fiscal and monetary policies)	Log transformation of BBD Index (Government disagreement on fiscal and monetary policies)
EPU_CPI	Economic Policy Uncertainty (Inflation)	Log transformation of BBD Index (Inflation)
EPU_TAX	Economic Policy Uncertainty (Tax Codes)	Log transformation of BBD Index (Tax Codes)
Pension Characteristics Variable		
PENSION_RETURN	Pension actual return on plan assets	Compustat: *PBARAT*
Firm Characteristics Variable		
CASH	Firm's cash position	Cash divided by total assets: CH_t/AT_t
EARNVOL	Earnings volatility	Standard deviation of quarterly earnings (Compustat item "*EPSPIY"*) in the previous four years
LEVERAGE	Leverage	Total debt divided by total assets: $(DLTT_t + DLC_t)/AT_t$
PPE	Asset tangibility	Tangible assets divided by total assets: $PPENT/AT_t$
Z_SCORE	Financial distress risk	Z_SCORE= $3.3 \times \left(\frac{EBIT_t}{AT_t}\right) + 1.0 \times \left(\frac{SALES_t}{AT_t}\right) + 1.4 \times \left(\frac{RE_t}{AT_t}\right) + 1.2 \times [\frac{(ACT_t - LCT_t)}{AT_t}]$
MTB	Market-to-Book Ratio	Market value of assets (book value of assets – book value of equity (*CEQ*)+market value of equity (common shares outstanding (*CSHO*)×closing share price at the end of the fiscal year (*PRCC_F*) – deferred taxes (*TXDB*) over book value of assets
ROA	Return on assets	Net income over book value of assets: NI/AT_t
SIZE	Firm size	Natural logarithm of the book value of total assets: Log (AT_t)
OP_CF	Operating cash flow	Operating cash flow plus pension contributions, scaled by total assets.
INVEST_CF	Operating cash flow	Net cash flows received from investing activities from the statement of cash flows, scaled by total assets.
FINANCING_CF	Financing cash flow	Net cash flows received from financing activities from the statement of cash flows, scaled by total assets.

INTEREST_COVERAGE	Interest Coverage	Interest expense, scaled by operating income before depreciation.
T-BOND	Average 30-year T-bond rate for the year	Fixed Income Security Market
INSTOWNERSHIP	Institutional Ownership	Total institutional ownership based on 13(f) filings recorded in Thomson Reuters Institutional Holdings database.
RET_PENSON	Actual return from pension asset investments	Actual returns from plan assets (PBARAT).
SALES_GROWTH	Growth in sales revenue	NI_t/NI_{t-1}
LEV_LONG	Long term debt position	Computed as dltt/(prcc_f×csho).
NEG_EQUITY	Negative Equity	Dummy variable that equals 1 if the firm's total equity is negative, and 0 otherwise
MARKET CAP	Market capitalization of the firm's equity	Market capitalization of the firm's equity, computed as prcc_f× sho.
PENSION_BETA	The beta of pension asset investment portfolio	1×pension asset allocation equity+0.175×pension asset allocation debt+ 0.15 ×pension asset allocation real estate + 1.2×pension asset allocation other
Macroeconomic Control Variables		
EX_GDPGROWTH	Expected GDP Growth	The percentage change between the annual mean one-year-ahead GDP forecasts from the Philadelphia Federal Reserve's biannual Livingstone survey
ECONOMIC_INDEX	Leading Economic Index	The Conference Board's monthly Leading Economic Index, which is based on ten macroeconomic indicators
REAL_GDPGROWTH	Real GDP Growth Rates	The real GDP growth rates from the World Bank's World Development Indicator
CONSUMER_CONFID	Consumer Confidence	The Michigan Consumer Confidence Index from the University of Michigan
ELECYEAR	Election Year Dummy	Dummy variable indicating the presidential election years
GDPDIS	GDP Dispersion	Log transformation of GDP Dispersion, the coefficient of variation of GDP forecasts
SDPROFIT	Profit Volatility	Log transformation of profit growth, the annual cross-sectional standard deviation of the growth in firm profit
VXO	Implied Volatility	Log transformation of VXO index, the implied volatility from the Chicago Board Options Exchange
SDRETURN	Return Volatility	The yearly historical stock return volatility, i.e., the standard deviation of monthly stock returns in previous twelve months
JLN	Jurado et al. (2015)'s Index	Log transformation of JLN aggregate uncertainty index
CFNAI	The Chicago Fed National Activity Index	

		Measure current economic activity and inflationary pressure based on 85 monthly economic indicators.
RATE SPREAD	Proxy for market liquidity using the spread between Baa rated bonds and the Federal Funds rate	To match the annual frequency of the firm-level data, we use calendar-year averages of this (monthly) spread variable.
Shiller's CAPE RATIO		The cyclically adjusted price earnings (CAPE) ratio developed by Robert Shiller
Moderation Analysis Variables		
DIVIDEND	Dividend payout, including cash dividend and share repurchase	Common stock dividends plus stock repurchases divided by lagged total assets: $(DVC_t + Stock\ repurchase_t)/AT_{t-1}$.
FIRM_AGE	The history of a firm	Log transformation of the number of years since the year of a firm's incorporation or founding
CEO_TOTAL_PAY	CEO total annual compensation	Log transformation of Total compensation (*TDC1*)
SP500 RETURN	Market Return	Value-Weighted Return incl. dividends, CRSP data item "VWRETD ").
SALES	Sales Revenue	Natural logarithm of sales (Compustat item "*SALE"*)
RET_STOCK	Stock Return	Stock return over the last fiscal year ((*PRCC_F*/*AJEX* + *DVPSX_F*/ *AJEX*)/(lag(*PRCC_F*)/lag(*AJEX*))-1)
UNION	Industry median unionization rate	Union Membership and Coverage http://www.unionstats.com/
CASHMATRIC	CEO's compensation depends on operating cash flow	
Number of Employees	A proxy for employee efficiency	Log (asset) to number of employees
Institutional Investor Horizon	Whether the firm's institutional investors are mainly long-term investors	Bushee's Institutional Investor Classification Data https://accounting-faculty.wharton.upenn.edu/bushee/
INDSENSITIVITY	EPU-stock return sensitivity (EPU_BETA)	The coefficient of EPU in regressions of each Fama-French 48 industry's value weighted monthly excess stock returns on EPU
CORCULTURE	Corporate Culture with respect of employee teamwork	firm-level measure of corporate culture with repsect to teamwork.
SOCIALCAP	Social capital, captured by secular norms and social networks surrounding corporate headquarters.	The Northeast Regional Center for Rural Development (NRCRD) at the Pennsylvania State University https://aese.psu.edu/nercrd/community/social-capital-resources
MANDAT_CONTRI_HIGH	The firm's mandatory contributions to corporate pension funds	For years before 2008, computed as (ppsc+ (pbaco- pplao)/30), if PBO>FVPA, and 0 otherwise; for years beginning or later, computed as (ppsc+ (pbaco- pplao)/7), if pbaco>pplao, and 0 otherwise
HP INDEX	Financial Constraint Index	HP = – 0.737×log(*AT*) – 0.043×[log(*AT*)]^2 – 0.040× "FIRM_AGE"
IA_INDEX	Information Asymmetric Index	Firmsize_pcrank+ mkequity_pcrank+ RD_assets_pcrank+

	TobinQ_pcrank+NUMEST_pcrank+ forecasterrors_pcrank+cshr_pcrank

Table 1. Summary Statistics

This table presents the summary statistics for the main variables in the baseline regression. The data ranges from 1998 to 2020. It presents firm-year observations which do not have missing values. Variables definitions are provided in Appendix.

Variable	Observations	Mean	SD	Min	25th Percentile	50th Percentile	75th Percentile	90th Percentile	Max
UNDERFUND	13200	0.3449	0.5398	-1.655	0.0569	0.2095	0.515	1.0122	2.1483
EPU	13200	4.7373	0.3005	4.2673	4.4788	4.7136	4.9464	5.123	5.493
CASH	13200	0.0855	0.0843	0	0.0236	0.0601	0.1195	0.1962	0.8579
EARNVOL	13200	1.5494	2.5956	0.0163	0.4106	0.775	1.5786	3.2373	19.4979
LEVERAGE	13200	0.2801	0.2034	0	0.1458	0.2571	0.3762	0.5228	2.4387
PPE	13200	0.286	0.1936	0.0017	0.1371	0.2381	0.3876	0.5763	0.9194
Z_SCORE	13200	1.7722	1.1789	-2.459	1.121	1.8139	2.4836	3.1157	4.9578
MTB	13200	1.4173	1.1401	0.2356	0.8161	1.1424	1.6734	2.457	41.7242
ROA	13200	0.0328	0.1592	-12.95	0.0114	0.0461	0.0798	0.1183	0.3974
FIRM SIZE	13200	7.5338	1.6917	-0.949	6.4462	7.6025	8.7271	9.8651	10.3326
RET_PENSON	13200	0.0631	0.106	-0.281	0.0072	0.0837	0.1294	0.1752	0.2997
LEV_LONG	13200	0.641	1.4385	0	0.0905	0.2285	0.5203	1.27	9.8192
NEG_EQUITY	13200	0.0633	0.2435	0	0	0	0	0	1
SALES_GROWTH	13200	0.0505	0.2362	-1	-0.0344	0.0405	0.1155	0.2264	9.2515
INSTOWNERSHIP	13200	0.6744	0.2593	0.0002	0.5267	0.734	0.8722	0.953	1.0671
MARKET_CAP	13200	7.2506	2.0309	-1.036	5.9991	7.3547	8.6729	9.9656	10.5902

Table 2. Correlations

Table 2 shows the correlation matrix for the main variables in the baseline analysis. The data ranges from the year 1998 to 2020. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, separately.

	(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_OWNERSHIP	-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

Table 3. Baseline Regression

Column (1) of Table 3 regresses the underfunding level of firm pension plans (*UNDERFUND*) on Economic Policy Uncertainty (EPU). Column (2) includes firm-level controls such as firm's cash position (*CASH*), earnings volatility (*EARNVOL*), leverage (*LEVERAGE*), asset tangibility (*PPE*), Altman Z-score (*Z_SCORE*), ROA (*ROA*), firm size (*SIZE*), and return from corporate pension asset investments (*RET_PENSON*), firm's long-term debt position (LEV_LONG), whether the firm has negative equity (NEG_EQUITY), firm's sale growth (SALES_GROWTH), institutional ownership (INSTOWNERSHIP) and market cap (MARKET_CAP). In Column 3, general macroeconomic uncertainty variables, including expected GDP growth (*EX_GDPGROWTH*), real GDP growth (*REAL_GDPGROWTH*), leading economic index (*ECONOMIC_INDEX*) and consumer confidence (*CONSUMER_CONFID*), GDP forecast dispersion (*GDPDIS*), a standard deviation of cross-sectional profit growth (SDPROFIT), a standard deviation of cross-sectional real returns (*SDRETURN*), implied volatility (*VXO*), Jurado, Ludvigson and Ng (2015)'s index (*JLN*) and election year dummy (*ELECYEAR*) are added following Gulen and Ion (2016), Nguyen and Phan (2017). Following Bonaime, Gulen and Ion (2018), we additionally include three more macroeconomic variables: CFNAI, Rate_Spread and Shiller's CAPE ratio. We use the first principle component method to form combine these 13 macroeconomic variables into 2 first principal component variables. In Columns (4) through (6), the overall EPU measure is replaced by each of its four components (news (*EPU_NEWS*), disagreement on government fiscal and monetary policies (*EPU_GOV_DIS*), inflation (*EPU_CPI*), and tax (*EPU_TAX*)). All continuous variables are winsorized at 1% levels. In all regressions, we include firm fixed effects and firm clustering effects, following Duong et al. (2020). Robust firm clustered t-statistics are reported in the parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, separately.

	(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)
Firm fixed effects	YES	YES	YES	YES	YES	YES	YES
Firm cluster	YES	YES	YES	YES	YES	YES	YES
Number of observations	13210	13210	13210	13210	13210	13210	13210
Adj.R^2	0.063	0.118	0.178	0.178	0.166	0.166	0.179

Table 4. The moderating role of executives

In this table, we conduct a cross-sectional analysis of additional regressions to examine the conflict between employees and CEOs in moderating the relation between EPU and DB pension underfunding status. EPU_HIGH is classified for the years in the third quartile. CASHMETRIC is a dummy variable equal to 1 if the main factor that influences CEO compensation includes cash flows from operations (Incentive Lab "METRIC"). CEO compensation is the natural log of total CEO compensation (Execucomp "tdc1") according to Chhaochharia and Grinstein (2009) and Cheng and Swenson (2018). CEO_PAY_HIGH of the firm-year observations with a CEO total compensation higher than the respective contemporaneous industry median at the two-digit SIC code level in the corresponding year. We regress corporate pension underfunding (*UNDERFUND*) on EPU, a dummy variable *CEO_PAY_HIGH* and *CASHMETRIC* and their corresponding interaction term with EPU (e.g. *EPU×CEO_PAY_HIGH* and *EPU× CASHMATRIC)*. All continuous variables are winsorized at 1% levels. T-statistics are reported in parentheses, adjusted for heteroscedasticity, clustered by firms. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, separately.

	(1)	(2)
	CEO Total Compensation	CEO Compensation Based on Operating Cash Flow
Variables	UNDERFUND (t+1)	UNDERFUND (t+1)
EPU_HIGH	0.0992***	0.0550***
	(7.72)	(3.11)
EPU_HIGH ×CEO_PAY_HIGH	0.0644**	
	(1.98)	
CEO_PAY_HIGH	-0.3207**	
	(-2.07)	
EPU_HIGH × CASHMATRIC		0.1102*
		(1.71)
CASHMETRIC		0.0959*
		(1.68)
Firm and Macroeconomic controls	YES	YES
Firm fixed effects	YES	YES
Firm cluster	YES	YES
Number of observations	9192	3598
Adj. R^2	0.221	0.146

Table 5. The moderating role of dividends and unions

In this table, we conduct a cross-sectional analysis of additional regressions to examine the conflict between employees and shareholders in moderating the relation between EPU and DB pension underfunding status. EPU_high is classified for the years in the third quartile. *Dividend* is calculated as common stock dividends (Compustat item "DVC") plus stock repurchases (Compustat "PRSTKC" minus "PSTKRV") divided by lagged total assets (Compustat "AT"), according to Boutchkova et al. (2012). Following Klasa, Maxwell and Ortiz-Molina (2009), we obtain the union data from the Union Membership and Coverage Database. *NUMEMP* is the proxy for employee efficiency, calculated as natural logarithm of the book value of total assets (Compustat "AT") to the number of employees Compustat "EMP"). *DIVIDEND_HIGH* of the firm-year observations with a *DIVIDEND* higher than the respective contemporaneous industry median at the two-digit SIC code level in the corresponding year. Similarly, *UNION_HIGH* and *NUMEMP_HIGH* equal 1 when employees union coverage and logarithm of asset to the number of employees is higher than the industry median at the two-digit SIC code level in the corresponding year, respectively, otherwise 0. We regress corporate pension underfunding (*UNDERFUND*) on EPU, a dummy variable (*DIVIDEND_HIGH, UNION_HIGH, NUMEMP_HIGH*), and their corresponding interaction term with EPU (e.g. *EPU×DIVIDEND_HIGH)*. All continuous variables are winsorized at 1% levels. T-statistics are reported in parentheses, adjusted for heteroscedasticity, clustered by firms. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, separately.

	(1)	(2)
	Dividend	Union
Variables	UNDERFUND (t+1)	UNDERFUND (t+1)
EPU_HIGH	0.0698***	0.3382***
	(6.71)	(4.07)
EPU_HIGH ×DIVIDEND_HIGH	0.1123***	
	(4.52)	
DIVIDEND_HIGH	-0.5700***	
	(-4.84)	
EPU_HIGH ×UNION_HIGH		-0.2480***
		(-2.96)
UNION_HIGH		0.1254*
		(1.81)
Firm and Macroeconomic controls	YES	YES
Firm fixed effects	YES	YES
Firm cluster	YES	YES
Number of observations	12634	10548
Adj. R^2	0.191	0.138

Table 6. The moderating role of the external environment: Social capital and industry EPU sensitivity

In this table, we conduct a cross-sectional analysis of additional regressions on the role of the external environment in moderating the relation between EPU and pension underfunding status. EPU_high is classified for the years in the third quartile. Following Hoi, Wu and Zhang (2019), *SOCIALCAP* is defined as joint influences arising from social networks and cooperative norms in US counties (The Northeast Regional Center for Rural Development at the Pennsylvania State University dataset item "sk"). The dummy variable, *SOCIALCAP_HIGH*, takes a value of one if the score of social capital surrounding corporate headquarters is higher than the respective contemporaneous industry median at the two-digit SIC code level in the corresponding year and zero otherwise. Column (2) investigates whether the effect of EPU on pension underfunding is more pronounced for firms whose stocks are with higher EPU-return sensitivity. EPU-stock return sensitivity is computed by estimating the coefficient of EPU in regressions of each Fama-French 48 industry's value-weighted monthly excess stock returns over the past 5 years, following Duong et al. (2020). *INDSENSITIVITY_HIGH* of the firm-year observations with a *coefficient of EPU* in the EPU-return sensitivity regression higher than the respective contemporaneous industry median at the two-digit SIC code level in the corresponding year. We regress corporate pension underfunding (*UNDERFUND*) on EPU, a dummy variable (*SOCIALCAP_HIGH* and *INDSENSITIVITY_HIGH)* and their corresponding interaction term with EPU (e.g. *EPU×SOCIALCAP_HIGH* and *EPU×INDSENSITIVITY_HIGH)*. All continuous variables are winsorized at 1% levels. T-statistics are reported in parentheses, adjusted for heteroscedasticity, clustered by firms. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, separately.

	(1)	(2)
	Social Capital	Industry Sensitivity
	UNDERFUND (t+1)	UNDERFUND (t+1)
EPU_HIGH	0.1570***	0.0705***
	(11.76)	(5.67)
EPU_HIGH ×SOCIALCAP_HIGH	-0.0810***	
	(-6.59)	
SOCIALCAP_HIGH	0.0168	
	(0.90)	
EPU_HIGH ×INDSENSITIVITY		0.0801***
		(6.22)
INDSENSITIVITY		-0.0918***
		(-8.37)
Firm and Macroeconomic controls	YES	YES
Firm fixed effects	YES	YES
Firm cluster	YES	YES
Number of observations	13210	13210
Adj. R2	0.184	0.186

Table 7. The moderating role of stakeholder orientation: Institutional investor horizon and corporate culture

In this table, we conduct a cross-sectional analysis of additional regressions on the role of the external environment in moderating the relation between EPU and pension underfunding status. *EPU_high* is classified for the years in the third quartile. *LONG_TERM* is a dummy variable equal to 1 with the institutional investment on the firm mainly with a long investment horizon (dedicated and quasi-indexer investors from Bushee's classifications of institutional investors dataset), following Ghaly, Dang and Stathopoulos (2020). *CORCULTURE* refers to firm-level measure of corporate culture from Li et al. (2021) and we take the most relevant aspects of employees with regards to the elements in the corporate culture scores, which is the score for teamwork. The dummy variable, *CORCULTURE_HIGH*, takes a value of one if the score for corporate culture of team work higher than the respective contemporaneous industry median at the two-digit SIC code level in the corresponding year and zero otherwise. We regress corporate pension underfunding (*UNDERFUND*) on EPU, a dummy variable (*LONG_TERM* and *CORCULTURE_HIGH*), and their corresponding interaction term with EPU (*EPU*× *LONG_TERM* and *EPU*×*CORCULTURE_HIGH*). All continuous variables are winsorized at 1% levels. T-statistics are reported in parentheses, adjusted for heteroscedasticity, clustered by firms. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, separately.

	(1)	(2)
	Institutional Investor Horizon	Corporate Culture
	UNDERFUND (t+1)	UNDERFUND (t+1)
EPU_HIGH	0.0972***	0.0587***
	(7.99)	(4.85)
EPU_HIGH ×LONG_TERM	-0.0342**	
	(-2.28)	
LONG_TERM	0.0047	
	(0.40)	
EPU_HIGH ×CORCULTURE_HIGH		-0.0408***
		(-2.92)
CORCULTURE_HIGH		0.0303***
		(2.94)
Firm and Macroeconomic controls	YES	YES
Firm fixed effects	YES	YES
Firm cluster	YES	YES
Number of observations	11743	8271
Adj. R^2	0.135	0.104

Table 8. 2SLS Regressions

The table presents the 2SLS regression results. EPU may be an endogenous variable. The party polarisation for the members in the Senate (POLAR) acts as the instrument variable. Column (1) reports the first-stage regression result, and Column (2) reports the second-stage regression result. The dependent variable in Column (2) is the underfunding levels in corporate DB pension plans. The sample contains 13,210 firm-year observations between 1998 and 2020. P-value is reported in parentheses, is adjusted for heteroscedasticity. It is clustered by firm. All regressions control for the firm fixed effects. ***, **, and * indicate significant level at the 1%, 5% and 10%, separately.

	(1)	(2)
	First Stage	Second Stage
Variables	EPU	UNDERFUND (t+1)
POLAR	0.8123***	
	(22.68)	
EPU_HAT (Instrumented)		1.905***
		(16.78)
Under-identification test	493.779***	
Anderson canon. corr. LM Wald F-statistic		
Weak identification test	514.541***	
Cragg-Donald Wald F-statistic		
Firm and Macroeconomic controls	YES	YES
Firm fixed effects	YES	YES
Firm cluster	YES	YES
Number of observations	13077	13077
R^2	0.5269	

Table 9. **Alternative measurements of risk-shifting in pensions**

In this table, following Anantharaman and Lee (2014), Column (1) considers cash contribution and further adds two control variables for cash flow, cash flow from operations (OCF) and standard deviation thereof (SDOCF), as distressed firms could underfund plans not necessarily to exploit the PBGC option, but simply because they are too cash-constrained to fund them. Columns (2) and (3) consider two other key pension characteristics relating to the risk of the pension investment portfolio: Equity allocation of pension portfolios and the beta of pension portfolio. The pension underfunding level (UNDERFUNDED_HIGH) is a dummy variable equal to one if the firm's pension underfunding level is higher than the respective contemporaneous industry median in their corresponding years at the two-digit SIC code level and zero otherwise. All continuous variables are winsorized at 1% levels. T-statistics are reported in parentheses, adjusted for heteroscedasticity, clustered by firms. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, separately.

	(1)	(2)	(3)
Variables	CASH CONTRIBUTION (t+1)	EQUITY ALLOCATION (t+1)	PENSION BETA (t+1)
EPU	0.0183	-0.0137	-0.0108
	(0.79)	(-1.40)	(-1.14)
MANDAT_CONTRI_HIGH	0.0540**	0.0111**	0.0164***
	(2.12)	(2.05)	(3.21)
EPU× UNDERFUND_HIGH	-0.0709**	0.0526***	0.0398***
	(-2.35)	(3.68)	(2.95)
UNDERFUND_HIGH	0.2557*	-0.2246***	-0.1656**
	(1.90)	(-3.30)	(-2.56)
Firm and Macroeconomic controls	YES	YES	YES
Firm fixed effects	YES	YES	YES
Firm cluster	YES	YES	YES
Number of observations	7927	7482	7152
Adjusted R^2	0.075	0.243	0.112

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