The Impact of Economic Policy Uncertainty on Corporate Financial Decisions and Stock Market Returns

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Abstract

Economic policy uncertainty (EPU) is a non-diversifiable shock which plays a crucial role in corporate financial decisions and firms' stock market performance. This thesis investigates three key issues related to the effects of EPU on corporate financial decisions and stock returns. First, we examine the effect of EPU on firms' financing mix using the system-GMM method and annual data on listed companies in France, Germany, Japan, the United Kingdom, and the United States between 1999 and 2022. We find that changes in lagged EPU are positively associated with firms' leverage ratios. The results are robust to both book and market leverage ratios. The effects of EPU on leverage ratios also depend on the debt maturity period (term) and institutional conditions. Changes in EPU are positively associated with short-term and long-term leverage ratios. Moreover, A weaker regulatory environment amplifies the long-term delayed positive effect of EPU on the book leverage ratio and its long-term component. In contrast, the strong regulatory environment strengthens the short-term positive effect of EPU on the book leverage ratio.

Second, we investigate the impact of EPU on firms' payout policies and the motivations (rationales) underlying it. We employ fixed-effects panel regression and the inverse propensity weighting (IPW) method to analyse year-firm data from France, Germany, Japan, the United Kingdom, and the United States between 1999 and 2022. We find that changes in EPU are positively correlated with changes in the total payout ratio. Additionally, firms' dividend payout ratios and dividend yields are positively associated with changes in EPU. However, firms tend to decrease their regular dividends if EPU increases over an extended period. Moreover, we find that share repurchases tend to increase when EPU rises. Finally, the mediation tests suggest that free cash flow is a channel through which firms increase payouts to distribute surplus

cash flows when EPU rises, while financial constraints are a channel through which firms increase payouts even as they are more financially constrained during EPU times.

Third, we examine the impact of EPU on stock market returns and the underlying transmission mechanisms. Using monthly and quarterly panel data from 22 countries between 1997 and 2021, the fixed-effect panel and quantile regressions suggest an inverse and robust association between EPU and stock market returns. Although the negative relationship holds in both developed and developing country groups, the response of stock market returns is more delayed in developing countries. Finally, using Baron and Kenny's (1986) mediation tests, we identify three channels through which changes in EPU affect stock market returns: the risk premium, investment, and the dividend yield.

Overall, this thesis suggests that EPU plays an important role in corporate financial decisions and stock market returns. An increase in EPU is associated with higher leverage ratios, increased payouts to shareholders, and lower stock market returns. Declined investment, heightened risk perception and premium, reduced corporate profitability, and exacerbated agency problems following EPU rises are reasons behind the above effects.

Declaration of Authenticity and Author's Rights

This thesis is the result of the author's original research. It has been composed by the author and has not been previously submitted for examination which has led to the award of a degree.

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List of Abbreviations

Abbreviation	Full term
AMEX	American Stock Exchange
BCI	Business Confidence Index
BRICS	Brazil, Russia, India, China, and South Africa
CFOs	Chief Financial Officers (UK)
CPI	Consumer Price Index
DID	Difference-in-Difference
EIU	Economist Intelligence Unit
EPU	Economic Policy Uncertainty
ESG	Environmental, Social, and Governance
GDP	Gross Domestic Product
GMM	Generalised Method of Moments
IMF	International Monetary Fund
IPI	Industrial Production Index
IPW	Inverse Propensity Weighting
MIBOR	Mumbai Interbank Offered Rate
NASDAQ	National Association of Securities Dealers Automated Quotations
NYSE	New York Stock Exchange
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
PRER	Policy-risk-induced Equity Return
PSM	Propensity Score Matching
R&D	Research and Development
SEO	Seasoned Equity Offerings
SMEs	Small and Medium-sized Enterprises
UK	United Kingdom
US	United State
WB	World Bank
NPV	Net Present Value
WACC	Weighted Average Cost of Capital
WHO	World Health Organisation
WUI	World Uncertainty Index

Chapter 1

INTRODUCTION

1.1 Motivation for the Study

Changes in EPU are non-diversifiable shocks that extensively affect corporate financial decisions. Accordingly, the literature suggests that EPU has a pronounced impact on corporate financial decisions, including corporate investment (Liu et al., 2022; Wu et al., 2020), financing mix (Schwarz & Dalmácio, 2021; Bajaj et al., 2021), and payout policy (Sarwar et al., 2020a; 2020b; Yousefi & Yung, 2022). In the real world with financial frictions, EPU ultimately affects firms' market value [1] and, therefore, stock market returns.

The importance of economic policies for aggregate economies and financial markets can be clearly understood from the observed effects of recent policy decisions in some countries. For example, from July 2024 onward, the UK government announced a series of policy changes in fiscal, taxation, and international trade that affected financial markets.[2] Similarly, US President Trump's tariff policy in 2025 has added economic uncertainty to the international trade policies of many countries, including the UK. These policy changes have triggered a substantial increase in EPU. As shown in Figure 1.1, the UK's EPU index, constructed by Baker et al. (2016a) (BBD index), rose sharply from 147 in June 2024 to 473 in March 2025. Deloitte's 2025 survey of UK chief financial officers (CFOs) anticipated a net 58% and 64% cut in discretionary

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[1] The MM theory by Modigliani and Miller (1958) suggests that firm value is irrelevant to capital structure in perfect stock and bond markets. This indicates that capital structure can impact firm value in financial markets with financial frictions.
[2] The government's commitment to tighter fiscal rules increases future fiscal policy and spending uncertainty. The increase in national insurance contributions and the minimum salary threshold for the skilled worker visa raise business costs, heightening the uncertainty of employment decisions

spending and hiring in UK firms due to high uncertainty.[3] The Bank of England's Monetary Policy Report (February 2025) also notes that 'rising uncertainty may lead businesses to delay investment spending and hiring decisions'.[4] Reflecting this outlook, the Office for Budget Responsibility has adjusted the UK's GDP growth forecast for 2025 from 2% to 1%.[5]

[Insert Figure 1.1 here]

Similarly, due to concerns about policy changes following the presidential election, uncertainty about tariff policy in 2025, and the sunset of the Tax Cuts and Jobs Act[6], the EPU of the US increased from the end of 2024. In April 2025, the news-based BBD index (Baker et al., 2016a) rose to 725 from 139 in April 2024 (See Figure 1.2). At the same time, the US stock market responded to the EPU shocks with high volatility. Subsequent to President Trump's tariff announcement on 2 April 2025, the S&P 500, NASDAQ Composite, and Dow Jones Industrial Average dropped by 4.88%, 5.97%, and 3.98%, respectively.[7] On 9 April 2025, after Trump announced a 90-day pause on reciprocal tariffs, these indices rebounded by 9.5%, 12.2%, and 7.9%, respectively.[8] The high EPU also dampened consumption and investment in the US. The Beige Book issued by the Federal Reserve District in May 2025 reveals that 'all Districts reported elevated levels of economic and policy uncertainty, which have led to hesitancy and a

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[3] Deloitte, CFOs expect further cost cutting in 2025, https://www.deloitte.com/uk/en/about/press-room/cfos-expect-further-cost-cutting-in-2025.html?utm_source=chatgpt.com

[4] Bank of England, Monetary Policy Report - February 2025, p. 32, https://www.bankofengland.co.uk/monetary-policy-report/2025/february-2025?utm_source=chatgpt.com

[5] Office for Budget Responsibility, Economic and fiscal outlook-March 2025, https://obr.uk/economic-and-fiscal-outlooks/?utm_source=chatgpt.com#chapter-3, Jan 2025

[6] The Tax Cuts and Jobs Act will expire on 31 December 2025.

[7] Investing.com, Historical data of S&P, NASDAQ Composite, and Dow Jones Industrial Average.

[8] Market Index History. U.S. Markets Show Incredible, Record-Level Rally - April 9, 2025 - Market Index History. https://www.marketindexhistory.com/historical-insights/2025/us-markets-show-incredible-record-level-rally-april-9-2025.html

cautious approach to business and household decisions'[9]. The Organisation for Economic Co-operation and Development (OECD) stressed the high uncertainty in the US, forecasting a slow economic growth of 1.6% in 2025.[10]

The uncertainty stemming from US President Trump's tariff policy in 2025 has substantially exacerbated global policy uncertainty. In Canada, as shown in Figure 1.2, the BBD index of EPU reached a historical high (since 1985) of 1635 in February 2025, more than nine times its average EPU level. Canadian residential investment fell 11% in the first quarter of 2025. The unemployment rate rose to 6.9% in June 2025.[11] The OECD attributes this to 'escalating trade tensions with the US' and expects weak Canadian GDP growth of 1.0% in 2025.[12]

[Insert Figure 1.2 here]

Likewise, as illustrated in Figure 1.3, the BBD index of European countries hit its historical high of 779 (since 1987) in April 2025. The BBD indices for Germany and France were 1502 and 620, respectively, reaching their recorded highest levels (since 1993 and 1987, respectively). Italy's BBD index rose to an all-time third-highest (since 1997) level of 246. As these uncertainties can lead to sluggish consumer demand, the OECD forecasted GDP growth of 0.6%, 0.4%, and 0.6% for France, Germany, and Italy in 2025.[13]

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[9] Federal Reserve. (2025). The Beige Book Summary of Commentary on Current Economic Conditions by Federal Reserve District (May 2025), p. 1 https://www.federalreserve.gov/monetarypolicy/files/BeigeBook_20250604.pdf,

[10] OECD. (2025). OECD Economic Outlook, Volume 2025 Issue 1, Tackling Uncertainty, Reviving Growth, p. 268. https://doi.org/10.1787/83363382-en,

[11] Bank of Canada. (2025). Monetary Policy Report—July 2025, p. 5, https://www.bankofcanada.ca/wp-content/uploads/2025/07/mpr-2025-07-30.pdf

[12] OECD. (2025). OECD Economic Outlook, Volume 2025 Issue 1, Tackling Uncertainty, Reviving Growth, p 123. https://doi.org/10.1787/83363382-en.

[13] OECD. (2025). OECD Economic Outlook, Volume 2025 Issue 1, Tackling Uncertainty, Reviving Growth, p 163, p 159, and p 190. https://doi.org/10.1787/83363382-en

[Insert Figure 1.3 here]

In China, the BBD index (See Figure 1.4) rose to 524.83 in April 2025, the third-highest since 2000. The economic outlook issued by the World Bank (June 2025) lowered China's economic growth expectation to 4.5% in 2025 due to heightened uncertainty at home and abroad, trade restrictions, and low domestic demand.[14]

[Insert Figure 1.4 here]

The above account of some major economies worldwide demonstrates that EPU plays a pivotal role in economic growth, which, in turn, affects corporate financial decisions and market returns.

The existing literature also shows that changes in EPU are significantly associated with corporate strategies and financial market performance. During periods of high EPU, firms tend to delay investment and wait for more information (Bernanke, 1983; Pindyck, 1988; Dixit & Pindyck, 1994). Financial frictions are also likely to increase with EPU (Rodrik, 1991; Gilchrist et al., 2014; Rana & Debata, 2024). Thus, firms may adjust their financing decisions and payout policy in response to changes in EPU. Studies have documented a significant correlation between EPU and corporate financing mix (Zhang et al., 2015; Schwarz & Dalmácio, 2021; Jumah et al., 2023), as well as between EPU and firms' payout policies (Sarwar et al., 2020a, 2020b; Farooq & Ahmed, 2019; Ayed et al., 2024). Consequently, when EPU changes, adjustments in firms' financial mix affect firms' cost of capital and investors' required rate of return. On the other hand, alterations in payout policy following changes in EPU impact firms'

[14] World Bank group. (2025). Global Economic Prospects June 2025, p. 14. https://openknowledge.worldbank.org/server/api/core/bitstreams/0e685254-776a-40cf-b0ac-f329dd182e9b/content

dividend yields and market values (Vermaelen, 1981; Miller & Rock, 1985). This evidence indicates that EPU is closely related to stock market returns, aligned with previous empirical findings (Arouri et al., 2016; Christou et al., 2017; Kwon, 2022).

However, the existing literature indicates that several aspects of EPU's effects on the corporate sector and stock returns remain underexplored. First, associations between EPU and financing mix, as well as EPU and payout policy, are subject to ongoing debate, as studies have reported conflicting results across countries and over time. Similarly, the effect of EPU on stock market returns remains ambiguous, as the mixed evidence of both negative (Arouri et al., 2016; Christou et al., 2017; Kwon, 2022) and asymmetric effects (Kundu & Paul, 2022; Huang & Liu, 2022) has been documented. Second, the mechanisms through which EPU affects financing mix, payout policy, and stock market returns are under investigation. Third, existing studies have not used methods to establish the cause-and-effect relationship between EPU and corporate financial decisions or stock market returns. The above research gaps are the specific areas that this thesis focuses on. By filling gaps in the literature, this thesis aims to contribute new knowledge in several ways. First, it seeks to clarify the magnitude and direction of EPU's impact on the financing mix, payout policy, and stock market returns. Second, it aims to identify the channels and motives through which EPU affects the corporate financing mix, payout policy, and stock market returns. Third, it seeks to provide a comprehensive understanding of EPU's role in the financial market and corporate financial decisions by linking the financing mix, payout policy, and stock market returns to corporate investment based on the real option theory.

Motivated by the growing importance of comprehensively understanding how firms' financial decisions respond to EPU, and how their responses transmit to capital markets, especially in an increasingly volatile economic policy environment, this thesis investigates the impact of EPU on key corporate financial decisions and stock market returns to bridge the gaps in the previous literature. Specifically, we examine three key financial aspects of the corporate sector. They are: (a) whether EPU impacts the corporate financing mix and what the mechanisms of the effects are; (b) how EPU affects corporate payout policy and what motivations drive the adjustment of the payout policy; and (c) whether EPU affects stock market returns and what the impacting channels are.

1.2 Literature Review

1.2.1 Economic Policy Uncertainty

1.2.1.1 Definitions of EPU

Knight (1921) defines uncertainty as the probability that cannot be calculated a priori or empirically from numerous instances. Therefore, compared to ‘risk’, ‘uncertainty’ cannot be measured in quantity. Moore (1990) describes uncertainty as unpredictable individual outcomes. Similarly, Farber (2011) argues that uncertainty is associated with fat-tail distributions. Since the expectation and variance of such distributions are infinite, it is difficult to set a critical parameter to calculate them. Jurado et al. (2015) take uncertainty as ‘the conditional volatility of a disturbance that is unforecastable from the perspective of economic agents’. Therefore, these studies suggest that uncertainty is unpredictable and cannot be figured out by an exact probability, whereas risks have a measurable probability.

In earlier studies, uncertainty refers to future demands or output prices. Bernanke (1983) states that uncertainty about future demand is a transitory shock that can be generated within the economic system because firms and workers may be uncertain about their permanent demand when current demand is low. Additionally, policymakers, practitioners, and academics face another source of uncertainty, EPU, which can also impact economic variables. For example, Bernanke (1983) describes policy uncertainty as an exogenous shock to the economy that can affect firms and economic variables. Pastor and Veronesi (2012) define policy uncertainty as a surprise in the form of a policy change. They argue that EPU is endogenous since economic and political forces determine it. Baker et al. (2016a) argue that EPU captures the uncertainty associated with content, decision-makers, time, and the effect of changes in economic policy.

1.2.1.2 Measures of EPU

Studies have employed various approaches to measure uncertainty. An approach is based on a variety of financial or economic variables. For example, Bloom (2009) measures uncertainty using the stock market volatility. This study first employs the nonparametric bipower variation test to identify jumps in stock market volatility. Then it defines uncertainty as jumps more than 1.65 standard deviations above the Hodrick–Prescott detrended mean of the volatility series. This study also measures cross-sectional uncertainty using the standard deviations of (i) firm-level profit growth, (ii) firm-level stock returns, (iii) the industry-level five-factor total factor productivity growth rate for the SIC 4-digit industries, and (iv) GDP forecasts based on the Philadelphia Federal Reserve Bank's Livingstone survey of professional forecasters. The volatility-based measure of uncertainty highlights stock market fluctuations. Jurado et al. (2015) argue that uncertainty indicates that the economy is harder to predict rather than more volatile or dispersed. Therefore, this study constructs a measure of macroeconomic uncertainty based on the conditional standard deviation of the forecast error. This study first defines the h-period ahead uncertainty of a macroeconomic variable y_{jt}, as: $u_{jt}^{y}(h) \equiv \sqrt{E[(y_{jt+h} - E[y_{jt+h}|I_t])^2|I_t]}$, where y_{jt} belongs to a large panel of macroeconomic variables Y_t. $E(\cdot\,|I_t)$ is the expectation of economic agents given the information available I_t at time *t*. Then, macroeconomic uncertainty is measured as the weighted (w_j) aggregate of individual uncertainty at each date, which is $u_t^y(h) = \underset{N_y \to \infty}{\text{plim}} \sum_{j=1}^{N_y} w_j \, u_{jt}^y(h)$. Rossi and Sekhposyan (2015) emphasise the role of forecast errors and define uncertainty using a cumulative distribution function $U_{t+h} = \int_{-\infty}^{e_{t+h}} p(e)de$, where e_{t+h} is the realised forecast error at horizon h, and $p(e)$ is the ex ante probability density of forecast errors. Therefore, this uncertainty index measures the ex post surprise in the real GDP growth relative to the ex ante forecast. This study further constructs measures of positive and negative uncertainty. The positive uncertainty index is defined as $U_{t+h}^{+} = \frac{1}{2} + \max\{U_{t+h} - \frac{1}{2}, 0\}$, while the negative uncertainty index is $U_{t+h}^{-} = \frac{1}{2} + \max\{\frac{1}{2} - U_{t+h}, 0\}$. In the above formulas, a value of 1/2 indicates that the outcome is close to the expectation. The overall uncertainty index is $U_{t+h}^{*} = \frac{1}{2} + \left|U_{t+h} - \frac{1}{2}\right|$.

The second approach is to measure uncertainty based on business surveys. For example, Bachmann et al. (2013) developed a survey-based uncertainty measure. They categorise responses to economic expectations in business surveys of the US and Germany into ‘Increase’, ‘Decrease’, and ‘Neutral’. They then use the cross-sectional standard deviation of responses to proxy for business uncertainty[15]. This measure captures the dispersion of expectations for business activity.

Another approach is based on text mining. For example, Baker et al (2016a) developed a news-based EPU index through the following steps. First, count the frequency of articles containing terms indicating policy uncertainty, such as policy, deficit, spending,

[15] Specifically, Business Uncertainty$_t$= $\sqrt{\text{Frac}_t(\text{Increase}) + \text{Frac}_t(\text{Decrease}) - (\text{Frac}_t(\text{Increase}) - \text{Frac}_t(\text{Decrease}))^2}$, Frac(.) is the fraction of the responses.

budget, tax, regulation, and central bank,[16] in the leading newspapers of a country. Second, standardise the raw EPU frequency time series for newspaper *i* by dividing by the standard deviation of this newspaper over the baseline interval T_1, obtaining series Y_{it}. Third, compute Z_t, the mean value of Y_{it} across newspapers available in each month. Fourth, calculate the mean value of Z_t in the aggregation interval T_2 and obtain M. Finally, normalise Z_t by multiplying by 100/M. Therefore, the BBD index is a newspaper-based country-level measure of economic policy uncertainty. Similarly, Ahir et al. (2022) construct a quarterly World Uncertainty Index (WUI) by reflecting frequencies of the word 'uncertainty' and its variants in the Economist Intelligence Unit (EIU) country reports. This study first counts the number of appearances of the words 'uncertainty', 'uncertain', and 'uncertainties' in EIU reports for each country and each quarter. Then, it scales the raw counts by the total number of words in each report. The WUI is a measure of general uncertainty, including uncertainty related to economic recessions, elections, financial crises, wars, policy changes, and pandemics such as COVID-19.

Meinen and Roehe (2017) compare uncertainty measures of four European countries. They find that the uncertainty measures of Bloom (2009), Jurado et al. (2015), and Rossi and Sekhposyan (2015) are strongly positively correlated across the four European countries, while their correlations with the uncertainty measure of Bachmann et al. (2013) are milder. However, the BBD index has weak correlations with the above measures. The BBD index is significantly correlated with the uncertainty index of Jurado et al. (2015) across three countries, with the highest correlation coefficient of 0.249. It is significantly correlated with the uncertainty index of Rossi and Sekhposyan (2015) in France, but the coefficient is negative, indicating

[16] The terms may slightly differ in the construction of EPU indices of different countries, and they were counted in the country's local language.

an opposite co-movement between the BBD index and uncertainty measures of Rossi and Sekhposyan (2015). The BBD index is significantly correlated with the uncertainty measure of Bachmann et al. (2013) in 2 countries. Ahir et al. (2022) also compare the WUI with some other uncertainty measures. They find that the WUI is highly positively correlated with the BBD index. The correlations of the WUI with stock volatility and GDP growth forecast disagreement are also significant, but at much smaller coefficients than those between the WUI and the BBD index.

Table 1.1 summarises the sources, methods, as well as the pros and cons of the above uncertainty measures. As reported in Table 1.1, the BBD index captures economic policy uncertainty, which is uncertainty regarding changes in economic policies, the timing of policy adjustments, and the effects of the policies. It also covers multiple aspects of economic policy, such as monetary, tax, trade, and fiscal policies. However, the BBD index may be subject to media bias (Ahir et al., 2025), as selection in newspapers (Buliskeria et al., 2023) and changes in editorial policy or preference can affect the index (Huang & Luk, 2020). On the other hand, the BBD index is a country-level measure. Although individual firms may be exposed differently to EPU, the BBD index does not provide a direct measure of firm-level exposure. The comparison of the uncertainty measures suggests that the above measures capture market uncertainty (Bloom, 2009), macroeconomic uncertainty (Jurado et al., 2015; Rossi & Sekhposyan, 2015), business uncertainty (Bachmann et al., 2013), economic policy uncertainty (Baker et al, 2016a), as well as general uncertainty (Ahir et al., 2022). The BBD index is related to market, business, macroeconomic, and general uncertainty, but is distinct from them. The BBD index captures EPU that aligns with this thesis's research objectives. It is also the most widely accepted EPU measure used in existing research. Therefore, this thesis uses the BBD index as the proxy for EPU.

[Insert Table 1.1 Here]

1.2.2 The Impact of EPU on the Corporate Sector

1.2.2.1 The Impact of EPU on Financing and Payout Decisions

It is generally accepted that uncertainty affects crucial corporate financial decisions. For example, numerous studies have demonstrated a significant effect of EPU on firms' financing mix, although the results are mixed. When EPU rises, firms are likely to reduce their demand for financing (Huang, 2021; Aftab et al., 2023), cut down supply (Asimakopoulos et al., 2023), or decrease both (Granville et al., 2019). This, in turn, lowers firms' leverage ratios, resulting in an inverse relationship between EPU and corporate leverage ratios (Zhang et al., 2015; Granville et al., 2019). On the other hand, when EPU is high, firms prefer debt over equity in external financing (Schwarz & Dalmácio, 2021; Bajaj et al., 2021), resulting in a higher leverage ratio. In addition, firms tend to hold more cash for precautionary purposes when EPU is high, which encourages them to borrow more and heightens their leverage ratios (Jumah et al., 2023). Therefore, while some researchers argue that EPU negatively impacts leverage ratios through reduced demand and supply of financing, studies also document a positive effect of EPU on leverage ratios by motivating borrowing (Schwarz & Dalmácio, 2021; Bajaj et al., 2021; Jumah et al., 2023).

Similarly, the existing literature has found that EPU has a significant effect on firms' payout policies. When EPU is high, managers and investors anticipate slower corporate asset growth, lower future earnings, and heightened external financing costs (Sarwar et al., 2020a, 2020b). The high EPU also increases risk perception among investors and managers due to uncertainty about future cash flow (Yousefi & Yung, 2022). Consequently, managers tend to reduce payouts to reserve more cash (Sarwar et al., 2020a, 2020b; Yousefi & Yung, 2022). This suggests that EPU and the payout policy are negatively associated. However, some studies have documented a positive correlation between them (Farooq & Ahmed, 2019; Qian, 2023; Ayed et al., 2024). They argue that high EPU intensifies information asymmetry among managers, investors, and shareholders, which leads to more severe agency problems (between shareholders and managers) and more volatile stock prices. Firms tend to adopt an active payout policy to signal their confidence to investors (Farooq & Ahmed, 2019; Attig et al., 2021; Qian, 2023) or to alleviate agency problems (Li et al., 2024; Ayed et al., 2024). To sum up, although EPU is known to affect payout policy significantly, the direction of its effect remains debatable.

Corporate investment decisions serve as a crucial channel through which EPU influences the corporate financing mix and payout policy decisions. Specifically, changes in EPU impact corporate investment through the option value of waiting (Pindyck, 1988; Bloom et al., 2007) and financial frictions (Rodrik, 1991; Gilchrist et al., 2014; Rana & Debata, 2024). Firms' investment decisions affect demand and supply for corporate financing, which, in turn, impacts the corporate financing mix. Additionally, the reduced corporate investment associated with high EPU influences firms' payout policy, as it enables firms to hold more cash for payout. Moreover, EPU affects corporate financing mix and payout decisions through its impact on firms' profitability, information asymmetry, and financial constraints. High EPU aggravates information asymmetry between managers and shareholders, as well as financial risk perceptions among investors. This leads to a more severe agency problem, a higher risk premium, and an increased cost of capital (Ashraf & Shen, 2019; Bales & Burghof, 2021; Liu & Wang, 2022). As a result, firms are motivated to monitor managers and to stabilise their market values through payout policy. They also confront aggravated financial constraints (Hu & Gong, 2019; Danisman et al., 2020; Benlemlih et al., 2024) and reduced corporate profitability, which influence their financing mix decisions.

Given the extensive impact of EPU on corporate sectors, this thesis, in addition to analysing the literature on how EPU influences the corporate financing mix and payout policies (detailed reviews are provided in Chapters 2 and 3), also relates to four strands of literature. They are literature on EPU impacts on corporate investment, the cost of capital, financial flexibility, and firms' profitability. The possible effects of EPU in these four areas are discussed below.

1.2.2.2 The Impact of EPU on Other Corporate Financial Decisions

Investment

Existing literature has identified two channels through which uncertainty hampers corporate investment: the option value of waiting and financial friction. The real option theory suggests that irreversible investment is akin to a financial call option, where the future value of assets acquired through investment is uncertain. There is a trade-off between the value of waiting and the loss of the investment's profit flow. If the uncertainty level is high, the option value of waiting increases, and the firm will postpone the investment (Bernanke, 1983; Pindyck, 1988; Dixit & Pindyck, 1994). Empirically, studies document more significant inverse effects of EPU on corporate investment when investment is more irreversible (Gulen & Ion, 2016; Lee & Jeon, 2022; Chen et al., 2023).

In addition, uncertainty inversely affects corporate investment by increasing financial friction. Studies have suggested that uncertainty acts as a tax on investment and may cause a decline in investment (Rodrik, 1991). Uncertainty also widens credit spreads on the firms' outstanding bonds, decreasing their capital expenditure (Gilchrist et al., 2014). High EPU increases managers' risk perception. Therefore, they are more cautious about their investment decisions (Meinen & Roehe, 2017; Nie et al., 2020; Kurniawan et al., 2024).

Cost of Capital

The literature suggests that the cost of capital increases with high EPU. Existing studies report significant positive associations between EPU and bank loan interest rates (Ashraf & Shen, 2019; Ashraf, 2021), EPU and interbank market rates (Bales & Burghof, 2021), as well as EPU and bond spreads (Kaviani et al., 2020). Additionally, at the firm level, EPU negatively affects pricing and the number of Seasoned Equity Offerings (SEO) because aggravated information asymmetry among insiders, investors, and underwriters increases SEO discounts (Chan et al., 2021). Increases in EPU are associated with higher costs of capital for firms, especially the cost of equity (Liu &Wang, 2022).

Financial Flexibility

Studies have found that high EPU can affect firms' financial flexibility in two ways. First, it may exacerbate firms' financial constraints, decreasing firms' external financial flexibility. EPU is significantly and negatively associated with bank lending growth (Hu & Gong, 2019; Danisman et al., 2020; Shabir et al., 2022). In addition, the EPU level is inversely related to the loan size (Hamdi & Hassen, 2022; Yu et al., 2022) and firms' financial accessibility (Enlemlih et al., 2024). Conversely, EPU is significantly and positively associated with banks' credit risk (Hamdi & Hassen, 2022).

Meanwhile, firms are likely to adjust their cash holdings for precautionary or monitoring purposes, affecting firms' internal financial flexibility. For example, studies by Demir and Ersan (2017), Li (2019), Feng et al. (2019), Makosa et al. (2021), Floros et al. (2024), Xue et al. (2024), and Alam et al. (2025) have reported positive associations between EPU and firms' cash holdings, as well as positive relationships between EPU and the tendency to save cash out of cash flows (Li, 2019). As a component of EPU, trade policy uncertainty can also trigger firms to adopt conservative cash policies (Graham et al., 2024). In addition, Chang et al. (2024) suggest that EPU has a positive and significant impact on firms' working capital levels.

These studies have identified two channels through which EPU impacts financial constraints. The first is financing supply. When EPU is high, the information asymmetry between banks and borrowers increases. Banks face higher moral hazard from borrowers and find it harder to identify firms' financial conditions (Yu et al., 2022). In addition, banks' default risk increases with EPU. As a result, banks tend to decrease risk exposure (Hu & Gong, 2019) and are more cautious about increasing lending.

1.2.3 The Impact of EPU on Stock Market Returns

Modigliani and Miller (1958) argue that, in a perfect capital market, a firm's capital structure does not affect its value. This implies that in the real world, where financial frictions exist, a firm's financial decisions do impact its value. In practice, corporate financial decisions aim to maximise the shareholders' value. EPU, by increasing financial friction, impacts firms' key financial decisions and market values, and ultimately, stock market returns. Pastor and Veronesi (2012) developed a general equilibrium model to analyse the effect of policy uncertainty on stock market returns. The model suggests that policy uncertainty has both upward and downward effects on stock prices, and the downward discount effect is more substantial. Therefore, stock market returns negatively respond to policy uncertainty on average, and the inverse effect is larger when policy uncertainty is substantial. Empirical tests also provide evidence for the inverse effect of EPU on stock market returns. (Arouri et al., 2016; Christou et al., 2017; Kwon, 2022). However, across different periods, countries, or market conditions, the impacts of EPU on stock returns may be asymmetric. For example, Kundu and Paul (2022) find lower contemporaneous stock market returns but a higher future return when EPU is high. Huang and Liu (2022) find asymmetric effects of EPU on stock market returns across G7 countries and under different market conditions. A detailed review of the relevant literature is provided in Chapter 4.

Aggregate investment serves as a channel through which EPU affects stock market returns. Specifically, high EPU reduces a country's aggregate investment (Hardouvelis et al., 2018; Ghirelli et al., 2019; Davis et al., 2019), which depresses stock market returns. It also provokes uncertainty in employment, discouraging consumption (Gomes et al., 2012; Nam et al., 2021; Wu & Zhao, 2022)[17] and decreasing the attractiveness of investment projects. The consumption reductions contribute to declines in stock market returns by affecting investment. Reductions in aggregate investment and consumption ultimately slow economic growth.[18] Consequently, investors' risk perception increases with EPU, and therefore, they demand a higher risk premium, further reducing stock market returns.

1.2.4 The Gaps in Research

The existing literature shows that EPU is usually associated with risk-averse financial markets, more cautious corporate strategies, and slower economic growth. It can affect

[17] Gomes et al. (2012) develop a life-cycle model of policy delay, demonstrating that households will reduce their consumption if the government delays resolving policy uncertainty due to potential income cuts, risk aversion, and labour income fluctuations associated with policy uncertainty. Empirical tests using household data have also indicated that consumption responds negatively to economic uncertainty (Nam et al., 2021; Wu & Zhao, 2022; Gu et al., 2022).

[18] Based on the IS-LM framework and the Cobb-Douglas function, Bernanke (1983) and Bloom (2009) have evidenced that macro-uncertainty can delay aggregate investment and employment. Following Baker et al. (2016a), researchers, such as Hardouvelis et al. (2018), Davis et al. (2019), and Cho and Kim (2023), have constructed news-based EPU indices and reported negative associations between EPU and aggregate economic variables, including aggregate investment, employment, and output. In addition, EPU shocks are negatively associated with household deposits (Hardouvelis et al., 2018), economic sentiment (Hardouvelis et al., 2018; Ren et al., 2019), stock market prices (Bloom, 2009; Hardouvelis et al., 2018; Ren et al., 2019), interest rates (Cho & Kim, 2023; Orlowski, 2023), the exchange rate of the domestic currency to the US dollar (Ren et al., 2019; Cho & Kim, 2023; Orlowski, 2023), activities in real estate (Gholipour, 2019), and financial market transactions (Gholipour, 2019).

corporate investment, financing mix, payout policy, cost of capital, level of financial constraints, and corporate liquidity. Additionally, uncertainty plays a crucial role in the overall economy, affecting a country's investment, employment, consumption, interest rate, exchange rate, and output growth.

However, the literature also shows inconsistencies regarding the role of EPU in the corporate sector and stock markets in several aspects. First, compared to the broad consensus on the inverse effect of EPU on corporate investment, the impact of EPU on the other two key financial decisions—financing and payout policy—remains ambiguous. For example, some studies have reported positive effects of EPU on payouts, while others have found inverse effects. These contradictory findings even occur within the same country during different periods, indicating the need for further investigation, including the channels through which the effects occur. A similar debate exists in studies of how EPU affects firms' financing mix, as both inverse and positive EPU-leverage associations have been documented.

Second, the mechanisms by which changes in EPU affect financing mix, payout policy, and stock market returns are underexplored. Compared with research on how uncertainty influences investment, the channels through which EPU affect corporate financing decisions, payout policies, and stock market returns are not fully understood. In addition, EPU may impact corporate financing decisions, payout policy, and stock market returns through multiple channels, including corporate investment, liquidity, or financial frictions. These perspectives interact in complex ways, further complicating the effect of EPU on financial decisions. Therefore, there is a need to examine the transmission mechanisms through which EPU influences corporate financing decisions, payout policies, and stock market returns, in the context of the co-existence and co-movement of these factors.

Third, although some studies have conducted the Granger causality tests between EPU and stock market returns, this method does not provide evidence for a genuine causal relationship. The Granger causality method only examines whether a variable precedes another. For example, the empirical results show that EPU is the Granger cause of changes in stock market returns (Li et al., 2013; Karacaer & Pirgaip, 2019), indicating that EPU helps predict stock market returns. However, it does not suggest a cause-and-effect relationship between them. On the contrary, causal inference methods, such as propensity score matching (PSM), identify cause-and-effect relationships by comparing effects between treatment and control groups or before and after the treatment. However, the existing literature has not used these methods to establish the cause-and-effect relationship between EPU and corporate financial decisions or stock market returns. This highlights the need to employ a causal inference method to provide more robust evidence for the relationships between EPU and payout policies.

The above research gaps are the specific areas that this thesis should focus on. They are the impact of EPU on the financing mix, payout policy, and stock market returns. This thesis comprises three empirical chapters, each delving into one of the three areas with its own specific research gaps and questions.

Given the gaps in the existing literature, this thesis aims to provide new knowledge in several ways. First, it seeks to clarify the magnitude and direction of EPU's impact on the financing mix, payout policy, and stock market returns with multiple approaches. Second, it aims to identify the channels and motivations through which EPU affects the corporate financing mix, payout policy, and stock market returns theoretically and empirically. Third, it seeks to provide a comprehensive understanding of EPU’s role as an external undiversified shock to financial decisions and markets by linking it with corporate investment, financing mix, payout policy, and stock market returns.

1.3 The Research Objectives and Main Findings

The overall research objective of this thesis is to examine the influence of EPU on firms’ key financial decisions and market returns, as well as the mechanisms through which EPU affects them. To achieve these objectives, this thesis focuses on three key financial aspects of the corporate sector. Specifically, Chapter 2 examines whether EPU affects the corporate financing mix and the channels that mediate the effect; Chapter 3 investigates how EPU affects corporate payout policy and what drives the adjustment in the payout policy; and Chapter 3 analyses whether EPU affects stock market returns and the channels through which the returns are affected. To answer these research questions, this thesis employs system-GMM, panel fixed-effects OLS, IPW, and quantile estimation. These methods enable the thesis to provide robust evidence of how EPU affects firms’ financing mix, payout policy, and stock market returns, as well as the transmission channels of these effects. The thesis finds that EPU is significantly associated with firms’ financing mix, payout policy, and stock market returns through its impact on investment, risk premium, and financial frictions.

The thesis comprises three empirical chapters, each with specific research objectives and findings. The second chapter aims to analyse the effect of EPU on firms’ financing mix and the mechanism underlying the impact. First, this chapter tests whether changes in EPU are associated with firms' leverage ratios. It then examines whether changes in EPU are related to both short- and long-term leverage to clarify the term structure of the impact. Finally, it examines whether corporate investment and profitability serve as channels through which EPU impacts the financing mix.

To answer the above research questions, the chapter uses the system-GMM method to analyse annual data from listed companies in France, Germany, Japan, the United Kingdom, and the United States between 1999 and 2022. The results uncover several findings. First, changes in EPU are positively associated with firms' leverage ratios, after controlling for industry, country, and country-level regulatory quality. The results are robust to both book and market-based leverage measures and consistent after controlling for the global financial crisis and COVID-19. Second, both the short- and long-term leverage ratios are positively associated with percentage changes in EPU. The results hold for both book and market-based leverage measures, and after controlling for the global financial crisis and COVID-19. Third, percentage changes in EPU primarily affect firms' leverage ratios directly, whereas the indirect channels play a secondary role. Specifically, profitability is likely to be a transmission channel through which changes in EPU affect leverage ratios. However, investment has a limited mediating effect only when it is jointly with profitability. Finally, the effect of EPU on the financing mix is likely to be conditional on regulatory quality. A weaker regulatory environment amplifies the long-term delayed positive effect of EPU on the book and long-term book leverage ratios. In contrast, the strong regulatory environment strengthens the short-term positive effect of EPU on the book leverage ratio.

Chapter 3 of the thesis investigates the effect of EPU on firms' payout policies and the motivations behind the changes. To achieve this objective, this chapter first examines whether changes in EPU are associated with changes in the total payout ratio. After that, it tests whether changes in EPU are associated with two components of payout policies: dividends and share repurchases. In addition, the chapter examines how dividends and share repurchases respond to various EPU thresholds. Finally, it examines whether free cash flow and financial constraints are channels through which EPU affects payout policy decisions.

Chapter 3 utilises annual data from firms listed in France, Germany, Japan, the United Kingdom, and the United States between 1999 and 2022. Several findings emerge.

First, percentage changes in EPU are positively related to changes in the total payout ratio, indicating that firms prefer to pay out more when EPU increases. The results are robust after controlling for firm-level characteristics, across different EPU thresholds, and after controlling for the global financial crisis in 2007-2008 and COVID-19. Second, firms' dividend payout ratios and dividend yields are positively associated with percentage changes in EPU. This indicates that firms tend to pay a higher portion of their income as extra or special dividends when EPU rises. The increase in the dividend yield indicates that the relative return from dividends rises when EPU increases. Third, some firms tend to repurchase shares when EPU increases (while others choose to pay out special and extraordinary dividends). The results are robust to alternative estimation methods (OLS and IPW) and after controlling for the global financial crisis in 2007-2008 and COVID-19. Fourth, the results suggest that both free cash flow and financial constraints are channels through which EPU affects firms' payout decisions. Firms tend to increase payouts when they hold surplus free cash flow, and even when they are more financially constrained during periods of rising EPU.

The main objective of Chapter 4 is to investigate the effect of EPU on stock market returns and its transmission mechanism. First, this chapter examines whether EPU affects total stock market returns. It also compares whether the EPU-return effects differ between developed and developing countries and what the underlying reasons for the differences are. Second, it examines whether premium, investment, and dividend yield are the channels through which EPU affects stock market returns. Finally, it compares the strength of influence of transmission channels.

Chapter 4 utilises monthly and quarterly panel data from 22 countries between 1997 and 2021 and reveals the following findings. First, the fixed-effects panel and quantile regressions indicate a robust negative association between EPU and stock market returns. The results are presented after controlling for variables that may affect stock market returns, including the short-term interest rate, the business confidence index, the Consumer Price Index (CPI), the real exchange rate, the inflation rate, the industrial production index, and the economic freedom index. Second, stock market returns in both developed and developing countries tend to decrease when EPU rises. However, stock market returns respond to changes in EPU with a longer delay in developing countries. Finally, Baron and Kenny's (1986) mediation tests demonstrate three channels through which changes in EPU affect stock market returns: the risk premium, investment, and the dividend yield. Stock market returns negatively respond to changes in EPU through risk premium and investment channels. In contrast, the effect of EPU on dividend yields is negative but economically small, suggesting that the dividend yield channel slightly mitigates the negative effect of EPU on stock returns. By comparing the strengths of the negative and positive mediation effects across these three channels, this chapter confirms the negative final effect of EPU on stock market returns.

1.4 The Contributions

This thesis contributes to the literature in three ways. First, it adds to the literature on the effects of EPU on the financing mix, payout policy, and stock market returns. Although researchers have examined these effects, the results are mixed. Using various methods, such as system-GMM and IPW, this thesis clarifies the impacts of EPU on financing mix, payout policy, and stock market returns. It also considers various components of stock market returns, alternative measures of leverage ratios, and different constituents of payout policy, which have received comparably less attention in previous studies, to provide a more comprehensive understanding of the effects of EPU on the financing mix, payout policy, and stock market returns. In addition, this thesis offers valuable insights into the mechanisms through which EPU affects financing mix, payout policy, and stock market returns. Particularly, we consider the coexistence of multiple channels and their co-movement when analysing the final effects of EPU on the financing mix, payout policy, and stock market returns.

In addition to the overall contributions, each chapter has specific contributions. The contributions of the second chapter are in three strands. First, it adds to the existing literature on how EPU impacts the financing mix. Although previous studies have examined the effect of EPU on firms' leverage ratios (Zhang et al., 2015; Schwarz & Dalmácio, 2021), conflicting results have been documented. By examining data from five highly developed countries between 1999 and 2022, the second chapter provides robust and multifaceted evidence of the association between EPU and leverage ratios, which is more generally applicable since it is based on data from countries with well-established financial markets. Second, this chapter offers new insights into the existing literature by examining the fundamental mechanisms through which EPU affects the financing mix. Rather than the channels examined in previous studies, such as the external financing supply (Bajaj et al., 2021) and demand (Chow et al., 2018), this chapter tests the fundamental channels underlying financing supply and demand: the investment and profitability channels. Finally, this chapter provides new insights into the regulatory-conditional effect of EPU on the financing mix, which has received little attention in previous studies. Since firms may respond to EPU shocks differently in strong and weaker regulatory contexts, it is meaningful to analyse how EPU is associated with leverage ratios in different regulatory quality settings.

Chapter 3 contributes to the literature in three ways. First, it contributes to how EPU affects payout policy, where the evidence has been mixed (Farooq & Ahmed, 2019; Attig et al., 2021; Ayed et al., 2024). This chapter examines data from five developed economies using alternative estimation methods (OLS and IPW), providing more robust and reliable findings. Second, the study enhances the literature on the EPU-payout effect by examining its impact on both dividends and share repurchases using the same data. Previous studies have examined the influence of EPU on either dividends or share repurchases, with most focusing on dividends. However, their co-movement with EPU has seldom been examined in previous studies. This chapter examines the impact of EPU on dividends and share repurchases using the same sample. This allows an analysis of the co-movement between the two components of the payout policy when EPU changes. Third, this chapter contributes to the literature by empirically examining the channels through which EPU affect the payout policy. This helps to clarify the effect of EPU on the payout policy, while different motives indicate opposing effects of EPU on payouts.

Chapter 4 contributes to the literature in several ways. First, it examines the different EPU-stock return relations in developing and developed countries, providing a comparison that has received limited attention. Second, the chapter extends the existing literature by investigating the channels through which EPU impacts stock market returns: investment, risk premium, and dividend yield. In particular, it examines the effect of EPU on dividend yields, which has been underexplored, and compares its strength with that of the other two channels. This helps us to understand and explain the overall EPU-return effect.

1.5 Organisation of the Thesis

The thesis investigates the effect of EPU on firms' financial decisions and market performance. It comprises three empirical chapters. Chapters 2 and 3 focus on EPU's effect on firm-level financial decisions: the financing mix and the payout policy. Chapter 4 investigates the influence of EPU on stock market returns. Finally, Chapter 5 summarises the findings and their policy implications and offers some directions for further research in the area.

Inclusion of both firm- and market-level analyses in the three empirical chapters is theoretically motivated. EPU may affect stock market returns, which in turn affect firms’ financing mix and payout decisions. For example, when EPU changes, firms' stock market performance directly affects their market leverage ratios (see the discussion in Chapter 2) and investors' risk perceptions, thereby affecting firms’ financial mix and payout decisions (see discussions in Chapter 2 and Chapter 3). On the other hand, EPU may affect firm-level financial decisions, thereby influencing firms’ market value and stock market performance. For example, as a component of the total return, dividend yield affects stock market returns (see the discussion in Chapter 4). Therefore, this thesis examines EPU’s effects from both the firm and market levels to offer a more comprehensive understanding of its economic consequences.

Each empirical chapter includes an introduction section highlighting its key research issue, a review of the relevant literature, hypothesis development, and a discussion of the empirical results and conclusions. Empirical methods also differ across chapters according to their varying research objectives, data structures, and econometric challenges. Chapters 2 and 3 use firm-level data and methods designed to address firm-specific heterogeneity, endogeneity, and selection bias, where relevant. Chapter 4 employs country-level data and methods better suited for analysing aggregate stock market returns and various effects of EPU across different market conditions. Therefore, each chapter adopts empirical approaches appropriate to its specific research questions and data structure.

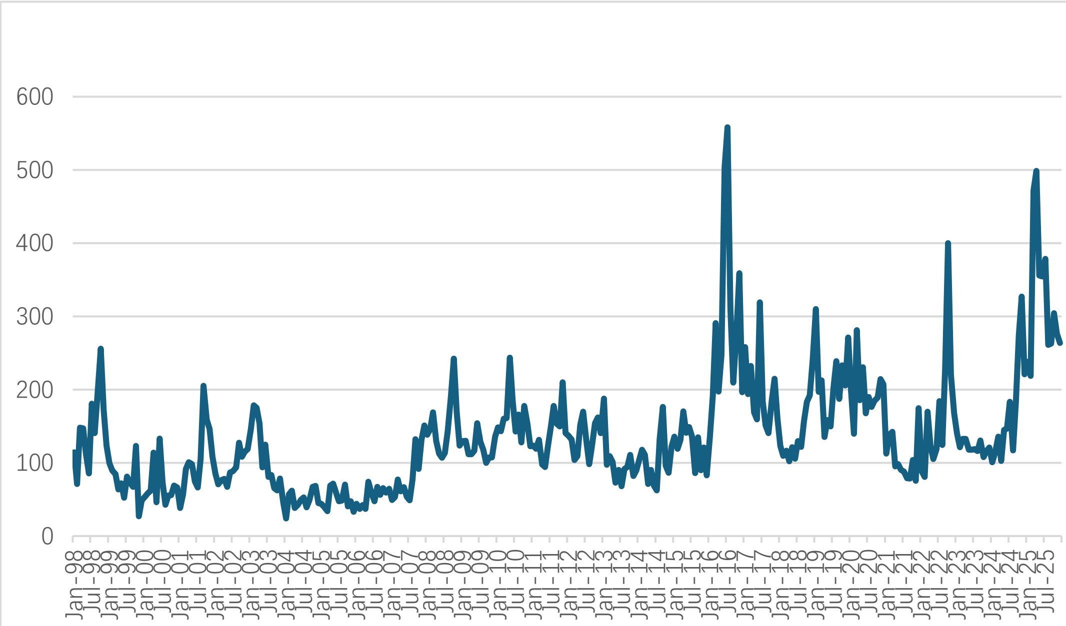

Figure 1.1 The BBD Index of the UK (January 1998-December 2025)

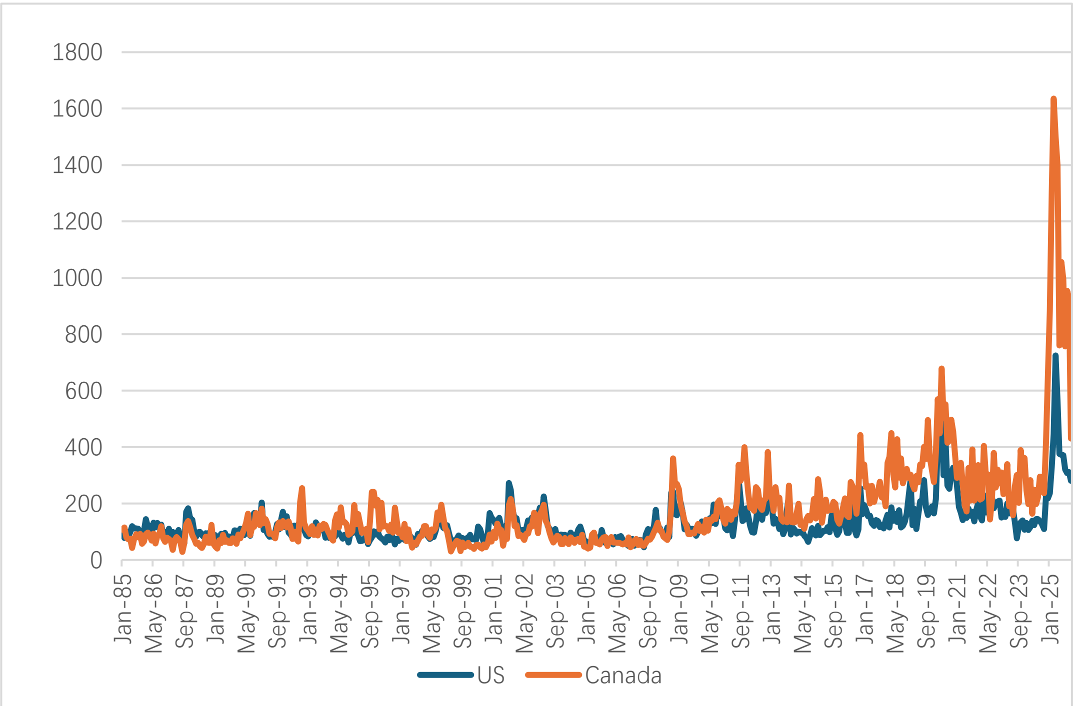

Figure 1.2 The BBD Index of the US and Canada (January 1985-December 2025)

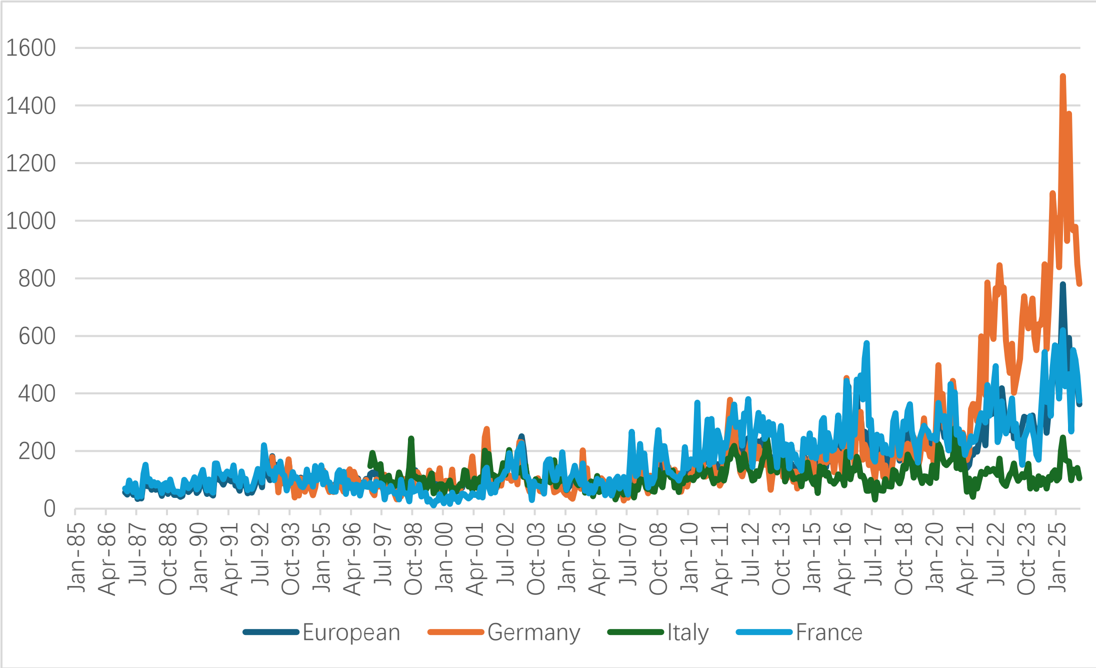

Figure 1.3 The BBD Index of the European countries (January 1987-December 2025)

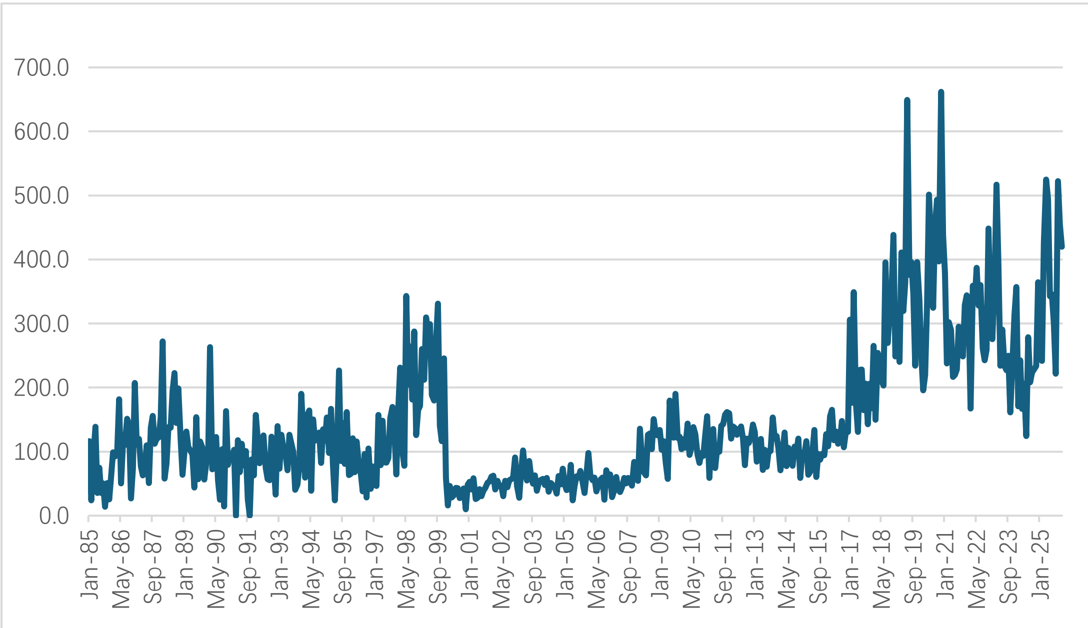

Figure 1.4 The BBD Index of China (January 1985-December 2025)

Table 1.1 Comparison of Uncertainty Measures

This table compares measures of uncertainty.

	BBD index (2016a)	Bloom (2009)	Jurado et al. (2015) Rossi and Sekhposyan (2015)	Bachmann et al. (2013)	Ahir et al.(2022)
Type of Uncertainty Measured	EPU	Market uncertainty; Cross-firm/industry uncertainty	Macroeconomic uncertainty	Business uncertainty	Board uncertainty
Source	Newspapers	Stock market volatility; Firm-level stock return; Firm/ industry profit/productivity; GDP forecast	Macroeconomic variable(s)	Business Surveys	EIU country reports
Methods	Normalised and standardised frequency counts of terms regarding economic policy uncertainty in newspapers.	Stock market jump-based uncertainty; Standard deviation of firms/industries' performance	Forecast error for macroeconomic outcomes	Expectation dispersion	Frequencies of the word "uncertainty" and its variants in EIU country reports scaled by the total number of words in each report.

Pros	(1) It covers multiple policies. (2) It captures the uncertainty from policymaking to policy effects.	(1) Jump-based identification reduces endogeneity. (2) High-frequency data are available Multiple measures	(1) It covers a wide range of macroeconomic uncertainty by using forecast errors across a wide range of macroeconomic variables. (2) It clearly defines uncertainty as how hard the forecast is.	(1) It reflects the disagreement in economic expectations, which is forward-looking. (2) It can capture firm-level uncertainty.	(1) It covers various uncertainty types. The raw frequency counts are from a single source on the specific topic, making it comparable across countries. (2) It is consistent with previous theories and studies on the negative economic effects of uncertainty shocks.
Cons	(1) It may be subject to media bias (Ahir et al, 2025). (2) Firm-level EPU exposure is not provided directly.	(1) Stock market uncertainty is sensitive to investor sentiment, besides uncertainty. (2) Cross-sectional measures capture heterogeneity across firms/industries. (3) Cross-sectional measures may be affected by multiple factors, such as firms' characteristics, beyond uncertainty.	It is difficult to separate uncertainty from different sources	It is strongly affected by the quantity and quality of surveys	(1) It is single-sourced, which highly depends on the writing styles of analysts of reports. (2) It is difficult to separate different types of uncertainty. (3) Firm-level exposure is unavailable directly.

Chapter 2

THE IMPACT OF EPU ON THE FINANCING MIX

2.1 Introduction

A well-structured financial mix can balance a firm’s needs for investing, repaying debt, and maintaining financial flexibility by combining debt and stocks with various maturities. Therefore, existing studies have developed theories to investigate how firms optimise their financing mix. For example, the pecking order theory suggests that firms prioritise internal funds over external financing and prefer debt to equity (Myers & Majluf, 1984; Myers, 1984). In contrast, the trade-off theory posits that firms weigh tax advantages and bankruptcy costs to determine their optimal capital structure (Modigliani & Miller, 1958). More recent literature has documented the role of macroeconomic factors, such as economic growth, the economic cycle, and monetary policy, in shaping firms’ capital structures (Kjellman & Hansi, 1995; Frank et al., 2003).

Among macroeconomic variables, EPU has been identified as a crucial but under-investigated factor that can affect a firm’s capital structure. It can affect firms' demand and supply of funds by delaying investment, reducing profitability, and exacerbating financial frictions. However, the empirical evidence on how EPU affects firms’ financing mix is ambiguous. For example, studies by Zhang et al. (2015) and Granville et al. (2019) suggest that EPU is negatively associated with firms’ leverage, while Schwarz and Dalmácio (2021) hold the opposite view. Additionally, the samples in the previous research are confined to the US, China, and other BRICS countries, which limits the generalisability of the results. Moreover, there is limited empirical evidence on how EPU affects market leverage ratios and leverage ratios with different maturities, hindering a comprehensive understanding of the relationship between EPU and firms' financing mix.

To address the above gaps in the literature, this chapter analyses the effects of EPU on firms' financing mix and the underlying mechanisms/channels. In particular, this chapter investigates the following issues. First, it examines whether and how EPU affects firms' financing mix. To provide robust evidence of the effect, we employ the system-GMM method to address the potential issues of heteroskedasticity and endogeneity. Additionally, we use two measures of financing mix in the empirical test: the book and the market leverage ratios. We also control for firm-level characteristics, industry- and country-average leverage ratios, and regulatory quality in our estimations. Second, the chapter investigates which mechanisms EPU affect the financing mix. We test the mediating effects of three channels through which EPU impacts the financing mix. They are investment and profitability. Third, the chapter analyses how EPU impacts the term structure of firms' financial mix. To answer this question, we examine both short- and long-term leverage ratios in relation to percentage changes in the contemporaneous and lagged EPU. Finally, the chapter examines whether the association between EPU and the financing mix is dependent on institutional quality. To test this conditional effect, our model includes interaction terms between Δ%EPU and regulatory quality, as well as between lagged Δ%EPU and regulatory quality in dynamic models. Furthermore, it assesses the regulatory-conditional effect of percentage changes in EPU on leverage ratios by conducting marginal effect tests on interaction terms (those significant in system-GMM regressions).

Rigorous analysis of annual data from firms listed in France, Germany, Japan, the United Kingdom, and the United States between 1999 and 2022 reveals several findings. First, percentage changes in EPU are positively associated with firms' leverage ratios. The results are robust with respect to firm-level characteristics, industries, countries, and country-level regulatory quality. They are robust to the alternative leverage measure (the market leverage ratio) and remain so after controlling for the global financial crisis from 2007 to 2008 and the COVID-19 pandemic from 2020 to 2022. Second, the results suggest a partial mediation effect of profitability, whereas investment plays only a limited joint mediating role together with profitability. The mediation tests suggest that EPU primarily affect the leverage ratio directly, and the indirect effect is of secondary importance in the EPU-leverage relation. Third, both short- and long-term leverage ratios are positively associated with percentage changes in EPU. Although the results are somewhat mixed across EPU lag specifications, they are consistent with market leverage ratios, and after controlling for the global financial crisis and COVID-19. Finally, the effect of EPU on the leverage ratio is conditional on the country's institutional environment. Specifically, supplementary evidence from marginal tests suggests that a weaker regulatory environment tends to amplify the long-term delayed positive effect of EPU on the book and long-term book leverage ratios. In contrast, a strong regulatory environment strengthens the short-term positive effect of EPU on the book leverage ratio.

This research makes several contributions to the literature. First, it adds to the existing literature by providing robust and comparable evidence on the effects of EPU on firms' financing mix. This chapter employs the system-GMM method to address potential unobserved heterogeneity in panel data. Additionally, to enhance the robustness of the results, it uses market and book leverage ratios as alternative measures of firms' financing mix. We also use percentage changes in contemporaneous and lagged EPU to examine both its current and delayed effects on the financing mix, thereby producing robust results. Moreover, to improve comparability, the chapter utilises data from five developed countries. Compared with data from BRICS countries, which have been widely used in existing studies, this strengthens the generalisability of the findings because these highly developed countries have more accurate measures of the financing mix and more efficient financial markets.

Second, the chapter contributes to the literature by identifying the underlying mechanisms through which EPU affects the financing mix. Instead of the financing supply (Bajaj et al., 2021) and demand (Chow et al., 2018) channels identified by existing research, this chapter investigates the investment and profitability channels. This reveals the fundamental mechanisms underlying the EPU-financing mix effect, as EPU influences financing demand and supply through these channels, ultimately affecting the financing mix.

Third, the chapter enhances the literature by examining the temporal characteristics of EPU on firms' financing mix. While most studies focus on the total effect of EPU on leverage ratios, we distinguish the associations of EPU on short- and long-term leverage ratios. This enriches our understanding of the underlying mechanisms driving the relationship between EPU and the financing mix, as firms' debt maturities match those of their assets.

Finally, this chapter provides new insights into the regulatory-conditional effect of EPU on the financing mix, which has been relatively under-investigated in previous studies. Because firms may respond to EPU shocks differently in strong and weaker regulatory contexts, it is meaningful to analyse how EPU is associated with leverage ratios in different regulatory quality settings.

The remainder of the chapter is structured as follows: Section 2 reviews the related literature, Section 3 discusses the firm-level capital structure decision-making when EPU changes and develops hypotheses, Section 4 describes the data and methodology used in this chapter, Section 5 presents and discusses the empirical results, and Section 6 concludes the chapter.

2.2 Literature Review

2.2.1 Studies on firm-level characteristics of financing mix decisions

MM theory (Modigliani & Miller, 1958) suggests that under the strict assumptions of a perfect capital market, a firm's average cost of capital is independent of its capital structure and equals the capitalisation rate of a pure equity stream of its class. Therefore, a firm's market value is unrelated to its capital structure. Modigliani & Miller (1963) introduced the tax shield effect and found that debt financing offers a tax advantage. Subsequently, several theories have emerged on this issue, including the trade-off, pecking order, agency, and market-timing theories. These theories, together with rich empirical studies, have shown that firm-level characteristics such as taxes, firm size, payout ratio, earnings volatility, tangibility, profitability, and growth opportunities can impact the corporate financing structure.

2.2.1.1 Theoretical Perspectives on Capital Structure

Trade-off theory

The trade-off theory posits that the optimal capital structure is determined by the trade-off between benefits and costs associated with it. The optimal capital structure refers to the mix of debt and equity that maximises firm value (Schwartz, 1959; Kraus & Litzenberger, 1973; Scott, 1976) and minimises the weighted average cost of capital. The costs of heavy leverage can be high financing costs (Schwartz, 1959), the risk of financial distress (Robichek & Myers, 1966; Bradley et al., 1984), or bankruptcy costs (Kraus & Litzenberger, 1973; Fischer et al., 1989; De Wet, 2006). On the other hand, the benefits of a high debt-to-equity ratio can be a marginal increase in earnings (Schwartz, 1959) or a tax advantage of debt (Robichek & Myers, 1966; Kraus & Litzenberger, 1973; Fischer et al., 1989; De Wet, 2006). On the other hand, firms are incentivised to use more equity when the non-debt tax shield is high (Bradley et al., 1984). Consequently, firm-level characteristics that impact the costs and benefits of capital structure will affect the optimal mix of debt and equity. Specifically, firms with stable earnings and cash flows (Schwartz, 1959; Bradley et al.,1984), higher asset liquidity (marketability) (Schwartz, 1959; Scott, 1976), operating in an environment of higher tax shields (Schwartz, 1959; Robichek & Myers, 1966; Kraus & Litzenberger, 1973), with larger size (Scott, 1976), and facing lower financial risks but gaining more benefits from leverage, tend to borrow more. However, firms with a greater non-tax shield tend to rely less on debt (Bradley et al., 1984).

Pecking Order Theory

The pecking order theory assumes that information asymmetries exist between managers and potential investors, investors are rational, and managers make decisions in the interests of existing shareholders. Internal financing through financial slack helps mitigate potential conflicts of interest between old and new shareholders, as well as the consequences of inside information held by managers. Therefore, firms prefer internal to external funds for their investments. When they must turn to external financing, they prefer debt to equity. Hence, financial slack is crucial for firms to take good investment opportunities. Firms can build it up by restricting dividend payouts when investment demand is weak (Myers & Majluf, 1984). Considering the costs of financial distress, when firms move up the pecking order, they face a higher cost, including a higher likelihood of financial distress. This could lead to missed opportunities for positive-NPV projects because the company is unwilling to finance them by issuing common stock or other risky securities (Myers, 1984). The pecking order theory suggests that profitability is negatively related to the leverage ratio since profitable firms have more retained earnings for internal funding and are less likely to rely on external financing. The capital expenditure ratio is likely negatively correlated with the leverage ratio because firms that invest more have larger financial deficits (Shyam-Sunder & Myers,1999) and are more likely to finance their investment with debt. On the other hand, the payout ratio is positively related to the leverage ratio. Firms that pay out more retain less earnings (financial slack), and they tend to finance externally. Firms prioritise debt over equity in external financing, and therefore, firms that pay out more to their shareholders rely more heavily on leverage.

Market timing theory

Baker and Wurgler (2002) find that market timing affects firms' financing decisions. Firms prefer to issue equity when the market value is high and repurchase it when the market value is low. Moreover, firms tend to issue equity when its cost is lower and repurchase it when its cost is higher. Firms are also likely to issue equity when investors are overly optimistic about earnings prospects. This suggests that firms with high market-to-book ratios or previously experienced high stock prices are more likely to issue equity and therefore have lower leverage ratios.

Agency theory

The agency theory highlights the importance of agency costs in capital structure decisions. To finance profitable projects, diversify risk, and convert wealth into general purchasing power, the original firm's owners may choose to issue shares to outsiders. However, once ownership and management are separated, managers do not bear all the costs of their actions, giving rise to an agency problem. Therefore, investors discount the share price, which leads to a decrease in firm value. Issuing debt (bonds) can mitigate the agency problem by facilitating monitoring and control. Nevertheless, debt raises agency costs associated with the conflict between shareholders and creditors. Therefore, firms will choose an optimal debt-to-equity mix to minimise agency costs rather than to maximise firm value (Jensen & Meckling, 1976). The agency problem between shareholders and managers may be exacerbated when firms have substantial free cash flows, since managers may be motivated to invest them in low-return projects or even waste them. Issuing debt to repurchase shares is an effective way to mitigate the agency problem related to free cash flows for several reasons. Debt can decrease free cash flows under managers' control. It can incentivise managers to retrench and be disciplined through the threat of default. Debt in exchange for shares also brings tax advantages. Whereas the increase in debt raises agency costs between managers and creditors, as well as bankruptcy costs. Given this condition, the optimal leverage ratio is the point at which firm value is maximised, and the marginal cost of debt equals the marginal benefit (Jensen, 1986). Myers (1977) further investigated the optimal capital structure decision in the context of the agency problem between shareholders and creditors. Specifically, debt is a fixed claim. If a firm relies heavily on leverage, most of the benefits from its investment will go to creditors rather than shareholders. Shareholders may therefore decline the investment project even if it has an NPV, leading to underinvestment. Future investment options are crucial for firms with strong growth opportunities; therefore, these firms should use less debt to maintain the incentives for future investment options and financial flexibility. Within this framework, firms' profitability is positively associated with the leverage ratio, while the payout ratio is negatively associated with leverage. This is because profitable firms and firms that pay out less to shareholders have more severe agency problems and therefore tend to use more debt to mitigate them. On the contrary, a firm's investment can reduce free cash flow within managers' control, thereby alleviating the agency problem. Therefore, firms' capital expenditure tends to be negatively associated with leverage. For firms with high growth opportunities, investment is important, and they tend to use less debt to mitigate the shareholder-creditor agency problem. As a result, growth opportunities are negatively correlated with leverage.

2.2.1.2 Firm-level characteristics and financing mix

Tax rate

According to the Trade-off theory, interest on debt can be deducted from taxes, whereas dividends cannot. Therefore, the tax advantage of debt over equity encourages firms to increase debt. Hence, firms' debt tax advantages (effective tax rate) are likely to be positively associated with leverage ratios. However, the empirical tests have documented mixed results. For example, Thies and Klock (1992) suggest that tax incentives promote the use of debt by analysing inflation-adjusted corporate financial and supplementary data from large U.S. manufacturing firms from 1935-1941 through 1977-1983. Similarly, using data from 370 firms in CompStat four-digit industrial files between 1978 and 1988, Homaifar et al. (1994) find that the leverage ratio is positively related to the corporate tax rate in the long run. However, there was no statistically significant relationship between leverage and corporate tax rates in the short term. Panier et al. (2015) use the Belgian Notional Interest Deduction (NID) as an example of a reduction in the debt tax benefit compared to equity. The study uses data on 314,228 unique Belgian firms from 2004 to 2009 and finds that Belgian firms, particularly larger ones, substantially increase their equity after the NID in 2006. This suggests a positive association between debt tax benefit and leverage. Devereux et al. (2018) use confidential tax returns data covering 16,124 companies from 2001 to 2009 and find that a 1% increase in the corporation tax rate can cause a 1% rise in private firms' leverage ratio in the long run. Contrary to the predictions of the trade-off theory, Taub (1975) reports that increases in the tax rate are negatively associated with the desired debt-to-equity ratio based on a test of security issuances of 89 US firms between 1960 and 1969. In addition, Titman and Wessels (1988) find that the tax rate and leverage rate are not significantly related.

Earnings volatility

According to the trade-off theory, firms with higher earnings volatility face greater financial distress risk (Schwartz, 1959; Bradley et al.,1984). In addition, lenders may perceive that firms with higher earnings volatility are riskier and less willing to lend to them. Consequently, these firms may face lower access to credit and debt capacity. Firms may have to turn to equity financing, leading to a lower debt-to-equity ratio (Titman & Wessels,1988). Therefore, firms tend to rely less on debt if their earnings are volatile. However, the empirical evidence on the association is ambiguous. For example, Taub (1975) finds that the uncertainty of a firm's earnings is negatively correlated to its debt-to-equity ratio when examining data from US firms' security issuances between 1960 and 1969. Delcoure (2007) reveals that the total leverage ratio and long-term leverage are negatively correlated with earnings volatility in 33 Russian firms, and the long-term leverage is negatively correlated with earnings volatility in 22 Czech firms from 1996 to 2002. There is no significant relationship between them in Polish and Slovak firms. On the contrary, Bennett and Donnelly (1993) report a positive relationship between earnings volatility and leverage ratios in an empirical test of 433 firms across 19 industries in the UK from 1981 to 1984. This study argues that the strength of agency costs exceeds that of bankruptcy, thereby contributing to the positive association between earnings volatility and leverage.

Non-debt tax shield

The trade-off theory suggests that non-debt tax shields are negatively associated with leverage. This is because non-debt tax shields are tax deductions unrelated to interest, and they reduce tax without using debt. In other words, non-debt tax shields serve as substitutes for interest tax shields, decreasing the benefit of debt. (Titman & Wessels, 1988). Given the costs of financial distress associated with debt, firms with greater non-debt tax shields are less motivated to use debt (Bradley et al., 1984), helping them maintain a lower financial distress risk while enjoying tax deductions on non-debt.

Empirically, the association between non-debt tax shield and leverage is mixed. Some studies support the negative relationship between them. For example, Bennett and Donnelly (1993) find a negative association between non-debt tax shield and leverage ratio by examining data on 433 UK firms across 19 industries from 1981 to 1984. Similar negative results have also been reported in studies by De Miguel & Pindado (2001), Deesomsak et al. (2004), and Huang and Song (2006) through analysing data from Spain, Thailand, Malaysia, Singapore, Australia, and China. On the other hand, studies by Titman and Wessels (1988), Homaifar et al. (1994), and Michaelas et al. (1999) do not find a significant relationship between them. Contrary to the above study, Delcoure (2007) report a strong and positive correlation between non-debt tax shield and leverage ratios after examining 129 publicly traded firms from the Czech Republic, Poland, Russia, and Slovakia between 1996 and 2002. The study argues that the non-debt tax shield may serve as a measure of the assets' securability. Firms with more securable assets tend to have a higher leverage ratio.

Profitability

The relationship between profitability and leverage is an ongoing debate both theoretically and empirically. Based on the trade-off theory, creditors perceive a lower financial distress risk among profitable firms and are more willing to lend to them at lower costs. As a result, profitability is positively associated with a firm's leverage ratio (Schwartz, 1959; Bradley et al.,1984). Likewise, the agency theory supports a positive association. Profitable firms generate more free cash flow, and managers can use it for their own benefit rather than shareholders'. This aggravates the agency problems between shareholders and managers. Shareholders are motivated to request that firms use more debt, which serves as a discipline mechanism on managers through the threat of default. Firms may even issue debt to repurchase shares to reduce free cash flow under managers' control. This can mitigate the agency problem and increase tax advantages. Therefore, the agency theory predicts a positive association between profitability and leverage (Jensen & Meckling, 1976; Jensen, 1986). However, according to the pecking order theory, a firm's profitability is negatively correlated with its leverage level. This is because firms prefer internal funds to external sources when financing. Profitable firms can retain more earnings and therefore have more internal funds available for investment. Consequently, they rely less on debt (Myers & Majluf, 1984; Myers, 1984).

Studies have also documented significant but conflicting empirical results regarding the relationship between profitability and leverage. Certain studies report a negative association between them. For example, Titman and Wessels (1988) suggest that profitable firms have lower debt-to-equity ratios, based on an analysis of data from 469 US manufacturing firms between 1974 and 1982. Rajan and Zingales (1995) find that profitability is negatively correlated with leverage across G7 countries. Öztekin (2015) uses a firm-level sample of 15,177 firms from 37 countries between 1991 and 2006 and suggests that profitable firms tend to have lower leverage. Similarly, Zeng et al. (2022) analyse data on 890 listed non-financial firms in the Guangdong-Hong Kong-Macao Greater Bay Area from 2007 to 2017. They find that profitability is the most important factor in firms' capital structure decisions and is negatively correlated with the leverage ratio. On the contrary, a few studies support positive associations between them. For example, Mayer and Sussman (2004) find that profitable firms are more likely to use debt to finance their projects based on empirical tests of 535 large investment events of non-financial North American companies between 1988 and 1998. Using 226,355 firm-year observations from CompStat and CRSP databases between 1971 and 2006, Frank and Goyal (2009b) find that profitability positively and significantly affects firms' debt, book equity, and market equity while negatively impacting equity issues.

Firm size

The trade-off theory suggests that larger firms are more diversified, face a lower risk of financial distress (Bas et al., 2009; Frank & Goyal, 2009a), and have more access to debt (Mayer & Sussman, 2004; Eriotis et al., 2007). Therefore, they tend to borrow more (Scott, 1976). In addition, large firms are more likely to undertake large-scale investments that require external financing. According to the pecking order theory, they prefer to use debt rather than equity in their capital structure. Therefore, firm size is positively correlated with leverage within the trade-off and pecking order theory frameworks. In addition, Kurshev and Strebulaev (2015) investigate the size-leverage relationship through a general dynamic financing model under the assumptions of fixed-cost external financing, perfect markets, passive financing decisions of firms, and two external financing modes (common equity and debt). The study suggests that market leverage decreases when a firm's size increases, as its market value rises. Small firms choose more debt when refinancing, but their refinancings are less frequent. Since the cost of debt is fixed, very small firms may choose zero leverage, and larger firms are more likely to use debt. Therefore, over time, within firms, firm size and market leverage are negatively correlated. However, across firms, they are positively correlated.

Empirically, many studies support a positive correlation between firm size and leverage. For example, Taub (1975) reports that firm size is positively associated with its debt-to-equity ratio when analysing security issuances of 89 firms between 1960 and 1969. Bevan and Danbolt (2004) employ data on 1054 listed UK firms between 1991 and 1997 and find that larger firms have higher long-term and short-term debt levels than smaller firms. Antoniou et al. (2008) examine samples of 4,854 firms operating in France, Germany, Japan, the U.K., and the U.S. from 1987 to 2000 and document a positive correlation between firm size and leverage. Chang et al. (2014) examine data on Chinese A-share-listed firms (excluding those listed in the growth enterprise market) between 1998 and 2009 and find that firm size is positively associated with leverage. However, some studies document a negative or heterogeneous size-leverage relationship. For example, Titman and Wessels (1988) analyse data from 469 US manufacturing firms between 1974 and 1982, and report that smaller firms rely more on short-term debt than larger ones. Chen and Strange (2005) examine data on 972 firms listed on the Shanghai Stock Exchange and Shenzhen Stock Exchange in China in 2003 and suggest that firm size is positively related to the market value of the debt ratio, but not the book value. Talberg et al. (2008) examine data on 382 non-financial US headquarters firms listed on the NYSE in 2005 and find that firm size exhibits both positive and negative relationships with the debt ratio across size intervals.

Growth opportunity

The existing literature has identified two mechanisms through which growth opportunities can affect a company's capital structure. The first one is the shareholder-creditor agency problem. When firms are heavily leveraged, they are disciplined in paying off debt. This indicates that creditors obtain most of the benefits of firms' investment, whereas shareholders do not. Shareholders are motivated to reduce investment even when projects are NPV, leading to underinvestment. Future investment options are crucial for firms with strong growth opportunities. Therefore, these firms tend to use less debt to preserve opportunities for future investment options and financial flexibility (Myers, 1977). As outlined above, the agency theory suggests a negative relationship between growth opportunities and leverage ratios. However, issuing short-term rather than long-term debt can alleviate this agency problem. This indicates that short-term debt ratios may be positively associated with growth rates if growing firms substitute short-term financing for long-term financing (Titman & Wessels,1988).

The second mechanism is market timing. Baker and Wurgler (2002) suggest that firms tend to issue equity when market value is high (i.e., equity's cost is lower) and repurchase it when market value is low (i.e., equity's cost is higher). Moreover, firms with high growth potential may find it challenging to raise debt because lenders perceive them as riskier and often demand higher returns (Eriotis et al., 2007). Therefore, firms with high market-to-book values are more likely to issue equity and therefore have lower leverage ratios.

Empirical studies provide evidence for the negative relationship. For example, using evidence from U.S. firms, Homaifar et al. (1994) and Frank and Goyal (2009a) report a strong negative relationship between leverage and future growth opportunities. Rajan & Zingales (1995) find that market-to-book value is negatively correlated with leverage across G7 countries and explain this by market-timing theory. By examining data on 1,054 listed UK companies between 1991 and 1997, Bevan and Danbolt (2004) report a negative association between growth opportunities and short-term bank borrowing. However, the significant relationship between long-term borrowing and growth opportunities has not been documented. Deesomsak et al. (2004) use data on 1,527 non-financial firms listed in Thailand, Malaysia, Singapore, and Australia, and find a negative association between growth opportunities and leverage. By analysing data on 4,854 firms operating in France, Germany, Japan, the U.K., and the U.S, Antoniou et al. (2008) find that growth opportunities are negatively correlated with the leverage ratio in both capital-market- and bank-oriented economies. These studies suggest that firms with substantial growth opportunities rely less on debt and have lower leverage ratios. On the contrary, Michaelas et al. (1999) report a positive correlation between future growth opportunities and debt ratios among small firms after examining the sample of 3,500 small and medium-sized UK firms from 1986 to 1995.

Tangibility

According to the trade-off theory, firms with high tangibility have more assets available as collateral and are easier to evaluate than intangible assets (Titman & Wessels, 1988; Frank & Goyal, 2009a; Lim et al., 2020). Firms with high tangibility face less financial risk, and lenders demand a lower risk premium (Bas et al., 2009). The lower cost of capital and greater access to debt for high-tangibility firms indicate that tangibility is positively associated with leverage ratios.

Empirical tests provide strong evidence for the positive association, although a few studies report an insignificant correlation between them. For example, Michaelas et al. (1999) find that fixed asset components positively affect debt ratios in small firms based on a test of 3,500 small and medium-sized UK firms from 1986 to 1995. Analysing data on publicly traded non-financial US firms, Frank and Goyal (2009a), Talberg et al. (2008), and Lim et al. (2020) report a positive correlation between tangibility and leverage. Bevan and Danbolt (2004) employ data on 1054 listed UK companies between 1991 and 1997 and suggest that tangibility is positively associated with short-term bank borrowing and long-term debts. Delcoure (2007) finds a positive relationship between asset tangibility and firm leverage, using evidence from the Czech Republic, Poland, Russia, and Slovakia. Using data on 4,854 firms operating in France, Germany, Japan, the UK, and the US from 1987 to 2000, Antoniou et al. (2008) suggest that tangibility is positively correlated to firms' leverage ratios. Chang et al. (2014) report a positive association between asset tangibility and leverage after examining Chinese A-listed firms from 1998 to 2009. Using data on 15,177 firms from 37 countries from 1991 to 2006, Öztekin (2015) reports that firms with more tangible assets tend to have higher leverage. However, Titman & Wessels (1988), Ghosh et al. (2000), as well as Chen and Strange (2005) find that the association between tangibility and leverage is insignificant in their tests of US and Chinese firms.

Payout ratio

The pecking order theory suggests that firms restricting dividend payouts can retain more earnings. They prefer to use these internal funds to finance their investment (Myers & Majluf, 1984). Therefore, firms that pay out fewer dividends tend to rely less on debt. The payout ratio is positively correlated with the leverage ratio. However, the agency theory suggests a negative association between payout ratio and leverage. Firms that pay out less to shareholders hold more free cash flow that is under managers' control. Managers use it for their own benefit rather than for shareholders', aggravating agency problems between shareholders and managers. Shareholders, therefore, may request firms to issue more debt to mitigate the agency problem (Jensen & Meckling, 1976; Jensen, 1986). Empirically, Frank and Goyal (2009a) report that dividend payout is a reliable factor negatively associated with leverage in publicly traded non-financial US firms between 1950 and 2003.

Stock returns

According to the market timing theory, firms are more likely to issue equity when equity prices are high (i.e. when costs are low). This suggests that firms previously experienced high stock prices are more likely to issue equity and therefore have lower leverage ratios. Therefore, prior stock returns are likely to be negatively associated with leverage.

Studies empirically support a negative relationship between stock returns and leverage. For example, Deesomsak et al. (2004) use data on 1,527 non-financial firms listed in the national stock exchanges of Thailand, Malaysia, Singapore, and Australia between 1993 and 2001. The study reports a negative effect of share price performance on leverage. Similarly, Welch (2004) finds a negative correlation between stock prices and the debt-to-equity ratio based on evidence from all publicly traded US corporations between 1962 and 2000. This study argues that stock returns are negatively related to leverage because firms do not adjust their capital structure to offset the impact of stock price changes. Examining data on 4,854 firms operating in France, Germany, Japan, the U.K., and the U.S. from 1987 to 2000, Antoniou et al. (2008) suggest that share price performance is negatively correlated with leverage.

Capital expenditure ratio

According to the pecking order theory, firms' capital expenditures increase their financing deficits (Shyam-Sunder & Myers,1999). After exhausting their internal financial slack, firms tend to use debt to finance the deficit before issuing equity as a last resort (Myers & Majluf, 1984). Therefore, firms borrow more and have higher leverage ratios when the capital expenditure ratio is high. The trade-off theory also predicts a positive correlation between them. Investment allows firms to expand their size and obtain additional collateral, reducing their risk of financial distress. Therefore, firms with high capital expenditure can borrow more. However, the agency theory suggests the opposite. High capital expenditure leaves firms with less free cash flow under managers' control (Jensen & Meckling, 1976), mitigating the agency problem between shareholders and managers. Therefore, firms with high capital expenditure tend to use less debt.

Likewise, empirical studies have evidenced mixed results on the relationship between the capital expenditure ratio and leverage. For example, De Miguel and Pindado (2001) use data on 133 Spanish companies between 1990 and 1997 and find that investment and debt are positively correlated because investment increases firms' access to credit. However, Frank and Goyal (2009a) document a positive correlation between the capital expenditure ratio and the book leverage ratio, but a negative or weak relationship between the capital expenditure ratio and the market leverage ratio in publicly traded American firms from 1950 to 2003. Mogha and Williams (2021) examine data on 5968 firms across 33 countries from 2009 to 2017 and find inconsistent correlations between capital expenditure and leverage when different sets of factors are included in regressions.

Industry

The industry in which a firm operates can affect the firm's capital structure due to variations in risk, profitability, and asset tangibility across industries (Islam & Khandaker, 2015). In addition, industry-specific business environment, technological development, and regulatory challenges affect corporate capital structure (Talberg et al., 2008). Moreover, when firms make capital structure decisions, they may use the industry's mean leverage ratio as their benchmark (Frank & Goyal, 2009a). Therefore, optimal capital structures may differ across industries (Titman & Wessels, 1988). Michaelas et al. (1999) analyse data on 3,500 small and medium-sized enterprises in the UK from 1986 to 1995 and find that industry-specific effects influence the total level and maturity structure of small firms' debt. Frank and Goyal (2009a) report that median industry leverage is the most reliable factor impacting a firm's leverage among publicly traded US non-financial firms between 1950 and 2003. Chang et al. (2014) examine Chinese A-share listed companies between 1998 and 2009 and suggest that industry leverage is positively associated with leverage. Using data on 15,177 firms in

37 countries from 1991 to 2006, Öztekin (2015) find that firms competing in industries with high median leverage tend to have higher leverage. Similarly, Zeng et al. (2022) report a significant and positive correlation between the industry's median leverage ratio and firms' leverage ratios after examining firm-year data on 890 listed non-financial firms in the Guangdong, Hong Kong, and Macao Greater Bay Area from 2007 to 2017.

According to the above theories and empirical studies, firm-level characteristics, such as firm size, tangibility, profitability, growth opportunity, payout ratio, capital expenditure ratio, tax rate, non-tax debt shield, stock performance, earnings volatility, and the industry a firm operates in, are significantly associated with firms' financial mix. However, there are still debates on how these factors affect firms' financing mix. Their relationships with leverage in selected studies are summarised in Table 2.1.

[Insert Table 2.1 Here]

2.2.2 The Impact of Macroeconomic Factors on Capital Structure

In 1958, Modigliani and Miller (1958) postulated that in perfect markets, firm value remains independent of capital structure choices. Since then, extensive studies have analysed firm-level factors influencing firms' financing mix decisions, and several theories have emerged. The representative theories include the trade-off theory (Modigliani & Miller, 1958), the pecking order theory (Myers & Majluf, 1984; Myers, 1984), and the market timing theory (Baker & Wurgler, 2002).

Recent studies have increasingly recognised the important roles of macroeconomic factors in firms' financing mix decisions. Some studies, based on surveys of firms' managers, have emphasised the role of macroeconomic factors in these decisions. For example, Kjellman and Hansi (1995) examine a questionnaire of 54 Finnish firms on the Helsinki Stock Exchange and the OTC list. They find that confidence in economic policy, the external value of the currency, and inflation expectations ranked sixth, seventh, and ninth in terms of relative importance as factors affecting capital structure decisions. Similarly, a study by Michaelas et al. (1998) demonstrates the importance of economic states in capital structure decisions based on interviews conducted in 1997 with 30 small UK firms.[19] The interviews show that government policy, as well as economic and market conditions, are factors considered by managers when making financial structure decisions.

Empirical studies based on samples from various countries and periods have demonstrated that macroeconomic factors influence firms' financing mix decisions. Existing studies have suggested that economic growth can impact a firm's capital structure. For example, Frank and Goyal (2009a), utilising data from publicly traded US non-financial firms between 1950 and 2003, suggest a negative relationship between firms' leverage and economic growth rate. They argue that firms' internal funds and profits increase during economic expansions. According to the pecking order theory, firms prioritise internal funds. Additionally, higher profits alleviate agency problems between shareholders and managers, resulting in less borrowing. Conversely, some studies have found a positive relationship between macroeconomic growth and leverage ratios, without delving into the underlying reasons. For example, based on the investigation of 11,845 firms in 42 countries from 1997 to 2001, De Jong et al. (2008) suggest that firms operating in countries with higher GDP growth rates tend to have higher leverage. Similarly, Zeng et al. (2022) utilise firm-year data on 890 listed non-financial companies in the Guangdong-Hong Kong-Macao Greater Bay Area of China from 2007 to 2017. They report a positive and significant impact of

[19] 'Smaller firms' are those firms that have fewer than 200 employees.

EPU on the leverage ratio among both state-owned and non-state-owned firms. It can even indirectly impact capital structure through firm-level factors, such as asset tangibility, profitability, and liquidity ratios.

Furthermore, existing research suggests that monetary factors, such as the growth rate of money and credit supply or the inflation rate, can influence a firm's financing mix. For instance, Frank and Goyal (2009a) report a positive association between firms' leverage and expected inflation. They explain this based on the trade-off theory, which suggests that the real value of tax deductions on debt is greater when expected inflation is high. Inversely, some studies hold the opposite view. For instance, Öztekin (2015) utilises a sample of 15,177 firms across 37 countries from 1991 to 2006 and finds that firms operating in high inflationary environments have lower leverage. They argue that, according to the trade-off theory, firms in a high-inflation environment face higher bankruptcy risk and, therefore, lower leverage. Similarly, Zeng et al. (2022) report an inverse association between broad money supply (M_2) growth and a firm's leverage ratio after analysing data on 890 listed non-financial Chinese firms. This is because a higher M_2 growth rate leads to a more active stock market, and firms with a high proportion of tangible assets find it less expensive to raise funds through equity financing. The study also indicates a significant indirect impact of the M_2 growth rate on firms' capital structure. When the M_2 grows more rapidly, it magnifies the inverse effect of the tangible asset ratio on corporate leverage. It also lessens the inverse impact of profitability on the leverage ratio. However, a study by Daskalakis et al. (2017) finds that credit expansion consistently and positively impacts the leverage ratio, examining firm-year data on 17,317 non-financial SMEs in Greece from 2004 to 2014. The reason for the positive association is that commercial banks can provide more external financing during periods of credit expansion, thereby increasing the supply of funds available to firms.

Additionally, studies have found that country-level institutional quality can affect firms' financing mix. Öztekin (2015) analyses data from 15,177 firms across 37 countries. The results indicate that high-quality institutions accelerate leverage adjustments, whereas laws and traditions that protect debt holders relative to stockholders result in higher leverage. Pindado et al. (2017) use year-firm data from 11,698 listed firms across 35 countries between 1999 and 2013 and suggest that the leverage ratio is high in countries with transparent information and stronger legal protection for lenders and borrowers. This is because a country's institutional characteristics can directly and indirectly impact firms' debt. Countries with transparent and solid legal protection regimes have lower inverse selection, moral hazard, default risk, and financial distress costs. Therefore, firms prefer to borrow more. Additionally, these institutional characteristics can mitigate the inverse impact of unfavourable economic expectations on corporate leverage.

2.2.3 Studies on the Effect of EPU on Financing Mix Decisions

Studies have suggested that macroeconomic factors can impact firms' financing mix decisions. This implies that the EPU can affect firms' financing mix through its impact on the macroeconomic variables. Since 2015, a growing body of literature has recognised the importance of EPU in financing mix decisions. However, the findings are contradictory: some studies report negative correlations between EPU and leverage, while others have observed positive relationships.

2.2.3.1 Inverse Relation Between EPU and Leverage Ratios

Some existing studies report that EPU negatively impacts leverage ratios, either the ratio of total debt's book value to assets (book leverage ratio) or the ratio of total debt to the market value of assets (market leverage ratio). Some studies argue that decreased demand for or supply of funds following the EPU increases leads to this inverse effect.

Other studies, however, suggest that the combined effects of both demand for and supply of funds are the main reason for the inverse relationship.

From the perspective of financing demand, existing research has argued that higher EPU reduces investments or increases financing costs, decreasing the demand for external financing. For example, Zhang et al. (2015) use quarterly data on 2,038 Chinese-listed firms between 2003 and 2013 and document an inverse association between EPU and the market leverage ratio. They argue that the heightened economic uncertainty increases information asymmetry between borrowers and lenders, as well as default risks among firms. The external financing environment deteriorates, and financing costs go up. As a result, firms use more trade credit, which leads to a lower leverage ratio. Similarly, Chow et al. (2018) analyse the cases of 907 non-financial firms listed in seven Asia-Pacific countries[20] between 2004 and 2014. The results suggest that macroeconomic uncertainty negatively impacts firms' book leverage ratios because firms use less debt during times of uncertainty. However, firms with better corporate governance quality leverage less when facing macroeconomic uncertainty because it helps monitor their financing behaviours. Still, Li and Qiu (2021), using annual data on 5,360 US firms trading on the NYSE, NYSE MKT, and NASDAQ between 1985 and 2015, report a negative correlation between EPU and market/book leverage ratios. However, the marginal effects of EPU on debt ratios can be positive or negative among firms due to differences in their characteristics. The reason behind the inverse association is that a higher EPU indicates a deterioration of macroeconomic conditions and investment opportunities. Consequently, firms expect more volatile future cash flows and tend to cut their debts. By analysing annual data on 323 non-financial listed companies in Pakistan from 2015 to 2020, Aftab et al.

[20] In detail, the sample includes 221 from Australia, 186 from Japan, and 100 from Malaysia, Indonesia, Thailand, the Philippines, and Singapore.

(2023) report a negative association between EPU and the book leverage ratio and a positive correlation between EPU and the adjustment speed of the leverage ratio. This study argues that increases in EPU lead to higher market volatility. Consequently, managers are more cautious in making investment decisions, leading to a lower demand for external financing and a lower leverage ratio.

Some studies have suggested that the decrease in the supply of funds is the reason for the inverse EPU-leverage effect. For example, Asimakopoulos et al. (2023) examine data on 15,960 US firms from 1986 to 2020 and find that changes in EPU are positively associated with the leverage ratio but positively correlated with its adjustment speed. However, the environmental, social, and governance (ESG) rating can mitigate the inverse impact of EPU on the leverage ratio. They argue that it becomes more difficult for firms to access the financial market when the EPU rises. This negative financing supply shock results in a drop in the leverage ratio. However, firms with ESG ratings can mitigate the inverse impact of EPU on the leverage ratio because they prefer a lower leverage ratio and have lower default risks. This allows them to have better control of their borrowing conditions. Consequently, firms with ESG ratings have better access to the financial market even when EPU is high.

Some researchers have demonstrated that EPU can impact leverage through both the financing demand and supply channels. For example, Granville et al. (2019) argue that EPU affects capital structure through both demand and supply of financing. When EPU is high, financial institutions become more cautious about lending because high EPU increases information asymmetry between borrowers and lenders, volatility of future cash flows, and default risk among firms. Additionally, firms become more cautious about investing when EPU is high, decreasing their demand for external financing. Both channels suggest a negative correlation between EPU and the leverage ratio. The study reports that EPU is inversely associated with the total, short-term, and long-term book leverage ratios after examining a sample of 16,882 non-financial firms in Russia between 2000 and 2017. However, this effect is less significant among large firms. Furthermore, the leverage ratios of firms in strategically important sectors are more stable when EPU is high. Similarly, Khan et al. (2020) analyse data on 17,127 observations of non-financial firms listed on China's Shanghai and Shenzhen Stock Exchanges from 1999 to 2016. They find that changes in EPU and the leverage ratio are negatively associated. This is because firms reduce their demand for external financing for precautionary purposes, and lenders are likely to reduce their credit supply to control default risks when EPU is high. The results also show that the leverage ratio of non-state-owned enterprises (SOEs) is more sensitive to changes in EPU. This is because EPU has less impact on the credit availability of SOEs due to support from the government and state-owned banks. In addition, they find that trade credit can mitigate the adverse effect of EPU on the leverage ratio by alleviating the financial constraints caused by high EPU. By examining annual data on 1,072 US firms listed on the NYSE, NYSE MKT, and NASDAQ between 2012 and 2021, Almustafa et al. (2023) document an inverse correlation between current EPU and future leverage ratios (both book and market leverage ratios). They explain the effect through the demand and supply channels. From the demand side, managers are more cautious about their investment decisions when EPU is high. Conversely, they are willing to hold more cash when EPU is high, reducing financing demand and the leverage ratio. From the supply side, high EPU increases information asymmetry and volatility of future cash flows. This results in a higher cost of debt and heightened default risks. Therefore, lenders tend to supply less debt, which decreases firms' leverage ratios when EPU is high. Similarly, Athari and Bahreini (2023) analyse data on 92 firms listed in the travel and leisure sectors across the UK, Germany, France, Spain, and Italy between 2005 and 2019. The results suggest that the total liability-to-assets ratio declines as EPU rises. They interpret the impact of EPU on firms' debt ratios from both the demand and supply sides. From the demand side, high EPU leads to unstable cash flows and the heightened risk of financial distress. The high risk not only increases the cost of external financing but also decreases asset returns. According to the trade-off theory, firms tend to finance through equity and demand less debt. From the supply side, when EPU is high, financial institutions are less willing to lend because they need to control financial risks. As a result, EPU negatively affects the debt ratio.

However, unlike the studies summarised above, a few studies have investigated the mechanism beyond the demand and supply channels. For instance, Im et al. (2020) report an inverse association between uncertainty and firms' target leverage ratios (both book and market) by testing firm-year data on 1,455 firms listed on the NYSE, NASDAQ, and AMEX between 2003 and 2018. The study identifies four channels through which uncertainty affects optimal leverage ratios: the debt tax shield, potential financial distress costs, the debtholder-shareholder agency problem, and the agency benefits of debt. High uncertainty has a negative effect on firms' target leverage ratios, as it leads to lower debt tax shields, higher potential financial distress costs, and exacerbated conflicts between debtholders and shareholders. Additionally, Li and Qiu (2023) developed a model to investigate the impact of EPU on leverage. They treat EPU as a state variable within the ICAMP framework proposed by Merton (1973). They define the related conditional exposures as EPU Beta, which is the covariance of the ex-post returns and changes in the expected state variable, divided by the variance of changes in the expected state variable: namely, $\beta_{i,t}^{x} = Cov_t(r_{i,t+1}, \Delta x_{t+1})/ Var_t(\Delta x_{t+1})$, where x is the state variable that shifts the investment opportunity set, and includes EPU. $r_{i,t+1}$ is the ex-post return on asset i. Then, the authors introduce the concept of 'policy-risk-induced equity return' (PRER) into the research. PRER equals EPU beta times EPU shocks. PRER captures the expected return associated with the compensation for investors' risk caused by EPU. A negative EPU beta for a firm implies that the current returns of its stock move in the opposite direction of EPU shocks. This suggests that the stock can hedge against EPU shocks, meaning a positive EPU shock will result in a negative PRER. If last year's EPU shock is positive, hedgers' demand for this stock may rise, and the current price of the stock may go up. In line with the market timing theory, this firm would issue equity and reduce debt, resulting in a decline in the leverage ratio. If the previous year's EPU shock is inverse, risks from the EPU shock are lower, and hedgers' demand for the stock would decrease. This stock price will decline, and the firm will issue more debt than equity. The leverage ratio of this firm rises. Controversially, if a firm's EPU beta is positive, an EPU rise induces a positive PRER that decreases the target leverage. In the empirical test, this study uses end-of-year data from 2,690 firms listed on the Shanghai and Shenzhen stock exchanges in China from 2003 to 2018. The study first estimates the Betas of EPU shocks, non-policy economic uncertainty shocks, and financial market uncertainty shocks using a rolling-window time-series regression based on an augmented Fama-French three-factor model that includes the three above shocks. Then, the study uses a two-stage model to estimate the target ratio. Finally, the authors employ a time-varying partial adjustment model to estimate the speed of leverage adjustment. The results suggest that the Chinese equity market serves as a bridge through which EPU shocks impact capital structure. These shocks negatively affect firms' leverage targets through their stock returns. Among Chinese firms, PRERs have a positive effect on leverage targets when their EPU beta is negative and an inverse effect when it is positive. Additionally, the study reveals that EPU shocks slow the adjustment speed of firms' leverage ratios.

2.2.3.2 Positive Relations Between EPU and Leverage Ratios

Another strand of literature has documented a positive relationship between EPU and leverage ratios. Studies have investigated two mechanisms related to it: the changes in demand for credit relative to equity and the cash-holding channel.

From the perspective of debt demand, studies suggest that firms prefer debt to equity when EPU is high. This is because equity financing is less accessible, or its cost is less affordable than debt. For example, Schwarz and Dalmácio (2021) analyse data on 163 non-financial listed firms in Brazil between 2010 and 2019. The results indicate a positive effect of EPU on book and market leverage ratios. The authors argue that high EPU increases the risk premium and the cost of equity, leading to a decrease in firms' SEO activity. According to the market timing theory, firms' market leverage ratios increase with EPU. Similarly, Bajaj et al. (2021) examine data from Indian firms listed on the National Stock Exchange (NSE 500) between 2009 and 2016. The results document both long- and short-term positive correlations between EPU and the leverage ratio, and the long-run effect of EPU is stronger than the short-term effect. Conversely, EPU negatively affects the adjustment speed of the leverage ratio. The authors argue that firms are uncertain about their expected earnings when EPU is high, which causes them to rely more on external financing. Although the costs of both equity and debt increase when EPU is high, equity capital is more expensive than debt because the equity market is more volatile. Therefore, firms prefer debt to equity when EPU is high, leading to a higher leverage ratio.

In addition, Jumah et al. (2023) estimate a stepwise dataset from 2,534 US non-financial firms listed on the NYSE between 1995 and 2018. The result reveals a positive correlation between the EPU and the book leverage ratio. It also suggests that cash holdings significantly and partially mediate the effect of EPU on the leverage ratio. The mediation effects are sensitive to firm-level characteristics and significant for both long- and short-term debt-to-asset ratios. The authors argue that firms save more cash for precautionary purposes when EPU is high. This encourages firms to borrow more because holding more cash provides a cushion against financial distress, leading to higher leverage ratios when EPU rises.

2.2.3.3 The Heterogeneous Effects of EPU on Leverage Ratios

In addition to the positive and negative associations between EPU and the leverage ratio, Makololo and Seetharam (2020) find heterogeneous EPU-leverage effects across countries. The study utilises annual data from BRICS countries between June 2002 and June 2017, including the top 80 listed firms from Brazil, India, China, and South Africa, as well as the top 50 from Russia. They report that an increase in EPU in Brazil, Russia, and South Africa negatively impacts firms' book and market leverage ratios, leading to herding behaviour in leverage decision-making. However, in China and India, an increase in EPU raises the leverage ratios. They argue that smaller firms with less experience may imitate the capital structure decisions of larger firms. This herding behaviour exists in firms' leverage decision-making during periods of high EPU and affects firms' leverage ratios.

Key features of the above studies are summarised in Table 2.2.

[Insert Table 2.2 Here]

2.2.4 The Gaps in Research

The existing literature has investigated how macroeconomic factors and EPU influence firms' financing mix decisions. Surveys of managers have shown that economic policy, economic conditions, and inflation expectations play an important role in these decisions. Empirical tests have demonstrated that macroeconomic factors, such as the economic growth rate, the economic cycle, the inflation rate, the money supply growth rate, and the credit supply growth rate, significantly affect firms' capital structure decisions. These studies have also found an effect of country-level institutional quality on the composition of the financing mix.

Since 2015, researchers have increasingly focused on the impact of EPU on firms' financing mix. However, views on how and why EPU impacts the financing mix are ambiguous. Some existing research suggests that high EPU reduces firms' financing demand and supply, resulting in a decline in leverage ratios. Conversely, other studies have found that firms' leverage ratios increase with high EPU. Makololo and Seetharam (2020) even document both positive and negative effects of EPU on leverage ratios in different countries. Overall, the existing literature reveals several areas that require further research.

First, the effect of EPU on the financing mix requires further empirical examination. The existing literature has uncovered varying and even controversial findings on the impact of EPU on the financing mix. Additionally, the samples in the empirical tests have been limited to the US, China, and other BRICS countries. This may restrict a complete understanding of the effect. Altogether, it is necessary to clarify the association between EPU and the financing mix by using different samples and various measures for the financing mix.

Second, there is a need to analyse the fundamental mechanisms underlying the EPU-leverage effect. Most existing research suggests that high EPU reduces firms' financing demand due to delayed investment, heightened financing costs, or increased bankruptcy risks. However, these studies have overlooked the two-way effect of increases in EPU on the leverage ratio. On the one hand, increases in EPU may decrease investment but raise the demand for precautionary cash. Then, firms have an option between holding cash and paying off debt. This challenges the assumption in previous studies that declines in investment must be related to decreases in the long-term debt ratio. On the other hand, firms' profitability may decrease with heightened EPU, increasing demand for working capital and external financing. The dual effects complicate firms' decisions regarding their financing mix. Specifically, managers must consider the financing demand related to investment, precautionary, and working capital when making financing decisions under uncertainty. Therefore, it is possible that the demand for financing increases under high EPU. This indicates the need to investigate the fundamental mechanisms underlying changes in financing demand and supply during periods of high EPU, as well as the channels through which EPU impacts the financing mix.

Finally, most existing studies focus on the relationship between EPU and overall leverage, while little attention has been given to the responses of short- and long-term leverage ratios to EPU shocks. However, this temporal characteristic of the EPU-leverage effect is important because firms usually match their debt to assets. Capturing the different effects of EPU on long-term vs short-term leverage ratios helps explain the underlying reasons for the leverage adjustment under uncertainty. This suggests a requirement to examine the effect of EPU on both long- and short-term leverage ratios.

2.3 Hypothesis Development

2.3.1 The Impact of EPU on a Firm’s Leverage Ratios

EPU intensifies the information asymmetry between policymakers and economic sectors. On the one hand, employees expect income cuts when EPU rises. Consequently, risk-averse households tend to reduce their consumption (Gomes et al., 2012), which decreases the demand for firms’ goods and services. Firms’ sale prices and earnings decline during periods of high EPU, and so does firms' profitability. On the other hand, when EPU rises, managers are more uncertain about future economic policy and conditions. Consequently, they suspend investment and wait for more information (Bernanke, 1983; Baker et al., 2016a). Rises in EPU also increase firms' cash-flow volatility and default risk, which motivates lenders to demand a higher risk premium. As a result, the cost of capital rises with EPU, making some otherwise profitable projects unprofitable. Additionally, lower demand and profitability may reduce corporate investment incentives and internal funds available for investment. Consequently, firm-level and aggregate investment decline under high EPU (Gulen & Ion, 2016; Baker et al., 2016a), reinforcing decreases in firms' sales and profitability.

Reduced profitability associated with high EPU leads to a larger financial deficit that needs to be covered by external financing (Shyam-Sunder & Myers, 1999). Firms prefer lower-risk debt to equity (Myers, 1984), and therefore, they may borrow more and have higher leverage ratios when EPU rises. Additionally, firms tend to suspend investment during periods of EPU, increasing the firms' free cash initially set aside for investment. Managers may use them for their own benefit (Jensen & Meckling, 1976; Jensen, 1986), exacerbating the agency problem between shareholders and managers. Therefore, shareholders may, through the board of directors, request that firms borrow more to alleviate agency costs because lenders can limit managerial activities through clauses in loan agreements or bond indentures. Moreover, when EPU rises, managers expect more financial frictions, including a higher cost of capital, greater market risks, stricter financial constraints, and more volatile future cash flows. Firms may be motivated to borrow for precautionary purposes. This leads to Hypothesis $H_{2.1}$.

$H_{2.1}$: The changes in EPU and firms' leverage ratios are positively associated.

As previously noted, increases in EPU may reduce investment and profitability, potentially resulting in a higher book leverage ratio. To further test $H_{2.1}$, we investigate how EPU impacts the financing mix through investment and profitability channels separately. This analysis helps clarify the influence of EPU on firms' financing mix.

2.3.2 The Channels Through Which EPU Impacts Firms' Financing Mix

2.3.2.1 Corporate Investment Channel

When EPU rises, the investment risk associated with economic policy also increases. According to the real option theory, firms tend to be more cautious in their investment decisions and wait until uncertainty is resolved (Bernanke, 1983; Bloom, 2009; Baker et al., 2016a). Firms are more likely to postpone investments, particularly when they are irreversible, as the sunk costs are high if inappropriate choices are made under uncertainty (Gulen & Ion, 2016). Furthermore, when EPU rises, investors may demand a higher risk premium (Pastor & Veronesi, 2013), increasing the cost of financing. This, in turn, may reduce the attractiveness of investment projects and decrease the available positive net present value (NPV) projects on the market. Consequently, firms may choose to delay their investment plans during uncertain times. Additionally, when economic policy is uncertain, future employment also becomes uncertain (Gomes et al., 2012). As a result, consumers may reduce their consumption to prepare for possible income reductions, leading to lower current and uncertain future demand. This reduces the investment further. To sum up, increases in EPU may cause a decline in corporate investment.

On the other hand, when corporate investment declines with high EPU, managers will have a larger cash balance (i.e. unspent retained earnings) that was initially set aside for investment, exacerbating the agency problems. Since debt can serve as a disciplining mechanism for managers (Jensen & Meckling, 1976), shareholders may request that firms issue more debt rather than retain earnings to mitigate agency problems during periods of EPU. In addition, when investment decreases, managers expect increases in future cash-flow volatility and default risks. Therefore, firms may raise debt to build precautionary cash holdings. This leads to Hypothesis $H_{2.2}$.

$H_{2.2}$: Firm-level investment is a channel through which changes in EPU exert a positive effect on the leverage ratio.

2.3.2.2 Profitability Channel

In addition to corporate investment, EPU increases may impact firms' profitability in several ways.

First, when EPU rises, firms delay their investment because the option value of waiting increases (Bernanke, 1983; Dixit & Pindyck, 1994). Consequently, R&D investment decreases (Koroma & Bein, 2024; Arianpoor & Khargh, 2025), leading to lower innovation output (Arianpoor & Khargh, 2025). Firms' operational efficiency decreases (Kang et al., 2014). At the same time, they may find it more challenging to create new sources of revenue during periods of high EPU. Therefore, firms' profitability is likely to decline when EPU is high. Second, high EPU increases the information asymmetry between firms and investors, as well as the default risk of firms and households. Therefore, investors demand a higher risk premium for compensation, leading to an increase in the cost of capital (Ashraf & Shen, 2019; Ashraf, 2021) and, consequently, a decrease in firms' profitability when EPU rises. The heightened cost of capital caused by high EPU also reduces the available NPV projects in the market. Firms may seek lower-yielding but less risky investment opportunities, resulting in lower profitability under high EPU. Third, the high EPU may also lead to a decline in demand for firms' products and services because consumers tend to reduce their consumption to buffer for the uncertainty about future income (Gomes et al., 2012; Baker et al., 2016a). This decreases firms' revenue and, in turn, their profitability under EPU.

Increased EPU leads to a decline in profitability, which in turn reduces firms' cash flow. Consequently, firms have less funding to retain. However, firms require working capital to maintain daily operations. As suggested by the pecking order theory, when internal funds are insufficient, firms use external financing to cover financial deficits (Shyam-Sunder & Myers,1999). As firms prefer to raise debt rather than equity in external financing, they tend to rely more on debt (Myers, 1984), particularly short-term debt, to meet their working capital needs. Therefore, firms are likely to borrow more when EPU increases. This leads to Hypothesis $H_{2.3}$.

$H_{2.3}$: Firms' profitability is a channel through which changes in EPU positively correlate with the leverage ratio.

2.3.3 The Impact of EPU on Short-term and Long-term Leverage Ratios

The discussions above show that when EPU increases, firms' investment and profitability are likely to decrease, leading to more borrowing. However, firms may face different needs for short- and long-term debts when EPU increases. First, responding to an increase in EPU, corporate investment decreases, leading to lower demand for long-term funds. Consequently, firms are less likely to borrow long-term debt when EPU rises. Second, although rises in EPU decrease corporate investment, managers may consider preserving future investment incentives. If firms borrow long-term debt that matures after a potential new investment, a large share of future investment benefits goes to creditors, which may discourage firms' future investment (Myers, 1977). Therefore, firms may choose not to borrow long-term debt to preserve the interests of existing investors. Third, long-term debt normally has a higher interest rate, discouraging firms from borrowing for the long term. Therefore, firms are less likely to borrow long-term debt, especially when they expect a short-term increase in EPU. This leads to Hypothesis $H_{2.4}$.

$H_{2.4}$: Changes in EPU have no significant effect on a firm's long-term leverage ratio.

On the other hand, as mentioned earlier, firms' profitability, and hence cash inflow, decreases when EPU is high. Due to reduced cash inflows, firms may find it hard to fund their operations. Consequently, firms may need additional sources of working capital to cover their short-term expenses and debt (Deloof, 2003). Moreover, Myers (1977) suggests that borrowing short-term debt can alleviate debt overhang[21] and preserve firms' investment incentives, as it offers firms the flexibility to shift back to all-equity financing or other debt capital sources. In bad income shocks, borrowing short-term debt may also help firms lower their default probability and underinvestment (Moyen, 2007). This indicates that firms may prefer short-term debt to reduce both default risk and debt overhang when EPU rises. Taken together, the short-term book leverage ratio is likely to rise when EPU increases, leading to Hypothesis $H_{2.5}$.

$H_{2.5}$: Changes in EPU are positively correlated with the short-term leverage ratio.

2.4 Sample and Methodology

2.4.1 Sample

The data used in this chapter are from the listed firms of five major developed countries: France, Germany, Japan, the UK, and the US, covering the period from 1999 to 2022. Although the BBD index is available for earlier years in some countries[22], for the UK,

[21] According to Myers (1977), debt overhang refers to downward incentives to invest in profitable projects when firms hold outstanding debt and look to maximise equity value.
[22] The EPU indices for France, Germany, Japan, and the US are available from 1987, 1993, 1987, and 1900, respectively.

it is available only from 1998[23]. As we use percentage changes in EPU, the sample for this chapter starts from 1999. The selection of the sample is guided by data consistency, comparability, and empirical validity. First, these five developed countries have well-established financial markets, allowing the empirical analysis to capture the relationship between EPU and leverage ratios that is more broadly applicable. Second, the firm-level data are more comparable among these five countries than in developing countries. This enables reliable empirical tests using a comparable panel across all five countries. Third, although EPU indices for some sample countries are available for earlier years, firm-level financial data and EPU measures have been more consistent across the five sample countries since the late 1990s. If earlier years were included, the sample would be heavily skewed toward countries with longer BBD indices (particularly the US). This could lead to biased results that overemphasise country and year-specific effects. Therefore, starting the sample from 1999 ensures that the empirical examination is conducted on a more balanced cross-country dataset, reducing the risk of biased results.

Sampled firms consist of available historical constituent firms listed in France's CAC-All, Germany's DAX and MDAX, Japan's Nikkei 225, the UK's FTSE-All, and the US's S&P 500. Financial institutions and utility firms are excluded from the sample. For this chapter, the constituents are updated in 1997[24], 2002, 2007, 2012, and

[23] There are two resources of the EPU index for the UK. The first is the individual UK index (available from 1998) that we use in this chapter. The second source (available from 1997) is on the website of the EPU indices named All Country-level Data (https://www.policyuncertainty.com/all_country_data.html), including 22 countries' EPU indices. I discussed these two resources of the UK's EPU index with the author Scott R. Baker through email. Professor Baker informed me that the EPU index for the UK in the All Country-level Data contains only two newspapers. On the contrary, the EPU index of the UK that we use in this chapter covers a broader span of newspapers and is more reliable. That is why we chose the UK's EPU index from the first resource in this chapter. However, to maintain consistency with other countries, we use the second resource in Chapter 4.

[24] Inclusion of the constituent firms of 1997 into the sample firms, despite the analysis period starting from 1999, is to enable the sample to contain firms that were listed before 1999 rather than those that only survived after 1999.

2017[25] for two reasons. First, this enables the sample to include both long-term survivors and new entrants, reflecting the evolution of industrial and economic structures. Second, this approach mitigates the potential survivorship bias by including firms that exited from the market during the analysis period. Because this chapter uses GMM estimation, following Arellano and Bond (1991), the minimum number of consecutive observations should be 5 in unbalanced panel data when testing the second-order serial correlation of GMM estimation. Therefore, the sample excludes firms with fewer than five consecutive observations of variables. The final sample contains 1,959 firms, including 447 French,[26] 107 German, 202 Japanese, 663 British, and 540 American firms.

This study uses book leverage ratio, as well as its short- and long-term counterparts, to measure a firm's financing mix. The market leverage ratios are alternative measures of financing mix used in robust tests. Since changes in both current and previous EPU may affect the financing mix (i.e., firms may react with some delay to EPU information), the explanatory variables include the contemporaneous EPU and its three-, six-, nine-, and 12-month lags. The yearly contemporaneous EPU is the annual percentage change in the monthly BBD index that matches each firm's fiscal year start and end month. Three-, six-, nine-, and 12-month lagged Δ%EPU are the annual percentage changes of the BBD index with corresponding lags from the start of the

[25] Historical constituent data for some index–year are unavailable from DataStream. Specifically, the 1997 constituent lists for Germany DAX and France CAC-ALL, as well as the 1997, 2002, and 2007 lists for Japan Nikkei 225, are not provided in Datastream. We combine the available constituents of each country.

[26] In the French CAC-all constituent lists, we exclude IMMOBILIERE HOTEL from the sample because the book leverage ratios of this firm from DataStream were abnormally high from 2011 to 2015. They were 108,691.667%, 197,094.118%, 1,135,250%, 1,766,000% and 1,208,466.667%. In 2016, both the assets and debt of this firm were zero. However, we could not find other data sources to verify the accuracy of these data. To avoid data errors, we deleted the IMMOBILIERE HOTEL from our sample.

fiscal year. The BBD index data can be found at https://www.policyuncertainty.com/all_country_data.html.

Following previous studies (Rajan & Zingales, 1995; Antoniou et al., 2008), we control for various firm-level characteristics that could influence a firm's financing mix, including growth opportunities, firm size, effective tax rate, tangibility of assets, earnings volatility, dividend payout ratio, and tax shields (section 2.2.1.2 explains the effects of these factors on the capital structure of a firm). On the other hand, Leduc and Liu (2016) indicate that increases in uncertainty resemble aggregate demand shocks, raising the possibility that EPU may be correlated with broad macroeconomic variables. To isolate the effect of EPU from those of macroeconomic variables, this chapter controls for the real GDP growth rate, the interest rate, and stock market returns, following previous studies (Daskalakis et al., 2017; Antoniou et al., 2008). The proxy for interest rate is the three-month Treasury bill yield, and the measure of stock returns is the natural logarithm of changes in stock prices. The real GDP growth rate data are sourced from the OECD database. Since firms may take time to adjust their capital structure after changes in interest rates or stock returns, these changes are matched with a six-month lag relative to the firm's fiscal year-end month to cover the time required for decision-making. Since the characteristics of the industries or countries in which firms operate can affect their financing mix, we use the average leverage ratios of industries[27] and countries to proxy them. The average book leverage ratios of industries and countries are used to control for industry and country effects in regressions involving short-term, long-term, and total book leverage ratios. On the other hand, in regressions involving the market leverage ratio, we use the average market leverage ratios of industries and countries.

[27] The industries are classified according to the SIC code. The details are in Appendix 2A

Additionally, as an essential component of institutional quality, regulatory quality is crucial for research on policy uncertainties, as it reflects the government's capacity to implement policies and regulations effectively. High regulatory quality can improve information transparency, decrease the risk and cost of bankruptcy, and reduce borrowing and transaction costs in financial markets. Therefore, high regulatory quality is likely to increase firms' leverage ratios. In addition, high regulatory quality provides a better business environment, in which firms may be more sensitive to changes in EPU. To investigate how the capital structure responds to changes in EPU when considering regulatory quality, this study measures regulatory quality as the annual percentage change in the regulatory quality indicator from the World Bank's Worldwide Governance Indicators. This regulatory quality indicator ranges from approximately -2.5 to 2.5, with a higher value indicating higher regulatory quality. The indicators were issued every two years between 1996 and 2000, while annual indicators have been available since 2000. To fill in the missing values for 1999, we calculated the average for the 1998 and 2000 values. The average regularity quality of the UK from 1999 to 2022 is 1.724, the highest among the five countries. Japan's average regularity quality is 1.104, the lowest among the five countries. All other data not explicitly sourced above are from DataStream. The definition of variables is in Table 2.3.

[Insert Table 2.3 here]

2.4.2 Descriptive Statistics

Table 2.4 shows that the mean values for book and market leverage ratios are 25.539 and 25.332, respectively, which are broadly consistent with the previous findings of Antoniou et al (2008) for the same countries but for a different sample period. The standard deviations of book and market leverage ratios are 69.728 and 21.789, respectively. This indicates that the average values of book and market leverage ratios are close, but market leverage ratios are less volatile than book leverage ratios. The standard deviation of the market leverage is comparable with that reported by Antoniou et al. (2008). However, the standard deviation of the book leverage ratio is much higher than that in Antoniou et al. (2008). This might be because the sample of this chapter contains some extreme book leverage values, which enlarges the standard deviation. For example, the maximum value of the book leverage rate is 12,655.770%.[28] This extreme book leverage ratio suggests an overly high debt-to-assets ratio, implying a heightened risk of financial distress. The average values of the short-term book and market leverage ratios are 6.3 and 8.12, indicating that average short-term book and market leverage levels are similar. Additionally, the standard deviations of the short-term book and market leverage ratios are close, at 10.208 and 11.520, suggesting these short-term ratios are less volatile across observations compared to the total book and market leverage ratios. The average short-term book leverage ratio is similar to the ratios for Russia and Slovakia reported by Delcoure (2007), but lower than the UK firms' average short-term book leverage of 30.3% reported in Michaelas et al. (1999). This indicates that the short-term leverage ratio may vary across countries and periods. The mean values of the long-term book and market leverage ratios are 19.297 and 18.919, lower than those for US firms reported by Jumah et al. (2023) but higher than those for UK firms reported by Michaelas et al. (1999). The higher mean value of the long-term leverage ratio compared with the short-term leverage ratio indicates that firms prefer long-term debt to short-term debt.

[28] The maximum value is the book leverage ratio of Sportech Plc in 1999, characterised by relatively stable debt over largely shrunken assets during 1998 to 1999. It might be related to the acquisition deal of the firm in 2000.

On the other hand, the standard deviations of the long-term book and market leverage ratios are 68.719 and 16.941, respectively. Suggesting-term

that the long-term book leverage ratio is more volatile than the long-term market leverage ratio. Δ%EPU has a mean of 14.237 but a large standard deviation of 55.627, highlighting the volatility in EPU across periods and countries. The three-month lagged Δ%EPU has the highest standard deviation, followed by the nine- and six-month lagged Δ%EPU. Furthermore, the standard deviations of effective tax rate, earnings volatility, payout ratio, stock return, and capital expenditure ratio are substantial.

[Insert Table 2.4 here]

The correlation coefficients in Table 2.5 show that the coefficient between total and long-term book leverage ratios is 0.869, and that between total and short-term book leverage ratios is 0.491, suggesting a stronger positive correlation between total and long-term book leverage ratios. The correlation coefficient between the book and the market leverage ratios is 0.596. Additionally, the correlation coefficients of book leverage with short- and long-term market leverage ratios are 0.284 and 0.595, respectively. All correlation coefficients between the leverage ratios are significant at the 1% level. These positive coefficients indicate that firms' book and market leverage ratios tend to move in the same direction.

Moreover, the book leverage ratio negatively correlates with percentage changes in contemporaneous, three-, and six-month lagged EPU. However, the correlation coefficients become positive for the nine- and 12-month lagged Δ%EPU. The correlation coefficients between the book leverage ratio and contemporaneous, as well as lagged Δ%EPU, are small in magnitude, inconsistent in sign across lags, and statistically significant only for the nine-month lagged Δ%EPU. Similar characteristics are observed in the correlations between Δ%EPU (as well as lagged EPU) and the short- and long-term book leverage ratios. This suggests the linear correlations between the total, short-, and long-term book leverage ratios and Δ%EPU (lagged Δ%EPU) are weak in pairwise settings. Since the pairwise setting does not control for firm-level characteristics and macroeconomic variables, it may obscure the meaningful association between the leverage ratio and Δ%EPU (lagged Δ%EPU). Furthermore, the book leverage ratio positively correlates with firm size and tax shield with coefficients of 0.104 and 0.121, respectively, indicating that large firms and firms with a high tax shield tend to have more pronounced book leverage. Besides this, the book leverage ratio is also negatively and significantly correlated with profitability (-0.081) and stock returns (-0.078), implying that more profitable firms or firms with higher stock returns tend to have lower book leverage ratios. However, the book leverage ratio is negatively correlated with tangibility (-0.320), indicating that firms with more tangible assets have lower book leverage ratios, inconsistent with the trade-off theory. The short-term book leverage ratio strongly and positively correlates with total and short-term market leverage ratios, with coefficients of 0.427 and 0,703, showing that firms with high short-term book leverage also tend to have higher total and short-term market leverage. The long-term book leverage ratio is positively correlated with both the total and long-term market leverage ratios, with coefficients of 0.441 and 0.630, respectively. This indicates that the long-term book leverage ratio and the market and long-term market leverage ratios tend to move in the same direction. However, the long-term book and short-term market leverage ratios are negatively correlated with a coefficient of -0.073. The market leverage ratio is positively correlated with the contemporaneous and lagged Δ%EPU. It is also moderately and negatively correlated with profitability (-0.235) and the stock return (-0.221), but positively correlated with firm size (0.204), implying that firms with higher market leverage are generally less profitable, have lower stock returns, but are larger. Short-term market leverage positively correlates with contemporaneous and lagged Δ%EPU. The correlation coefficients between the long-term market leverage ratio and the three-, six- and nine-month lagged Δ%EPU are positive and significant, consistent with those for the total and short-term market leverage ratios. The correlation between the long-term market leverage ratio and Δ%EPU is positive but not significant. The long-term market leverage ratio also shows a positive and moderate correlation with firm size (0.192), suggesting that larger firms tend to have higher long-term market leverage ratios.

Δ%EPU is significantly and positively correlated with its three-, six-, and nine-month lags, with coefficients of 0.273, 0.209, and 0.059, respectively. However, it is negatively correlated with the 12-month-lagged Δ%EPU with a coefficient of -0.323. Compared with the EPU level, which may remain consistent over time, the percentage change in EPU (Δ%EPU) is considerably less persistent. This may explain the lower correlation coefficients between Δ%EPU and its lags. Percentage changes in EPU may also reverse after a sharp increase or decrease, which may explain the inverse correlation between the contemporaneous and 12-month lagged Δ%EPU.

The highest absolute correlation among explanatory variables is 0.635 between Tangibility and profitability. Because correlation alone is insufficient to capture multicollinearity (Kennedy, 2008), the variance inflation factor (VIF) test is conducted, and results are reported in Appendix 2B. The maximum VIF is 1.25 for the variable "tax shield", and the mean VIF is 1.09, indicating a low degree of linear association. Therefore, multicollinearity is unlikely to be a concern in our estimations.

[Insert Table 2.5 here]

2.4.3 The Model and Estimation

2.4.3.1 The Dynamic Model and System-GMM Estimation

The OLS estimation based on static models assumes that explanatory variables are strictly exogenous and homoscedastic. However, unobserved heterogeneities may exist in panel data. Transforming the first difference based on a dynamic model effectively addresses this issue. Consider a dynamic model with a one-period lag of the dependent variable (Equation 2.1):

$$LEVERAGE_{i,t} = C + \alpha LEVERAGE_{i,t-l} + \beta \Delta\% EPU_{i,t-l} + \gamma X_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (2.1)$$

where $LEVERAGE_{i,t}$ is the leverage ratio measured by the book leverage or the market leverage ratio of firm *i* in year *t*. $\Delta\% EPU_{i,t-l}$ is the annual percentage change of the BBD index matched to firm *i*'s fiscal year-end month of year *t*; *l* is the lag of EPU and equals 0, 3, 6, 9, or 12 months. $X_{i,t}$ are control variables of firm *i* in year *t*. μ_i is the firm-fixed effect, and δ_t is the year-fixed effect.

When the previous book/market leverage ratio is included in Equation 2.1, the assumption of strict exogeneity does not hold, as the lagged dependent variable is endogenous. Hence, OLS estimation is biased. GMM estimation can be applied when regressors are endogenous. It can even be used without specifying the complete data-generating process and for potentially mis-specified dynamic models (Hanson, 2007). Besides, GMM estimation is suitable for samples with small T and large N. In our sample, T is 24, and cross-section N is 1,959, meeting the sample requirements for GMM estimation. Therefore, the GMM method is appropriate for estimating the dynamic model (2.1). Arellano and Bond (1991) suggest using lags of the dependent variable as instrumental variables for the differenced equation in GMM estimation. However, lagged dependent variables as instruments may lead to weak-instrument issues. Blundell and Bond (1998) estimate the autoregressive model using the system-GMM approach, in which lagged levels of the dependent variable are used as instruments for the differenced equations and lagged differences of the dependent variable are used as instruments for the level equations. Specifically, a firm's leverage ratios can affect its growth opportunity (Lang et al., 1996), size (Tran Thi et al., 2023), payout ratio (Fama & French, 2002), earnings volatility (Putri & Willim, 2024), firm size (Frank & Goyal, 2009a), effective tax rate (Titman & Wessels, 1988), and stock returns (Kayhan & Titman). These variables are therefore endogenous in system-GMM estimations of leverage ratios with respect to Δ%EPU. Contemporaneous and lagged Δ%EPU, regulatory, the interaction term between EPU and regulatory, GDP growth rate, changes in interest rates, tangibility, and the non-debt tax shield, the average leverage ratios of the industry and the country excluding firm i, and year dummies (used to control for time-specific shocks affecting all firms) are treated as exogenous. Accordingly, in the first-difference equation, lagged levels of endogenous variables are used as GMM-type instruments. In the level equations, the lagged first differences of the endogenous variables are used as instruments. Exogenous variables are standard instrumental variables in the differenced equation. According to the assumption in Arellano-Bond (1991), instrument variables are valid when the idiosyncratic error term meets the condition: $E\left(v_{it}v_{i,t-s}\right) = 0 \; for \; s \geq 1$. Therefore, we conduct Arellano-Bond serial correlation tests on the residuals of the first-differenced equation AR(1) and AR(2). The AR(1) test is expected to reject the null hypothesis. On the contrary, AR(2) examines whether there is second-order serial correlation in the differenced residuals, whose null hypothesis is no second-order serial correlation, expected to be accepted. In practice, instrumental variables are considered to be valid when the p-value for the AR(1) test is below 10% and the p-value for the

AR(2) is above 10%. We adjust the lag of GMM-style instrument variables to allow models to meet the requirements of AR(1) and AR(2) tests. Two measures are taken to mitigate instrument proliferation. First, the Hansen test is examined to assess whether the instrument variables are overidentified. The reason for reporting the Hansen test is that it is robust to heteroskedasticity (Roodman, 2009a). A significance level for the Hansen test above 5% or 10% is considered acceptable. However, the overly high p-value (close to 1) is viewed as a concern of proliferation (Roodman, 2009b). Second, the number of instruments is restricted to being smaller than the number of groups. Both the number of instruments and the number of firms are reported to demonstrate that this requirement is met.

2.4.3.2 The Baron and Kenny (1986) Mediation Test

To empirically test channels through which EPU affects financing mix, this chapter employs the mediation test developed by Baron and Kenny (1986). First, we estimate Equation 2.1 using the system-GMM method to confirm whether contemporaneous or lagged Δ%EPU significantly predict the leverage ratio. Secondly, estimate Equation 2.2 using the system-GMM method to test whether contemporaneous or lagged Δ%EPU significantly indicates the mediation variable. Thirdly, if there is a significant correlation between the mediator and contemporaneous or lagged Δ%EPU in Equation 2.2, then use system-GMM (the same setting is used as the total effect discussed above) to estimate Equation 2.3, which includes the mediator and contemporaneous or lagged Δ%EPU as regressors. If the mediator is significantly correlated with the leverage ratio, the mediation effect exists. Finally, we check whether the mediation effect is partial or complete. There is complete mediation if the mediator is significantly correlated with the leverage ratio, but contemporaneous or lagged Δ%EPU is not, in Equation 2.3. On the contrary, a partial mediation effect exists if contemporaneous or lagged Δ%EPU is significant with a smaller coefficient than in Equation 2.1.

$$M_{i,t} = c + \gamma M_{i,t-1} + \rho \Delta\% EPU_{i,t-l} + \eta X_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \tag{2.2}$$

$$LEVERAGE_{i,t} = C + \alpha LEVERAGE_{i,t-l} + \beta \Delta\% EPU_{i,t-l} + \lambda M_{i,t} + \gamma X_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \tag{2.3}$$

M_{it} is the mediator, including capital expenditure and profitability. X_{it} are control variables.

2.5 Empirical Test Results

2.5.1 The Effect of EPU on Financing Mix

Table 2.6 presents the results of the relationship between the book leverage ratio and EPU. All AR(1) tests across models are rejected at a significance level of 1%, suggesting the existence of a first-order serial correlation in the differenced residuals. On the contrary, the p-values of AR(2) are all above 10%, indicating no second-order serial correlation in the differenced residuals. The above results suggest that the conditions for valid instrument variables are met. Hansen test p-values range from 0.218 to 0.298. Meanwhile, the number of instruments is 82 across all models, notably lower than the number of groups (1,952). These tests suggest the instruments are valid.

The results show that the book leverage ratio is significantly and positively correlated with percentage changes in the three-, six-, nine-, and 12-month lagged EPU in models (2) to (5), suggesting that an increase in EPU is associated with a higher leverage ratio with a delay. This indicates that firms rely more on debt financing over time in response to increases in EPU. The positive association is consistent with findings reported by Bajaj et al. (2021) and Schwarz and Dalmácio (2021), but opposite to those of Granville et al. (2019) and Aftab et al. (2023). The results support Hypothesis $H_{2.1}$. The reason for the delay may be that the book values are based on historical accounting data, which do not immediately respond to percentage changes in EPU. On the other hand, the coefficient on the contemporaneous Δ%EPU is insignificant. The interaction terms between regulatory quality and both the three- and 12-month lagged Δ%EPU are significant but small in magnitude, suggesting that the association between EPU and book leverage is conditional on regulatory environments, but the conditional effect is limited.

Among the control variables, the tangible asset ratio negatively and significantly correlates with the book leverage ratio across models (1) to (5). This indicates that firms with higher tangibility are likely to borrow less debt, which is inconsistent with the finding of Michaelas et al. (1999). A possible reason is that high-tangibility firms may generate more stable cash flows and therefore hold sufficient internal funds, allowing them to rely less on external debt. The coefficient of firm size is significantly positive across all models, aligning with the trade-off and pecking theories (Bevan & Danbolt, 2004; Antoniou et al., 2008; Chang et al., 2014). The tax shield is significant and positive across all models, consistent with Delcoure (2007), who argues that the non-debt tax shield may serve as a measure of asset securability, and firms with more securable assets tend to have higher leverage ratios. The coefficient on the GDP growth rate is significantly negative across all models in Table 2.6, suggesting that firms operating in faster-growing economic environments tend to rely less on debt, perhaps because more internal cash flow decreases the need for external financing. The average book leverage ratio is significantly positive across all models, suggesting that firms tend to use it as a benchmark for their leverage ratios. The results are consistent with Frank and Goyal (2009a) and Im et al. (2020). However, the industry leverage is insignificant across all models in Table 2.6, suggesting that country-level characteristics may be more important in leverage decisions among sample firms.

[Insert Table 2.6 here]

2.5.2 Results of Mediation Tests

2.5.2.1 The Corporate Investment Channel

One possible channel through which changes in EPU affect firms' financing mix is corporate investment. To examine the impact of EPU on corporate investment, we employ the system-GMM approach to estimate a group of dynamic models. First, we estimate Equation 2.2, in which the dependent variable (potential mediator) of these models is the capital expenditure ratio, while the explanatory variables are percentage changes in the contemporaneous and lagged EPU. We include control variables that indicate firm-level characteristics. They are growth opportunities, tangibility, firm size, earnings volatility, tax shields, payout ratio, changes in interest rates, and stock returns. The results in Panel A of Table 2.7 show that the one-year lagged capital expenditure ratio is significant across all regressions, suggesting that capital expenditure is persistent over time. The percentage changes in the three-month lagged EPU are significantly and negatively associated with the capital expenditure ratio. This suggests that firms tend to reduce their capital expenditure ratios following EPU increases, consistent with the predictions of the real option theory (Dixit & Pindyck, 1994; Bloom et al., 2007). The three-month delay seems plausible because firms need some time to reflect on changes in EPU and adjust their actual investments accordingly.

Second, Equation 2.3 is estimated with the book leverage ratio as the dependent variable, $\Delta\%EPU$ and its lags as explanatory variables, the capital expenditure ratio as the potential mediator, and control variables including growth opportunity, firm size, payout ratio, earnings volatility, stock returns, asset tangibility, tax rate, non-debt tax shield, changes in interest rates, industry- and country-average leverage ratios, regulatory quality, and year dummies. The results reported in Panel B of Table 2.7

show that the capital expenditure ratio is significantly and positively associated with the book leverage ratio in model (6), suggesting that increases in the capital expenditure are linked to increases in the book leverage ratio. However, the capital expenditure ratio is not significant in the remaining models in Panel B. In all models, the Hansen and serial correlation tests suggest that the instruments are valid. Taken together, although percentage changes in three-month lagged EPU can predict capital expenditure, capital expenditure is not significantly associated with the book leverage ratio when lagged Δ%EPU is included. This suggests that the condition for the mediation effect of corporate investment is not consistently met across lag specifications. Overall, the results indicate that Hypothesis $H_{2.2}$ receives limited empirical support.

[Insert Table 2.7 here]

2.5.2.2 The Profitability Channel

To examine whether EPU impacts firms' financing mix through its effect on firms' profitability, we conduct system-GMM regressions based on dynamic model 2.2. The dependent variable is profitability, and the explanatory variables are changes in the contemporaneous and lagged Δ%EPU. The regressions also control for variables such as firm size, growth opportunity, tax shield, tax rate, tangibility, changes in interest rate, GDP growth rate, and year dummies. Then, we estimate equation 2.3, in which the dependent variable is the book leverage ratio and the explanatory variables are percentage changes in the contemporaneous and lagged EPU. The models also include the potential mediator, profitability, and control variables, including growth opportunity, firm size, payout ratio, earnings volatility, stock returns, asset tangibility, tax rate, non-debt tax shield, changes in interest rates, industry- and country-average leverage ratios, regulatory quality, and year dummies.

The results in Panel A of Table 2.8 show that percentage changes in the three- and six-month lagged EPU are negatively and significantly correlated with profitability, whereas percentage changes in the contemporaneous EPU are significantly positive. This suggests that increases in EPU are associated with lower profitability after three- and six-month delays. The positive contemporaneous association may reflect either an immediate adjustment or the effect before firms' full responses to EPU changes.

The results in Panel B of Table 2.8 show that profitability is negatively and significantly associated with the book leverage ratio in model (8), consistent with the findings of Rajan and Zingales (1995). This suggests that the six-month lagged $\Delta\%$EPU is negatively associated with profitability, and profitability is negatively correlated with book leverage when including the six-month lagged $\Delta\%$ EPU. However, the mediation effect is not robust to contemporaneous and other $\Delta\%$EPU lag specifications. Therefore, profitability may be a transmission channel between EPU and the leverage ratio. However, the evidence is limited because the mediation effect is present only in the specification with the six-month lagged $\Delta\%$EPU and is not robust across $\Delta\%$EPU lags. In all models, the Hansen and serial correlation tests suggest that the instrument variables are valid. Overall, the empirical results show a mediating effect of profitability in the six-month lagged EPU specification, providing partial support for Hypothesis $H_{2.3}$.

[Insert Table 2.8 here]

2.5.2.3 Joint Mediation Effect of Investment and Profitability Channels

Profitability and investment channels may be correlated and jointly impact firms' leverage ratios. Therefore, we further examine whether profitability and investment can predict the leverage ratio when $\Delta\%$EPU and its lags are included in models. The results reported in Table 2.9 show that profitability is significantly negative in models

(2) and (3), whereas capital expenditure is not significantly correlated to the leverage ratio across all models. Compared with the results in Table 2.8, profitability becomes significant in the model that includes the three-month lagged Δ%EPU once capital expenditure is introduced. A possible explanation is that firms' investment decisions affect firms' performance and profitability, which in turn impact the leverage ratio. This provides additional and partial support for the profitability channel and Hypothesis $H_{2.3}$, while only limited evidence for the joint mediation effect.

[Insert Table 2.9 here]

2.5.2.4 Mediation Tests Summary

Taken together, comparing the results reported in Tables 2.7 to 2.9 with those in Table 2.6 shows that the coefficients on three-, six-, nine-, and 12-month lagged Δ%EPU remain significant, and generally unchanged after capital expenditure and profitability are included. This indicates a modest mediation effect of profitability because it does not substantially reduce the EPU-leverage effect. Additionally, although capital expenditure responds to percentage changes in the three-month lagged EPU, it does not predict the leverage ratio in the specification of three-month lagged Δ%EPU. Therefore, it has only a limited mediating effect jointly with profitability. The mediation tests suggest that the indirect effect only plays a secondary role in the effect of EPU on the leverage ratio. The empirical results provide partial support for Hypothesis $H_{2.3}$ and limited evidence for $H_{2.2}$. On the other hand, the limited role of investment and profitability channels suggests that EPU may directly affect firms' leverage ratios. One possible explanation is that an increase in EPU heightens managers' risk perception, leading to precautionary borrowing.

2.5.3 The Results on the Effect of EPU on the Term Structure of Leverage

2.5.3.1 The result on the Long-term Book Leverage ratio

Panel A of Table 2.10 presents the System-GMM estimation results of the effects of EPU and other control variables on the long-term book leverage ratio. The results show that the coefficients of the one-year lagged long-term book leverage ratio range from 0.545 to 0.586 and are significant across all models. This indicates that firms' long-term book leverage ratios are significantly impacted by their previous values. Percentage changes in six- and 12-month lagged EPU are significantly positively associated with long-term leverage ratios. On the contrary, percentage changes in the contemporaneous, three- and nine-month lagged EPU are insignificant relative to the long-term book leverage ratio. Thus, the results do not support Hypothesis $H_{2.4}$, which predicts no significant association between the long-term leverage ratio and changes in EPU, as the six- and 12-month lagged EPU are significantly positive. The results are partially consistent with those of Jumah et al. (2023), which suggest a positive relationship between the long-term leverage ratio and EPU. A possible explanation is that although short-term debt may alleviate debt overhang, it increases the risks of rollover (Diamond & He, 2014). When increases in EPU are sustained, firms may expect higher costs and less availability of continuous short-term rollovers. Additionally, when increases in EPU persist, decreases in profitability and investment exacerbate firms' default risks. Short-term borrowing increases firms' immediate repayment pressure. As a result, firms may turn to long-term debt to meet their external financing needs, and therefore, the long-term leverage ratio may increase after a delay in the rise of EPU. In addition, the interaction term between regulatory quality and 12-month lagged Δ%EPU is significantly negative but small in magnitude, suggesting that higher regulatory quality mitigates the positive effect of uncertainty on long-term book leverage. In contrast, interaction terms are insignificant in models (1) to (4) of Table 2.10.

2.5.3.2 The Results on The Short-term Leverage Ratio

Panel B of Table 2.10 presents the results of the system-GMM estimation on the relationship between $\Delta\%$EPU and the short-term book leverage ratio. This table suggests that the one-year lagged short-term book leverage ratio is significant across all models in Panel B, indicating that the previous short-term book leverage has a significant impact on future short-term book leverage. The coefficient on percentage changes in nine-month lagged EPU is positively and significantly associated with the short-term book leverage ratio. This suggests that an increase in the EPU is associated with a rise in contemporaneous short-term book leverage approximately nine months later. These results are partially consistent with Jumah et al. (2023), indicating a positive effect of EPU on the short-term book leverage ratio. However, percentage changes in contemporaneous, three-, six-, and 12-month lagged EPU are insignificant relative to short-term leverage ratios. Therefore, the empirical results provide limited evidence for Hypothesis $H_{2.5}$. The association is not robust across EPU lags, possibly because firms' rollover and short-term default risks are high when EPU increases, outweighing the benefits of reduced debt overhang associated with short-term borrowing. Moreover, the interaction terms between percentage changes in EPU (lagged EPU) and regulatory quality are insignificant across all models in Panel B of Table 2.10, indicating that regulatory quality has little impact on EPU's effect on short-term leverage ratios.

[Insert Table 2.10 here]

To sum up, the empirical results suggest that percentage changes in lagged EPU are positively associated with the long-term and short-term book leverage ratios. However, the results are sensitive to the selection of EPU lags. The results partially support Hypothesis $H_{2.4}$, but the support for $H_{2.5}$ is relatively weak.

2.5.4 The Results on Marginal Tests

To capture how the impact of EPU on the financing mix depends on regulatory environments, this chapter includes interaction terms of regulatory quality and $\Delta\%$EPU (or lagged $\Delta\%$EPU) in the system-GMM regressions. To interpret the interaction terms more accurately, we conduct marginal tests on interaction terms that are significant in system-GMM regressions. We define three representative levels of regulatory quality for marginal tests. The mean value of regulatory quality is 0.803, with a standard deviation of 10.869. Accordingly, we set 0.8, the approximate mean value, as the median regulatory quality level. We assign -10 (approximately one standard deviation below the mean) as the low level of regulatory quality, and 12 (approximately one standard deviation above the mean) as the high level of regulatory quality. The results of the marginal tests are presented in Table 2.11.

2.5.4.1 The Marginal Effect of EPU on the Book Leverage Ratio

The marginal effect results reported in Table 2.11 indicate that the marginal effect of the three-month lagged $\Delta\%$EPU on the book leverage ratio is insignificant at the low regulatory quality. However, it becomes positive and significant at the average and high regulatory levels. This suggests that a stronger regulatory environment can amplify the short-term positive effect of EPU on the book leverage ratio. A possible reason for this is that regulatory quality improves access to external finance, and firms tend to increase leverage to build a financial buffer in response to increases in EPU in the short term.

Conversely, the marginal effect of a 12-month lagged Δ%EPU on the book leverage ratio is significantly positive at the low and median regulatory quality levels, but insignificant at the high regulatory quality level. This suggests that a poorer regulatory environment can magnify the delayed positive effect of EPU on the book leverage ratio. A possible explanation is that firms face higher financial friction in a weaker regulatory environment and tend to rely more on debt for flexibility or preparing for future investment after prolonged periods of EPU.

2.5.4.2 The Marginal Effect of EPU on the Long-term Book Leverage Ratio

In regressions of the long-term book leverage ratio, the interaction term between regulatory quality and the 12-month lagged Δ%EPU is significant. As shown in Table 2.11, the marginal effects of the 12-month lagged Δ%EPU on the long-term book leverage ratio are significantly positive at low and medium regulatory levels, but the effects become smaller and insignificant at the high regulatory level. This suggests that a weaker regulatory environment amplifies the positive effect of the 12-month lagged Δ% EPU on the long-term leverage ratio. A possible explanation is that lower regulatory quality indicates higher financial friction, prompting firms to take on more long-term debt to hedge against the risks associated with prolonged EPU and prepare for future investment.

2.5.4.3 Summary on the Marginal Effect

Taken together, the marginal effect tests suggest that a weaker regulatory environment amplifies the long-term delayed positive effect of EPU on the aggregate and long-term book leverage ratios. On the other hand, the strong regulatory environment strengthens the more immediate positive effect of EPU on the book leverage ratio. However, given the small magnitude and limited number of statistically significant interaction terms, these results provide only supplementary evidence of the conditional effect of regulatory quality on the EPU-leverage relationship.

[Insert Table 2.11 here]

2.5.5 Results of Robustness Tests

2.5.5.1 Alternative Measure of Leverage

To test the robustness of the results, we examine the associations between EPU and alternative measures of financing mix: the market leverage ratio, as well as its short- and long-term components. The tests control for firm-level characteristics, country, and industry mean leverage ratios. The results of the system-GMM regressions are presented in Tables 2.12-2.13.

The results in Table 2.12 show that changes in the contemporaneous, three-, nine- and 12-month lagged Δ%EPU are significantly and positively associated with the market leverage ratio, consistent with the findings of Schwarz and Dalmácio (2021). This suggests that firms' market leverage ratios are likely to increase when the EPU rises. These results are broadly consistent with those on the book leverage ratio with respect to Δ%EPU, as both leverage measures show a general positive association with percentage changes in EPU. These findings suggest that the positive association between leverage ratio and Δ%EPU is robust to alternative measures of leverage, providing additional evidence for Hypothesis $H_{2.1.}$

[Insert Table 2.12 here]

Panel A of Table 2.13 presents the results of the system-GMM estimation of the long-term market leverage ratio with respect to percentage changes in the contemporaneous and lagged EPU. The table shows that percentage changes in contemporaneous and three-month lagged EPU are positively correlated with the long-term market leverage ratio. On the contrary, percentage changes in the six-, nine-, and 12-month lagged EPU are statistically insignificant. Taken together, the results of various $\Delta\%$EPU lags suggest that increases in EPU are associated with higher long-term market leverage only contemporaneously and shortly after EPU rises. Compared with the long-term book leverage ratio, the long-term market leverage ratio rises more promptly in response to increases in EPU. A possible reason is that market capitalisation adjusts more swiftly than the book value of assets, causing the long-term market leverage measure to react more quickly than the book leverage measure. The results are broadly consistent with the baseline regressions and reject Hypothesis $H_{2.4}$. Panel B of Table 2.13 reports the results of the system-GMM estimation of the short-term market leverage ratio in relation to $\Delta\%$EPU and control variables. The results show that percentage changes in the contemporaneous and three-month lagged EPU are positively and significantly associated with the short-term market leverage ratio. In contrast, percentage changes in six-, nine-, and 12-month lagged EPU are insignificant. Compared with the short-term book leverage ratio, the short-term market leverage ratio responds to changes in EPU with short delays. The results are broadly consistent with the baseline regressions, although the specific significant lag specifications differ. These results suggest that the relationship between the short-term leverage ratio and EPU is robust to alternative leverage measures, providing additional but partial support for Hypothesis $H_{2.5}$.

[Insert Table 2.13 here]

2.5.5.2 Controlling for the Global Financial Crisis and COVID-19

In the baseline regressions, we controlled for time fixed effects using year dummies. However, during the sample periods, firms experienced two worldwide economic shocks: the global financial crisis of 2007-2008 and the COVID-19 pandemic from 2020 to 2022[29]. To further examine whether the results are robust to these two shocks, we define two dummy variables. The dummy variable for the global financial crisis takes the value of 1 for 2007 and 2008 and 0 otherwise. The COVID-19 dummy takes the value of 1 for 2020, 2021, and 2022 and 0 otherwise. The control variables are the same as in Table 2.5, including firm-level characteristics, industry- and country-level mean leverage ratios, the interest rate, and regulatory quality as in the main tests discussed earlier. The results of estimating Equation 2.1, while including the global financial crisis and COVID-19, are presented in Tables 2.14-2.15.

Table 2.14 shows that, after controlling for the global financial crisis and COVID-19, percentage changes in the three-, six-, nine-, and 12-month lagged EPU are significantly and positively associated with the book leverage ratio. Conversely, the contemporaneous Δ%EPU is not significant. The coefficients on the global financial crisis and COVID-19 dummies are not significant in any models. Thus, the results of the baseline regressions reported in Table 2.5 are robust to controlling for the global financial crisis and COVID-19. This is possibly because the changes in EPU have already captured part of the economic implications of these global events.

[Insert Table 2.14 here]

Panel A of Table 2.15 reports the effects of EPU and its lags on the long-term book leverage ratio after controlling for the two economic shocks. It shows that percentage changes in the six- and 12-month lagged EPU are positively and significantly associated with the long-term book leverage ratio. However, the coefficients of the

[29] The COVID-19 pandemic period is set from 2020 to 2022 in the thesis. This is because the pandemic started in December 2019, and on 5 May 2023, the World Health Organisation recommended that it no longer met the definition of a public health emergency of international concern.

global financial crisis and COVID-19 are not significant in any of the models in Panel A. These results are consistent with those from the baseline regressions reported in Table 2.10, suggesting the relationship between the long-term book leverage and EPU is robust to the effects of the global financial crisis and COVID-19.

The results in Panel B of Table 2.15 show that percentage changes in the nine-month lagged EPU are significantly and positively associated with the short-term book leverage ratio, consistent with the baseline regression results reported in Table 2.11. However, as with total and long-term leverage, the coefficients for the global financial crisis and COVID-19 are not statistically significant. This further confirms that the relation between the short-term book leverage ratio and the EPU is robust to the effects of the global financial crisis and COVID-19.

[Insert Table 2.15 here]

To sum up, the results from the robustness tests provide further evidence that leverage ratios are positively associated with percentage changes in EPU and its lags. The positive associations are observed in both book and market leverage measures, as well as both their short- and long-term components. The results are robust after controlling for the 2007-2008 financial crisis and the COVID-19 pandemic.

2.6 Conclusions

This chapter investigated the impact of EPU on firms' financing mix using annual data of 1959 non-financial firms listed in France, Germany, Japan, the UK, and the US between 1999 and 2022. The empirical tests reveal the following findings. First, percentage changes in EPU are positively associated with firms' leverage ratios. The results hold after controlling for firm-level characteristics, country, industry, and regulatory quality. They are also robust to the alternative leverage measure (the market leverage ratio) and to the effects of the global financial crisis of 2007-08 and COVID-19.

Second, the results suggest a partial mediation effect of profitability. However, investment has only a limited joint mediating effect together with profitability. The mediation tests suggest that EPU primarily affects the leverage ratio directly, and the indirect effect plays a secondary role in the EPU-leverage relationship. Third, both long- and short-term leverage ratios are positively associated with percentage changes in lagged EPU, although the effects vary by the lag length. Once again, the results remain robust when controlled for the effects of the global financial crisis and COVID-19.

Finally, the effect of EPU on corporate leverage (financing mix) appears dependent on both timing (term) and regulatory conditions. A weaker regulatory environment can amplify the long-term delayed positive effect of EPU on the book leverage ratio and its long-term component. On the other hand, a strong regulatory environment is likely to strengthen a more near-term positive effect of EPU on the short-term book leverage ratio. However, given the small magnitude and limited number of statistically significant interaction terms between Δ%EPU and regulatory conditions, the evidence on the role of regulatory conditions should be interpreted with caution.

Table 2.1 Summary of Selected Studies on The Relationship between Firm-level Characteristics and Financing Mix

This table summarises the key studies on the effects of firm-level characteristics on financing mix.

Firm-level characteristics	The related theory (Sign)	Positive relation with leverage	Negative relation with leverage	Insignificant/heterogeneous relation with leverage
Tax rate	Trade-off theory (+)	Thies & Klock (1992); Homaifar et al. (1994); Panier et al. (2015); Devereux et al. (2018)	Taub (1975)	Insignificant: Titman & Wessels (1988)
Earnings volatility	Trade-off theory (-)	Bennett & Donnelly (1993).	Taub (1975); Delcoure (2007)	
Non-debt Tax shields	Trade-off theory (-)	Delcoure (2007)	Bennett & Donnelly (1993); De Miguel & Pindado (2001); Deesomsak et al. (2004); Huang and Song (2006)	Insignificant: Titman and Wessels (1988); Homaifar et al. (1994); Michaelas et al. (1999):
Profitability	Trade-off theory (+) Agency theory (+) Pecking order theory (-)	Mayer & Sussman (2004); Frank & Goyal, (2009b)	Titman & Wessels (1988); Rajan & Zingales (1995); Öztekin (2015); Zeng et al. (2022)	
Firm size	Trade-off theory (+) Pecking order theory (+)	Taub (1975); Bevan & Danbolt (2004); Antoniou et al. (2008); Chang et al. (2014)	On short-term debt: Titman & Wessels (1988)	Positively related to the market value of the debt ratio, but not the book value: Chen and Strange (2005); Both positive and negative relationships with the debt ratio across size intervals: Talberg et al. (2008)

Growth opportunity	Agency theory (-) Market timing (-)	Michaelas et al. (1999)	Frank & Goyal (2009a); Rajan & Zingales (1995); Bevan & Danbolt (2004); Antoniou et al. (2008)	
Tangible asset ratio	Trade-off theory (+)	Michaelas et al. (1999); Frank & Goyal (2009a); Delcoure (2007); Antoniou et al. (2008); Chang et al. (2014); Öztekin (2015); Lim et al. (2020)		Insignificant: Titman & Wessels (1988); Ghosh et al. (2000); Chen and Strange (2005)
Payout ratio	Pecking order theory(+) Agency theory(-)		Frank & Goyal (2009a); Panier et al. (2015)	
Stock returns	Market timing (-)		Deesomsak et al.(2004); Welch (2004); Antoniou et al. 2008	
Capital expenditure ratio	Pecking order theory; trade-off (+) Agency theory (-)	De Miguel & Pindado (2001)		Positive with book leverage ratio and negative with market leverage: Frank & Goyal (2009a); Mixed: Mogha & Williams (2021)
Industry		Michaelas et al. (1999); Talberg et al. (2008); Frank & Goyal (2009a); Öztekin (2015); Islam & Khandaker (2015); Chang et al. (2014); Zeng et al. (2022)		

Table 2.2 Summary of Empirical Studies on EPU and Financing Mix

This table summarises the key studies on the effect of EPU on corporate financing mix decisions.

Study	Country / Sample	Period	Methodology	Mechanism / Explanation	Main Findings
Zhang et al. (2015)	2,038 Chinese listed firms	2003–2013	Fixed-effects (FE) OLS; 2SLS	Higher EPU increases information asymmetry and default risk, which increases financing costs and reduces firms' demand for debt.	EPU negatively affects market leverage
Chow et al. (2018)	907 firms from seven Asia-Pacific countries	2004–2014	System-GMM	Firms reduce debt usage under macroeconomic uncertainty; governance strengthens this effect.	EPU negatively affects book leverage
Li & Qiu (2021)	5,360 US firms (NYSE, NASDAQ, NYSE MKT)	1985–2015	Dynamic panel (GTS, LD estimators)	Higher EPU increases cash-flow volatility and decreases investment opportunities.	EPU negatively affects both book and market leverage
Aftab et al. (2023)	323 Pakistani firms	2015–2020	GMM	Managers become cautious under uncertainty	EPU negatively affects book leverage but increases adjustment speed
Asimakopoulos et al. (2023)	15,960 US firms	1986–2020	Dynamic panel model	Financing supply declines under high EPU; ESG mitigates the effect	EPU negatively affects leverage
Granville et al. (2019)	16,882 Russian firms	2000–2017	Pooled OLS; FE; random-effect;	Both credit supply and financing demand decline under uncertainty	EPU negatively affects book and debt maturity leverage
Khan et al. (2020)	Chinese listed firms	1999–2016	System-GMM	Demand and supply channels; trade credit mitigates the effect	EPU negatively affects book leverage
Almustafa et al. (2023)	1,072 US firms	2012–2021	Dynamic FE; OLS	Reduced investment demand and higher borrowing costs	EPU negatively affects book and market leverage

Athari & Bahreini (2023)	92 European travel and leisure firms	2005–2019	FE OLS; GMM	Higher distress risk increases financial costs and asset returns, decreasing the demand for debt and the credit supply.	EPU negatively affects leverage ratios
Im et al. (2020)	1,455 US firms (NYSE, NASDAQ, and AMEX)	2003–2018	System-GMM; LSDVC; OLS	Four channels: the debt tax shield, the potential financial distress costs, the debtholder-shareholder agency problems, and the agency benefits of debt	EPU reduces target leverage ratios
Li & Qiu (2023)	2,690 Chinese firms	2003–2018	Two-stage model; partial adjustment model	Equity market channel via policy-risk-induced equity returns	EPU shocks reduce leverage targets
Schwarz & Dalmácio (2021)	163 Brazilian firms	2010–2019	OLS; IV estimation	Equity financing becomes more difficult under EPU	EPU positively affects leverage
Bajaj et al. (2021)	Indian NSE500 firms	2009–2016	Partial adjustment model; OLS; GMM	Equity becomes more expensive than debt during uncertainty	EPU positively affects leverage
Jumah et al. (2023)	2,534 US firms	1995–2018	Stepwise regression	Cash-holding precautionary motive	EPU positively affects leverage via cash holdings
Makololo & Seetharam (2020).	BRICS firms	2002–2017	OLS; GMM	Herding behaviour in leverage decisions	EPU decreases leverage in Brazil, Russia, and South Africa but increases leverage in China and India

Table 2.3 Variable Definitions

This table lists the definitions of all variables used in this chapter.

Variables	Period	Frequency	Definitions
Dependent variables			
Book leverage ratio	1999-2022	Annual	The ratio of the book value of total debt to the book value of total assets.
Long-term book leverage ratio	1999-2022	Annual	The ratio of long-term debt to the book value of total assets, where the long-term debt excludes the current portion of long-term debt
Short-term book leverage ratio	1999-2022	Annual	The ratio of short-term debt to the book value of total assets, where the short-term debt includes the current portion of long-term debt.
Market leverage ratio	1999-2022	Annual	The ratio of the book value of total debt to the sum of market capitalisation and total debt.
Long-term market leverage ratio	1999-2022	Annual	The ratio of long-term debt to the sum of market capitalisation and total debt, where the long-term debt excludes the current portion of long-term debt
Short-term market leverage ratio	1999-2022	Annual	The ratio of short-term debt to the sum of market capitalisation and total debt, where the short-term debt includes the current portion of long-term debt.
Explanatory variables			
Δ%EPU	1999-2022	Annual	Annual percentage changes in the BBD index between fiscal years.
Three-month lagged Δ%EPU	1999-2022	Annual	Annual percentage changes in the BBD index match a three-month lag of the fiscal ending date.
Six-month lagged Δ%EPU	1999-2022	Annual	Annual percentage changes in the BBD index match a six-month lag of the fiscal ending date.
Nine-month lagged Δ%EPU	1999-2022	Annual	Annual percentage changes in the BBD index match a nine-month lag of the fiscal ending date.
12-month lagged Δ%EPU	1999-2022	Annual	Annual percentage changes in the BBD index match a twelve-month lag of the fiscal ending date.
Control variables			
Profitability	1999-2022	Annual	The percentage ratio of operating income to the book value of total assets.
Growth opportunity	1999-2022	Annual	The ratio of the market value of the ordinary equity divided by the balance sheet value of ordinary equity.
Tangibility	1999-2022	Annual	The percentage ratio of net tangible assets to total assets.

Firm size	1999-2022	Annual	Natural logarithm of asset (the proxy of firm size).
Effective tax rate	1999-2022	Annual	The percentage of total tax to earnings before interest and taxes (EBIT) minus interest expense.
Earnings volatility	1999-2022	Annual	The percentage changes of earnings before interest, tax, and depreciation minus the average percentage changes of earnings before interest, taxes, depreciation, and amortisation (EBITDA).
Payout ratio	1999-2022	Annual	The percentage ratio of the common dividend to the net income available to the common share.
Tax shields	1999-2022	Annual	The ratio of depreciation to total assets.
Stock returns	1999-2022	Annual	Six-month lagged natural logarithm changes in share price match the fiscal year-end date.
Capital expenditure ratio	1999-2022	Annual	The ratio of capital expenditures to last year's total assets.
Changes in interest rate	1999-2022	Annual	The first difference in the three-month treasury bill yield matches the fiscal year-end date with a six-month lag.
Industry book leverage ratio	1999-2022	Annual	The average book leverage of firms in the industry (excluding firm i) classified by the first SIC code.
Industry market leverage ratio	1999-2022	Annual	The average market leverage of firms in the industry (excluding firm i), classified by the first SIC code.
Industry long-term book leverage ratio	1999-2022	Annual	The average long-term book leverage of firms in the industry (excluding firm i) classified by the first SIC code.
Industry long-term market leverage ratio	1999-2022	Annual	The average long-term market leverage of firms in the industry (excluding firm i) classified by the first SIC code.
Industry short-term book leverage ratio	1999-2022	Annual	The average short-term book leverage of firms in the industry (excluding firm i) classified by the first SIC code.
Industry short-term market leverage ratio	1999-2022	Annual	The average short-term market leverage of firms in the industry (excluding firm i) classified by the first SIC code.
Country book leverage ratio	1999-2022	Annual	The average book leverage of firms (excluding firm i) in the country.
Country market leverage ratio	1999-2022	Annual	The average market leverage of firms (excluding firm i) in the country.
Country long-term book leverage ratio	1999-2022	Annual	The average long-term book leverage of firms (excluding firm i) in the country.
Country long-term market leverage ratio	1999-2022	Annual	The average long-term market leverage of firms (excluding firm i) in the country.

Country short-term book leverage ratio	1999-2022	Annual	The average short-term book leverage of firms (excluding firm i) in the country.
Country short-term market leverage ratio	1999-2022	Annual	The average short-term market leverage of firms (excluding firm i) in the country.
Regularity quality	1999-2022	Annual	Annual percentage changes of the regularity quality indicator.
GDP Growth	1999-2022	Annual	The percentage GDP growth rate
Dummy Variables			
Global financial crisis	1999-2022	Annual	The dummy variable for the global financial crisis from 2007 to 2008. It is 1 for 2007 and 2008, and is 0 otherwise
COVID-19	1999-2022	Annual	The dummy variable for COVID-19 from 2020 to 2022. It is 1 for 2020, 2021, and 2022, and is 0 otherwise

Table 2.4 Descriptive Statistics

See Table 2.3 for variable definitions. This table presents descriptive statistics of variables based on firms' data from France, Germany, Japan, the UK, and the US.

Variables	Observation	Mean	Std. dev.	Min	Max
Book leverage ratio	36349	25.539	69.728	0.000	12655.770
Short-term book leverage ratio	36033	6.300	10.208	0.000	908.333
Long-term book leverage ratio	36306	19.297	68.719	0.000	12589.100
Market leverage ratio	35149	25.332	21.789	0.000	99.937
Short-term market leverage ratio	25353	8.120	11.520	0.000	98.447
Long-term market leverage ratio	25480	18.919	16.941	0.000	99.788
Δ%EPU	35945	14.237	55.627	-86.552	548.015
Three-month lagged Δ%EPU	35801	17.675	72.033	-84.469	392.288
Six-month lagged Δ%EPU	35731	14.834	57.340	-86.552	708.437
Nine-month lagged Δ%EPU	35672	17.242	59.577	-84.469	548.015
Profitability	36367	6.842	18.299	-1322.989	211.662
Growth opportunity	42981	3.321	47.005	-2068.800	4560.530
Tangibility	36325	41.278	134.950	-7455.799	18397.440
Firm size	36377	14.914	3.142	3.332	24.933
Effective tax rate	35805	22.184	449.563	-53670.000	33033.330
Earnings volatility	35257	-1.295	1680.481	-90783.470	151783.900
Payout ratio	36135	50.741	2256.221	-36208.510	366900.000
Tax shield	32442	3.419	2.717	-0.192	77.592
Stock return	34244	226.978	4648.642	-765.741	726874.800
Capital expenditure ratio	35590	6.659	263.064	-41.800	49123.730
Changes in interest rate	35945	-0.189	1.069	-4.770	3.460
Industry book leverage ratio	36342	25.531	5.472	0.000	69.582
Industry market leverage ratio	35142	25.320	5.121	0.000	80.539

Industry long-term book leverage ratio	36299	19.297	5.697	0.000	58.144
Industry long-term market leverage ratio	25444	18.905	5.035	0.000	37.529
Industry short-term book leverage ratio	36025	6.293	1.328	0.000	42.958
Industry short-term market leverage ratio	25316	8.115	1.963	0.000	49.183
Country book leverage ratio	36350	25.540	4.630	19.888	46.545
Country market leverage ratio	35150	24.561	6.974	15.190	46.237
Country long-term book leverage ratio	36307	19.298	5.139	10.620	39.920
Country long-term market leverage ratio	25481	18.919	3.431	12.251	26.593
Country short-term book leverage ratio	36033	6.300	2.967	2.322	16.708
Country short-term market leverage ratio	25353	8.120	5.278	1.452	21.455
Regulatory quality	47015	0.803	10.869	-23.363	116.006
GDP growth	47015	1.684	2.639	-10.360	8.675

Table 2.5 Correlation Coefficients Matrix

This table presents the Pearson correlation coefficient matrix of dependent, explanatory, and other key variables. The correlation coefficients for control variables are not reported for brevity. BL = Book leverage ratio; LBL = Long-term book leverage ratio; SBL = Short-term book leverage ratio; ML = Market leverage ratio; SML = Short-term market leverage ratio; LML = Long-term market leverage ratio; EPU = Δ%EPU; EPU_L3, EPU_L6, EPU_L9, and PU_L12 = three-, six-, nine-, and 12-month lagged Δ%EPU, respectively; PROF = Profitability; REGQ = Regulatory quality; CAPX=Capital expenditure; FS= Firm size; TSH=Tax shield; STR= Stock return; Tan=Tangibility. See Table 2.3 for variable definitions. The table presents Pearson correlation coefficients computed using a balanced sample obtained via listwise deletion (complete-case observations). ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively.

Variables	BL	SBL	LBL	ML	SML	LML	EPU	EPU-L3	EPU-L6	EPU-L9	EPU-L12	PROF	TAN	FS	TSH	STR	CAPX	REGQ
BL	1.000																	
SBL	0.491***	1.000																
LBL	0.869***	-0.004	1.000															
ML	0.596***	0.427***	0.441***	1.000														
SML	0.284***	0.703***	-0.073***	0.671***	1.000													
LML	0.595***	0.093***	0.630***	0.869***	0.216***	1.000												
EPU	-0.012	0.005***	-0.017**	0.015***	0.016***	0.009	1.000											
EPU-L3	-0.002	-0.009**	0.003	0.011***	0.001***	0.015*	0.273***	1.000										
EPU-L6	-0.003	0.007	-0.007	0.050***	0.042***	0.038***	0.209***	0.123***	1.000									
EPU-L9	0.016**	0.011	0.011*	0.042***	0.028***	0.037***	0.059***	0.129***	0.196***	1.000								
EPU-L12	0.001	0.011	0.005	0.050***	0.037***	0.042***	-0.323***	0.150***	0.171***	0.347***	1.000							
PROF	-0.081***	-0.110***	-0.031***	-0.235***	-0.202***	-0.175***	0.001	-0.017**	-0.027***	-0.032***	-0.026***	1.000						
TAN	-0.320***	-0.168***	-0.271***	-0.223***	-0.122	-0.212***	-0.009	-0.033***	-0.012	-0.013**	-0.008	0.635***	1.000					
FS	0.104***	0.076***	0.076***	0.204***	0.113***	0.192***	-0.076***	-0.103***	-0.095***	-0.062***	-0.037***	0.088***	0.014	1.000				
TSH	0.121***	0.090***	0.088***	0.175***	0.119***	0.150***	-0.005	0.013***	0.019***	0.032***	0.022***	-0.119***	-0.073***	0.094***	1.000			
STR	-0.078***	-0.086***	-0.041***	-0.221***	-0.162***	-0.183***	-0.008***	0.003	-0.200***	-0.159***	-0.120***	0.187***	0.061***	0.035***	-0.112***	1.000		
CAPX	0.044***	0.009	0.045***	0.027	-0.011*	0.043***	0.022***	0.026***	-0.003	-0.007	-0.010	-0.012	-0.066***	0.007	0.427***	0.049***	1.000	
REGQ	0.026***	0.083***	-0.017*	0.072***	0.115***	0.019***	-0.049***	-0.109	-0.091***	0.014***	-0.039***	-0.026***	-0.004	0.078***	0.049***	0.069***	0.000	1.000

Table 2.6 System-GMM Estimation of Δ%EPU on Book Leverage

This table presents the System-GMM regression results for the book leverage ratio, including explanatory and control variables. The interaction terms of regulatory quality and EPU include those of regulatory quality and Δ%EPU, as well as lagged Δ%EPU at three-, six-, nine-, and 12-month intervals (lag=0, 3, 6, 9, 12), which match the explanatory variables in the regressions. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. The regressions control for both countries' average leverage ratio and country-level regulatory quality. The reason for this is that the country's average leverage ratio reflects the firms' capital structure characteristics of a specific country, while the regulatory quality proxies the ability of a country's government to implement policy. These two variables are not highly correlated; there is no multilinearity issue. See Table 2.3 for variable definitions.

Explanatory and control variables	Dependent variable: Book leverage ratio$_{i,t}$				
	(1)	(2)	(3)	(4)	(5)
Book leverage ratio$_{i,t-1}$	0.408***	0.412***	0.413***	0.413***	0.410***
	(0.103)	(0.102)	(0.104)	(0.102)	(0.104)
Δ%EPU$_{i,t}$	0.000				
	(0.002)				
Three-month lagged Δ%EPU$_{i,t}$		0.002*			
		(0.001)			
Six-month lagged Δ%EPU$_{i,t}$			0.004***		
			(0.002)		
Nine-month lagged Δ%EPU$_{i,t}$				0.005***	
				(0.003)	
12-month lagged Δ%EPU$_{i,t}$					0.005***
					(0.001)
Regulatory quality$_{i,t}$	-0.001	0.001	0.003	0.005	-0.003
	(0.008)	(0.007)	(0.007)	(0.006)	(0.008)
Regulatory quality$_{i,t}$×Δ%EPU$_{i,t-lag}$	0.000	0.000**	-1.865e-4	-4.118e-4	-0.473e-3*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Growth opportunity$_{i,t}$	0.011	0.011	0.012	0.007	0.013
	(0.026)	(0.027)	(0.026)	(0.029)	(0.030)
Tangible asset ratio$_{i,t}$	-0.273***	-0.276***	-0.273**	-0.265***	-0.270***
	(0.092)	(0.091)	(0.091)	(0.093)	(0.092)
Firm size$_{i,t}$	2.203*	2.218*	2.449*	2.246*	2.269*
	(1.238)	(1.273)	(1.263)	(1.312)	(1.247)
Tax rate$_{i,t}$	-0.022	-0.022	-0.021	-0.025	-0.018
	(0.019)	(0.019)	(0.018)	(0.019)	(0.019)
Earnings volatility$_{i,t}$	0.000	0.000	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tax shields$_{i,t}$	0.455**	0.460**	0.474**	0.419**	0.463**
	(0.197)	(0.198)	(0.187)	(0.192)	(0.202)
Stock returns$_{i,t}$	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Changes in Interest rate$_{i,t}$	-0.387	-0.399	-0.720	-0.184	-0.338
	(0.657)	(0.688)	(0.744)	(0.677)	(0.642)
Payout ratio$_{i,t}$	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

GDP growth rate	-1.102**	-1.164**	-1.259**	-1.059*	-1.140**
	(0.530)	(0.551)	(0.525)	(0.592)	(0.529)
Industry book leverage ratio$_{i,t}$	0.112	0.102	0.103	0.045	0.115
	(0.111)	(0.114)	(0.111)	(0.118)	(0.103)
Country book leverage ratio$_{i,t}$	0.288**	0.280**	0.264***	0.311***	0.271**
	(0.117)	(0.125)	(0.123)	(0.123)	(0.118)
Constant	-14.283	-13.760	-28.037	-14.401	-4.126
	(15.013)	(15.246)	(17.914)	(15.856)	(45.962)
Hansen (P-value)	0.295	0.290	0.298	0.265	0.218
Correlation 1 (P-value)	0.006	0.006	0.005	0.009	0.005
Correlation 2 (P-value)	0.124	0.120	0.121	0.122	0.122
Wald test (P-value)	0.000	0.000	0.000	0.000	0.000
Firms	1952	1952	1952	1952	1952
Observations	29930	29792	29724	29671	29402
Number of instruments	82	82	82	82	82
Time effect	Controlled	Controlled	Controlled	Controlled	Controlled

Table 2.7 Mediation Analysis of the Investment Channel

This table presents the system-GMM regression results for the Baron and Kenny (1986) mediation tests on capital expenditure. The control variables in Panel A include growth opportunity, tangibility, firm size, tax shields, earnings volatility, changes in interest rates, stock returns, and payout ratio. The control variables in Panel B are growth opportunity, tangibility, earnings volatility, firm size, tax shields, changes in interest rates, payout ratio, stock returns, GDP, the average industry and country leverage ratios, regulatory quality, and interaction terms between Δ%EPU and regulatory quality. They are not reported for brevity. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. See Table 2.3 for variable definitions. The regressions in Panel A do not control for time effects because the Hansen test strongly rejects the time fixed effects, indicating redundant instruments when year dummies are included.

Panel A: The Effect of Δ%EPU on Capital Expenditure

Explanatory and control variables	Dependent variable: Capital expenditure ratio$_{i,t}$				
	(1)	(2)	(3)	(4)	(5)
Capital expenditure ratio$_{i,t-1}$	0.509***	0.506***	0.513***	0.405***	0.499***
	(0.126)	(0.125)	(0.128)	(0.127)	(0.136)
Δ%EPU$_{i,t}$	0.000				
	(0.000)				
Three-month lagged Δ%EPU$_{i,t}$		-0.001**			
		(0.000)			
Six-month lagged Δ%EPU$_{i,t}$			0.000		
			(0.001)		
Nine-month lagged Δ%EPU$_{i,t}$				0.000	
				(0.000)	
12-month lagged Δ%EPU$_{i,t}$					0.000
					(0.000)
Constant	-3.907	-4.850	-5.534	-7.569	-7.470
	(4.175)	(4.361)	(4.298)	(3.543)	(3.703)
Control variables	Yes	Yes	Yes	Yes	Yes
Hansen (P-value)	0.183	0.105	0.118	0.199	0.228
Correlation 1 (P-value)	0.000	0.000	0.001	0.001	0.000
Correlation 2 (P-value)	0.807	0.945	0.758	0.744	0.876
Wald test (P-Value)	0.000	0.000	0.000	0.000	0.000
Firms	1952	1952	1952	1952	1952
Observations	29660	29525	29457	29404	29212
Number of instruments	15	15	15	14	14

Panel B: The Effect of Δ%EPU and Capital Expenditure on Book Leverage

Explanatory and control variables	Dependent variable: Book leverage ratio$_{i,t}$				
	(6)	(7)	(8)	(9)	(10)
Book leverage ratio$_{i,t-1}$	0.298**	0.374***	0.376***	0.437***	0.378***
	(0.150)	(0.126)	(0.124)	(0.147)	(0.125)
Δ%EPU $_{i,t}$	-0.001				
	(0.003)				
Three-month lagged Δ%EPU$_{i,t}$		0.002**			
		(0.001)			

Six-month lagged $\Delta\%EPU_{i,t}$			0.003**		
			(0.001)		
Nine-month lagged $\Delta\%EPU_{i,t}$				0.005**	
				(0.002)	
12-month lagged $\Delta\%EPU_{i,t}$					0.009***
					(0.002)
Capital expenditure $ratio_{i,t}$	0.876***	0.074	0.077	0.442	0.024
	(0.292)	(0.215)	(0.209)	(0.291)	(0.250)
Constant	-9.195	57.401**	58.278**	-35.539	59.501**
	(54.786)	(23.462)	(23.634)	(52.231)	(27.500)
Control variables	Yes	Yes	Yes	Yes	Yes
Hansen (P-value)	0.495	0.257	0.253	0.257	0.284
Correlation 1 (P-value)	0.015	0.002	0.002	0.007	0.002
Correlation 2 (P-value)	0.235	0.224	0.220	0.230	0.231
Wald test (P-Value)	0.000	0.000	0.000	0.000	0.000
Firms	1952	1952	1952	1952	1952
Observations	29819	29681	29613	29560	29292
Number of instruments	75	86	86	88	87
Time effect	Controlled	Controlled	Controlled	Controlled	Controlled

Table 2.8 Mediation Analysis of the Profitability Channel

This table presents the system-GMM regression results for Baron and Kenny's (1986) mediation tests on profitability. The control variables in panel A include growth opportunities, tangibility, firm size, tax shields, changes in the interest rate, the tax rate, and GDP. The control variables in Panel B are growth opportunity, tangibility, earnings volatility, firm size, tax shields, changes in interest rates, payout ratio, stock returns, GDP, the average industry and country leverage ratios, regulatory quality, and interaction terms between Δ%EPU and regulatory quality. They are not reported for brevity. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. See Table 2.3 for variable definitions.

Panel A: The Effect of Δ%EPU on Profitability

Explanatory and control variables	Dependent variable: $Profitability_{i,t}$				
	(1)	(2)	(3)	(4)	(5)
$Profitability_{i,t-1}$	0.602***	0.597***	0.604***	0.605***	0.602***
	(0.151)	(0.152)	(0.147)	(0.146)	(0.147)
$\Delta\%EPU_{i,t}$	0.003**				
	(0.001)				
Three-month lagged $\Delta\%EPU_{i,t}$		-0.002**			
		(0.001)			
Six-month lagged $\Delta\%EPU_{i,t}$			-0.002**		
			(0.001)		
Nine-month lagged $\Delta\%EPU_{i,t}$				-0.001	
				(0.001)	
12-month lagged $\Delta\%EPU_{i,t}$					-0.002
					(0.001)
Constant	-15.832	-17.067	-16.805	-17.909	-18.167
	(12.734)	(13.133)	(12.858)	(12.828)	(12.501)
Control variables	Yes	Yes	Yes	Yes	Yes
Hansen (P-value)	0.394	0.366	0.380	0.384	0.411
Correlation 1 (P-value)	0.000	0.000	0.000	0.000	0.000
Correlation 2 (P-value)	0.591	0.609	0.593	0.592	0.566
Wald test (P-Value)	0.000	0.000	0.000	0.000	0.000
Firms	1952	1952	1952	1952	1952
Observations	30469	30330	30262	30209	29927
Number of instruments	61	61	63	63	63
Time effect	Controlled	Controlled	Controlled	Controlled	Controlled

Panel B: The Effect of Δ%EPU and Profitability on Book Leverage

	Dependent variable: Book leverage $ratio_{i,t}$				
Explanatory and control variables	(6)	(7)	(8)	(9)	(10)
Book leverage $ratio_{i,t-1}$	0.316**	0.238*	0.327***	0.509***	0.503***
	(0.130)	(0.138)	(0.126)	(0.137)	(0.148)
$\Delta\%EPU_{i,t}$	-0.003				
	(0.003)				
Three-month lagged $\Delta\%EPU_{i,t}$		0.002*			
		(0.001)			

Six-month lagged $\Delta\%EPU_{i,t}$			0.003*		
			(0.002)		
Nine-month lagged $\Delta\%EPU_{i,t}$				0.005*	
				(0.003)	
12-month lagged $\Delta\%EPU_{i,t}$					0.006***
					(0.002)
$Profitability_{i,t}$	0.007	-0.338	-0.355*	0.024	0.116
	(0.179)	(0.217)	(0.198)	(0.190)	(0.232)
Constant	46.060	54.828*	83.177***	17.048	38.125
	(32.379)	(31.703)	(27.630)	(32.850)	(39.854)
Control variables	Yes	Yes	Yes	Yes	Yes
Hansen (P-value)	0.286	0.154	0.400	0.327	0.280
Correlation 1 (P-value)	0.003	0.003	0.002	0.008	0.008
Correlation 2 (P-value)	0.247	0.260	0.242	0.224	0.232
Wald test (P-Value)	0.000	0.000	0.000	0.000	0.000
Firms	1,952	1,952	1,952	1,952	1,952
Observations	29,930	29,792	29,724	29,671	29,402
Number of instruments	76	67	70	87	82
Time effect	Controlled	Controlled	Controlled	Controlled	Controlled

Table 2.9 Joint Mediation Analysis of Investment and Profitability

This table presents the system-GMM regression results for the mediation test for both profitability and investment. Control variables include growth opportunity, tangibility, earnings volatility, firm size, tax shields, changes in interest rates, payout ratio, stock returns, regulatory quality, the average industry and country leverage ratios, and interaction terms between Δ%EPU and regulatory quality. They are not reported for brevity. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. See Table 2.3 for variable definitions.

Explanatory and control variables	Dependent variable: Book leverage ratio$_{i,t}$				
	(1)	(2)	(3)	(4)	(5)
Book leverage ratio$_{i,t-1}$	0.631***	0.511***	0.512***	0.357***	0.398**
	(0.086)	(0.119)	(0.120)	(0.112)	(0.159)
Δ%EPU$_{i,t}$	-0.001				
	(0.004)				
Three-month lagged Δ%EPU$_{i,t}$		0.002*			
		(0.001)			
Six-month lagged Δ%EPU$_{i,t}$			0.003*		
			(0.001)		
Nine-month lagged Δ%EPU$_{i,t}$				0.005***	
				(0.002)	
12-month lagged Δ%EPU$_{i,t}$					0.010***
					(0.003)
Capital expenditure ratio$_{i,t}$	0.023	0.499	0.500	0.754	0.164
	(0.231)	(0.327)	(0.330)	(0.233)	(0.490)
Profitability$_{i,t}$	-0.104	-0.215*	-0.220*	-0.217	-0.259
	(0.167)	(0.121)	(0.123)	(0.155)	(0.198)
Constant	-4.950	33.484*	42.341*	-10.820	43.597
	(33.726)	(20.224)	(23.497)	(27.313)	(34.035)
Control variables	Yes	Yes	Yes	Yes	Yes
Hansen (P-value)	0.468	0.466	0.456	0.316	0.396
Correlation 1 (P-value)	0.015	0.004	0.004	0.002	0.003
Correlation 2 (P-value)	0.208	0.163	0.163	0.186	0.234
Wald test (P-value)	0.000	0.000	0.000	0.000	0.000
Firms	1,952	1,952	1,952	1,952	1,952
Observations	29,819	29,681	29,613	29,560	29,292
Number of instruments	94	117	117	96	78
Time effect	Controlled	Controlled	Controlled	Controlled	Controlled

Table 2.10 System-GMM Estimation of Δ%EPU on Long- and Short-term Book Leverage Ratio

This table presents the system-GMM regression results for the long-term and short-term book leverage ratios, including explanatory and control variables. Control variables include growth opportunity, tangibility, earnings volatility, firm size, tax shields, changes in interest rates, payout ratio, stock returns, regulatory quality, the average industry and country long-term leverage ratios, and interaction terms between EPU and regulatory quality. They are not reported for brevity. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. See Table 2.3 for variable definitions.

Panel A: Long-term Book Leverage Ratio

Explanatory and control variables	Dependent variable: Long-term book leverage ratio$_{i,t}$				
	(1)	(2)	(3)	(4)	(5)
Long-term book leverage ratio$_{i,t-1}$	0.552***	0.586***	0.552***	0.545***	0.552***
	(0.117)	(0.135)	(0.126)	(0.129)	(0.126)
Δ%EPU$_{i,t}$	-0.003				
	(0.002)				
Three-month lagged Δ%EPU$_{i,t}$		0.002			
		(0.001)			
Six-month lagged Δ%EPU$_{i,t}$			0.005***		
			(0.002)		
Nine-month lagged Δ%EPU$_{i,t}$				0.001	
				(0.002)	
12-month lagged Δ%EPU$_{i,t}$					0.005***
					(0.002)
Regulatory quality$_{i,t}$×Δ%EPU$_{i,t\text{-lag}}$	0.000	0.000	0.000	0.000	-0.405e-3**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-5.608	-7.012	-6.837	-4.204	-5.101
	(13.436)	(13.282)	(17.673)	(15.804)	(13.817)
Control Variable	Yes	Yes	Yes	Yes	Yes
Hansen (P-value)	0.286	0.322	0.292	0.336	0.320
Correlation 1 (P-value)	0.002	0.003	0.002	0.002	0.002
Correlation 2 (P-value)	0.153	0.121	0.156	0.158	0.148
Wald test (P-value)	0.000	0.000	0.000	0.000	0.000
Firms	1952	1952	1952	1952	1952
Observations	29900	29762	29694	29641	29373
Number of instruments	75	70	75	75	75
Time effect	Controlled	Controlled	Controlled	Controlled	Controlled

Panel B: Short-term Book Leverage Ratio

Explanatory and control variables	Dependent variable: Short-term book leverage ratio$_{i,t}$				
	(6)	(7)	(8)	(9)	(10)
Short-term Book leverage ratio$_{i,t-1}$	0.376***	0.391***	0.364***	0.372***	0.370***
	(0.138)	(0.149)	(0.134)	(0.116)	(0.133)
Δ%EPU$_{i,t}$	0.000				
	(0.002)				

Three-month lagged $\Delta\%EPU_{i,t}$		0.001			
		(0.001)			
Six-month lagged $\Delta\%EPU_{i,t}$			0.001		
			(0.001)		
Nine-month lagged $\Delta\%EPU_{i,t}$				0.004**	
				(0.002)	
12-month lagged $\Delta\%EPU_{i,t}$					0.002
					(0.002)
Regulatory quality$_{i,t}$×$\Delta\%EPU_{i,t-lag}$	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	27.381	29.813*	29.288*	32.430**	33.556**
	(17.309)	(17.054)	(16.881)	(15.032)	(15.948)
Control variables	Yes	Yes	Yes	Yes	Yes
Hansen (P-value)	0.431	0.471	0.365	0.235	0.304
Correlation 1 (P-value)	0.011	0.010	0.007	0.011	0.008
Correlation 2 (P-value)	0.117	0.110	0.127	0.111	0.119
Wald test (P-value)	0.000	0.000	0.000	0.000	0.000
Firms	1,951	1,951	1,951	1,951	1,951
Observations	29,696	29,559	29,491	29,438	29,173
Number of instruments	73	73	72	71	72
Time effect	Controlled	Controlled	Controlled	Controlled	Controlled

Table 2.11 The Marginal Effects of Δ%EPU on Leverage Ratios at Different Levels of Regulatory Quality

This table reports the results of the marginal effect tests of Δ%EPU on leverage ratios at three levels of regulatory quality: low (–10), average (0.8), and high (12). Marginal effects are derived from system-GMM regressions that use interaction terms of EPU (lagged EPU) and regulatory variables. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. See Table 2.3 for variable definitions.

	Regulatory Level=-10	Regulatory Level=0.8	Regulatory Level=12
Effects of EPU–Regulatory Quality Interactions on the Book Leverage Ratio			
Three-month lagged Δ%$EPU_{i,t}$	-0.003	0.002**	0.007***
12-month lagged Δ%$EPU_{i,t}$	0.010***	0.004***	-0.001
Effects of EPU–Regulatory Quality Interactions on the long-term Book Leverage Ratio			
12-month lagged Δ%$EPU_{i,t}$	0.009***	0.005***	0.000

Table 2.12 Robust test: System-GMM Estimation of Δ%EPU on Market Leverage Ratio (Alternative Measure)

This table presents the System-GMM regression results for the market leverage ratio, including explanatory and control variables. Control variables include growth opportunity, tangibility, earnings volatility, firm size, tax shields, changes in interest rates, payout ratio, stock returns, regulatory quality, the average industry and country market leverage ratios, and interaction terms between EPU and regulatory quality. They are not reported for brevity. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. See Table 2.3 for variable definitions.

Explanatory and control variables	Dependent variable: Market leverage ratio$_{i,t}$				
	(1)	(2)	(3)	(4)	(5)
Market leverage ratio $_{i,t-1}$	0.905***	0.847***	0.845***	0.934***	0.902***
	(0.106)	(0.130)	(0.121)	(0.104)	(0.107)
Δ%EPU $_{i,t}$	0.010***				
	(0.003)				
Three-month lagged Δ%EPU$_{i,t}$		0.005***			
		(0.002)			
Six-month lagged Δ%EPU$_{i,t}$			-0.002		
			(0.002)		
Nine-month lagged Δ%EPU$_{i,t}$				0.004**	
				(0.002)	
12-month lagged Δ%EPU$_{i,t}$					0.006***
					(0.002)
Contol variables	Yes	Yes	Yes	Yes	Yes
Constant	2.127	15.146	8.843	-1.730	8.702
	(17.830)	(23.084)	(22.741)	(18.571)	(18.713)
Hansen (P-value)	0.381	0.299	0.308	0.258	0.438
Correlation 1 (P-value)	0.000	0.000	0.000	0.000	0.000
Correlation 2 (P-value)	0.317	0.343	0.242	0.240	0.305
Wald test (P-Value)	0.000	0.000	0.000	0.000	0.000
Firms	1951	1951	1951	1951	1951
Observations	29741	29605	29537	29486	29239
Number of instruments	62	66	66	67	67
Time effect	Controlled	Controlled	Controlled	Controlled	Controlled

Table 2.13 Robust test: System-GMM Estimation of Δ%EPU on Long- and Short-term Market Leverage Ratio (Alternative Measure)

This table presents the System-GMM regression results for the long- and short-term market leverage ratios, including explanatory and control variables. Control variables include growth opportunity, tangibility, earnings volatility, firm size, tax shields, changes in interest rates, payout ratio, stock returns, regulatory quality, the average industry and country long-term market leverage ratios, and interaction terms between EPU and regulatory quality. They are not reported for brevity. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. See Table 2.3 for variable definitions.

Panel A: Long-term Market Leverage Ratio

Explanatory and control variables	Dependent variable: Long-term market leverage ratio				
	(1)	(2)	(3)	(4)	(5)
Long-term market leverage ratio$_{i,t-1}$	0.684***	0.693***	0.722***	0.721***	0.725***
	(0.109)	(0.125)	(0.142)	(0.130)	(0.130)
Δ%EPU$_{i,t}$	0.005*				
	(0.003)				
Three-month lagged Δ%EPU$_{i,t}$		0.005*			
		(0.003)			
Six-month lagged Δ%EPU$_{i,t}$			0.002		
			(0.003)		
Nine-month lagged Δ%EPU$_{i,t}$				-0.000	
				(0.003)	
12-month lagged Δ%EPU$_{i,t}$					0.004
					(0.004)
Constant	-7.089	-2.838	-5.718	-10.798**	-8.133**
	(4.306)	(3.865)	(3.380)	(4.188)	(4.157)
Control variables	Yes	Yes	Yes	Yes	Yes
Hansen (P-value)	0.268	0.465	0.497	0.437	0.449
Correlation 1 (P-value)	0.038	0.000	0.025	0.030	0.003
Correlation 2 (P-value)	0.756	0.180	0.823	0.825	0.878
Wald test (P-value)	0.000	0.000	0.000	0.000	0.000
Firms	1294	1294	1294	1294	1294
Observations	20734	20734	20734	20734	20708
Number of instruments	66	61	67	67	67
Time effect	Controlled	Controlled	Controlled	Controlled	Controlled

Panel B: Short-term Market Leverage Ratio

Explanatory and control variables	Dependent variable: Short-term market leverage ratio				
	(6)	(7)	(8)	(9)	(10)
Short-term market leverage ratio$_{i,t-1}$	0.569***	0.587***	0.583***	0.597***	0.608***
	(0.088)	(0.091)	(0.090)	(0.092)	(0.095)
Δ%EPU$_{i,t}$	0.004**				
	(0.002)				
Three-month lagged Δ%EPU$_{i,t}$		0.005***			
		(0.002)			

Six-month lagged $\Delta\%EPU_{i,t}$			0.001		
			(0.002)		
Nine-month lagged $\Delta\%EPU_{i,t}$				0.000	
				(0.002)	
12-month lagged $\Delta\%EPU_{i,t}$					0.001
					(0.002)
Constant	-5.489	-3.043	-5.517	-2.252	-2.786
	(8.420)	(8.954)	(8.666)	(8.808)	(8.640)
Control variables	Yes	Yes	Yes	Yes	Yes
Hansen (P-value)	0.345	0.379	0.432	0.383	0.397
Correlation 1 (P-value)	0.000	0.000	0.000	0.000	0.000
Correlation 2 (P-value)	0.145	0.136	0.139	0.148	0.123
Wald test (P-value)	0.000	0.000	0.000	0.000	0.000
Firms	1,293	1,293	1,293	1,293	1,293
Observations	20,611	20,611	20,611	20,611	20,586
Number of instruments	79	79	79	83	83
Time effect	Controlled	Controlled	Controlled	Controlled	Controlled

Table 2.14 Robust Test: System-GMM Estimation of Δ%EPU on the Book Leverage Ratio after Controlling for the Global Financial Crisis and COVID-19

This table presents the System-GMM regression results for the book leverage ratio on EPU and lagged EPU after controlling for the global financial crisis and COVID-19. Control variables are growth opportunity, tangibility, earnings volatility, firm size, tax shields, changes in interest rates, payout ratio, stock returns, regulatory quality, the average industry and country leverage ratios, and interaction terms between EPU and regulatory quality. They are not reported for brevity. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. See Table 2.3 for variable definitions. The regressions do not include time fixed effects because they are collinear with the dummy variables for the Global Financial Crisis and COVID-19. See Table 2.3 for variable definitions.

Explanatory and control variables	Dependent variable: Book leverage ratio$_{i,t}$				
	(1)	(2)	(3)	(4)	(5)
Book leverage ratio$_{i,t-1}$	0.400*	0.455***	0.504***	0.444***	0.488***
	(0.208)	(0.140)	(0.134)	(0.150)	(0.150)
Δ%EPU$_{i,t}$	-0.003				
	(0.002)				
Three-month lagged Δ%EPU$_{i,t}$		0.003***			
		(0.001)			
Six-month lagged Δ%EPU$_{i,t}$			0.003*		
			(0.002)		
Nine-month lagged Δ%EPU$_{i,t}$				0.003*	
				(0.002)	
12-month lagged Δ%EPU$_{i,t}$					0.005***
					(0.002)
Global Financial Crisis	0.453	-0.400	-0.206	-0.239	-0.186
	(0.594)	(0.560)	(0.492)	(0.512)	(0.550)
COVID-19	1.207	-0.073	0.998	0.655	-0.358
	(2.517)	(1.727)	(1.408)	(2.221)	(2.147)
Constant	64.859**	57.018**	69.785***	62.397**	51.501**
	(26.390)	(22.270)	(23.840)	(26.268)	(24.472)
Hansen (P-value)	0.170	0.389	0.390	0.262	0.330
Correlation 1 (P-value)	0.003	0.001	0.001	0.001	0.002
Correlation 2 (P-value)	0.218	0.191	0.186	0.196	0.186
Wald test (P-value)	0.000	0.000	0.000	0.000	0.000
Firms	1,952	1,952	1,952	1,952	1,952
Observations	29,930	29,792	29,724	29,671	29,402
Number of instruments	64	76	69	65	66
Control variables	Yes	Yes	Yes	Yes	Yes

Table 2.15 Robust Test: System-GMM Estimation of Δ%EPU on the Long- and Short-term Book Leverage Ratios after Controlling for the Global Financial Crisis and COVID-19

This table presents the System-GMM regression results for the long- and short-term book leverage ratios on EPU and lagged EPU after controlling for the global financial crisis and COVID-19. Control variables are growth opportunity, tangibility, earnings volatility, firm size, tax shields, changes in interest rates, payout ratio, stock returns, regulatory quality, the average industry and country market leverage ratios, and interaction terms between EPU and regulatory quality. They are not reported for brevity. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. The regressions do not include the time-fixed effect because they are collinear with the dummy variables of the Global Financial Crisis and COVID-19. See Table 2.3 for variable definitions.

Panel A: Long-term Book Leverage Ratio & Controlling for Global Financial Crisis and COVID-19

Explanatory and control variables	Dependent variable: Long-term book leverage ratio$_{i,t}$				
	(1)	(2)	(3)	(4)	(5)
Long-term book leverage ratio$_{i,t-1}$	0.555***	0.541***	0.586***	0.618***	0.526***
	(0.120)	(0.131)	(0.122)	(0.156)	(0.113)
Δ%EPU$_{i,t}$	-0.001				
	(0.001)				
Three-month lagged Δ%EPU$_{i,t}$		0.001			
		(0.001)			
Six-month lagged Δ%EPU$_{i,t}$			0.005***		
			(0.001)		
Nine-month lagged Δ%EPU$_{i,t}$				0.002	
				(0.002)	
12-month lagged Δ%EPU$_{i,t}$					0.003**
					(0.001)
Global Financial Crisis	0.407	0.004	0.286	0.484	0.150
	(0.327)	(0.296)	(0.314)	(0.386)	(0.270)
COVID-19	-0.526	-0.476	-0.242	-0.353	-0.087
	(0.614)	(0.650)	(0.586)	(0.696)	(0.576)
Constant	1.937	7.448	8.680	7.151	2.997
	(9.841)	(9.108)	(8.525)	(11.084)	(7.214)
Hansen (P-value)	0.487	0.414	0.294	0.402	0.250
Correlation 1 (P-value)	0.019	0.013	0.003	0.015	0.010
Correlation 2 (P-value)	0.167	0.177	0.115	0.160	0.135
Wald test (P-value)	0.000	0.000	0.000	0.000	0.000
Firms	1952	1952	1952	1952	1952
Observations	29900	29762	29694	29641	29373
Number of Instruments	48	48	45	40	55
Control variables	Yes	Yes	Yes	Yes	Yes

Panel B: Short-term Book Leverage Ratio & Controlling for Global Financial Crisis and COVID-19

Explanatory and control variables	Dependent variable: Short-term book leverage ratio$_{i,t}$				
	(6)	(7)	(8)	(9)	(10)
Short-term book leverage ratio$_{i,t-1}$	0.381**	0.370**	0.355**	0.308**	0.314*
	(0.153)	(0.150)	(0.149)	(0.140)	(0.160)
Δ%EPU$_{i,t}$	0.000				
	(0.001)				
Three-month lagged Δ%EPU$_{i,t}$		0.001			
		(0.001)			
Six-month lagged Δ%EPU$_{i,t}$			-0.001		
			(0.001)		
Nine-month lagged Δ%EPU$_{i,t}$				0.003**	
				(0.001)	
12-month lagged Δ%EPU$_{i,t}$					0.001
					(0.001)
Global Financial Crisis	-0.359	-0.440	-0.382	-0.698	-0.366
	(0.415)	(0.404)	(0.371)	(0.467)	(0.368)
COVID-19	-0.489	-0.464	-0.451	-0.121	0.310
	(0.562)	(0.525)	(0.527)	(0.472)	(0.472)
Constant	17.647	18.990	19.159	34.728**	30.290*
	(12.378)	(13.145)	(13.045)	(13.682)	(17.393)
Hansen (P-value)	0.428	0.422	0.344	0.381	0.464
Correlation 1 (P-value)	0.016	0.016	0.016	0.004	0.014
Correlation 2 (P-value)	0.111	0.120	0.131	0.149	0.132
Wald test (P-value)	0.000	0.000	0.000	0.000	0.000
Firms	1951	1951	1951	1951	1951
Observations	29696	29559	29491	29438	29173
Number of instruments	54	53	53	50	54
Control variables	Yes	Yes	Yes	Yes	Yes

Appendix 2A The Industrial Classification

The SIC code used in this research is the US Standard Industrial Classification of Economic Activities (SIC). The data for SIC codes comes from DataStream. Because a firm may have multiple segments, the SIC code used in this research is based on the segment that generates the most revenue for firms. The first two numbers of the SIC code represent the industries in which firms are. This chapter utilises the first digit of the SIC code to categorise the industrial groups.

Appendix 2A.1 The SIC Code

SIC code	Industries	Code in estimation
01-09	Agriculture, forestry, and fishing	0
10-14	Mining	1
15-17	Construction	2
20-39	Manufacturing	3
40-49	Transport and utilities	4
50-59	Wholesale and retail trade	5
60-69	Finance, insurance and real estate	Exclude from the sample
70-79	Service	7
80-89	Service	8
91-99	Public administration	9

Appendix 2B The VIF Test Result

The VIF test is based on the regression model: $LEVERAGE_{i,t} = C + \beta\Delta\%EPU_{i,t} + \gamma X_{i,t} + \varepsilon_{i,t}$. The control variables are growth opportunity, tangibility, earnings volatility, firm size, tax shields, changes in interest rates, payout ratio, stock returns, regulatory quality, and the average industry and country book leverage ratios.

Appendix 2B.1 The VIF Test

Variable	VIF	1/VIF
Tax shield	1.25	0.800904
Capital expenditure	1.23	0.811798
Country book leverage ratio	1.21	0.829806
GDP growth rate	1.2	0.832578
Firm size	1.16	0.864404
Interest rate	1.15	0.867204
Industry leverage ratio	1.1	0.909427
Regulatory	1.07	0.937241
Profitability	1.04	0.964639
EPU	1.04	0.965942
Tangibility	1.01	0.992172
Growth opportunity	1	0.998416
Stock returns	1	0.99856
Earnings volatility	1	0.999273
Tax rate	1	0.999333
Payout ratio	1	0.999824
Mean VIF	1.09	

Chapter 3

THE IMPACT OF EPU ON PAYOUT POLICY OF FIRMS

3.1 Introduction

The payout policy determines firms' choices among holding cash, paying dividends, and repurchasing shares. It affects a firm's payment to shareholders, its ability to reinvest, and its potential to maintain financial flexibility. Therefore, the factors affecting the payout policy have drawn interest from corporate managers and academics. Studies have found that firm-level characteristics, including profitability, growth opportunities, firm size, retained earnings, and equity mix, play a crucial role in firms' payout policy decisions (Fama & French, 2000; DeAngelo et al., 2006; Andriosopoulos & Hoque, 2013). Furthermore, existing literature also suggests that macroeconomic growth (Aivazian et al., 2003), economic cycles (Jagannathan et al., 2000; Hamouda,2021; Sodhi et al., 2023), tax policy (Julio & Ikenberry, 2004; Kaserer et al., 2012), monetary policy (Pandey & Bhat, 2007; Wang, 2020), and employment protection policy (Ahmad et al., 2017) can significantly influence firms' payout policy. Since 2015, a growing body of literature has recognised the influence of EPU on payout policy, although the results are mixed. For example, Sarwar et al. (2020a, 2020b) report that EPU and firms' dividends are inversely associated. Similarly, Yousefi and Yung (2022) find a negative relationship between EPU and total payout. On the other hand, some studies have documented a positive correlation between EPU and payout policy. They argue that high EPU increases information asymmetry. This motivates managers to adopt an active payout policy during uncertain times because they want to signal their confidence (Farooq & Ahmed, 2019; Attig et al., 2021; Qian, 2023) or alleviate agency problems (Li et al., 2024; Ayed et al., 2024).

Although previous studies have suggested that EPU may affect firms' payout policy, several areas require further investigation. First, existing research has documented inconsistent findings regarding the EPU-payout relationship, with both positive and inverse associations being reported. Furthermore, most studies have focused on the influence of EPU on dividend policies while paying little attention to its effect on share repurchases. Additionally, there is a limited understanding of the relationship between dividend payments and share repurchases when EPU increases. Finally, while existing literature suggests several motives of EPU affecting payout policies, limited effort has been made to examine the channels through which EPU impacts payout policy and the underlying reasons. This is crucial for understanding the final impact of EPU on payouts, as different motives may exert opposing effects on firms' payout decisions when EPU rises.

This research bridges the gaps in the literature by investigating the following issues. First, we examine whether EPU affects firms' payout policies. To answer this question, we analyse the effect of changes in EPU on the total payout ratio using the data from five developed countries[30] (France, Germany, Japan, the United Kingdom, and the United States) with well-functioning financial markets. These developed countries are comparable in institutional quality, accounting standards, and operational and informational efficiencies. This improves the consistency and comparability of payout policy and EPU measures, and therefore the reliability of analysis (La Porta et al., 2000; Leuz et al., 2003).

[30] The sample did not include firms from developing countries primarily for consistency and comparability reasons. Compared with developed countries with well-functioning financial markets, developing countries may have great differences in institution quality, information disclosure levels, investor protection, and financial market development (La Porta et al., 1998; La Porta et al., 2000; Leuz et al., 2003)

Second, this chapter analyses how changes in EPU affect two components of payout: (i) dividends and (ii) share repurchases using the same sample. This enables us to compare the impact of EPU on dividend policy and share repurchases. We also test the effects using IPW regressions at various EPU thresholds to examine how dividends and share repurchases respond to different levels of EPU changes.

Third, this chapter investigates through which channel(s) the EPU affects the payout. We theoretically outline two potential channels: financial constraints and free cash flow. We then examine these two channels individually and jointly by applying Baron and Kenny's (1986) mediation test.

Using annual data from firms listed in France, Germany, Japan, the United Kingdom, and the United States from 1999 to 2022, this chapter uncovers the following results. First, changes in EPU and the total payout ratio are positively associated, indicating that firms tend to payout more to their shareholders when EPU increases. The results are robust after controlling for firm-level characteristics and across different EPU thresholds. Second, changes in firms' dividend payout ratios and dividend yields are positively associated with changes in EPU, indicating that firms tend to pay a higher portion of their income as extra or special dividends when EPU rises. Third, changes in share repurchases and EPU are positively associated. Some firms tend to repurchase shares (while others may choose to pay extraordinary dividends) when EPU increases. The results are robust across OLS and IPW regressions and consistent across all the EPU thresholds examined. Finally, free cash flow is a channel through which firms increase payouts to monitor managers and stabilise stock prices in response to increases in EPU. On the other hand, when EPU rises, firms tend to pay out more even when they are more financially constrained, contrary to the precautionary motive. This implies that monitoring and signalling outweigh the precautionary motive.

This chapter contributes to the literature in several ways. First, it adds to the literature on the effect of EPU on payout policy, where evidence has been mixed (Farooq & Ahmed, 2019; Attig et al.,2021; Ayed et al., 2024). It examines data from five developed economies using alternative estimation methods (OLS and IPW), enhancing the robustness and reliability of findings. Second, unlike prior studies that examine either dividends or share repurchases and focus primarily on dividends, this study enriches the literature by examining the responses of both dividends and share repurchases to changes in EPU. Third, the chapter contributes to the literature by empirically testing the channels through which EPU affects payout policy: free cash flow and financial constraints.

The rest of the chapter is structured as follows. The second section reviews the related literature. Section 3 investigates the motivations of EPU that impact the payout policy and develops hypotheses. Section 4 describes the data and methods used in this research. Sections 5, 6, 7 and 8 present and discuss the empirical results from OLS, IPW, mediation tests, and robustness tests. Section 9 concludes the chapter.

3.2 Literature Review

Lintner (1956) suggests that the dividend payout is a way by which firms distribute long-term, sustainable earnings to their shareholders. Miller and Modigliani (1961) argue that a firm's dividend policy does not influence its value in a perfect capital market. However, if the assumptions in this study are not upheld, the dividend policy may affect a firm's value. For example, managers normally have more internal information about firms than shareholders do, which enables them to use dividend payouts or share repurchases to communicate positive information to investors (Vermaelen, 1981; Miller & Rock, 1985). However, this information asymmetry may create agency problems between managers and shareholders, as managers may act for their own benefit rather than that of shareholders. Payouts to shareholders can help distribute excess cash, alleviate agency issues, and monitor managers at a lower cost (Easterbrook, 1984; Jensen, 1986). Share repurchases have a similar function (Nohel & Tarhan, 1998). Therefore, in financial markets with frictions, the payout policy is a crucial decision for firms, as it conveys information, mitigates agency problems, and influences the firm's value.

The literature has suggested that specific firm-level characteristics, including profitability, growth opportunities, firm size, retained earnings, and equity mix, play essential roles in shaping a firm's dividend policy (Fama & French, 2000; DeAngelo et al., 2006). Additionally, factors such as firm size, cash dividends, and ownership concentration significantly impact share repurchases (Andriosopoulos & Hoque, 2013). Previous studies also suggest that macroeconomic variables, including economic growth (Almeida et al., 2004) and policy (Pandey & Bhat, 2007; Wang, 2020), can influence firms' payout policies. This implies that EPU may affect firms' payout policy through its effect on macroeconomic policies.

3.2.1 Macroeconomic Variables Impacting Payout Policy

Researchers have observed that macroeconomic growth and cycles can impact firms' payout policy decisions. Some studies show that the economic growth rate is positively correlated with dividend payments. For example, Almeida et al. (2004) suggest that a decline in economic growth may lead financially constrained firms to hold more cash to manage liquidity risks and maintain financial flexibility. The study utilises 29,954 firm-year data from all manufacturing firms in Compustat's P/S/T between 1971 and 2000. The empirical test shows that financially constrained firms save notably more cash than unconstrained firms following economic growth shocks. This implies that constrained firms may reduce dividends during economic downturns. Although not extensively investigated, a study by Julio and Ikenberry (2004) suggests that the overall economy may influence dividend payout policy by affecting earning power, and poor economic conditions may be associated with lower dividend payouts.

Studies have found that the economic cycle can influence firms' payout policy, particularly regarding share repurchases. For example, Jagannathan et al. (2000) examine the data on share repurchase announcements and actual share repurchases of all US publicly listed firms between 1985 and 1996. They find that share repurchases increase with economic booms and decline during economic recessions, while dividends are comparably stable. This is because firms prefer share repurchases when distributing temporary cash flows and dividends when they expect sustainable cash flows. During economic downturns, firms have more volatile cash flows. Therefore, they are more likely to choose share repurchases over dividends when distributing to shareholders. Additionally, Hamouda (2021) finds that share repurchases increase during economic downturns, due to higher availability of financial resources. Investment opportunities decline when economic growth slows, leaving firms with sufficient free cash flow to repurchase their shares. Utilising monthly data from Canada, Japan, the United Kingdom, and the United States between 1998 and 2016, the study indicates that slower economic growth increases share repurchases in the US. However, in Japan, previous repurchase programmes often indicate changes in economic growth. Sodhi et al. (2023) document conflicting theoretical and empirical results on the relationship between the economic cycle and share repurchases. They argue that firms are more likely to repurchase shares during periods of economic growth because it can positively impact their profitability, productivity, and cash reserves. However, their empirical results based on 419 share repurchase announcements between 1981 and 2014 contradict their expectations, indicating that economic expansion is negatively associated with share repurchases. The authors attribute this to unnecessary declines in stock prices due to macro-adjustments, which incentivise firms to maximise share repurchases during economic downturns.

Tax regime reforms offer researchers opportunities to examine the impact of tax policy on payout policy. For example, Julio and Ikenberry (2004), using data from 12,073 US industrial firms, compare the changes in dividend payouts before and after the Bush tax cut in the first two quarters of 2003. The comparison indicates that dividend initiations have increased gradually since the first two quarters of 2003. However, firms with established dividend payments began increasing their dividends about two years before the tax cut. This suggests that the tax cut can only account for part of the changes in dividend payouts. On the other hand, the study also compared the average percentage changes in dividend payouts among low, medium, and high payout ratio quintiles before and after the tax cut. It suggests that low-dividend-paying stocks had a higher dividend growth rate than high dividend-payers. Similarly, Pattenden and Twite (2008) examine the impact of the tax system on dividend policy based on Australia's imputation system introduced in 1987. The imputation tax system allows shareholders to receive a tax credit if a firm has already paid corporation tax on dividends. It treats different forms of dividend payments equally. Therefore, firms are motivated to pay more dividends. Moreover, firms with a higher proportion of income available as franked dividends or with a higher level of franked dividends are more likely to increase their dividend payouts. They use data on 295 Australian firms between 1982 and 1997 and group them into pre-1987 and post-1988 periods to capture the changes in dividend policy following the tax reform. Their results indicate that dividend initiations, dividend payout ratios, and the use of dividend reinvestment plans positively correlate with dividend imputation. The tax system raises the volatility of dividend payouts. The research also finds a positive correlation between firms' franking tax credits and gross dividend payouts. Still, Kaserer et al. (2012) analyse the impact of tax policy on payout policy by examining the effect of changes in the German tax system from 1999 to 2002. They argue that the 1999, 2000 and 2002 Tax Relief Acts reduced the tax rates of both individual and corporate income, while the

German Tax Reduction Act of 2001 fundamentally changed the business taxation system. The half-income system introduced in 2002 stipulated that capital gains were tax-exempt for personal shareholders if shares were held for at least 12 months, and 95% of capital gains of firms were tax-exempt for corporate shareholders. The reform increases the shareholders' preference for share repurchases over dividends. This leads to lower dividends and higher share repurchases because the personal capital exemption is higher than the corporate capital exemption. Firms with influential insiders are less likely to increase share repurchases but rely more on dividends.

Studies have also documented that the tax advantages of share repurchasing over dividends affect firms' payout decisions. For example, Jagannathan et al. (2000) suggest that share repurchasing has tax advantages over dividends at the personal level, although with no detailed discussion of this topic. Brav et al. (2005) investigate the issue through a survey of 384 financial executives from 256 public and 128 private firms. It shows that taxes were of secondary importance in the payout decision. The survey also reveals that firms are more inclined to initiate or raise dividends when investor tax rates on dividends and capital gains decrease. Additionally, because dividends were taxed at a higher rate than capital gains from share repurchases, 41.8% of executives admit that this tax advantage of repurchases over dividends plays a significant role in their repurchase decisions.

The literature has suggested that monetary policy is a crucial factor managers consider in payout decisions. For instance, Pandey and Bhat (2007) examine data on 571 Indian firms from 1989 to 1997. They find that a restricted monetary policy is associated with a reduction in firms' dividends. The authors argue that the risk premium on external funds is higher than that on internal funds when information is asymmetric because firms may default on debt due to moral hazard. This suggests that the cost of external funds is higher than that of internal funds. When monetary policy is restrictive, the free-market interest rate rises, increasing the costs of both internal and external funds. However, the cost spread between external and internal funding rises because the increased risk-free interest rate reduces the value of firms' collateral and raises the risk of moral hazard. Firms may opt for cheaper internal funds to meet financial needs before using more expensive external funds. Consequently, firms tend to reduce their dividends under restrictive monetary policy.

Conversely, some studies have focused on the impact of accommodative monetary policy on share repurchases. For example, Wang (2020) utilises firm-level data on 3,407 US public firms in the financial year 2009 and 1964 Japanese public firms in the financial year 2005. The results indicate that firms with high free cash flow and lower borrowing costs tend to engage in share repurchases, whereas those with higher financial leverage are less likely to repurchase shares during periods of unconventional monetary policy. Wang analyses five channels through which unconventional monetary policy[31] affects share repurchases. First, unconventional monetary policy increases free cash flow by relaxing firms' financial constraints during financial crises. Firms, therefore, are more inclined to use the free cash flow to repurchase shares and distribute cash to shareholders. Second, low interest rates caused by unconventional monetary policy can reduce firms' borrowing costs and boost asset prices. Higher asset prices improve the financial conditions of both firms and banks, reducing firms' financing premiums and increasing credit availability. This encourages them to increase borrowing and spending, and motivates share repurchases. This effect may also occur even without adopting unconventional monetary policy when interest rates are low. Third, firms may be undervalued during periods of unconventional monetary

[31] The unconventional monetary policy refers to an accommodative policy linked to periods of financial crises when the traditional monetary tools, such as the interest rate, are set at low to zero and are not effective. For example, central banks buy government bonds or other assets to increase the liquidity of financial markets and stimulate the economy.

policy due to information asymmetry during financial crises. Undervalued firms tend to repurchase their shares to stabilise share prices and signal to the market. Additionally, since there are fewer profitable investment opportunities on the market and stocks are undervalued during crises, managers are more likely to repurchase shares. Fourth, unconventional monetary policy decreases the cost of debt and encourages borrowing. Firms with higher leverage are more motivated to repurchase shares to adjust their leverage ratios below target levels. On the other hand, higher-leveraged firms have higher default risks. They are more strictly monitored by debtors, and it is harder for them to repurchase shares. Finally, share repurchasing is a more flexible and primary method for distributing transient cash flow, while dividends are suitable for paying out permanent cash flows. During periods of unconventional monetary policy, firms are more cautious about their capital spending. Consequently, they prefer share repurchases when distributing to shareholders. Elgouacem and Zago (2020) used quarterly data from non-financial firms in the S&P Compustat, the Institutional Brokers' Estimate System (IBES), and the Trade Reporting and Compliance Engine (TRACE) between 1985 and 2016. The results suggest that share repurchases increase during periods of accommodative monetary policy because debt costs decrease, a crucial factor for managers' share repurchase decisions. Firms take advantage of the lower corporate yield and issue more corporate bonds to finance share repurchases. A study by Pazarbasi (2021) examines the relationship between payouts and monetary policy shocks among firms with different cash-holding levels using quarterly data on publicly listed non-financial, non-utility US firms in the Compustat database between 1990 and 2018. The results suggest that cash-rich firms have higher payouts and stock prices under the expansionary monetary policy. Then, the author develops a heterogeneous-firm New Keynesian model,[32] which includes financial

[32] The new Keynesian economic model in this paper is an adaptation of Keynesian economics, incorporating financial frictions and endogenous cash holdings into macroeconomic models.

frictions and endogenous cash holdings to explain the empirical results. The model indicates that firms with poor cash flows and high operating leverage tend to hold more cash for precautionary motives. An expansionary monetary policy decreases the discount rate and the cost of external financing. This reduces firms' need to hold cash, indicating that cash-rich firms may hold excess cash. Because they typically have low profitability, they prefer to distribute cash to shareholders rather than invest it. This explains why such firms are likely to raise payouts during expansionary monetary policy. Additionally, Ahmad et al. (2017) argue that employment protection laws protect workers from wage reductions or arbitrary dismissal. These laws decrease firms' operating flexibility and increase their costs and operating risks. Therefore, firms are motivated to hold more precautionary cash under employment protection laws, which leads to a lower payout ratio. The study uses firm-year data from 21 OECD countries from 1985 to 2013. The empirical tests suggest that employment protection is negatively correlated with total and dividend payout ratios, particularly among firms with financial constraints, higher operating leverage, and intensive labour. The tests, based on changes in employment protection laws, indicate that softening employment protection laws causes a rise in dividend payouts. However, firms are unwilling to reduce dividend payout when the laws tighten.

Overall, the existing literature has examined the effects of various economic policy measures and indicators on payout policies. They suggest that economic growth, economic cycles, tax, monetary, and employment protection policies can significantly influence firms' payout policy decisions. Firms operating in countries with higher economic growth typically pay out more. Firms are more likely to repurchase shares during economic downturns. Moreover, tax cuts encourage firms to increase payouts, whereas share repurchases are preferred when repurchasing shares has a tax advantage over paying dividends. Monetary policy and interest rates impact a firm's payout policy as well. When monetary policy is accommodative, firms distribute more cash to shareholders. In contrast, restrictive monetary policy leads to a decrease in payouts. Finally, the employment protection policy has a negative effect on firms' dividend payout. This body of literature implies that uncertainty in the macroeconomic environment and policies may affect payout decisions by introducing volatility in economic conditions and firms' earnings. The summary of the key studies is presented in Table 3.1.

[Insert Table 3.1 Here]

3.2.2 The Impact of EPU on the Payout Policy

The evidence from the literature on the impact of EPU on the payout policy is mixed. Some studies have suggested that higher EPU leads to lower payouts, while others have indicated that the changes in EPU and payout are positively associated. In addition, some studies have reported heterogeneous effects of EPU on payout policies. In the paragraphs below, we discuss each group of studies.

3.2.2.1 Inverse Relation Between EPU and Corporate Payout

A body of literature suggests that policy uncertainty, induced by political policy uncertainty, negatively impacts firms' dividend payments. The studies often connect political uncertainty with policy uncertainty and highlight the information asymmetry that arises from heightened political uncertainty. For example, using China as a case study, Lei et al. (2015) identify three reasons why political uncertainty can lead to policy uncertainty. First, the new officials differ from previous ones in various aspects, including their policy preferences and motivations. Therefore, they tend to adopt new policies different from those of their predecessors. Second, under China's political promotion system, which emphasises local economic growth, the new party chief is strongly motivated to implement different policies that can stimulate economic growth.

Third, a new official is expected to adopt important policies following traditional norms. Overall, political uncertainty greatly amplifies policy uncertainty because new officials are inclined to adopt different policies. The authors then analyse the impact of political and policy uncertainty on dividend payment. With high political uncertainty, information asymmetries become more severe. This raises the risk for external investors and financial institutions. Lenders and investors may demand a higher risk premium, which increases the cost of debt and equity. Consequently, firms prefer cheaper internal funds over higher-cost external financing under uncertainty. To retain cash during uncertain times, dividend payers are more likely to stop or reduce dividends, and non-payers are less likely to initiate dividend payments. Additionally, high political uncertainty increases managers' risk perception because uncertainty negatively affects firms' cash flows and increases the risk of financial distress. Consequently, firms tend to adopt prudent dividend policies, retain more funds, and reduce expenditures to manage the risk. Therefore, a negative association exists between firms' dividend payments and political uncertainty. To test these propositions, the authors use a sample comprising A-share firms listed in the Shanghai and Shenzhen stock markets between 2004 and 2010. The findings suggest that high political uncertainty leads firms to be more cautious in their cash dividend policies. Specifically, firms that do not currently pay dividends are more hesitant to start dividend payments when uncertainty is high. Furthermore, political uncertainty leads to more significant decreases in cash dividends. Compared with private firms, state-owned enterprises are more likely to adopt prudent cash dividend policies when uncertainty is high. Similarly, Joof and Azimli (2022) argue that political uncertainty usually accompanies EPU because different parties may adopt various tax or monetary policies. The high level of political uncertainty increases the information asymmetry between managers and investors, thereby raising the cost of capital. Thus, managers reduce dividend payments during periods of uncertainty. Analysing data on 350 non-financial firms listed in Turkey from 1998 to 2019, the results indicate that political uncertainty is negatively correlated with dividend payments. This suggests that uncertainty increases the cost of capital, leading to lower dividend payouts. A study by Huang et al. (2015) does not explicitly explain why political uncertainty is connected to policy uncertainty. However, it suggests that political uncertainty associated with potential changes in government policies and the macroeconomic environment may heighten the risk perception among capital market participants and drive up the cost of equity. Firms may be reluctant to pay dividends. Political uncertainty increases managers' perception of cash flow risk. Therefore, it is beneficial for firms to make conservative dividend decisions to minimise the risk of relying on external equity markets. Consequently, firms may be more inclined to reduce (or stop) paying dividends and less likely to start paying dividends when there is high political uncertainty. Using firm-year data from 35 countries between 1990 and 2008, this study finds that firms that have previously paid dividends are more likely to suspend their dividend payments during periods of political uncertainty. Firms that have not paid dividends previously are less likely to initiate dividend payments during such periods. Furthermore, political crises have less impact on dividend decisions in countries with stable political systems and stronger investor protection.

Thus, previous research suggests that political uncertainty is linked to policy uncertainty, as new government officials often introduce different policies. This change heightens uncertainty regarding future policies. When faced with increased political and policy uncertainty, firms have greater risk perception and tend to adopt a more cautious dividend policy. Consequently, both political and policy uncertainty negatively impact dividend payouts.

In recent years, the impact of EPU on the payout policy has drawn extensive research interest. Researchers have documented an inverse relationship between EPU and firms' dividends. For example, Sarwar et al. have investigated how EPU affects firms' dividend policies through risk perception. Sarwar et al. (2020a, 2020b) and Sarwar and Hassan (2021) suggest that EPU impacts the dividend policy and its sustainability in several ways. First, higher EPU may negatively affect managers' expectations of firms' growth and earnings. Second, increases in EPU raise expected external financing costs. Third, heightened EPU may lead to higher risk perception among investors, hence increasing the cost of capital. Fourth, higher EPU can increase managers' risk perception due to uncertainty about cash flows. Consequently, managers may adopt a conservative payout policy to increase cash reserves. Specifically, firms that have not previously paid dividends are unlikely to initiate dividend payments when the EPU is high. On the other hand, previous dividend-paying firms are more likely to stop payments during periods of high EPU. In their study, Sarwar et al. (2020a) examine data on 1,372 Chinese-listed firms between 2000 and 2015. They suggest that the cost of equity and perceived market uncertainty increase during periods of high EPU. Furthermore, firms that have paid dividends are likely to stop paying them during periods of high EPU, whereas firms that have not previously paid dividends are less likely to initiate dividend payments in such periods. Utilising data on 1,153 non-financial listed firms in China from 2006 to 2015, Sarwar et al. (2020b) report a similar negative association between EPU and payouts. These studies also examine the impact of board structure and managers' abilities on the EPU-dividend effect. In particular, Sarwar et al. (2020b) suggest that even during periods of high uncertainty, professional CEOs with strong managerial abilities may be more likely to initiate or maintain dividends rather than stop them, given their risk-averse nature. Additionally, examining data on 517 Chinese firms listed on the Shenzhen and Shanghai Stock Exchanges from 2007 to 2015, Sarwar and Hassan (2021) suggest that having a board with more financial expertise helps firms maintain dividend payments during periods of high EPU.

The above studies focus on dividend policy, while Yousefi and Yung (2022) investigate the impact of EPU on the total payout. Using firm-quarter data on 7,200 US non-financial and non-utility firms between 1989 and 2018, this study finds a negative association between EPU and total payout. It also reports that firms prefer share repurchases over dividends under EPU because share repurchases are more flexible. Nevertheless, firms' financial flexibility can mitigate this negative effect. When EPU is high, firms' cash flow is more uncertain, encouraging them to reduce their payouts. However, financially flexible firms can handle volatile cash flows more effectively. Therefore, financial flexibility can moderate the negative relationship between EPU and corporate equity payouts.

In summary, several studies have reported that EPU, which may be induced by political uncertainty, is negatively associated with firms' dividends and total payouts because managers are more cautious about payouts when risk perception increases due to higher EPU.

3.2.2.2 The Positive Relationship Between EPU and Corporate Payouts

Several studies have demonstrated a positive correlation between EPU and corporate dividends and share repurchases. They suggest two possible reasons behind the positive association. The first is the signalling effect due to information asymmetry. For example, Farooq and Ahmed (2019) argue that political uncertainty during national elections leads to policy uncertainty. They use data on US non-financial firms covering six presidential elections between 1996 and 2016 and find that election years are associated with higher dividend payout ratios compared to non-election years. This is because firms use dividend payouts to signal their confidence in their ability to handle uncertain situations and generate corporate income. Similarly, Qian (2023) reports a significant positive association between EPU and cash dividend payments after examining 2,340 observations of publicly listed firms in the Shanghai and

Shenzhen A-share markets from 2013 to 2021. Managers use higher dividends to signal positive expectations and confidence in the future, which can help stabilise/enhance stock prices. In addition, this study finds that EPU shows a more pronounced positive influence on dividend payments in financing-constrained or high-growth companies. This is because companies with financing constraints or those experiencing higher growth rates tend to rely more on equity financing. As a result, they are more likely to use higher dividends as a positive signal. Hoang et al. (2024) analyse 47,536 firm-year observations from US-listed firms between 1995 and 2018. They find that EPU and dividend payments are significantly and positively associated. The reason for the positive association is that firms use dividends as positive signals to convey optimistic expectations to shareholders and to attract external financing sources when EPU is high.

In the existing literature, the second explanation for the positive association between EPU and dividend payouts is that high dividends alleviate agency problems. For instance, Attig et al. (2021) analyse data on 23,042 firms in 19 countries between 1991 and 2015 and find a statistically consistent and positive relationship between EPU and dividends. The authors argue that firms hold more cash when EPU is high, and managers may use this cash for their private benefits. Therefore, shareholders demand higher payouts to impose discipline on the use of the firm’s resources when facing EPU. Still, using firm-year data on 4,421 Chinese A-share listed firms between 2007 and 2020, Li et al. (2024) find that corporate cash dividends are positively associated with EPU. This association is stronger among smaller, non-state-owned firms with lower levels of equity concentration and financial constraints. They argue that high EPU increases internal operating costs and decreases firms’ growth opportunities. Moreover, high EPU exacerbates information asymmetry between managers and shareholders. Consequently, firms implement an active dividend policy to reduce excessive management consumption and mitigate agency problems. Additionally, the heightened EPU may decrease demand for external financing and increase anticipation of higher dividends. Consequently, firms are motivated to increase dividends to maintain investor confidence and prevent potential stock selloffs.

Studies have also documented a positive association between EPU and share repurchases. Anolick et al. (2021) use the event study method to examine 871 share repurchase announcements from January 2000 to June 2017 in Austria, France, Germany, Greece, Italy, the Netherlands, Spain, Sweden, and the UK. They find that high EPU is associated with more share-repurchase announcements and higher abnormal announcement returns. This is because share repurchase announcements alleviate information asymmetry between managers and investors during periods of uncertainty. Additionally, the announcements serve as an implicit put option that allows firms to repurchase shares if the stock price deviates from its true value, thereby maximising shareholders' benefits during periods of EPU. Huang et al. (2025) argue that, theoretically, firms may decrease their share repurchases for precautionary purposes or increase them to demonstrate confidence when EPU is high. Therefore, the relationship between the EPU and share repurchases is an empirical question. The study examines data on 4,706 A-share listed firms in China, comprising 1,922 repurchase programmes and 89,051 observations, from the first quarter of 2017 to the fourth quarter of 2022. The results show that EPU has a significant and positive relationship with the likelihood and scale of open-market share repurchases in Chinese firms. This suggests that share repurchases in Chinese firms support the signalling motives. The study also examines the impact of EPU on diverse types of firms by including interaction terms of EPU with variables such as state-owned enterprises, government subsidies, the number of patents, and on-site investor visits. It finds that private firms that receive more government subsidies, hold more patents, and attract more on-site visits tend to repurchase more shares when EPU is high. Additionally, the study finds that share repurchases help to reduce information asymmetry.

This strand of literature suggests that high EPU can increase information asymmetry between managers and investors. Managers are incentivised to signal their confidence in future performance to investors through higher payouts, particularly facing information asymmetry during periods of EPU. On the other hand, information asymmetry exacerbates the agency problems caused by excessive cash. This encourages firms to pay out more to alleviate agency problems when EPU is high.

3.2.2.3 The Heterogeneous Effects of EPU on the Payout Policy

Some recent studies report heterogeneous effects of EPU on payout policies among different countries, firms, periods, and EPU levels. For example, using data from CRSP stocks from 1962 to 2009, Walkup (2016) finds a heterogeneous EPU-dividend effect across firms' cash-flow constraint levels. Specifically, dividend-paying firms with lower cash flow levels are less likely to increase their dividends when market-level uncertainty is high. Inversely, market uncertainty has a less pronounced impact on firms with rich cash flows. For non-dividend-paying firms, internal and market-level uncertainty negatively impacts the decision to initiate dividends. Their findings also suggest that firms with ample cash flows are likely to start or increase share repurchases during periods of high market-level uncertainty. Still, the impacts of uncertainty on prior stock repurchasers are unclear. This study argues that when market-level uncertainty increases, the availability of external financing decreases and financing costs increase. This causes firms to be more conservative with free cash that would otherwise be used for dividend payments. As a result, firms reduce their dividends or the rate of dividend growth. This effect primarily affects cash-constrained firms as their free cash is more likely to be affected when market-level uncertainty is high. Firms with low cash flows may also reduce share repurchases to preserve free cash. Conversely, firms with sufficient free cash may increase share repurchases to take advantage of lower stock prices during uncertain times. This can increase a firm's value and protect shareholders. Maquieira et al. (2023) utilise data on 133 Chilean firms from 2005 to 2016. The study finds a positive and statistically significant effect of the squared transformations of both EPU average and volatility on dividend payout, suggesting a U-shaped, nonlinear relation between EPU and dividend payout. However, this holds only when EPU is high, while no significant relationship between them in cases of low EPU. This indicates a heterogeneous effect depending on the level of EPU. They argue that the correlation between EPU and dividend payout can be either negative or positive. Precautionary motives cause a negative relationship. When EPU is high, information asymmetries become more severe. Consequently, financing costs, risk perception, and the risk of financial distress all increase. Firms face greater challenges raising funds when the EPU is high, leading to a greater need for internal cash and therefore fewer dividends. On the other hand, according to agency theory, firms may increase their dividends during periods of high uncertainty. When EPU is high, firms may hold more cash as there are fewer NPV investment projects in the market, exacerbating agency problems. To expose managers to the capital market's monitoring, firms may increase dividend payouts to reduce agency costs. Similarly, the signalling theory indicates a positive relationship between EPU and dividend payouts, as managers tend to increase dividends to signal their expectations on future earnings when EPU is high.

Chen et al. (2023) analyse data on non-utility, non-financial firms in the Compustat database from 1985 to 2021 and report heterogeneous effects of EPU on share repurchases across firms. The study finds evidence that firms reduce share repurchases when EPU is high, supporting precautionary motivation. However, firms whose values were greatly underestimated ex ante repurchase more shares when EPU is high, supporting the signalling motivation. The study argues that share repurchases theoretically respond to high EPU in opposing directions. On the one hand, EPU reinforces information asymmetry about firms' values. Consequently, firms may increase share repurchases to signal their underlying profitability and financial health to investors. This positive signal is particularly important during periods of uncertainty because firms may use it to reduce information asymmetry. On the other hand, high EPU leads to higher external financing costs, lower credit supply, and more volatile cash flow. This increases external and internal financing friction. Therefore, firms hold more cash and reduce share repurchases for precautionary reasons under uncertainty. In addition, the institutional contexts play an important role in shaping its precautionary and signalling motives during uncertain times. This can lead to different motives being predominant in different countries, industries, or periods.

Using data on 12,381 non-financial firms in Compustat between 1986 and 2017, Baker et al. (2021) demonstrate that dividends and share repurchases respond differently to increases in EPU. Specifically, policy uncertainty is associated with a higher likelihood of dividend increases in the subsequent quarter. In contrast, the possibility of share repurchases decreases when policy uncertainty is high. The study argues that the impact of uncertainty on dividend payments is an empirical issue because the relationship can theoretically be either positive or negative. When uncertainty is high, dividend payment announcements signal managers' optimistic expectations and can also alleviate information asymmetry. Therefore, dividend payments may be positively correlated with uncertainty. However, for precautionary purposes, managers may decrease cash distribution to reserve cash when uncertainty is high, indicating that dividend payments may decrease under high uncertainty. Additionally, firms prefer share repurchases over dividends when EPU is high because share repurchases are more flexible than dividends with a binding signal effect.

The above discussion of the literature indicates that the evidence on the effects of EPU on payouts is mixed and varies across countries, firms, periods, or levels of changes in EPU. While some studies report a positive association between EPU and payouts, others find negative, weak, or conditional relationships. Additionally, firm share repurchases and dividends may respond differently to the same EPU shock. This highlights the complexities involved in how EPU influences payout policies. A summary of key studies on the relationship between EPU and payout is presented in Table 3.2.

[Insert Table 3.2 Here]

3.2.3 The Gap in the Literature

The literature summarised above shows how EPU affects the payout policy. Existing research has identified several reasons for EPU affecting corporate payout policy, including precautionary, signalling, and monitoring motives. Heightened EPU exacerbates information asymmetry, prompting firms to use higher payouts to convey information to investors. Information asymmetry also worsens agency problems. This incentivises firms to adopt more active payout policies to alleviate them and monitor managers at lower costs. On the other hand, high EPU increases the volatility of firms' earnings and cash flows. Hence, firms' risk perception and cost of capital increase, and they rely more on internal funding. Therefore, they tend to complement a conservative payout policy. However, there are several areas where the literature remains incomplete.

First, the research on the impact of EPU on firms' payout policies has produced inconsistent findings. Some studies have reported positive effects of EPU on payouts, while others have found inverse effects. These findings are contradictory even within the same country during different periods, indicating the need for further investigation.

Second, while existing literature has identified why EPU affects payout policies, no effort has been made to determine which of the competing motives is the most influential and why. This is crucial for understanding the true impact of EPU on payouts, as these motives have opposing effects.

Finally, while most studies have focused on the influence of EPU on dividend policies, comparatively fewer studies highlight its impact on share repurchases. Further, there is a limited understanding of the trade-offs between dividend payments and share repurchases when EPU increases. As both payout methods are critical components of payout policies, each of them, as well as the trade-off between the two (if any), deserves a thorough analysis. Thus, this chapter aims to address these issues.

3.3 Hypothesis Development

3.3.1 The Impact of EPU on the Payout Policy

When EPU increases, information asymmetry among policymakers, firms, and investors becomes more prominent. At periods of high EPU, firms tend to be more cautious about new investments. They may suspend their investments and wait for more information before making decisions. This is particularly true when investments are irreversible, as the potential costs of making incorrect choices under uncertainty can be substantial (Gulen & Ion, 2016). Furthermore, investors demand a higher risk premium when EPU increases, leading to a higher cost of capital (Pastor & Veronesi, 2013). This results in fewer positive NPV projects available on the market during periods of uncertainty. As a result, firms may reduce investments when EPU increases due to fewer investment opportunities and heightened investment risks. At the same time, consumers also reduce their spending due to uncertainty about future income and employment policy conditions, further exacerbating declines in investments (Gomes et al., 2012). Thus, when EPU increases, both investment and consumption decline, which, in turn, can lead to several consequences.

First, due to lower consumption associated with high EPU, firms face diminished demand. As a result, they tend to reduce their supply, which leads to a decrease in firms' earnings. Consequently, firms face a higher likelihood of financial distress. Firms may have to rely more on retained earnings and/or external financing to maintain their financial flexibility during periods of EPU. Additionally, escalating EPU can signal a negative economic outlook, making investors pessimistic and cautious about their equity investments (Baker et al., 2016a). As a result, investors will ask for a higher risk premium. Thus, the firms' cost of capital (investors' required rate of return) rises, leading to lower stock prices (Pastor & Veronesi, 2013). Furthermore, the escalated information asymmetry caused by higher EPU makes it harder for investors to predict firms' performance, which, in turn, increases stock market volatility. Therefore, under high EPU, managers face the challenge of maintaining investor confidence and stabilising firms' market values. A prudent payout policy can signal managers' confidence in the firm's future performance. To signal their confidence, managers may increase the total payout during periods of upward EPU. Therefore, when EPU increases, firms are likely to increase total payout to signal their optimism about future earnings.

Second, when investment decreases following EPU rises, firms may hold extra cash that would otherwise have been invested. Managers may use surplus cash for non-profit initiatives, executive benefits, or acquisitions that exceed reasonable spending, leading to agency problems. However, holding cash can put firms at a disadvantage as they must pay corporation tax on the interest earned from retaining it, while distributing the extra cash can effectively alleviate agency problems. Therefore, when EPU increases, shareholders, through board members, may request that managers distribute the surplus cash by increasing total payouts in the form of dividends and/or share repurchases.

Third, due to the decrease in investment caused by increased EPU, firms expect lower future earnings and cash flows. To maintain financial flexibility and reduce the risk of financial distress during uncertain times, firms may reduce their total payouts and retain cash for precautionary purposes. This is especially likely when EPU increases enormously, or the managers expect a long-term (sustained) increase in EPU. Therefore, due to precautionary reasons, firms may reduce their total payouts.

In sum, when EPU increases, firms are motivated to increase total payouts for signalling and monitoring reasons, but to reduce them to maintain financial flexibility. Therefore, the dominant motivations determine the net effect of EPU on the total payout. If a firm opts to decrease the total payout incentivised by precautionary motives, lower payouts may worsen agency problems and future expectations because firms hold surplus free cash and do not communicate their confidence to investors. This could lead to a further decrease in stock prices, indicating higher risk. As a result, firms may find it even harder to raise finance from the market and face a higher risk of financial distress. Conversely, if managers distribute more cash to shareholders when EPU rises, it signals their confidence in the firm's future performance and stabilises stock prices. Additionally, more payouts and lower cash holdings also alleviate agency problems. When stock prices are stable and investors are optimistic, firms can raise external capital and achieve financial flexibility more easily. Furthermore, distributing cash is more tax-efficient because retaining cash may be taxed twice: once on the interest firms earn on the surplus cash and again on dividends paid to investors. Comparing the costs and benefits, firms may be more strongly incentivised by signalling and monitoring than by precautionary motives. However, if EPU increases over an extended period, firms may prioritise precautionary motivation over signalling and monitoring motivations because they may need operating capital in the long run. This suggests that firms are likely to increase their total payout when signalling and monitoring motives dominate. This leads to our first hypothesis ($H_{3.1}$) that:

$H_{3.1}$: Changes in EPU and firms' total payouts are positively associated.

Two common methods of distributing cash to shareholders are dividends and share repurchases. Typically, managers prefer to maintain the dividend payment per share. They change the dividend only if the change in the firm's income is likely to be sustainable in the foreseeable future. Therefore, any change in dividend per share indicates the firm's future performance. Managers distribute temporary surplus cash to the shareholders either by paying a special dividend or by repurchasing the shares at a premium. Consequently, managers' decisions to repurchase shares versus change dividends signal different messages to the market. To examine the signalling implications of changes in total payout in response to changes in EPU, we investigate the effects of EPU on dividends and share repurchases separately.

3.3.2 The Impact of EPU on Dividend Policy

Increases in EPU raise the uncertainty about future economic conditions and corporate earnings, enhancing risk perception among investors. Therefore, investors may reduce their demand for stocks or sell shares they hold, causing a decline in firms' stock prices and market values. Furthermore, when EPU increases, investors find it more challenging to predict future changes in economic policy and their impact on firms' cash flows and earnings, leading to more volatile stock prices and market values. To stabilise stock prices, managers are motivated to communicate their optimistic earnings expectations to investors (Qian, 2023) through clear signals of increasing dividend payments (Farooq & Ahmed, 2019). Therefore, firms are likely to increase dividends during periods of rising EPU. Moreover, an increase in EPU may cause a temporary decline in investment, prompting managers to hold extra cash initially intended for investments. In this scenario, investors may demand that firms distribute excess cash flows to alleviate agency problems through higher dividend payouts (Ayed et al., 2024). This indicates that firms tend to pay more dividends when EPU increases.

Suppose firms expect heightened EPU to decline in the short term, they may prefer to distribute the temporary cash surplus through extra or special dividends. This is because managers are more cautious about increasing regular dividends significantly, as this can avoid investors mistakenly interpreting it as a signal of a contemporaneous decrease in investment opportunities. Moreover, paying special or extra dividends based on the perception of a short-term EPU rise keeps the future payout policy flexible without committing to long-term dividend increases. However, if managers perceive that the EPU increase will last for an extended period, they may decrease regular dividends to prioritise financial flexibility. The above analysis leads to our second hypothesis ($H_{3.2}$) that:

$H_{3.2}$: Changes in EPU and dividends are positively correlated.

3.3.3 The Impact of EPU on Share Repurchases

As previously discussed, increased EPU can delay investment, leading to excess cash within firms. Managers may use this cash for their private benefit, aggravating agency problems. In response, shareholders may demand that managers distribute the extra cash to shareholders (Ayed et al., 2024). If investors and managers expect a short-term increase in EPU, firms prefer share repurchases to dividends. This is because share repurchases offer firms a more flexible way to allocate their temporary cash flows (Jagannathan et al., 2000). Moreover, when EPU rises, a reduction in investment may lead to decreases in future cash flows and stock prices. On the one hand, this motivates firms to repurchase shares to maximise shareholders' benefits according to the market timing theory (Baker & Wurgler, 2002). On the other hand, this heightens investors' risk perception. Firms are driven to boost investor confidence and stabilise stock prices through share repurchases, as they can signal managers' optimistic expectations, although they are not as strong as regular dividends. Furthermore, by adjusting their scales, share repurchases provide firms with additional flexibility when they face rising EPU. This leads to our third hypothesis ($H_{3.3}$) that:

$H_{3.3}$: Changes in EPU and share repurchases are positively associated.

3.3.4 Possible Reasons for Changes in EPU Affecting Payout Policy

As discussed earlier, when the EPU rises, firms suspend investment due to the uncertainty of their investment outcomes. In addition, higher costs of capital, fewer positive-NPV projects in the market, and reduced consumer demand caused by high EPU also contribute to a decline in corporate investment. The reduced investment opportunities lead to surplus cash holdings that were originally set aside for investments. As the excess cash can escalate agency issues, managers are likely to be persuaded by the shareholders (board) to distribute such surplus cash to shareholders. Higher payouts can also help firms stabilise their stock prices during times of uncertainty. This leads to our hypothesis ($H_{3.4A}$) that:

$H_{3.4A}$. The distribution of surplus cash created by reduced investment opportunities during periods of higher EPU leads to an increase in total payouts.

An increase in EPU can signal a decline in expected earnings, hence, in future cash flows. Owing to cash required for pre-committed debt servicing, a possible reduction in future cash flows can increase firms' financial distress risk. Therefore, to avoid distress (i.e. to maintain financial flexibility) during periods of higher EPU, firms may reduce their total payouts and retain cash for precautionary purposes. This is particularly true when managers anticipate a sustained period of higher EPU. In other words, when EPU rises, firms become more financially constrained (i.e., have lower financial flexibility) and therefore tend to be more cautious about their payout policy. This leads to hypothesis ($H_{3.4B}$) that:

$H_{3.4B}$: Managers reduce total payout at the time of increased EPU to minimise the financial distress of the firm.

3.4 Sample and Methodology

3.4.1 Sample

This chapter examines the relation between EPU and payouts of firms listed in five major developed countries: France, Germany, Japan, the UK, and the US. Sample firms consist of available historical constituent lists from 1997, 2002, 2007, 2012, and 2017 for the following indices: France CAC-All, Germany Dax and MDax, Japan Nikkei 225, the UK FTSE-All, and the US S&P 500.[33] After excluding financial institutions and utility firms, the final sample contains 1,959 firms, including 447 French firms,[34] 107 German firms, 202 Japanese firms, 663 British firms, and 540 American firms. Guided by the availability of the UK's BBD index, the sample period covers 1999 to 2022.

This study utilises four indicators to measure a firm's payout: The natural logarithm of changes in the total payout ratio, which assesses the overall payout; the natural

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[33] Historical constituent data for some index–year are unavailable from DataStream. Specifically, the 1997 constituent lists for Germany DAX and France CAC-ALL, as well as the 1997, 2002, and 2007 lists for Japan Nikkei 225, are not provided in Datastream. We include historical constituents in the sample to ensure that it encompasses both long-term survivors and new entrants, thereby mitigating the potential survivorship bias.

[34] In the French CAC-all constituent lists, we exclude IMMOBILIERE HOTEL from the sample because the book leverage ratios of this firm from DataStream were abnormally high from 2011 to 2015. They were 108691.667%, 197094.118%,1135250%,1766000% and 1208466.667%. In 2016, both the assets and debt of this firm were zero. However, we were unable to find other data sources to verify the accuracy of these data. To avoid data errors, we deleted the IMMOBILIERE HOTEL from our sample.

logarithm of changes in the dividend yield, which evaluates the changes in return from dividends relative to the stock price; the natural logarithm of changes in the dividend payout ratio, which measures the percentage of a firm’s income distributed to shareholders; and, finally, the natural logarithm of the common preferred stock redeemed, which measures the changes in share repurchases. These indicators collectively provide a comprehensive view of a firm's payout strategies.[35]

The BBD index, developed by Baker et al. (2016a), proxies EPU. The data are collected from https://www.policyuncertainty.com/all_country_data.html (see Chapter 1 for the details of the index). Since previous changes in EPU may affect the current payout policy, the explanatory variables are changes in the contemporaneous, three-, six-, nine-, and 12-month lagged EPU. The original BBD index is monthly data. We calculate the yearly contemporaneous EPU as the annual percentage changes in the BBD index that match each firm’s fiscal year start month. Changes in the lagged EPU are calculated similarly, but using lags of three, six, nine, and 12 months from the start month of the fiscal year.

Based on previous studies (Fama & French, 2000; Bradley et al., 1998), we control for firm-level characteristics that may affect firms’ payout policies, including profitability, growth opportunities, firm size, retained earnings, and financial constraints. All of them are transformed into changes in natural logarithms to be compatible with the dependent variables. To distinguish the effect of EPU from that of broader macroeconomic conditions, following earlier studies (Almeida et al., 2004; Julio & Ikenberry, 2004), we include the real GDP growth rate in regressions to control for country-level economic conditions. The real GDP growth rate data are collected from

[35] Natural logarithm changes instead of percentage changes of the above variables are used because natural logarithm changes can normalise the data, reducing the impact of extreme payout and improving the comparability across firms.

the OECD database. All other data not explicitly sourced above are from DataStream. The definitions of the variables are in Table 3.3.

[Insert Table 3.3 here]

3.4.2 Descriptive Statistics

Table 3.4 shows that the mean total payout ratio is 8.121, which is higher than the average values of dividend yield, dividend payout ratio, and share repurchase. The standard deviation for the total payout ratio is 112.547, indicating remarkable variation over the years and among firms. The mean values for dividend yield and dividend payout ratio are 3.198 and 6.010, respectively. Their standard deviations are 47.388 and 90.738, suggesting that the dividend payout ratio is more volatile than the dividend yield across observations. In contrast, the mean share repurchases is -0.775. As the share repurchase is measured by the natural logarithm of changes in common preferred redeemed, the negative mean value suggests an average decline in common preferred redeemed. The standard deviation of share repurchases is 207.946, the highest among all variables, indicating a wide range of variability across observations.

The mean $\Delta\%$EPU is 14.237, with a standard deviation of 55.626, indicating significant fluctuations in economic policies across periods and countries. The most prominent change in EPU at 548.015 was observed in UK firms in 2016, possibly triggered by the UK's vote to leave the European Union. Among the lagged EPU measures, the three-month lagged $\Delta\%$EPU shows the greatest deviation (72.033) across periods and countries, followed by the nine-month (59.577), six-month (57.340), and 12-month (55.782) lagged $\Delta\%$EPU.

Among firm-level control and mediator variables, the first difference in free cash flow has the lowest standard deviation at 12.819, while the variable financial constraints has the highest at 81.641. Comparatively, the real GDP growth rate has the lowest standard deviation (2.639) among the control variables. This indicates that firm-level characteristics vary significantly among observations, while the economic growth rate tends to be more consistent across the sample countries.

[Insert Table 3.4 here]

Table 3.5 shows that the correlation coefficient between the total payout ratio and the dividend payout ratio is 0.726, suggesting a positive correlation between changes in these ratios. Changes in share repurchases are also positively correlated with the total payout ratio, with a coefficient of 0.461. On the other hand, the correlation coefficient between the total payout ratio and the alternative dividend payout measure, the dividend yield, is 0.110, indicating a mild correlation between changes in dividend yield and total payout ratio. Δ%EPU is mildly and positively correlated with its three-, six-, and nine-month lags but negatively correlated with its 12-month lag. This suggests that Δ%EPU changes in the opposite direction to its previous year's value. The total payout ratio is positively correlated with Δ%EPU and weakly positively correlated with the three-month lagged Δ%EPU. However, it negatively correlates with the six-, nine- and 12-month lagged EPU, indicating the current and opposite lagged effects between Δ%EPU and total payout. This is similar to the relationship between changes in share repurchases and Δ%EPU, as well as their lags. The dividend payout ratio positively correlates with contemporaneous, three-, six-, nine- and 12-month lagged Δ% EPU. The dividend yield is also positively correlated with contemporaneous Δ%EPU and all its lags, suggesting a consistent positive correlation between them over time. The correlation coefficients between the control and explanatory variables are relatively low, indicating that there is unlikely to be concerns of multicollinearity in the regressions.

[Insert Table 3.5 here]

3.4.3 The Methods of Estimation

This chapter employs two methods to estimate the relationship between EPU and firms' payout policy. The baseline regressions employ OLS estimation with both firm and period fixed effects (Equation 3.1).

$$Payout_{i,t} = c + \alpha\Delta\%EPU_{i,t(-m)} + \beta X_{i,t} + \delta_i + \varepsilon_t + \mu_{i,t} \tag{3.1}$$

$Payout_{i,t}$ are measures of the payout policy. $\Delta\%EPU_{i,t(-m)}$ are the percentage changes of the EPU Index and its three-, six-, nine-, and 12-month lags. $X_{i,t}$ are control variables. δ_i and ε_t are firm and the period fixed effects.

3.4.3.1 IPW regression

IPW is a well-established causal inference method for mitigating selection bias. Recent uncertainty-related research also uses it as a robustness test (Woahid Murad & Rahman, 2025). To address the potential endogeneity and selection bias associated with firms' exposure to Δ%EPU in OLS regressions, we further test the association between EPU and payout policy through IPW regression. The IPW method is chosen for two reasons. First, this is a quasi-experimental method which can mitigate selection bias and improve causal inference. Specifically, firms exposed to high and low EPU shocks may have systematically different firm-level and macroeconomic characteristics. Therefore, directly comparing their payout policies may raise concerns about selection bias if the differences in payout policies are driven by underlying firm-level or macroeconomic characteristics. The IPW method reweights observations based on propensity scores for receiving treatment that is conditional on firm-level characteristics and GDP growth. This allows comparison of payout policies between two groups with more balanced firm-level and macroeconomic characteristics, thereby isolating the effect of EPU shocks. Second, percentage changes in EPU vary across countries, periods, and firms' fiscal years. Because the Δ%EPU is calculated by matching the beginning and ending months of each firm's fiscal year, firms within the same country and calendar year may still be exposed to different EPU shocks. These cross-sectional and temporal variations in EPU shocks allow us to construct control and treatment groups within the IPW regression framework. Overall, the nature of the research questions and heterogeneity in EPU shock exposure make IPW regression an appropriate method for this analysis.

The IPW regressions involve four steps. First, we group observations into treatment and control groups. Δ%EPU thresholds are used to categorise the observations according to the magnitude of EPU shocks. The treatment groups contain observations that experience high EPU shocks, while the control groups include those with comparably lower EPU shocks. However, there is no universally accepted definition of exactly what magnitude accounts for a 'high' EPU shock. Therefore, this chapter sets four thresholds: 60%, 70%, 80%, and 90% of the Δ%EPU distribution. The 90% and 80% threshlds capture extremely high EPU shocks, while 60% and 70% quantiles indicate above-average but comparably mild growth in EPU. Observations with Δ%EPU values greater than or equal to the threshold are classified as the treated group, representing relatively high EPU growth. In contrast, observations with Δ%EPU values below the thresholds are categorised as the control group, indicating low Δ%EPU. Use of four alternative thresholds is motivated by both economic and econometric considerations. Economically, firms may respond heterogeneously to different magnitudes of EPU rises. For instance, a significant rise in EPU could lead firms to adopt more cautious payout policies due to a heightened precautionary motive. Conversely, if EPU changes only slightly, signalling or monitoring motives may be more dominant. Econometrically, using four thresholds enables us to examine whether the results of IPW regressions are robust across different treatment-control grouping points, reducing the possibility of the results being biased by a single arbitrary threshold. In addition, the impact of EPU on payout policy across different thresholds helps us to examine the sensitivity of the dividend policy to various levels of 'high' EPU shocks.

In the second step, we estimate the logistic regression (Equation 3.2) to predict the propensity scores. The dependent variable is binary, taking a value of 1 if Δ%EPU values fall within the top 60%, 70%, 80%, or 90% percentiles, and zero otherwise. The explanatory variables include changes in profitability, growth opportunities, retained earnings, financial constraints, and real GDP growth rate. We control for the year effect but not the country effect in the logistic regression because the logistic regression includes the real GDP growth rate, which captures cross-country differences. We employ the nearest neighbour method with a calliper of 0.05 to match treated and control observations.

$$\log\left(\frac{p_{treated}}{1 - p_{treated}}\right) = \beta X_{i,t} + \varepsilon_t + \mu_{i,t} \tag{3.2}$$

$X_{i,t}$ are explanatory variables, and ε_t period effects. The observations with Δ%EPU values above the threshold belong to the treatment group.

The third step is to calculate the propensity scores using Equation 3.3. $p_{treated}$ is the propensity score of this group. $1 - p_{treated}$ is the propensity score of the control group.

$$p_{treated} = \mathrm{p}_r\left(treatment_{i,t} = 1 \middle| X_{i,t}, \varepsilon_t\right) \quad (3.3)$$

Finally, we estimate Equation 3.4 using the weighted least squares method with inverse probability weights.

$$Payout_{i,t} = c + \alpha \Delta\%EPU_{threshold_{i,t(-m)}} + \beta X_{i,t} + \mu_{i,t} \quad (3.4)$$

$\Delta\%EPU_{threshold_{i,t(-m)}}$ are treatment variables equal to 1 for treated groups and 0 otherwise. The thresholds are 60%, 70%, 80%, and 90%. The subscript "m" represents the lag of $\Delta\%$EPU at 3, 6, 9, and 12 months, respectively. To ensure the treated and control groups have similar characteristics, the IPW regression assigns higher weights to observations with lower probabilities of treatment and lower weights to those with higher probabilities of treatment. The weight for the treated group is:

$$weight_{treated} = \frac{1}{p_{treated}} \quad (3.5)$$

The weight for the control group is:

$$weight_{control} = \frac{1}{1 - p_{treated}} \quad (3.6)$$

3.4.3.2 Mediation test

This chapter employs Baron and Kenny's (1986) mediation test to examine the mediation effects of free cash flow and financial constraints on the EPU-payout relationship. The mediation tests follow four steps. The first step is to regress the dependent variable on the independent and control variables (excluding mediators) to confirm that the independent variables can significantly predict the dependent variable. The second step is to estimate whether the independent variable significantly predicts the mediator, as in Equation 3.7. If there is a significant association between the mediator and the independent variable, it proceeds to the next step. The third step is estimating Equation 3.8, which regresses the dependent variable on both the dependent variable and the mediator in a single regression. If the mediator is significantly associated with the dependent variable, the mediation effect exists. The last step is to determine whether the mediation effect is partial or complete. If the mediator is significantly associated with the dependent variable but the dependent variable is insignificant in Equation 3.8, then complete mediation exists. On the other hand, if the independent variable is still significant, it indicates a partial mediation effect.

$$M_{i,t} = c + \rho\Delta\%EPU_{i,t} + \beta X_{i,t} + \delta_i + \varepsilon_t + \mu_{i,t} \tag{3.7}$$

$$\mathrm{L}nReturn_{i,t} = \mathrm{c} + \alpha\Delta\%EPU_{i,t} + \beta X_{i,t} + \rho M_{i,t} + \delta_i + \varepsilon_t + \mu_{i,t} \tag{3.8}$$

M_{it} is the mediator, including free cash flow and financial constraints. X_{it} are control variables.

3.5 The Results of OLS Regressions

3.5.1 The Impact of EPU on Total Payout

Table 3.6 shows a significant positive association between percentage changes in EPU and the total payout ratio. Additionally, the six-month lagged Δ%EPU is positively related to the total payout ratio at the 1% significance level. This suggests that increases in EPU are associated with a rise in total payout ratio, supporting Hypothesis $H_{3.1}$. The results are consistent with Farooq and Ahmed (2019) and Li et al. (2024), who have suggested that high EPU is associated with higher dividend payouts. In contrast, the 12-month lagged Δ%EPU is negatively related to changes in the total payout ratio. This implies that firms tend to reduce their total payout ratios one year after an increase in EPU, possibly reflecting lower earnings and the need to retain cash for precautionary purposes during periods of sustained increase in EPU. Although firms may initiate share repurchases at an early stage of EPU rises, they may subsequently suspend or reduce these activities, leading to a lower total payout ratio.

Among the control variables, changes in firms' profitability, firm size, and retained earnings are negatively associated with changes in the total payout ratio at a 1% significance level. This suggests that increases in firms' retained earnings and profitability are associated with decreases in their total payout ratio, which is consistent with the findings of Fazzari et al. (1987), who argue that profitable firms prefer reinvestment over payouts. Table 3.6 also shows a negative association between asset growth and changes in total payouts, which is consistent with the results of Fama and French (2001). Furthermore, the results in Table 3.6 suggest a negative association between changes in the interest coverage ratios and total payout ratio, implying that firms with a stronger ability to repay debt (lower financial constraint levels) tend to distribute less to their shareholders. This may be because firms with higher interest coverage ratios usually have better financial health. Therefore, they may prioritise reinvestment (Fazzari et al., 1987) over payouts when allocating earnings. Conversely, firms with higher financial constraints are likely to distribute more to shareholders to signal their confidence and attract external funding in the market. Moreover, both growth opportunities and real GDP growth are positively and significantly correlated with the total payout ratio. This suggests that firms with more growth opportunities and operating in countries with higher economic growth tend to pay out more, consistent with previous studies (Fama & French, 2001; Julio & Ikenberry, 2004). In summary, Table 3.6 suggests a positive association between Δ%EPU and total payout ratio. The results hold after controlling for firm-level characteristics and real economic growth, supporting Hypothesis $H_{3.1}$.

[Insert Table 3.6 here]

3.5.2 The Results of the Impact of EPU on Dividends

We use changes in the dividend payout ratio and yield to measure the dividend payout from the absolute portion of a firm's dividend to its net income and the comparative return of the dividend to the stock price. In the empirical test, we examine the impact of EPU on these two indicators separately.

3.5.2.1 The Impact of EPU on the Dividend Payout Ratio

Panel A of Table 3.7 shows that changes in the contemporaneous, three-, and six-month lagged Δ%EPU are significantly and positively associated with changes in dividend payout ratios. The results align with those from Farooq and Ahmed (2019) and Anolick et al. (2021), who argue that EPU is positively associated with dividends or share repurchases. However, the nine- and the 12-month lagged Δ%EPU are not significantly correlated with changes in the dividend payout ratio. The results suggest that EPU rises are associated with increases in dividend payout ratio, even after a six-month time lag. The insignificant coefficients of the nine- and 12-month lagged Δ%EPU suggest that the effect of EPU on the dividend payout is mainly short-term and weaker in the long-term. This partially supports Hypothesis $H_{3.2}$.[36]

3.5.2.2 The Results of the Impact of EPU on the Dividend Yield

Estimates reported in Panel B of Table 3.7 suggest a positive association between percentage changes in EPU and changes in the dividend yield. Specifically, percentage changes in the contemporaneous, three-, six-, nine-, and 12-month lagged EPU are positively associated with changes in dividend yield at the 1% significance level. This suggests that firms are likely to increase their dividend yields when EPU rises, consistent with the results from Attig et al. (2021). In other words, the relative return from dividends increases compared with capital gain during periods of EPU increases. The results provide additional support for Hypothesis $H_{3.2}$.

In summary, the results in Table 3.7 suggest a positive association between Δ%EPU and changes in dividends (both dividend payout ratio and dividend yield). Specifically, changes in dividend payout ratios are positively associated with contemporaneous, three-, and six-month lagged Δ%EPU, while changes in dividend yields are positively associated with Δ%EPU and lagged Δ%EPU. These results provide evidence in support of Hypothesis $H_{3.2}$.

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[36] We also test the impact of EPU and lagged EPU on the payout ratio per share, which is the ratio of dividend per share to earnings per share. The dividend per share excludes special dividends but includes extra dividends, which are closer to the regular dividends. The results suggest that the three-month lagged EPU is positively associated with changes in the dividend payout ratio per share at the 1% significance level. This implies that firms tend to increase their dividend payout ratios after three months of an EPU rise. This aligns with Hypothesis $H_{3.2.}$ Conversely, nine- and 12-month lagged EPU are negatively correlated with the dividend payout ratio, which is consistent with our expectations in the hypothesis development section. The reason might be that firms increase their dividend payout ratio during short-term uncertainty to signal confidence. However, over time, they may lower the dividend payout ratio to meet operating capital needs or retain earnings for future investments. The detailed results are in Appendix 3C.1.

[Insert Table 3.7 here]

3.5.3 The Impact of EPU on Share Repurchases

The results reported in Table 3.8 show that changes in share repurchases are positively associated with Δ%EPU at the 1% significance level. This suggests that firms tend to increase their share repurchases when EPU rises, consistent with the findings of Anolick et al. (2021) and Huang et al. (2023). This supports Hypothesis $H_{3.3}$. However, the coefficients of the six-, nine-, and 12-month lagged Δ%EPU are significantly negative, indicating that firms tend to reduce their share repurchases after an extended increase in EPU. This is likely because when EPU rises, firms initially distribute surplus cash to shareholders. However, if the increase in EPU persists, they retain earnings for precautionary purposes, causing a statistically negative association between changes in share repurchases and the lagged Δ%EPU.

In summary, Table 3.8 suggests a contemporaneous positive association between changes in EPU and share repurchases. However, the effect becomes negative when changes in EPU extend more than 6 months. The results partially support Hypothesis $H_{3.3}$.

[Insert Table 3.8 here]

3.6 Propensity Score Matching (PSM) and Inverse Probability Weighting (IPW)

3.6.1 Results of PSM Based on EPU Thresholds

Table 3.9 presents the summarised PSM matching quality across thresholds for Δ%EPU and its lags. The detailed matching quality tables, containing all covariates, are reported in Appendix 3A. The table shows that the Pseudo R^2 values are minimal across EPU thresholds, indicating no significant differences between the covariates of low (control) and high Δ%EPU (treated) groups. This suggests a good balance between the treated and control groups. The likelihood ratio (LR) Chi^2 statistic is insignificant at the 80% and 90% Δ%EPU thresholds, indicating that matching reduces group differences. The total standardised biases range from 4.6 at the 80% Δ%EPU threshold to 9.3 at the 70% Δ%EPU threshold, showing that covariate balance is best achieved at the 80% threshold. The variance ratios range from 0.85 at the 80% threshold to 1.04 at the 70% threshold, close to the ideal value of 1. Additionally, the percentage of variables falling outside the acceptable range is 50% at the 80% threshold, 67% at the 70% threshold, 83% at the 90% threshold, and 100% at the 60% Δ%EPU threshold. Overall, Δ%EPU achieves the best matching at the 80% threshold. Although the LR Chi^2 at the 80% threshold is insignificant, this may also indicate a high matching quality as covariates no longer distinguish between the treated and control groups. Additionally, the 80% threshold achieves the lowest mean and total standardised bias, as well as the smallest percentage of variance outside the acceptable range among the four thresholds.

For the three-month lagged Δ%EPU, pseudo R^2 values at the 60%, 70%, 80%, and 90% thresholds are approaching zero. This indicates that the covariates of the treated and control groups are not significantly different and that there is a good balance between them. The LR-Chi^2 statistics are significant at the 60%, 70% and 90% three-month lagged Δ%EPU thresholds. The total standardised bias is 5.2 at the 80% threshold, the smallest among the four thresholds, indicating the best covariate balance is achieved at this threshold. Inversely, the total bias at the 90% threshold is 12.6, the largest among the three-month lagged Δ%EPU thresholds. The variance ratio at the 90% threshold is 0.91, the closest to 1 (the ideal value) among all variance ratios across the three-month lagged Δ%EPU thresholds. In contrast, the variance ratios at the 60% and 80% thresholds exceed 1, suggesting that the variances of the treated groups are greater than those of the control groups after matching. The percentage of variables falling outside the acceptable range is 50% at the 90% threshold, the lowest across the four thresholds. The number of treated observations decreases as thresholds escalate. Comparing the matching quality of the four thresholds for the three-month lagged Δ%EPU, the 80% threshold yields the best results, as it has the lowest mean, median, and standardised bias, and a comparably large sample size. The LR Chi² value and the low predictive power of the covariates ($p = 0.385$) at the 80% threshold may suggest weak differentiation, implying that the covariates no longer effectively predict treatment assignment. Combined with the zero Pseudo R^2 value and low bias, the low LR Chi² value suggests effective matching between the treated and control groups at the 80% three-month lagged Δ%EPU threshold[37].

For the six-month lagged Δ%EPU, the Pseudo-R^2 values approach zero at the 60%, 70%, 80%, and 90% thresholds, indicating an effective balance in matching. The LR Chi² statistics are insignificant at the 80% and 90% thresholds. The highest total standardised bias is 7.2 at the 60% threshold, while the lowest is 4.2 at the 80% threshold. This indicates that the balance between the treated and control groups is best at the 80% threshold. The variance ratio at the 90% threshold is 0.86, slightly below the ideal value of 1. The variance ratios range from 1.04 to 1.07 at the 60%, 70% and 80% thresholds, indicating a potential overbalancing. The variance ratios round 1 across the four six-month lagged Δ%EPU thresholds suggest that the covariates between the treated and control groups are comparable after matching. Then, 67% of variables fall outside the acceptable range at the 60% threshold, while 83% fall outside the acceptable range at the 70%, 80% and 90% thresholds. The matching quality at the

[37] The LR Chi² value and the low predictive power of the covariates could suggest that the logistic regression used for propensity score estimation does not capture significant differences between control and treated groups, but it could also suggest that the treated and control groups are well-matched. Therefore, their indication needs to be assessed using the pseudo R^2 value and bias.

80% threshold is optimal due to the lower bias, better balance, and reasonable sample sizes for both the treated and control groups.

When we use 60%, 70%, 80%, and 90% of the nine-month lagged Δ%EPU thresholds to classify the treated and control groups, the Pseudo-R^2 approaches zero. This suggests a good balance of covariates after matching across the four nine-month lagged Δ%EPU thresholds. The LR Chi^2 statistics are significant at the 70% and 80% thresholds. The variance ratios are 0.88 and 0.89 at 60% and 70% thresholds, respectively, while the variance ratio is only 0.79 at the 80% threshold. The lowest total standardised bias is 4.5 at the 60% threshold, while the highest is 11.3 at the 70% threshold. Then, 67% of variables fall outside the acceptable range at the 70% threshold, and 83% fall outside 60% and 80% thresholds. Overall, the matching quality at the 60% of the nine-month lagged Δ%EPU threshold is the best among the four thresholds, with the lowest mean bias of 1.7, the lowest total standardised bias of 4.5, and a zero Ps R^2 statistic.

When matching is based on the 60%, 70%, 80%, and 90% of the 12-month lagged Δ%EPU thresholds, the Pseudo-R^2 values are close to zero, with the lowest value at the 70% and 80% thresholds. This indicates that the matching balances are good at all thresholds and are best at the 70% and 80% of the 12-month lagged Δ%EPU thresholds. Moreover, the LR Chi^2 statistics fall across the thresholds and are insignificant at the 70%, 80% and 90% thresholds. The total standardised biases of matching are from 3.4 (at the 70% threshold) to 6.7 (at the 60% threshold). This suggests the covariate balance is best achieved at the 70% threshold. The variance ratio at the 70% threshold is 1.02, closest to the ideal value of 1. At the same time, the variance ratio at the 80% threshold is 0.92, close to the ideal value. Then, 67% of variables fall outside the acceptable variance ratio at the 80% and 90% thresholds, while 83% fall outside the acceptable variance ratio at the 70% threshold. Although

80% and 90% thresholds have better %variable outside range than the 70% threshold, considering the trade-off among the measurements, the matching quality at the 70% of the 12-month lagged Δ%EPU threshold is the best, as it achieves the lowest mean and total standardised bias, and the best variance ratio.

Overall, as shown in Table 3.9, the covariate balance between the treated and control groups after matching is good across Δ%EPU and lagged Δ%EPU. However, the thresholds with the best matching quality vary across the contemporaneous, three-, six-, nine-, and 12-month lagged Δ%EPU.

[Insert Table 3.9 here]

3.6.2 Results of IPW Regressions

Although the matching qualities are good, not all variables fall into the acceptable ranges in balance tests, as shown in Table 3.9, indicating that the matchings do not achieve full balance. Additionally, the overlaps between the treated and control groups across all Δ%EPU and lagged Δ%EPU thresholds are acceptable (See Appendix 3B). Therefore, we weight observations by their propensity scores to address the residual imbalance using IPW regression.

3.6.2.1 Results of IPW Regression of Total Payout Ratio on EPU

To ensure the simplicity and clarity of the IPW-based results to the readers, in Table 3.10, we report the results of Δ%EPU and its lags, dependent variables (total payout ratio, dividend payout ratio, dividend yield, and share repurchases), and key IPW regression tests.

The results in Table 3.10 show that the coefficient of Δ%EPU on the total payout ratio is significantly positive across four thresholds. These results align with the baseline regression results reported in Table 3.6 and the findings reported by Farooq and Ahmed (2019) and Li et al. (2024). This suggests that the positive correlation between changes in EPU and the total payout ratio is robust and insensitive to EPU thresholds. The three-month lagged Δ%EPU is significantly positive at 60% and 80% thresholds. However, this relationship is not significant at the other two thresholds. These results indicate that firms that experienced increases in EPU above 60% and 80% thresholds in the previous three months tend to exhibit increases in their total payout ratio. The coefficients of the six-month lagged Δ%EPU are significantly positive at the 80% and 90% thresholds, but insignificant at the other two thresholds. These results suggest that firms that experienced substantial increases in EPU above 80% and 90% thresholds in the previous six months exhibit a more pronounced increase in the total payout ratio. The coefficients of nine-month lagged Δ%EPU are significantly positive at 70%, 80%, and 90% thresholds, suggesting that firms experiencing more pronounced increases in EPU above these thresholds tend to show larger increases in total payouts after a nine-month delay. The 12-month lagged EPU is significantly negative at the 60% threshold, but the coefficients become positive at 80% and 90% thresholds. These results suggest that the relationship between 12-month lagged EPU and the total payout ratio varies across thresholds of Δ%EPU. Specifically, firms that experience relatively mild increases (above the 60% threshold) in EPU are likely to show lower growth[38] in their total payout after 12 months. However, if firms experience substantial increases in EPU, specifically above 80% and 90% thresholds, they are likely to exhibit a more pronounced increase in payout ratios after a 12-month delay.

[38] As the means of ln changes in the total payout ratio are positive for both control and treated group across thresholds of 12-month lagged Δ%EPU. The negative coefficient of the 12-month lagged Δ%EPU on ln changes in total payout ratio is interpreted as slower growth rather than a decline in the total payout ratio.

Altogether, the results presented in Table 3.10 indicate that changes in the contemporaneous EPU are positively associated with changes in the total payout ratio. This correlation is robust across EPU thresholds, supporting Hypothesis $H_{3.1}$. Interestingly, even with a few months' delay, firms are likely to exhibit a larger increase in their total payout ratio when previous EPU levels rise substantially. This behaviour may be due to firms being more strongly incentivised by signalling and monitoring motives when facing substantial increases in EPU.

[Insert Table 3.10 here]

3.6.2.2 Results of the IPW Regression on the Impact of EPU on the Dividend Policy

3.6.2.2.1 Results of IPW Regression of Dividend Payout Ratio on EPU

Table 3.11 shows that the coefficients of contemporaneous Δ%EPU on the dividend payout ratio are positive at the 60%, 70% and 80% thresholds. This suggests that observations with EPU increases above the 60%, 70%, and 80% thresholds exhibit a larger increase in their dividend payout ratio. The three-month lagged Δ%EPU is significantly positive across all thresholds. This suggests that firms that experienced a larger increase in EPU in the previous three months show a more pronounced increase in dividend payout ratio. Additionally, the six-month lagged Δ%EPU is significantly positive across all thresholds. This indicates that firms experiencing larger increases in EPU over the previous six months show more substantial increases in the current dividend payout ratio. This positive correlation is consistent, regardless of EPU thresholds. Furthermore, the nine- and 12-month lagged Δ%EPU are significantly positive only at the 80% and 90% thresholds. This suggests that if firms experienced substantial increases in EPU in the previous nine or 12 months, their current dividend payout ratio is likely to increase more sharply. These results are consistent with previous studies (Farooq & Ahmed, 2019; Qian, 2023; Hoang et al.,2024). Overall, the results in Table 3.11 indicate a strong and positive association between changes in the dividend payout ratio and changes in the contemporaneous, three-month, and six-month lagged EPU, supporting Hypothesis $H_{3.2}$. However, the positive association is more sensitive to thresholds for the nine- and 12-month lagged Δ%EPU.

[Insert Table 3.11 here]

3.6.2.2.2 Results of IPW Regression of the Dividend Yield on EPU

Table 3.12 suggests that the coefficients of Δ%EPU on the dividend yield are significantly positive at the 60%, 70%, and 90% thresholds, indicating that firms experiencing larger increases in EPU above these thresholds show more pronounced increases in the dividend yield. These results align with the OLS regression results and those from Attig et al. (2021), supporting Hypothesis $H_{3.2}$. Similarly, the coefficient on the six-month lagged Δ%EPU is significantly positive at the 60% threshold. However, most coefficients on lagged Δ%EPU are significantly negative in dividend yield regressions. Specifically, the three-month lagged Δ%EPU is significantly negative at the 80% and 90% thresholds; the nine-month lagged Δ%EPU is significantly negative at the 60%, 70%, and 80% thresholds; and the 12-month lagged EPU is significantly negative at the 60%, 70%, and 80% thresholds. These results indicate that the lagged effect of EPU on the dividend yield is mixed and sensitive to thresholds. The results on the relationship between percentage changes in lagged EPU and the dividend yield, obtained from the OLS and IPW methods, show significant differences. First, in the OLS regressions, the coefficients on Δ%EPU lags are consistently positive and statistically significant (See Table 3.7). In contrast, in IPW regressions, the signs of these coefficients are opposite, and significance levels vary across lag specifications and thresholds (See Table 3.12). Second, the standard errors for lagged EPU in the OLS regressions are smaller than those in the IPW regressions. Third, the adjusted R-squared values in the OLS regressions range from 0.026 to 0.040.

In contrast, the R-squared values in the IPW regressions range from 0.003 to 0.027. The distinctions between the OLS and IPW approaches might be the reason for these differences. The OLS estimation focuses on the correlation between the Δ%EPU and dividend yield using all available data points. In contrast, the IPW highlights the causal effect by assigning weights to treated and control groups. However, because using the weighting method balances covariates and infers causal effects, the IPW estimation may have larger standard errors. Moreover, the relatively smaller adjusted R-squared values in the IPW than those in the OLS models demonstrate that the IPW estimation prioritises causality over maximising explained variance. Overall, Table 3.12 demonstrates a positive association between changes in the contemporaneous EPU and the dividend yield. The results are consistent with the OLS regression results in Table 3.7, providing robust support for Hypothesis $H_{3.2}$. However, the relationships between changes in lagged EPU and the dividend yield are less robust across approaches and thresholds.

[Insert Table 3.12 here]

3.6.2.3 Results of IPW Regression of Share Repurchases on EPU

Table 3.13 shows that the coefficient of the Δ%EPU is positive at the 60%, 70% and 80% thresholds at the 1% significance level, indicating that firms experiencing EPU increases above 60%, 70%, and 80% show more substantial increases in share repurchases, consistent with baseline regressions and supporting Hypothesis $H_{3.3}$. However, the coefficient of Δ%EPU is insignificant at the 90% threshold. The three-month lagged Δ%EPU is significantly positive at 60%, 70%, and 80% thresholds, but it becomes significantly negative at the 90% threshold, suggesting that firms experiencing extremely large increases in EPU above 90% exhibit more pronounced declines in share repurchases after a three-month delay. A possible reason is that firms that have experienced substantial EPU increases above the 90% threshold in the previous three months are likely to reserve cash and stop or reduce share repurchases for precautionary purposes. The six-month lagged Δ%EPU is significantly negative at 60% and 70% thresholds and insignificant at the other two thresholds, suggesting that firms with larger increases in EPU above 60% and 70% exhibit greater declines in share repurchases with a six-month delay. The nine-month lagged Δ%EPU is significantly negative at 60% and 80% thresholds, but significantly positive at the 90% threshold, suggesting that firms experiencing exceptionally large growth in EPU (above the 90% threshold) may substantially increase their share repurchases after nine months. on the other hand, firms experiencing increases in EPU above the 60% and 80% are likely to reduce share repurchases with a nine-month delay. The 12-month lagged Δ% EPU is negative and statistically significant across four thresholds, suggesting that firms experiencing large increases in EPU above 60% and all higher thresholds show a larger decline in share repurchases after 12 months.

Altogether, the results in Table 3.13 suggest that contemporaneous Δ% EPU is positively associated with share repurchases, consistent with Anolick et al. (2021) and Huang et al. (2023). The 12-month lagged Δ% EPU is inversely correlated with changes in share repurchases in both the OLS and IPW regressions, indicating a robust inverse association. However, the associations between share repurchases and the three-month, six-month, and nine-month lagged Δ% EPU are threshold-sensitive. These results are consistent with baseline regressions and partially support Hypothesis $H_{3.3}$.

[Insert Table 3.13 here]

As reported in Tables 3.10 to 3.13, the IPW regression results provide evidence of robustness in partially supporting Hypotheses $H_{3.1}$, $H_{3.2}$, and $H_{3.3}$, suggesting that increases in EPU are generally associated with higher dividend payout ratios and dividend yields. However, the effect of EPU on share repurchase may vary across time lags and EPU thresholds.

3.7 Results of Mediation Tests

Table 3.14 reports the total effect of Δ%EPU on the total payout ratio excluding mediators. The results show that contemporaneous, three-, and six-month lagged Δ% EPU are significantly and positively associated with changes in the total payout ratio when excluding mediators. Inversely, the 12-month lagged Δ%EPU is significantly negatively correlated to changes in the total payout ratio.

[Insert Table 3.14 Here]

3.7.1 The Mediation Test on Free Cash Flows

When EPU rises, firms that have accumulated more free cash earlier are more likely to distribute it to shareholders to mitigate agency problems. Consequently, firms' current free cash flow declines. Accordingly, the mediation test for free cash flow adopts a timing-based mechanism. Specifically, the first step examines whether Δ%EPU and its lags can predict current free cash flows. The second step tests whether lagged free cash flows, together with Δ%EPU, are associated with changes in the total payout ratio. This timing structure reflects the idea that during periods of higher EPU, free cash flow initially increases due to the decline in investment. The excess cash is then distributed to shareholders for monitoring purposes, leading to higher payouts and reduced free cash. However, if the higher EPU persists, the managers may like to retain more cash to minimise financial distress. The results reported in Panel A of Table 3.15 show that while the effects of the contemporaneous and three-month lagged Δ%EPU on percentage changes in free cash flow remain insignificant, the six- and nine-month lagged Δ%EPU have significant and positive effects. This suggests that firms tend to hold more free cash after six or nine months of EPU rises. On the other hand, the results in Panel B indicate that the changes in the one-period lagged free cash ratio are significantly positive across models (6)-(10), suggesting that the firms experienced increases in free cash in the previous period payout more currently. Although the coefficients of the contemporaneous and three-month lagged Δ%EPU do not decline after including the mediator, the coefficient of the six-month lagged Δ%EPU decreases from 0.4 to 0.34, suggesting a partial and primarily delayed mediating effect. Taken together, the results in Panels A and B provide evidence consistent with the free cash flow channel in supporting Hypothesis $H_{3.4A}$. Specifically, heightened EPU is likely to increase firms' free cash flows, especially due to reduced investments. Firms tend to distribute part of this increased free cash to mitigate agency problems.

[Insert Table 3.15 Here]

3.7.2 The Mediation Test on Financial Constraints

The results in Panel A of Table 3.16 show that the contemporaneous, three-, six-, and nine-month lagged Δ%EPU are negatively associated with changes in the interest coverage ratio, suggesting that firms are more financially constrained following increases in EPU. The results in Panel B suggest that contemporaneous and six-month lagged Δ%EPU are significantly and positively associated with the total payout ratio when financial constraints are included. In contrast, three- and nine-month lagged Δ%EPU are not significantly correlated with the total payout ratio in models (7) and (9), and 12-month lagged Δ%EPU is negatively associated with the interest coverage at only10% significant level. Meanwhile, the interest coverage ratio is negatively associated with the total payout ratio across all models, indicating that firms with lower interest coverage ratios (i.e., higher financial constraint levels) pay out more, which contradicts the prediction of the precautionary motivation but is consistent with the finding of Qian (2023). A possible reason is the precautionary borrowing associated with high EPU (See Chapter 2 for the effect of EPU on leverage). Specifically, firms that paid out more retained earnings and held less internal cash tend to rely more on debt, resulting in a lower interest coverage ratio. Another possible explanation is that signalling motivation outweighs the precautionary motivation, as firms tend to increase payouts even when they are more financially constrained during periods of high EPU. Firms are more strongly motivated to increase payouts to signal their optimistic expectations for future performance. In addition, the coefficient on contemporaneous Δ%EPU declines from 0.48 in the total effect to 0.039 in the mediation test, while the coefficients on the nine-month lagged Δ%EPU are generally unchanged, indicating that financial constraints play a partial mediating role. Overall, the results do not support Hypothesis $H_{3.4B}$, which suggests that the aggravated financial constraints during periods of high EPU reduce the total payout. Instead, the results suggest that the signalling motive may outweigh the precautionary motive in firms' payout decisions during periods of heightened EPU. Therefore, the results provide limited evidence that financial constraints serve as a channel but operate in the opposite direction to the prediction of the precautionary motives.

[Insert Table 3.16 Here]

3.7.3 The Joint Effect of Two Mediators

To further examine the joint effects of the two mediators, we include them in a single regression together with Δ%EPU, and the results are reported in Table 3.17. Consistent with Table 3.14-3.16, the contemporaneous and six-month lagged Δ%EPU are significantly and positively associated with the total payout ratio, aligning with Hypothesis $H_{3.1}$. In contrast, the 12-month lagged Δ%EPU is significantly and negatively related to changes in the total payout ratio. In mediators, changes in previous free cash flows are significantly and positively associated with changes in the total payout ratio across models (1)-(5) in Table 3.17, suggesting firms with more free cash flows in the previous period tend to payout more in this period. Whereas changes in financial constraints are significantly and negatively associated with changes in the total payout ratio across all models in Table 3.17, suggesting that firms tend to pay out more even when financial constraints deteriorate during periods of high EPU. These effects are consistent with those in Tables 3.15 and 3.16, suggesting that EPU may affect the payout policy through both free cash flow and financial constraints. Overall, the positive association between changes in the EPU and the total payout ratio in the contemporaneous and six-month lagged Δ%EPU suggests that firms may increase total payouts to monitor managers and stabilise stock prices in the short term. However, when the increase in EPU persists over a longer period, firms tend to reduce payouts, as presented by the negative coefficient on 12-month lagged EPU. This suggests firms tend to be more cautious on payouts when increases in EPU are extended for a long period. This is consistent with the precautionary motive, which predicts firms retaining more cash for flexibility under prolonged uncertainty.

[Insert Table 3.17 here]

3.8 Results of Robustness Tests

During the sample period, the global economy experienced two worldwide shocks, the global financial crisis in 2007-2008 and the COVID-19 pandemic. To assess whether the results are robust to these two global shocks, this section examines the effect of EPU on the total payout ratio while controlling for dummy variables that represent these two shocks. The dummy variable proxying the global financial crisis equals 1 for 2007 and 2008 and 0 otherwise. The COVID-19 dummy equals 1 for 2020, 2021, and 2022 and 0 for other years.

The results reported in Panel A of Table 3.18 show that the contemporaneous and six-month lagged Δ%EPU are significantly and positively associated with changes in the total payout ratio, whereas 12-month lagged Δ%EPU are significantly but negatively correlated with changes in the total payout ratio after controlling for the global financial crisis and COVID-19. The three- and nine-month lagged Δ%EPU remain insignificant. These results are consistent with those of the baseline regressions in Table 3.6.

The results in Panel B of Table 3.18 suggest that six-month lagged Δ%EPU are significantly and positively associated with changes in the dividend payout ratio. Whereas the contemporaneous, three-, nine-, and 12-month-lagged Δ%EPU are insignificant. The results are broadly consistent with those reported in Table 3.7.

The results in Panel C of Table 3.18 show that contemporaneous Δ%EPU is significantly and positively associated with changes in share repurchases after controlling for the global financial crisis and COVID-19. In contrast, three-, nine-, and 12-month lagged Δ%EPU are significantly negative. The results are consistent with those in Table 3.8.

To sum up, the effects of Δ%EPU on changes in the total payout ratio, dividend payout ratio, and share repurchases remain broadly unchanged after controlling for the global financial crisis and COVID-19 pandemic, indicating the main findings are robust to these two shocks.

[Insert Table 3.18 Here]

3.9 Conclusions

By examining year-firm data from listed firms in France, Germany, Japan, the UK, and the US from 1999 to 2022, this chapter reveals three findings. First, changes in

EPU and total payout ratios are positively associated. The association hold even after controlling for country-level real GDP growth rates and firm-level characteristics, including profitability, firm size, growth opportunities, retained earnings, and financial constraints. The results are robust across OLS and IPW methods, before and after controlling for the global financial crisis and COVID-19, and at various EPU thresholds.

Second, firms are likely to increase their dividend payout ratio and dividend yield when EPU increases. Simultaneously, firms tend to repurchase shares in the short term when EPU rises. These findings are broadly consistent with those from the total payout ratio analysis.

Finally, the mediation tests suggest that free cash flow is a channel through which firms increase payouts. This is consistent with monitoring and signalling motives. Specifically, firms tend to increase payouts in response to increases in EPU, thereby monitoring managers and stabilising stock prices. On the other hand, evidence provides limited support for the financial constraint channel through which firms increase payouts even as they become more financially constrained during periods of heightened EPU, suggesting that the signalling motive may dominate payout decisions.

Table 3.1 Summary of Selected Studies on the Effect of Macroeconomic Factors on Corporate Payout Policy

This table summarises studies on the effect of macroeconomic factors on corporate payout policy, including the mechanisms, main results and methods.

Macroeconomic Factor	Mechanism / Explanation	Impact on Payout Policy	Supporting Studies: methods
Economic growth	Higher economic growth improves firms' growth opportunities, profitability, and earnings capacity	Firms in high-growth economies tend to pay higher dividends	Aivazian et al. (2003): pool OLS
Economic cycles/conditions	Economic downturns increase liquidity risk and financing constraints, encouraging firms to preserve cash; during economic downturns, firms have more financial resources due to decreased investment opportunities, stock prices decrease, and firms prefer more flexible payout methods, motivating more share repurchases	Firms reduce dividends and retain more cash during downturns; share repurchases become more common than dividends during adverse economic conditions	Almeida et al. (2004): two-stage estimations on panel data; Hamouda (2021): Granger linear causality test, non-linear causality test, and VAR estimations; Sodhi et al. (2023): Tobit regressions
Tax policy	Lower taxes on dividends and capital gains increase the attractiveness of payouts to investors Share repurchases may be more tax-efficient than dividends	Firms are more likely to initiate or increase dividends when dividend taxes decrease Firms may prefer repurchases over dividends	Julio and Ikenberry (2004): comparing the changes in dividend payers before and after the Bush tax cut Brav et al. (2005): Survey
Monetary policy	Restrictive monetary policy widens the interest rate gap between internal and external funds, and firms tend to use more internal funds; accommodative monetary policy decreases financial constraints, cost of capital, firm value, and investment opportunities, leading to more free cash flow and lower price, which encourages share repurchases; however, rich-cash firms are less profitable and their investment are less likely to be stimulated by an accommodative monetary policy	Restrictive monetary policy is negatively associated with payouts; in contrast, accommodative monetary policy encourages share repurchases; rich-cash firms increase dividends during an accommodative monetary policy	Pandey and Bhat (2007): GMM; Wang (2020): Tobit and Probit regressions; Zago (2020): panel fixed effect regressions and the two-stage least squares; Pazarbasi (2021): FE panel regressions

Table 3.2 Summary of Selected Studies on the Relationship between EPU and Payout Policy

This table summarises the studies on the effect of EPU on corporate payout policy, including the methods, mechanisms, and main findings.

Study	Country / Sample	Period	Methodology	Mechanism / Explanation	Main Findings
EPU and Payout are negatively associated					
Lei et al. (2015)	Chinese A-share firms (6,227 firm-years)	2004–2010	Logit and panel regressions	Political uncertainty is generally associated with policy uncertainty. They increase information asymmetry, financing costs, and managers' risk perception, encouraging precautionary cash retention	Political uncertainty is normally accompanied by policy uncertainty. They are negatively related to dividend initiation and positively related to dividend cuts
Huang et al. (2015)	35 countries (112,151 firm-years)	1990–2008	Panel and logit regressions	Political uncertainty, together with potential changes in policy, raises cash-flow risk and the cost of equity financing	Firms are more likely to suspend/reduce dividends and less likely to initiate dividends during political uncertainty
Sarwar et al. (2020a)	1,372 Chinese listed firms	2000–2015	Logit regressions	Higher EPU increases risk perception among managers and investors, heightening the cost of capital. This leads to a reduction in payout for precautionary purposes.	Firms are more likely to stop dividends and less likely to initiate dividends under high EPU
Sarwar et al. (2020b)	1,153 Chinese non-financial firms	2006–2015	Logit and IV regressions		Experienced CEOs are more likely to maintain dividends during high EPU.
Sarwar and Hassan (2021)	517 Chinese firms	2007–2015	Logit regressions		Firms with stronger board expertise are more likely to maintain dividends during high EPU.

Joof and Azimli (2022)	350 Turkish non-financial firms	1998–2019	GMM estimation	Political uncertainty is usually accompanied by EPU, which increases information asymmetry and the cost of capital	Political uncertainty is negatively associated with dividend payments
Yousefi and Yung (2022)	7,200 US non-financial and non-utility firms	1989–2018	OLS and IV-2SLS	High EPU increases cash-flow uncertainty; firms preserve flexibility by reducing payouts	EPU is negatively associated with total payouts, although financial flexibility mitigates the effect
EPU and Payout are positively associated					
Farooq and Ahmed (2019)	US non-financial firms	1996–2016	Pooled OLS	Political and policy uncertainty increases information asymmetry. Dividends signal confidence and future earnings during uncertainty	Election-related uncertainty is positively related to dividend payouts
Qian (2023)	Chinese listed firms (2,340 observations)	2013–2021	Panel OLS	Firms use dividends to signal confidence and stabilise stock prices	EPU is positively associated with cash dividends, especially in financing-constrained and high-growth firms
Hoang et al. (2024)	US-listed firms (47,536 firm-years)	1995–2018	Panel OLS	Dividends are a positive signal that reassures stakeholders and attracts external sources of financing during EPU times	EPU and dividend payments are significantly and positively associated.
Attig et al. (2021)	23,042 firms in 19 countries (190,799 observations)	1991–2015	Panel and change regressions	shareholders demand higher payouts to impose discipline on the use of the firm's resources when facing EPU	EPU is positively and significantly associated with dividends and payout ratios
Li et al. (2024)	Chinese A-share firms (38,601 firm-years)	2007–2020	Univariate, IV, and two-way cluster regressions	Higher dividends alleviate agency problems and maintain investor confidence	EPU is positively associated with cash dividends, especially in smaller and non-state-owned firms

Anolick et al. (2021)	European firms (871 repurchase announcements)	2000–2017	Event study and regressions	Repurchases reduce information asymmetry and signal undervaluation	High uncertainty is associated with more share-repurchase announcements and higher abnormal repurchase announcement returns
Huang et al. (2025)	Chinese A-share firms (89,051 observations)	2017–2022	Fixed-effect panel regressions	Share repurchases signal confidence	EPU is positively associated with repurchase likelihood and scale
The Heterogeneous Effects of EPU on the Payout Policy					
Walkup (2016)	US CRSP firms	1962–2009	GARCH and panel analysis	The availability of external financing decreases, and financing costs increase when uncertainty rises. Cash-constrained firms are more conservative on dividends, whereas cash-rich firms are less affected and tend to repurchase shares when their prices are low.	High uncertainty reduces dividends in cash-constrained firms but may increase repurchases in cash-rich firms
Baker et al. (2021)	12,381 US non-financial firms (429,763 firm-quarter observations)	1986–2017	Random-effects likelihood and IV estimation	Firms increase dividends to signal confidence and reserve precautionary cash under EPU, while they prefer repurchases over dividends to preserve flexibility when EPU is high	Higher EPU is associated with an increase in the likelihood of dividends but decreases repurchases
Maquieira et al. (2023)	133 Chilean firms	2005–2016	Panel regressions	Precautionary, signalling, and agency motives coexist	U-shaped nonlinear relationship between EPU and dividend payout
Chen et al. (2023)	US non-financial firms (Compustat)	1985–2021	Pooled estimations	Firms may either reduce repurchases for precautionary reasons or increase them for signalling motives	Average repurchases decline under EPU, but undervalued firms increase repurchases when EPU is high

Table 3.3 Variable Definitions

All firm-level variables are expressed as natural logarithm changes, namely the log difference between years and are from DataStream. EPU data are from https://www.policyuncertainty.com/all_country_data.html. Lagged EPU variables are aligned to fiscal year-ends as described in the text. GDP growth rates are from the OECD database.

The variable name	Period	Frequency	Definition
Dependent variables			
Measure of the total payout			
Total payout ratio	1999-2022	Annual	Natural logarithm changes in the total payout ratio. The total payout ratio is the sum of dividends of common and preferred dividends redeemed divided by the income before extraordinary items and preferred and common dividends after operating and non-operating income and expenses.
Measures of the dividend policy			
Dividend yield	1999-2022	Annual	Natural logarithm changes in the dividend yield. The dividend yield is the ratio of the dividend per share to the share price.
Dividend payout ratio	1999-2022	Annual	Natural logarithm changes in the dividend payout ratio. The dividend payout ratio is the common dividend divided by the net income available for it. The common dividend includes regular, extra, and special dividends.
Measures Share repurchases			
Share repurchases	1999-2022	Annual	Natural logarithm changes in the common preferred redeemed. The common preferred redeemed refers to the funds used to decrease the outstanding shares of common and/or preferred stock.
Explanatory variables			
Δ%EPU	1996-2022	Annual	Percentage changes in the BBD index between fiscal years.
Three-month lagged Δ%EPU	1999-2022	Annual	Annual percentage changes in the BBD index correspond to a three-month lag relative to the fiscal ending date.
Six-month lagged Δ%EPU	1999-2022	Annual	Annual percentage changes in the BBD index correspond to a six-month lag relative to the fiscal ending date.
Nine-month lagged Δ%EPU	1999-2022	Annual	Annual percentage changes in the BBD index correspond to a nine-month lag relative to the fiscal ending date.
12-month lagged Δ%EPU	1999-2022	Annual	Annual percentage changes in the BBD index correspond to a 12-month lag relative to the fiscal ending date.

Control and mediator variables			
Profitability	1999-2022	Annual	Natural logarithm changes in profitability. Profitability is the operating income divided by the total assets' book value.
Growth opportunity	1999-2022	Annual	Natural logarithm changes in the market-to-book value. The market-to-book value is the market value of the ordinary (common) equity divided by the balance sheet value of the company's ordinary (common) equity.
Firm size	1999-2022	Annual	Natural logarithm changes in firms' assets.
Retained earnings	1999-2022	Annual	Natural logarithm changes in retained earnings. The retained earnings are the company's accumulated after-tax earnings that have not been distributed as dividends to shareholders or allocated to a reserve account.
Financial constraints	1999-2022	Annual	Natural logarithm changes in the interest coverage ratio. The interest coverage ratio equals EBITDA divided by the interest expense.
ΔFree cash flow	1999-2022	Annual	The first difference in the ratio of cash flow operating minus capital expenditure to total assets.
GDP growth	1999-2022	Annual	The real economic growth rate of the country where firms operate.

Table 3.4 Descriptive Statistics

This table presents the descriptive statistics of the dependent, explanatory, and control variables. See Table 3.3 for variable definitions.

Variable	Observations	Mean	Std. dev.	Min	Max
Total payout	21840	8.121	112.547	-1095.276	1136.316
Dividend yield	28992	3.198	47.388	-525.096	464.302
Dividend payout ratio	20698	6.010	90.738	-948.543	937.8611
Share repurchases	13090	-0.775	207.946	-1165.373	1066.599
Δ%EPU	35945	14.237	55.627	-86.552	548.015
Three-month lagged Δ%EPU	35801	17.675	72.033	-84.469	392.288
Six-month lagged Δ%EPU	35731	14.834	57.340	-86.552	708.437
Nine-month lagged Δ%EPU	35672	17.242	59.577	-84.469	548.015
12-month lagged Δ%EPU	34,778	14.362	55.782	-86.552	548.015
Profitability	30440	-0.538	58.976	-639.503	697.811
Firm size	35928	7.296	27.245	-545.127	790.060
Growth opportunity	40154	-1.200	48.452	-659.593	650.418
Retained earnings	28105	12.104	59.143	-919.910	780.156
ΔFree cash flows	33729	0.108	12.819	-1516.564	501.586
Financial constraints	30061	2.870	81.641	-775.969	870.953
GDP growth	47015	1.684	2.639	-10.360	8.675

Table 3.5 Correlation Matrix

This table presents the correlation coefficients of the dependent, explanatory, and control variables. Variable abbreviations: TP=Total payout ratio, DY=Dividend yield, DPR=Dividend payout ratio, SR=Share repurchases, EPU=Δ%EPU, EPU_L3/6/9/12=lagged Δ%EPU (3/6/9/12 months), PROF=Profitability, SIZE=Firm size, GROWTH=Growth opportunity, RE=Retained earnings, ERE=Expected retained earnings, FCF=ΔFree cash flow, FC=Financial constraints, GDP%=GDP growth. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. See Table 3.3 for variable definitions.

	TP	DY	DPR	SRs	EPU	EPU_L3	EPU_L6	EPU_L9	EPU_L12	PROF	SIZE	GROWTH	RE	ΔFCF	FC	GDP%
TP	1.000															
DY	0.110***	1.000														
DPR	0.726***	0.172***	1.000													
SRs	0.461***	0.024*	-0.045***	1.000												
EPU	0.036***	0.183***	0.028**	0.026**	1.000											
EPU_L3	0.014	0.080***	0.034***	0.001	0.273***	1.000										
EPU_L6	0.007	0.127***	0.064***	-0.050***	0.241***	0.122***	1.000									
EPU_L9	-0.010	0.035***	0.027**	-0.047***	0.145***	0.207***	0.260***	1.000								
EPU_L12	-0.043***	0.023*	0.021*	-0.066***	-0.263***	0.186***	0.134***	0.331***	1.000							
PROF	-0.195***	-0.012	-0.331***	0.122***	-0.019	-0.041***	-0.072***	-0.080***	-0.049***	1.000						
SIZE	-0.094***	-0.037***	-0.034***	-0.061***	0.025**	0.011	0.020	0.031**	0.027**	-0.281***	1.000					
GROWTH	0.034***	-0.228***	-0.039***	0.091***	-0.043***	-0.028**	-0.127***	-0.053***	-0.088***	0.139***	-0.071***	1.000				
RE	-0.133***	0.008	-0.153***	0.012	-0.027**	-0.009	-0.030**	-0.043***	0.003	0.100***	0.130***	-0.096***	1.000			
ΔFCF	-0.075***	-0.075***	-0.097***	0.008	-0.008	-0.006	0.002	0.004	0.013**	0.191***	0.132***	-0.046***	0.051***	1.000		
FC	-0.213***	-0.059***	-0.302***	0.063***	-0.067***	-0.062***	-0.054	-0.051	-0.028***	0.320***	-0.127***	0.047***	0.095***	0.049***	1.000	
GDP%	-0.027**	-0.043***	-0.122***	0.090***	-0.113***	-0.096	-0.237***	-0.228***	-0.160***	0.124***	0.050***	0.118***	0.037***	-0.063***	0.063***	1.000

Table 3.6 The OLS Regression Results of Δ%EPU on the Total Payout Ratio

This table presents the OLS regression results for the total payout ratio, including explanatory and control variables. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. See Table 3.3 for variable definitions.

Explanatory and control variables	Dependent variable: Total payout				
	(1)	(2)	(3)	(4)	(5)
$\Delta\%EPU_{i,t}$	0.039** (0.015)				
Three-month lagged $\Delta\%EPU_{i,t}$		0.011 (0.011)			
Six-month lagged $\Delta\%EPU_{i,t}$			0.041*** (0.015)		
Nine-month lagged$\Delta\%EPU_{i,t}$				-0.008 (0.014)	
12-month lagged $\Delta\%EPU_{i,t}$					-0.029* (0.015)
$Profitability_{i,t}$	-0.502*** (0.021)	-0.497*** (0.022)	-0.496*** (0.022)	-0.497*** (0.022)	-0.498*** (0.022)
Firm $size_{i,t}$	-0.757*** (0.054)	-0.762*** (0.055)	-0.761*** (0.055)	-0.759*** (0.055)	-0.770*** (0.056)
Growth $opportunity_{i,t}$	0.146*** (0.022)	0.147*** (0.022)	0.154*** (0.022)	0.146*** (0.022)	0.140*** (0.023)
Retained $earnings_{i,t}$	-0.220*** (0.019)	-0.221*** (0.019)	-0.220*** (0.019)	-0.222*** (0.019)	-0.221*** (0.020)
Financial $constraints_{i,t}$	-0.283*** (0.014)	-0.285*** (0.014)	-0.286*** (0.014)	-0.287*** (0.014)	-0.286*** (0.014)
GDP $growth_{i,t}$	1.385*** (0.368)	1.331*** (0.369)	1.503*** (0.375)	1.276*** (0.375)	1.206*** (0.379)
Constant	14.523*** (1.085)	15.039*** (1.084)	14.369*** (1.109)	15.429*** (1.117)	15.912*** (1.114)
R-squared	0.095	0.094	0.095	0.094	0.093
Prob > F	0.000	0.000	0.000	0.000	0.000
Observations	18,152	18,067	18,011	18,030	17,512
Fixed effects	Controlled	Controlled	Controlled	Controlled	Controlled

Table 3.7 The OLS Regression Results of Δ%EPU on the Dividend

This table presents the OLS regression results for the dividend payout ratio and dividend yield on explanatory and control variables. The control variables also include profitability, firm size, growth opportunities, retained earnings, financial constraints, and GDP. They are not reported for brevity. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. See Table 3.3 for variable definitions.

Panel A: The effect of Δ%EPU on the dividend payout ratio

Explanatory and control variables	Dependent variable: Dividend payout ratio				
	(1)	(2)	(3)	(4)	(5)
$\Delta\%EPU_{i,t}$	0.020*				
	(0.011)				
Three-month lagged $\Delta\%EPU_{i,t}$		0.018**			
		(0.009)			
Six-month lagged $\Delta\%EPU_{i,t}$			0.055***		
			(0.011)		
Nine-month lagged $\Delta\%EPU_{i,t}$				0.003	
				(0.010)	
12-month lagged $\Delta\%EPU_{i,t}$					0.018
					(0.011)
Constant	16.364***	16.350***	15.493***	16.615***	16.166***
	(0.832)	(0.828)	(0.848)	(0.855)	(0.844)
Control variables	Yes	Yes	Yes	Yes	Yes
R-squared	0.184	0.185	0.186	0.185	0.187
Prob > F	0.000	0.000	0.000	0.000	0.000
Observations	17,531	17,509	17,496	17,490	17,199
Fixed effects	Controlled	Controlled	Controlled	Controlled	Controlled

Panel B: The effect of Δ%EPU on the dividend yield

Explanatory and control variables	Dependent variable: Dividend yield				
	(1)	(2)	(3)	(4)	(5)
$\Delta\%EPU_{i,t}$	0.144***				
	(0.006)				
Three-month lagged $\Delta\%EPU_{i,t}$		0.062***			
		(0.005)			
Six-month lagged $\Delta\%EPU_{i,t}$			0.106***		
			(0.006)		
Nine-month lagged $\Delta\%EPU_{i,t}$				0.026***	-
				(0.006)	
12-month lagged $\Delta\%EPU_{i,t}$					0.035***
					(0.007)
Constant	1.476***	2.640***	1.482***	3.189***	3.426***
	(0.460)	(0.464)	(0.472)	(0.480)	(0.480)
Control variables	Yes	Yes	Yes	Yes	Yes
R squared	0.052	0.033	0.040	0.026	0.026
Prob > F	0.000	0.000	0.000	0.000	0.000
Observations	19,250	19,160	19,119	19,087	18,457
Fixed effects	Controlled	Controlled	Controlled	Controlled	Controlled

Table 3.8 The OLS Regression Results of Δ%EPU on the Share Repurchases

This table presents the OLS regression results for share repurchases, including explanatory and control variables. The control variables also include profitability, firm size, growth opportunities, retained earnings, financial constraints, and GDP. They are not reported for brevity. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. See Table 3.3 for variable definitions.

Explanatory and control variables	Dependent variable: Share repurchases				
	(1)	(2)	(3)	(4)	(5)
$\Delta\%EPU_{i,t}$	0.232*** (0.044)				
Three-month lagged $\Delta\%EPU_{i,t}$		0.035 (0.035)			
Six-month lagged $\Delta\%EPU_{i,t}$			-0.111** (0.049)		
Nine-month lagged $\Delta\%EPU_{i,t}$				-0.105** (0.041)	
12-month lagged $\Delta\%EPU_{i,t}$					-0.262*** (0.045)
Constant	-4.324 (2.966)	-0.991 (2.961)	2.034 (3.031)	2.399 (3.041)	5.000 (3.007)
Control variables	Yes	Yes	Yes	Yes	Yes
R-squared	0.0215	0.0186	0.019	0.0192	0.0219
Prob > F	0.000	0.000	0.000	0.000	0.000
Observations	10,203	10,199	10,197	10,194	9,980
Fixed effects	Controlled	Controlled	Controlled	Controlled	Controlled

Table 3.9 Summarised PSM Quality at Δ%EPU Thresholds

This table reports the PSM matching quality at 60%, 70%, 80%, and 90% of the contemporaneous, three-month lagged, six-month lagged, nine-month lagged, and 12-month lagged Δ%EPU thresholds. The detailed matching quality tables, including all covariates, are presented in Appendix 3A.1 to Appendix 3A.5. See Table 3.3 for variable definitions.

Threshold	Ps R^2	LR chi^2	p>chi^2	Mean bias	Med bias	Standardised bias	Variance ratio	%Var Outside range	Sample Size (Treated /Control)
$\Delta\%EPU_{i,t}$									
60%	0.001	19.99	0.003	2.3	2.0	6.5	0.90	100	9, 419/13,658
70%	0.002	30.35	0.000	2.9	2.3	9.3	1.04	67	7,003/16,074
80%	0.000	4.95	0.550	1.4	1.3	4.6	0.85	50	4,737/18,340
90%	0.001	4.25	0.643	1.8	1.6	6.0	0.93	83	2,337/20,740
Three-month lagged $\Delta\%EPU_{i,t}$									
60%	0.002	50.33	0.000	2.6	1.3	10.4	1.17	83	9,345/13,732
70%	0.001	20.20	0.003	2.6	2.6	7.6	0.82	100	6,950/16,127
80%	0.000	6.35	0.385	1.8	1.5	5.2	1.11	67	4,743/ 18,334
90%	0.003	19.65	0.003	3.8	3.4	12.6	0.91	50	2,417/20,606
Six-month lagged $\Delta\%EPU_{i,t}$									
60%	0.001	23.98	0.001	2.4	1.6	7.2	1.04	67	9,241/ 13,836
70%	0.001	12.73	0.048	2.5	2.5	6.0	1.04	83	7,078/15,999
80%	0.000	4.10	0.663	1.5	1.3	4.2	1.07	83	4,757/18,320
90%	0.001	3.44	0.752	1.5	1.1	5.3	0.86	83	2,429/20,648
Nine-month lagged $\Delta\%EPU_{i,t}$									
60%	0.000	9.50	0.148	1.7	1.4	4.5	0.88	83	9,278/13,799
70%	0.002	44.30	0.000	3.6	1.9	11.3	0.89	67	6,923/ 16,154
80%	0.001	13.61	0.034	3.1	2.8	7.5	0.79	83	4,802/18,275
90%	0.001	6.45	0.374	2.1	1.6	7.3	1.18	100	2,461/ 20,616
12-month lagged $\Delta\%EPU_{i,t}$									
60%	0.001	19.92	0.003	2.0	1.3	6.7	0.86	100	8,833/13,323
70%	0.000	3.95	0.684	1.3	1.3	3.4	1.02	83	6,655/15,501
80%	0.000	4.36	0.628	1.5	0.9	4.4	0.92	67	4,551/17,605
90%	0.001	3.73	0.713	1.9	1.8	5.7	1.15	67	2,297/19,859

Table 3.10 IPW Regression Results of Δ%EPU on the Total Payout

This table reports the IPW regression of the total payout ratio on the contemporaneous (Panel A), three-month (Panel B), six-month (Panel C), nine-month (Panel D), and 12-month lagged (Panel E) EPU. The control variables are profitability, firm size, growth opportunity, retained earnings, financial constraints, and GDP. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. See Table 3.3 for variable definitions.

Explanatory and control variables	Dependent variable: Total payout (Threshold %)			
	60%	70%	80%	90%

Panel A: Treated group≥ threshold of the $\Delta\%EPU_{it}$

	(1)	(2)	(3)	(4)
Treated $\Delta\%EPU_{i,t}$	5.090***	6.459***	5.398***	4.129***
	(1.499)	(1.488)	(1.444)	(1.390)
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.082	0.089	0.083	0.098
Prob > F	0.000	0.000	0.000	0.000
Observations	18,138	18,142	18,155	18,022

Panel B: Treated group≥ threshold of the three-month lagged $\Delta\%EPU_{it}$

	(5)	(6)	(7)	(8)
Treated three-month lagged	2.499*	2.126	7.006***	-0.306
$\Delta\%EPU_{i,t}$	(1.471)	(1.475)	(1.446)	(1.510)
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.095	0.113	0.107	0.093
Prob > F	0.000	0.000	0.000	0.000
Number of Observations	18,225	18,081	18,002	18,072

Panel C: Treated group≥ threshold of the six-month lagged $\Delta\%EPU_{it}$

	(9)	(10)	(11)	(12)
Treated six-month lagged	-0.482	1.932	6.114***	7.311***
$\Delta\%EPU_{i,t}$	(1.465)	(1.431)	(1.442)	(1.359)
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.097	0.110	0.108	0.101
Prob > F	0.000	0.000	0.000	0.000
Number of Observations	18,227	18,235	18,012	18,191

Panel D: Treated group≥ threshold of the nine-month lagged $\Delta\%EPU_{it}$

	(13)	(14)	(15)	(16)
Treated nine-month lagged	-0.436	2.824*	7.172***	8.914***
$\Delta\%EPU_{i,t}$	(1.448)	(1.431)	(1.460)	(1.444)
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.090	0.091	0.087	0.092
Prob > F	0.000	0.000	0.000	0.000
Number of Observations	18,223	18,086	17,502	17,649

Panel E: Treated group≥ threshold of the 12-month lagged Δ%EPU

	(17)	(18)	(19)	(20)
Treated 12-month lagged	-3.919**	-2.439	6.121***	10.262***
$\Delta\%EPU_{i,t}$	(1.565)	(1.539)	(1.470)	(1.459)
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.094	0.091	0.078	0.097
Prob > F	0.000	0.000	0.000	0.000
Number of Observations	17,602	17,599	17,596	17,542

Table 3.11 IPW Regression Results of Δ%EPU on the Dividend Payout Ratio

This table reports the IPW regression results of the dividend payout ratio on the contemporaneous (Panel A), three-month (Panel B), six-month (Panel C), nine-month (Panel D), and 12-month lagged (Panel E) EPU. The control variables are profitability, firm size, growth opportunity, retained earnings, financial constraints, and GDP. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. See Table 3.3 for variable definitions.

Explanatory and control variables	Dependent variable: Dividend payout ratio (Threshold %)			
	60%	70%	80%	90%
Panel A: Treated group≥ threshold of the $\Delta\%EPU_{it}$				
	(1)	(2)	(3)	(4)
Treated $\Delta\%EPU_{i,t}$	5.555***	8.017***	10.524***	1.758
	(1.201)	(1.213)	(1.247)	(1.080)
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.166	0.1655	0.128	0.1809
Prob > F	0.000	0.000	0.000	0.000
Observations	17,616	17,616	17,616	17,616
Panel B: Treated group≥ threshold of the three-month lagged $\Delta\%EPU_{i,t}$				
	(5)	(6)	(7)	(8)
Treated three-month lagged	2.647**	4.238***	6.790***	2.266*
$\Delta\%EPU_{i,t}$	(1.150)	(1.151)	(1.115)	(1.185)
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.1918	0.2116	0.2051	0.1799
Prob > F	0.000	0.000	0.000	0.000
Number of Observations	17,616	17,616	17,616	17,616
Panel C: Treated group≥ threshold of the six-month lagged $\Delta\%EPU_{i,t}$				
	(9)	(10)	(11)	(12)
Treated six-month lagged	2.164*	3.065***	7.144***	6.441***
$\Delta\%EPU_{i,t}$	(1.170)	(1.129)	(1.167)	(1.059)
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.185	0.203	0.191	0.193
Prob > F	0.000	0.000	0.000	0.000
Number of Observations	17,616	17,616	17,616	17,616
Panel D: Treated group≥ threshold of the nine-month lagged $\Delta\%EPU_{i,t}$				
	(13)	(14)	(15)	(16)
Treated nine-month lagged	-1.519	1.013	3.799***	5.468***
$\Delta\%EPU_{i,t}$	(1.123)	(1.114)	(1.105)	(1.129)
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.189	0.190	0.184	0.178
Prob > F	0.000	0.000	0.000	0.000
Number of Observations	17,616	17,616	17,616	17,616

Panel E: Treated group≥ threshold of the 12-month lagged $\Delta\%EPU_{i,t}$

	(17)	(18)	(19)	(20)
Treated 12-month lagged	-1.332	0.483	5.270***	12.203***
$\Delta\%EPU_{i,t}$	(1.206)	(1.225)	(1.127)	(1.171)
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.180	0.176	0.187	0.193
Prob > F	0.000	0.000	0.000	0.000
Number of Observations	17,293	17,293	17,293	17,293

Table 3.12 IPW Regression Results of Δ%EPU on the Dividend Yield

This table reports the IPW regression results of dividend yield on the contemporaneous (Panel A), three-month (Panel B), six-month (Panel C), nine-month (Panel D), and 12-month lagged (Panel E) EPU. The control variables are profitability, firm size, growth opportunity, retained earnings, financial constraints, and GDP. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. See Table 3.3 for variable definitions.

Explanatory and control variables	Dependent variable: Dividend yield (Threshold %)			
	60%	70%	80%	90%
Panel A: Treated group≥ threshold of the Δ%EPU$_{it}$				
	(1)	(2)	(3)	(4)
Treated Δ%EPU $_{i,t}$	1.323**	1.553**	1.129	2.927***
	(0.663)	(0.672)	(0.720)	(0.720)
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.018	0.020	0.015	0.027
Prob > F	0.000	0.000	0.000	0.000
Observations	19,176	19,185	19,202	19,119
Panel B: Treated group≥ threshold of the three-month lagged Δ%EPU $_{i,t}$				
	(5)	(6)	(7)	(8)
Treated three-month lagged Δ%EPU $_{i,t}$	-0.180	0.274	-1.690**	-5.796***
	(0.690)	(0.691)	(0.668)	(0.683)
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.017	0.016	0.012	0.017
Prob > F	0.000	0.000	0.000	0.000
Number of Observations	19,338	19,182	19,107	19,167
Panel C: Treated group≥ threshold of the six-month lagged Δ%EPU				
	(9)	(10)	(11)	(12)
Treated six-month lagged Δ%EPU $_{i,t}$	1.525**	0.354	-0.175	1.031
	(0.642)	(0.655)	(0.681)	(0.667)
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.016	0.013	0.008	0.010
Prob > F	0.000	0.000	0.000	0.000
Number of Observations	19,340	19,346	19,135	19,297
Panel D: Treated group≥ threshold of the nine-month lagged Δ%EPU				
	(13)	(14)	(15)	(16)
Treated nine-month lagged Δ%EPU $_{i,t}$	-5.234***	-4.688***	-2.797***	-1.025
	(0.671)	(0.679)	(0.710)	(0.756)
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.010	0.011	0.003	0.004
Prob > F	0.000	0.000	0.000	0.000
Number of Observations	19,336	19,217	18,600	18,669

Panel E: Treated group≥ threshold of the 12-month lagged Δ%EPU

	(17)	(18)	(19)	(20)
Treated 12-month lagged Δ%EPU	-1.265*	-1.676**	-2.599***	1.199*
$_{i,t}$	(0.677)	(0.677)	(0.698)	(0.727)
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.012	0.012	0.008	0.006
Prob > F	0.000	0.000	0.000	0.000
Observations	18,566	18,558	18,555	18,491

Table 3.13 IPW Regression Results of Δ%EPU on Share Repurchases

This table reports the IPW regression results of share repurchases on contemporaneous (Panel A), three-month (Panel B), six-month (Panel C), nine-month (Panel D), and 12-month lagged (Panel E) EPU. The control variables are profitability, firm size, growth opportunity, retained earnings, financial constraints, and GDP. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. See Table 3.3 for variable definitions.

Explanatory and control variables	Dependent variable: Share Repurchases (Threshold %)			
	60%	70%	80%	90%
Panel A: Treated group≥ threshold of the Δ%EPU$_{i,t}$				
	(1)	(2)	(3)	(4)
Treated Δ%EPU$_{i,t}$	21.912***	19.094***	21.854***	1.193
	(4.108)	(4.133)	(3.907)	(3.887)
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.021	0.023	0.026	0.037
Prob > F	0.000	0.000	0.000	0.000
Observations	10,239	10,239	10,241	10,078
Panel B: Treated group≥ threshold of the three-month lagged Δ%EPU$_{i,t}$				
	(5)	(6)	(7)	(8)
Treated three-month lagged	11.719***	9.622**	14.070***	-17.763***
Δ%EPU$_{i,t}$	(4.145)	(4.073)	(3.915)	(4.102)
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.021	0.028	0.034	0.279
Prob > F	0.000	0.000	0.000	0.000
Number of Observations	10,237	10,143	10,107	10,132
Panel C: Treated group≥ threshold of the six-month lagged Δ%EPU$_{i,t}$				
	(9)	(10)	(11)	(12)
Treated six-month lagged	-9.347**	-7.359*	-3.867	4.389
Δ%EPU$_{i,t}$	(3.911)	(3.926)	(3.930)	(3.793)
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.024	0.031	0.038	0.049
Prob > F	0.000	0.000	0.000	0.000
Number of Observations	10,242	10,240	10,047	10,203
Panel D: Treated group≥ threshold of the nine-month lagged Δ%EPU$_{i,t}$				
	(13)	(14)	(15)	(16)
Treated nine-month lagged EPU$_{i,t}$	-8.594**	-5.066	-7.384*	10.069**
	(3.909)	(3.926)	(4.068)	(3.729)
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.027	0.026	0.030	0.050
Prob > F	0.000	0.000	0.000	0.000
Number of Observations	10,231	10,124	9,802	9,947

Panel E: Treated group≥ threshold of the 12-month lagged $\Delta\%EPU_{i,t}$

	(17)	(18)	(19)	(20)
Treated 12-month lagged	-20.156***	-10.608**	-7.379*	-11.653***
$\Delta\%EPU_{i,t}$	(4.055)	(4.084)	(4.057)	(3.958)
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.022	0.025	0.026	0.026
Prob > F	0.000	0.000	0.000	0.000
Observations	10,022	10,022	10,017	9,974

Table 3.14 The Total Effect of Δ%EPU on the Total Payout Ratio without Mediators

This table reports the total effect of Δ%EPU on the total payout ratio, excluding all mediators. The control variables are profitability, firm size, growth opportunity, retained earnings, and GDP. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. See Table 3.3 for variable definitions.

Explanatory and control variables	Dependent variable: the total payout ratio				
	(1)	(2)	(3)	(4)	(5)
$\Delta\%EPU_{i,t}$	0.048***				
	(0.014)				
Three-month lagged $\Delta\%EPU_{i,t}$		0.022*			
		(0.011)			
Six-month lagged $\Delta\%EPU_{i,t}$			0.040***		
			(0.014)		
Nine-month lagged $\Delta\%EPU_{i,t}$				0.003	
				(0.014)	
12-month lagged $\Delta\%EPU_{i,t}$					-0.031**
					(0.015)
Constant	14.425***	14.877***	14.449***	15.230***	16.101***
	(1.077)	(1.077)	(1.101)	(1.110)	(1.105)
R-squared	0.0746	0.0741	0.0743	0.0739	0.0734
Control variables	Yes	Yes	Yes	Yes	Yes
Observations	18,973	18,884	18,846	18,817	18,301
Fixed effects	Controlled	Controlled	Controlled	Controlled	Controlled

Table 3.15 Mediation Test Results for Free Cash Flow

This table reports the Baron and Kenny (1986) mediation test results for the effect of the total payout ratio on the EPU, with the free cash flow as the mediator. This mediation test examines monitoring motivation, as firms with excess free cash flows are likely to increase payouts when EPU rises. The control variables are profitability, firm size, growth opportunity, retained earnings, and GDP. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. See Table 3.3 for variable definitions.

Panel A: The effect of Δ%EPU on changes in free cash flow ratio

Explanatory and control variables	Dependent variable: changes in free cash flow ratio ($\Delta FCFR_{i,t}$)				
	(1)	(2)	(3)	(4)	(5)
$\Delta\%EPU_{i,t}$	-0.001 (0.001)				
Three-month lagged $\Delta\%EPU_{i,t}$		0.000 (0.001)			
Six-month lagged $\Delta\%EPU_{i,t}$			0.002** (0.001)		
Nine-month lagged $\Delta\%EPU_{i,t}$				0.002*** (0.001)	
12-month lagged $\Delta\%EPU_{i,t}$					0.001 (0.001)
Constant	0.474*** (0.052)	0.451*** (0.052)	0.427*** (0.053)	0.406*** (0.054)	0.437*** (0.053)
R-squared	0.044	0.044	0.044	0.045	0.045
Control variables	Yes	Yes	Yes	Yes	Yes
Observations	23,399	23,399	23,399	23,399	23,378
Fixed effects	Controlled	Controlled	Controlled	Controlled	Controlled

Panel B: The effect of Δ%EPU and lagged free cash flow on the total payout ratio

Explanatory and control variables	Dependent variable: Total payout ratio				
	(6)	(7)	(8)	(9)	(10)
$\Delta\%EPU_{i,t}$	0.055*** (0.015)				
Three-month lagged $\Delta\%EPU_{i,t}$		0.024** (0.012)			
Six-month lagged $\Delta\%EPU_{i,t}$			0.034** (0.015)		
Nine-month lagged $\Delta\%EPU_{i,t}$				-0.003 (0.014)	
12-month lagged $\Delta\%EPU_{i,t}$					-0.029* (0.015)
Δfree cash flow $\text{ratio}_{i,t-1}$	0.784*** (0.144)	0.795*** (0.144)	0.790*** (0.144)	0.789*** (0.144)	0.788*** (0.144)
Constant	14.907*** (1.101)	15.348*** (1.096)	15.087*** (1.122)	15.886*** (1.127)	16.404*** (1.117)
R-squared	0.077	0.076	0.076	0.076	0.076
Control variables	Yes	Yes	Yes	Yes	Yes
Observations	17,508	17,508	17,508	17,508	17,511
Fixed effects	Controlled	Controlled	Controlled	Controlled	Controlled

Table 3.16 Mediation Test Results for Financial Constraints

This table reports the Baron and Kenny (1986) mediation test results for the effect of the total payout ratio on the EPU, with financial constraint, measured by the interest coverage ratio, as the mediator. This mediation test examines the precautionary motive, as firms with higher financial constraints are more cautious about total payouts when EPU increases. The control variables are profitability, firm size, growth opportunity, retained earnings, and GDP. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. See Table 3.3 for variable definitions.

Panel A: the effect of Δ%EPU on financial constraints (interest coverage ratio)

Explanatory and control variables	Dependent variable: Financial constraints$_{i,t}$				
	(1)	(2)	(3)	(4)	(5)
Δ%EPU$_{i,t}$	-0.038***				
	(0.008)				
Three-month lagged Δ%EPU$_{i,t}$		-0.039***			
		(0.006)			
Six-month lagged Δ%EPU$_{i,t}$			-0.016*		
			(0.008)		
Nine-month lagged Δ%EPU$_{i,t}$				-0.013*	
				(0.008)	
12-month lagged Δ%EPU$_{i,t}$					-0.005
					(0.008)
Constant	-0.940	-0.781	-1.203**	-1.282**	-1.377**
	(0.597)	(0.595)	(0.610)	(0.615)	(0.611)
R-squared	0.138	0.137	0.136	0.136	0.137
Control variables	Yes	Yes	Yes	Yes	Yes
Observations	22,960	22,868	22,827	22,795	22,018
Fixed effects	Controlled	Controlled	Controlled	Controlled	Controlled

Panel B: the effect of Δ%EPU and financial constraints (interest coverage ratio) on the total payout ratio

Explanatory and control variables	Dependent variable: Total payout ratio				
	(6)	(7)	(8)	(9)	(10)
Δ%EPU$_{i,t}$	0.039***				
	(0.014)				
Three-month lagged Δ%EPU$_{i,t}$		0.011			
		(0.011)			
Six-month lagged Δ%EPU$_{i,t}$			0.041***		
			(0.015)		
Nine-month lagged Δ%EPU$_{i,t}$				-0.008	
				(0.014)	
12-month lagged Δ%EPU$_{i,t}$					-0.029*
					(0.015)
Financial constraints$_{i,t}$	-0.283***	-0.285***	-0.286***	-0.287***	-0.286***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Constant	14.523***	15.039***	14.369***	15.429***	15.912***
	(1.085)	(1.084)	(1.109)	(1.117)	(1.114)
R-squared	0.095	0.094	0.095	0.094	0.093
Control variables	Yes	Yes	Yes	Yes	Yes
Observations	18,152	18,067	18,030	18,001	17,512
Fixed effects	Controlled	Controlled	Controlled	Controlled	Controlled

Table 3.17 Mediation Test Results for Joint Effects of Two Mediators

This table reports the Baron and Kenny (1986) mediation test results for the effect of the total payout ratio on the EPU, with three mediators jointly. The control variables are profitability, firm size, growth opportunity, retained earnings, and GDP. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. See Table 3.3 for variable definitions.

Explanatory and control variables	Dependent variable: Total payout ratio				
	(1)	(2)	(3)	(4)	(5)
$\Delta\%EPU_{i,t}$	0.043*** (0.015)				
Three-month lagged $\Delta\%EPU_{i,t}$		0.011 (0.012)			
Six-month lagged $\Delta\%EPU_{i,t}$			0.038** (0.016)		
Nine-month lagged $\Delta\%EPU_{i,t}$				-0.014 (0.014)	
12-month lagged $\Delta\%EPU_{i,t}$					-0.029* (0.015)
Financial constraints$_{i,t}$	-0.288*** (0.015)	-0.289*** (0.015)	-0.290*** (0.015)	-0.290*** (0.015)	-0.290*** (0.015)
Δfree cash flow ratio$_{i,t-1}$	0.993*** (0.149)	1.001*** (0.149)	1.000*** (0.149)	1.000*** (0.149)	0.996*** (0.149)
Constant	14.819*** (1.109)	15.320*** (1.104)	14.709*** (1.131)	15.881*** (1.135)	16.124*** (1.125)
Adjusted R^2	0.0951	0.0947	0.0950	0.0947	0.0948
Control variables	Yes	Yes	Yes	Yes	Yes
Observations	16,773	16,773	16,773	16,773	16,776
Fixed effects	Controlled	Controlled	Controlled	Controlled	Controlled

Table 3.18 Robustness test: The OLS Regression Results of Δ%EPU on the Payout policy after Controlling for the Global Financial Crisis and COVID-19

This table presents the OLS regression results for the total payout ratio. In addition to dummies for the global financial crisis and COVID-19, the control variables also include profitability, firm size, growth opportunities, retained earnings, financial constraints, and GDP. They are not reported for brevity. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. See Table 3.3 for variable definitions.

Panel A: The effect of $\Delta\%EPU_{i,t}$ on the total payout ratio after controlling for the global financial crisis and COVID-19

Explanatory and control variables	Dependent variable: Total payout ratio				
	(1)	(2)	(3)	(4)	(5)
$\Delta\%EPU_{i,t}$	0.030**				
	(0.015)				
Three-month lagged $\Delta\%EPU_{i,t}$		0.003			
		(0.012)			
Six-month lagged $\Delta\%EPU_{i,t}$			0.038***		
			(0.015)		
Nine-month lagged $\Delta\%EPU_{i,t}$				-0.012	
				(0.014)	
12-month lagged $\Delta\%EPU_{i,t}$					-0.037**
					(0.015)
Global Financial Crisis	4.380	6.104**	5.791**	6.591**	7.768***
	(2.856)	(2.816)	(2.708)	(2.727)	(2.761)
COVID	-2.757	-2.742	-2.652	-2.688	-2.473
	(2.693)	(2.697)	(2.700)	(2.702)	(2.714)
Constant	14.543***	14.882***	14.141***	15.164***	15.547***
	(1.175)	(1.178)	(1.209)	(1.208)	(1.210)
Control variables	Yes	Yes	Yes	Yes	Yes
R-squared	0.0947	0.0944	0.0948	0.0945	0.0933
Number of observations	18,152	18,067	18,030	18,001	17,512
Fixed effects	Controlled	Controlled	Controlled	Controlled	Controlled

Panel B: The effect of $\Delta\%EPU_{i,t}$ on the dividend payout ratio after controlling for the global financial crisis and COVID-19

Explanatory and control variables	Dependent variable: Dividend payout ratio				
	(6)	(7)	(8)	(9)	(10)
$\Delta\%EPU_{i,t}$	0.012				
	(0.012)				
Three-month lagged $\Delta\%EPU_{i,t}$		0.013			
		(0.009)			
Six-month lagged $\Delta\%EPU_{i,t}$			0.053***		
			(0.011)		
Nine-month lagged $\Delta\%EPU_{i,t}$				0.001	
				(0.010)	
12-month lagged $\Delta\%EPU_{i,t}$					0.013
					(0.012)

Global Financial Crisis	3.793*	3.531	3.689*	4.379**	4.183**
	(2.191)	(2.166)	(2.078)	(2.094)	(2.091)
COVID	-6.970***	-6.995***	-6.909***	-7.036***	-6.949***
	(2.150)	(2.149)	(2.148)	(2.150)	(2.132)
Constant	16.954***	16.943***	16.007***	17.087***	16.695***
	(0.897)	(0.896)	(0.920)	(0.920)	(0.912)
Control variables	Yes	Yes	Yes	Yes	Yes
R-squared	0.1849	0.1857	0.1869	0.1860	0.1880
Number of observations	17,531	17,509	17,496	17,490	17,199
Fixed effects	Controlled	Controlled	Controlled	Controlled	Controlled

Panel C: The effect of $\Delta\%EPU_{i,t}$ on share repurchases after controlling for the global financial crisis and COVID-19

Explanatory and control variables	Dependent variable: Share repurchases				
	(11)	(12)	(13)	(14)	(15)
$\Delta\%EPU_{i,t}$	0.226***				
	(0.047)				
Three-month lagged $\Delta\%EPU_{i,t}$		0.017			
		(0.037)			
Six-month lagged $\Delta\%EPU_{i,t}$			-0.114**		
			(0.049)		
Nine-month lagged $\Delta\%EPU_{i,t}$				-0.123***	
				(0.042)	
12-month lagged $\Delta\%EPU_{i,t}$					-0.286***
					(0.046)
Global Financial Crisis	14.840**	14.782**	13.916**	15.291**	13.208*
	(6.997)	(7.009)	(7.014)	(7.013)	(7.042)
COVID	4.749	17.431**	19.390***	21.269***	26.254***
	(7.956)	(7.720)	(7.449)	(7.498)	(7.583)
Constant	-7.191**	-5.129	-2.534	-2.239	0.092
	(3.283)	(3.297)	(3.398)	(3.360)	(3.351)
Control variables	Yes	Yes	Yes	Yes	Yes
R-squared	0.0220	0.0195	0.0201	0.0204	0.0235
Number of observations	10,203	10,199	10,197	10,194	9,980
Fixed effects	Controlled	Controlled	Controlled	Controlled	Controlled

Appendix 3A PSM Matching Quality

Appendix 3A.1 PSM Matching Quality With all Covariates at Δ%EPU Thresholds

See Table 3.3 for variable definitions. This table reports the PSM matching quality, containing all covariates. The t-value is the result of the t-test. If the p-value of the t-test is insignificant, it indicates there are no statistically significant differences between the treated and control groups. The variance ratio is the ratio of the variance for the treated group to that for the control group. * indicates that the variance ratio is out of the acceptable range, which is [0.96 1.04], [0.95 1.05], [0.94 1.06], and [0.92 1.08] at 60%, 70%, 80% and 90% EPU thresholds, respectively.

Variable	Mean (Treated)	Mean (Control)	% Bias	t-value	p > t	Variance Ratio
60% $\Delta\%EPU_{i,t}$						
$Profitability_{i,t}$	0.796	2.724	-3.8	-2.57	0.010	0.90*
$Firm\ size_{i,t}$	8.858	9.458	-3.4	-2.19	0.028	0.87*
$Growth\ opportunity_{i,t}$	-0.153	0.589	-1.8	-1.24	0.216	0.87*
$Retained\ earnings_{i,t}$	13.398	12.771	1.2	0.85	0.396	0.96*
$Financial\ constraints_{i,t}$	-1.192	0.361	-2.2	-1.45	0.147	0.78*
$GDP\ growth_{i,t}$	1.660	1.687	-1.2	-0.88	0.382	0.82*
70% $\Delta\%EPU_{i,t}$						
$Profitability_{i,t}$	0.261	-0.380	1.3	0.73	0.467	0.80*
$Firm\ size_{i,t}$	8.916	9.983	-6.0	-3.42	0.001	0.91*
$Growth\ opportunity_{i,t}$	-1.232	0.136	-3.4	-2.02	0.043	0.99
$Retained\ earnings_{i,t}$	13.695	13.938	-0.5	-0.29	0.772	0.98
$Financial\ constraints_{i,t}$	-1.843	-2.123	0.4	0.23	0.822	0.86*
$GDP\ growth_{i,t}$	1.479	1.618	-6.1	-3.93	0.000	0.93*
80% $\Delta\%EPU_{i,t}$						
$Profitability_{i,t}$	-0.242	0.977	-2.4	-1.20	0.228	0.99
$Firm\ size_{i,t}$	8.933	9.124	-1.1	-0.51	0.608	0.95
$Growth\ opportunity_{i,t}$	-3.397	-4.400	2.5	1.21	0.228	0.97
$Retained\ earnings_{i,t}$	13.173	13.115	0.1	0.06	0.954	1.41*
$Financial\ constraints_{i,t}$	-1.669	-1.969	0.4	0.20	0.842	0.80*
$GDP\ growth_{i,t}$	1.498	1.533	-1.6	-0.82	0.413	0.63*
90% $\Delta\%EPU_{i,t}$						
$Profitability_{i,t}$	3.292	1.486	3.6	1.28	0.202	0.99
$Firm\ size_{i,t}$	10.165	10.105	0.3	0.11	0.915	0.86*
$Growth\ opportunity_{i,t}$	-1.256	-0.804	-1.1	-0.36	0.716	0.87*
$Retained\ earnings_{i,t}$	16.348	16.334	0.0	0.01	0.993	1.14*
$Financial\ constraints_{i,t}$	3.955	1.212	4.0	1.32	0.187	0.89*
$GDP\ growth_{i,t}$	1.542	1.583	-2.0	-0.91	0.362	0.80*

Appendix 3A.2 PSM Matching Quality With all Covariates at Three-month Lagged Δ%EPU Thresholds

See Table 3.2 for variable definitions. This table reports the PSM matching quality, containing all covariates. The t-value is the result of the t-test. If the p-value of the t-test is insignificant, it indicates there are no statistically significant differences between the treated and control groups. The variance ratio is the ratio of the variance for the treated group to that for the control group. * indicates that the variance ratio is out of the acceptable range, which is [0.96 1.04], [0.95 1.05], [0.94 1.06], and [0.92 1.08] at 60%, 70%, 80% and 90% three-month lagged EPU thresholds, respectively.

Variable	Mean (Treated)	Mean (Control)	% Bias	t-value	p > t	Variance Ratio
60% three-month lagged Δ%$EPU_{i,t}$						
$Profitability_{i,t}$	-2.471	-3.089	1.2	0.79	0.431	0.80*
Firm $size_{i,t}$	8.842	8.885	-0.2	-0.16	0.871	0.96*
Growth $opportunity_{i,t}$	-1.526	-.431	-2.7	-1.81	0.070	0.96
Retained $earnings_{i,t}$	12.514	11.918	1.2	0.81	0.418	0.89*
Financial $constraints_{i,t}$	-2.993	-4.018	1.5	0.96	0.335	0.85*
GDP $growth_{i,t}$	1.392	1.602	-9.0	-6.59	0.000	1.20*
70% three-month lagged Δ%$EPU_{i,t}$						
$Profitability_{i,t}$	-4.057	-3.677	-0.7	-0.42	0.672	0.89*
Firm $size_{i,t}$	9.168	9.628	-2.6	-1.43	0.152	0.91*
Growth $opportunity_{i,t}$	-1.630	-0.5530	-2.6	-1.49	0.136	0.88*
Retained $earnings_{i,t}$	12.588	10.994	3.1	1.78	0.076	0.89*
Financial $constraints_{i,t}$	-4.159	-1.410	-4.0	-2.15	0.032	0.75*
GDP $growth_{i,t}$	1.361	1.304	2.4	1.47	0.143	1.18*
80% three-month lagged Δ%$EPU_{i,t}$						
$Profitability_{i,t}$	-3.664	-2.671	-1.9	-0.93	0.352	1.17*
Firm $size_{i,t}$	9.182	8.993	1.0	0.50	0.614	1.22*
Growth $opportunity_{i,t}$	-3.305	-2.963	-0.8	-0.37	0.709	0.82*
Retained $earnings_{i,t}$	13.666	11.954	3.3	1.61	0.106	0.96
Financial $constraints_{i,t}$	-4.646	-3.946	-1.0	-0.48	0.629	1.03
GDP $growth_{i,t}$	1.440	1.507	-2.8	-1.41	0.157	1.28*
90% three-month lagged Δ%$EPU_{i,t}$						
$Profitability_{i,t}$	-3.687	-4.455	1.5	0.51	0.609	0.95
Firm $size_{i,t}$	10.424	11.423	-5.2	-1.70	0.090	1.01
Growth $opportunity_{i,t}$	-4.576	-5.236	1.6	0.52	0.603	0.80*
Retained $earnings_{i,t}$	14.721	15.548	-1.6	-0.55	0.583	0.85*
Financial $constraints_{i,t}$	-8.670	-12.313	5.2	1.69	0.090	0.74*
GDP $growth_{i,t}$	1.840	1.683	7.7	3.74	0.000	1.06

Appendix 3A.3 PSM Matching Quality With all Covariates at Six-month Lagged Δ%EPU Thresholds

See Table 3.2 for variable definitions. This table reports the PSM matching quality, containing all covariates. The t-value is the result of the t-test. If the p-value of the t-test is insignificant, it indicates there are no statistically significant differences between the treated and control groups. The variance ratio is the ratio of the variance for the treated group to that for the control group. * indicates that the variance ratio is out of the acceptable range, which is [0.96 1.04], [0.95 1.05], [0.94 1.06], and [0.92 1.08] at 60%, 70%, 80% and 90% six-month lagged EPU thresholds, respectively.

Variable	Mean (Treated)	Mean (Control)	% Bias	t-value	p > t	Variance Ratio
60% six-month lagged $\Delta\%EPU_{i,t}$						
$\text{Profitability}_{i,t}$	-5.636	-5.181	-0.9	-0.60	0.548	1.14*
$\text{Firm size}_{i,t}$	7.883	7.840	0.2	0.17	0.865	1.06*
$\text{Growth opportunity}_{i,t}$	-6.990	-5.660	-3.3	-2.08	0.037	0.91*
$\text{Retained earnings}_{i,t}$	12.878	13.437	-1.1	-0.75	0.450	1.32*
$\text{Financial constraints}_{i,t}$	-3.087	-4.624	2.2	1.47	0.142	0.96
$\text{GDP growth}_{i,t}$	0.973	1.124	-6.5	-3.99	0.000	0.98
70% six-month lagged $\Delta\%EPU_{i,t}$						
$\text{Profitability}_{i,t}$	-6.233	-4.687	-3.0	-1.78	0.076	1.15*
$\text{Firm size}_{i,t}$	7.773	7.646	0.7	0.43	0.666	1.10*
$\text{Growth opportunity}_{i,t}$	-8.694	-7.658	-2.6	-1.45	0.148	0.88*
$\text{Retained earnings}_{i,t}$	12.366	11.470	1.7	1.09	0.275	1.42*
$\text{Financial constraints}_{i,t}$	-5.214	-3.554	-2.4	-1.40	0.163	1.02
$\text{GDP growth}_{i,t}$	0.964	1.080	-4.9	-2.69	0.007	0.94*
80% six-month lagged $\Delta\%EPU_{i,t}$						
$\text{Profitability}_{i,t}$	-7.446	-7.976	1.0	0.47	0.637	1.03
$\text{Firm size}_{i,t}$	8.871	9.158	-1.6	-0.70	0.486	0.69*
$\text{Growth opportunity}_{i,t}$	-7.969	-8.230	0.6	0.30	0.762	0.82*
$\text{Retained earnings}_{i,t}$	13.357	15.128	-3.3	-1.58	0.115	1.16*
$\text{Financial constraints}_{i,t}$	-5.688	-4.502	-1.7	-0.79	0.431	0.91*
$\text{GDP growth}_{i,t}$	1.237	1.218	0.8	0.41	0.679	0.84*
90% six-month lagged $\Delta\%EPU_{i,t}$						
$\text{Profitability}_{i,t}$	-4.852	-4.121	-1.4	-0.49	0.627	0.91*
$\text{Firm size}_{i,t}$	10.158	10.303	-0.8	-0.25	0.805	0.69*
$\text{Growth opportunity}_{i,t}$	-7.722	-15.676	0.6	0.19	0.849	0.79*
$\text{Retained earnings}_{i,t}$	12.541	12.607	-0.1	-0.05	0.961	0.93
$\text{Financial constraints}_{i,t}$	-4.155	-2.620	-2.1	-0.73	0.464	1.25*
$\text{GDP growth}_{i,t}$	1.511	1.597	-4.1	-1.63	0.103	0.79*

Appendix 3A.4 PSM Matching Quality With all Covariates at Nine-month Lagged Δ%EPU Thresholds

See Table 3.2 for variable definitions. This table reports the PSM matching quality, containing all covariates. The t-value is the result of the t-test. If the p-value of the t-test is insignificant, it indicates there are no statistically significant differences between the treated and control groups. The variance ratio is the ratio of the variance for the treated group to that for the control group. * indicates that the variance ratio is out of the acceptable range, which is [0.96 1.04], [0.95 1.05], [0.94 1.06], and [0.92 1.08] at 60%, 70%, 80% and 90% six-month lagged EPU thresholds, respectively.

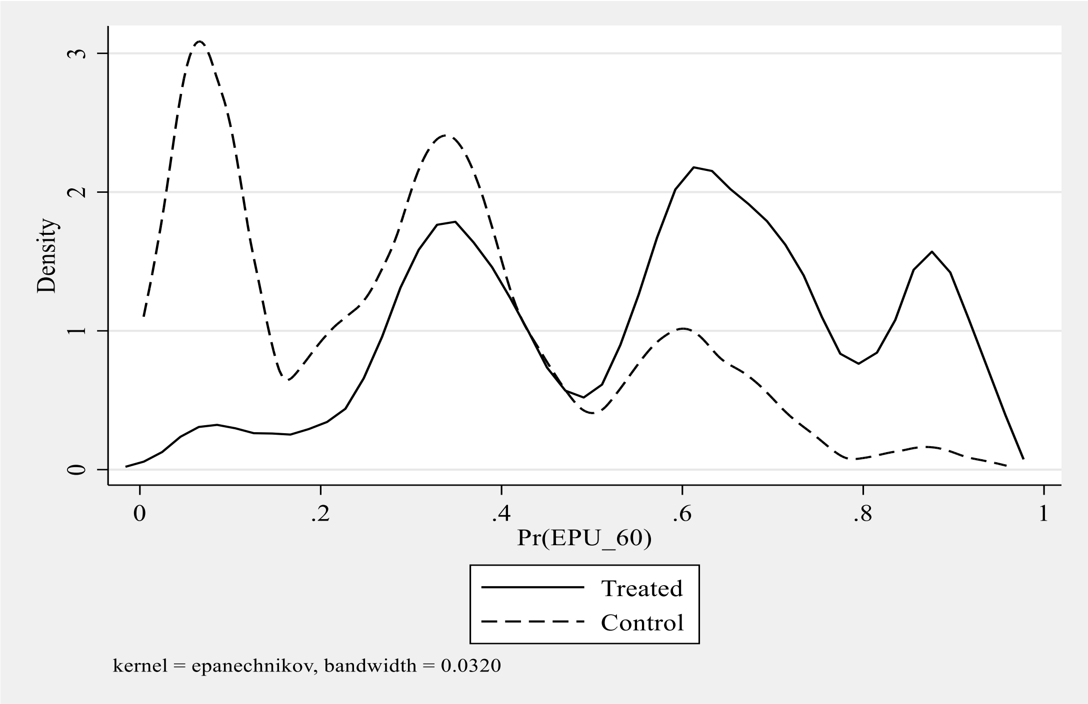
Variable	Mean (Treated)	Mean (Control)	% Bias	t-value	p > t	Variance Ratio
60% nine-month lagged Δ%$EPU_{i,t}$						
$Profitability_{i,t}$	-4.977	-4.750	-0.4	-0.30	0.767	1.14*
Firm $size_{i,t}$	7.927	8.148	-1.3	-0.86	0.391	0.92*
Growth $opportunity_{i,t}$	-4.635	-3.986	-1.6	-1.05	0.292	0.96
Retained $earnings_{i,t}$	10.799	9.483	2.6	1.71	0.087	0.84*
Financial $constraints_{i,t}$	-2.650	-3.134	0.7	0.45	0.655	0.81*
GDP $growth_{i,t}$	0.955	1.034	-3.4	-1.93	0.054	0.89*
70% nine-month lagged Δ%$EPU_{i,t}$						
$Profitability_{i,t}$	-6.539	-6.848	0.6	0.35	0.730	1.23*
Firm $size_{i,t}$	7.984	9.113	-6.5	-3.70	0.000	0.80*
Growth $opportunity_{i,t}$	-5.375	-5.708	0.8	0.45	0.655	0.87*
Retained $earnings_{i,t}$	10.181	9.396	1.5	0.91	0.365	1.03
Financial $constraints_{i,t}$	-3.337	-4.906	2.2	1.26	0.208	0.86*
GDP $growth_{i,t}$	0.752	0.995	-10.2	-5.37	0.000	0.96
80% nine-month lagged Δ%$EPU_{i,t}$						
$Profitability_{i,t}$	-5.206	-7.255	3.9	1.75	0.079	0.84*
Firm $size_{i,t}$	8.125	9.136	-5.8	-2.75	0.006	0.85*
Growth $opportunity_{i,t}$	-6.796	-7.328	1.3	0.64	0.524	1.00
Retained $earnings_{i,t}$	10.037	9.133	1.8	0.84	0.403	0.88*
Financial $constraints_{i,t}$	-3.652	-7.525	5.6	2.56	0.011	0.77*
GDP $growth_{i,t}$	1.076	1.070	0.3	0.12	0.908	0.52*
90% nine-month lagged Δ%$EPU_{i,t}$						
$Profitability_{i,t}$	-4.659	-1.624	-5.9	-2.17	0.030	1.20*
Firm $size_{i,t}$	9.432	9.520	-0.5	-0.16	0.874	0.65*
Growth $opportunity_{i,t}$	-9.278	-9.316	0.1	0.03	0.975	0.90*
Retained $earnings_{i,t}$	10.252	11.464	-2.4	-0.86	0.392	1.20*
Financial $constraints_{i,t}$	-1.949	-1.335	-0.9	-0.29	0.775	0.74*
GDP $growth_{i,t}$	1.456	1.517	-2.8	-1.08	0.282	0.68*

Appendix 3A.5 PSM Matching Quality With all Covariates at 12-month Lagged Δ%EPU Thresholds

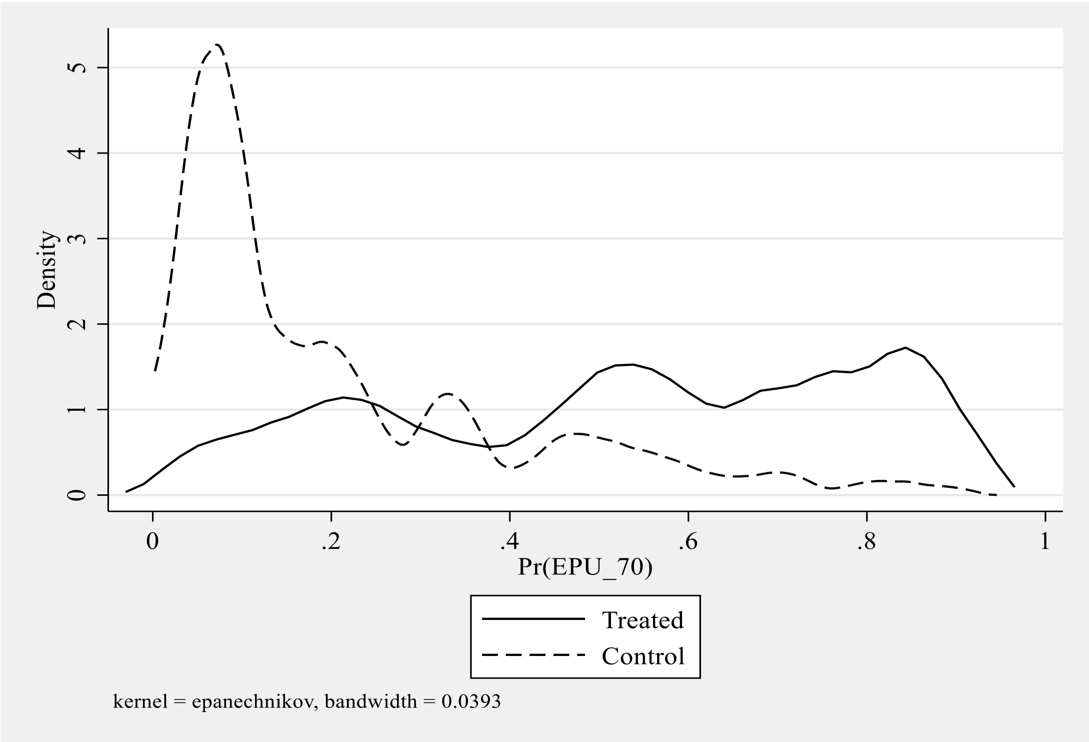
See Table 3.2 for variable definitions. This table reports the PSM matching quality, containing all covariates. The t-value is the result of the t-test. If the p-value of the t-test is insignificant, it indicates there are no statistically significant differences between the treated and control groups. The variance ratio is the ratio of the variance for the treated group to that for the control group. * indicates that the variance ratio is out of the acceptable range, which is [0.96 1.04], [0.95 1.05], [0.94 1.06], and [0.92 1.09] at 60%, 70%, 80% and 90% six-month lagged EPU thresholds, respectively.

Variable	Mean (Treated)	Mean (Control)	% Bias	t-value	p > t	Variance Ratio
60% 12-month lagged $\Delta\%EPU_{i,t}$						
$Profitability_{i,t}$	-5.872	-5.775	-0.2	-0.12	0.904	0.91*
$Firm\ size_{i,t}$	7.986	8.127	-0.8	-0.51	0.608	0.73*
$Growth\ opportunity_{i,t}$	-5.048	-7.235	5.4	3.29	0.001	0.80*
$Retained\ earnings_{i,t}$	10.973	9.195	3.5	2.24	0.025	0.96*
$Financial\ constraints_{i,t}$	-2.980	-4.268	1.9	1.17	0.243	0.86*
$GDP\ growth_{i,t}$	1.1656	1.166	-0.0	-0.00	0.998	0.87*
70% 12-month lagged $\Delta\%EPU_{i,t}$						
$Profitability_{i,t}$	-7.120	-7.976	1.7	0.88	0.378	0.81*
$Firm\ size_{i,t}$	8.066	8.097	-0.2	-0.10	0.923	0.70*
$Growth\ opportunity_{i,t}$	-6.331	-6.716	1.0	0.50	0.616	0.77*
$Retained\ earnings_{i,t}$	10.711	9.872	1.6	0.95	0.343	1.14*
$Financial\ constraints_{i,t}$	-3.324	-5.452	3.1	1.70	0.088	0.97
$GDP\ growth_{i,t}$	1.013	1.023	-0.4	-0.21	0.834	0.88*
80% 12-month lagged $\Delta\%EPU_{i,t}$						
$Profitability_{i,t}$	-7.964	-5.837	-4.1	-1.77	0.077	0.78*
$Firm\ size_{i,t}$	7.949	8.098	-0.9	-0.38	0.700	0.74*
$Growth\ opportunity_{i,t}$	-8.980	-8.622	-0.9	-0.37	0.709	0.72*
$Retained\ earnings_{i,t}$	9.366	10.578	-2.3	-1.11	0.266	1.05
$Financial\ constraints_{i,t}$	-3.276	-2.708	-0.8	-0.38	0.707	0.91*
$GDP\ growth_{i,t}$	1.041	1.039	0.1	0.04	0.968	1.01
90% 12-month lagged $\Delta\%EPU_{i,t}$						
$Profitability_{i,t}$	-6.232	-6.495	0.5	0.17	0.867	1.16*
$Firm\ size_{i,t}$	7.983	8.599	-3.5	-1.16	0.248	1.00
$Growth\ opportunity_{i,t}$	-8.674	-7.240	-3.5	-1.16	0.244	1.09*
$Retained\ earnings_{i,t}$	11.487	11.357	0.3	0.09	0.930	1.22*
$Financial\ constraints_{i,t}$	-5.091	-3.805	-1.9	-0.63	0.527	1.06
$GDP\ growth_{i,t}$	0.813	0.854	-1.7	-0.59	0.552	1.39*

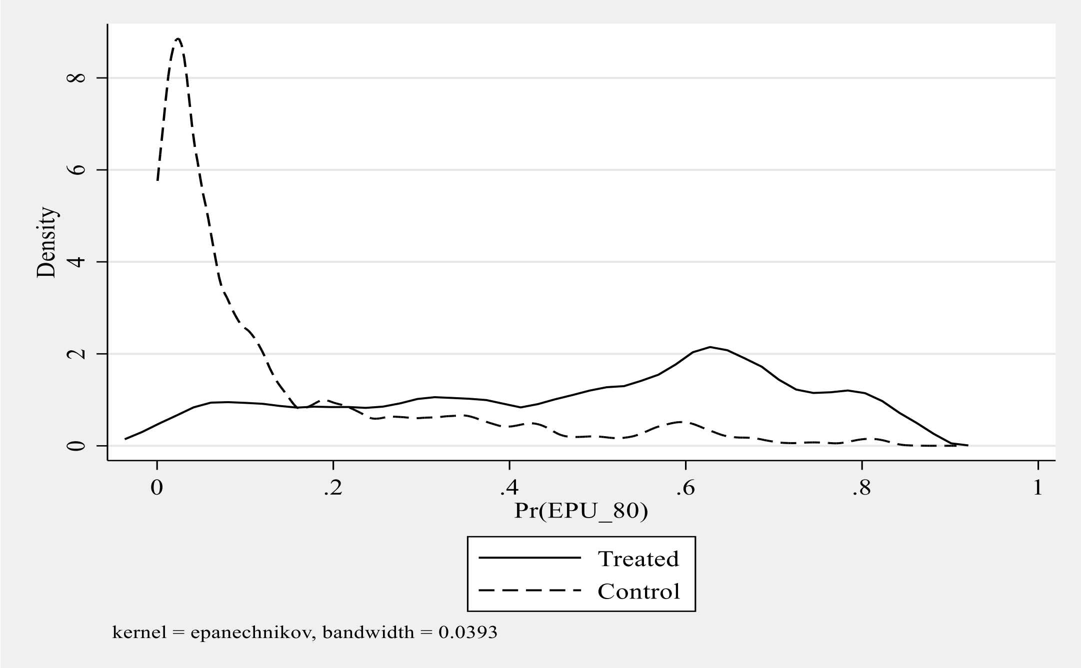
Appendix 3B The Overlap Graph of Propensity Scores for Treated And Control Groups



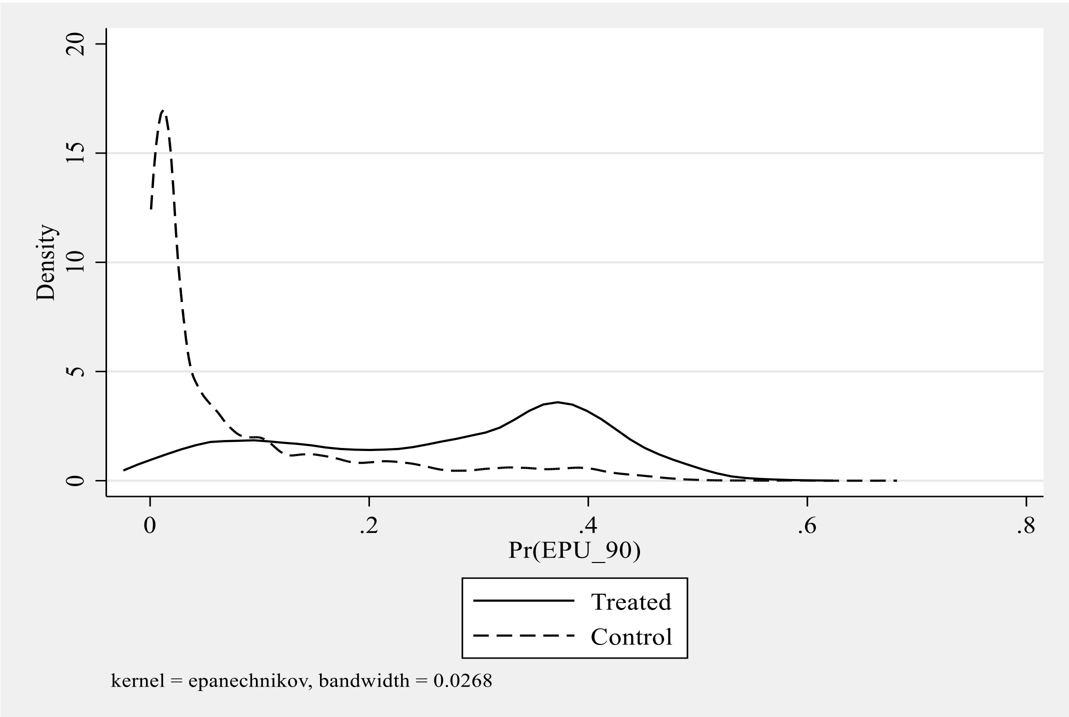
Appendix 3B.1 Kernel Density Estimation Overlap Graph at 60% of Δ%EPU



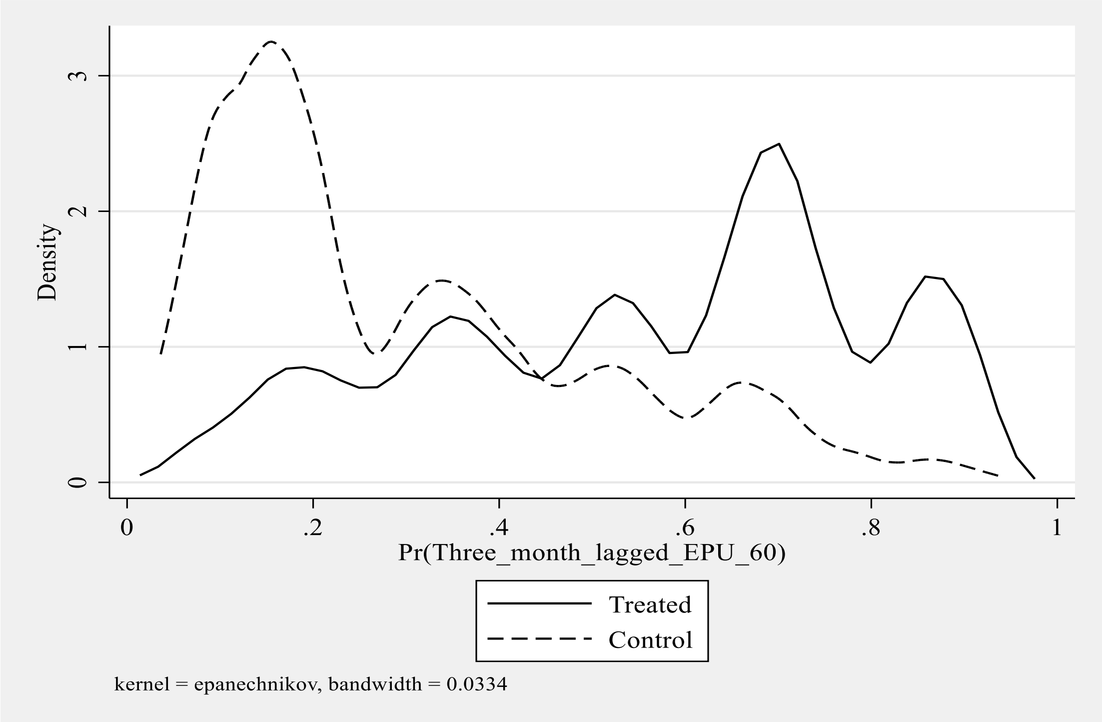
Appendix 3B.2 Kernel Density Estimation Overlap Graph at 70% of Δ%EPU



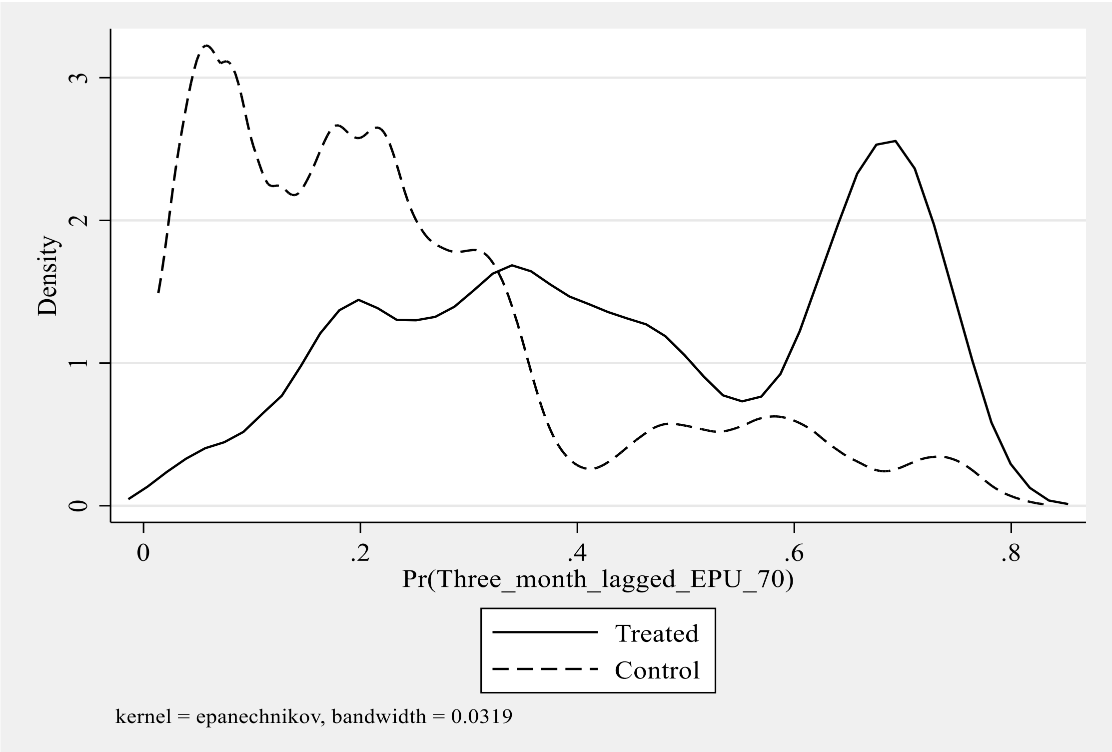
Appendix 3B.3 Kernel Density Estimation Overlap Graph at 80% of Δ%EPU



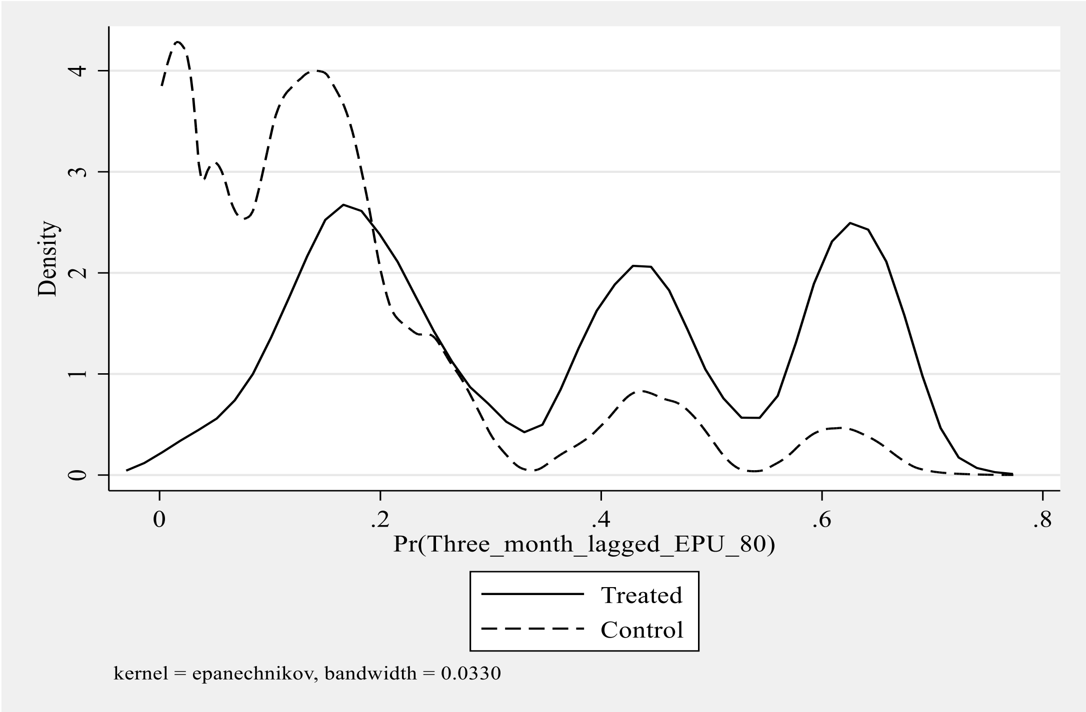
Appendix 3B.4 Kernel Density Estimation Overlap Graph at 90% of Δ%EPU



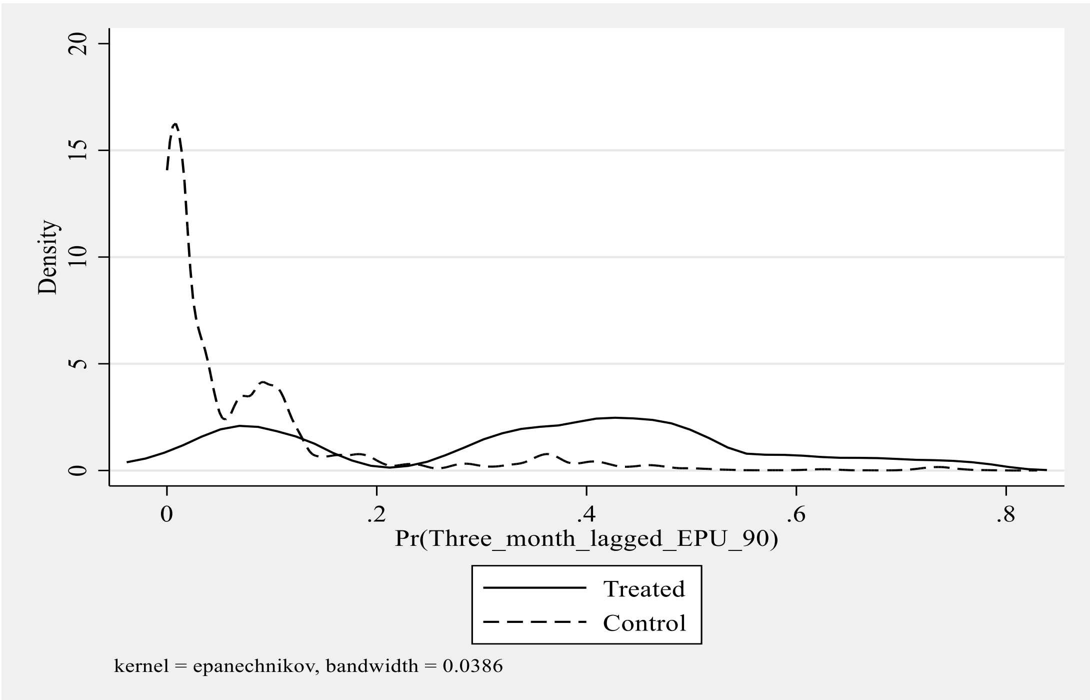
Appendix 3B.5 Kernel Density Estimation Overlap Graph at 60% of Three-month Lagged Δ%EPU



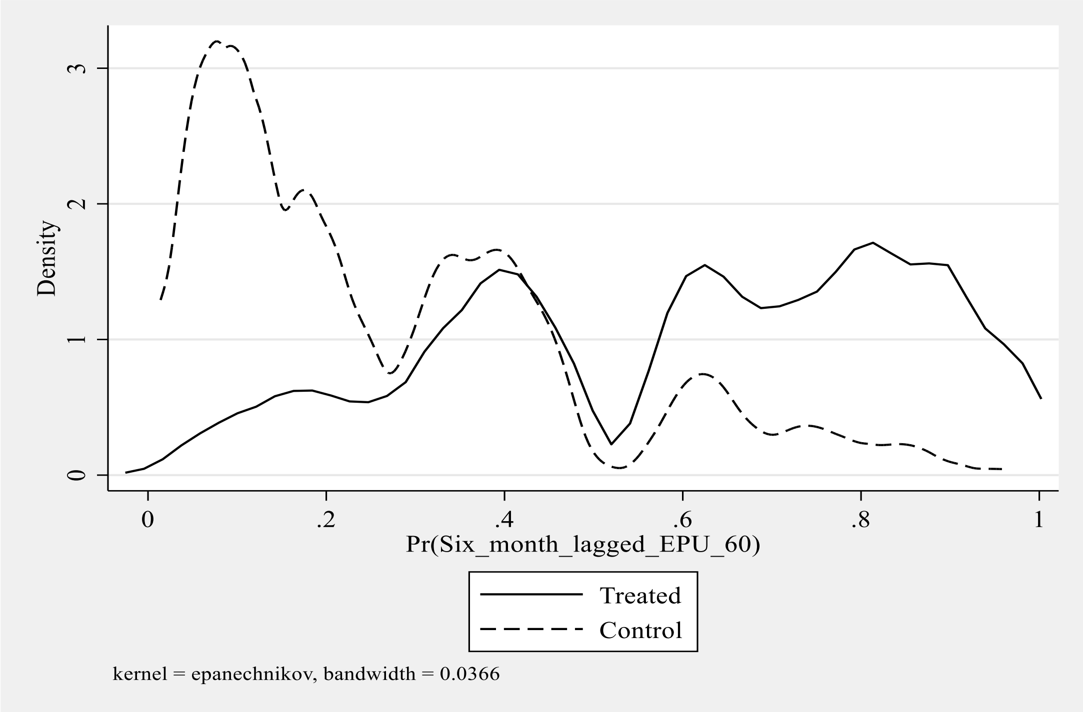
Appendix 3B.6 Kernel Density Estimation Overlap Graph at 70% of Three-month Lagged Δ%EPU



Appendix 3B.7 Kernel Density Estimation Overlap Graph at 80% of Three-month Lagged Δ%EPU



Appendix 3B.8 Kernel Density Estimation Overlap Graph at 90% of Three-month Lagged Δ%EPU



Appendix 3B.9 Kernel Density Estimation Overlap Graph at 60% of Six-month Lagged Δ%EPU

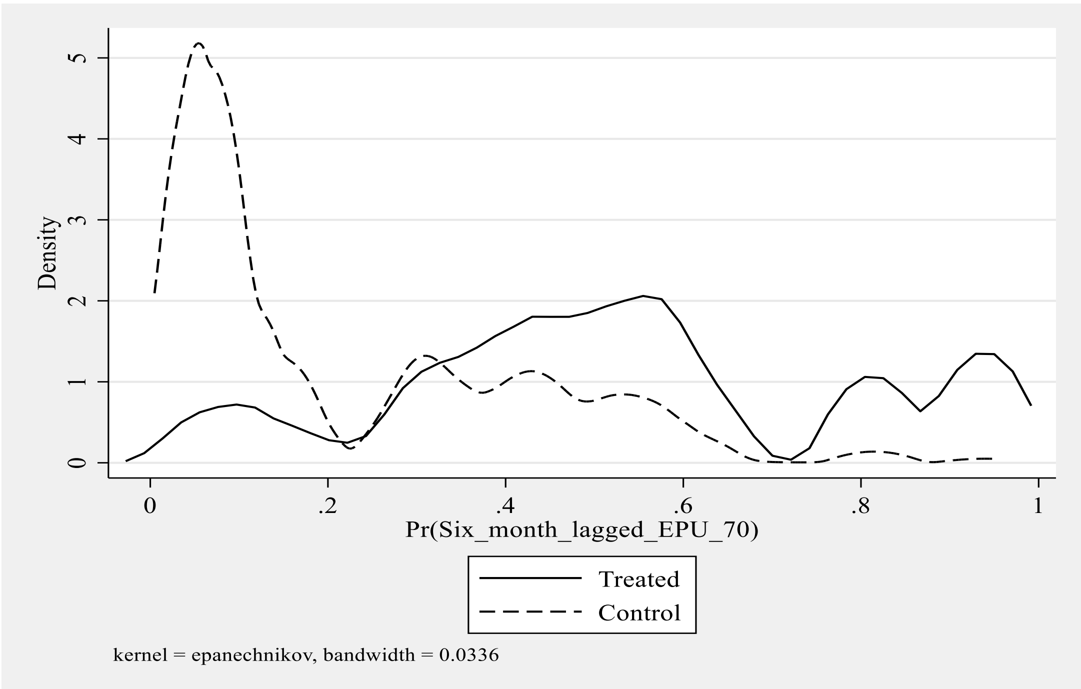
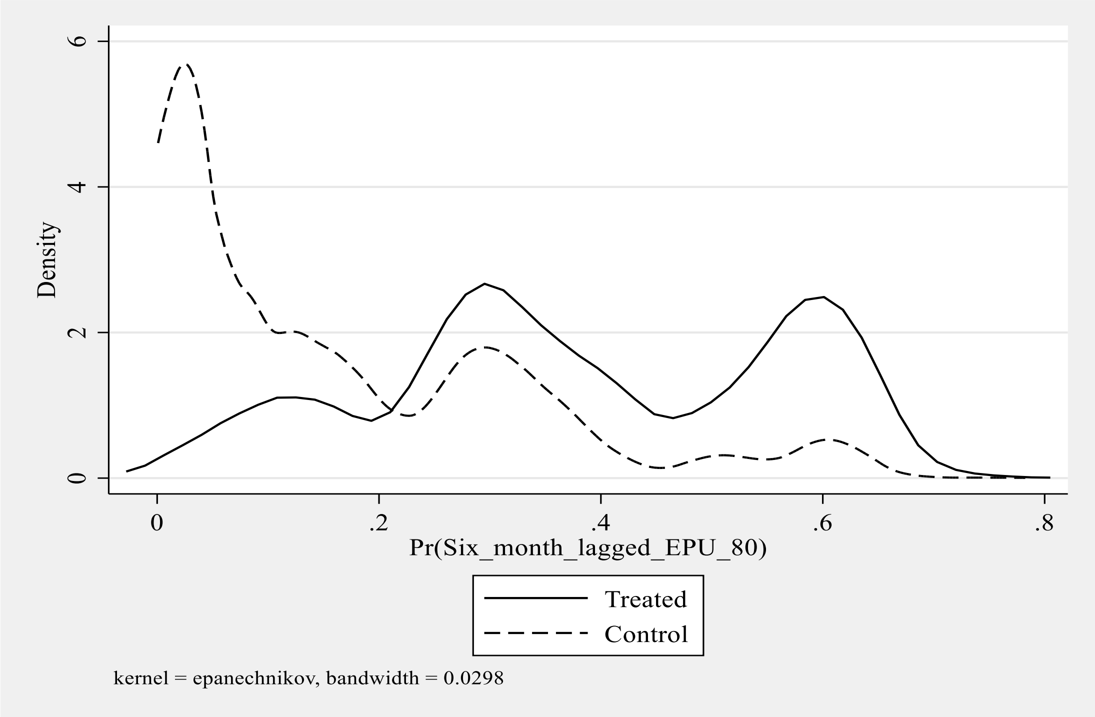
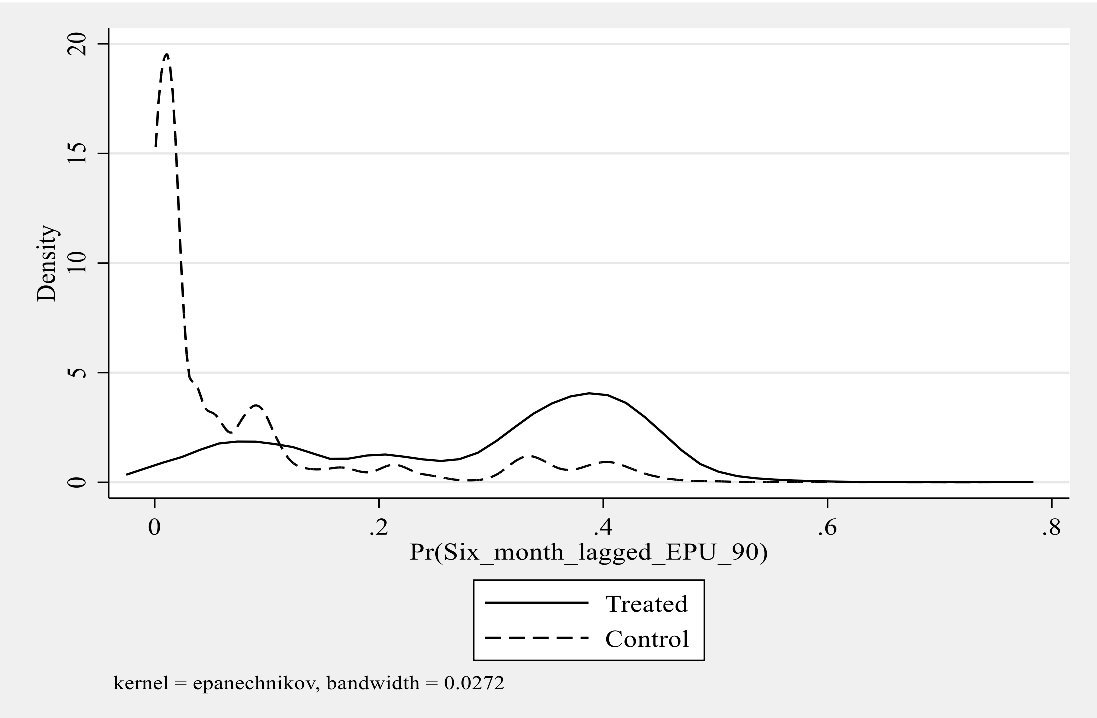


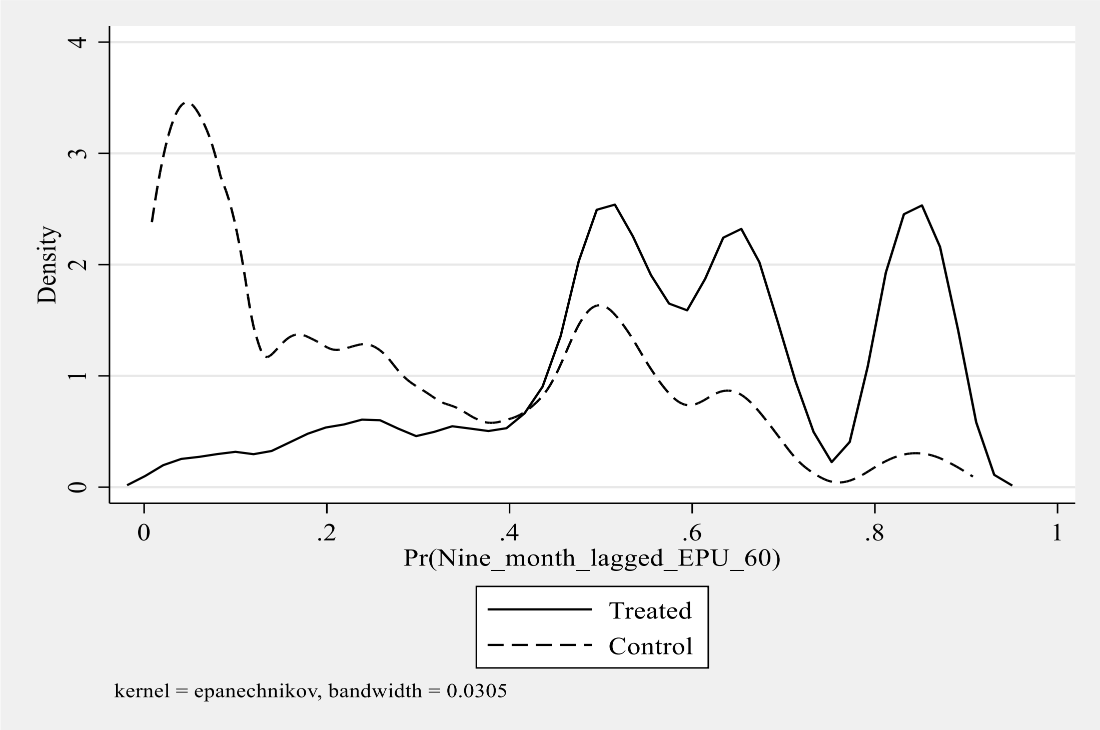
Figure3. B10 Kernel Density Estimation Overlap Graph at 70% of Six-month Lagged Δ%EPU



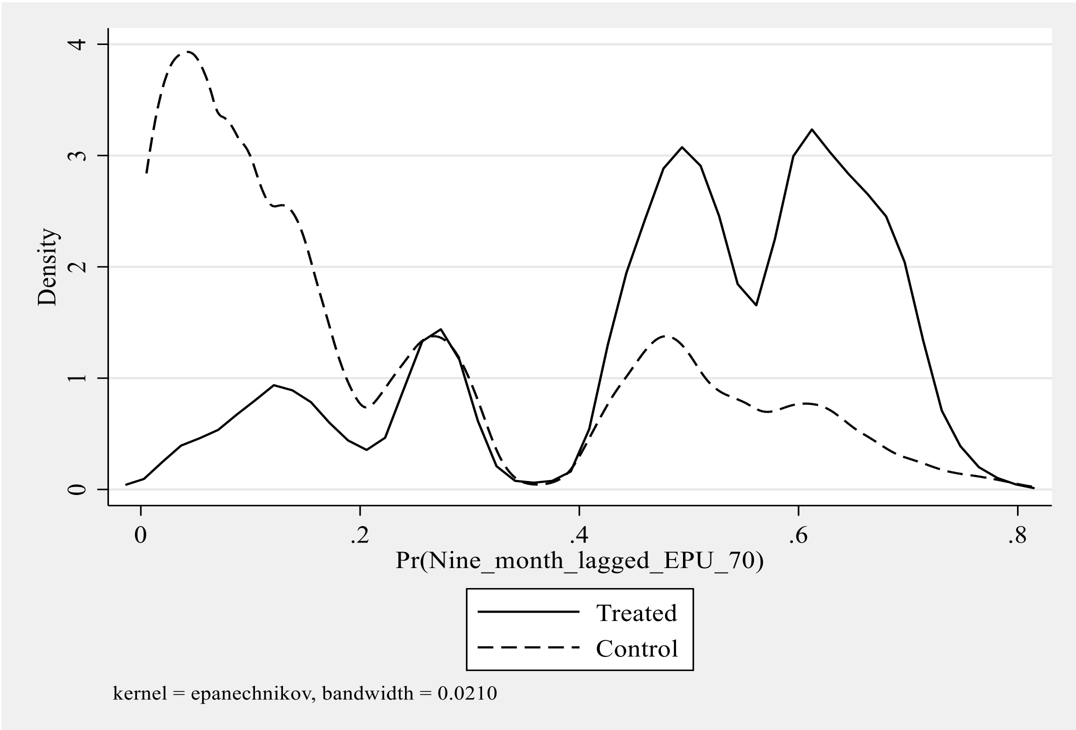
Appendix 3B.11 Kernel Density Estimation Overlap Graph at 80% of Six-month Lagged Δ%EPU



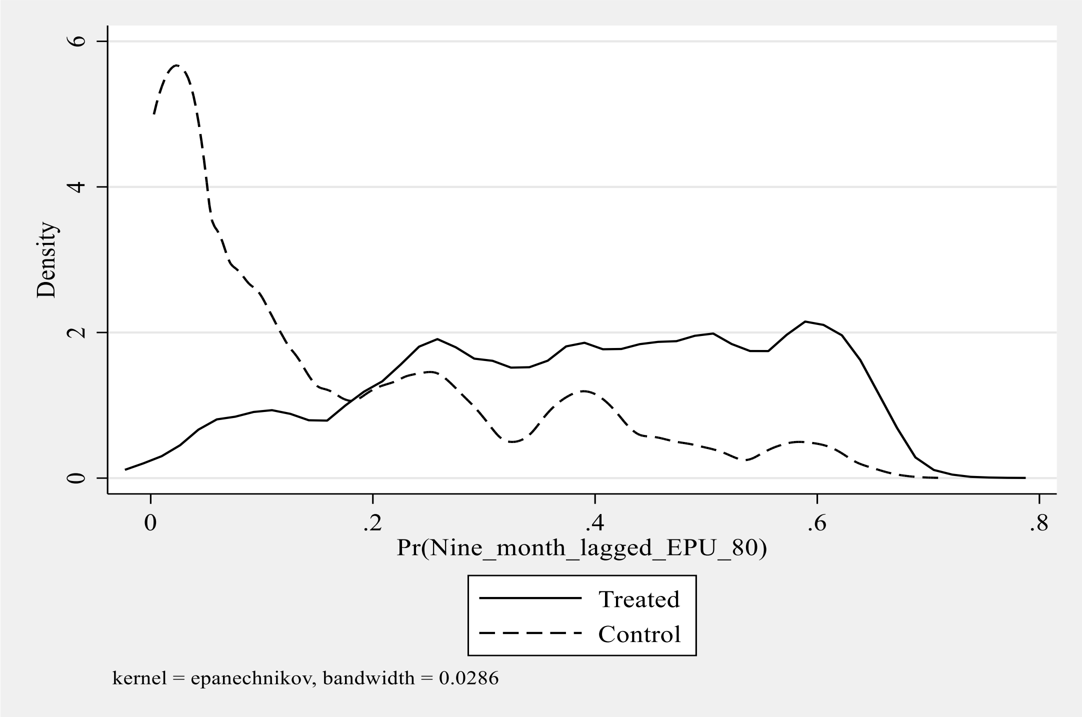
Appendix 3B.12 Kernel Density Estimation Overlap Graph at 90% of Six-month Lagged Δ%EPU



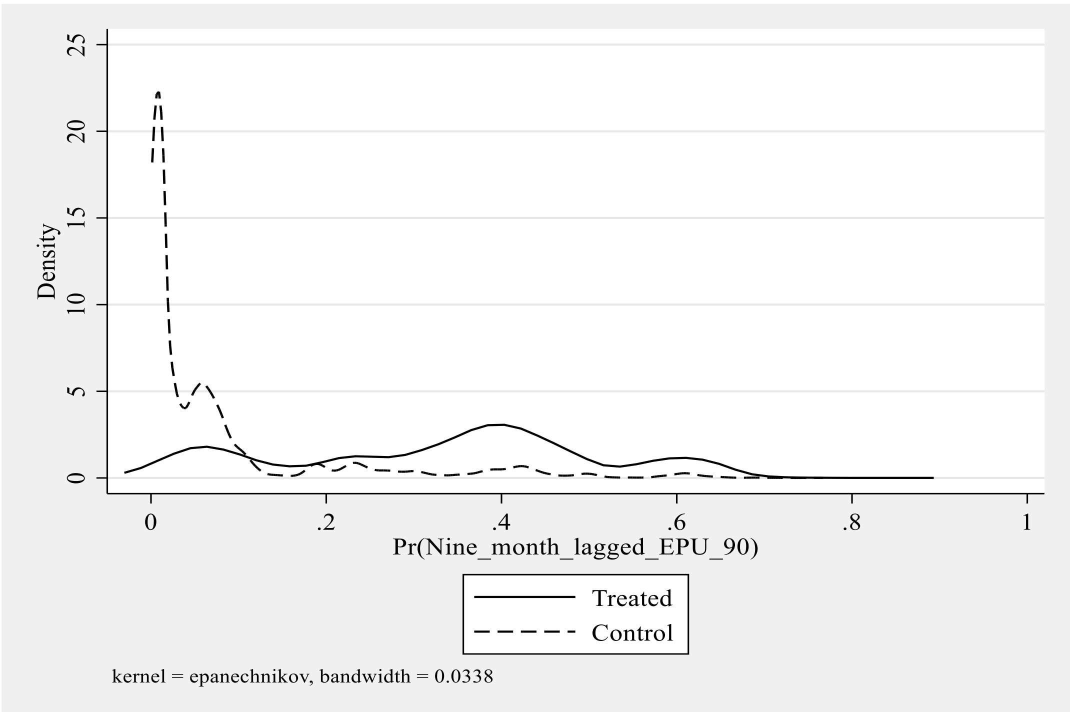
Appendix 3B.13 Kernel Density Estimation Overlap Graph at 60% of Nine-month Lagged Δ%EPU



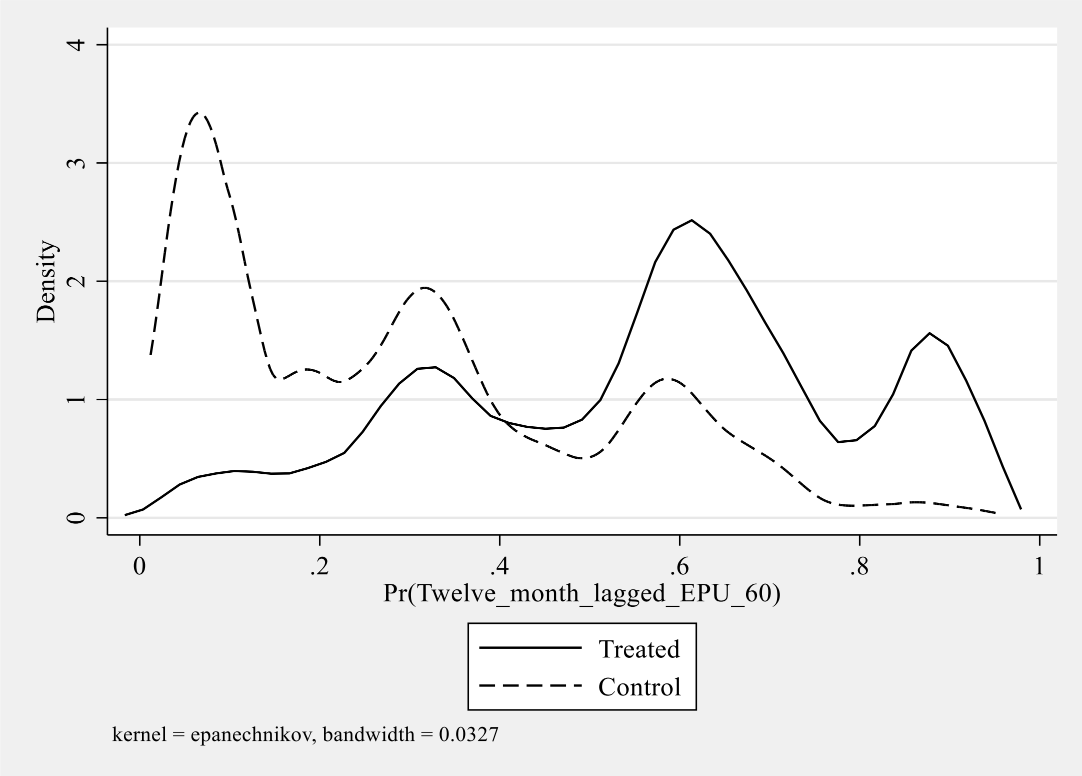
Appendix 3B.14 Kernel Density Estimation Overlap Graph at 70% of Nine-month Lagged Δ%EPU



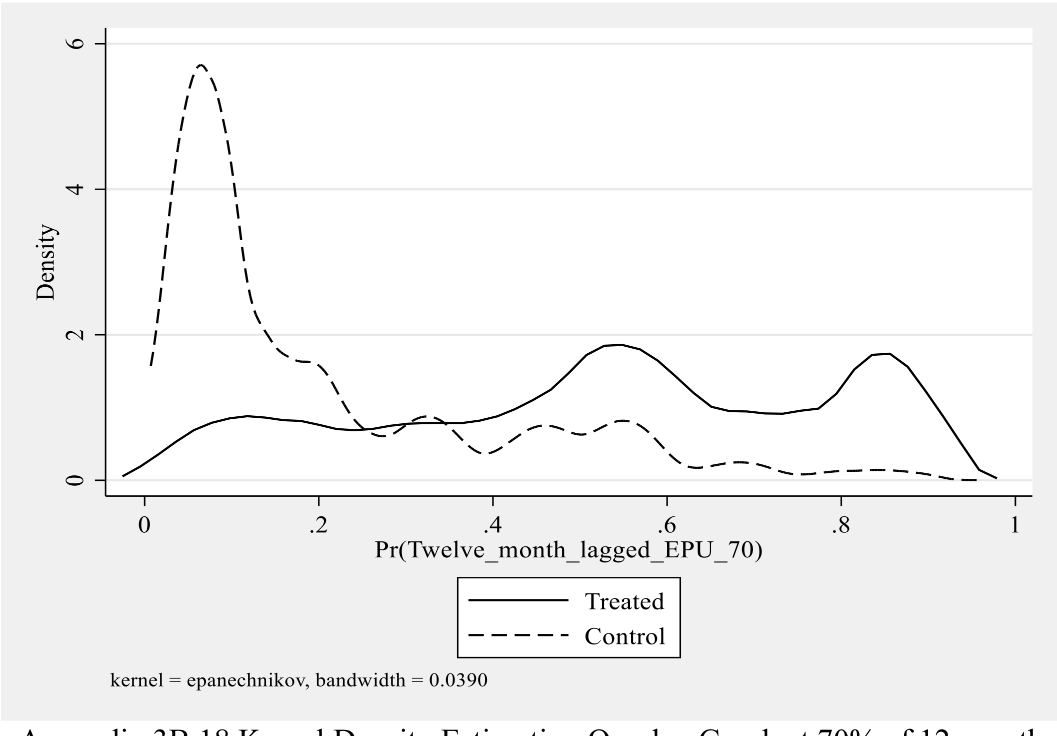
Appendix 3B.15 Kernel Density Estimation Overlap Graph at 80% of Nine-month Lagged Δ%EPU



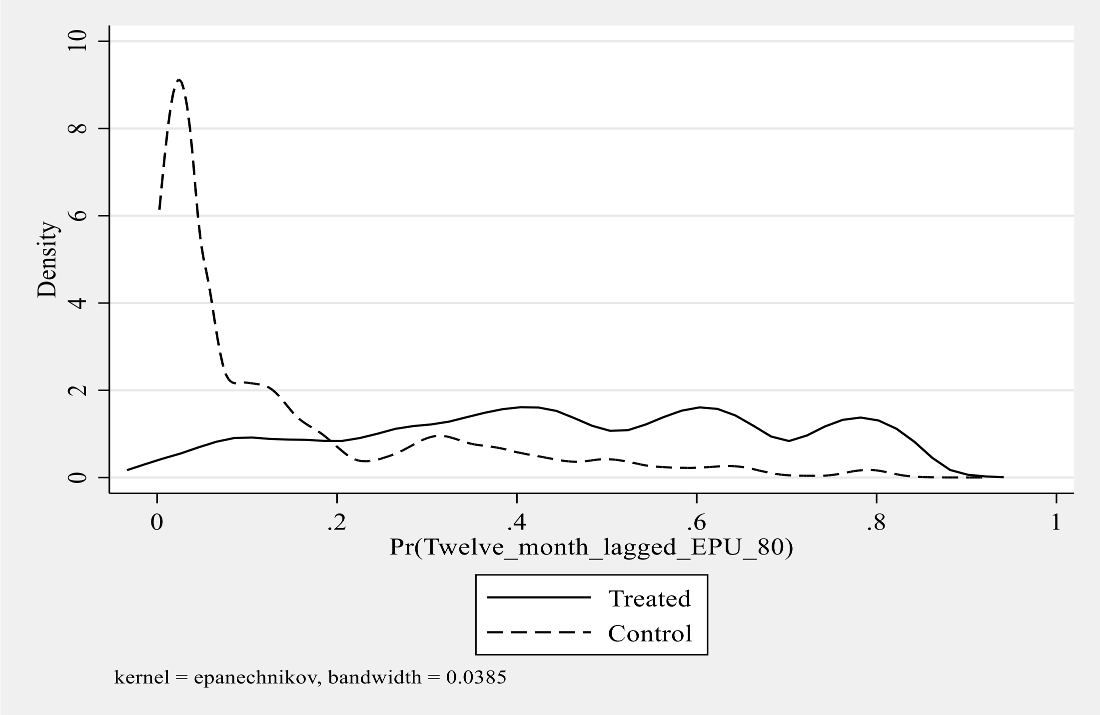
Appendix 3B.16 Kernel Density Estimation Overlap Graph at 90% of Nine-month Lagged Δ%EPU



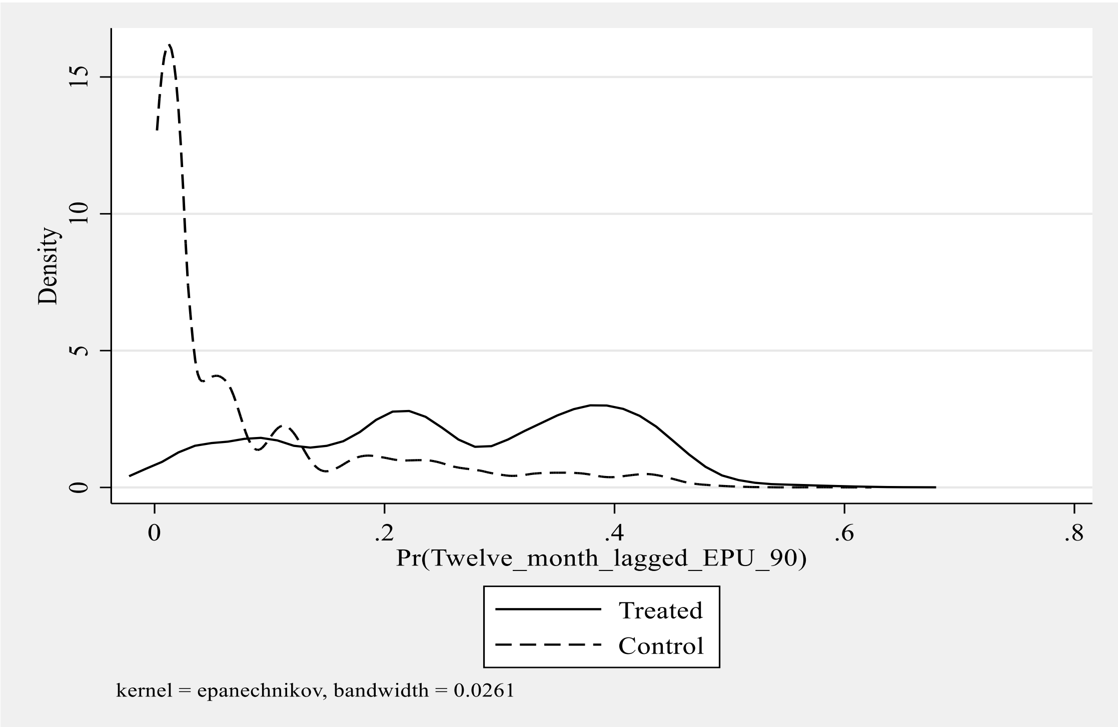
Appendix 3B.17 Kernel Density Estimation Overlap Graph at 60% of 12-month Lagged Δ%EPU



Appendix 3B.18 Kernel Density Estimation Overlap Graph at 70% of 12-month Lagged Δ%EPU



Appendix 3B.19 Kernel Density Estimation Overlap Graph at 80% of 12-month Lagged Δ%EPU



Appendix 3B.20 Kernel Density Estimation Overlap Graph at 90% of 12-month Lagged Δ%EPU

Appendix 3C The Association Between Δ%EPU and the Regular Dividend

Appendix 3C.1 The OLS Regression Results of the Dividend Payout Ratio Per Share on The Impact of Δ%EPU on the Regular Dividend

The dividend payout ratio per share is the ratio of the dividend per share to the earnings per share. This table presents the OLS regression results for dividend payout per share on explanatory and control variables. ***, **, and* denote the statistical significance level at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. See Table 3.3 for variable definitions.

Explanatory and control Variables	Dependent variable: Dividend payout ratio				
	(1)	(2)	(3)	(4)	(5)
$\Delta\%EPU_{i,t}$	0.002 (0.006)				
Three-month lagged $\Delta\%EPU_{i,t}$		0.015*** (0.005)			
Six-month lagged $\Delta\%EPU_{i,t}$			0.005 (0.007)		
Nine-month lagged $\Delta\%EPU_{i,t}$				-0.028*** (0.006)	
12-month lagged $\Delta\%EPU_{i,t}$					-0.018*** (0.007)
$Profitability_{i,t}$	-0.286*** (0.010)	-0.284*** (0.010)	-0.284*** (0.010)	-0.285*** (0.010)	-0.292*** (0.011)
Firm $size_{i,t}$	-0.292*** (0.025)	-0.301*** (0.026)	-0.299*** (0.026)	-0.297*** (0.026)	-0.318*** (0.027)
Growth $opportunity_{i,t}$	-0.027*** (0.010)	-0.027*** (0.010)	-0.026** (0.010)	-0.029*** (0.010)	-0.025** (0.011)
Retained $earnings_{i,t}$	-0.112*** (0.010)	-0.112*** (0.010)	-0.112*** (0.010)	-0.115*** (0.010)	-0.109*** (0.010)
Financial $constraints_{i,t}$	-0.124*** (0.007)	-0.124*** (0.007)	-0.125*** (0.007)	-0.126*** (0.007)	-0.124*** (0.007)
GDP $growth_{i,t}$	-1.203*** (0.174)	-1.179*** (0.174)	-1.167*** (0.177)	-1.344*** (0.177)	-1.276*** (0.179)
Constant	8.843*** (0.504)	8.641*** (0.502)	8.823*** (0.515)	9.669*** (0.518)	9.312*** (0.517)
R-squared	0.123	0.123	0.123	0.124	0.122
Prob > F	0.000	0.000	0.000	0.000	0.000
Observations	16,134	16,060	16,028	16,003	15,490
Firm and year-fixed effects	Controlled	Controlled	Controlled	Controlled	Controlled

Chapter 4

THE IMPACT OF EPU ON STOCK MARKET RETURNS

4.1 Introduction

Financial markets across the world have experienced substantial volatility over time. Two examples of such volatility are the 2008 financial crisis and the COVID-19 pandemic (2019/2020), both of which led to sharp declines in global stock markets.[39] Although the view that macroeconomic situations affect stock market returns is not new, evidence based on an aggregate indicator of macroeconomic conditions is relatively new. Since the introduction of the EPU index developed by Baker et al. (2016a), studies using it to examine the effects of EPU on corporate financial decisions (Huang, 2021; Aftab et al., 2023; Asimakopoulos et al., 2023), stock market prices (Hardouvelis et al., 2018), aggregate investment (Gholipour, 2019; Ren et al., 2019), and other related topics have increased. As a result, the impact of EPU on stock market returns has attracted extensive research attention. A growing body of literature has documented the inverse association between EPU and stock market returns (Arouri et al., 2016; Christou et al., 2017; Chiang et al., 2019). In addition, a few studies have also identified asymmetric effects of EPU on stock market returns over time or across countries (Kundu & Paul, 2022; Huang & Liu, 2022).

However, the existing literature still has several areas that require further investigation. First, studies have paid limited attention to the heterogeneous impacts of EPU on stock markets based on developed and developing economies. In addition, previous studies have reported inconsistent findings on the effects of EPU on stock market returns. This scenario indicates a need to further clarify the stock markets' response to EPU. Second, despite some empirical studies examining the effect of EPU on stock market returns, only one study (Pastor & Veronesi, 2012), to my knowledge, has theoretically

[39] For example, the UK FTSE 100 price index dropped 13.95% and 13.31% in September and October of 2008, respectively; the S&P 500 price index fell 18.56% in October 2008. In March 2020, when COVID-19 began to spread in European countries and the US, the UK FTSE 100 price index declined 16.79% and the S&P 500 index dropped 13.37%.

investigated the mechanism through which EPU impacts stock market prices, suggesting a need for further analysis of this mechanism. Finally, existing literature has not fully investigated the impact of EPU on dividend yield, a component of total stock returns.

Therefore, to fill some voids in the literature, this chapter investigates the following issues. First, it investigates whether and how EPU impacts stock market returns. To answer this question, we have used monthly and quarterly data from 22 countries between 1997 and 2021 to examine the relationship between EPU and total stock market returns. In addition to fixed-effect panel regressions, we have employed the quantile method to examine the relationships between changes in EPU and stock market returns under different market conditions.

Second, this chapter examines whether there is a heterogeneous EPU-return effect between developed and developing countries. To address this question, the chapter classifies sample countries into developed and developing groups based on the World Bank's income categories. By regressing the two sub-samples, the chapter examines and compares the different responses of changes in stock market returns to changes in EPU between developed and developing markets. We also analyse the reasons behind the heterogeneous effects.

Third, the chapter examines the possible channels of the observed relationship between EPU and stock market returns. Using monthly and quarterly data from 22 countries and the mediation test method proposed by Baron and Kenny (1986), the chapter tests whether risk premium, investment, and dividend yield mediate the effect of EPU on stock returns. Then, the chapter analyses the overall effect of EPU on the stock market returns by comparing the strength of the three channels.

Several key findings have emerged from our analysis. First, changes in EPU are inversely associated with stock market returns. The results hold after controlling for variables which may affect stock market returns, such as the short-term interest rate, the business confidence index, the CPI, the real exchange rate, the inflation rate, the industrial production index, and the economic freedom index. The results are robust to panel fixed effects and quantile regressions. Second, the results indicate that changes in EPU or lagged EPU are negatively correlated with changes in stock market returns in both developed and developing country groups. However, stock market returns take longer to respond to changes in EPU in developing countries, indicating that changes in stock market returns are less sensitive to changes in EPU in this country group. Finally, the chapter documents three channels through which changes in EPU affect stock market returns: the risk premium, investment, and the dividend yield. The mediation tests on risk premium and investment channels indicate that stock market returns respond negatively to changes in EPU. However, the test reveals a small but statistically significant positive impact of EPU on stock market returns through the dividend yield channel.

This chapter contributes to the literature in several ways. On the one hand, it offers valuable insights into the mechanisms through which EPU affects stock market returns. This chapter extends the work of Pastor and Veronesi (2012) by analysing the multiple channels through which EPU may affect stock returns, such as investments (a corporate decision), risk premiums (a measure of the market response), and dividend yields (a combined reflection of corporate decisions and market responses). On the other hand, it contributes to the existing literature by revealing a heterogeneous effect of EPU on stock returns between developed and developing countries. Although Kundu and Paul (2022) and Huang and Liu (2022) identify asymmetric effects of EPU on stock market returns over time or across individual countries, the differences in the effects between developed and developing markets remain relatively under-investigated. Uncovering the heterogeneous EPU-stock return effect between developed and developing countries enables us to provide specific implications for countries at different levels of development. This finding can be useful for corporate managers as well as economic policymakers. The remainder of the chapter is structured as follows. Section 2 reviews the related literature. Section 3 analyses the possible channels through which EPU can affect stock market returns and develops the relevant hypotheses. Section 4 describes the data used in this chapter. Section 5 presents and discusses the empirical results. Section 6 concludes the chapter.

4.2 Literature Review

Previous research has examined the effects of macroeconomic variables on stock returns, such as output, interest rates, inflation, and exchange rates. Given that EPU is closely associated with macroeconomic variables, this section first summarises the literature on the relationship between macroeconomic variables and stock market returns and then reviews the literature on how EPU influences stock returns.

4.2.1 Macroeconomic Variables and Stock Market Returns

It is widely believed that real macroeconomic variables correlate with stock market returns. Researchers organise their studies under two theoretical frameworks. The first is the flexible accelerator model. According to the flexible accelerator model, Fama (1981) argues that an increase in real economic activity puts pressure on existing capital stocks, which induces a rise in the average return on these stocks. The second theoretical framework is asset pricing models, in which real economic variables determine stock prices. For example, Cox et al. (1985) developed an intertemporal general equilibrium model of asset prices. This model solves the asset equilibrium price through underlying real economic variables and their probabilistic information. The economic variables include individual current wealth, consumption, and production opportunities. Other economic variables that do not affect production opportunities can be introduced into the model as state variables. When these factors increase wealth or risk, the asset return will rise. Chen et al. (1986) suggest that macroeconomic variables are sources of risk which affect the real value of cash flows. Thus, they can have a significant impact on stock market prices. Asprem (1989) argues that macroeconomic variables may represent state variables in the intertemporal CAPM. Then, economic activity and expectations about future real economic activity can significantly impact stock market returns. The above studies theoretically demonstrate that macroeconomic variables, such as output, interest rates, exchange rates, and inflation rates, correlate with stock returns.

Output

Existing literature suggests a positive association between output and stock market returns (Fama, 1981; Chen et al., 1986). This is because an increase in output growth indicates higher demand for capital, which, in turn, increases the average capital return (Fama, 1981). Additionally, Asprem (1989) and Srinivasan (2011) suggest that output growth expectations are positively associated with stock market prices because higher output growth and expectations increase firms' cash flows, raising stock returns.

Interest Rate

Studies by Asprem (1989), Alam and Uddin (2009), Huang et al. (2016), Assefa et al. (2017), and Kyei-Mensah and Awuah-Werekoh (2020) have reported a negative association between the interest rate and stock market returns. They argue that a rise in interest rates increases the discount rate for firms' future cash flows (Asprem, 1989; Huang et al., 2016; Assefa et al., 2017) and the cost of capital (Alam & Uddin, 2009), leading to decreases in stock prices and returns. Contrary to the above studies, Srinivasan (2011) reports a significantly positive long-run relationship between interest rates and stock market returns. This is because a rise in interest rates can increase the cost of holding cash and stimulate demand for stocks, inducing an upward movement in stock prices.

Inflation Rate

Researchers have reported contradictory findings on the relationship between inflation and stock market returns. Some studies have suggested an inverse association between stock market returns and inflation (Schwert, 1977; Fama, 1981; Geske & Roll, 1983; Zhang, 2021). These studies attribute the negative association to the negative relationship between inflation and real economic variables (Fama, 1981), high expected inflation resulting from inverse stock market shocks (Geske & Roll, 1983), and countercyclical monetary policy during periods of inflation (Zhang, 2021). Inversely, Firth (1979), Boudoukh and Richardson (1993), Choudhry (2001), Bekaert and Engstrom (2010), and Tiwari et al. (2022) suggest a positive association between stock market returns and the inflation rate. The studies explain the positive association in two ways: the Fisher effect (Firth, 1979; Choudhry, 2001; Tiwari et al., 2022) and a positive relationship between the inflation rate and real activity in emerging countries (Spyrou, 2004).

Exchange Rate

Studies have reported a significant but country-asymmetric (Asprem, 1989; Kyei-Mensah & Awuah-Werekoh, 2020) and period-asymmetric (Choi et al., 1992) association between exchange rates and stock market returns. The reasons for the asymmetric effect may be: (i) the opposite economic conditions underlying exchange rates (Asprem, 1989), (ii) various exchange rates and economic policies across countries (Kyei-Mensah & Awuah-Werekoh, 2020), and (iii) the different net foreign exchange exposure positions held by financial institutions (Choi et al., 1992).

Investor Sentiment

The literature discussed above assumes that the investors are rational and that the equity market is informationally efficient. However, when researchers relax the assumptions and allow investors to be irrational, they find that investor sentiment can significantly impact stock market returns as it can lead stock prices to diverge from their fundamental values (De Long et al., 1990; Barberis et al., 1998). Empirical studies also evidence the effect of investor sentiment on stock market returns (Baker & Wurgler, 2006; Bouri et al., 2022), while Chu et al. (2016) report a robust bidirectional nonlinear causality between stock returns and investor sentiment in China.

Overall, the literature suggests that macroeconomic variables are closely associated with stock market returns. Specifically, researchers have reached a consensus on a positive association between output and stock market returns and a negative correlation between interest rates and stock market returns. However, there are still wide debates on how inflation and exchange rates influence stock market returns. On the other hand, investor sentiment may cause stock prices to deviate from their fundamental values, leading to overreaction and underreaction. Key studies and their findings are summarised in Table 4.1.

[Insert Table 4.1 Here]

4.2.2 EPU and Stock Market Returns

Previous studies have investigated the impact of EPU on stock market returns. Pastor and Veronesi (2012) built a theoretical general equilibrium model to capture the effect of policy uncertainty on firms. The study considers two types of uncertainty in the model. One is the uncertainty about whether the policy will change, and the other is the uncertainty about the new policy's impact on firms' profitability. In the model, the government's prevailing policy affects the mean of a firm's profitability, following a stochastic process. The government and investors obtain beliefs about the current policy's effect through observing realised profitability. The government decide whether and when to change the policy by considering both its political cost and the maximisation of investors' welfare. Since investors are unaware of the political costs, they cannot accurately predict policy changes. The optimal choice of the government is to change policy when the policy's effect on profitability is lower than a given threshold. There are two effects of policy changes on stock prices. The first is the upward effect, which is because policy changes improve firms' expected profitability and expected cash flows. The other is the downward effect, as the new policy introduces greater uncertainty and increases the discount rate. The study suggests that the downward discount effect is more substantial unless the old policy's impact on profitability is sufficiently low. Therefore, stock market returns should decline on average. Moreover, the inverse effect is more pronounced when policy uncertainty is high or when policy changes occur after an economic downturn.

Empirical tests have demonstrated the inverse association between EPU and stock market returns. Arouri et al. (2016) examine monthly data from the US from January 1900 to January 2014. The results suggest that policy uncertainty significantly reduces stock market returns, and the inverse relation is stronger during periods of extreme volatility. Christou et al. (2017) employ monthly data from Australia, Canada, China, Japan, Korea, and the US between January 1998 and December 2014. The results based on a Bayesian panel VAR suggest that EPU has a negative impact on stock market returns. Xiong et al. (2018) analyse monthly data from the China A-share stock market from January 1995 to December 2016 by using Engle's dynamic conditional correlation model. The results suggest that stock market returns negatively respond to changes in EPU. Additionally, the dynamic correlations between EPU and stock market returns fluctuate considerably, especially during financial crises. Similarly, Chiang et al. (2019) utilise monthly data from the US S&P 500 index and the Shanghai Stock Exchange A-share index of China between January 1997 and February 2017. The GED-TARCH (1,1)-M procedure suggests that economic uncertainty negatively affects China's stock market returns. Kwon (2022) extracts a common and a global factor of stock market returns from MSCI stock indices for 20 emerging and 10 developed countries, respectively, between January 1999 and December 2018. The results of the FAVAR model reveal that global economic uncertainty shocks lead to a decline in emerging stock market returns. Although these studies do not delve into the mechanisms by which EPU impacts stock market returns, they identify two possible channels. First, EPU shocks hinder key decisions of firms and other economic agents, such as investment, employment, consumption, and saving (Arouri et al., 2016). This, in turn, negatively affects firms' future cash flows and stock returns. Second, EPU rises increase stock market volatility, heightening the risk premium. Consequently, the discount rate rises, decreasing stock returns (Arouri et al., 2016; Chiang et al., 2019).

In addition, several studies have found asymmetric effects of EPU on stock returns over time and across countries. For example, Gao et al. (2021) estimate the Diebold and Yilmaz spillover index using monthly data from China between October 2002 and May 2017. They report that EPU has a spillover effect on the growth rate of stock market returns and receives spillover from the stock market in China. The net growth spillover effect of EPU on stock returns was inverse before April 2007 and fluctuated around zero thereafter. Although the study did not investigate the underlying reasons for this asymmetric effect, it suggests that EPU has asymmetric effects on stock returns over time. Kundu and Paul (2022) examine monthly data from G7 countries between 1998 and 2018 through the two-regime MSVAR model. They find that increases in EPU contemporaneously lower stock market returns and aggravate stock market volatility. However, in the future, they lead to higher returns and lower volatility. The authors explain the asymmetry as the expected stock risk premium turning into the stock return. Namely, when EPU rises, investors demand an extra premium for holding risky stocks. The higher risk premium currently decreases stock market returns. However, this leads to a rise in the stock market price and return in the future. Huang and Liu (2022) employ the monthly data from G7 countries between January 1997 and March 2020. The results of the quantile regressions indicate that both increases and decreases in EPU significantly and negatively influence stock market returns; however, the decreases in EPU have a less pronounced impact. Moreover, higher EPU decreases stock returns in Japan, Canada, the UK, and the US during bearish markets but not during bullish markets. The reason for the asymmetric effects is investors' different responses to good and bad news. EPU is bad news for the stock market, where investors care more about bad news than good news. Therefore, increases in EPU have a more substantial impact on stock market returns.

Since the stock market price may be a leading indicator of EPU, a Granger causal relationship may exist between the EPU and stock market returns (Karacaer & Pirgaip, 2019). However, the statistical causal relationship between these two variables only exists in some periods and countries. For example, using a time-varying bootstrap Granger approach with a 24-month rolling window, Li et al. (2015) analyse the monthly data from China between February 1995 and February 2003 and India between February 2003 and February 2013. The results suggest a bidirectional Granger causal relationship between EPU and stock market return in several sub-periods in China and India. Karacaer and Pirgaip (2019) utilise monthly data from 12 developed and nine emerging countries between March 2005 and March 2019. The results from a bootstrap panel Granger causality test suggest that changes in stock market returns Granger-cause changes in EPU in emerging markets, and there is no Granger causal relationship between these two variables in developed countries. Similarly, Hong et al. (2024) use the time-varying Granger causality method to examine the G7 and seven emerging countries from 1997 to 2022. They find that domestic EPU and stock market returns have bidirectional linear Granger causality in three countries. In the UK, EPU is the linear Granger cause of the stock market return. Moreover, a two-way nonlinear Granger relationship exists in six countries. The time-varying Granger causality tests suggest that periods when EPU affects the stock market are usually those with financial crises or local events.

With economic globalisation, changes in EPU can cause capital inflow and outflow across countries. This leads to a spillover effect of domestic EPU on the stock market returns of other countries (Uddin et al., 2020). Uddin et al. (2020) use the monthly data from Bangladesh and its six trading partners, including the US, Canada, the EU, China, Russia, and India, from January 2003 to April 2019. The results of break-least squares and the Markov-switching regression suggest that the EPU of major importing countries (China and India) has a more substantial inverse impact on Bangladesh's stock market returns than that of major exporting countries (the US and the EU). Hung (2021) employs monthly data from BRICS countries (China, India, Brazil, Russia, and South Africa) from January 1997 to December 2019. The results from the multivariate DECO-GARCH model and the Diebold and Yilmaz spillover index suggest a positive average return equicorrelation between EPU and stock indices, as well as a short-term spillover effect of EPU on stock market returns through stock market prices. The key features and findings of the above studies are summarised in Table 4.2.

[Insert Table 4.2 Here]

4.2.3 The Gaps in the Literature

The above summary of the literature shows that studies have examined variables that impact stock market returns under various conditions. If information is perfect in the financial market, economic policy shocks are predictable. However, irrational investors would take measures to diminish the effect of these predictable shocks. Then, the impact of these shocks on the stock market returns will be limited. Therefore, under the assumption of perfect information, existing studies have demonstrated that economic variables, including output, interest rates, inflation rates, and exchange rates, are significantly correlated with stock market returns.

On the other hand, researchers have included investor sentiment and uncertainty into studies by assuming that information is imperfect and investors are irrational. Under information asymmetry, it is challenging for economic agents and investors to predict future changes in government policies and their effects, causing EPU. Studies over the past decade have examined the impact of EPU on stock market returns, using data from various countries and different methods. However, there are still research gaps that require further research.

First, the effect of EPU on stock market returns requires further clarification through various methods and across-country groups based on their economic development. The existing literature has documented both negative (Arouri et al., 2016; Christou et al., 2017; Kwon, 2022) and asymmetric effects (Kundu & Paul, 2022; Huang & Liu, 2022) of EPU on stock market returns. Additionally, existing studies have paid relatively limited attention to the heterogeneous impacts of EPU on stock market returns across developed and developing countries. This highlights the need for further investigation into whether EPU drives stock market returns, how these effects vary across different country groups, and whether the results are robust under alternative methods.

Second, the transmission mechanism through which EPU affects stock market returns has been under-researched. Studies by Bernanke (1983), Pindyck (1988), Bloom et al. (2007), and Bloom (2009) have proposed models exploring uncertainty and its impact on investment. However, these works have not addressed investment as a channel of the EPU-return effect. Additionally, despite extensive empirical tests of the effect of EPU on stock market returns, only one study (Pastor & Veronesi, 2012), to my knowledge, theoretically analyses the mechanism through which EPU impacts stock market prices. Furthermore, the existing studies have not empirically examined the channels through which EPU impacts stock market returns. Therefore, the transmission mechanism through which changes in EPU affect stock market returns requires further investigation.

Third, previous research has paid little attention to the role of dividend yield in the EPU-return effect. For example, Pastor and Veronesi (2012) analyse EPU's effect on stock prices through changes in the discount rate and cash flow, but they did not mention the impact of dividend yield on stock returns. Empirical studies typically measure stock market returns using logarithmic changes or the first difference of the stock market price index, which excludes the dividend component of returns received by the investors. However, dividend yield is a component of total returns that may respond to changes in EPU (the effect of EPU on payout policy is also established by the evidence provided in Chapter 3 of this thesis). Thus, to better understand the impact of EPU on stock returns, it is necessary to investigate how EPU affects stock returns through the dividend component of total stock returns.

4.3 Hypothesis Development

4.3.1 The Effect of EPU on Stock Market Returns

Total stock returns involve two components: capital gains (the change in stock market prices) and dividends received from the firm. Therefore, this chapter examines the relationship between EPU and total returns by investigating responses of both components to EPU. When EPU increases, firms may delay investments and wait for more information, thereby avoiding inappropriate investment decisions and the related risks (Baker et al., 2016a). Consumers are also likely to reduce their consumption because of increased uncertainty about their future employment and income (Gomes et al., 2012). The decline in consumption reduces the demand for firms' products and services. Thus, firms are reluctant to invest further and increase their production capacity. Furthermore, considering heightened EPU, lenders and investors require a higher risk premium to compensate for the increased risk. This increases the cost of capital, reducing the profitability of investment projects or even making some of them economically unviable. Consequently, firms hold back from investing. The absence of new investment and the reduction in consumer demand for goods and services negatively affect firms' future free cash flows. Moreover, investors demand higher risk premiums, leading to higher discount rates, reducing the present value of future cash flows. Therefore, when EPU increases, the present value of expected cash flows is likely to decrease due to both lower expected future cash flows (in nominal terms) and heightened discount rates. This, in turn, leads to lower stock prices and capital gains (or even a capital loss) during periods of rising EPU.

Decreases in firms' investments and stock prices in response to EPU increases may also impact firms' payouts, as evidenced in Chapter 3 of this thesis. An increase in EPU may affect the dividend payout in different ways. First, to counter possible inverse effects of declining stock prices, managers may signal their confidence in firms' future performance by increasing dividend payouts. This results in an increase in dividend yield. Second, managers are likely to hold additional cash for precautionary reasons if they lack confidence about the firm's future performance or believe that EPU increases are likely to continue for an extended period. This scenario can result in a reduction in dividend payments. On the other hand, as the agency theory suggests, when managers have surplus cash, they may use it for their own benefit. Therefore, to minimise such agency costs, shareholders may ask managers to distribute the surplus cash initially set aside for investment when EPU rises. This should lead to a higher dividend payout (i.e. a higher dividend yield).

However, Watts et al. (2023) suggest that dividend yields account for only a small portion of total stock returns relative to capital gains yields. According to this study commissioned by the S&P 500, 'From 1926 to February 2025, dividend income constituted 31% of the monthly total return of the S&P 500, with the remaining portion coming from capital appreciation' (Watts et al, 2023, p.3). Therefore, the net effect of EPU on total returns is likely to be negative, which leads to our Hypothesis $H_{4.1.}$

$H_{4.1}$: Changes in EPU and total stock market returns are inversely related.

The efficient market hypothesis predicts that new information is incorporated in stock prices as soon as it becomes available (Fama, 1970). This suggests that the implications of changes in EPU should be reflected in stock prices as soon as they are revealed. While the existing literature suggests that stock markets are generally efficient at processing information, it also finds that emerging stock markets exhibit slower reactions and longer delays to local and global market information compared to developed stock markets (Camilleri et al., 2020; Hsin & Peng, 2023). This is because emerging markets have higher transaction costs and less efficient information production than developed markets (Griffin et al., 2010), resulting in a less efficient financial market. Therefore, market participants in developed countries are likely to respond more rapidly to changes in EPU than those based in developing countries. Additionally, investors typically request a higher risk premium in developing markets compared to developed markets to compensate for the inherent risks associated with these markets. Therefore, stock returns in the developing markets are likely to take longer to respond to EPU shocks than those in developed markets. This leads to our Hypothesis $H_{4.1A.}$

$H_{4.1A}$: Stock market returns take longer to respond to the changes in EPU in developing countries than in developed countries.

4.3.2 The Channels Through Which EPU Affects Stock Returns

There are three possible channels through which the changes in EPU are likely to affect the stock returns. They are (a) the discount rate (especially its risk premium component), (b) investments, and (c) the dividends. Their transmission mechanisms are discussed below, and the testable hypotheses are developed.

4.3.2.1 The Discount Rate Channel

EPU may affect the risk premium in several ways. First, when EPU increases, it becomes more challenging for investors to predict future economic conditions and firms' cash flows, thereby raising the risk of inverse selection among investors. Consequently, investors look for a higher risk premium to offset the increased risk. Second, when EPU rises, there is insufficient information about future policy adjustments and their potential impact on stock prices. Therefore, news or even rumours can substantially affect investors' expectations in an asymmetric information environment. This increases volatility in stock markets and the risks for investors. As a result, investors demand a higher risk premium, i.e. the investors' required rate of return increases. Third, when EPU rises, firms' future cash flows decrease due to delayed investment and reduced consumption, increasing firms' risks of financial distress. Accordingly, investors ask for higher risk premiums. Overall, the risk premium, and therefore the discount rate, is likely to increase when EPU rises.

On the other hand, firms' future cash flows tend to decrease when EPU rises due to the delayed investment and reduced consumption demand. Both heightened discount rates and lowered future cash flows lead to lower stock prices and returns. Therefore, the returns of existing shareholders decrease when EPU rises, leading to our Hypothesis $H_{4.2}$.

$H_{4.2}$: At the time of rising EPU, increases in risk premiums lead to declines in stock market returns.

4.3.2.2 The Investment Channel

When EPU increases, the information asymmetry between policymakers and firms also rises. Owing to market uncertainty, firms may suspend investments until they get more information (Bernanke, 1983). On the other hand, increases in EPU also indicate heightened uncertainty about future employment and consumers' income. Consequently, consumers may reduce their consumption to prepare for a potential decline in income (Gomes et al., 2012), decreasing demand for firms' products and services. Therefore, firms are more cautious about their future investments during periods of rising EPU. Additionally, lenders and investors require a higher risk premium when EPU increases to compensate for the higher risks (discussed in the previous paragraph). The cost of capital also rises, and investment projects become less profitable. This results in fewer NPV projects available for investment, further reducing firms' investments. Taken together, aggregate investment decreases when EPU rises. As a result, firms expect lower future cash flows and earnings, decreasing firms' market values (stock prices) and stock returns. Additionally, decreased investment may trigger negative investor sentiment, further reducing stock prices and, in turn, stock market returns. In summary, reduced investments in response to increases in EPU may reduce stock market returns. This leads to Hypothesis $H_{4.3}$.

$H_{4.3}$: Reduced investments caused by rising EPU lead to a decline in stock market returns.

4.3.2.3 The Dividend Yield Channel

Previous discussions have suggested that capital gains decrease when EPU rises. However, another component of total stock return, the dividend yield, may also change with EPU. According to previous analysis, when EPU increases, firms tend to suspend capital investments, resulting in a decrease in expected future cash flows. The stagnant (or possibly reduced) expected cash flows, combined with the increased cost of capital, as discussed above, lead to declines in stock prices. Due to decreased stock prices, observed dividend yields (the ratio of dividends to stock prices) may increase even if the dividend remains unchanged.

In addition, decreased investment may lower future earnings. As a result, firms face high pressure to stabilise their stock prices and rely more on external funding. Firms, therefore, are strongly motivated to stabilise stock prices by signalling their confidence in future performance through higher dividend payout (Baker et al., 2016b). Moreover, when the EPU increases, firms hold surplus cash that would otherwise be used for investments. Managers may use the extra cash for their own benefit instead of the shareholders'. Simultaneously, heightened EPU indicates more severe information asymmetries between investors and managers. This aggravates agency problems. Therefore, shareholders demand higher dividends to distribute the extra cash and mitigate agency problems with low costs (e.g., Tran, 2020; Attig et al., 2021).[40] Thus, during periods of heightened EPU, increased dividends, combined with reduced stock prices (due to a higher required rate of return), can further increase the dividend yields. As a component of total return, increases in dividend yields may partially offset the negative effect of EPU on stock market returns associated with the investment and risk premium channels. This leads to our Hypothesis $H_{4.4.}$

Hypothesis $H_{4.4}$: Changes in EPU are positively associated with dividend yields, which partially mitigates the negative effect of EPU on stock market returns.

4.4 Data

This chapter employs unbalanced monthly and quarterly data from 22 countries, as shown in Table 4.4. The sample periods vary based on data availability, most covering the period from January 1997 to December 2021. All the variables and their sample periods are reported in Appendix A. Although Baker et al. (2016a) developed BBD indices for 26 countries, we were unable to include Croatia, Pakistan, Hong Kong, and Singapore due to gaps in the data of several key variables.

[Insert Table 4.3 here]

[40] This may hold even when managers prefer to hold cash and reduce dividends for precautionary reasons because the signalling effect of dividends can stabilise firms' market values and protect shareholders' benefits. Therefore, shareholders may request managers to pay higher dividends.

4.4.1 Measuring Stock Market Returns

We use the monthly logarithmic return, calculated using Equation 4.1, to measure changes in stock market returns.

$$Ln\text{Return}_{it} = \left(Ln(TRI_{it}) - Ln(TRI_{it-1})\right) * 100\% \tag{4.1}$$

TRI is the monthly total return index, which includes capital gains, all cash distributions, and capitalisation changes. The monthly stock market total return index of 22 countries is collected from DataStream.

In the mediation test examining the investment channel, we use quarterly stock market returns to match the frequency of the investment data. The quarterly return percentage change is calculated using Equation 4.2:

$$Ln\text{Return}_{i,q} = \left(Ln\left(TRI_{i,t}\right) - Ln\left(TRI_{i,t-3}\right)\right) * 100\% \tag{4.2}$$

where $t \in \{3, 6, 9, 12\}$ of each sample year.

4.4.2 Measuring EPU

The BBD Index developed by Baker et al. (2016a) aims to capture uncertainty regarding economic policy decision-makers, the content of economic policy actions, the timing of economic policy changes, and the economic effects of policy actions (or inaction) (Baker et al., 2016a). The data for BBD indices are sourced from the *Economic Policy Uncertainty* website (http://www.policyuncertainty.com/all_country_data.html). The detailed discussion of the BBD index is included in Chapter 1. We calculated monthly percentage changes of the EPU using Equation 4.3.

$$\Delta\%EPU_{i,t} = \left(\frac{BBD_{i,t} - BBD_{i,t-1}}{BBD_{i,t-1}}\right) * 100\% \tag{4.3}$$

In the mediation test of the investment channel, quarterly EPU is used to align with the quarterly investment data. The percentage change in quarterly EPU is calculated using Equation 4.4:

$$\Delta\%EPU_{i,q} = \frac{BBD_{i,t} - BBD_{i,t-3}}{BBD_{i,t-3}} * 100\% \tag{4.4}$$

where $EPU_{i,t}$ is the monthly data of the EPU index. $t \in \{3, 6, 9, 12\}$ of each sample year.

4.4.3 Control Variables

Although EPU may be correlated with macroeconomic variables, such as inflation, industrial production, disposable income, and unemployment (Baker et al, 2016a; Leduc & Liu, 2016), these variables are conceptually distinct from EPU because EPU captures uncertainty about future policy rather than the realised economic outcomes. To separate the effect of EPU on stock market returns from that of macroeconomic variables, following existing literature, we include the CPI, business confidence index, real effective exchange rate, industrial production index, Index of Economic Freedom, and short-term interest to control for macroeconomic conditions in the regressions. To capture changes in these variables and keep them statistically stable and consistent with the measure of stock market returns, we use the first difference of the short-term interest rate and percentage changes of other macroeconomic variables. In the mediation tests, we also use the quarterly percentage change of the CPI, business confidence index, real effective exchange rate, industrial production index, and the Index of Economic Freedom. The method used to calculate the quarterly percentage change is the same as that used to calculate the quarterly percentage changes in EPU. Additionally, the medication tests control the first difference in the quarterly short-term interest rate, calculated by Equation 4.5.

$$\Delta SIR_{i,q} = STI_{i,t} - STI_{i,t-3} \tag{4.5}$$

where $t \in \{3, 6, 9, 12\}$.

The industrial production index (total) captures the output of industrial establishments, including mining, manufacturing, electricity, gas, steam, and air conditioning. Changes in output are likely to be positively associated with stock market returns because output growth increases cash flow, thereby promoting real capital returns and capital expenditures (Fama, 1981). Industrial production indices, except in Australia and India, are collected from the OECD database. The Industrial Production Index of Australia come from Refinitiv Workspace. India's index is sourced from the Ministry of Statistics and Programme Implementation of India (https://www.mospi.gov.in/download-tables-data?search_block_form=industrial+production+index&op=Go). China does not issue an industrial production index. Based on the definition of the Industrial Production Index, we use China's industrial value-added index to measure the output in industrial sectors. The data is collected from the Wind database.

India's industrial production index is composed of three parts: the first time series is from April 1994 to April 2011 (named IPI_t^{s1}); the second is from April 2005 to March 2017 (named $\mathrm{IPI}_\mathrm{t}^{s2}$); and the last is from April 2012 to December 2021 (named $\mathrm{IPI}_\mathrm{t}^{s3}$). The base years of these three parts are 1993-1994, 2004-2005 and 2011-2012, respectively. The base is calculated through the average of the index from April of the base year to March of the following year. For example, if the base year was 1993-1994, the average index from April 1993 to March 1994 equalled 100. The baskets are also distinct within each series. Therefore, we adjust both the base year and the comparability. The raw data of $\mathrm{IPI}_\mathrm{t}^{s2}$ (2004-2005=100) is the longest among the three series. Consequently, we use $\mathrm{IPI}_\mathrm{t}^{s2}$ (2004-2005=100) as the main part, and adjust the base year and comparability of the other two series. First, we change the base year of $\mathrm{IPI}_\mathrm{t}^{s1}$ from 1993-1994 to 2004-2005 (named $\mathrm{IPI}_\mathrm{t}^{ss1}$). The equation is:

$$IPI_t^{ss1} = (IPI_t^{s1}/\mathrm{A}IP_t^{s1})*100, \tag{4.6}$$

, where

$$\mathrm{A}IP_t^{s1} = \sum_{t=2004M4}^{2005M3} IPI_t^{s1} / 12 \quad (4.7)$$

Second, we adjust IPI_t^{ss1} to be comparable with IPI_t^{s2}. Attributed to the overlapped part between these two series, we calculate the ratio of IPI_t^{s2} to IPI_t^{ss1} and name it D_t^1, where

$$D_t^1 = IPI_t^{s2} / IPI_t^{ss1} \quad (4.8)$$

The values of D_t^1 vary across months. Therefore, we calculate AD_t^1, the average of D_t^1.

$$AD_t^1 = \sum_{t=2005M4}^{2006M3} D_t^1 / 12. \quad (4.9)$$

The reason for choosing the period from April 2005 to March 2006 is that they are the first 12 months that overlap between IPI_t^{ss1} and IPI_t^{s2}. We then converted IPI_t^{ss1} to IPI_t^{sss1} by using Equation 4.10.

$$IPI_t^{sss1} = IPI_t^{ss1} * AD_t^1 \quad (4.10)$$

IPI_t^{sss1} is comparable with IPI_t^{s2}, meaning they have the same base year and a comparable basket.

Third, we rebase $\mathrm{IPI}_t^{sss1}$and IPI_t^{s2} from 2004-2005 to 2011-2012. The rebased new series IPI_t^{n1} is derived from IPI_t^{sss1} and IPI_t^{n2} is derived from IPI_t^{s2}. Both of their new base years are 2011-2012.

$$IPI_t^{n1} = (IPI_t^{sss1} / \mathrm{A}IP_t^{s2}) * 100 \quad (4.11)$$

, where

$$\mathrm{A}IP_t^{s2} = \sum_{t=2011M4}^{2012M3} IPI_t^{s2} /12 \tag{4.12}$$

We combine IPI_t^{n1} and IPI_t^{n2} into a time series IPI_t^{n}, where the values between April 1994 and April 2005 are from IPI_t^{n1}, and the values between May 2005 and March 2017 come from IPI_t^{n2}.

Fourth, we convert IPI_t^{s3} to IPI_t^{ss3}, which is comparable with IPI_t^{n}.

$$IPI_t^{ss3}=IPI_t^{s3}*\mathrm{A}D_t^2 \tag{4.13}$$

, where

$$AD_t^2 = \sum_{t=2016M4}^{2017M3} (IPI_t^n/IPI_t^{s3}) /12 \tag{4.14}$$

April 2016 to March 2017 is the last 12 months that IPI_t^{n} overlap with IPI_t^{s3}.

Fifth, we combine IPI_t^{ss3} and IPI_t^{n} into the series $\mathrm{IPI}_t^{\mathrm{India}_{2011}}$, where values between April 2017 and December 2021 come from IPI_t^{ss3}, and others from the series IPI_t^{n}.

Sixth, we rebase $\mathrm{IPI}_t^{\mathrm{India}_{2011}}$ from 2011-2012 to 2015,

$$IPI_t^{india} = IPI_t^{India_{2011}}/AIP_t * 100 \tag{4.15}$$

, where

$$AIP_t = \sum_{t=2015M1}^{2015M12} IPI_t^{India_{2011}} /12 \tag{4.16}$$

$\mathrm{IPI}_t^{\mathrm{India}}$ is the continuous index we used in the regressions.

Increases in interest rates raise discount rates, leading to decreases in stock market prices and returns (Choi et al.,1992). Therefore, this chapter controls for short-term interest rates, proxied by the three-month money market rates of the sample countries. Chile's short-term interest rate is the monetary policy rate collected from Refinitiv Workspace. China's short-term interest rate is the China Interbank Offered Rate (China's interbank offered rate), and India's is the three-month Mumbai Interbank Offered Rate (MIBOR). These data come from the Wind database. Japan's short-term interest rate is the uncollateralised overnight call rate from the Bank of Japan. Short-term interest rates of other countries are collected from the OECD database, and they can be a ‘three-month money market rate’ or a ‘three-month treasury bill rate’.

The exchange rate can affect firms' competitiveness (Choi et al.,1992). Additionally, domestic currency depreciation may boost domestic firms’ exports and future cash flows, raising stock market prices and returns accordingly (Dornbusch & Fischer, 1980). Therefore, the exchange rate is controlled in this chapter. We employ percentage changes in the broad real effective exchange rate index issued by the Bank for International Settlements (https://www.bis.org/statistics/eer.htm?m=2676) to measure exchange rates.

The high inflation rate can negatively affect future real activity (Fama, 1981) and raise the discount rates of cash flows (Geske & Roll, 1983). Therefore, it may negatively impact stock market returns. To control inflation rates, percentage changes in the CPI are used to measure the inflation rate in countries other than Australia. Australia's monthly CPI is unavailable, and we use the commodity price index collected from Refinitiv Workspace instead.

Investor sentiment is also controlled in this chapter because it may affect stock market returns. When investors are irrational, they limit the role of arbitrage and cause prices to diverge from fundamental values (De Long et al., 1990; Barberis et al.,1998). Additionally, investor optimism may increase stock market returns (Bouri et al., 2022). We use percentage changes in the business confidence index as a proxy of investor sentiment, which captures the anticipation of future production in industry sectors. The data are from the OECD database.

Institutional quality may affect stock market returns since poor institutional quality, especially inefficient economic governance, can lower productivity and economic growth (Brunetti et al., 1998; Acemoglu et al., 2003). This, in turn, may cause a decrease in stock market returns. Therefore, we use percentage changes in the Index of Economic Freedom to control for institutional quality among countries. The Heritage Foundation and The Wall Street Journal issue this annual index. The data is collected from the 2022 Index of Economic Freedom website (https://www.heritage.org/index/). The index groups 12 quantitative and qualitative factors from four aspects: the rule of law, government size, regulatory efficiency, and open markets. We convert annual data to monthly data using the Litterman (1983) method. The introduction of this method is in Appendix 4B.

Global financial markets experienced substantial volatility during the financial crisis in 2007-2008 and the COVID-19 pandemic, both of which led to sharp declines in global stock markets. These market shocks coincide with EPU shocks. To clarify whether EPU growth affected stock market returns during economic shocks, we introduce dummy variables to control for the global financial crisis and COVID-19 in the robust tests. One dummy captures the global financial crisis, taking the value 1 from August 2007 to December 2008 (as in Brunnermeier, 2009) and 0 otherwise.[41] Another dummy variable representing COVID-19 takes the value of 1 from Jan 2020 to December 2021[42] and 0 for other months/years.

4.4.4 Mediation Variables

The above analysis reveals that the risk premium, investment, and dividend yield are likely to be channels through which EPU affects stock returns.

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[41] The starting month of the global financial crisis is set as Augst 2007. This is because the European Central Bank and the US Federal Reserve stepped in to inject liquidity into interbank markets, which was generally considered the beginning of the global financial market turmoil associated with the subprime mortgage crisis (Brunnermeier, 2009).

[42] December 2021 is the last month of the sample period, not necessarily the end of the COVID-19 pandemic.

To examine hypothesis $H_{4.2}$, we use Equation 4.17 to calculate the variance of stock market returns as the measure of the risk premium.

$$RISK_{i,t} = \sum_{j=1}^{N}(R_{it,j} - E(R_i))^2, \tag{4.17}$$

, where

$$R_{it,j} = l\,n\left(\frac{RI_{it,j}}{RI_{it,j-1}}\right) * 100\% \tag{4.18}$$

$RISK_{it}$ is the monthly variance of stock market returns of country i, N represents the number of trading days in the month t, $R_{it,j}$ is the logarithmic return on the trading day j in month t, and $RI_{it,j}$ is the daily stock market total return index of country i on trading day j in month t. The data on the stock market return index are collected from DataStream.

The other mediation variable is investment growth ($\Delta\%INVEST_{i,q}$), which captures changes in gross fixed capital formation of sample countries. In this case, we use gross fixed capital formation (unadjusted) from the IMF Financial Statistics database, except for the US and China. As the unadjusted quarterly data for the US are unavailable, we use seasonally adjusted gross fixed capital formation data instead. For China, the fixed capital formation data issued by the National Statistics Bureau of China is reported on a monthly accumulated basis. We calculate China's quarterly gross fixed capital formation using Equation 4.19:

$$CAPITAL_{China,q} = ACAPITAL_{China,q} - ACAPITAL_{China,q-1}, \tag{4.19}$$

where $CAPITAL_{China,q}$ is the fixed capital formation in quarter q. $ACAPITAL_{China,q}$ is the accumulated fixed capital formation. Then we calculated the quarterly growth rate of gross fixed capital formation for all sample countries using Equation 4.20.

$$\Delta\%INVEST_{i,q} = \frac{CAPITAL_{i,,q} - CAPITAL_{i,q-1}}{CAPITAL_{i,q-1}} * 100\% \tag{4.20}$$

The third mediation variable is dividend yield. The data is from DataStream. However, in 22 sample countries, dividend yield data are available for only 14 countries (see Appendix 4A). We use the first difference of dividend yield in mediation tests. The definitions and symbols of all the variables are in Table 4.4.

[Insert Table 4.4 here]

4.4.5 Descriptive Statistics and Correlations

Table 4.5 reports the descriptive statistics for both monthly and quarterly variables. The mean $\Delta\%EPU_{it}$ is 7.544%, while its standard deviation is 46.865. This indicates that $\Delta\%EPU_{it}$ varies considerably across countries and periods. Its highest value was 844.44% in Mexico in May 2007. The reason for this might be the pension reform plan announced in late March 2007 by Calderón's government, which was the most critical Mexican reform policy in a decade. The standard deviation of monthly changes in the stock market return ($LnReturn_{it}$) is larger (6.537) than that of the control and mediation variables. This indicates that the values of logarithmic stock market returns vary considerably. The remaining control and mediation variables exhibit smaller variations than the dependent variable ($LnReturn_{it}$) and explanatory variable ($\Delta\%EPU_{it}$).

Compared with monthly data sets, quarterly data for the same variables have larger standard deviations, indicating that quarterly data is more volatile than monthly data. In quarterly data, $\Delta\%EPU_{i,q}$ (quarterly percentage changes in EPU) are the most volatile variable with a standard deviation of 54.524, the maximum among all variables. The standard deviation of quarterly changes in the stock returns ($LnReturn_{iq}$) is 28.705, indicating changes in quarterly stock market returns vary substantially across countries and over periods. The standard deviation of quarterly changes in investment ($\Delta\%INVEST_{iq}$) is 24.339, the third-largest among all variables, suggesting significant volatility among observations.

[Insert Table 4.5 here]

Table 4.6 presents the correlation coefficients of all monthly and quarterly data. The coefficient between the dependent variable $LnReturn_{it}$ and the explanatory variable $\Delta\%EPU_{i,t}$ is -0.150, suggesting that changes in stock market returns and EPU are negatively correlated. On the other hand, the correlation coefficient between $LnReturn_{it}$ and $\Delta IDY_{i,t}$ is -0.701, indicating that changes in dividend yield are negatively correlated to stock market returns. Similarly, $LnReturn_{it}$ is negatively correlated with the mediation variable $RISK_{i,t}$ with a coefficient of -0.323. Finally, the coefficient between changes in stock market returns and the business confidence index ($\Delta\%BCI_{i,t}$) is 0.253, the largest among the control variables, indicating a positive correlation between these two variables. The correlation coefficients between $\Delta\%EPU_{i,t}$ and two mediation variables, $RISK_{i,t}$ and $\Delta IDY_{i,t}$, are positive. Most correlation coefficients among the explanatory variables and control variables are smaller than 0.1, with the largest at 0.306 between $\Delta\%BCI_{i,t}$ and $\Delta\%IPI_{it}$. The small correlation coefficients between explanatory and control variables suggest that multicollinearity is unlikely to be an issue in the regressions.

The correlation coefficients for the quarterly data exhibited similar features to those of the monthly data. The coefficient between quarterly changes in stock market returns and EPU remains negative at -0.272, but it is larger than that of the monthly data (-0.150). The correlation coefficients among the explanatory, control, and mediation variables are small, indicating that the multicollinearity issue is unlikely to be a concern in mediation tests.

[Insert Table 4.6 here]

4.5 Empirical Test Results

4.5.1 The Effect of Changes in EPU on Stock Market Returns

Earlier theoretical analysis has suggested that changes in EPU are negatively associated with changes in stock market returns. This chapter employs the panel regression Equation 4.21 to examine the association between them.

$$LnReturn_{i,t} = c + \alpha\Delta\%EPU_{i,t} + \beta X_{i,t} + \delta_i + \varepsilon_t + \mu_{i,t} \tag{4.21}$$

where $LnReturn_{i,t}$ is the logarithmic change in the stock market return index, and $\Delta\%EPU_{i,t}$ is the percentage change in the BBD Index. $X_{i,t}$ are control variables, which contain the first difference of the short-term interest rate ($\Delta SIR_{i,t}$), the percentage change in the effective exchange rate index ($\Delta\%REER_{i,t}$), the percentage change in the economic freedom index ($\Delta\%EFI_{i,t}$), the percentage change in the CPI ($\Delta\%CPI_{i,t}$), the percentage change in the business confidence index ($\Delta\%BCI_{i,t}$), and the percentage change in the industrial production index ($\Delta\%IPI_{i,t}$). δ_i is the cross-section fixed effect, and ε_t is the period fixed effect.

Table 4.7 shows that changes in the contemporaneous EPU are negatively related to changes in stock market returns at the 5% significance level, which supports Hypothesis $H_{4.1}$. Similarly, changes in the one-month and three-month lagged EPU are negatively and significantly correlated with changes in stock market returns, indicating a delayed inverse effect of EPU on stock market returns. These results are consistent with previous studies (Arouri et al., 2016; Christou et al., 2017; Chiang et al., 2019). In contrast, changes in the two-month lagged EPU are positively correlated with changes in stock market returns. These inconsistent lagged effects of EPU on stock market returns may be caused by stock price overreaction.[43] Specifically, investors may have overreacted to the increase in the EPU of the previous three months. They then realise that they were too pessimistic about EPU shocks, so the stock price rebounded to its fundamental value (Baytas & Cakici, 1999; Bordalo et al., 2022). This finding aligns with Bloom's (2009) theoretical model, indicating that rising uncertainty shocks induce a temporary drop and subsequent rebound in stock market levels. It is

[43] Extensive studies have documented the stock price overreaction (De Bondt & Thaler, 1985; Baytas & Cakici, 1999; Bordalo et al, 2022). That is ‘a given stock decreases (increases) too far in price because of recent bad (good) news associated with the stock, but eventually returns to its fundamental value as investors realise that they had overreacted’ (Baytas & Cakici, 1999, p.1122). Investors overemphasise current information but underemphasise prior information (De Bondt & Thaler, 1985). On the other hand, economic agents are irrational. Their expectations are systematically biased. Specifically, they are overly confident in good times but tend to overestimate the severity of bad situations (Bordalo et al., 2022). These, in turn, lead to overreactions in stock prices.

also consistent with findings from Kang and Ratti (2013), which show a sharp negative response in stock market returns to EPU shocks initially, followed by a reversal after a few months. We also examined the effects of changes in the four- to six-month lagged EPU and changes in the one- to three-month lead EPU on changes in stock market returns. However, their coefficients are insignificant and not reported in Table 4.7 for brevity. This suggests that the effect of EPU on stock market returns is short-lived and consistent with the overreaction effect.

Among the control variables, changes in the short-term interest rate are significantly and inversely associated with changes in stock market returns across models presented in Table 4.7, aligning with previous research (Asprem, 1989; Alam & Uddin, 2009; Huang et al., 2016). In contrast, changes in the business confidence index are positively correlated with stock market returns in all the models presented in Table 4.7, suggesting that optimistic investor sentiment is associated with an increase in stock market returns, which is consistent with the findings of Baker and Wurgler (2006) and Bouri et al. (2022).

Taken together, the results suggest that changes in EPU are generally negatively associated with stock market returns after controlling for other variables, including changes in the short-term interest rate, inflation rate, CPI, output, business confidence index, real effective exchange rate, and institutional quality. However, the positive coefficient on the two-month lagged EPU suggests a rebound after the initially negative response of stock market returns to EPU shocks. Overall, these results support Hypothesis $H_{4.1}$.

[Insert Table 4.7 here]

4.5.2 The EPU-Stock Return Relationship in Developed and Developing Countries

To investigate whether the effect of EPU on stock market returns is robust across countries at different levels of development, we split the 22 countries into two groups based on the World Bank's (WB) classification for the fiscal year 2023. One group comprises the developed countries, i.e. the high-income nations categorised by the WB, including Australia, Belgium, Canada, Germany, Spain, France, the UK, the US, Ireland, Italy, Japan, the Netherlands, Sweden, Greece, Chile, and South Korea. The other is developing countries, which include China, India, Colombia, Mexico, Brazil, and Russia.

Panel A of Table 4.8 shows that the results for developed countries are similar to those for the entire sample. Specifically, the coefficients on changes in the contemporaneous and three-month lagged EPU are negative and significant in developed countries, indicating that increases in current EPU and in EPU from the previous three months are associated with declines in contemporaneous stock market returns. The one-month lagged EPU is insignificant. However, changes in the two-month lagged EPU are positively associated with changes in stock market returns. This suggests that the overreaction of stock market returns to EPU shocks exists in developed countries.

Panel B in Table 4.8 shows that the coefficients of changes in contemporaneous, one- and two-month lagged EPU are insignificant in developing countries. Conversely, changes in the three-month lagged EPU are negatively associated with changes in stock market returns at the 5% significance level, suggesting an increase in the EPU in the previous three months is associated with a decrease in current stock market returns.

[Insert Table 4.8 here]

A comparison of the results for the two country groups suggests that changes in EPU are significantly and negatively associated with changes in stock market returns in developed countries contemporaneously and after a three-month delay. Although the association between these two variables is also inverse in developing countries, their stock market returns respond more slowly to changes in EPU. This implies that well-established financial markets in developed countries incorporate changes in EPU into stock market prices more quickly than developing markets. These results are consistent with findings of Camilleri et al. (2020) and Hsin and Peng (2023), which suggest that emerging stock markets exhibit slower reactions and longer delays to local and global market information than developed stock markets. To summarise, these results generally support hypotheses $H_{4.1}$ and $H_{4.1A}$.

4.5.3 The Results of the Robustness Tests[44]

4.5.3.1 Robust Test by Quantile Regressions

As shown in Table 4.5, the standard deviations of the dependent variable $LnReturn_{it}$ and the explanatory variable $\Delta\%EPU_{it}$ are large, suggesting substantial heterogeneity in stock market returns and EPU across countries and over periods. Therefore, the quantile approach is an appropriate method for a robust test because the quantile regression allows for heteroskedasticity and makes no assumptions about the variables' distributions. We set the quantiles to 0.8, 0.5, and 0.2 to target the high, medium, and low changes in stock market return in quantile regressions.

Estimates reported in Panel A of Table 4.9 show that changes in contemporaneous EPU are significantly negative at the 0.8 quantile, indicating that changes in EPU and stock market returns are negatively associated. Additionally, the coefficients of the one- and three-month lagged EPU are insignificant. Conversely, changes in the two-month lagged EPU are positively and significantly correlated with changes in stock market returns, suggesting that stock markets overreact to EPU shocks.

Panel B in Table 4.9 shows that at the 0.5 quantile of stock market returns, changes in the contemporaneous EPU are negatively associated with changes in stock market returns at the 1% significance level. The coefficient of changes in the contemporaneous EPU is larger than that at the 0.8 quantile, suggesting that changes in EPU have a more substantial effect on stock market returns at the 0.5 quantile than at the 0.8 quantile. Changes in the two-month lagged EPU are positively correlated

[44] Following Paudyal et al. (2021), we applied the Difference in Difference (DID) method to examine the further robustness of the results from the baseline test. For this, we divide all countries' monthly Δ%EPU into 5 quantiles from low to high. The lowest 20% Δ%EPU belongs to the first quantile, and the highest 20% is in the fifth quantile. Dataset D-I includes the dataset whose Δ%EPU values are in the first quantile, and the dataset whose Δ%EPU values are in the fifth quantile is dataset D-V. Samples in D-I are candidates of the control group. Those in D-V are candidates for the treatment group. Then impose a condition that Δ%EPU values do not jump over than 1 quantile in the following three months to catch the long-term tendency of EPU changes. Δ%EPU values in D-I that meet all conditions are the control group. Similarly, Δ%EPU values in D-V that meet the above conditions are assigned to the treatment group. In this way, the effect of the DID can be estimated. The result shows that the coefficient for the DID effect is negative at the 5% significance level, suggesting that changes in EPU can negatively affect changes in stock market returns.

with changes in stock market returns, capturing the overreaction of stock market returns to changes in the EPU. Panel C in Table 4.9 shows that at the 0.2 quantile, the coefficient on changes in the contemporaneous EPU is negative and more substantial than those at the 0.8 and 0.5 quantiles, indicating that changes in EPU are inversely and significantly associated with stock market returns. Changes in the one- and three-month lagged EPU are negatively correlated with changes in the stock market return at the 1% significance level, suggesting a delayed inverse effect of EPU on stock market returns.

[Insert Table 4.9 here]

The results of the quantile regressions indicate a significant inverse association between changes in contemporaneous EPU and stock market returns across all three quantiles, providing evidence supporting Hypothesis $H_{4.1}$. The effects of changes in EPU on stock market returns are more substantial at lower quantiles, indicating a more pronounced negative association between EPU shocks and stock market returns during market downturns. This is consistent with the prediction by Pastor and Veronesi (2012), which shows that changes in economic policy lead to higher uncertainty and discount rates when they occur after an economic downturn. However, changes in the two-month lagged EPU are significantly and positively correlated with stock market returns at the 0.8 and 0.5 quantiles but are insignificant at the 0.2 quantile, indicating an overreaction of stock market returns to EPU shocks when stock market returns are relatively high. This is consistent with baseline regressions and the findings of Kang and Ratti (2013).

4.5.3.2 Controlling the effects of the Global Financial Crisis and COVID-19

To examine whether the negative association between changes in EPU and stock returns hold during extreme economic shocks, we control for the global financial crisis in 2007-2008 and the COVID-19 pandemic in 2020-2021.[45]

[45] The WHO declared that COVID-19 had ended as a public health emergency in May 2023. The sample period for this chapter is from January 1997 to December 2021. Therefore, the dummy proxying COVID-19 in this chapter takes the value 1 from January 2020 to December 2021.

The results in Table 4.10 show that after controlling for both the global financial crisis and COVID-19, the percentage changes in contemporaneous and one-month lagged EPU are significantly (at the 1% significance level) negatively associated with stock market returns. The results are broadly consistent with those in the baseline regressions in Table 4.7. However, the percentage changes in the two-month lagged EPU are significantly positive, consistent with the overreaction observed in the baseline regressions. The percentage changes in the three-month lagged EPU have an insignificant effect after controlling for the global financial crisis and COVID-19. The global financial crisis dummy is significantly negative across all models, whereas the COVID-19 dummy is not significant. Overall, the balance of evidence suggests an inverse association between changes in EPU and stock market returns that is robust to the effects of the global financial crisis in 2007- 2008 and the COVID-19 pandemic.

[Insert Table 4.10 Here]

4.5.4 The Results of Mediation Tests

4.5.4.1 Tests over The Discount Rate Channel

The above theoretical analysis suggests three channels through which the EPU affects stock market returns. To empirically test these channels, we employ the mediation analysis proposed by Baron and Kenny (1986). The mediation analysis (Baron & Kenny, 1986) detects the mediation effect following four steps. The first step is to regress the dependent variable on the explanatory variable to confirm that the explanatory variable can significantly predict the dependent variable. The second step is to regress Equation 4.23, which includes both the mediator and the explanatory variable, to test whether the explanatory variable significantly predicts the mediation variable. If the test confirms a significant correlation between the mediator and the explanatory variable, it proceeds to the next step. The third step involves regressing Equation 4.24, which contains both the explanatory variable and the mediator in a single regression. If the mediator is significantly correlated with the dependent variable, the mediation effect exists. The last step is to determine whether the mediation effect is partial or complete. If the mediator is significantly correlated with the dependent variable but the explanatory variable is insignificant in Equation 4.24, then complete mediation exists. On the other hand, if the explanatory variable is still significant, but the strength of its coefficient is smaller than that in the regression of step one, there is a partial mediation effect.

$$M_{i,t} = c + \rho\Delta\%EPU_{i,t} + \beta X_{i,t} + \delta_i + \varepsilon_t + \mu_{i,t} \tag{4.23}$$

$$\mathrm{L}nReturn_{i,t} = \mathrm{c} + \alpha\Delta\%EPU_{i,t} + \beta X_{i,t} + \rho M_{i,t} + \delta_i + \varepsilon_t + \mu_{i,t} \tag{4.24}$$

M_{it} is the mediator, including the risk premium ($RISK_{it}$), the index dividend yield (ΔIDY_{it}), and the investment ($\Delta\%INVEST_{it}$). X_{it} are control variables.

The results of the mediation test over the risk premium are presented in Table 4.11. Panel A of Table 4.11 indicates that changes in the contemporaneous, one-, and two-month lagged EPU are positively correlated with the risk premium at the 1% significance level, suggesting that a rise in EPU significantly increases the risk premium.

Panel B of Table 4.11 shows that the risk premium is significant in all the regressions that included changes in the EPU and control variables. The coefficients on the risk premium in relation to changes in stock market returns are significantly negative. Meanwhile, percentage changes in the contemporaneous, one-, and three-month lagged EPU are significantly and negatively correlated with changes in stock market returns. In contrast, percentage changes in two-month lagged EPU are positively and significantly associated with changes in stock market returns. Since the coefficients of the changes in EPU and its lags are significant across all models in Panel B after including the risk premium, the results suggest that the risk premium partially mediates the effect. Taken together, the results reported in Panels A and B suggest that the risk premium is likely to be a mediator between changes in EPU and stock market returns. This is consistent with the argument of Arouri et al. (2016) and Chiang et al. (2019). The mediation test results support Hypothesis $H_{4.2}$, which suggests that the heightened risk premium associated with rising EPU may lead to decreases in stock market returns.

[Insert Table 4.11 here]

4.5.4.2 Tests over the Investment Channel

The above theoretical analysis suggests that a country's aggregate investment is likely to decrease when EPU is high, as investors tend to suspend their investment decisions until the uncertainty is resolved. EPU impacts stock market returns through its effect on investment since firms' cash flows and stock prices change with investment. We examine the mediation effect of investment by regressing Equations 4.23 and 4.24. Since country-level investment data are available quarterly, we also use the quarterly data for the other variables.

Panel A of Table 4.12 shows that percentage changes in one- and four-quarter lagged EPU are negatively correlated with changes in investment at the 10% and 5% significance levels, respectively, suggesting that a rise in EPU is associated with a decrease in future investment. This finding is consistent with previous studies (Baker et al., 2016a; Hardouvelis et al., 2018; Ghirelli et al., 2019), which suggest that investment decreases in response to EPU shocks.

On the other hand, the results of Panel B suggest that changes in country-level investments are significantly correlated with changes in stock market returns, even after controlling for changes in EPU and other variables. Coefficients of changes in investment are positive across all models in Panel B, indicating that more investment is associated with higher stock market returns. In model (6) of Panel B, percentage changes in EPU are negatively and significantly correlated with stock market returns, suggesting that investment has a partial mediation effect.

Overall, the results of Table 4.12 show that percentage changes in EPU are inversely associated with changes in investments with one- and four-quarter delays. At the same time, changes in investments are positively correlated with stock market returns. This suggests that investment may serve as a partial channel playing a limited role in mediating the effect of EPU on stock market returns. Therefore, these results provide limited evidence for Hypothesis $H_{4.3}$. They also align with the argument of Arouri et al. (2016), which indicates that EPU shocks hinder investment and, therefore, negatively affect firms' future cash flows and stock returns.

[Insert Table 4.12 here]

4.5.4.3 Tests over the Dividend Yield Channel

Theoretical analysis suggests that a rise in EPU may increase dividend yield, as firms are likely to signal their confidence in future performance and alleviate agency problems. When examining the mediation effect of dividend yield, we only test Equation 4.23 rather than regressing both Equations 4.23 and 4.24. This is because the dividend yield is a component of stock returns and is directly added to the total return. If we regress the dividend yield on the total stock market return, the regression residual will correlate with the dividend yield, causing an endogeneity issue. The results of the mediation tests over the dividend yield are in Table 4.13.

Table 4.13 shows that percentage changes in the contemporaneous, two-, and three-month lagged EPU are significantly and positively associated with dividend yield, consistent with the findings of previous studies (Qian, 2023; Hoang et al., 2024). However, the coefficients on percentage changes in the contemporaneous and lagged EPU are economically small and close to zero, indicating that although changes in EPU and dividend yield are significantly correlated, the effect strength is negligible. This supports our Hypothesis $H_{4.4}$ and suggests that dividend yield is unlikely to be a dominant channel mediating changes in EPU and stock market returns. Therefore, increases in the dividend yield can only slightly mitigate the negative effect of the EPU on stock market returns.

[Insert Table 4.13 here]

Taken together, the evidence pertinent to the discount rate, investment, and dividend yield channels suggests that the discount rate channel appears to be the dominant transmission channel. This is because the mediation tests provide stronger and more statistically consistent support for the risk premium channel. In contrast, the significant but economically weak correlation between EPU and dividend yield suggests a very limited mediation effect of dividend yield in strength. Therefore, the net effect of EPU on stock market returns is likely negative, consistent with EPU's total effect on stock market returns reported in Table 4.7.

4.6 Conclusions

This chapter has investigated the impact of EPU on stock market returns. Using monthly and quarterly panel data from 22 countries between 1997 and 2021, it finds that changes in EPU are inversely associated with changes in stock market returns. The results remain consistent after controlling for variables that may influence stock market returns, including the short-term interest rate, business confidence index, CPI, real exchange rate, inflation rate, industrial production index, and economic freedom index. The results are robust to alternative methods, such as quantile regression, and to the implications of the 2007-2008 financial crisis and the COVID-19 pandemic.

Additionally, the chapter examines whether changes in EPU play a similar role in stock market returns across developed and developing countries. The results suggest that stock market returns in both developing and developed countries tend to decline following increases in EPU. However, the effect is stronger and more immediate in developed countries, whereas it is weaker and more delayed in developing countries.

Finally, using Baron and Kenny's (1986) mediation test, the chapter has examined three channels through which changes in EPU affect stock market returns: the discount rate, investment, and dividend yield channels. The results of mediation tests provide evidence that changes in stock market returns respond negatively to changes in EPU through the discount rate (risk premium) and investment channels. At the same time, dividend yield is positively associated with changes in EPU. However, the coefficient of the dividend yield on changes in EPU is nearly zero, indicating a statistically significant but minimal effect of EPU on stock market returns through this channel. Comparing the strengths of the three channels, the chapter suggests an inverse association between changes in EPU and stock market returns, consistent with the results from baseline regressions.

Table 4.1 Summary of Selected Studies on the Factors Affecting Stock Market Returns

This table summarises key research on the macroeconomic factors that affect stock market returns.

Factor	Theoretical Explanation	Empirical Findings	Key References
General framework of the effects of macroeconomic variables	The flexible accelerator model suggests that higher economic activity increases demand for capital and raises average capital returns. Asset pricing models argue that output growth improves firms' expected cash flows and investment opportunities.	Macroeconomic variables such as output, inflation, interest rates, and exchange rates are generally found to have significant impacts on stock market returns.	Cox et al. (1985); Chen et al. (1986); Asprem (1989)
Output	An increase in output growth indicates higher demand for capital, increasing the average capital return; higher output growth and expectations increase firms' cash flows, raising stock returns.	Most studies report a positive association between output growth and stock market returns. Higher output growth and expectations of future growth increase firms' profitability and stock valuations.	Fama (1981); Chen et al. (1986); Asprem (1989); Srinivasan (2011)
Interest rate	Rising interest rates increase firms' borrowing costs and discount rates applied to future cash flows, reducing stock valuations. However, higher interest rates may also increase the opportunity cost of holding cash and stimulate demand for stock.	Most studies document a negative relationship between interest rates and stock market returns. Nevertheless, some evidence suggests a positive long-run relationship.	Asprem (1989); Alam & Uddin (2009); Huang et al. (2016); Assefa et al. (2017); Kyei-Mensah & Awuah-Werekoh (2020); Srinivasan (2011)
Inflation rate	Inflation can reduce stock returns through lower real economic activity, tighter monetary policy, and higher uncertainty. Conversely, the Fisher effect suggests stocks may hedge against inflation.	Findings are mixed. Some studies report a negative relationship, while others support a positive association between inflation and stock returns.	Schwert (1977); Fama (1981); Geske & Roll (1983); Zhang (2021); Firth (1979); Boudoukh & Richardson (1993); Choudhry (2001); Bekaert & Engstrom (2010); Tiwari et al. (2022); Spyrou (2004)

Exchange rate	Exchange rate movements influence firms' competitiveness, export revenues, import costs, and foreign currency exposure. Different economic structures and policy environments may lead to asymmetric effects across countries and periods.	Studies generally report a significant but asymmetric relationship between exchange rates and stock market returns across countries and time periods.	Asprem (1989); Choi et al. (1992); Kyei-Mensah & Awuah-Werekoh (2020)
Investor sentiment	Behavioural finance theories argue that irrational investor sentiment can cause stock prices to deviate from their fundamental values, leading to overreaction and underreaction in financial markets.	Empirical studies report a significant influence of investor sentiment on stock market returns, including nonlinear bidirectional causality.	De Long et al. (1990); Barberis et al. (1998); Baker & Wurgler (2006); Bouri et al. (2022); Chu et al. (2016)

Table 4.2 Summary of Selected Studies on the Effect of EPU on Stock Market Returns

This table summarises the studies on the effect of EPU on stock market returns, including the methods, mechanisms, and main findings.

Study	Sample / Period	Methodology	Mechanism / Explanation	Main Findings
Pastor & Veronesi (2012)	Theoretical study	General equilibrium model	EPU has dual effects on stock returns: an upward effect, as policy changes improve firms' expected profitability and cash flows; a downward effect, as the new policy introduces greater uncertainty and increases the discount rate.	The downward discount effect of policy changes is more substantial unless the old policy's impact on profitability is sufficiently low. Therefore, EPU negatively affects stock market returns on average, especially during periods of high uncertainty or after economic downturns.
Arouri et al. (2016)	US monthly data, 1900–2014	Linear regressions and the Markov switching model	EPU hinders investment, employment, consumption, and saving decisions. It also increases volatility and risk premiums.	EPU significantly decreases stock market returns, and the inverse effect is stronger during periods of extreme volatility.
Christou et al. (2017)	Australia, Canada, China, Japan, Korea, US; monthly data, 1998–2014	Bayesian panel VAR	Higher EPU raises uncertainty and negatively affects expected cash flows and investor confidence.	EPU negatively impacts stock market returns across countries.
Xiong et al. (2018)	China A-share market; monthly data, 1995–2016	Engle's Dynamic Conditional Correlation model	EPU increases uncertainty and market instability, particularly during crises.	Stock market returns respond negatively to changes in EPU; dynamic correlations fluctuate substantially during crises.
Chiang et al. (2019)	US S&P500 and China Shanghai A-share indices; monthly data, 1997–2017	GED-TARCH (1,1)-M model	EPU increases volatility and risk premiums, raising discount rates and reducing returns.	EPU negatively affects China's stock market returns.
Kwon (2022)	20 emerging and 10 developed countries; monthly data, 1999–2018	FAVAR model	Global uncertainty shocks reduce expected profitability and investment.	Global EPU shocks significantly reduce emerging stock market returns.

Gao et al. (2021)	China monthly data, 2002–2017	Diebold–Yilmaz spillover index	EPU and stock returns transmit spillover effects to each other over time.	EPU exerts asymmetric spillover effects on stock market returns over different periods.
Kundu & Paul (2022)	G7 countries; monthly data, 1998–2018	Two-regime MSVAR model	Higher EPU initially raises risk premiums and depresses returns, but higher expected premiums later increase future returns.	EPU lowers return and increases volatility contemporaneously, but positively affects future returns.
Huang & Liu (2022)	G7 countries; monthly data, 1997–2020	Quantile regression	Investors react more strongly to bad news than good news; EPU effects vary across market conditions.	Both increases and decreases in EPU reduce stock returns, but increases in EPU have stronger effects, especially during bearish markets.
Li et al. (2015)	China (1995–2003) and India (2003–2013) monthly data	Time-varying bootstrap Granger causality with rolling windows	Stock prices may lead to policy uncertainty, creating bidirectional interactions.	Bidirectional Granger causality exists between EPU and stock returns during several sub-periods.
Karacaer & Pirgaip (2019)	12 developed and 9 emerging countries; monthly data, 2005–2019	Bootstrap panel Granger causality	Stock market movements may influence policy uncertainty, especially in emerging markets.	Stock returns Granger-cause EPU in emerging markets; no significant causal relationship in developed countries.
Hong et al. (2024)	G7 and seven emerging countries; monthly data, 1997–2022	Time-varying Granger causality	Financial crises and local events strengthen the EPU–stock return relationship.	Bidirectional linear and nonlinear Granger causality exists in several countries, especially during crisis periods.
Uddin et al. (2020)	Bangladesh and six trading partners; monthly data, 2003–2019	Break least squares and Markov-switching regression	International EPU causes changes in capital flows and spillover effects across stock markets.	EPU from major importing countries has a stronger negative impact on Bangladesh's stock market returns.
Hung (2021)	BRICS countries; monthly data, 1997–2019	Multivariate DECO-GARCH and Diebold–Yilmaz spillover index	EPU affects stock returns through market interconnectedness and spillover transmission.	Positive average return equicorrelation and short-term spillover effects exist between EPU and stock markets.

Table 4.3 Sample Countries

This table lists 22 sample countries used in the empirical tests.

Regine	Europe	Asia	North America	South America	Oceanian
Countries	Belgium Germany Spain France UK Greece Ireland Italy Netherlands Sweden Russia	China India Japan Korea	Canada US	Brazil Chile Colombia Mexico	Australia

Table 4.4 Variable definitions

This table reports the variables' names, definitions, sample periods, and their symbols. These variables are country-level data; therefore, we use different symbols and names in this chapter from those in Chapters 2 and 3 to avoid confusion with firm-level data.

Variable name	Period	Frequency	Definition	Symbol
Total Stock Market Return	Jan 1997 – Dec 2021	Monthly/Quarterly	Logarithmic changes of the stock market return index.	$LnReturn_{i,t}$
EPU Growth	Jan 1997 – Dec 2021	Monthly/Quarterly	Percentage changes in the BBD index.	$\Delta\%EPU_{i,t}$
Investor Sentiment	Jan 1997 – Dec 2021	Monthly/Quarterly	Percentage changes in the business confidence index.	$\Delta\%BCI_{i,t}$
Inflation	Jan 1997 – Dec 2021	Monthly/Quarterly	Percentage changes in the CPI. For Australia, the commodity price index is used.	$\Delta\%CPI_{i,t}$
Output Growth	Jan 1997 – Dec 2021	Monthly/Quarterly	Percentage changes in the industrial production index (total). For China, the industrial value-added index is used.	$\Delta\%IPI_{i,t}$
Short-term Interest Rate Change	Jan 1997 – Dec 2021	Monthly/Quarterly	The first difference in the three-month money market rate or the three-month Treasury Bill rate.	$\Delta SIR_{i,t}$
Exchange Rate Change	Jan 1997 – Dec 2021	Monthly/Quarterly	Percentage changes in the real effective exchange rate.	$\Delta\%REER_{i,t}$
Institutional Quality Growth	Jan 1997 – Dec 2021	Monthly/Quarterly	Percentage changes in the economic freedom index.	$\Delta\%EFI_{i,t}$
Risk Premium	Jan 1997 – Dec 2021	Monthly/Quarterly	Monthly variance of the stock market returns of a country.	$RISK_{i,t}$
Investment Growth	Jan 1997 – Dec 2021	Quarterly	Growth rate of gross fixed capital formation.	$\Delta\%INVEST_{i,q}$
Index Dividend Yield Change	Jan 1997 – Dec 2021	Monthly/Quarterly	First difference of the index-level dividend yield.	$\Delta IDY_{i,t}$

Table 4.5 Descriptive Statistics

This table presents descriptive statistics of the variables in a full sample. See Table 4.4 for variable definitions and symbols. The variables with a subscript 't' represent monthly data, and those with a subscript 'q' represent quarterly data.

	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
Monthly Data						
Dependent Variable						
$LnReturn_{i,t}$	0.620	1.164	42.274	-51.545	6.537	6281
Explanatory Variable						
$\Delta\%EPU_{i,t}$	7.544	-0.132	844.444	-87.576	46.865	6542
Control Variables						
$\Delta\%CPI_{i,t}$	0.273	0.218	38.430	-13.872	1.042	6578
$\Delta SIR_{i,t}$	-0.026	-0.0004	23.900	-23.4	0.901	6533
$\Delta\%EFI_{i,t}$	0.021	0.027	1.572	-1.863	0.224	6578
$\Delta\%REER_{i,t}$	-0.011	0.000	13.537	-37.309	1.916	6578
$\Delta\%IPI_{i,t}$	0.183	0.198	67.823	-77.290	4.071	6364
$\Delta\%BCI_{i,t}$	0.009	0.015	3.137	-4.172	0.410	6389
Mediation variables						
$RISK_{i,t}$	2.244	1.090	81.437	0.000	4.300	6392
$\Delta IDY_{i,t}$	0.002	-0.010	4.130	-3.650	0.260	4090
Quarterly Data						
Dependent Variable						
$LnReturn_{i,q}$	0.261	2.959	179.322	-516.871	28.705	2153
Explanatory Variable						
$\Delta\%EPU_{i,q}$	10.354	-1.301	536.231	-100.000	54.524	2187
Control Variables						
$\Delta\%CPI_{i,q}$	0.3450	0.571	43.754	-93.919	5.693	2199
$\Delta SIR_{i,q}$	-0.003	-0.002	31.182	-19.400	1.621	2199
$\Delta\%EFI_{i,q}$	0.072	0.082	4.552	-5.379	0.649	2178
$\Delta\%REER_{i,q}$	0.122	0.120	77.980	-41.347	4.727	2199
$\Delta\%IPI_{i,q}$	0.225	0.536	58.564	-100.000	6.658	2181
$\Delta\%BCI_{i,q}$	-0.225	0.019	8.446	-100.000	4.954	2137
Mediation variables						
$\Delta\%INVEST_{i,q}$	3.865	2.838	324.481	-100.000	24.339	2011

Table 4.6 Correlation Matrix

This table shows correlations among variables. See Table 4.4 for variable definitions and symbols. The variables with a subscript 't' represent monthly data, and those with a subscript 'q' represent quarterly data.

Monthly data	LnReturn$_{i,t}$	Δ%EPU$_{i,t}$	Δ%BCI$_{i,t}$	ΔSIR$_{i,t}$	Δ%EFI$_{i,t}$	Δ%REER$_{i,t}$	Δ%IPI$_{i,t}$	Δ%CPI$_{i,t}$	RISK$_{i,t}$	ΔIDY$_{i,t}$
LnReturn$_{i,t}$	1.000									
Δ%EPU$_{i,t}$	-0.150***	1.000								
Δ%BCI$_{i,t}$	0.253***	-0.076***	1.000							
ΔSIR$_{i,t}$	0.045***	0.041	0.105	1.000						
Δ%EFI$_{i,t}$	-0.016	0.015	-0.035***	0.069	1.000					
Δ%REER$_{i,t}$	0.083***	-0.108***	0.115	-0.092**	-0.058	1.000				
Δ%IPI$_{i,t}$	0.122**	-0.012	0.306***	0.023***	-0.001	0.012	1.000			
Δ%CPI$_{i,t}$	-0.010	0.055***	-0.015	0.045***	-0.005	-0.122***	0.006***	1.000		
RISK$_{i,t}$	-0.323***	0.158***	-0.313***	-0.067**	0.039	-0.187***	-0.157***	-0.001***	1.000	
ΔIDY$_{i,t}$	-0.701***	0.124***	-0.220***	-0.028	0.047***	-0.082***	-0.112***	0.034**	0.261***	1.000
Quarterly data	LnReturn$_{i,q}$	Δ%EPU$_{i,q}$	Δ%BCI$_{i,q}$	ΔSIR$_{i,q}$	Δ%EFI$_{i,q}$	Δ%REER$_{i,q}$	Δ%IPI$_{i,q}$	Δ%CPI$_{i,q}$	Δ%INVEST$_{i,q}$	
LnReturn$_{i,q}$	1.000									
Δ%EPU$_{i,q}$	-0.272***	1.000								
Δ%BCI$_{i,q}$	0.337***	-0.099	1.000							
ΔSIR$_{i,q}$	-0.080***	0.071***	-0.045***	1.000						
Δ%EFI$_{i,q}$	0.020	0.031	-0.024*	0.030	1.000					
Δ%REER$_{i,q}$	0.180***	-0.152***	0.116***	-0.125	-0.045**	1.000				
Δ%IPI$_{i,q}$	0.153***	0.024***	0.149***	0.039***	0.054**	0.016***	1.000			
Δ%CPI$_{i,q}$	0.002***	0.067***	-0.001***	0.027***	0.000	-0.068***	0.004***	1.000		
Δ%INVEST$_{i,q}$	0.073***	0.027	0.028	0.076	0.011	-0.045***	0.036**	-0.075	1.000	

Table 4.7 OLS Regression Results (Full Sample)

This table presents the OLS regression results for changes in stock market returns, examining explanatory and control variables across 22 countries. For conciseness, the coefficients of the fixed cross and period effects are not reported in the table. ***, ** and * denote the statistical significance level at 1%, 5% and 10%, respectively. See Table 4.4 for the variable definitions.

Explanatory and control variables	Dependent variable: Total stock market return ($LnReturn_{it}$)				
	(1)	(2)	(3)	(4)	(5)
EPU growth	-0.004**	-0.003**			
One-month lagged EPU growth			-0.003**		
Two-month lagged EPU growth				0.005***	
Three-month lagged EPU growth					-0.005***
Short-term interest rate change		-0.982***	-0.975***	-0.989***	-0.970***
Output growth		0.007	0.007	0.008	0.007
Real effective exchange rate growth		-0.016	-0.014	-0.011	-0.011
Institutional quality growth		0.281	0.302	0.286	0.316
Investor sentiment		1.227***	1.231***	1.227***	1.238***
Inflation		0.035	0.032	0.030	0.026
Constant	0.632***	0.605***	0.603***	0.542***	0.611***
Adjusted R-squared	0.314	0.336	0.337	0.338	0.338
Country and year-fixed effects	Controlled	Controlled	Controlled	Controlled	Controlled
Observations	6229	5897	5884	5871	5858

Table 4.8 OLS Regression Results of Developed and Developing Countries

This table reports the OLS regression results for the effect of EPU growth on changes in stock market returns across 16 developed and six developing countries. The control variables are changes in the short-term interest rate, output growth, the real effective exchange rate growth, investor sentiment, and inflation. For conciseness, the coefficients of fixed effects and control variables are not reported in the table. ***, ** and * denote the statistical significance level at 1%, 5% and 10%, respectively. See Table 4.4 for the variable definitions.

Explanatory and control variables	Dependent variable: Total stock market return ($\mathrm{LnReturn}_{it}$)				
Panel A: Developed countries					
	(1)	(2)	(3)	(4)	(5)
EPU growth	-0.004**	-0.004**			
One-month lagged EPU growth			-0.003		
Two-month lagged EPU growth				0.005***	
Three-month lagged EPU growth					-0.003*
Constant	0.538***	0.507***	0.497***	0.446***	0.500***
Control Variables	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.367	0.374	0.375	0.377	0.377
Fixed effects	Controlled	Controlled	Controlled	Controlled	Controlled
Observations	4627	4525	4514	4503	4492
Panel B: Developing countries					
	(6)	(7)	(8)	(9)	(10)
EPU growth	-0.001	-0.002			
One-month lagged EPU growth			-0.004		
Two-month lagged EPU growth				0.002	
Three-month lagged EPU growth					-0.007**
Constant	0.871	1.228***	1.268***	1.181***	1.277***
Control Variables	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.280	0.362	0.361	0.361	0.364
Fixed effects	Controlled	Controlled	Controlled	Controlled	Controlled
Observations	1602	1372	1370	1368	1366

Table 4.9 Robustness tests: Quantile Regressions (Full Sample)

This table reports quantile regression results on changes in stock market return with explanatory and control variables across 22 countries when tau is 0.8, 0.5, and 0.2, respectively. Control variables include changes in the short-term interest rate, output growth, the real effective exchange rate growth, investor sentiment, and inflation. They are not reported for brevity. ***, ** and * denote the statistical significance level at 1%, 5% and 10%, respectively. See Table 4.4 for the variable definitions.

Explanatory and control variables	Dependent Variable: Total stock market return ($\mathrm{LnReturn}_{it}$)			
Panel A: tau=0.8				
	(1)	(2)	(3)	(4)
EPU growth	-0.007***			
One-month lagged EPU growth		-0.001		
Two-month lagged EPU growth			0.009***	
Three-month lagged EPU growth				0.004
Constant	4.766***	4.734***	4.693***	4.710***
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.022	0.019	0.023	0.020
Observations	5897	5884	5871	5858
Panel B: tau=0.5				
	(5)	(6)	(7)	(8)
EPU growth	-0.014***			
One-month lagged EPU growth		-0.003		
Two-month lagged EPU growth			0.004**	
Three-month lagged EPU growth				0.000
Constant	1.134***	1.020***	0.989***	1.001***
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.025	0.020	0.020	0.020
Observations	5897	5884	5871	5858
Panel C: tau=0.2				
	(9)	(10)	(11)	(12)
EPU growth	-0.022***			
One-month lagged EPU growth		-0.010***		
Two-month lagged EPU growth			0.002	
Three-month lagged EPU growth				-0.004***
Constant	-3.338***	-3.462***	-3.560***	-3.522***
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.046	0.038	0.036	0.037
Observations	5897	5884	5871	5858

Table 4.10 Robustness Tests: Controlling for the Global Financial Crisis and COVID-19

This table reports OLS regression results on changes in stock market returns with explanatory and control variables across 22 countries after controlling for the global financial crisis and COVID-19. Control variables include changes in the short-term interest rate, output growth, the real effective exchange rate growth, investor sentiment, and inflation. They are not reported for brevity. ***, ** and * denote the statistical significance level at 1%, 5% and 10% respectively. See Table 4.4 for the variable definitions.

Explanatory and control variables	Dependent Variable: Total stock market return ($\mathrm{LnReturn}_{it}$)			
	(1)	(2)	(3)	(4)
EPU growth	-0.015***			
One-month lagged EPU growth		-0.007***		
Two-month lagged EPU growth			0.006***	
Three-month lagged EPU growth				0.000
The global financial crisis	-2.896***	-2.942***	-3.013***	-2.963***
COVID	-0.463	-0.465	-0.465	-0.465
Constant	0.898***	0.849***	0.753***	0.797***
Control variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.046	0.038	0.036	0.037
Fixed effects	Controlled	Controlled	Controlled	Controlled
Observations	5897	5884	5871	5858

Table 4.11 Mediation Test (Mediator: Risk Premium)

This table reports the regression results of Baron and Kenny's (1986) mediation test across 22 countries. The mediator in the regressions is the stock market risk premium ($RISK_{it}$). Panel A is the second step of Baron and Kenny's (1986) mediation test, as outlined in Equation 4.23. Panel B is the third step of Baron and Kenny's (1986) mediation test, as outlined in Equation 4.24. ***, ** and * denote the statistical significance level at 1%, 5% and 10%, respectively. For conciseness, the coefficients of the fixed cross and period effects are not reported in the table. See Table 4.4 for the variable definitions.

Panel A. Dependent Variable: Risk premium ($RISK_{it}$)

Explanatory and control variables	(1)	(2)	(3)	(4)
EPU growth	0.002**			
One-month lagged EPU growth		0.002**		
Two-month lagged EPU growth			0.002***	
Three-month lagged EPU growth				0.001
Constant	2.147***	2.148***	2.164***	2.158***
Controlled variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.539	0.539	0.539	0.539
Fixed effects	Controlled	Controlled	Controlled	Controlled
Observations	6005	5990	5975	5960

Panel B. Dependent Variable: Total stock market return ($\mathrm{LnReturn}_{\mathrm{it}}$)

Explanatory and control variables	(1)	(2)	(3)	(4)
EPU growth	-0.003*			
One-month lagged EPU growth		-0.003*		
Two-month lagged EPU growth			0.005***	
Three-month lagged EPU growth				-0.005***
Risk premium	-0.291***	-0.292***	-0.296***	-0.293***
Constant	1.207***	1.208***	1.156***	1.220***
Controlled variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.349	0.350	0.351	0.351
Fixed effects	Controlled	Controlled	Controlled	Controlled
Observations	5896	5883	5870	5857

Table 4.12 Results of Mediation Test (Mediator: Investment growth, Quarterly Data)

This table reports the regression results of Baron and Kenny's (1986) mediation test across 22 countries. The mediator in regressions is the investment growth ($\Delta\%INVEST_{i,t}$). Panel A is the second step of Baron and Kenny's (1986) mediation test, as outlined in Equation 4.23. Panel B is the third step of Baron and Kenny's (1986) mediation test, as outlined in Equation 4.24. ***, ** and * denote the statistical significance level at 1%, 5% and 10%, respectively. For conciseness, the coefficients of the fixed cross and period effects are not reported in the table. See Table 4.4 for the variable definitions.

Panel A Dependent Variable: Investment growth ($\Delta\%INVEST_{i,q}$)

Explanatory and control variables	(1)	(2)	(3)	(4)	(5)
EPU growth	0.003				
One-quarter lagged EPU growth		-0.019*			
Two-quarter lagged EPU growth			0.009		
Three-quarter lagged EPU growth				0.016	
Four-quarter lagged EPU growth					-0.024**
Constant	4.323***	4.544***	4.229***	4.197***	4.595***
Controlled variables	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.187	0.189	0.187	0.188	0.190
Fixed effects	Controlled	Controlled	Controlled	Controlled	Controlled
Observations	1917	1916	1902	1888	1874

Panel B Dependent Variable: Total stock market return ($LnReturn_{i,t}$)

Explanatory and control variables	(6)	(7)	(8)	(9)	(10)
EPU growth	-0.016***				
One-quarter lagged EPU growth		-0.006			
Two-quarter lagged EPU growth			0.005		
Three-quarter lagged EPU growth				-0.005	
Four-quarter lagged EPU growth					0.004
Investment growth	0.025***	0.024***	0.025***	0.026***	0.024***
Constant	1.669***	1.574***	1.409***	1.476***	1.435***
Controlled variables	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.571	0.568	0.567	0.569	0.572
Fixed effects	Controlled	Controlled	Controlled	Controlled	Controlled
Observations	1881	1880	1868	1856	1844

Table 4.13 Mediation Test (Mediator: Index Dividend Yield Change)

This table reports the regression results of Baron and Kenny's (1986) mediation test across 22 countries. The mediator in regressions is the dividend yield ($DIVIDEND_{it}$). Regressions are the second step in Baron and Kenny's (1986) mediation test, as outlined in equation 4.23. ***, ** and * denote the Statistical significance level at 1%, 5% and 10% respectively. For conciseness, the coefficients of the fixed cross and period effects are not reported in the table. See Table 4.4 for the variable definitions.

Explanatory and control variables	Dependent Variable: Changes in Index Dividend Yield ($\Delta IDY_{i,t}$)			
	(1)	(2)	(3)	(4)
EPU growth	0.000**			
One-month lagged EPU growth		0.000		
Two-month lagged EPU growth			0.000*	
Three-month lagged EPU growth				0.000***
Constant	-0.001	0.000	0.002	-0.002
Controlled variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.224	0.223	0.224	0.227
Fixed effects	Controlled	Controlled	Controlled	Controlled
Observations	3961	3950	3939	3928

Appendix 4A Country-Specific Data Sources and Coverage

This appendix presents the data sources and coverage for each sample country in this chapter. The listed data series are the indicators we collected as proxies of variables (See Table 4.4 for variable definitions). The coverage periods may vary across countries due to data availability. Missing observations are indicated as ‘Na’. The indices used to calculate index-level dividend yields are the same as those used in calculating total stock market return indices.

Appendix 4A.1 Australia

Data	Coverage	Source
Total stock market return index	S&P/ASX 200 Total Return Index 01/1997–12/2021 (daily and monthly)	DataStream
BBD index	01/1997–12/2021 (monthly/quarterly)	Baker et al. (2016a), policyuncertainty.com
Business confidence index	01/1997–12/2021 (monthly/quarterly)	OECD
Commodity price index	01/1997–12/2021 (monthly/quarterly)	Refinitiv Workspace
Industrial production index	01/1997–12/2021 (monthly/quarterly)	Refinitiv Workspace
Three-month money market rate/T-bill	01/1997–12/2021 (monthly/quarterly)	OECD
Real effective exchange rate	01/1997–12/2021 (monthly/quarterly)	Bank for International Settlements
Economic Freedom Index	01/1997–12/2021 (monthly/quarterly)	Heritage Foundation
Gross fixed capital formation	Q1/1997–Q4/2021 (quarterly)	IMF IFS
Index dividend yield	01/1997–12/2021 (monthly)	DataStream

Appendix 4A.2 Belgium

Data	Coverage	Source
Total stock market return index	BEL20 Total Return Index 01/1997-12/2021 (daily and monthly)	DataStream
BBD index	01/1997–12/2021 (monthly/quarterly)	Baker et al. (2016a), policyuncertainty.com
Business confidence index	01/1997–12/2021 (monthly/quarterly)	OECD
Consumer price index	01/1997–12/2021 (monthly/quarterly)	OECD
Industrial production index	01/1997–12/2021 (monthly/quarterly)	OECD
Three-month money market rate/T-bill	01/1997–12/2021 (monthly/quarterly)	OECD
Real effective exchange rate	01/1997–12/2021 (monthly/quarterly)	Bank for International Settlements
Economic Freedom Index	01/1997–12/2021 (monthly/quarterly)	Heritage Foundation
Gross fixed capital formation	Q1/1997–Q4/2021 (quarterly)	IMF IFS
Index dividend yield	01/1997–12/2021 (monthly)	DataStream

Appendix 4A.3 Brazil

Data	Coverage	Source
Total stock market return index	BOVESPA Total Return Index 01/1997-12/2021 (daily and monthly)	DataStream
BBD index	01/1997–12/2021 (monthly/quarterly)	Baker et al. (2016a), policyuncertainty.com
Business confidence index	01/1997–12/2021 (monthly/quarterly)	OECD
Consumer price index	01/1997–12/2021 (monthly/quarterly)	OECD
Industrial Production Index	01/1997–12/2021 (monthly/quarterly)	OECD
Three-month money market rate/T-bill	01/1997–12/2021 (monthly/quarterly)	OECD
Real effective exchange rate	01/1997–12/2021 (monthly/quarterly)	Bank for International Settlements
Economic Freedom Index	01/1997–12/2021 (monthly/quarterly)	Heritage Foundation
Gross fixed capital formation	Q1/1997–Q4/2021 (quarterly)	IMF IFS
Index dividend yield	01/1997–12/2021 (monthly)	DataStream

Appendix 4A.4 Canada

Data	Coverage	Source
Total stock market return index	Canada S&P/TSX Composite Total Return Index 01/1997-12/2021 (daily and monthly)	DataStream
BBD index	01/1997–12/2021 (monthly/quarterly)	Baker et al. (2016a), policyuncertainty.com
Business confidence index	07/1998–12/2021 (monthly/quarterly)	OECD
Consumer price index	01/1997–12/2021 (monthly/quarterly)	OECD
Industrial production index	01/1997–12/2021 (monthly/quarterly)	OECD
Three-month money market rate/T-bill	01/1997–12/2021 (monthly/quarterly)	OECD
Real effective exchange rate	01/1997–12/2021 (monthly/quarterly)	Bank for International Settlements
Economic freedom index,	01/1997–12/2021 (monthly/quarterly)	Heritage Foundation
Gross fixed capital formation	Q1/1997–Q4/2021 (quarterly)	IMF IFS
Index dividend yield	01/1997–12/2021 (monthly)	DataStream

Appendix 4A.5 Chile

Data	Coverage	Source
Total stock market return index	MSCI Chile Total Return Index 01/1997-12/2021 (daily and monthly)	DataStream
BBD index	01/1997–12/2021 (monthly/quarterly)	Baker et al. (2016a), policyuncertainty.com
Business confidence index	11/2003–12/2021 (monthly/quarterly)	OECD
Consumer price index	01/1997–12/2021 (monthly/quarterly)	OECD
Industrial production index	01/1997–12/2021 (monthly/quarterly)	OECD
Monetary policy rate	01/1997–12/2021 (monthly/quarterly)	Refinitiv Workspace
Real effective exchange rate	01/1997–12/2021 (monthly/quarterly)	Bank for International Settlements
Economic Freedom Index	01/1997–12/2021 (monthly/quarterly)	Heritage Foundation
Gross fixed capital formation	Q1/1997–Q4/2021 (quarterly)	IMF IFS
Index dividend yield	Na.	--

Appendix 4A.6 China

Data	Coverage	Source
Total stock market return index	MSCI China Total Return Index 01/1997-12/2021 (daily and monthly)	DataStream
BBD index	01/1997–12/2021 (monthly/quarterly)	Baker et al. (2016a), policyuncertainty.com
Business confidence index	02/2000–12/2021 (monthly/quarterly)	OECD
Consumer price index	01/1997–12/2021 (monthly/quarterly)	OECD
Industrial value-added index	01/1997–12/2021 (monthly/quarterly)	Wind database
Interbank offered rate (90 days)	01/1997–12/2021 (monthly/quarterly)	Wind Database
Real effective exchange rate	01/1997–12/2021 (monthly/quarterly)	Bank for International Settlements
Economic Freedom Index	01/1997–12/2021 (monthly/quarterly)	Heritage Foundation
Accumulated fixed capital formation	Q1/1997–Q4/2021 (quarterly)	National Statistics Bureau of China
Index dividend yield	Na.	--

Appendix 4A.7 Colombia

Data	Coverage	Source
Total stock market return index	MSCI Colombia Total Return Index 01/1997–12/2021 (daily and monthly)	DataStream
BBD index	01/1997–12/2021 (monthly/quarterly)	Baker et al. (2016a), policyuncertainty.com
Business confidence index	01/1997–12/2021 (monthly/quarterly)	OECD
Consumer price index	01/1997–12/2021 (monthly/quarterly)	OECD
Industrial production index	01/1997–12/2021 (monthly/quarterly)	OECD
Three-month money market rate/T-bill	01/1997–12/2021 (monthly/quarterly)	OECD
Real effective exchange rate	01/1997–12/2021 (monthly/quarterly)	Bank for International Settlements
Economic Freedom Index	01/1997–12/2021 (monthly/quarterly)	Heritage Foundation
Gross fixed capital formation	Q1/1997–Q4/2021 (quarterly)	IMF IFS
Index dividend yield	Na.	--

Appendix 4A.8 Germany

Data	Coverage	Source
Total stock market return index	Dax Total Return Index 01/1997–12/2021 (daily and monthly)	DataStream
BBD index	01/1997–12/2021 (monthly/quarterly)	Baker et al. (2016a), policyuncertainty.com
Business confidence index	01/1997–12/2021 (monthly/quarterly)	OECD
Consumer price index	01/1997–12/2021 (monthly/quarterly)	OECD
Industrial production index	01/1997–12/2021 (monthly/quarterly)	OECD
Three-month money market rate/T-bill	01/1997–12/2021 (monthly/quarterly)	OECD
Real effective exchange rate	01/1997–12/2021 (monthly/quarterly)	Bank for International Settlements
Economic Freedom Index	01/1997–12/2021 (monthly/quarterly)	Heritage Foundation
Gross fixed capital formation	Q1/1997–Q4/2021 (quarterly)	IMF IFS
Index dividend yield	01/1997–12/2021(monthly)	DataStream

Appendix 4A.9 Spain

Data	Coverage	Source
Total stock market return index	IBEX35 Total Return Index 01/1997–12/2021 (daily and monthly)	DataStream
BBD index	01/1997–12/2021 (monthly/quarterly)	Baker et al. (2016a), policyuncertainty.com
Business confidence index	01/1997–12/2021 (monthly/quarterly)	OECD
Consumer price index	01/1997–12/2021 (monthly/quarterly)	OECD
Industrial production index	01/1997–12/2021 (monthly/quarterly)	OECD
Three-month money market rate/T-bill	01/1997–12/2021 (monthly/quarterly)	OECD
Real effective exchange rate	01/1997–12/2021 (monthly/quarterly)	Bank for International Settlements
Economic Freedom Index	01/1997–12/2021 (monthly/quarterly)	Heritage Foundation
Gross fixed capital formation	Q1/1997–Q4/2021 (quarterly)	IMF IFS
Index dividend yield	01/1997-12/2021(monthly)	DataStream

Appendix 4A.10 France

Data	Coverage	Source
Total stock market return index	CAC40 Total Return Index 01/1997–12/2021 (daily and monthly)	DataStream
BBD index	01/1997–12/2021 (monthly/quarterly)	Baker et al. (2016a), policyuncertainty.com
Business confidence index	01/1997–12/2021 (monthly/quarterly)	OECD
Consumer price index	01/1997–12/2021 (monthly/quarterly)	OECD
Industrial production index	01/1997–12/2021 (monthly/quarterly)	OECD
Three-month money market/T-bill rate	01/1997–12/2021 (monthly/quarterly)	OECD
Real effective exchange rate	01/1997–12/2021 (monthly/quarterly)	Bank for International Settlements
Economic freedom index,	01/1997–12/2021 (monthly/quarterly)	Heritage Foundation
Gross fixed capital formation	Q1/1997–Q4/2021 (quarterly)	IMF IFS
Index dividend yield	01/1997–12/2021(monthly)	DataStream

Appendix 4A.11 UK

Data	Coverage	Source
Total stock market return index	FTSE 100 Total Return Index 01/1997–12/2021 (daily and monthly)	DataStream
BBD index	01/1997–12/2021 (monthly/quarterly)	Baker et al. (2016a), policyuncertainty.com
Business confidence index	01/1997–12/2021 (monthly/quarterly)	OECD
Consumer price index	01/1997–12/2021 (monthly/quarterly)	OECD
Industrial production index	01/1997–12/2021 (monthly/quarterly)	OECD
Three-month money market/T-bill rate	01/1997–12/2021 (monthly/quarterly)	OECD
Real effective exchange rate	01/1997–12/2021 (monthly/quarterly)	Bank for International Settlements
Economic Freedom Index	01/1997–12/2021 (monthly/quarterly)	Heritage Foundation
Gross fixed capital formation	Q1/1997–Q4/2021 (quarterly)	IMF IFS
Index dividend yield	01/1997–12/2021(monthly)	DataStream

Appendix 4A.12 Greece

Data	Coverage	Source
Total stock market return index	Athex Composite Total Return Index 01/1997–12/2021 (daily and monthly)	DataStream
BBD index	01/1997–12/2021 (monthly/quarterly)	Baker et al. (2016a), policyuncertainty.com
Business confidence index	01/1997–12/2021 (monthly/quarterly)	OECD
Consumer price index	01/1997–12/2021 (monthly/quarterly)	OECD
Industrial production index	01/1997–12/2021 (monthly/quarterly)	OECD
Three-month money market/T-bill rate	01/1997–12/2021 (monthly/quarterly)	OECD
Real effective exchange rate	01/1997–12/2021 (monthly/quarterly)	Bank for International Settlements
Economic Freedom Index	01/1997–12/2021 (monthly/quarterly)	Heritage Foundation
Gross fixed capital formation	Q1/1997–Q4/2021 (quarterly)	IMF IFS
Index dividend yield	Na.	—

Appendix 4A.13 India

Data	Coverage	Source
Total stock market return index	Nifty50 Total Return Index 01/1998–12/2021 (daily and monthly)	DataStream
BBD index	01/1997–12/2021 (monthly/quarterly)	Baker et al. (2016a), policyuncertainty.com
Business confidence index	05/2000–12/2021 (monthly/quarterly)	OECD
Consumer price index	01/1997–12/2021 (monthly/quarterly)	OECD
Industrial production index	01/1997–12/2021 (monthly/quarterly)	OECD
Three-month interbank offered rate (3 months MIBOR)	12/1998=11/2021(monthly/ quarterly)	Wind database
Real effective exchange rate	01/1997–12/2021 (monthly/quarterly)	Bank for International Settlements
Economic Freedom Index	01/1997–12/2021 (monthly/quarterly)	Heritage Foundation
Gross fixed capital formation	Q1/1997–Q4/2021 (quarterly)	IMF IFS
Index dividend yield	01/1997–12/2021(monthly)	DataStream

Appendix 4A.14 Ireland

Data	Coverage	Source
Total stock market return index	ISEQ All Share Total Return Index 01/1997–12/2021 (daily and monthly)	DataStream
BBD index	01/1997–12/2021 (monthly/quarterly)	Baker et al. (2016a), policyuncertainty.com
Business confidence index	01/1997–12/2021 (monthly/quarterly)	OECD
Consumer price index	01/1997–12/2021 (monthly/quarterly)	OECD
Industrial production index	01/1997–12/2021 (monthly/quarterly)	OECD
Three-month money market/T-bill rate	01/1997–12/2021 (monthly/quarterly)	OECD
Real effective exchange rate	01/1997–12/2021 (monthly/quarterly)	Bank for International Settlements
Economic Freedom Index	01/1997–12/2021 (monthly/quarterly)	Heritage Foundation
Gross fixed capital formation	Q1/1997–Q4/2021 (quarterly)	IMF IFS
Index dividend yield	Na.	—

Appendix 4A.15 Italy

Data	Coverage	Source
Total stock market return index	S&P Italy BMI Total Return Index 01/1997–12/2021 (daily and monthly)	DataStream
BBD index	01/1997–12/2021 (monthly/quarterly)	Baker et al. (2016a), policyuncertainty.com
Business confidence index	01/1997–12/2021 (monthly/quarterly)	OECD
Consumer price index	01/1997–12/2021 (monthly/quarterly)	OECD
Industrial production index	01/1997–12/2021 (monthly/quarterly)	OECD
Three-month money market/T-bill rate	01/1997–12/2021 (monthly/quarterly)	OECD
Real effective exchange rate	01/1997–12/2021 (monthly/quarterly)	Bank for International Settlements
Economic Freedom Index	01/1997–12/2021 (monthly/quarterly)	Heritage Foundation
Gross fixed capital formation	Q1/1997–Q4/2021 (quarterly)	IMF IFS
Index dividend yield	Na.	—

Appendix 4A.16 Japan

Data	Coverage	Source
Total stock market return index	Topix Total Return Index 01/1997–12/2021 (daily and monthly)	DataStream
BBD index	01/1997–12/2021 (monthly/quarterly)	Baker et al. (2016a), policyuncertainty.com
Business confidence index	01/1997–12/2021 (monthly/quarterly)	OECD
Consumer price index	01/1997–12/2021 (monthly/quarterly)	OECD
Industrial production index	01/1997–12/2021 (monthly/quarterly)	OECD
Call rate uncollaterised overnight average	01/1997–12/2021 (monthly/quarterly)	Bank of Japan
Real effective exchange rate	01/1997–12/2021 (monthly/quarterly)	Bank for International Settlements
Economic Freedom Index	01/1997–12/2021 (monthly/quarterly)	Heritage Foundation
Gross fixed capital formation	Q1/1997–Q4/2021 (quarterly)	IMF IFS
Index dividend yield	11/2000–12/2021(monthly)	DataStream

Appendix 4A.17 South Korea

Data	Coverage	Source
Total stock market return index	South Korea FTSE Total Return Index 01/1997–12/2021 (daily and monthly)	DataStream
BBD index	01/1997–12/2021 (monthly/quarterly)	Baker et al. (2016a), policyuncertainty.com
Business confidence index	01/1997–12/2021 (monthly/quarterly)	OECD
Consumer price index	01/1997–12/2021 (monthly/quarterly)	OECD
Industrial production index	01/1997–12/2021 (monthly/quarterly)	OECD
Three-month money market /T-bill rate	01/1997–12/2021 (monthly/quarterly)	OECD
Real effective exchange rate	01/1997–12/2021 (monthly/quarterly)	Bank for International Settlements
Economic Freedom Index	01/1997–12/2021 (monthly/quarterly)	Heritage Foundation
Gross fixed capital formation	Q1/1997–Q4/2021 (quarterly)	IMF IFS
Index dividend yield	01/1997–12/2021(monthly)	DataStream

Appendix 4A.18 Mexico

Data	Coverage	Source
Total stock market return index	Mexico IPC Total Return Index 08/2002–12/2021 (daily and monthly)	DataStream
BBD index	01/1997–12/2021 (monthly/quarterly)	Baker et al. (2016a), policyuncertainty.com
Business confidence index	01/1998–12/2021 (monthly/quarterly)	OECD
Consumer price index	01/1997–12/2021 (monthly/quarterly)	OECD
Industrial production index	01/1997–12/2021 (monthly/quarterly)	OECD
Three-month money market /T-bill rate	01/1997–12/2021 (monthly/quarterly)	OECD
Real effective exchange rate	01/1997–12/2021 (monthly/quarterly)	Bank for International Settlements
Economic Freedom Index	01/1997–12/2021 (monthly/quarterly)	Heritage Foundation
Gross fixed capital formation	Q1/1997–Q4/2021 (quarterly)	IMF IFS
Index dividend yield	08/2002–12/2021(monthly)	DataStream

Appendix 4A.19 Netherlands

Data	Coverage	Source
Total stock market return index	AEX Total Return Index 01/1997–12/2021 (daily and monthly)	DataStream
BBD index	01/1997–12/2021 (monthly/quarterly)	Baker et al. (2016a), policyuncertainty.com
Business confidence index	01/1997–12/2021 (monthly/quarterly)	OECD
Consumer price index	01/1997–12/2021 (monthly/quarterly)	OECD
Industrial production index	01/1997–12/2021 (monthly/quarterly)	OECD
Three-month money market /T-bill rate	01/1997–12/2021 (monthly/quarterly)	OECD
Real effective exchange rate	01/1997–12/2021 (monthly/quarterly)	Bank for International Settlements
Economic Freedom Index	01/1997–12/2021 (monthly/quarterly)	Heritage Foundation
Gross fixed capital formation	Q1/1997–Q4/2021 (quarterly)	IMF IFS
Index dividend yield	01/1997–12/2021(monthly)	DataStream

Appendix 4A.20 Russia

Data	Coverage	Source
Total stock market return index	RTS Total Return Index 02/2002–12/2021 (daily and monthly)	DataStream
BBD index	01/1997–12/2021 (monthly/quarterly)	Baker et al. (2016a), policyuncertainty.com
Business confidence index	01/1997–12/2021 (monthly/quarterly)	OECD
Consumer price index	01/1997–12/2021 (monthly/quarterly)	OECD
Industrial production index	01/1997–12/2021 (monthly/quarterly)	OECD
Three-month money market /T-bill rate	01/1997–12/2021 (monthly/quarterly)	OECD
Real effective exchange rate	01/1997–12/2021 (monthly/quarterly)	Bank for International Settlements
Economic Freedom Index	01/1997–12/2021 (monthly/quarterly)	Heritage Foundation
Gross fixed capital formation	Q1/1997–Q4/2021 (quarterly)	IMF IFS
Index dividend yield	Na.	—

Appendix 4A.21 Sweden

Data	Coverage	Source
Total stock market return index	OMX 30 Total Return Index 01/2002–12/2021 (daily and monthly)	DataStream
BBD index	01/1997–12/2021 (monthly/quarterly)	Baker et al. (2016a), policyuncertainty.com
Business confidence index	01/1997–12/2021 (monthly/quarterly)	OECD
Consumer price index	01/1997–12/2021 (monthly/quarterly)	OECD
Industrial production index	01/1997–12/2021 (monthly/quarterly)	OECD
Three-month money market /T-bill rate	01/1997–12/2021 (monthly/quarterly)	OECD
Real effective exchange rate	01/1997–12/2021 (monthly/quarterly)	Bank for International Settlements
Economic Freedom Index	01/1997–12/2021 (monthly/quarterly)	Heritage Foundation
Gross fixed capital formation	Q1/1997–Q4/2021 (quarterly)	IMF IFS
Index dividend yield	02/2003–12/2021(monthly)	DataStream

Appendix 4A.22 US

Data	Coverage	Source
Total stock market return index	S&P500 Total Return Index 01/1997–12/2021 (daily and monthly)	DataStream
BBD index	01/1997–12/2021 (monthly/quarterly)	Baker et al. (2016a), policyuncertainty.com
Business confidence index	01/1997–12/2021 (monthly/quarterly)	OECD
Consumer price index	01/1997–12/2021 (monthly/quarterly)	OECD
Industrial production index	01/1997–12/2021 (monthly/quarterly)	OECD
Three-month money market /T-bill rate	01/1997–12/2021 (monthly/quarterly)	OECD
Real effective exchange rate	01/1997–12/2021 (monthly/quarterly)	Bank for International Settlements
Economic freedom index,	01/1997–12/2021 (monthly/quarterly)	Heritage Foundation
Seasonally adjusted gross fixed capital formation	Q1/1997–Q4/2021 (quarterly)	IMF IFS
Index dividend yield	01/1997–12/2021(monthly)	DataStream

Appendix 4B Introduction of Litterman Frequency Conversion

The Litterman method is a regression-based interpolation approach widely used to convert low-frequency data to high-frequency data through Equation 4.1_A:

$$L(t) = \alpha H(t) + \beta(t) \qquad (4.1_A)$$

$L(t)$ is a low-frequency series, and $H(t)$ is a high-frequency series. Alphaα is the coefficient, and $\beta(t)$ is a random variable with mean zero and covariance matrix CM. CM is calculated from residuals of the following time series model:

$$\beta(t) = \beta(t-1) + \varepsilon(t) \qquad (4.1_B)$$

where $\varepsilon \sim N(0, CM)$, $\varepsilon(t) = \gamma\varepsilon(t-1) + \mu(t)$ and $\beta(0) = 0$.

Chen (2007) argues that this method improves the mathematical frequency conversion methods by not considering certain behaviours of economic time series data.

Chapter 5

CONCLUSIONS

5.1 Conclusions and Implications

In its three empirical chapters, this thesis analyses how EPU affects key corporate financial decisions and stock market returns. The issues examined are: (a) whether EPU influences corporate financing mix and what the mechanisms underlying these impacts are; (b) how EPU affects corporate payout policies and what reasons drive payout policy adjustments under uncertainty; and (c) whether EPU affects stock market returns and what the impacting channels are. The empirical tests provide evidence that increases in EPU are associated with higher leverage ratios, more payouts, and lower stock market returns. These effects are caused by reduced investment, deteriorated corporate profitability, aggravated agency problems, and increased risk premiums associated with increases in EPU. These findings have implications for managers, investors, and policymakers.

For managers, the results provide insight into the complicated associations between corporate financial decisions and market responses when EPU rises. The findings suggest that in response to rising EPU, possibly directed by the shareholders (the board), managers pay out more and rely more heavily on external financing to maintain flexibility and meet working capital needs. This may help preserve investors' confidence and stabilise firms’ market performance during periods of rising EPU. However, a higher leverage ratio and lower retained earnings may also heighten firms’ default risks. Therefore, when EPU rises, managers are likely to face a trade-off between better stock market performance and increased default risk. Managers need to balance the costs and benefits of borrowing more vs paying out more at the time of EPU increase.

For investors, the findings of this thesis help them understand the timing and the choice of investable financial instruments in response to the changes in EPU. When EPU increases, stock market returns are likely to decrease, while payouts, corporate bond yields, and default risks are likely to increase. Therefore, when an increase in EPU is expected, risk-averse investors may reduce risk by reducing stock exposure in their portfolios in favour of fixed income securities.

For policymakers, economic stability is of paramount importance. Policies that cause market turmoil can lead to higher inflation and interest rates, which will have implications for the government's borrowing costs and exchange rates. The results show that EPU affects corporate financial decisions and financial market performance, signalling the future economic direction. Therefore, policymakers should be aware of the important role played by EPU and maintain transparency and predictability in economic policies.

EPU and Leverage

Chapter 2 (the first empirical chapter) investigates how EPU impacts firms' financing mix (leverage ratios). The research analyses annual data from 1,959 non-financial firms listed in France, Germany, Japan, the UK, and the US between 1999 and 2022. The results from the System-GMM estimation suggest that changes in EPU are positively associated with firms' leverage ratios (both book and market). These findings suggest that the effect of EPU on the financing mix is consistent across different measures of the leverage ratio. However, the market leverage ratio responds more rapidly and significantly to changes in EPU. The results are robust after controlling for country, industry, government regulatory qualities, the global financial crisis in 2007-2008, and the COVID-19 pandemic.

Second, long- and short-term leverage ratios are positively associated with percentage changes in lagged EPU. The results are robust to both book and market measures of leverage, and consistent after controlling for the global financial crisis and COVID-19.

Third, profitability is likely to have a partial mediating effect which links EPU to leverage ratios. However, investment has only a limited joint mediating effect together with profitability. This suggests that EPU may primarily affect leverage ratios directly, with the indirect mediation playing a secondary role in the EPU-leverage effect.

Finally, the effect of EPU on the financing mix is regulatory-conditional. A weaker regulatory environment may amplify the long-term delayed positive effect of EPU on the book and the long-term book leverage ratios. On the other hand, a strong regulatory environment is likely to magnify the short-term positive effect of EPU on the book leverage ratio. However, given the small magnitude and a limited number of significant interaction terms between Δ%EPU and regulatory, this finding should be interpreted with caution.

The findings of this chapter have several implications. First, when EPU rises, managers should prepare for heightened financial distress risk, costs of capital, and debt rollover risk, as firms may have higher leverage ratios and lower profitability. They should balance financial flexibility and default risk during periods of high EPU. In addition, market leverage ratios are likely to respond more quickly to EPU than book leverage ratios, and a firm's debt-to-capital ratio may increase substantially (due to the reduced market value of the firm) even if the borrowing stays unchanged. Therefore, managers should pay close attention to the leverage ratios and take measures to stabilise stock prices when needed. This helps to preserve firms' future investment incentives.[46] Second, investors should be aware that the default risk of corporate bonds is likely to increase as EPU rises. Although the interest rate may rise to compensate for it, risk-averse investors could reduce their exposure to corporate bonds in their portfolios to control the risk when they expect EPU increases. Third, policymakers should closely monitor market liquidity before and during policy changes and provide liquidity to the market when needed during periods of high EPU to stabilise the financial system.

EPU and Payout Policy

Chapter 3 (the second empirical chapter) examines whether changes in EPU impact payout policy decisions. This chapter examines year-firm data from listed non-financial firms in France, Germany, Japan, the UK, and the US from 1999 to 2022. The results suggest that firms tend to pay out more to shareholders when EPU increases. The results are robust after controlling for firm-level characteristics, the 2007-2008 financial crisis, and the COVID-19 pandemic. They also hold across different EPU thresholds and alternative methods (OLS and IPW).

The findings suggest that firms tend to increase their dividend payout ratio (and the dividend yield) when EPU increases. Similarly, some firms are likely to repurchase shares (as opposed to increasing dividends) in response to short-term positive EPU shocks. However, if the EPU is sustained for an extended period, dividend payouts and share repurchases may decline as the precautionary motive to holding cash becomes dominant.

[46] When the debt-to-capital ratio increases, the benefit of investment goes to the creditors rather than the shareholders. This will discourage investment, even if the projects are NPV (Myers 1977).

Finally, this chapter provides evidence supporting the mediating effect of the free cash flow and financial constraints channels in the EPU-payout effect. The mediation tests indicate that firms tend to increase payouts when they hold surplus free cash flows, and even when they are more financially constrained during periods of rising EPU.

The findings of this chapter have several practical implications for investors and managers. From the investors' perspective, they may tailor their decisions depending on the duration of heightened EPU. If investors expect a prolonged increase in EPU, they may reduce their exposure to stocks and reallocate part of their portfolios to safer assets, such as government bonds, to manage risk and maintain flexibility. However, if investors perceive a temporary rise in EPU, they may continue to hold stocks to receive higher dividends. From the managers' perspective, if they expect a short-term rise in EPU, they could choose to increase the extra and special dividends or repurchase shares to distribute the temporary cash surplus. They should be cautious about increasing regular dividends substantially for two reasons. The first is to avoid investors mistakenly interpreting it as a signal of a temporary decrease in investment opportunities. The second is to keep the future payout policy flexible without committing to long-term dividend increases. However, if managers perceive that the EPU is likely to remain persistently high, they can reduce the payout and retain more cash buffer against potential financial distress. This will help firms to maintain financial flexibility during extended periods of high EPU.

EPU and Stock Market Returns

Chapter 4 (the third empirical chapter) examines the impact of EPU on stock market returns. This chapter analyses monthly and quarterly panel data from 22 countries between 1997 and 2021. The results suggest that changes in EPU are inversely associated with stock market returns. This finding holds after controlling for the short-term interest rate, the business confidence index, the CPI, the real exchange rate, the inflation rate, the industrial production index, and the economic freedom index. The results are robust to alternative methods (quantile estimation) and the implications of the 2007-2008 financial crisis and the COVID-19 pandemic. Second, this chapter suggests that stock market returns in both developed and developing countries tend to decrease when EPU rises. However, the stock market returns of developing countries take longer to respond to changes in EPU.

Finally, this chapter identifies three channels through which changes in EPU affect stock market returns: the risk premium, the investment, and the dividend yield. The first two mediators lead stock market returns to respond inversely to changes in EPU. On the other hand, the positive effect of EPU on dividend yields tends to mitigate the negative effect of EPU on stock market returns. However, compared to capital gains, dividend yields account for only a small portion of stock market returns. Therefore, the overall effect of changes in EPU on stock market returns is negative.

The findings of this chapter have several practical implications. First, managers could opt to repurchase shares when EPU is high because lower stock prices offer a good opportunity to buy back at a lower cost and stabilise the stock price. Second, from the investors' perspective, they can use EPU as an indicator to adjust their investment strategy. Specifically, when EPU increases, investors could underweight stocks in their portfolio but switch to low-risk assets, such as government bonds. Third, investors in developed countries should react more swiftly when they expect the EPU to rise to avoid losses from holding stocks, as stock market returns in developed countries tend to respond more quickly.

5.2 Limitations and Recommendations for Future Research

This thesis has several potential limitations which encourage further study.

First, while aiming to provide in-depth insights by examining data from previously underexplored highly developed markets, Chapters 2 and 3 of this thesis are limited to five developed countries: France, Germany, Japan, the UK, and the US. The sample excludes firms from developing countries where financial frictions are usually high. However, firms in developing markets may respond differently to EPU shocks than firms from developed countries. Future research could extend the sample to developing countries, where the data permits, and compare the different outcomes of the effect.

Second, this thesis employs Baron and Kenny's (1986) mediation test to examine the channels through which EPU affects firms' financing mix, payout policy, and stock market returns. Future research could employ other approaches, such as bootstrapping or structural equation modelling, to test direct, indirect, or multiple mediation effects between EPU and the financing mix, payout policy, and stock market returns.

Finally, the thesis assumes that relationships between EPU and the financing mix, payout policy, and stock market returns are linear. However, future research can examine the possible asymmetric or nonlinear effects of EPU on firms' financial decisions and stock markets.

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