**Policy uncertainty and the capital shortfall of global financial firms**

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## Abstract

This paper examines how economic policy uncertainty affects financial firms' capital shortages in the event of a new crisis. By employing a global economic policy uncertainty index, we show that an increase in policy uncertainty leads to future capital shortfall increases in the event of a severe market decline. This effect of policy uncertainty is of a similar magnitude for all firms across all regions and sectors, albeit with a few exceptions. As expected, well-capitalized financial firms are less affected. Our findings have important implications for policymakers and politicians, since if their response during a severe market decline is not timely and decisive, the delay will come at a cost. Further, in terms of the implications for firms' managers, we show that during periods of elevated policy uncertainty and a severe market downturn, firms will face additional, unexpected capital requirements.

Keywords: Policy uncertainty; Systemic risk; Financial stability; Capital shortfall
JEL Codes: E66, G15, G18

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## 1. Introduction

> "*The crisis taught us that we must be vigilant in safeguarding the resilience of our financial system at times when vulnerabilities are building up. The slower growth momentum we are seeing increases the risk of tail events… Bank capital plays a crucial role in absorbing these tail risks: it provides solvency insurance and makes it more likely that banks will be able to continue to provide credit during a downturn.*" Luis de Guindos, Vice-President of the European Central Bank, May 2019.

While the impact of policy uncertainty on economic outcomes and firms' plans has become an extensively researched area, the impact of policy uncertainty on the future capital shortfall remains a relatively unexplored field of research. Recently, concerns have been growing regarding the capital shortfall of financial institutions, as the implementation of the Basel III rules necessitates that financial institutions raise more capital in order to meet the regulatory standards. For example, in March 2019, the Bundesbank announced that "*The total capital shortfall assuming the full implementation of the final Basel III standards increased slightly from €12.2 billion to €15.5 billion compared with the previous survey based on 31 December 2017 data*,"[1] while the Financial Times reported that "*Listed Chinese banks will need to raise about $260bn in fresh capital over the next three years as regulations force shadow-bank loans back on to balance sheets and global rules on systemically important groups impose extra requirements on the largest lenders.*"[2] Furthermore, the concept of capital shortage is very important in today's global business environment because corporations now operate in an interconnected and globalized environment, and hence, the distress of one firm

[1]https://www.bundesbank.de/en/tasks/banking-supervision/legal-basis/basel-framework/basel-iii-monitoring-622584
[2] https://www.ft.com/content/6a9ff690-4593-11e9-b168-96a37d002cd3

would affect other firms through networks of interdependencies. Influential studies in the area show that various channels such as cross-holdings of shares, and other cross-border interbank connections aid the contagion of shocks to governments, central and other kinds of banks and financial institutions (see among others, Elliott, Golub and Jackson, 2014 and Acemoglu, Carvalho, Ozdaglar, and Tahbaz-Salehi, 2012).

There exists a broad consensus that economic policy uncertainty affects the economic environment in which firms and households operate. Empirical research shows that economic policy uncertainty negatively affects the real economy along with the financial markets (e.g., Pástor and Veronesi, 2012; Baker, Bloom, and Davis, 2016; Kelly, Pástor, and Veronesi, 2016). From a firm's perspective, the effects of elevated economic policy uncertainty range from the postponement and decrease of corporate investments (Bernanke, 1983; Gulen and Ion, 2016; Julio and Yook, 2016) to adverse effects in terms of corporate spreads and lending availability (Waisman, Ye, and Zhu, 2015; Çolak, Durnev, and Qian, 2017; Lee, Lee, Zeng, and Hsu, 2017; Nguyen and Phan, 2017). Further, a number of studies show that an increase in bank failures and delays in firms' leverage adjustments is related to the political component of economic policy uncertainty (Dam and Koetter, 2012; Liu and Ngo, 2014; Çolak, Gungoraydinoglu, and Öztekin, 2018).

The global financial crisis (GFC) in 2007-2008 prompted unprecedented capital injections into financial institutions worldwide, which resulted in significant fiscal costs. There is a general consensus that if appropriate financial regulation and supervision of the financial markets and financial institutions had been imposed prior to or during the GFC, then the degree of uncertainty and the economic impact would have been less severe. Therefore, it is essential to investigate whether unclear and delayed policy decisions by central banks, regulators, and governments are related to future capital shortages (or shortfalls) on the part of economic agents in the event of a new crisis.

In this paper, we shed light on the relationship between policy-related uncertainty and the expected capital needs of financial firms in the event of a future crisis. Our research objectives spring from the works by Gulen and Ion (2016) and Nguyen and Phan (2017), who document a negative relation between policy uncertainty and US firm-level investments and mergers and acquisitions, respectively. However, the availability of capital is a prerequisite for these corporate actions. If policy uncertainty contributes to an increase in the capital shortage, firms will postpone or revoke their investments and acquisitions. In this study, we provide further evidence about the economic channel that links policy uncertainty and corporate actions. As we show, our study further extends the work of Gungoraydinoglu, Çolak, and Öztekin (2017) by providing empirical evidence of the relationship between a firm's capital availability and policy uncertainty. They identify the financial intermediation channel between a firm's investment, leverage, and cash management policies and policy uncertainty, and they find that at uncertain times the cost burden of a firm will be higher. We take a step back, and by establishing a link between a firm's available capital and increasing policy uncertainty, we argue that during such times the available capital is lower than expected.

We may summarize our main contribution and the novelty of our approach as follows: First, we provide international empirical evidence on the relation between economic policy uncertainty and a firm's capital shortfall in the event of a new financial crisis. While most of the related literature regarding policy uncertainty focuses on only the US, we endeavor to provide a global analysis by investigating 1,162 firms in five regions. Second, we seek to expand the research focus by investigating the importance of policy uncertainty in five financial sectors, whereas the majority of the prior literature focuses on either banks or non-financial firms. This represents an important contribution because non-bank financial firms that operate in multiple countries are less regulated, although they do contribute to the systemic risk (e.g., the US government rescued AIG with a $182 billion bailout). Third, by decomposing the capital shortfall, we aim to show that economic policy uncertainty exerts a greater effect on the systemic component than on the leverage component, which points to pronounced effects during economic downturns due to the interconnectedness of financial firms. Fourth, we aim to establish the economic mechanism through which global economic policy uncertainty affects the capital shortfall. Finally, we argue that policy uncertainty can exert a significant positive long-term impact on the capital shortfall of up to two years in duration in the case of a new crisis.

We employ an international dataset and consider all types of financial firms. In this way, we are able to explore which types of financial firms and which regions are more affected in the case of a new financial crisis and under which circumstances the effect will be minimal. To the best of our knowledge, this represents the first attempt to examine the effect of global policy uncertainty on financial firms' capital shortfall. To quantify this relationship, we employ Davis's (2016) global economic policy uncertainty (*GEPU*) index as a measure of policy uncertainty globally and the systemic risk (*SRISK*) indicator proposed by Acharya, Engle, and Richardson (2012) and Brownlees and Engle (2016) as a measure of capital shortfall. The *GEPU* index is a gross domestic product (GDP)-weighted average of Baker, Bloom, and Davis's (2016) national news-based indices, which capture uncertainty due to economic policy decisions, while the *SRISK* indicator is a market-data-based risk measure, which calculates the expected capital shortfall conditional on a severe market downturn and is an increasing function of systemic risk and leverage.

We briefly summarize our key findings. We confirm a positive and significant (both statistically and economically) relation between the *GEPU* index and the *SRISK* indicator, and this relation holds for all financial sectors and geographical regions. We also quantify the rise in the capital shortfall if governments and policymakers are not decisive and swift to act during a crisis period. Our findings indicate that a one-standard-deviation increase in the *GEPU* index is associated with a $205 billion increase in the capital shortage at the end of 2016 in the case of a systemic event. To put these amounts into perspective, the Capital Purchase Program used $205 billion from the funds of the Troubled Asset Relief Program, which amounted to $700 billion. Furthermore, a 100% increase in policy uncertainty is related to a 17.6% increase, on average, in the capital shortage, which corresponds to $528 billion in additional capital at the end of 2016. This is a significant finding, as the *GEPU* index increased by 119% after the 9/11 terrorist attacks and by 92% twice, first during the GFC of 2008 and then following the US presidential elections in 2016.

It is worth mentioning that our results withstand a battery of alternative specifications, subsample analyses, and robustness tests. First, we take into account the potential omitted variable bias by including the relevant sets of control variables for the market and macroeconomic conditions as well as for the different sources of uncertainty. Second, we employ an instrumental variable analysis, placebo tests, and exogenous shocks to identify the exogenous variation in economic policy uncertainty and to mitigate concerns about endogeneity and possible reverse causality. Finally, we analyze the effect of global economic policy uncertainty on the regional capital shortfall, as per types of financial firms, market threshold declines, and capital shortfall severance. We also consider well-capitalized firms and alternative regression specifications.

The remainder of this paper is organized as follows. Section 2 reviews the relevant empirical literature, while Section 3 describes the dataset and the empirical methodology we employ to investigate the relationship between policy uncertainty and the capital shortfall. Section 4 provides empirical evidence in support of the view that policy uncertainty matters, while Section 5 establishes the channel through which economic policy uncertainty affects the capital shortfall. In Section 6, we present the tests used to mitigate endogeneity concerns, and in Section 7, we present the sensitivity analyses and robustness tests. Finally, Section 8 concludes the paper.

## 2. Literature review

### 2.1 Economic policy uncertainty

Uncertainty, whether political or impact, affects the environment in which firms and households operate.[3] A well-developed strand of the literature shows that policy uncertainty, which arises not only from the uncertainty stemming from elections and political instability, but also from the actions of policymakers, can have long-lasting effects on the stock and bond markets as well as on the real economy. Pástor and Veronesi (2012, 2013) develop a theoretical model that explains the relation between policy uncertainty and stock prices, and they show that changes in government policy lead to substantial price declines. Naturally, the option markets and bond markets are affected as the price, tail, variance risk (Kelly, Pástor, and Veronesi, 2016), and corporate spreads all increase (Waisman, Ye, and Zhu, 2015). Baker, Bloom, and Davis (2012, 2016) and Azzimonti (2018) show that periods of high uncertainty (policy or political) adversely impact gross investment, industrial production, employment, and therefore, the real economy.

The main mechanism, as identified in the literature, through which uncertainty affects the real economy is via corporate decisions such as investments, dividend policies, leverage adjustments, and mergers and acquisitions. In his research on cyclical investment fluctuations, Bernanke (1983) shows that in periods of high uncertainty, companies postpone investments,

[3] Pástor and Veronesi (2012) define two types of policy uncertainties that affect stock prices. The first is political uncertainty, and it arises because firms and households do not know whether a government will continue to implement current policies in the future (e.g., tax policy). The second one is impact uncertainty, which is related to the impact that the new policies will have on the economy.

especially if the project is irreversible, or if high costs will arise from firing workers or canceling the project, while they implement investments following the end of the uncertainty period.[4] More recently, Stokey (2016) develops a model of tax policy and business fixed investments, and she shows that firms adopt a wait-and-see policy when the uncertainty of the implemented tax reforms is high, while they implement their projects when the uncertainty is resolved. Gulen and Ion (2016) provide evidence in support of the notion that policy uncertainty can serve to depress corporate investment by inducing precautionary delays due to the irreversibility of investments. The authors attribute a 10% decrease in capital investments during the recent GFC to the increase in policy uncertainty. The effect on dividend policies is examined by Buchanan, Xuying Cao, Liljeblom, and Weihrich (2017), who show that before an expected tax increase, dividend policies are revised, which leads to increased dividend amounts in the year prior to the tax increase. Çolak, Gungoraydinoglu, and Öztekin (2018) find that the leverage adjustment of firms' delays when uncertainty is high, as well as the time needed to minimize the gap between firms' actual and optimal capital structures, double during periods of elevated uncertainty. Finally, policy uncertainty affects mergers and acquisitions negatively, in addition to increasing the time required to complete them (Nguyen and Phan, 2017; Bonaime, Gulen, and Ion, 2018).[5]

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[4] Nowadays, politicians recognize the effect of policy uncertainty on firms' investments. Chancellor Philip Hammond, while analyzing the negotiations between the EU and the UK regarding their post-Brexit relation, said that "It is absolutely clear [to] businesses where they have discretion over investment, where they can hold off, are doing so - you can understand why … They are waiting for more clarity about what the future relationship with Europe will look like" (http://www.bbc.com/news/business-40623473).

[5] Isolating the political component of policy uncertainty, Julio and Yook (2012, 2016) find that during election years, there is a 4.8% decrease in investments and a significant drop in foreign direct investments. The decrease is more pronounced when the outcome of the election is unpredictable and the country's institutional level is low. Similarly, gubernatorial elections and the political turnover affect initial public offering (IPO) activity (Çolak, Durnev, and Qian, 2017) and corporate investments (An, Chen, Luo, and Zhang, 2016), respectively. Financial intermediation costs also contribute to the effect of political uncertainty on corporate activities. Gungoraydinoglu, Çolak, and Öztekin (2017) simultaneously analyze financing, investment, and cash policies, and they report a decrease in leverage levels and corporate security offerings when firms are exposed to policy uncertainty. Their findings confirm that during policy-related uncertain times, firms experience difficulties raising external capital.

Bank credit growth is another important channel through which policy uncertainty affects the real economy, corporate firms, and financial institutions. Bordo, Duca, and Koch (2016) show that high levels of policy uncertainty slowed banks' loan growth and decreased the annual loan growth by an average of 2.5% from 2007 to 2013. This effect is more pronounced for larger, lower capitalized, and less liquid banks. Similarly, Lee, Lee, Zeng, and Hsu (2017) focus on the leverage decisions of financial institutions, and they find that uncertainty has a negative short-term effect on the leverage decisions of financial institutions, although it has a positive long-term effect. Tightening credit conditions often impact firms' cost of capital, and Francis, Hasan, and Zhu (2014) document a 5% increase in the loan price during the period from 1990 to 2010.

More importantly, the stability of the entire financial system is at risk during periods of high policy uncertainty. Bank failures are more likely to occur following gubernatorial elections (Liu and Ngo, 2014), while bailouts are unlikely to happen during election years (Dam and Koetter, 2012). Governments are more likely to bail out banks after elections, since politicians are reluctant to act before the elections due to the political costs associated with firm failures (Brown and Dinc, 2005). Similarly, electoral cycles, as well as the power and the ideology of the government, can affect the stability of the banking sector, as shown by Eichler and Sobański (2016), who study the relationship between national politics and the distance-to-default for Eurozone banks. Their findings suggest that the impact of national political factors on banks' stability is much more pronounced for large and weakly capitalized banks. Large banks are typically too big to fail and thus strongly rely on governmental support during periods of distress. Conversely, highly capitalized banks are more immune to political uncertainty.

### 2.2 Capital shortfall and systemic risk

A firm is systemically important if its failure contributes to a system-wide failure. Firm failures are more likely to occur during periods of elevated uncertainty because, during such periods, other firms cannot acquire a failed firm due to the aggregate capital shortfall and so cannot resolve the temporary instability (Acharya, Engle, and Richardson, 2012). Motivated by this, Acharya, Engle, and Richardson (2012) and Brownlees and Engle (2016) develop the *SRISK* indicator, which is a market-data-based risk measure that calculates the expected capital shortfall conditional on a severe market downturn and is an increasing function of the systemic risk and leverage.[6]

Due to the multiple dimensions of systemic risk, it is almost impossible for a single measure to capture all its aspects. Acharya, Engle, and Pierret (2014) compare the capital shortfall that is generated by the regulatory stress tests with that generated by the *SRISK* indicator. They show that the rankings of financial institutions based on these two measures are correlated when the required capitalization is a function of the total assets, and hence, they suggest that regulatory stress tests must include a market risk component so as to improve their accuracy. Benoit, Hurlin, and Perignon (2019) compare the *SRISK* indicator and other market-data-based systemic risk measures with the systemic risk-scoring methodology of the Basel Committee of Banking Supervision (2013), and they find that a key advantage of the former is that they can easily be implemented and compared, unlike the regulatory approach, since they are based on publically available data.

Brownlees and Engle (2016) demonstrate that the *SRISK* indicator identified the financial firms with the largest capital shortfalls as early as 2005. These firms were Fannie Mae, Freddie Mac, Morgan Stanley, Bear Stearns, and Lehman Brothers, which all faced substantial financial problems during the recent GFC. Thus, the authors show the importance of their measure as an early warning indicator. Following the onset of the subprime mortgage crisis in 2007, large commercial banks, such as Citigroup, Bank of America, and JP Morgan, join the list of the

[6] Among others, Bisias, Flood, Lo, and Valavanis (2012), Brunnermeier and Oehmke (2012), Hansen (2014), and Silva, Kimura, and Sobreiro (2017) provide extensive surveys of the systemic risk measures.

most important systemic risk contributors. As the crisis deepens (August 2008), this list is extended to include AIG, Merrill Lynch, and Wachovia Bank. Between 2007 and 2009, the US Federal Reserve carried out several recapitalization programs, the most notable and extensive of these being the Troubled Asset Relief Program (TARP). The majority of the financial firms identified above as being major systemic risk contributors received government aid. For example, Freddie Mac and Fannie Mae were seized by the US government and placed under conservatorship, while Wachovia Bank was sold to Citigroup with the help of the Federal Deposit Insurance Corporation (FDIC), which absorbed the losses. Citigroup, Bank of America (which acquired Merrill Lynch), AIG, JP Morgan (which purchased Bear Sterns), and Morgan Stanley all received aid via TARP. Lehman Brothers was the only systemic firm to file for bankruptcy in September 2008. Overall, during the recent financial crisis, the large financial firms with severe capital shortfalls (as proxied by the *SRISK* indicator) were eventually bailed out by governments due to being "too big to fail."

## 3. Data and methodology

Our empirical analysis is based on a monthly panel of 1,162 financial firms, as defined in the Global Industry Classification Standard (GICS).[7] Table 1 presents the definitions of the five financial sectors included in our analysis (Diversified and Regional Banks, Investment Banking and Diversified Capital Markets, Insurance Services, Diversified Financial Services, and Mortgage Real Estate Investment Trusts).

[Insert Table 1 around here]

[7] The GICS is an industry classification developed by MSCI and Standard & Poor's (S&P) for use by the global financial community.

We use the *SRISK* indicator as a measure of systemic risk and the *GEPU* index as a measure of global economic policy uncertainty (henceforth, we use the terms economic policy uncertainty, policy uncertainty, and uncertainty interchangeably). We take a global view by investigating the effect of policy uncertainty on the capital shortfall in the case of a new crisis in five regions (North and South America, Europe, Asia, and Africa). Our sample period (June 2000 to December 2016) is limited to the availability of the *SRISK* data.[8] In the following sections, we provide detailed descriptions of the indices and datasets employed.

### 3.1 Measuring the capital shortfall

Acharya, Engle, and Richardson (2012) and Brownlees and Engle (2016) define $SRISK_{i,t}$ as the capital shortfall of firm $i$ at month $t$ during a systemic event calculated as:

$$SRISK_{i,t} = kDebt_{i,t} - (1-k)\left(1 - LRMES_{i,t}\right)CAP_{i,t} \quad (1)$$

where $k$ is the prudential capital ratio, which is equal to 5.5% for European firms and 8% for non-European ones;[9] $Debt_{i,t}$ is the book value of the debt; $CAP_{i,t}$ is firm $i$'s market capitalization; $LRMES_{i,t}$ is the long-run marginal expected shortfall, which is equal to $1 - e^{(ln(1-d)beta_{i,t})}$; $beta_{i,t}$ is the beta coefficient with respect to the Morgan Stanley Capital International (MSCI) world index, which is estimated using a dynamic conditional beta model (Engle, 2002); and $d$ is the threshold of a six-month market decline (or systemic crisis event), the default value of which is set to -40%. The *SRISK* indicator combines two characteristics that are essential in terms of measuring the capital shortfall: (1) the liabilities and the size of

[8] We wish to thank the V-Lab team members for making the data available on the V-Lab website (https://vlab.stern.nyu.edu/). Since we analyze the global effect of policy uncertainty on firms' capital shortages, we use the GMES database of V-Lab. The database includes only the major global financial firms so as to calculate the expected capital shortfall of a systemically important firm in the event of another crisis.

[9] V-Lab uses a different capital ratio for European firms due to the difference in dividend accounting. For more information about the justification for the different levels of the capital ratio, see Engle, Jondeau, and Rockinger (2015).

the financial institution, and (2) the common shock that affects the financial system through the $LRMES$ term.[10]

Table 2 presents the countries/nations included in our sample, the number of monthly observations, the number of firms, the average market capitalization, and the average quasi-leverage ratio per country.[11] For a firm to be included in our analysis, it must have at least 12 monthly observations of positive *SRISK* (corresponding to the capital shortfall).[12] As mentioned above, our sample is based on 1,162 firms that are divided into five regions: North America (191), South America (75), Europe (407), Asia (463), and Africa (26). Some 25 countries have less than five firms, whereas nine countries/nations (China, France, Hong Kong, India, Italy, Japan, Switzerland, the UK, and the US) have more than 30 firms in our sample. The average quasi-leverage ratio equals 9.70, and it ranges from 1.59 (Curacao) to 48.51 (Slovenia).

[Insert Table 2 around here]

Table 3 (Panel A) presents summary statistics for the global and regional *SRISK* for the full study period.[13] The *SRISK* indicator is reported in millions of USD. At the global level, the average capital shortfall is close to 8,248 million USD, and it ranges from 10 to 105,492 million USD. The total capital shortage need at the end of 2016 is estimated to be close to 3 trillion USD, which reveals the possible economic impact of a financial crisis. There is significant variation among the firms, with the least (most) capital shortage being observed as the 1%

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[10] Following the suggestion of Brownlees and Engle (2016) and Engle, Jondeau, and Rockinger (2015), we only use the positive *SRISK* values, since we want to investigate how policy uncertainty affects the amount of capital that firms will need during a severe market decline. Within this framework, a well-capitalized firm that will not need to raise new capital during severe crises is one for which the $SRISK \leq 0$. In the empirical part of the paper (see Section 7.1.5), we also investigate the effect of policy uncertainty on well-capitalized firms.

[11] The quasi-leverage ratio is defined as: $(book\ value\ of\ Assets - book\ value\ of\ Equity + CAP)/CAP$, where *CAP* is the firm market capitalization.

[12] The *SRISK* indicator is a daily measure of the capital shortfall in the event of a crisis, and we calculate the monthly *SRISK* as the average of the daily observations for each firm. For a firm to be included in our monthly analysis, it must have at least ten daily observations of positive *SRISK*.

[13] To mitigate the effect of outliers, we winsorized all the variables at the 1% and 99% levels.

(99%) quantile equals 10 (105,492). The region that contributes the most (least) to the aggregate capital shortfall is North America (Africa), since the mean capital shortfall is equal to 11,161 (1,376). European firms require more capital than Asian and South America firms. Panel B in Table 3 presents summary statistics of the *SRISK* for the five financial sectors. The average capital shortfall for the Banks, Capital Markets, Insurances, Diversified Financial Services, and Mortgage REITs is equal to 8,786, 12,962, 6,722, 1,737, and 276, respectively. There is significant within variation in the five sectors. For example, the median capital shortfall for the Banks equals 1,665, while the 25% (75%) quantile equals 384 (5,838).

[Insert Table 3 around here]

### 3.2 Measuring policy uncertainty

Relying on political variables to examine the effect of policy uncertainty on the capital shortfall may not be appropriate, since these variables (1) only capture periods of uncertainty around election months, which means that we do not know anything about the level of uncertainty during non-election months; (2) do not quantify the change in uncertainty between periods; and (3) do not capture other events that may be related to policy uncertainty. To this end, we use the *GEPU* index proposed by Davis (2016) to capture the uncertainty that arises not only from the political environment, but also from policymakers themselves. The *GEPU* index is a GDP-weighted average of 18 country-specific *EPU* indices (Australia, Brazil, Canada, Chile, China, France, Germany, India, Ireland, Italy, Japan, the Netherlands, Russia, South Korea, Spain, Sweden, the UK, and the US). Each country-specific index measures the relative frequency of articles published in local newspapers that cover issues regarding the economy (E), policy (P), and uncertainty (U).

Figure 1 plots the *GEPU* index for the period from June 2000 to December 2016. It ranges from 50 to 277, and it shows spikes not only during periods of elections or referenda (e.g., the June 2016 Brexit referendum), but also during periods most likely related to specific policy-changing events (e.g., the Gulf War, 9/11 terrorist attacks, 2008 GFC).[14] Figure 1 also presents the total *SRISK* as the sum of individual firms' *SRISK*. There is a clear positive relation between the two variables, with a correlation coefficient of 0.62 $(t - stat = 11.14)$. Therefore, based on the graphical analysis, there are indications that policy uncertainty and the *SRISK* move in tandem. In the empirical part of this paper (Section 4), we further investigate whether this relation is statistically and economically significant. Panel C of Table 3 presents summary statistics for the *GEPU* index. The average value is equal to 111.01, with a standard deviation of 43.13, and it ranges from 50.26 (July 2007) to 277.09 (November 2016). The minimum value of the *GEPU* index occurs a few months prior to the start of the GFC, while the two highest values coincide with two major political events, namely the Brexit referendum and the US presidential elections.

[Insert Figure 1 around here]

### 3.3 Empirical methodology

Our baseline panel model for testing the effect of policy uncertainty on the capital shortfall is similar to the specification used by Gulen and Ion (2016) and is as follows:

$$SRISK_{i,t} = \alpha_i + \beta_1 SRISK_{i,t-1} + \beta_2 GEPU_{t-1} + \beta_3 SD_{i,t-1} + \delta M_{t-1} + \zeta CAP_{i,t-1} + \eta Crises_t + MNT_t + \varepsilon_{i,t} \quad (2)$$

where $SRISK_{i,t}$ is the natural logarithm of the arithmetic *SRISK* average of firm $i$ in month $t$; $GEPU_{t-1}$ is the natural logarithm of the *GEPU* index in month $t-1$; $SD_{i,t-1}$ represents the annualized standard deviation of firm $i'$s returns in month $t-1$, as provided by V-Lab; $CAP_{i,t-1}$ is the natural logarithm of firm $i'$s market capitalization in month $t-1$, which proxies

[14] Baker, Bloom, Canes-Wrone, Davis, and Rodden (2014) attribute the increase in the *EPU* to secular growth in government and political polarization.

for the firm size (market capitalization is highly correlated with the total assets, rank correlation of 75%); and $\alpha_i$ is the firm fixed effects. We include a set of seasonal monthly dummy variables $(MNT_t)$ to control for the possible seasonality in the capital requirements.[15] $Crises_t$ is a dummy variable that takes the value of 1 for the period from June 2007 to June 2009, and 0 otherwise.[16] The standard errors are clustered at the firm and calendar-month levels to take into account the potential cross-sectional and serial correlation in $\varepsilon_{i,t}$ (Petersen, 2009). Following the work of Gulen and Ion (2016), who investigate the effect of the US *EPU* index on corporate investments, we do not include the time fixed effects in Equation (2), since the *GEPU* index is common for every firm $i$ in month $t$, and hence, the time fixed effects would have mechanically absorbed the effect of the *GEPU* index on the capital shortage. However, to take into account the other factors that may also affect the *SRISK*, we include a set of control variables ($M_{t-1}$) in Equation (2) spanning stock market, macroeconomic, and uncertainty-oriented variables.[17] More specifically, we use three sets of control variables:

1. Firm-specific variables: $SD_{i,t}$ is the annualized standard deviation of firm $i$'s stock returns in month $t$, as provided by V-Lab, and it captures the firm-specific uncertainty. We hypothesize that the standard deviation of the stock returns should be positively related to the *SRISK*, since an increase in the risk coincides with periods of market turbulence (Kelly, Pástor, and Veronesi, 2016). $CAP_{i,t}$ is the natural logarithm of the market capitalization of firm $i$ in month $t$, and it accounts for the different sizes of firms.

[15] More specifically, we include 11 dummy variables in our baseline equation. For example, the dummy variable for January equals 1 if the month is January, and 0 otherwise. Gulen and Ion (2016) use the same procedure to account for seasonality in their dataset.
[16] The crisis period includes: (1) the pre-Lehman Brothers period (from June 2007 to September 2008), which was characterized by the interventions of the central banks; (2) the global crisis period (October 2008 to December 2008); and (3) the aftermath of the global crisis (January 2009 to June 2009), during which the recovery started.
[17] One other possible set of candidate control variables is the balance sheet data. Since these data are suitable for quarterly and yearly analysis, we cannot include them in our baseline model. However, in Equation (2), we add the lag value of the *SRISK* that is, by construction, a function of the total equity, total asset, and debt. Therefore, we have indirectly taken the balance sheet data into account.

2. Market variables: $MKT_t$ is the excess market return of the developed markets. We obtain the market index data from Kenneth French's website. We prefer to use a global stock market index rather than country-specific indices because we want to measure the global systemic effect on the capital shortfall. We hypothesize that when market conditions are positive, the required capital should be lower, since an increase in the market capitalization of firm $i$ is associated with less capital shortage. This hypothesis is in line with the fact that the *SRISK* is a positive function of the market conditions. $SDMKT_t$ is the annualized monthly standard deviation of the developed stock markets index returns. The higher the market risk, the higher the capital needs should be. We also use the $VIX_t$ index, which we obtain from the Federal Reserve Bank of St. Louis, as a market-related uncertainty proxy. The implied volatility index is positively related to the *GEPU* index (Baker, Bloom, and Davis, 2016), and it is negatively related to the quarterly growth rate of the real US GDP (Gulen and Ion, 2016). Hence, the *GEPU* index may not contain additional information to the *VIX* index.
3. Macroeconomic variables: $ADS_t$ is the US business index of Aruoba, Diebold, and Scotti (2009), which measures the economic conditions in real time because it combines weekly, monthly, and quarterly data to estimate the current state of the economy.[18] We calculate the monthly index as the average of the daily index. Positive (negative) values indicate an improvement (deterioration) in the economic conditions. We hypothesize that the relation should be negative, since during economic crises firms will need more capital to cope with the financial problems that they will face. We also use the corporate spread ($Corp\_Spread_t$), which is calculated as the difference between Moody's BBB and AAA US corporate bond yield, as a measure of the financial conditions. We hypothesize that the

[18] We obtain the ADS index from the website of the Federal Reserve Bank of Philadelphia (https://www.philadelphiafed.org/research-and-data/real-time-center/business-conditions-index).

relation should be positive, since higher spread values are associated with worse economic conditions, and hence, with higher capital needs. Finally, we use the difference between the ten-year Treasury constant maturity rate and the three-month Treasury constant maturity rate ($Term_t$) as an alternative proxy for the economic conditions.[19, 20]

Panel D in Table 3 presents the correlation coefficients between the explanatory variables included in Equation (2).

## 4. The effect of economic policy uncertainty on the capital shortfall

### 4.1 The average effect of policy uncertainty on the capital shortfall

Table 4 (Panel A) presents our baseline model results for all the countries for the 2000–2016 period. We consider five specifications of Equation (2) so as to examine whether policy uncertainty contains incremental information over the three sets of control variables described in Section 3.3. Overall, our results show that policy uncertainty is positively and statistically significantly related to the future level of the capital shortfall in the case of a new crisis. As Column (1) of Table 4 shows, when policy uncertainty increases by 100%, the *SRISK* increases by 88.9%. The significance of the coefficient of policy uncertainty remains intact when we include the lagged value of the *SRISK*, even if the coefficient decreases from 0.889 to 0.177 (Column (2)). However, the long-run effect is equal to 1.017 (=0.177/(1-0.826)). Columns (3)–(5) present the results when the control variables are included. With the exception of the

[19] We obtain the data for the corporate and term spread from the website of the Federal Reserve Bank of St. Louis (https://fred.stlouisfed.org/).

[20] All the macroeconomic variables are US-based, as similar data at the global level are not available. However, these variables are appropriate since the US economy affects the global economic conditions, and in this respect, a common global factor affects both national and regional economies. For example, Kose, Lakatos, Ohnsorge, and Stocker (2017) show that positive and negative developments in the US economy affect the global economy, while Kose, Otrok, and Whiteman (2003) demonstrate that a world factor is a source of local variability and hence that there is a world business cycle.

corporate spread, *ADS*, and *SDMKT,* all the variables are statistically significantly related to the capital shortfall.

In Column (5), which presents the results of our baseline model including all the control variables, we observe that the coefficient of policy uncertainty is positive, statistically significant, and equal to 0.176. A 100% increase in policy uncertainty is related to a 17.6% increase, on average, in the capital shortage, given the effect of all the other factors.[21] This increase is statistically and economically significant, since at the end of 2016 the total capital shortage in the case of a crisis period was close to $3,000,000 million. Thus, the 17.6% increase corresponds to $528 billion more required capital. Even a modest increase in the *GEPU* index is related to a significant increase in the capital shortfall. For example, if the *GEPU* increases by one standard deviation or 38.85% $(= 43.13/111.01\ )$, the *SRISK* will increase by 6.84% $(= 0.176\ \times 38.85\%)$, which corresponds to an additional $205 billion in capital in the case of a crisis at the end of 2016. To put these amounts into perspective, the Capital Purchase Program used $205 billion from the funds of the Troubled Asset Relief Program, which amounted to $700 billion.[22] With respect to the control variables, both the firm standard deviation and the term spread are positively related to the future capital shortage, while the global market returns and *VIX* are negatively related. Overall, the effect of policy uncertainty remains intact after the inclusion of the full set of control variables, and it also remains statistically and economically significant.

[Insert Table 4 around here]

A potential concern regarding our results is that the *GEPU* index may capture the effect of general economic uncertainty and not just the effect of policy-related uncertainty. Events

[21] A natural question that arises here is whether the *GEPU* index has ever increased by 100%. The five highest monthly increases in the *GEPU* are: 119% (2001M09: terrorist attacks), 92% (2008M09: GFC), 92% (2016M11: US presidential elections), 85% (2016M6: Brexit referendum), and 64% (2000M11: US presidential elections).
[22] The source for these data is the US Department of the Treasury (https://www.treasury.gov/initiatives/financial-stability/TARP-Programs/bank-investment-programs/cap/Pages/overview.aspx).

such as financial crises, wars, and recessions tend to increase both policy uncertainty and overall macroeconomic uncertainty. To ascertain that the *GEPU* index contains incremental information for the *SRISK* relative to the alternative measures of macroeconomic/financial uncertainty, we enrich our baseline specification with four proxies of uncertainty. First, we employ the real and financial uncertainty measures of Jurado, Ludvigson, and Ng (2015). Second, we employ the financial stress indicator provided by the Office of Financial Research.[23] Finally, to better proxy for the stock market uncertainty, we also consider the stock market return dispersion, which is calculated as the cross-sectional standard deviation ($CSV_t$) of the monthly stock returns. Garcia, Mantilla-García, and Martellini (2014) show that the return dispersion is related to economic uncertainty and also forecasts stock returns.

Our results are reported in Table 4, Panel B. In more detail, Columns (6)–(9) report our results when each competing variable is included one at a time, while Column (10) reports a specification with all the variables. In all cases, the coefficient of the *GEPU* index remains positive and statistically significant, while the majority of the competing uncertainty proxies are insignificant. The *GEPU* effect is very close to our baseline specification, since it ranges from 0.170 to 0.177, and its significance remains intact.

### 4.2 The evolution of the policy uncertainty effect over time

We now take a closer look at how the relationship between policy uncertainty and the capital shortfall evolves over time. To this end, we follow the approach of Gulen and Ion (2016) and extend our baseline model to include further lags between the dependent and independent variables. We run 24 regressions, corresponding to lags 1 through 24 for a two-year horizon, and we plot the coefficients of the lagged *GEPU* (the horizontal axis presents the lags) in Figure

[23] We obtain the data from Professor Ludvigson's website (https://www.sydneyludvigson.com/data-and-appendixes/) and the website of the Office of Financial Research (https://www.financialresearch.gov/financial-stress-index/).

2. All the coefficients are highly statistically significant, with the exception of lag 24. As is apparent from Figure 2, the impact of the *GEPU* on the *SRISK* is hump-shaped, reaching a peak at about 11 months and then steadily declining up to the two-year horizon. More specifically, the coefficient values increase from 0.176 at lag 1 to 0.514 at lag 11 and then steadily decrease to an insignificant value at lag 24. Overall, our results show that policy uncertainty can exert a significant positive long-term impact on the capital shortfall of up to two years in duration in the case of a new crisis.

[Insert Figure 2 around here]

### 4.3 Out-of-sample predictability

The evidence detailed in Sections 4.1 and 4.2 shows that economic policy uncertainty is related to future capital needs and also contains incremental forecasting information relative to other financial and economic factors. Given that our evidence is based on an in-sample regression, a question arises concerning whether or not the predictive power of the *GEPU* index holds in an out-of-sample setting. To this end, we employ the predictive accuracy test of Clark and West (2007) to examine whether policy uncertainty statistically improves the forecasting power of the following benchmark models by including in each of them the lagged *GEPU* index ($GEPU_{t-1}$) and calculating the one-month-ahead prediction errors:

$$SRISK_{i,t} = \alpha_i + \varepsilon_{i,t} \tag{3a}$$

$$SRISK_{i,t} = \alpha_i + \beta_1 SRISK_{i,t-1} + \varepsilon_{i,t} \tag{3b}$$

$$SRISK_{i,t} = \alpha_i + \beta_1 SRISK_{i,t-1} + \beta_3 SD_{i,t-1} + \delta MKT_{t-1} + \zeta CAP_{i,t-1} + \varepsilon_{i,t} \tag{3c}$$

The Clark and West (2007) test statistic is defined as $Adj.\Delta MSPE = \frac{2}{N}\sum_{i,t} PE_{i,t}\left(PE_{i,t} - PE_{i,t}^{EPU}\right)$, where $PE_{i,t}$ is the prediction error of firm $i$ at month $t$ of the benchmark model and

$PE_{i,t}^{EPU}$ is the prediction error of the model that includes the *GEPU* index. The related test statistic is calculated by regressing the quantity $2PE_{i,t}\left(PE_{i,t} - PE_{i,t}^{EPU}\right)$ on a constant with clustered standard errors at the firm and calendar-month levels. For our analysis, we use the first 120 monthly observations and calculate the prediction errors. Then, we consecutively add one month into our sample and repeat the procedure until the end of the sample period.

Table 5 reports the results of the out-of-sample study. The *GEPU* index improves the forecasting power of the benchmark models, since in all cases the prediction error is always lower than that of the benchmark model. More specifically, the adjusted difference in the mean square prediction errors ranges from 0.007 to 0.213, and it is statistically significant at the 1% confidence level. The extended model (Column 3) that includes the *GEPU* index appears superior to the more parsimonious specifications because its average forecasting error is the lowest among all the models considered. To summarize, our results hold not only in sample, but also out of sample, which implies that economic policy uncertainty is a major factor that forecasts the future capital needs of firms in a severe market decline and conveys more relative information about the capital shortfall than other economic and financial variables.

[Insert Table 5 around here]

## 5. How does policy uncertainty affect the capital shortfall?

In this section, we seek to reveal the mechanisms by which policy uncertainty increases the future level of the capital shortfall in the event of a severe market decline. To address this issue, we follow two approaches. The first approach stems from the calculation of the capital shortfall and its decomposition into its components, namely (a) systemic risk and (b) leverage. The second approach is more economically intuitive and relates to the decrease in private investments and profitability of firms during periods of high policy uncertainty.

### 5.1 Capital shortfall components and policy uncertainty

Kelly, Pástor, and Veronesi (2016) and Pástor and Veronesi (2012, 2013) show that an increase in policy uncertainty is negatively (positively) related to stock prices (volatility). This effect is expected to spill over to the markets (Scheffel, 2016) and to generate a systemic event. Therefore, an increase in policy uncertainty is associated with a decrease in stock prices, and since the *SRISK* indicator is a market-based measure and a function of the market decline, it is also expected to increase. Moreover, Lee, Lee, Zeng, and Hsu (2017) explore the long- and short-term effects of policy uncertainty on the leverage decisions of financial institutions, and they show that the long-term (short-term) economic policy uncertainty is positively (negatively) related to the leverage ratio. They point out that financial institutions prefer to reduce their leverage ratio in an effort to deal with short-term instability, while they increase it in response to long-term uncertainty so as to achieve their long-term goals (e.g., to increase their profits). Since the *SRISK* is a positive function of the leverage ratio, the long-term component of policy uncertainty will increase the capital shortfall.

To shed light on the driving forces behind the capital shortfall increases, we decompose the *SRISK* indicator into the following two components: (a) systemic risk and (b) leverage risk. More specifically, we employ the following alternative definition/decomposition of *SRISK* = $k\left(LVG_{i,t} * CAP_{i,t} - CAP_{i,t}\right) - (1-k) * CAP_{i,t} * \ e^{(ln(1-d)*Beta_{i,t})}$. The first part is the natural logarithm of the leverage risk component $\left(COMP1_{i,t} = k\left(LVG_{i,t} * CAP_{i,t} - CAP_{i,t}\right)\right)$, while the second part is the negative of the natural logarithm of the systemic risk component $\left(COMP2_{i,t} = -(1-\mathrm{k}) * \mathrm{CAP}_{\mathrm{i,t}} * \ \mathrm{e}^{(\ln(1-\mathrm{d})*\mathrm{Beta}_{\mathrm{i,t}})}\right)$. We estimate our baseline specification (Equation 2) by replacing the *SRISK* with its two components, and we present our findings in

Table 6. For both components, the effect of the *GEPU* index on the *SRISK* is positive and statistically significant. When policy uncertainty increases by 100%, the leverage component increases by 1%, while the systemic risk component increases by 3.7%. Therefore, both components contribute to the increase in the capital shortfall, with the effect of the systemic risk being more economically important.

[Insert Table 6 around here]

### 5.2 Profitability, investment and policy uncertainty

To explore whether the impact of economic policy uncertainty on the capital shortfall is driven by firm profitability and/or investment, we re-estimate our baseline specification, i.e., equation (2), by adding two interaction terms. The first is the (lagged) interaction term between economic policy uncertainty and firms' equity to assets ratio *(ETA)* proxying for firm level investment.[24] The second is the (lagged) interaction term between economic policy uncertainty and firms' return on equity *(ROE)* proxying for firm level profitability. We do not include the main terms of these two variables (*ROE* and *ETA)* in the model because they are highly collinear with the relevant interaction terms. We estimate two variants of this model, one at the global level by employing the *GEPU* index and one at the country-specific level by employing the country-level (local) *EPU* (*LEPU*).[25]

Our results (reported in Panel A of Table 7) show that both interaction terms are statistically significant and bear a negative sign, as expected, irrespective of whether we employ the *GEPU* or the *LEPU*. The marginal effects of the *ETA* and *ROE* (-0.027 and -0.004,

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24 The rationale behind employing equity capital as a proxy for firm investment is that via equity increases, firms finance new investment. These equity increases can be funded by retained earnings, new public equity issuance and/or government subsidies.

25 The country-specific indices are available for Australia, Brazil, Canada, Chile, China, France, Germany, Italy, Spain, Hong Kong, Mexico, India, Ireland, Japan, S. Korea, Netherlands, Russia, Singapore, Sweden, the UK, and the US.

respectively, reported in Panel B) reveal that the impact of economic policy uncertainty running through firms' investment is more pronounced than that running through profitability.

[Insert Table 7 around here]

## 6. Tests to mitigate endogeneity concerns

Does global economic policy uncertainty affect the capital shortfall or is the relation reversed? To put it differently, do the market conditions underlying the *SRISK* calculation affect the economic policies regarding taxes, interest rates, regulation frameworks, and unemployment? The answers to these questions will reveal the importance of economic policy uncertainty and also alleviate any concern that the elevated capital shortfall created during a crisis period can itself lead to policy uncertainty. To address these issues, we (a) conduct an instrumental variable analysis and placebo tests and (b) employ exogenous shocks.

### 6.1 Instrumental variable analysis and placebo tests

An appropriate instrument should be significantly related to economic policy uncertainty and only affect capital shortfall through that relation. We consider two variables to serve as instruments in this regard, namely (a) the migration fear index and (b) the partisan conflict index (Azzimonti, 2018).

The migration fear index measures the migration-related fears in France, Germany, the UK, and the US. It measures the relative frequency of articles published in local newspapers with at least one term from each of the following categories: migration (M) and fear (F). We use the average value of the four local indices to construct the migration fear index (*MFEAR*).[26] The migration fear index may serve as a useful instrument because "The recent influx of

[26] We obtain the data for the migration fear index from the Economic Policy Uncertainty website (http://www.policyuncertainty.com/immigration_fear.html). Since these indices are calculated every quarter, we perform a linear extrapolation to generate the monthly indices.

refugees to Europe has stoked security fears and created anxiety about the social and economic consequences."[27] Migration fear is related to economic policy uncertainty (the in-sample correlation coefficient is equal to 0.45), since it has an effect on labor markets, housing markets, schooling, social services, and government spending (Borjas, 2003; Card, 2005; Boeri, De Phillippis, Patacchini, and Pellizzari, 2015). Thus, it leads to economic policy changes. Therefore, the first condition necessary for the *MFEAR* index to be relevant as an instrument is met. As for the second condition, it is not apparent how the increased fear of immigration can directly force firms to increase their capital.

The partisan conflict index (Azzimonti, 2018) measures the political disagreement among US politicians at the federal level.[28] The index is constructed through keyword searches of major US newspapers, and it tracks lawmakers' disagreements about policy both within and between political parties. The higher the values of the index, the greater the conflict in the US political scene. According to the Federal Reserve Bank of Philadelphia, the index "tends to increase near elections and during debates over such contentious policies as the debt ceiling and health-care reform." Partisan conflict is related to economic policy uncertainty (the in-sample correlation coefficient is equal to 0.54) because it renders the legislation process more difficult. During periods of high political polarization, the government becomes dysfunctional and policy changes become unpredictable (Groseclose and McCarty, 2000; McCarty, Poole, and Rosenthal, 2006; McCarty, 2012). Thus, the first condition necessary for the index to be relevant as an instrument in our research is satisfied. As for the second condition, it is not apparent how US partisan conflict can directly drive the global *SRISK*.

[27] https://voxeu.org/article/immigration-fears-and-policy-uncertainty.
[28] We obtain these data from the website of the Federal Reserve Bank of Philadelphia (https://www.philadelphiafed.org/research-and-data/real-time-center/partisan-conflict-index).

As previously stated, the direct effect of conflicts within or between political parties renders the legislative process more difficult and also creates concerns and uncertainties about expected or unexpected changes in economic policies. Therefore, the uncertainty regarding policies created through partisan conflict might not affect the *SRISK* and its components directly, but rather through its effect on policy uncertainty. Thus, the exclusion condition is also satisfied. Even though our study is global in nature, due to the lack of relevant data for other countries, we use the partisan conflict index that refers to the US political environment. We believe that this strengthens our choice of an instrumental variable because it is not certain that the political disagreements in the US would directly affect the capital shortfalls of firms in other countries. Yet, the decision to use the US partisan conflict index may give rise to a question regarding its validity as an instrument, since it could be influenced by business cycles in the US and thus by the global capital shortfall when the US market is included. To address these concerns, we consider two specifications: one including all the firms and the second excluding the US firms.

Following the approach of Bonaime, Gulen, and Ion (2018), we implement a two-stage instrumental variable approach involving a time-series regression in the first stage and a panel regression in the second stage. This approach addresses the overstated correlation between the endogenous variable and its instrument, since these variables do not vary cross-sectionally. The standard errors of the first stage regression are Newey and West (1987) adjusted. In Panels A, B, and C of Table 8, we present the results of the first- and second-stage regressions by using the migration fear index, the partisan conflict index, and the partisan conflict index, respectively, with the latter excluding the US firms. For the first-stage regression employing the migration fear index (Panel A), the $\beta_1$ coefficient is 0.136, and it is statistically significant at the 5% level. Hence, the regression confirms the expected positive and significant effect of the migration fear index on the *GEPU* (the F-statistic of the regression equals 15.76). The relevant first-stage regression results for the partisan conflict index (Panels B and C) show that the inclusion or exclusion of the US firms does not affect our results, since in both cases the $\beta_1$ coefficient is positive and statistically significant.

To capture the exogenous variation in policy uncertainty, we re-estimate the average effect of global economic policy uncertainty on the capital shortfall by using the natural logarithm of the fitted values ($\widehat{GEPU}$) from the first-stage regression in each case. The standard errors of the second-stage regressions are bootstrapped (500 replications) because we use estimated regressors. The second-stage regression for the $MFEAR$ shows that the coefficient of the fitted $\widehat{GEPU}$ equals 0.167 and is highly statistically significant. Similarly, in both cases in which the partisan conflict index is employed, the impact on the capital shortfall remains positive, statistically significant, and of a similar magnitude to our baseline specification.

[Insert Table 8 around here]

To further alleviate concerns about endogeneity and the potentially spurious relationship between the *GEPU* index and the *SRISK* indicator, we conduct a series of placebo tests by following the approach of Berger, Guedhami, Kim, and Xinming (2018). We construct the $\widetilde{GEPU}$ by randomly selecting values without replacement from the original series of the $GEPU$. Then, we estimate the regression coefficients by using 100 different samples from the random $\widetilde{GEPU}$. In Panel D of Table 8, we present the relevant results. Based on these 100 samples, the average coefficient estimate on the *GEPU* is -0.002. More importantly, in only two of the 100 samples is the coefficient positive and statistically significant at the 5% level. In general, the results support our intuition and show that the $\widetilde{GEPU}$ is not statistically significantly related to the *SRISK*.

### 6.2 Employing exogenous shocks

In this section, we employ exogenous shocks that plausibly affect economic policy uncertainty, but do not directly affect the capital shortfall. These shocks stem from the political and/or social environment of the various countries worldwide. They impact economic policy uncertainty either at the global (*GEPU*) or the country-specific level (*LEPU*), which in turn impacts the capital shortfall of firms. We focus on both the global *EPU* and the country-level (local) *EPUs*. For the *GEPU*, we consider the following (cardinal) variables at the country-year level that serve as exogenous shocks: (i) the number of general strikes, which take values from 1 to 13, and zero otherwise; (ii) the number of purges, which take values from 1 to 4, and zero otherwise; and (iii) the number of riots, which take values from 1 to 28, and zero otherwise. For the *LEPU*, we consider the following (cardinal) variables: (i) the number of government crises, which take values from 1 to 4, and zero otherwise; (ii) the number of major cabinet changes, which take values from 1 to 3, and zero otherwise; and (iii) the number of changes in the effective executive, which take values from 1 to 3, and zero otherwise.[29] We employ in equation (2) the interaction term between the natural logarithm of (1+exogenous shock) and the *GEPU* or *LEPU*, respectively, for each one of the aforementioned shocks. The coefficient of each interaction term captures the incremental impact of economic policy uncertainty (*GEPU or LEPU)* on the capital shortfall for the treated group relative to the control group.

Table 9 reports the results using our quarterly level dataset. Panel A shows the results for *GEPU*, whereas Panel B shows the results for the country-specific policy uncertainty index *(LEPU)*. The coefficients for the interaction terms for *GEPU* and *LEPU* are positive and, in

[29] We obtain these data from the Cross-National Time-Series Data Archive (CNTS). The CNTS is a database comprised of more than 200 years of annual data (from 1815 onward) for over 200 countries and covering political, legislative, and economic matters, as well as domestic conflict events (terrorism/guerrilla warfare, assassinations, general strikes, major government crises, anti-government demonstrations, revolutions, riots, and purges).

almost all cases, statistically significant thus providing strong support for the causal effect of economic policy uncertainty on the capital shortfall of firms.

[Insert Table 9 around here]

## 7. Sensitivity analysis and further robustness tests

In the following sections, we further analyze the effect of global economic policy uncertainty on the capital shortfall regionally, per type of financial firm, market threshold decline, and capital shortfall severance. We also consider well-capitalized firms and alternative regression specifications.

### 7.1 Sensitivity analysis

#### *7.1.1 The regional effect of global economic policy uncertainty*

Based on our findings, we may question whether our results are attributed to a specific geographic region, or global policy uncertainty affects all regions equally. We expect a similar effect across all regions because most financial corporations operate in several countries, while the importance of regional risk has decreased over time, as markets have become more integrated (Bekaert, Hodrick, and Zhang, 2009). We further expect that economic policy uncertainty spillovers occur across countries, as shown by Klößner and Sekkel (2014). Following the approach of Klößner and Sekkel (2014), we calculate the Diebold and Yilmaz (2009) spillover measure for the country-specific $LEPU$ indices. The spillover index is estimated to be 65.69%, thereby providing evidence in favor of the existence of policy uncertainty spillover effects among countries. We also re-estimate Equation (2) by including regional dummy variables for four regions (South America, Europe, Asia, and Africa), keeping North America as the base group, and the relevant interaction terms between these regional dummy variables and the $GEPU_{t-1}$. Table 10 (Panel A1) presents the corresponding results. As is quickly apparent, the interaction terms are statistically insignificant, with the only exception being the relevant term for Europe, which is statistically significant at the 10% level, indicating that the effect of the *GEPU* on the *SRISK* is similar across all regions.

[Insert Table 10 around here]

*7.1.2 The effect of policy uncertainty on the financial sectors*

Baker, Bloom, and Davis (2016) note that policy uncertainty matters significantly in relation to the defense, finance, healthcare, and construction sectors. Hence, it also matters in terms of determining the capital shortfall of other non-bank companies. We use the GICS to examine whether policy uncertainty affects the capital shortfall equally for all the financial sectors. Thus, we include four industry dummy variables in Equation (2) (Capital Markets, Insurances, Diversified Financial Services, and Mortgage REITs), keeping Banks as the base group, and keeping the relevant interaction terms between these industry dummy variables and the $GEPU_{t-1}$ consistent.

Panel A2 in Table 10 reports the relevant findings. As the results suggest, the impact of policy uncertainty on three sectors, namely Capital Markets, Insurances, and Diversified Financial Services, is similar to that on Banks, since the relevant interaction terms are statistically insignificant. In turn, the impact of uncertainty on Mortgage REITs is almost double that seen in the case of Banks. This could be attributed to a possible large decline in real estate prices in the event of a crisis.

*7.1.3 Does the market decline threshold matter?*

The threshold for a six-month market decline is set as -40%, following the work of Acharya, Engle, and Richardson (2012) and Engle, Jondeau, and Rockinger (2015). Brownlees and Engle (2016) set the threshold as -10% for their baseline scenario, and they also use a higher threshold (-20%) to examine the ranking sensitivity of the *SRISK*. Thus, we also consider three more systemic event thresholds (-10%, -20%, and -30%) to investigate whether policy uncertainty also affects the capital shortfall in the case of a less severe market decline.

Panel B1 of Table 10 presents the results of Equation (2) for the different crisis levels. Column 1 presents the results of our baseline scenario (a 40% decrease in the market), which can also be seen in Table 4 (Column 5). The overall results indicate that irrespective of the severity of the market decline, an increase in policy uncertainty is related to an increase in the capital shortfall. Hence, policy uncertainty is a significant factor in relation to the stability of the financial system. To explore whether the coefficient of the GEPU differs across the different columns in Panel B1, we conduct a coefficient difference test. Panel B2 in Table 10 reports the results of the Z-test of the equality of the coefficients between the different market decline thresholds: -40% vs. -30%, -40% vs. -20%, -40% vs. -10%, -30% vs. -20%, -30 vs. -10%, and -20% vs. -10%. In all cases, the differences are not statistically significant and thus the effect of global economic policy uncertainty on capital shortfall is statistically the same across alternative market decline thresholds. However, economic significance increases substantially with the decline of the stock market. For example, a 100% increase in economic policy uncertainty corresponds to around $321 billion additional capital at the end of 2016 in the event of a 10% market decline. In the event of a 40% market decline this figure increases to $528 billion.

*7.1.4 Capital shortfall severance and policy uncertainty*

Does the relation with global economic policy uncertainty remain intact for lower or higher levels of capital shortfall? The answer to this question is important because if the relation changes for different levels of capital shortfall, then the uncertainty that arises from politicians and policymakers will asymmetrically affect the capital shortfall in the case of a new crisis. To examine the effect of policy uncertainty on the capital shortfall levels, we estimate a quantile regression version of Equation (2) for a fine grid of quantiles ranging from the $10^{th}$ to the $90^{th}$

quantile. Following the approach of Parente and Santos Silva (2016), we compute the standard errors that are asymptotically valid under conditions of heteroskedasticity and intra-cluster correlation. Table 10 (Panel C) presents the results for the firms with the least (10% quantile of the *SRISK*) to the most (90% quantile of the *SRISK*) capital shortfall. The overall results are in line with the previous evidence. Irrespective of whether the firm has the most or the least capital shortfall, policy uncertainty is positively related to the firm's future required capital needs. For all the quantiles, the coefficient of the *GEPU* is positive, with an average value of 0.115, and statistically significant. For the median (50%) quantile, the coefficient is equal to 0.106, and it is lower than the benchmark least squares case of 0.176, which points to a negatively skewed distribution of the capital shortfall. The coefficients decrease monotonically (from 0.220 to 0.050), implying that at low (high) levels of capital shortfall, the importance of economic policy uncertainty is higher (lower).

The percentage increase in the capital shortfall for the firms with the least capital shortage, which is associated with a one-standard-deviation increase, is 8.55% $(= 0.220 \times 38.85\%)$. A different picture emerges when we examine the effect on the most important systemic firms. In this case, a one-standard-deviation increase in policy uncertainty is associated with, on average, a 1.94% $(= 0.05 \times 38.85\%)$ increase in the capital shortfall of the most systemic firms. For the financial firms that have the least and the most capital shortfall, statistically the effect of economic policy uncertainty is greater for the least than the ones with the most capital shortfall. However, the economic significance of this effect is reverse. The additional capital that will be required in case of a new crisis due to economic policy uncertainty for the financial firms that have the least capital shortfall ($10^{th}$ quantile) is over \$350 million whereas for the firms with the most capital shortfall ($90^{th}$ quantile) is over \$90 billion. The latter is in accordance with what we would expect intuitively.

*7.1.5 Does policy uncertainty also affect well-capitalized firms?*

Our findings thus far refer to under-capitalized financial firms, which will require additional capital in the event of a new crisis. However, does policy uncertainty also affect well-capitalized firms during a crisis period? In this scenario, we use the absolute value of the *SRISK* of well-capitalized firms to estimate Equation (2), since the *SRISK* is negative for such firms. Table 11 presents our results for well-capitalized firms globally (Panel A), regionally (Panel B), and across different financial sectors (Panel C). As expected, we observe a negative (statistically significant) relationship between economic policy uncertainty and the capital surplus, which implies that an increase in policy uncertainty decreases the capital surplus. Comparing the absolute values of the coefficients of the capital shortfall and the surplus regressions (0.176 vs. 0.094) reveals that the effect of economic policy uncertainty is more pronounced for under-capitalized firms. As in the case of the capital shortfall, there are no differences between the regions, since the coefficients of the interaction terms are insignificant, with the exception of the coefficient for South America (at the 10% significance level). However, when considering the financial industries, we find an overall negative effect equal to -0.118, which is dampened for the Capital Markets, Insurances, and Mortgage REITs by 0.038, 0.052, and 0.043, respectively. Therefore, the combined evidence in Tables 4 and 11 suggests that policy uncertainty during a crisis period matters (1) for under-capitalized firms, which due to their high capital needs will induce systemic instability in the global financial system, and (2) for well-capitalized firms, since such firms are also likely to be short of capital in the future.

[Insert Table 11 around here]

### 7.2 Further robustness checks

We conduct several additional robustness tests. First, we employ additional econometric specifications. More specifically, we re-estimate our baseline model by employing as a dependent variable the last value of the *SRISK* indicator at month $t$ rather than the monthly average (reported in Appendix A, Table A1), in first differences (Table A2), not lagging the

*GEPU* and control variables (Table A3), normalizing the *SRISK* with the related firm market capitalization of firms (Table A4), and finally, at a quarterly frequency employing the total assets in lieu of the market capitalization as a control variable (Table A5).

Second, we address concerns about survivorship bias. In our analysis, we include all the firms available in the V-Lab database without taking into account whether they survived to the end of our sample period or not. It is worth mentioning here that the V-Lab database does not include all the financial firms in operation worldwide. It considers only the major global financial firms so as to calculate the expected capital shortfall of a systemically important firm. To mitigate concerns that our results are affected by this feature of the data, we conduct the following test. We randomly select banks from the sample and then, for those banks, we drop the data from a randomly selected month – different for each bank – from that month until the end of the study period. In other words, we impose a randomly selected removal for some of the bank-month observations as if these banks did not survive. Then, we re-run our baseline specification with this reduced sample and report the results in Table A6. Overall, we repeat this procedure several times and our results remain intact.

Third, we employ country-specific indices (*LEPU*) of economic policy uncertainty rather than the *GEPU*. Since the *GEPU* is a GDP-weighted index, the *LEPU* will also allow us to examine whether the influence of economic policy uncertainty in the major countries drives our results. Table A7 in the Appendix presents the results of our baseline model (Equation (2)) using the *LEPU* of Australia, Brazil, Canada, Chile, China, France, Germany, Italy, Spain, Hong Kong, Mexico, India, Ireland, Japan, South Korea, the Netherlands, Russia, Singapore, Sweden, the UK, and the US. The coefficient of the *LEPU* equals 0.092, and it differs significantly from zero. Its magnitude is reduced, providing additional support for the existence of a spillover effect of policy uncertainty among countries.

Fourth, we take into account the effect of influential countries because our panel is not level by country. Hence, bigger countries are weighted with more firms. We first estimate a weighted panel regression of our baseline model and use as a weight the inverse number of observations from each country. Second, we examine whether there are significant differences between the effects of the *GEPU* on the *SRISK* of the most influential countries according to the number of observations (US, UK, Japan) versus the remaining countries. Panels A and B of Table A8 report the relevant findings. In both cases, there is a significant positive relation between the *GEPU* and the *SRISK* that is similar in magnitude to our baseline results (0.163 and 0.175, respectively). More importantly, the coefficient of the interaction term is not significant, which provides ample evidence that our results are not driven by the effect of the most influential countries.

Finally, we offer an alternative way to address the issue of whether the *GEPU* not only reflects economic policy uncertainty, but is also contaminated with general financial market uncertainty. We apply a two-stage regression approach. In the first stage, we remove the effect of market conditions from the *GEPU* by running the following time-series regression: $GEPU_t = \alpha + \beta X_t + \gamma Crises_t + \dot{\varepsilon}_t$, where $X$ represents the market condition variable. As a proxy for the market conditions, we employ (a) the financial stress indicator of the Office of Financial Research, (b) the real uncertainty index of Jurado, Ludvigson and Ng (2015), and (c) the financial uncertainty index of Jurado, Ludvigson, and Ng (2015). In the second stage, we estimate our baseline specification by substituting $GEPU$ for the residual (*REPU*) from the first-stage regression. Our findings are shown in Table A9. Irrespective of the market condition variable, the results reinforce the notion that it is economic policy uncertainty that affects the capital shortfall. More specifically, when we use the financial stress indicator (Panel A), the coefficient of the *REPU* equals 0.174, which differs significantly from zero. When we use the real uncertainty index (Panel B) and the financial uncertainty index (Panel C), the coefficients decrease slightly in magnitude (0.154 and 0.156, respectively), but they remain statistically significant.

## 8. Conclusions

Political instability and unclear policy decisions affect both the real economy and firms from various perspectives, including capital investments, mergers and acquisitions, and corporate/country spreads. The rigorous analysis in this paper sheds light on another effect of policy uncertainty, namely the effect on the capital shortfall of financial firms in the case of a new crisis. This paper extends the prior literature and provides new empirical evidence of that effect by employing Davis's (2016) *GEPU* index and the *SRISK* indicator proposed by Acharya, Engle, and Richardson (2012) and Brownlees and Engle (2016) as measures of the overall economic policy uncertainty and the capital shortfall, respectively.

Our results indicate a strong positive relationship between policy uncertainty and the future level of the capital shortfall in the case of a severe market decline. We show that a one-standard-deviation increase in the *GEPU* index is associated with a $205 billion increase in the capital shortage in the case of a new crisis at the end of 2016. We also seek to reveal the mechanisms by which policy uncertainty increases the future level of the capital shortfall in the event of a crisis. By decomposing the capital shortfall into its systemic risk and leverage components, we show that economic policy uncertainty has a greater effect on the systemic component than on the leverage component. This finding points to pronounced effects during economic downturns due to the interconnectedness of financial firms. More specifically, when policy uncertainty increases by 100%, the leverage component increases by 1%, while the systemic risk component increases by 3.7%.

Since the prior literature has identified the adverse consequences of policy uncertainty for firms' performance, we further explore whether the transmission mechanism of policy uncertainty occurs via reduced firm profitability and/or investments during periods of high policy uncertainty. The results reveal that the impact of economic policy uncertainty running through investment is more pronounced than that running through profitability.

We also extend the prior literature, which has predominantly focused on policy uncertainty in the US, by providing a global perspective when we analyze 1,162 financial firms across five regions (North and South America, Europe, Asia, and Africa). We document how economic policy uncertainty affects all the financial sectors similarly, with the exception of real estate investment trusts, for which the effect is more than two times higher than the average effect. This finding could be explained by the increased exposure of such companies to policy decisions and economic uncertainty during the crisis periods. Our findings are robust to the potential omitted variable bias, since we include the relevant sets of control variables for market and macroeconomic conditions as well as other sources of uncertainty. To identify the exogenous variation in economic policy uncertainty and to mitigate concerns about endogeneity and reverse causality, we apply an instrumental variable analysis, placebo tests, and an exogenous shocks analysis. The results corroborate our expectations and our main findings.

As we describe in this paper, our results have important policy implications. We unambiguously show that the authorities have to take decisive and prompt action in the case of severe market turbulence. If they allow for any unnecessary delays, then their inactivity could cause additional costs for the economy as a whole. Taking into account the fact that external financing is more difficult to come by during crisis periods, we provide further evidence that during such periods, growing economic policy uncertainty leads to an increase in the capital shortages of financial firms.

We also contribute to the policy-oriented research on the limitations of the capital shortfall. In their recent study, Aikman, Haldane, Hinterschweiger, and Kapadia (2018) argue that one way to avoid capital shortfalls is the implementation of the qualitative elements of the Basel Accord III. One of these recommended elements is the counter-cyclical capital buffer, which takes into account the credit cycle (Basel Committee on Banking Supervision, 2010). In our study, we further identify the *GEPU* as an additional monitoring tool that could be used to detect a potentially elevated capital shortfall. Since the *GEPU* and the *SRISK* are publicly available, it should be relatively easy to use them as additional qualitative elements.

The findings of this study are also undoubtedly important for firms' managers. We provide evidence that during periods of elevated policy uncertainty and a severe market downturn, firms face higher capital requirements than they originally expect. In other words, firms with low capital will face significant distress and the capital shortfalls might not be covered by the markets, since external financing is difficult to arrange during periods of financial turbulence.

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**Table 1.** The Global Industry Classification Standard (GICS).

The table presents the definitions of the firms that are used in our sample divided in 5 different financial sectors, according to the Global Industry Classification Standard (GICS). The Global Industry Classification Standard (GICS) is an industry classification developed by MSCI and Standard & Poor's (S&P) for use by the global financial community. Definitions are provided from https://www.msci.com/gics.

| | |
|---|---|
| | **Banks** |
| **Diversified Banks** | Large, geographically diverse banks with a national footprint whose revenues are derived primarily from conventional banking operations, have significant business activity in retail banking and small and medium corporate lending, and provide a diverse range of financial services. Excludes banks classified in the Regional Banks and Thrifts & Mortgage Finance Sub-Industries. Also excludes investment banks classified in the Investment Banking & Brokerage Sub-Industry. |
| **Regional Banks** | Commercial banks whose businesses are derived primarily from conventional banking operations and have significant business activity in retail banking and small and medium corporate lending. Regional banks tend to operate in limited geographic regions. Excludes companies classified in the Diversified Banks and Thrifts & Mortgage Banks sub-industries. Also excludes investment banks classified in the Investment Banking & Brokerage Sub-Industry. |
| | **Capital Markets** |
| **Asset Management & Custody Banks** | Financial institutions primarily engaged in investment management and/or related custody and securities fee-based services. Includes companies operating mutual funds, closed-end funds and unit investment trusts. Excludes banks and other financial institutions primarily involved in commercial lending, investment banking, brokerage and other specialized financial activities. |
| **Investment Banking & Brokerage** | Financial institutions primarily engaged in investment banking & brokerage services, including equity and debt underwriting, mergers and acquisitions, securities lending and advisory services. Excludes banks and other financial institutions primarily involved in commercial lending, asset management and specialized financial activities. |
| **Diversified Capital Markets** | Financial institutions primarily engaged in diversified capital markets activities, including a significant presence in at least two of the following area: large/major corporate lending, investment banking, brokerage and asset management. Excludes less diversified companies classified in the Asset Management & Custody Banks or Investment Banking & Brokerage sub-industries. Also excludes companies classified in the Banks or Insurance industry groups or the Consumer Finance Sub-Industry. |
| **Financial Exchanges & Data** | Financial exchanges for securities, commodities, derivatives and other financial instruments, and providers of financial decision support tools and products including ratings agencies |
| | **Insurance** |
| **Insurance Brokers** | Insurance and reinsurance brokerage firms. |
| **Life & Health Insurance** | Companies providing primarily life, disability, indemnity or supplemental health insurance. Excludes managed care companies classified in the Managed Health Care Sub-Industry. |
| **Multi-line Insurance** | Insurance companies with diversified interests in life, health and property and casualty insurance. |
| **Property & Casualty Insurance** | Companies providing primarily property and casualty insurance. |
| **Reinsurance** | Companies providing primarily reinsurance. |
| | **Diversified Financial Services** |
| **Other Diversified Financial Services** | Providers of a diverse range of financial services and/or with some interest in a wide range of financial services including banking, insurance and capital markets, but with no dominant business line. Excludes companies classified in the Regional Banks and Diversified Banks Sub-Industries. |
| **Multi-Sector Holdings** | A company with significantly diversified holdings across three or more sectors, none of which contributes a majority of profit and/or sales. Stakes held are predominantly of a non-controlling nature. Includes diversified financial companies where stakes held are of a controlling nature. Excludes other diversified companies classified in the Industrials Conglomerates Sub-Industry. |
| **Specialized Finance** | Providers of specialized financial services not classified elsewhere. Companies in this sub-industry derive a majority of revenue from one specialized line of business. Includes, but not limited to, commercial financing companies, central banks, leasing institutions, factoring services, and specialty boutiques. Excludes companies classified in the Financial Exchanges & Data sub-industry. |
| | **Mortgage Real Estate Investment Trusts (REITs)** |
| **Mortgage REITs** | Companies or Trusts that service, originate, purchase and/or securitize residential and/or commercial mortgage loans. Includes trusts that invest in mortgage-backed securities and other mortgage related assets. |

**Table 2.** National and Regional Characteristics.

The table presents the nations and regions in our sample for which we have data for *SRISK*, as defined in Equation (1). It also presents the number of monthly observations per country, the number of firms per country, the average leverage ratio, market capitalization of firms per country and firms' region. The sample period is from 2000M06 to 2016M12.

| Nation | Obs. | Firms | Leverage ratio | Market capitalization | Region | Nation | Obs. | Firms | Leverage ratio | Market capitalization | Region |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Argentina | 767 | 4 | 11.40 | 3,142 | S. America | Luxembourg | 815 | 7 | 9.44 | 1,391 | Europe |
| Australia | 2808 | 16 | 7.10 | 18,312 | Asia | Malaysia | 2998 | 17 | 6.86 | 3,704 | Asia |
| Austria | 1659 | 12 | 12.96 | 3,809 | Europe | Malta | 321 | 2 | 11.68 | 784 | Europe |
| Bahrain | 102 | 1 | 7.39 | 4,156 | Asia | Mexico | 550 | 5 | 3.99 | 6,919 | S. America |
| Belgium | 2536 | 17 | 11.23 | 4,606 | Europe | Morocco | 559 | 5 | 5.33 | 4,147 | Africa |
| Bermuda | 2291 | 14 | 3.53 | 3,821 | S. America | Netherlands | 1943 | 14 | 14.07 | 9,109 | Europe |
| Brazil | 2429 | 22 | 4.85 | 12,751 | S. America | New Zealand | 135 | 1 | 4.83 | 325 | Asia |
| Canada | 5078 | 28 | 7.97 | 14,537 | N. America | Nigeria | 495 | 3 | 5.86 | 2,398 | Africa |
| Cayman Islands | 153 | 1 | 3.92 | 615 | S. America | Norway | 1516 | 9 | 12.19 | 3,154 | Europe |
| Chile | 2456 | 14 | 4.02 | 2,973 | S. America | Oman | 153 | 1 | 6.20 | 2,778 | Asia |
| China | 7816 | 70 | 5.07 | 15,909 | Asia | Pakistan | 215 | 2 | 6.01 | 2,160 | Asia |
| Colombia | 894 | 7 | 3.58 | 11,325 | S. America | Peru | 799 | 6 | 5.68 | 3,990 | S. America |
| Croatia | 198 | 1 | 8.29 | 2,278 | Europe | Philippines | 1684 | 11 | 3.66 | 2,513 | Asia |
| Curacao | 192 | 1 | 1.59 | 6,482 | S. America | Poland | 2287 | 14 | 6.66 | 3,940 | Europe |
| Cyprus | 411 | 4 | 31.71 | 1,880 | Europe | Portugal | 662 | 4 | 22.40 | 4,227 | Europe |
| Czech | 153 | 1 | 5.41 | 7,126 | Europe | Puerto Rico | 199 | 1 | 13.33 | 3,670 | S. America |
| Denmark | 1137 | 8 | 11.65 | 5,022 | Europe | Qatar | 1370 | 11 | 3.15 | 6,084 | Asia |
| Egypt | 292 | 2 | 5.20 | 2,565 | Africa | Romania | 372 | 2 | 7.05 | 1,647 | Europe |
| Finland | 924 | 5 | 7.96 | 3,951 | Europe | Russia | 791 | 9 | 8.15 | 12,496 | Europe |
| France | 6817 | 47 | 12.73 | 8,796 | Europe | Saudi Arabia | 2172 | 18 | 3.32 | 8,607 | Asia |
| Germany | 4469 | 29 | 19.13 | 8,817 | Europe | Singapore | 3135 | 22 | 3.78 | 5,968 | Asia |
| Greece | 2112 | 13 | 20.67 | 3,015 | Europe | Slovakia | 144 | 1 | 8.85 | 10,945 | Europe |
| Guernsey | 128 | 2 | 14.21 | 3,433 | Europe | Slovenia | 29 | 1 | 48.51 | 64 | Europe |
| Hong Kong | 8009 | 46 | 3.24 | 7,335 | Asia | South Africa | 2732 | 16 | 7.16 | 5,370 | Africa |
| Hungary | 330 | 2 | 9.04 | 3,891 | Europe | South Korea | 2477 | 24 | 10.54 | 4,855 | Asia |
| India | 8264 | 57 | 18.17 | 2,688 | Asia | Spain | 2564 | 19 | 13.32 | 14,647 | Europe |
| Indonesia | 2798 | 19 | 4.61 | 3,452 | Asia | Sweden | 4204 | 23 | 5.55 | 6,436 | Europe |
| Ireland | 682 | 4 | 23.08 | 11,592 | Europe | Switzerland | 5979 | 39 | 9.56 | 9,588 | Europe |
| Israel | 2109 | 12 | 14.44 | 2,103 | Asia | Taiwan | 4052 | 26 | 9.27 | 3,399 | Asia |
| Italy | 5002 | 33 | 16.96 | 7,075 | Europe | Thailand | 2203 | 13 | 8.66 | 3,306 | Asia |
| Japan | 9102 | 56 | 16.79 | 9,533 | Asia | Turkey | 4016 | 24 | 6.65 | 3,507 | Europe |
| Jordan | 626 | 6 | 5.42 | 2,168 | Asia | UAE | 1847 | 13 | 5.21 | 5,109 | Asia |
| Kazakhstan | 208 | 2 | 11.95 | 1,918 | Asia | Ukraine | 238 | 2 | 13.26 | 958 | Europe |
| Kuwait | 1008 | 7 | 5.14 | 5,596 | Asia | United Kingdom | 10157 | 58 | 7.05 | 10,378 | Europe |
| Lebanon | 346 | 3 | 7.17 | 2,432 | Asia | United States | 27048 | 163 | 6.37 | 14,386 | N. America |
| Liechtenstein | 138 | 1 | 12.89 | 1,810 | Europe | Vietnam | 728 | 9 | 4.55 | 1,672 | Asia |

**Table 3.** Descriptive Statistics and Correlation Analysis.

Panel A presents summary statistics for the global and regional *SRISK* for the period from June 2000 to December 2016. It shows the average, standard deviation, minimum, maximum, skewness, kurtosis, and five quantiles of *SRISK*. It also presents the number of observations (N) in our sample. The countries and the regions are described in Table 2. To mitigate the effect of outliers, we winsorized *SRISK* at the 1% and 99%. *SRISK* is priced in millions of USD. Panel B presents summary statistics of *SRISK* for 5 sectors (Banks, Capital Markets, Insurances, Diversified Financial Services and and Mortgage Real Estate Investment Trusts). Panel C presents summary statistics of *GEPU* index. Panel D presents the correlation analysis of the independent variables that we use in our baseline specification. The variables are described in Section 3.3.

| Region | Mean | St. dev. | min | max | skewness | kurtosis | p1 | p25 | p50 | p75 | p99 | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Panel A. *SRISK*** | | | | | | | | | | | | |
| Global | 8248.76 | 17704.67 | 10.12 | 105492.10 | 3.67 | 17.59 | 10.18 | 408.21 | 1728.89 | 6674.39 | 105492.10 | 49,532 |
| North America | 11161.72 | 18224.72 | 10.12 | 105492.10 | 2.88 | 12.40 | 13.77 | 799.96 | 3890.16 | 12630.14 | 99724.83 | 7,809 |
| South America | 2900.41 | 6293.29 | 10.12 | 34466.54 | 3.23 | 13.13 | 10.61 | 167.21 | 573.15 | 1815.93 | 30585.04 | 1,209 |
| Europe | 10406.46 | 20085.93 | 10.12 | 105492.10 | 3.06 | 12.77 | 10.12 | 405.96 | 2294.91 | 9183.90 | 105492.10 | 18,547 |
| Asia | 5824.05 | 15628.67 | 10.12 | 105492.10 | 4.82 | 27.68 | 10.12 | 345.39 | 1285.17 | 3684.68 | 104640.10 | 20,552 |
| Africa | 1376.40 | 2507.51 | 10.12 | 33071.94 | 10.23 | 125.99 | 24.67 | 501.14 | 876.28 | 1681.74 | 5569.78 | 1,122 |
| **Panel B. *SRISK* – Financial Sectors** | | | | | | | | | | | | |
| Banks | 8786.48 | 19678.99 | 10.12 | 105492.10 | 3.45 | 15.03 | 11.18 | 384.27 | 1665.45 | 5838.39 | 105492.10 | 32,083 |
| Capital markets | 12962.45 | 21864.20 | 10.12 | 105492.10 | 2.55 | 9.91 | 10.12 | 552.91 | 2638.57 | 18105.86 | 105492.10 | 3,708 |
| Insurance | 6722.00 | 9554.70 | 10.12 | 69903.29 | 2.29 | 8.86 | 18.57 | 682.05 | 2629.54 | 8594.38 | 43652.90 | 7,585 |
| Diversified Financial Services | 1737.18 | 2427.02 | 10.12 | 11751.68 | 2.14 | 7.23 | 11.56 | 219.42 | 784.076 | 1885.67 | 10938.80 | 1,547 |
| Mortgage REITS | 276.16 | 742.91 | 10.12 | 6067.41 | 6.09 | 43.08 | 10.12 | 22.05 | 81.74 | 282.86 | 5702.38 | 335 |
| **Panel C. *GEPU*** | | | | | | | | | | | | |
| *GEPU* | 111.01 | 43.13 | 50.26 | 277.09 | 1.20 | 5.00 | 52.98 | 79.19 | 104.00 | 134.75 | 272.53 | 199 |

Panel D. Correlation Analysis

| | GEPU | $SD$ | $MKT$ | $SDMKT$ | $VIX$ | $ADS$ | $Corp\_Spread$ | $Term$ | $LN$ CAP |
|---|---|---|---|---|---|---|---|---|---|
| GEPU | 1.00 | | | | | | | | |
| $SD$ | 0.18 | 1.00 | | | | | | | |
| $MKT$ | -0.13 | -0.19 | 1.00 | | | | | | |
| $SDMKT$ | 0.40 | 0.43 | -0.44 | 1.00 | | | | | |
| $VIX$ | 0.40 | 0.42 | -0.34 | 0.88 | 1.00 | | | | |
| $ADS$ | -0.19 | -0.36 | 0.24 | -0.58 | -0.67 | 1.00 | | | |
| $Corp\_Spread$ | 0.30 | 0.39 | -0.08 | 0.65 | 0.75 | -0.73 | 1.00 | | |
| $Term$ | 0.32 | 0.10 | 0.05 | 0.16 | 0.27 | -0.05 | 0.26 | 1.00 | |
| $CAP$ | 0.02 | -0.22 | 0.01 | -0.07 | -0.11 | 0.07 | -0.07 | -0.04 | 1.00 |

**Table 4.** Policy Uncertainty and Capital Shortfall.

Panel A of the table reports the results of our baseline Equation: $SRISK_{i,t} = \alpha_i + \beta_1 GEPU_{t-1} + \beta_2 SRISK_{i,t-1} + \beta_3 SD_{i,t-1} + \delta M_{t-1} + \zeta CAP_{i,t-1} + \eta Crises_t + MNT_t + \varepsilon_{i,t}$. The variables are described in Section 3.3. In Panel B of the table, we include in the baseline specification the financial and macro uncertainty measures (real and financial) of Jurado, Ludvigson and Ng (2015), the Financial Stress Indicator ($FSI$), and the cross-sectional standard deviation of monthly stock returns. Standard errors are clustered at firm and calendar month level. To mitigate the effect of outliers, we winsorized SRISK at the 1% and 99%. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The data are monthly and the sample period is from 2000M06 to 2016M12.

| | Panel A. Baseline specification | | | | | Panel B. Horse race | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| $GEPU$ | 0.889*** | 0.177*** | 0.164*** | 0.154*** | 0.176*** | 0.177*** | 0.177*** | 0.174*** | 0.172*** | 0.170*** |
| $SRISK$ | | 0.826*** | 0.824*** | 0.828*** | 0.821*** | 0.821*** | 0.821*** | 0.821*** | 0.820*** | 0.820*** |
| $SD$ | | | 0.104*** | 0.085*** | 0.093*** | 0.092*** | 0.093*** | 0.092*** | 0.095*** | 0.094*** |
| $MKT$ | | | | -0.007*** | -0.009*** | -0.009*** | -0.009*** | -0.009*** | -0.009*** | -0.009*** |
| $Term$ | | | | 0.013** | 0.020*** | 0.019*** | 0.020*** | 0.020*** | 0.019*** | 0.016** |
| $Corp\_Spread$ | | | | -0.017 | 0.040 | 0.041 | 0.040 | 0.039 | 0.046 | 0.048 |
| $ADS$ | | | | 0.018 | 0.018 | 0.020 | 0.018 | 0.019 | 0.011 | 0.015 |
| $VIX$ | | | | | -0.006*** | -0.007*** | -0.006*** | -0.007** | -0.005** | -0.006** |
| $SDMKT$ | | | | | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| $FINANCIAL$ | | | | | | 0.044 | | | | 0.084 |
| $REAL$ | | | | | | | 0.016 | | | -0.022 |
| $FSI$ | | | | | | | | 0.002 | | 0.001 |
| $CSV$ | | | | | | | | | -0.013** | -0.015** |
| $CAP$ | 0.007 | 0.041*** | 0.054*** | 0.047*** | 0.038*** | 0.038*** | 0.037*** | 0.038*** | 0.035*** | 0.036*** |
| Crises | 0.113* | 0.076*** | 0.053** | 0.088*** | 0.098*** | 0.097*** | 0.098*** | 0.093*** | 0.106*** | 0.101*** |
| Firm fixed effects | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Seasonal (monthly) dummies | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Obs. | 49,292 | 47,306 | 47,306 | 47,306 | 47,306 | 47,306 | 47,306 | 47,306 | 47,208 | 47,208 |
| $R^2$ (within) | 11.43% | 73.68% | 73.74% | 73.96% | 74.03% | 74.04% | 74.03% | 74.03% | 74.01% | 74.02% |

**Table 5.** The Out-Of-Sample Predictive Power of Economic Policy Uncertainty.

The table presents the out-of-sample analysis. We implement the predictive accuracy test of Clark and West (2007) to examine whether the policy uncertainty improves the forecasting power of the following benchmark models: $SRISK_{i,t} = \alpha_i + \varepsilon_{i,t}$ (column 1), $SRISK_{i,t} = \alpha_i + \beta_1 SRISK_{i,t-1} + MNT_t + \varepsilon_{i,t}$ (column 2) and $SRISK_{i,t} = \alpha_i + \beta_1 SRISK_{i,t-1} + \beta_3 SD_{i,t-1} + \delta MKT_{t-1} + \zeta CAP_{i,t-1} + \varepsilon_{i,t}$ (column 3). The variables are described in Section 3.3. The Clark and West (2007) test statistic is defined as: $Adj.\Delta MSPE = \frac{2}{N}\sum_{i,t} PE_{i,t}\left(PE_{i,t} - PE_{i,t}^{GEPU}\right)$, where $PE_{i,t}$ is the prediction error of firm $i$ at month $t$ of the benchmark model, and $PE_{i,t}^{GEPU}$ is the prediction error of the model that includes the *GEPU* index. We obtain the statistic by regressing the quantity $2PE_{i,t}\left(PE_{i,t} - PE_{i,t}^{GEPU}\right)$ on a constant with clustered standard errors at firm and calendar month level. To mitigate the effect of outliers, we winsorized SRISK at the 1% and 99%. The out-of-sample study starts on 2010M06 and we use a recursive sample. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

| | (1) | (2) | (3) |
|---|---|---|---|
| $\overline{PE}$ | 0.414 | 0.037 | 0. 054 |
| $\overline{PE}^{GEPU}$ | 0.246 | 0.010 | 0. 008 |
| $Adj.\Delta MSPE$ | 0.213*** | 0. 007*** | 0.009*** |

**Table 6.** Policy Uncertainty and the Components of SRISK.

The table reports the effect of policy uncertainty on leverage and systemic risk, which are the two components of *SRISK*. $COMP1$ is the natural logarithm of $\text{k}\left(LVG_{\text{i,t}} * cap_{i,t} - cap_{i,t}\right)$, $COMP2$ is the negative of the natural logarithm of $(1-\text{k}) * cap_{i,t} * e^{\left(ln(1-d)*Beta_{i,t}\right)}$, $LVG_{\text{i,t}}$ is the quasi-leverage ratio defined as: $\frac{book\ value\ of\ assets_{i,t} - book\ value\ of\ equity_{i,t} + cap_{i,t}}{cap_{i,t}}$, k is the prudential capital ratio which is equal to 5.5% for European firms and 8% for non-European ones, $beta_{i,t}$ is the beta coefficient with respect to the MSCI World Index, which is estimated by using a Dynamic Conditional Beta model (Engle, 2002, 2009), and $d$ is a threshold of a six month market decline (or systemic crisis event) and its default value is set to -40%. The other variables are described in Section 3.3. Standard errors are clustered at firm and calendar month level. To mitigate the effect of outliers, we winsorized SRISK at the 1% and 99%. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The data are monthly and the sample period is from 2000M06 to 2016M12.

| | Leverage Component | Systemic Risk Component |
|---|---|---|
| $GEPU$ | 0.010** | 0.037*** |
| $COMP1$ | 0.959*** | |
| $COMP2$ | | 0.713*** |
| $SD$ | -0.015** | 0.108*** |
| $MKT$ | 0.001** | -0.005*** |
| $Term$ | 0.002** | 0.000 |
| $Corp\_Spread$ | 0.010*** | -0.023 |
| $ADS$ | 0.009*** | -0.019* |
| $VIX$ | -0.001 | -0.001 |
| $SDMKT$ | 0.000 | 0.000 |
| $CAP$ | 0.016*** | -0.240*** |
| Crises | 0.019*** | -0.002 |
| Firm fixed effects | yes | yes |
| Seasonal (monthly) dummies | yes | yes |
| Obs. | 47,306 | 47,306 |
| $R^2$ (within) | 96.37% | 93.65% |

**Table 7.** Policy Uncertainty and Capital Shortfall: Profitability or Investment?

The table explores whether the impact of economic policy uncertainty to capital shortfall is driven by changes in profitability and investment. We re-estimate Equation 2 (Panel A) by adding two interaction terms. The first, is the (lagged) interaction term between the economic uncertainty measure, either the global ($GEPU$, column 1) or the country-specific ($LEPU$, column 2), and the equity to assets $(ETA)$ measured at the company level, as a proxy for investment. The second, is the (lagged) interaction term between economic uncertainty and the profitability (*ROE*) of the firms in our sample, as a proxy for profitability. Panel B reports the (average) marginal effects of *ETA* and *ROE* to *SRISK*. The other variables are described in Section 3.3 and are calculated as averages within a quarter. To control for the size of a firm we include the natural logarithm of firm's total assets $(TOT\ ASSETS)$. Standard errors are clustered at firm and calendar quarter level. To mitigate the effect of outliers, we winsorized SRISK at the 1% and 99%. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The data are quarterly and the sample period is from 2000Q3 to 2016Q4.

| Panel A. Baseline specification | | |
|---|---|---|
| | (1) | (2) |
| $GEPU$ | 0.180*** | |
| $GEPUxROE$ | -0.001*** | |
| $GEPUxETA$ | -0.006*** | |
| $LEPU$ | | 0.099*** |
| $LEPUxROE$ | | -0.001*** |
| $LEPUxETA$ | | -0.004** |
| $SRISK$ | 0.592*** | 0.601*** |
| $SD$ | 0.120*** | 0.088*** |
| $MKT$ | -0.014 | -0.017** |
| $Term$ | 0.036* | 0.036* |
| $Corp\_Spread$ | -0.022 | 0.072 |
| $ADS$ | 0.029 | 0.073 |
| $VIX$ | -0.007 | -0.006 |
| $SDMKT$ | 0.008 | 0.007 |
| $TOT\ ASSETS$ | 0.496*** | 0.524*** |
| Crises | 0.166** | 0.176*** |
| Firm fixed effects | yes | yes |
| Quarterly Dummies | yes | yes |
| Obs. | 9,389 | 6,655 |
| $R^2$ (within) | 64.22% | 65.73% |
| Panel B. Marginal Effects | | |
| $ROE$ | -0.004*** | -0.005*** |
| $ETA$ | -0.027*** | -0.017** |

**Table 8.** Instrumental Variable Analysis and Placebo Tests.

The table presents the results from the two-stage instrumental variable approach (Panels A, B, and C) and from the placebo test (Panel D). We use the Migration Fear Index (Panel A), and the Partisan Conflict Index (Panel B) as instrumental variables for the Global Economic Policy Uncertainty index. In Panel C, we exclude the US companies from our dataset and repeat the analysis by using the Partisan Conflict Index. Standard errors are 500 bootstrapped and clustered at firm level. Panel D presents the average coefficient estimates from the regression of $SRISK$ on randomly selected values of $GEPU$. We construct the $\widehat{GEPU}$ by randomly selecting values without replacement from the original series of GEPU. Then, we estimate regression coefficients by using 100 different samples from the random $\widehat{GEPU}$. $Controls$ are described in Section 3.3. Coefficients for the control variables are omitted due to space limitations. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The data are monthly and the sample period is from 2000M06 to 2016M12.

| Panel A. Instrumental variable analysis. The Migration Fear Index | | |
|---|---|---|
| | First Stage | Second Stage |
| | $GEPU$ | $SRISK$ |
| $\widehat{GEPU}$ | | 0.167*** |
| $MFEAR$ | 0.136** | |
| Controls | yes | yes |
| Firm fixed effects | | yes |
| R-squared | 51.00% | 73.85% |
| **Panel B. Instrumental variable analysis. The Partisan Conflict Index** | | |
| | First Stage | Second Stage |
| | $GEPU$ | $SRISK$ |
| $\widehat{GEPU}$ | | 0.164*** |
| $PConflict$ | 0.787*** | |
| Controls | yes | yes |
| Firm fixed effects | | yes |
| R-squared | 62.20% | 73.89% |
| **Panel C. Instrumental variable analysis. The Partisan Conflict Index (excluding the US firms)** | | |
| | First Stage | Second Stage |
| | $GEPU$ | $SRISK$ |
| $\widehat{GEPU}$ | | 0.170*** |
| $PConflict$ | 0.752*** | |
| Controls | yes | yes |
| Firm fixed effects | | yes |
| R-squared | 63.61% | 74.81% |
| **Panel D. Placebo tests** | | |
| | $SRISK$ | |
| $\widehat{GEPU}$ | -0.002 | |
| Controls | yes | |
| Firm fixed effects | yes | |

**Table 9.** Exogenous Shocks

In Panel A we use as exogenous shocks the natural logarithm of 1 plus i) the number of general strikes in a sample country in a given year, taking values from 1 to 13, and zero otherwise; ii) the number of purges in a sample country in a given year, taking values from 1 to 4, and zero otherwise; and iii) the number of riots in a sample country in a given year, taking values from 1 to 28, and zero otherwise. In Panel B we use as exogenous shocks the natural logarithm of 1 plus i) government crises, which take the value from 1 to 4, and zero otherwise; ii) number of major cabinet changes in a sample country in a given year, taking values from 1 to 3, and zero otherwise; and iii) number of changes in effective executive, taking values from 1 to 3 and zero otherwise. The exogenous shock variables are obtained from the Cross-National Time-Series Data Archive (C.N.T.S.). The other variables are described in Section 3.3. Standard errors are 500 bootstrapped and clustered at firm level. To mitigate the effect of outliers, we winsorized SRISK at the 1% and 99%. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The data are monthly and the sample period is from 2000M06 to 2016M12.

Panel A. GEPU

| | (1) | (2) | (3) |
|---|---|---|---|
| $GEPU$ | 0.161*** | 0.174*** | 0.153*** |
| $GEPUxSTRIKES$ | 0.010*** | | |
| $GEPUxPURGES$ | | 0.017*** | |
| $GEPUxRIOTS$ | | | 0.006*** |
| Controls | yes | yes | yes |
| Firm fixed effects | yes | yes | yes |
| Seasonal (quarterly) dummies | yes | yes | yes |
| Obs. | 44,930 | 44,930 | 44,930 |
| $R^2$ (within) | 74.33% | 74.26% | 74.30% |

Panel B. LEPU

| | (1) | (2) | (3) |
|---|---|---|---|
| $LEPU$ | 0.091*** | 0.126*** | 0.127*** |
| $LEPUxGOVCRISES$ | 0.008*** | | |
| $LEPUxCABCHANGES$ | | 0.004** | |
| $LEPUxEXECHANGES$ | | | 0.004* |
| Controls | yes | yes | yes |
| Firm fixed effects | yes | yes | yes |
| Seasonal (quarterly) dummies | yes | yes | yes |
| Obs. | 31,901 | 25,021 | 25,021 |
| $R^2$ (within) | 75.75% | 76.34% | 76.34% |

**Table 10.** Policy Uncertainty and the Capital Shortage: Sensitivity Analysis.

Panel A1 examines whether there are significant differences between regions (North America, South America, Europe, Asia, and Africa). Panel A2 examines whether there are significant differences between industries (Banks, Capital Markets, Insurances, Diversified Financial Services and Mortgage Real Estate Investment Trusts). Panel B1 reports the results of our baseline Equation for four market decline thresholds (40%, 30%, 20%, and 10%). The first (fourth) column presents the results for the 40% (10%) market decline threshold. Panel B2 of the table reports the results of the Z-test of the equality of coefficients between different market decline thresholds: -40% vs -30%, -40% vs -20%, -40% vs -10%, -30% vs -20%, -30 vs -10% and -20% vs -10%. Standard errors are clustered at firm and calendar month level. Panel C reports the quantile regression results of our baseline Equation and each column presents the results for a q$\in [0.10, 0.90]$ quantile. The other variables are described in Section 3.3. To mitigate the effect of outliers, we winsorized SRISK at the 1% and 99%. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The data are monthly and the sample period is from 2000M06 to 2016M12.

Panel A. Regional and Industry Analysis

| Panel A1. Regions | | Panel A2. Industries | |
|---|---|---|---|
| $GEPU$ | 0.211*** | $GEPU$ | 0.178*** |
| $D^{SA} \times GEPU$ | -0.025 | $D^{CM} \times GEPU$ | -0.022 |
| $D^{EUROPE} \times GEPU$ | -0.060* | $D^{INS} \times GEPU$ | -0.003 |
| $D^{ASIA} \times GEPU$ | -0.026 | $D^{DFS} \times GEPU$ | -0.028 |
| $D^{AFRICA} \times GEPU$ | -0.041 | $D^{RE} \times GEPU$ | 0.187*** |
| Controls | yes | Controls | yes |
| Firm fixed effects | yes | Firm fixed effects | yes |
| Seasonal (monthly) dummies | yes | Seasonal (monthly) dummies | yes |
| Obs. | 47,306 | Obs. | 47,306 |
| $R^2$ (within) | 74.05% | $R^2$ (within) | 74.05% |

Panel B. Alternative Market Decline Thresholds

| Panel B1. The Effect of Market Decline Threshold | (1) | (2) | (3) | (4) | Panel B2. Testing the equality of coefficients across columns (Z-test) | |
|---|---|---|---|---|---|---|
| $GEPU$ | 0.176*** | 0.167*** | 0.157*** | 0.168*** | Column (1) vs Column (2) | 0.26 |
| Controls | yes | yes | yes | yes | Column (1) vs Column (3) | 0.51 |
| Firm fixed effects | yes | yes | yes | yes | Column (1) vs Column (4) | 0.20 |
| Seasonal (monthly) dummies | yes | yes | yes | yes | Column (2) vs Column (3) | 0.27 |
| Obs. | 47,306 | 41,984 | 37,085 | 32,856 | Column (2) vs Column (4) | -0.03 |
| $R^2$ (within) | 74.05% | 74.26% | 74.59% | 73.48% | Column (3) vs Column (4) | -0.27 |

Panel C. Capital Shortfall Severance and *GEPU*

| | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.80 | 0.90 |
|---|---|---|---|---|---|---|---|---|---|
| $GEPU$ | 0.220*** | 0.151*** | 0.128*** | 0.114*** | 0.106*** | 0.097*** | 0.090*** | 0.075*** | 0.050*** |
| Controls | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Firm fixed effects | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Seasonal (monthly) dummies | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Obs. | 47,306 | 47,306 | 47,306 | 47,306 | 47,306 | 47,306 | 47,306 | 47,306 | 47,306 |
| $R^2$ (within) | 23.64% | 23.12% | 23.11% | 23.19% | 23.64% | 24.43% | 24.98% | 24.64% | 18.28% |

**Table 11.** Capital Surplus and Policy Uncertainty: Global, Regional, and Industry Analysis.

We use the absolute value of *SRISK* of the well-capitalized firms as dependent variable, since SRISK is negative for these firms. Panel A reports the results of our baseline equation. Panel B examines whether there are significant differences between regions (North America, South America, Europe, Asia, and Africa) by using interaction terms. Panel C examines whether there are significant differences between industries (Banks, Capital Markets, Insurances, Diversified Financial Services and Mortgage Real Estate Investment Trusts) by using interaction terms. Standard errors are clustered at firm and calendar month level to take into account the potential cross-sectional and serial correlation in $\varepsilon_{i,t}$. To mitigate the effect of outliers, we winsorized SRISK at the 1% and 99%. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The data are monthly and the sample period is from 2000M06 to 2016M12.

| Panel A. Global | | Panel B. Regions | | Panel C. Industries | |
|---|---|---|---|---|---|
| $GEPU$ | -0.094*** | $GEPU$ | -0.106*** | $GEPU$ | -0.118*** |
| | | $D^{SA} \times GEPU$ | 0.039* | $D^{CM} \times GEPU$ | 0.038*** |
| | | $D^{EUROPE} \times GEPU$ | 0.007 | $D^{INS} \times GEPU$ | 0.052*** |
| | | $D^{ASIA} \times GEPU$ | 0.018 | $D^{DFS} \times GEPU$ | 0.028 |
| | | $D^{AFRICA} \times GEPU$ | 0.014 | $D^{RE} \times$ GEPU | 0.043*** |
| Controls | yes | Controls | yes | Controls | yes |
| Firm fixed effects | yes | Firm fixed effects | yes | Firm fixed effects | yes |
| Seasonal (monthly) dummies | yes | Seasonal (monthly) dummies | yes | Seasonal (monthly) dummies | yes |
| Obs. | 120,309 | Obs. | 120,309 | Obs. | 120,309 |
| $R^2$ (within) | 86.08% | $R^2$ (within) | 86.09% | $R^2$ (within) | 86.09% |

## Online Appendix. Additional Robustness Tests

**Table A1.** Policy Uncertainty and Capital Shortfall. Last value of daily $SRISK$.

The table reports the results of our baseline equation, where $SRISK$ is the natural logarithm of *SRISK* defined in Equation (1) by using the last monthly value. The other variables are described in Section 3.3. Standard errors are clustered at firm and calendar month level to take into account the potential cross-sectional and serial correlation in $\varepsilon_{i,t}$.To mitigate the effect of outliers, we winsorized SRISK at the 1% and 99%. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The data are monthly and the sample period is from 2000M06 to 2016M12.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| $GEPU$ | 0.872*** | 0.201*** | 0.161*** | 0.189*** | 0.197*** | 0.209*** | 0.203*** | 0.232*** | 0.201*** | 0.173*** |
| $SRISK$ | | 0.765*** | 0.817*** | 0.767*** | 0.764*** | 0.766*** | 0.765*** | 0.762*** | 0.765*** | 0.809*** |
| $SD$ | | | -0.007 | | | | | | | -0.027 |
| $MKT$ | | | | -0.004** | | | | | | -0.005** |
| $Term$ | | | | | 0.014* | | | | | 0.025*** |
| $Corp\_Spread$ | | | | | | -0.020 | | | | 0.052 |
| $ADS$ | | | | | | | 0.005 | | | -0.001 |
| $VIX$ | | | | | | | | -0.003** | | -0.010*** |
| $SDMKT$ | | | | | | | | | 0.000 | 0.006** |
| $CAP$ | | 0.063*** | 0.048*** | 0.063*** | 0.065*** | 0.059*** | 0.062*** | 0.052*** | 0.063*** | 0.030*** |
| Crises | 0.111** | 0.074*** | 0.064** | 0.063** | 0.074** | 0.094** | 0.083** | 0.115*** | 0.074** | 0.089** |
| Firm fixed effects | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Seasonal (monthly) dummies | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Obs. | 50,391 | 47,738 | 46,388 | 47,738 | 47,738 | 47,738 | 47,738 | 47,738 | 47,738 | 46,388 |
| $R^2$ (within) | 10.34% | 63.91% | 66.74% | 63.96% | 63.93% | 63.91% | 63.91% | 63.95% | 63.91% | 66.99% |

**Table A2.** Policy Uncertainty and Capital Shortfall. The First Difference Model.

The table reports the results of our baseline Equation estimated in first differences. The variables are described in Section 3.3. Standard errors are clustered at firm and calendar month level to take into account the potential cross-sectional and serial correlation in $\varepsilon_{i,t}$. To mitigate the effect of outliers, we winsorized SRISK at the 1% and 99%. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The data are monthly and the sample period is from 2000M06 to 2016M12.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| $GEPU$ | 0.152*** | 0.102*** | 0.103*** | 0.058*** | 0.103*** | 0.097*** | 0.102*** | 0.102*** | 0.098*** | 0.054*** |
| $SRISK$ | | -0.112*** | -0.112*** | -0.112*** | -0.112*** | -0.112*** | -0.112*** | -0.112*** | -0.112*** | -0.112*** |
| $SD$ | | | -0.009 | | | | | | | -0.015* |
| $MKT$ | | | | -0.006*** | | | | | | -0.006*** |
| $Term$ | | | | | 0.002 | | | | | 0.005** |
| $Corp\_Spread$ | | | | | | -0.020*** | | | | -0.014* |
| $ADS$ | | | | | | | 0.006 | | | 0.006 |
| $VIX$ | | | | | | | | 0.000 | | 0.000 |
| $SDMKT$ | | | | | | | | | 0.001** | 0.000 |
| $CAP$ | | -0.354*** | -0.357*** | -0.282*** | -0.354*** | -0.358*** | -0.357*** | -0.352*** | -0.345*** | -0.288*** |
| Crises | 0.065*** | 0.041*** | 0.043*** | 0.028*** | 0.041*** | 0.061*** | 0.051*** | 0.038*** | 0.034*** | 0.055*** |
| Firm fixed effects | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Seasonal (monthly) dummies | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Obs. | 47,208 | 45,591 | 45,591 | 45,591 | 45,591 | 45,591 | 45,591 | 45,591 | 45,591 | 45,591 |
| $R^2$ (within) | 0.87% | 2.57% | 2.28% | 2.97% | 2.33% | 2.28% | 2.29% | 2.35% | 2.29% | 3.12% |

**Table A3.** Policy Uncertainty and Capital Shortfall. The Contemporaneous Model.

The table reports the results of our baseline Equation: $SRISK_{i,t} = \alpha_i + \beta_1 SRISK_{i,t-1} + \beta_2 GEPU_t + \beta_3 CAP_{i,t} + \beta_4 SD_{i,t} + \delta M_t + \zeta Crises_t + MNT_t + \varepsilon_{i,t}$. The variables are described in Section 3.3. Standard errors are clustered at firm and calendar month level to take into account the potential cross-sectional and serial correlation in $\varepsilon_{i,t}$. To mitigate the effect of outliers, we winsorized SRISK at the 1% and 99%. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The data are monthly and the sample period is from 2000M06 to 2016M12.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| $GEPU$ | 0.857*** | 0.199*** | 0.179*** | 0.184*** | 0.197*** | 0.203*** | 0.208*** | 0.199*** | 0.185*** | 0.189*** |
| $SRISK$ | | 0.824*** | 0.821*** | 0.827*** | 0.823*** | 0.824*** | 0.823*** | 0.824*** | 0.825*** | 0.818*** |
| $SD$ | | | 0.173*** | | | | | | | 0.172*** |
| $MKT$ | | | | -0.005*** | | | | | | -0.006*** |
| $Term$ | | | | | 0.006 | | | | | 0.010 |
| $Corp\_Spread$ | | | | | | -0.013 | | | | 0.044 |
| $ADS$ | | | | | | | 0.024** | | | 0.043** |
| $VIX$ | | | | | | | | 0.000 | | -0.003 |
| $SDMKT$ | | | | | | | | | 0.001 | 0.000 |
| $CAP$ | | -0.010 | 0.012 | -0.009 | -0.009 | -0.012 | -0.016 | -0.010 | -0.007 | 0.000 |
| Crises | 0.115* | 0.077*** | 0.039 | 0.067*** | 0.076*** | 0.090*** | 0.120*** | 0.077** | 0.060** | 0.101*** |
| Firm fixed effects | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Seasonal (monthly) dummies | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Obs. | 49,531 | 47,306 | 47,306 | 47,306 | 47,306 | 47,306 | 47,306 | 47,306 | 47,306 | 47,306 |
| $R^2$ (within) | 10.90% | 73.79% | 73.97% | 73.87% | 73.79% | 73.79% | 73.81% | 73.78% | 73.80% | 74.11% |

**Table A4.** Policy Uncertainty and Capital Shortfall. Normalization with Market Capitalization.

The table reports the results of our baseline Equation: $\frac{SRISK_{i,t}}{\text{CAP}_{i,t}} = \alpha_i + \beta_1 \frac{SRISK_{i,t-1}}{\text{CAP}_{i,t-1}} + \beta_3 GEPU_t + \beta_4 SD_{i,t} + \delta M_t + \zeta Crises_t + MNT_t + \varepsilon_{i,t}$. The variables are described in Section 3.3. Standard errors are clustered at firm and calendar month level to take into account the potential cross-sectional and serial correlation in $\varepsilon_{i,t}$. To mitigate the effect of outliers, we winsorized SRISK at the 1% and 99%. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The data are monthly and the sample period is from 2000M06 to 2016M12.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| $GEPU$ | 1.445*** | 0.106*** | 0.080*** | 0.065* | 0.108** | 0.131*** | 0.101** | 0.109** | 0.086* | 0.091** |
| | | 0.973*** | 0.972*** | 0.973*** | 0.973*** | 0.973*** | 0.973*** | 0.973*** | 0.973*** | 0.972*** |
| $SD$ | | | 0.180 | | | | | | | 0.174 |
| $MKT$ | | | | -0.016*** | | | | | | -0.017*** |
| $Term$ | | | | | -0.005 | | | | | 0.007 |
| $Corp\_Spread$ | | | | | | -0.060 | | | | -0.019 |
| $ADS$ | | | | | | | -0.012 | | | -0.018 |
| $VIX$ | | | | | | | | 0.000 | | -0.004 |
| $SDMKT$ | | | | | | | | | 0.002 | -0.002 |
| Crises | -0.272 | 0.039 | -0.002 | -0.003 | 0.039 | 0.099*** | 0.017 | 0.043 | 0.016 | 0.017 |
| Firm fixed effects | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Seasonal (monthly) dummies | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Obs. | 49,426 | 47,306 | 47,306 | 47,306 | 47,306 | 47,306 | 47,306 | 47,306 | 47,306 | 47,306 |
| $R^2$ (within) | 0.54% | 93.62% | 93.62% | 93.63% | 93.62% | 93.62% | 93.62% | 93.62% | 93.62% | 93.63% |

**Table A5.** Policy Uncertainty and Capital Shortfall: Quarterly Regressions.

The table reports the results of the baseline specification in quarterly frequency employing total assets in lieu of market capitalization to control for firm size. Variables are described in Section 3.3. Standard errors are clustered at firm and calendar quarter level to take into account the potential cross-sectional and serial correlation in residual terms. To mitigate the effect of outliers, we winsorized *SRISK* at the 1% and 99%. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The data are quarterly and the sample period is from 2000Q3 to 2016Q4.

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| $GEPU$ | 0.517*** | 0.166*** | 0.152*** | 0.130*** | 0.129*** |
| $SRISK$ | | 0.625*** | 0.617*** | 0.620*** | 0.622*** |
| $SD$ | | | 0.105*** | 0.108** | 0.102** |
| $MKT$ | | | | -0.014** | -0.011 |
| $Term$ | | | | 0.036** | 0.039** |
| $Corp\_Spread$ | | | | -0.064 | -0.083 |
| $ADS$ | | | | -0.006 | -0.014 |
| $SDMKT$ | | | | | -0.005 |
| $VIX$ | | | | | 0.007 |
| $TOT\ ASSETS$ | 1.131*** | 0.436*** | 0.455*** | 0.454*** | 0.444*** |
| Crises | 0.092 | 0.172*** | 0.149** | 0.148** | 0.152** |
| Firm fixed effects | yes | yes | yes | yes | yes |
| Seasonal (quarterly) dummies | yes | yes | yes | yes | yes |
| Obs. | 16,029 | 14,977 | 14,977 | 14,977 | 14,977 |
| $R^2$ (within) | 36.06% | 64.56% | 64.66% | 65.06% | 65.07% |

**Table A6.** Policy Uncertainty and Capital Shortfall: Randomly Reduced Sample.

The table reports the results of the baseline specification in a randomly reduced sample. Firms are randomly selected and for these firms we drop the data from a randomly selected month – different for each one of them – from that month till the end of the time period examined. Variables are described in Section 3.3. Standard errors are clustered at firm and calendar quarter level to take into account the potential cross-sectional and serial correlation in residual terms. To mitigate the effect of outliers, we winsorized *SRISK* at the 1% and 99%. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The data are monthly and the sample period is from 2000M06 to 2016M12.

| | Baseline specification | Horse race |
|---|---|---|
| $GEPU$ | 0.178*** | 0.172*** |
| SRISK | 0.821*** | 0.820*** |
| $SD$ | 0.107*** | 0.108*** |
| $MKT$ | -0.009*** | -0.009*** |
| $Term$ | 0.020*** | 0.016** |
| $Corp\_Spread$ | 0.038 | 0.046 |
| $ADS$ | 0.017 | 0.015 |
| $VIX$ | 0.001 | 0.001 |
| $SDMKT$ | -0.006*** | -0.006** |
| $FINANCIAL$ | | 0.094 |
| $REAL$ | | -0.033 |
| $FSI$ | | 0.001 |
| $CSV$ | | -0.015** |
| CAP | 0.041*** | 0.039*** |
| Crises | 0.091*** | 0.093*** |
| Firm fixed effects | yes | yes |
| Seasonal (monthly) dummies | yes | yes |
| Obs. | 38,772 | 38,675 |
| R2 (Within) | 73.9% | 73.9% |

**Table A7.** Country-specific Effect of Economic Policy Uncertainty to Capital Shortfall.

The table presents the results of our baseline equation by using the country-specific Economic Policy Uncertainty Indices, LEPU, of Australia, Brazil, Canada, Chile, China, France, Germany, Italy, Spain, Hong Kong, Mexico, India, Ireland, Japan, S. Korea, Netherlands, Russia, Singapore, Sweden, U.K., U.S, instead of the Global Economic Policy Index. Controls are defined in Section 3.3. Standard errors are clustered at firm and calendar month level to take into account the potential cross-sectional and serial correlation in $\varepsilon_{i,t}$. To mitigate the effect of outliers, we winsorized SRISK at the 1% and 99%. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The data are monthly and the sample period is from 2000M06 to 2016M12.

| | |
|---|---|
| $LEPU$ | 0.092*** |
| Controls | yes |
| Firm fixed effects | yes |
| Seasonal (monthly) dummies | yes |
| Obs. | 33,812 |
| $R^2$ (within) | 75.34% |

**Table A8**. Policy Uncertainty and Capital Shortfall. The Effect of the Most Influential Countries.

Panel A presents the results of our baseline equation by estimating a weighted panel regression that uses as a weight the inverse number of observations from each country. Panel B examines whether there are significant differences between the effect of GEPU on influential countries (US, UK, Japan) and all the other countries. We estimate the baseline equation with the interaction term $D^{INF}$ for firms in US, UK and Japan. Controls are described in Section 3.3. Standard errors are clustered at firm and calendar month level to take into account the potential cross-sectional and serial correlation in $\varepsilon_{i,t}$. To mitigate the effect of outliers, we winsorized SRISK at the 1% and 99%. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The data are monthly and the sample period is from 2000M06 to 2016M12.

| Panel A. Weighted | | Panel B. Difference of Influential Countries | |
|---|---|---|---|
| $GEPU$ | 0.163*** | $GEPU$ | 0.175*** |
| | | $D^{INF} \times$ GEPU | 0.012 |
| Controls | yes | Controls | yes |
| Firm fixed effects | yes | Firm fixed effects | yes |
| Seasonal (monthly) dummies | yes | Seasonal (monthly) dummies | yes |
| Obs. | 45,815 | Obs. | 47,306 |
| $R^2$ (within) | 71.25% | $R^2$ (within) | 74.05% |

**Table A9.** Removing the Effect of Market Conditions from *GEPU*.

The table presents the results from a two-stage regression in order to remove the effect of market conditions from Global Economic Policy Uncertainty Index. In the first stage we run the following time-series regression: $GEPU_t = \alpha + \beta X_t + \gamma Crises_t + \dot{\varepsilon}_t$, where $X$ represents the market condition variable: (a) the Financial Stress Indicator, Panel A, (b) Real Uncertainty Index of Jurado, Ludvigson and Ng (2015), Panel B, and (c) Financial Uncertainty Index of Jurado, Ludvigson and Ng (2015), Panel C. In the second stage, we estimate our baseline equation by substituting $GEPU$ with the residual from the first stage $\dot{\varepsilon}$. Standard errors are 500 bootstrapped and clustered at firm level. To mitigate the effect of outliers, we winsorized SRISK at the 1% and 99%. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The data are monthly and the sample period is from 2000M06 to 2016M12.

| Panel A. Financial Stress Indicator | | Panel B. Real Uncertainty Index | | Panel C. Financial Uncertainty Index | |
|---|---|---|---|---|---|
| First Stage Beta ($\beta$) | 0.048*** | First Stage Beta ($\beta$) | 0.713 | First Stage Beta ($\beta$) | 0.786*** |
| $REPU$ | 0.174*** | $REPU$ | 0.154*** | $REPU$ | 0.156*** |
| Controls | yes | Controls | yes | Controls | yes |
| Firm fixed effects | yes | Firm fixed effects | yes | Firm fixed effects | yes |
| Seasonal (monthly) dummies | yes | Seasonal (monthly) dummies | yes | Seasonal (monthly) dummies | yes |
| Obs. | 47,306 | Obs. | 47,306 | Obs. | 47,306 |
| $R^2$ (within) | 74.01% | $R^2$ (within) | 73.99% | $R^2$ (within) | 73.99% |