Economic Policy Uncertainty and the Cross-Section of Corporate Bond Returns

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Abstract

This paper examines the role of economic policy uncertainty in the pricing of corporate bonds for the period of 2002-2017. We find bonds with high economic policy uncertainty betas have low expected returns. The negative risk premium suggests that risk-averse investors prefer assets that provide hedge against policy uncertainty. The negative relationship between expected corporate bond returns and economic policy uncertainty beta appears in all segments of corporate bonds and is robust to controlling for conventional risk factors, bond characteristics and different model specifications. Moreover, economic policy uncertainty has a significantly positive effect on the long-term volatility of corporate bonds.

JEL classification: G12; G13

Keywords: Economic policy uncertainty, corporate bond returns, long-term volatility.

1 Introduction

How policy-related uncertainty affects economic activity and financial market performance is an issue receiving considerable attention among scholars, policy makers, and the general public (see Julio and Yook, 2012; Pastor and Veronesi, 2012, 2013; Gulen and Ion, 2015; Bonaime et al., 2018). This issue is particularly important at a time when government policies under the current administration seems more uncertain than ever. Firms are affected in many ways by government policies such as taxes, subsidies, regulations, environmental protections, and monetary and trade policies. Government basically set the rules of the game for the private sector, which shape the incentives of management and firm operations. Previous studies have shown that uncertainty about fiscal and monetary policies have negative effects on economic activity by reducing investment and employment.

Government policy uncertainty also has a significant impact on financial market performance. Unexpected policy changes cause strong reactions in financial markets. Policy uncertainty deteriorates the investment environment and this adverse effect commands a risk premium. Capricious changes in government policy increase financial market volatility and exacerbate asset price correlations in times of stress, which tend to undermine financial stability. Recent studies have shown that volatility risk is an important pricing factor for stocks and bonds. As policy uncertainty induces market volatility, investigating the role of economic policy uncertainty sheds light on the source of volatility effects on asset pricing.

Existing theories suggest that expected consumption decreases and investment opportunities deteriorate when there is high uncertainty (Campbell, 1993, 1996; Campbell et al., 2013). Fama (1970) suggests that in a multi-period economy, investors are averse to unfavorable changes in future investment opportunities. Merton (1973) demonstrates that state variables associated with variations in consumption and investment opportunities are priced in capital markets, thereby an assets' expected returns are related to its covariance with these state variables. Variables impacting the decisions on future consumption and investment can thus be priced risk factors in equilibrium. Economic policy uncertainty seems to be a good candidate for such a priced state variable. Past studies have shown that economic uncertainty is a priced factor of financial assets (see Anderson et al., 2009; Bekaert et al., 2009; Pastor and Veronesi, 2013).

Economic policy uncertainty is not directly observable and thus is difficult to be distinguished from general economic uncertainty. This problem posts a significant challenge in empirical tests. In the literature, political elections are commonly used to capture the period of elevated policy uncertainty. Examining the impact of elections on investment in 48 countries, Julio and Yook (2012) find that political uncertainty leads to a significant decline in corporate investment. Gao and Qi (2013) demonstrate that municipal bond yields increase around elections of U.S. state governors. More recently, Kelly et al. (2016) find that political uncertainty is an important pricing factor in the stock option market.

A drawback of using election dates to capture the effect of uncertainty is that the low frequency of election makes it difficult to explain variations in policy uncertainty between election dates. To overcome this difficulty, we employ a new index of economic policy uncertainty (EPU) constructed by Baker, Bloom, and Davis (2016, hereafter BBD) from the newspaper reports to quantify economic policy uncertainty. This news-based measure of policy uncertainty has several nice features. First of all, unlike political events such as elections, the EPU is a higher frequency measure that is capable of catching the time-varying characteristics of economic policy uncertainty. Second, rather than assuming that a new regime resolves uncertainty, the news-based measure quantifies uncertainty resolution.

A number of studies have used the BBD index to assess the broad impacts of EPU on financial markets. Pastor and Veronesi (2012, 2013) uncover a negative relationship between asset returns and policy uncertainty based on a general equilibrium model. Brogaard and Detzel (2015) find that innovations in EPU derive a significantly negative risk premium in the Fama–French 25 size–momentum portfolios and the premium associated with this uncertainty risk factor is of economic significance. Gulen and Ion (2015) show that policy uncertainty measured by the BBD index decreases corporate investment as adjustment costs and uncertainty cause companies to delay their investment as a precaution. Asgharian et al. (2018) document that the long-run stock market volatility in the U.S. is driven by economic policy shocks.

Prior research has suggested that economic policy uncertainty is a priced state variable in the stock market. Given that stocks and bonds are contingent claims for cash flows of the same firm, a natural question is whether economic policy uncertainty risk is priced in the corporate bond market as well.[1] On the one hand, both stock and bond returns are exposed to similar policy uncertainty shocks because the fortune of investors for both assets is determined by the same firm value. On the other hand, bonds and stocks differ from each other in various aspects such as risk characteristics, contractual stipulations and investment clienteles. Therefore, bond and stock prices may respond differently to policy shocks and experience differential effects of economic policy risk on their expected returns and volatilities, respectively. In this paper, we provide new insights as to the role of economic policy uncertainty in driving corporate bond returns and long-term volatility.

Using a comprehensive data set of corporate bond returns from the enhanced TRACE (Trade Reporting and Compliance Engine), we document a number of new findings that contribute to

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[1] The U.S. has the largest market for corporate debt in the world. According to data from the Securities Industry and Financial Markets Association, outstanding U.S. corporate debt at the end of 2014 reached a value of about 7.8 trillion dollars.

the current literature. First, we find that economic policy uncertainty beta explains the cross-sectional variation in expected corporate bond returns. Bonds with low policy uncertainty beta (β_{EPU}) on average earn 0.69% more excess returns per month. For convenience, we refer to the risk premium associated with economic policy uncertainty as the policy risk premium, and the beta with respect to economic policy uncertainty as policy beta or risk. This risk premium remains economically significant after controlling for conventional risk factors, volatility, macroeconomic and financial market uncertainty factors and bond characteristics. The results suggest that risk-averse investors require additional compensation for holding corporate bonds with low β_{EPU}.

The finding of the significant negative policy premium is in line with the intertemporal capital asset pricing model (ICAPM) framework proposed by Merton (1973) and Campbell (1993, 1996). High economic policy uncertainty discourages investment, reduces consumption and increases the likelihood of future economic downturn. Therefore, investors prefer to hold assets with returns positively related to economic policy uncertainty for hedging purposes and are willing to pay higher prices and accept lower returns for these assets.

The effect of policy uncertainty may reflect general economic uncertainty. To control for the effect of general economic uncertainty, we use a method suggested by Gulen and Ion (2015). Exploiting the fact that there is a high correlation between economic conditions in the U.S. and Canada, we regressing the U.S. EPU index on the Canadian EPU index to obtain the residuals as an alternative economic policy uncertainty factor that is free from the underlying general economic uncertainty. Using this alternative factor, we find that the negative relationship between the policy beta and future bond returns remains highly significant.

The policy risk has longer-term predictive power. Our results show a long-term negative cross-sectional relationship between policy beta β_{EPU} and future bond returns. The predictive power of β_{EPU} lasts up to a 15-month horizon. Analyzing the components of the EPU index shows that the news component beta is the most powerful predictor for future bond returns.

The effect of economic policy uncertainty is pervasive. When dividing corporate bonds by rating, we find that policy risk is priced in both investment-grade (IG) and high-yield (HY) bonds. Compared to IG bonds, HY bonds have a higher exposure to economic policy uncertainty and carry a larger policy risk premium.

The policy risk premium is countercyclical. Consistent with theoretical predictions, the policy risk premium is significantly higher when the economy is in a recession or characterized by high economic policy uncertainty. Conversely, when the economy is in an expansion or has low economic policy uncertainty, the policy risk premium is low.

We further examine the robustness of our results by taking several steps. We estimate policy beta using alternative factor models and find that the results are robust. In addition, using the bond returns adjusted for maturity and ratings in Fama-MacBeth (1973) regressions, we find that the coefficient of β_{EPU} remains negative and highly significant. The results show that the effect of policy uncertainty is not due to these bond characteristics.

Finally, we employ the generalized autoregressive conditional heteroscedastic mixed data sampling (GARCH–MIDAS) model to assess how economic policy uncertainty affects corporate bond return volatility. Our study demonstrates that policy uncertainty has a significantly positive effect on the long-term volatility of the corporate bond market. This finding has important implications for both market participants and policy makers. In particular, it suggests that to predict corporate bond volatility accurately for evaluating investment risk and formulating policy, they need to account for the effect of ΔEPU.

Our work is related to several recent studies on corporate bond pricing. Bali, Subrahmanyam and Wen (2018) use the economic uncertainty index developed by Jurado et al. (2015) to quantify macroeconomic uncertainty and find that macroeconomic uncertainty is priced in the cross-section of corporate bonds. Chung, Wang, and Wu (2018) consider aggregate volatility as a state variable and find that volatility risk is priced in the cross-section of expected corporate bond returns. Unlike these papers, we study the role of policy uncertainty in asset pricing by investigating the direct effects of economic policy shocks, instead of macroeconomic uncertainty and volatility. Kaviani, Kryzanowski, Maleki, and Savor (2017) document a strong positive relationship between an index level of economic policy uncertainty and corporate credit spreads. Using a structural VAR model, Nodari (2014) find that exogenous variations in uncertainty widen credit spreads. While these papers explore the determinants of yield spreads, our paper focuses on the pricing of economic policy risk in the cross-section of expected corporate bond returns. Nieto, Novales, and Rubio (2015) explore the correlation between corporate bond volatility and standard financial and macroeconomic indicators using the GARCH-MIDAS model. Extending their study, we explore the relationship between policy uncertainty and long-term corporate bond volatility by incorporating the EPU index into the GARCH-MIDAS model. To our knowledge, ours is the first paper to quantify the impact of EPU on long-term corporate bond volatility.

The remainder of the paper is arranged as follows. Section 2 describes the data and variables used in empirical tests. Section 3 conducts portfolio analyses and the cross-sectional tests for the relationship between the policy beta and future bond returns. Section 4 explores the role of economic policy uncertainty in affecting the long-term corporate bond volatility. Finally, Section 5 summarizes the main findings and concludes the paper.

2 Data and Variables

In this section, we describe the data and key variables used in empirical analyses.

2.1 Economic Policy, Macroeconomic and Financial Uncertainty Indexes

Baker et al. (2016) develop an economic policy uncertainty index (EPU) based on newspaper coverage frequency. EPU is computed as a weighted average of four components. The first component is a normalized comprehensive indicator of the volume of news articles that discuss economic policy uncertainty in ten major newspapers. An article is considered as a coverage on economic policy uncertainty so long as it contains at least one of the terms “uncertainty” or “uncertain” and “economic” or “economy”, and one of the terms “congress”, “legislation”, “white house”, “regulation”, “federal reserve”, or “deficit”. Each month, the number of articles on policy uncertainty is normalized by the total number of articles published in that newspaper. The second component uses the data from the Congressional Budget Office to measure taxation uncertainty based on the present value of future scheduled tax code expirations. The third component measures monetary policy uncertainty based on a proxy, the Consumer Price Index (CPI) forecast dispersion, computed according to individual forecasts in the Federal Reserve Bank of Philadelphia’s Survey of Professional Forecasters. The fourth component measures local/federal/state expenditures forecast dispersion computed from individual forecasts in the Federal Reserve Bank of Philadelphia's Survey of Professional Forecasters. By applying the weights 1/2, 1/6, 1/6, and 1/6 respectively to the above four components, the overall BBD index is obtained. The BBD index has been used extensively in academic research and carried by several commercial data providers. We obtain the economic uncertainty index (EPU) from www.policyuncertainty.com.

Jurado et al. (2015) interpret a rise in uncertainty as being more difficult to predict the future economy. Based on this notion, they suggest that it is necessary to strip the forecastable component before calculating the uncertainty measure, and uncertainty of an economic variable can be measured as the conditional volatility of the unforecastable component of that variable. Macroeconomic uncertainty is then measured by the common variation in uncertainty across major economic variables. To make the measures of uncertainty operational, they first employ an econometric forecasting model to obtain the predictable component from a data set that contains more than 100 macroeconomic variables. They then calculate the conditional volatility of forecast errors for each macroeconomic variable and obtain the weighted average of these conditional volatility measures across variables to generate a macro uncertainty index. We download the one-month-ahead macroeconomic uncertainty index (MU) from the website of Sydney Ludvigson: https://www.sydneyludvigson.com/data-and-appendixes/.[2]

Ludvigson et al. (2015) develop a U.S. financial uncertainty (FU) index using the same method as in Jurado et al. (2015) for creating the MU index. The FU index is constructed using variables that are more directly related to financial markets and removing the components not driven by uncertainty. We choose the one-month ahead FU index to measure financial market uncertainty.[3]

2.2 Volatility Index

We use the VIX index of the Chicago Board Options Exchange (CBOE) as a proxy for expected future market volatility. VIX represents the implied volatility of the S&P 500 stock index option that reflects the investor expectation of stock market volatility over the next 30-day

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[2] Jurado et al. (2015) provide the 1-month, 3-month and 12-month-ahead macroeconomic uncertainty indexes. We use the 3-month and 12-month-ahead macroeconomic uncertainty indexes to obtain qualitatively similar results.

[3] Ludvigson et al. (2015) provide the 1-month, 3-month and 12-month-ahead financial uncertainty indexes. We use the 3-month and 12-month-ahead financial uncertainty indexes to obtain qualitatively similar results.

period.[4] We obtain monthly VIX data from Yahoo Finance.

[Insert Table 1 Here]

Panel A of Table 1 provides a summary of various uncertainty measures with respect to their sources, sample and type of uncertainty. Panel B shows autocorrelation for the selected uncertainty measures. The first-order autoregressive (AR(1)) coefficient of each index which ranges from 0.67 to 0.99. The residuals of the first-order autoregression for the aggregate uncertainty and volatility indices, denoted by ΔEPU, ΔEPU_news, ΔEPU_gov, ΔEPU_cpi, ΔEPU_tax, ΔMU, ΔFU and ΔVIX, are used as uncertainty factors in empirical analysis.

Figure 1 displays the monthly time-series of the economic policy uncertainty index (EPU) and its innovations ΔEPU for the sample period from July 2002 to June 2017. These series capture fluctuations in business conditions. They tend to be low (high) in good (bad) economic states. Consistent with the finding of Bloom (2009), recessions are associated with the periods of high economic uncertainty.

[Insert Figure 1 here]

2.3 Corporate Bond Data

Corporate bond transaction data come from the enhanced TRACE database. These data are then merged with the Mergent's Fixed Investment Securities Database (FISD) that contains information for individual bond issues such as offering date, issuance amount, maturity date, coupon type and rate, interest payment frequency, rating, bond type and embedded options. We exclude the bonds backed by mortgages or other assets and non-US-dollar-denominated bonds. To avoid confounding effects caused by embedded options (e.g., call, put, sinking funds, and conversion), we focus on straight bonds in our empirical tests. We exclude bonds with a maturity

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[4] Changes in VIX may be related to time-varying risk-averse tendency or investor's sentiment instead of economic uncertainty (Bekaert et al., 2013).

less than one year or longer than 30 years. Moreover, following the data screening procedure used by Bessembinder et al. (2009) and Dick-Nielsen (2009, 2014), we eliminate cancelled, corrected, commission, and small (below \$100,000) trades. Figure 2 plots the number of bonds and firms in each month.

[Insert Figure 2 Here]

The monthly corporate bond return is calculated as

$$r_{i,t} = \frac{(P_{i,t}+AI_{i,t})+C_{i,t}-(P_{i,t-1}+AI_{i,t-1})}{P_{i,t-1}+AI_{i,t-1}}, \tag{1}$$

where $P_{i,t}$ is the transaction price, $AI_{i,t}$ is accrued interest, and $C_{i,t}$ is the coupon payment, if any, of bond i in month t. $R_{i,t}$ is denoted as bond excess return, $R_{i,t} = r_{i,t} - r_{f,t}$, where $r_{f,t}$ is the risk-free rate proxied by the one-month Treasury bill rate. Following Bessembinder et al. (2009), we calculate the daily volume-weighted average of intraday prices to minimize the effect of bid-ask bounce. Bond prices are then transformed from the daily to monthly frequency using the conversion method suggested by Bai et al. (2019).[5] Our final sample consists of 6,118 bonds issued by 1379 unique firms, with a total of 141,549 bond-month return observations from July 2002 to June 2017.

2.4 Risk Factors

The literature has suggested that the Fama-French three factors, term and default spreads, and liquidity factor are priced in corporate bonds (see Fama and French, 1993; Elton et al., 2001; Lin et al., 2011). To see if economic policy uncertainty is important for bond pricing, we add this variable in the conventional multifactor model:

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[5] Specifically, the monthly returns are calculated for two cases. In the first case, we filter the bonds traded on at least one day in the last five trading days in month *t* and traded on at least one day in the last five trading days in month *t-1*. The prices on the trading days closest to the end of the month are used to calculate the monthly return. In the second case, we filter bonds traded on at least one day in the first five trading days in month *t* and traded on at least one day in the last five trading days in month *t*. The prices on the trading days closest to the beginning and the end of the month are used to calculate the monthly return. If the monthly return can be calculated in both cases, we use the return obtained in the first case.

$$R_{i,t} = \alpha_{i,t} + \beta_{i,t}^{MKT} MKT_t + \beta_{i,t}^{SMB} SMB_t + \beta_{i,t}^{HML} HML_t + \beta_{i,t}^{DEF} DEF_t + \beta_{i,t}^{TERM} TERM_t + \beta_{i,t}^{L} LIQ_t + \beta_{i,t}^{EPU} \Delta EPU_t + \varepsilon_{\mathrm{i,t}}\ , \tag{2}$$

where $R_{i,t}$ is the excess return of bond *i* in month *t*, MKT_t is the stock market excess return, SMB_t is the size factor, HML_t is the book-to-market ratio, DEF_t is the default spread, $TERM_t$ is the term spread, LIQ_t is the liquidity factor, and ΔEPU_t is the economic policy uncertainty factor. Each month betas for individual bonds are estimated from the regression of excess bond returns on conventional bond market factors and the economic policy uncertainty factor (ΔEPU) in (2) over the past 60-months rolling window.

The Fama-French three factors are retrieved from Ken French's website. The default spread (DEF) is the Moody's BAA bond yield minus AAA bond yield. The term spread (TERM) is the yield on the 10-year Treasury bond minus the yield on the three-month Treasury bill, both are collected from the Federal Reserve Board (FRB).

We use the Amihud (2002) index as the liquidity factor. The Amihud illiquidity of an individual bond is estimated monthly by $ILLIQ_{i,t} = \frac{1}{D_{i,t}} \sum_{k=1}^{D_{i,t}} \frac{|r_{i,k,t}|}{Volume_{i,k,t}}$, where $r_{i,k,t}$ is the return of bond *i* on day *k* in month *t*, $Volume_{i,k,t}$ denotes the respective daily volume in dollars, and $D_{i,t}$ is the number of days for which transaction data are available for bond *i*. Illiquidity measures for individual bonds are then aggregated to generate a market-wide illiquidity index, $ILLIQ_{M,t} = \frac{1}{N_t} \sum_{i=1}^{N_t} ILLIQ_{i,t}$, where N_t is the number of bonds with transactions in month *t*. Following Chung, Wang and Wu (2019), we obtain illiquidity innovations based on the following time-series regression:

$$\Delta ILLIQ_{M,t} = \alpha_0 + \phi_1 \Delta ILLIQ_{M,t-1} + \phi_2 \left(\frac{M_{t-1}}{M_1}\right) ILLIQ_{M,t-1} + \varepsilon_t\ , \tag{3}$$

where $\Delta ILLIQ_{M,t} = \left(\frac{M_t}{M_1}\right)(ILLIQ_{M,t} - ILLIQ_{M,t-1})$ and M_t represents the total bond value at the beginning of month *t*. For ease of interpretation for liquidity risk, we add a negative sign to the Amihud index to convert it into a marketwide liquidity measure.

Panel A of Table 2 summarizes bond characteristics. For the full sample, average rating, issue size, maturity, age, and coupon rate are A-, $0.88 billion, 6.69 years, 4.90 years, and 5.55%, respectively. Bond characteristics are used as control variables in empirical tests. Panel B of Table 2 shows summary statistics for risk factors (Market, SMB, HML, DEF, TERM, Amihud Liquidity, ΔEPU, ΔEPU_news, ΔEPU_gov, ΔEPU_cpi, ΔEPU_tax, ΔMU, ΔFU, and ΔVIX). Panel C of Table 2 presents the correlation matrix for the risk factors. The correlation between ΔEPU and Amihud Liquidity is -0.35, indicating that when economic policy uncertainty is high, liquidity is usually low, consistent with the findings of Nagel (2012) and Chung and Chuwonganant (2014) that there is a negative relationship between market liquidity and market uncertainty. The correlations between ΔEPU and ΔMU, ΔFU, ΔVIX are 0.14, 0.17, and 0.28, respectively. The moderate correlations among these variables suggest that they contain different information. Panel D of Table 2 reports bond excess returns, and betas for conventional risk factors and the economic policy uncertainty factor (β_{EPU}).

[Insert Table 2 Here]

3. Empirical Results

In this section, we examine whether policy risk is priced in the cross section of corporate bonds. If policy risk is priced, we next ask the question of whether it is priced in only certain types of corporate bonds or the whole universe. In addition, we assess the ability of policy beta to predict future corporate bond returns and investigate the source of its predictive power. Finally, we examine whether policy risk premia are time-varying and conduct additional tests to check the robustness of our results to different controls and model specifications.

3.1 Univariate Portfolio Analysis

We begin by examining the role played by economic policy uncertainty in driving the cross-sectional differences in expected bond returns using the portfolio analysis of Daniel and Titman (1997) and Gebhardt et al. (2005). The portfolio sort is the most intuitive analysis which allows us to judge how significant is the relation between EPU beta and future bond returns and assess whether policy uncertainty indeed has power to explain the variations in the cross section of expected bond returns. We estimate monthly β_{EPU} using a 60-month rolling window regression that requires at least 15 months of return observations. The EPU beta measures the exposure of individual bonds or return sensitivity to economic policy uncertainty. If the EPU is an important risk factor, we should observe a close relationship between β_{EPU} and expected bond returns.

[Insert Table 3 Here]

Table 3 presents the results of univariate sorts based on the equal-weighted portfolio returns. For each month, corporate bonds are sorted into decile portfolios by their policy betas (β_{EPU}), where decile 1 includes the bonds with the lowest β_{EPU} and decile 10 includes the bonds with the highest β_{EPU}. The first row of Panel A reports average β_{EPU} that increases from -0.08 for decile 1 to 0.08 for decile 10. The 10-1 beta spread is 0.16 with a Newey-West *t*-statistic of 10.04,[6] indicating a wide dispersion in the exposure of bond returns to economic policy uncertainty. The second row in Panel A shows that average excess returns decrease from 1.09% to 0.40% per month, resulting a monthly return spread of -0.69% or 8.28% per annum between deciles 10 and 1 with a *t*-statistic of -2.65, which is of both economic and statistical significance.

The above analysis is based on the excess return which does not take into account the effects of bond rating and maturity. We next adjust returns for these bond characteristics. Bonds are divided into 15 benchmark portfolios by five ratings (AAA, AA, A, BBB, and junk) and three maturities, namely short (less than 5 years), medium (5-10 years) and long (longer than 10 years),

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[6] The standard errors adjusted by Newey and West (1987) are calculated using four lags.

and the average excess return for each portfolio is then calculated. To obtain the returns adjusted for ratings and maturity, we calculate the difference between the return of each bond and the return of the benchmark rating/maturity portfolio to which the bond belongs. Following this, we obtain the equal-weighted average adjusted returns of each portfolio. The results of portfolio sorts are shown in the third row of Panel A. The high-low portfolio adjusted return spread is -0.53% with a t-statistic of -2.41, indicating the negative relationship between bond returns and β_{EPU} is robust to the adjustment for bond maturity and ratings.

To further check robustness of our portfolio analysis to the measure of returns adjusted for the conventional risk factors, we run the Black-Jensen-Scholes (1972) time-series regression of portfolio returns against the Fama-French three factors. The last two rows in Panel A of Table 3 report alphas relative to the FF3-factor model (MKT, SMB, and HML), estimated using excess returns and characteristic-adjusted returns, respectively. As indicated, lower FF-3 alphas are associated with higher EPU betas. The long-short (10-1) portfolio alpha is -0.69% when alpha is estimated using excess returns, and -0.60% when using characteristic-adjusted returns. Both are significant at the 5% level. The results show robustness to conventional risk factors.

Panel B of Table 3 reports the pre-ranking betas and the post-ranking average of each characteristic for each decile. Results show that bonds with lower or more negative β_{EPU} (bonds with higher policy risk) tend to have higher default and term betas and credit risk and smaller firm size.

Overall, there is evidence that economic policy uncertainty has a significant effect on corporate bond pricing. The results suggest that investors are averse to economic policy uncertainty and require compensation for holding corporate bonds which have lower returns when economic policy becomes more uncertain.

3.2 Bivariate Portfolio-Level Analysis

The effect of economic policy uncertainty could be due to other factors and bond characteristics. To further ensure the robustness of results, we control for a battery of cross-sectional effects. Bonds are first sorted into quintiles based on each of these control variables in each month, and within each quintile, they are further sorted into five quintiles by policy uncertainty beta (β_{EPU}). After generating $5^{*}5$ portfolios from the bivariate sort, the return and alpha of each β_{EPU} quintile are averaged across quintile portfolios sorted by each control variable. These average quintile β_{EPU} portfolios have an effective control for differences in other factors and characteristics as each quintile β_{EPU} portfolio has an equal distribution of these factors and characteristics. We then report the average long-short portfolio (highest-β_{EPU} quintile – lowest-β_{EPU} quintile) returns and alphas to assess the robustness of the economic policy uncertainty effect to each control variable.[7]

Table 4 shows that controlling for the market beta, return and alpha spreads between quintiles 5 and 1 are -0.20% and -0.23%, respectively, which are statistically significant. Likewise, the betas of firm size, value-to-market, default spreads, term spreads, and the liquidity factors cannot explain the high (low) returns on the low (high) β_{EPU} bonds. Controlling for β_{SMB}, β_{HML}, β_{DEF}, β_{TERM} , and β_{L}, the average long-short portfolio returns are -0.23%, -0.17%, -0.22%, -0.25%, and -0.23%, respectively and the corresponding Newey-West *t*-statistics are -2.16, -1.79, -2.25, -2.23, and -2.40. A similar pattern is found in long-short portfolio alphas. The results strongly suggest that policy risk has an independent effect over and beyond conventional risk factors.

[Insert Table 4 Here]

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[7] These results are based on characteristic-adjusted returns and alphas relative to the FF3-factor model. Our results are robust to the use of raw excess returns.

The literature has also suggested that bond characteristics can explain cross-sectional variations in bond returns (Gebhardt et al., 2005; Lin et al., 2011) as they can capture the effects of missing risk factors. We next control for bond characteristics. The lower panel of Table 4 shows that after controlling for bond characteristics (credit rating, size, time-to-maturity, age, and coupon), we continue to observe significant return and alpha differences between the high- and low-β_{EPU} quintiles with the range from -0.16% to -0.29% per month.

Furthermore, we analyze the long-short portfolio returns and alphas for each characteristic quintile to check whether the effect of economic policy uncertainty risk may only occur in certain types of bonds. The results (unreported for brevity) show the effect of EPU beta is not concentrated among certain types of bonds. Overall, we find that the effect of economic policy uncertainty is robust to controlling for bond type, characteristics and other risk factors.

3.3 Bond-Level Fama-MacBeth Regressions

The preceding analysis suggests that economic policy uncertainty plays an important role in the cross-section of corporate bond returns. The results are consistent with the hypothesis that higher policy betas are associated with higher expected bond returns. To substantiate this hypothesis, we perform cross-sectional regression tests. An advantage of cross-sectional regression tests is that it permits multiple controls. We run the Fama-MacBeth (1973) regression month-by-month using the following multifactor model:

$$R_{i,t+1} = \lambda_{0,t} + \lambda_{1,t}\beta_{i,t}^{MKT} + \lambda_{2,t}\beta_{i,t}^{SMB} + \lambda_{3,t}\beta_{i,t}^{HML} + \lambda_{4,t}\beta_{i,t}^{DEF} + \lambda_{5,t}\beta_{i,t}^{TERM} + \lambda_{6,t}\beta_{i,t}^{L} + \lambda_{7,t}\beta_{i,t}^{VIX}(/\beta_{i,t}^{MU}/\beta_{i,t}^{FU}) + \lambda_{8,t}\beta_{i,t}^{EPU}(/\beta_{i,t}^{EPU\_res}) + \sum_{k=1}^{K}\lambda_{k,t}Controls_{k,t} + \varepsilon_{i,t+1}\,, \tag{4}$$

where $R_{i,t+1}$ is the excess return on bond *i* in month *t+1*, $\beta_{i,t}^{MKT}$, $\beta_{i,t}^{SMB}$, $\beta_{i,t}^{HML}$, $\beta_{i,t}^{DEF}$, $\beta_{i,t}^{TERM}$, $\beta_{i,t}^{L}$, $\beta_{i,t}^{VIX}$, $\beta_{i,t}^{MU}$, $\beta_{i,t}^{FU}$ and $\beta_{i,t}^{EPU}$ refer to the betas associated with market, size, value, default, term, liquidity, volatility, macroeconomic uncertainty, financial uncertainty, and economic policy uncertainty factors, respectively. $Controls_{k,t}$ includes a set of bond-specific control variables, i.e. credit rating, size, time-to-maturity, age, and coupon. Each variable on the right side of the regression is normalized by the cross-sectional standard deviation each month so that the coefficient of regression is readily interpretable as the premium per unit of standard deviation of each variable.

[Insert Table 5 Here]

Panel A of Table 5 shows the results of Fama-MacBeth regressions with the Newey-West adjusted t-statistics in parentheses. To reveal the role of each variable, we run regressions of different specifications. When we only include the EPU beta, there is a significantly negative relationship between β_{EPU} and the cross-section of future bond returns. The coefficient of β_{EPU} is -0.343 with a t-value of -3.24. In regressions (2)-(5), we add different controls for market, size, value, default, term and liquidity betas and bond characteristics (credit rating, size, time-to-maturity, age, and coupon). Consistent with previous findings (e.g., Lin et al., 2011), the Amihud liquidity beta is significantly related to expected bond returns. The coefficient of β_{EPU} remains negative and highly significant coefficients after these controls, indicating that the predictive power of β_{EPU} is not subsumed by standard risk factors and bond characteristics.

From regressions (6) to (8), we add more controls for volatility, macroeconomic uncertainty and financial uncertainty betas, respectively. Results show that the coefficient of VIX beta, β_{VIX}, is significantly negative, and that of β_L is significantly positive consistent with previous findings (e.g., Lin et al., 2011; Chung et al., 2018). More importantly, the coefficient of β_{EPU} remains negative and highly significant. The results suggest that the economic policy uncertainty factor is priced in bond returns, along with liquidity and volatility risk factors. On the other hand, controlling for the effects of these three risk factors, β_{MU} and β_{FU} are insignificant. The effect of

β_{EPU} is of economic significance. For example, given the estimated coefficient of β_{EPU} in regression (5), a one standard deviation less than the cross-sectional mean of β_{EPU} leads to an increase of 17 bps per month (2.04% per annum) in bond returns.

The economic policy uncertainty index may capture the effect of general economic uncertainty that is not policy related. To address this concern, we follow the procedure in Gulen and Ion (2015) to control for this effect by exploring the close relationship between the Canadian and American economies. Given the intimate relation between the two economies, there should be a strong correlation between their general economic uncertainties in that common economic shocks will induce uncertainty in both countries. Thus, to control for general economic uncertainty, we can extract the component of policy uncertainty ΔEPU_res that is orthogonal to general economic uncertainty by regressing U.S. ΔEPU on the Canadian ΔEPU:

$$US\Delta\mathrm{EPU}_{\mathrm{t}} = CAN\Delta\mathrm{EPU}_{\mathrm{t}} + \varepsilon_{\mathrm{t}}\ , \qquad (5)$$

where the residual ε_t (ΔEPU_res) captures ΔEPU in U.S. that is orthogonal to Canadian ΔEPU. To the extent that both policy innovation variables contain common macroeconomic shocks, the residual should be free from the effect of general economic uncertainty. We then estimate the policy uncertainty beta from the multifactor model by substituting ΔEPU_res for ΔEPU.

The last column in Panel A of Table 5 shows the regression that replaces β_{EPU} with β_{EPU_res}. The cross-sectional relationship between future bond returns and β_{EPU_res} is negative, -0.168, and highly significant with a *t*-statistic of -2.58. The results suggest that EPU contains important information for expected bond returns over and beyond general economic conditions, usual risk factors and bond characteristics.

The analysis has thus far focused on one-month-ahead cross-sectional return predictability. To investigate whether β_{EPU} has predictive power over longer investment horizons, we run the cross-sectional regression with a longer predictive horizon. Panel B of Table 5 shows that the negative relationship between β_{EPU} and future bond returns is not confined to the one-month prediction horizon. When controlling for other risk factors and bond characteristics, β_{EPU} remains negative and highly significant and predict bond returns up to a 15-month horizon.

3.4 Portfolio Analysis and Cross-Sectional Tests on Bond Rating Portfolios

Ratings are arguably the most important risk metric used in the corporate bond market. Institutional and individual investors rely heavily on ratings to make investment and trading decisions. Given that bonds of different ratings vary in risk characteristics, they may have different exposures to economic policy uncertainty and risk-return trade-offs. To explore this possibility, we study the pricing of investment-grade and high-yield bonds, respectively.

[Insert Table 6 Here]

Panel A of Table 6 reports the distribution of β_{EPU} by bond grade. β_{EPU} varies across bonds within each group with a greater dispersion of β_{EPU} for high-yield bonds. Differences in β_{EPU} between the highest and lowest quintile portfolios are all significant at the 1% level. The beta spread increases with credit risk: 0.08 for IG bonds and 0.21 for HY bonds.

Panel B reports characteristic-adjusted returns and risk-adjusted alphas of β_{EPU} portfolios by rating. The (5–1) return spreads are all significant at the conventional level and higher (in absolute terms) for HY bonds. Average return spread is -0.11% per month for IG bonds and -0.78% for HY bonds. The FF-3 alphas on the right panel show a similar pattern for the two groups.

Panel C reports the results of cross-sectional regressions of individual bonds by bond grade. We find that β_{EPU} is priced in both IG and HY bonds. The magnitude of β_{EPU} coefficient is larger for HY bonds, indicating a larger policy risk price for lower credit bonds. The results suggest that investors have higher preference for hedging the risk exposure of riskier bonds, and therefore are willing to receive lower returns for bonds with higher β_{EPU}.

3.5 The Role of EPU Components

By construction, the BBD index is a weighted average of four components: news, taxation, and CPI and government spending forecast dispersions. One question is how each component contributes to the risk premium of economic policy uncertainty. To answer this question, we run cross-sectional regressions similar to Table 5 for each component of the BBD index.

Table 7 reports the results using the components of the BBD index. As shown, only the cross-sectional relationship between $\beta_{\mathrm{EPU\_news}}$ and future bond returns is significantly negative, -0.145, with a *t*-statistics of -2.81. It appears that the news-based component contributes most to the policy risk premium of corporate bonds.

[Insert Table 7 Here]

3.6 Time-Varying Policy Risk Premia

Will the policy risk premium vary over time? To address this issue, we first show that the economic policy risk premium varies with economic conditions. Then, we provide evidence that this premium is countercyclical: higher (lower) during recessions (expansions) and periods of high (low) economic policy uncertainty.

Figure 3 plots the coefficient of β_{EPU} along with the Chicago FED National Activity Index (CFNAI) which measures inflation and economic growth.[8] The solid line presents the three-month moving averages of β_{EPU} coefficients (Column 6 in Table 5) and the dotted line indicates

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[8] The CFNAI refers to the weighted average of 85 monthly economic indicators, which is consistent with the time of economic expansion and contraction. Representing the moving average of CFNAI for three months, CFNAI-MA3 is of certain economic significance, because it is less volatile and the underlying data is more complete. If this value is 0, it means that the national economic growth is the normal average value over the years. If it is less than 0, it implies that the economic growth rate is lower than the average. If it is greater than 0, it means that the economic growth rate is greater than the average. When this value falls below -0.7, it indicates the increasing probability that a recession has begun.

the three-month moving averages of CFNAI index. The two series move closely to each other. When CFNAI-MA3 falls below -0.7, implying that the economy has entered a recession, the slope coefficient becomes quite negative. Regressing β_{EPU} on the CFNAI-MA3 shows a significantly positive coefficient of 0.28 with t equal to 4.02.

[Insert Figure 3 Here]

Table 8 reports the result of subperiod analysis where the median of EPU index is used to define the regimes of high and low economic policy uncertainty. For the regression with controls, the coefficients of β_{EPU} are -0.036 and -0.245, respectively for high and low regimes. Fisher's permutation test shows the difference 0.209 is significant (p-value=0.000). The coefficients of β_{TERM}, β_L, and β_{VIX} are also significantly higher during periods with high economic policy uncertainty. These results suggest that the policy risk premium is higher in times of uncertainty.

[Insert Table 8 Here]

3.7 Robustness Check

We examine the robustness of results to different model specifications. We first employ the model with only the Fama-French five factors to estimate the policy uncertainty beta:

$$R_{i,t} = \alpha_{i,t} + \beta_{i,t}^{MKT} MKT_t + \beta_{i,t}^{SMB} SMB_t + \beta_{i,t}^{HML} HML_t + \beta_{i,t}^{DEF} DEF_t + \beta_{i,t}^{TERM} TERM_t + \beta_{i,t}^{EPU} \Delta EPU_t + \varepsilon_{i,t} , \tag{6}$$

Panel A of Table 9 (Model 1) shows that excess return decreases from 1.17% to 0.45% per month from low to high deciles with a spread of -0.71% (t = -2.72). Characteristic-adjusted return, alpha and adjusted-return alpha spreads are also significantly negative.

[Insert Table 9 Here]

We next add the liquidity and volatility factors to the model to estimate betas:

$$R_{i,t} = \alpha_{i,t} + \beta_{i,t}^{MKT} MKT_t + \beta_{i,t}^{SMB} SMB_t + \beta_{i,t}^{HML} HML_t + \beta_{i,t}^{DEF} DEF_t + \beta_{i,t}^{TERM} TERM_t + \tag{7}$$

$$\beta_{i,t}^{L} LIQ_t + \beta_{i,t}^{VIX} \Delta VIX_t + \beta_{i,t}^{EPU} \Delta EPU_t + \varepsilon_{i,t} ,$$

Panel B of Table 9 (Model 2) shows a similar pattern of return and alpha spreads. Thus, the results are robust to different specifications for the multifactor model.

We have measured excess returns using the one-month Treasury bill rate suggested by the literature (Gebhardt et al., 2005; Bessembinder et al., 2009). However, Treasury bond rates are also affected by shocks to uncertainty (Balduzzi and Moneta (2017)). To address this concern, we use bond returns adjusted by rating and maturity. Table 10 shows that our finding of policy risk pricing is robust to potential endogeneity in Treasury rates.

[Insert Table 10 Here]

4. ΔEPU and Corporate Bond Return Volatility

An important issue is whether and to what extent economy policy uncertainty may drive bond return volatility. To address this issue, we investigate the role of economic policy uncertainty in affecting conditional return volatility using the GARCH-MIDAS model of Engle et al. (2013). This model is an effective framework to estimate expected volatility conditional on the information contained in economic policy uncertainty innovations (ΔEPU). To allow for different volatility processes, we follow Hong, Lin and Wu (2012) to use daily NASD-Bloomberg US Investment-Grade and High-Yield Bond Indexes to estimate the GRACH model. [9] These data are downloaded from Bloomberg. We compute the returns for these indexes by taking the difference in the logarithm between two consecutive values. This sample contains 3,717 daily observations from October 1, 2002 to June 30, 2017.

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[9] These indices are constructed based on actual transaction prices of the active fixed-coupon bonds represented by the Trade Reporting and Compliance Engine (TRACE) system of the NASD that disseminates over-the-counter trades for all publicly traded corporate bonds. The index price refers to the volume-weighted average price generated from TRACE transactions. The index basket excludes zero-coupon and convertible bonds, and bonds set to mature before the last day of the month for which index rebalance occurs.

We use the GARCH–MIDAS model to better cope with data frequency mismatch between corporate bond index data observed daily and macroeconomic ΔEPU variable sampled monthly. Relative to other volatility models, the GARCH-MIDAS model has several advantages. First, using the mixed data sampling (MIDAS) technique, the data of different frequencies can be aligned with minimal information loss by reducing the noise impact of high-frequency data in data filtering. This procedure provides parsimonious parameter estimates when involving data with high frequency. Second, the short-term and long-term components of return volatility can be combined and jointly estimated. When estimating the long-term component of return volatility, not only the information of the low-frequency data can be fully extracted, but also the influence of the intraday information (short-term component) can be filtered. Thus, the impact of ΔEPU on the corporate bond return volatility can be captured effectively using the GARCH-MIDAS model.

Let $g_{i,t}$ and m_t be the short- and long-term variance components, respectively. The short-term volatility component changes at the daily frequency *i*, whereas the long-term component changes at a monthly frequency of *t*. *N*(*t*) is denoted as the number of days in month *t*. In the GARCH-MIDAS framework, the corporate bond market return $r_{i,t}$ on day *i* = 1, 2, ..., *N* in month *t* = 1, 2, ...,T is characterized by the following process:

$$r_{i,t} = \mu + \sqrt{m_t \cdot g_{i,t}}\varepsilon_{i,t} , \qquad (8)$$

where $\varepsilon_{i,t}|\Phi_{\mathrm{i-1,t}} \sim N(0,1)$ and $\Phi_{\mathrm{i-1,t}}$ is the information available up to day *i-1* of period *t*. The short-term variance component $g_{i,t}$ at daily frequency follows the GARCH (1,1) process:

$$g_{i,t} = (1 - \alpha - \beta) + \alpha \frac{\left(r_{i-1,t} - \mu\right)^2}{m_t} + \beta g_{i-1,t} , \qquad (9)$$

with $\alpha > 0$, $\beta > 0$ and $\alpha + \beta < 1$. To accommodate updated information, m is allowed to change daily, instead of being fixed in a month t, and the m component, $m_t^{(rw)}$, is obtained by smoothing realized volatility using a rolling-window MIDAS filter:

$$\log(m_t^{(rw)}) = m + \theta^{(rw)} \Sigma_{k=1}^{K} \varphi_k(w_1, w_2) X_{t-k}^{(rw)}\ , \tag{10}$$

where $X_{t-k}^{(rw)}$ is the covariate (either the realized variance $RV_t^{(rw)} = \Sigma_{i=1}^{N_t} r_{t-i}^2$ or X_{t-k}^{EPU}, the EPU innovation)[10] and K is the number of periods used to smooth volatility. The unrestricted Beta weighting scheme $\varphi_k(w_1, w_2)$ has the following specification:

$$\varphi_k(w_1, w_2) = \frac{\left(\frac{k}{K}\right)^{w_1 - 1} \cdot \left(1 - \frac{k}{K}\right)^{w_2 - 1}}{\Sigma_{j=1}^{K} \left(\frac{j}{K}\right)^{w_1 - 1} \left(1 - \frac{j}{K}\right)^{w_2 - 1}}\ , \forall \text{ k} = 1, \dots, \text{K}. \tag{11}$$

The hump-shaped or convex weights are generated by the Beta weighting schemes. As w_1 is restricted to 1, the weighting schemes guarantee a decaying trend where the rate of decay is determined by parameter w_2.[11]

The restricted weighting schemes can be expressed as

$$\varphi_k(w_2) = \frac{\left(1 - \frac{k}{K}\right)^{w_2 - 1}}{\Sigma_{j=1}^{K} \left(1 - \frac{j}{K}\right)^{w_2 - 1}}\ . \tag{12}$$

The maximum number of K lags is chosen based on information criteria in Conrad and Loch (2015), which is 12 in our estimation. Equations (8)–(12) form a GARCH-MIDAS model for time-varying conditional variance with the parameter space $\Theta = \{\mu, \alpha, \beta, m^{(rw)}, \theta^{(rw)}, w_1, w_2\}$. The conditional return variance can be defined as follows:

$$\sigma_{i,t}^2 = m_t \cdot g_{i,t}. \tag{13}$$

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[10] Since RV is an unbiased and efficient estimator of return volatility, it can be used to predict the future volatility (Andersen et al., 2003; Koopman et al., 2005; Engle et al., 2013; Conrad and Loch, 2015).

[11] w_2 determines the speed of decaying, whereby large values of w_2 generate a rapid decaying pattern. See Engle et al. (2013) and Conrad and Loch (2015) for more details.

Table 11 reports parameter estimates of the GARCH-MIDAS model for corporate bond returns. As shown, nearly all parameters are significant. The sum of α and β deviate from one in a standard GARCH model, which is consistent with Engle and Rangel (2008). The sum of α and β ranges from 0.722 to 0.999 for the RV and ΔEPU, suggesting that the short-term volatility component is mean-reverting to the long-term trend.

[Insert Table 11 Here]

The slope parameters θ, in MIDAS filter are significantly positive, ranging from 0.008 to 0.169 for all cases, indicating that both ΔEPU and RV exert significant influence on long-term corporate bond return volatility. Higher ΔEPU and RV lead to greater future corporate bond market volatility, thereby causing higher market risk.

5. Conclusion

This paper examines the issues of whether economic policy uncertainty is priced in the cross-section of corporate bonds and how economic policy uncertainty affects long-term corporate bond volatility. Economic policy uncertainty is quantified by the uncertainty index of Baker et al. (2016) based on newspaper coverage frequency.

We find that policy risk plays an important role in the pricing of corporate bonds. Economic policy uncertainty exerts a systematic risk on the bond market that carries a significant negative premium. The results suggest that risk averse investors demand bonds that hedge against this risk and are willing to pay higher prices for bonds with positive economic policy uncertainty beta. A long-short trading strategy based on policy beta delivers an 8.28% return per annum, which is of economic significance.

Economic policy uncertainty risk is priced in both investment-grade and high-yield bonds. Riskier bonds have a higher exposure to economic policy uncertainty and carry a larger policy risk premium. Moreover, policy risk premia are time-varying which depends on economic conditions. The policy risk premium tends to be high near business-cycle troughs or in a period with high economic policy uncertainty.

Finally, we uncover new evidence that uncertainty in economic policy drives corporate bond return volatility. Using the GARCH-MIDAS model, we find that heightened economic policy uncertainty has a significantly positive effect on the long-term corporate bond volatility. The results suggest that economic policy uncertainty increases aggregate volatility, which in turn affects the pricing of corporate bonds.

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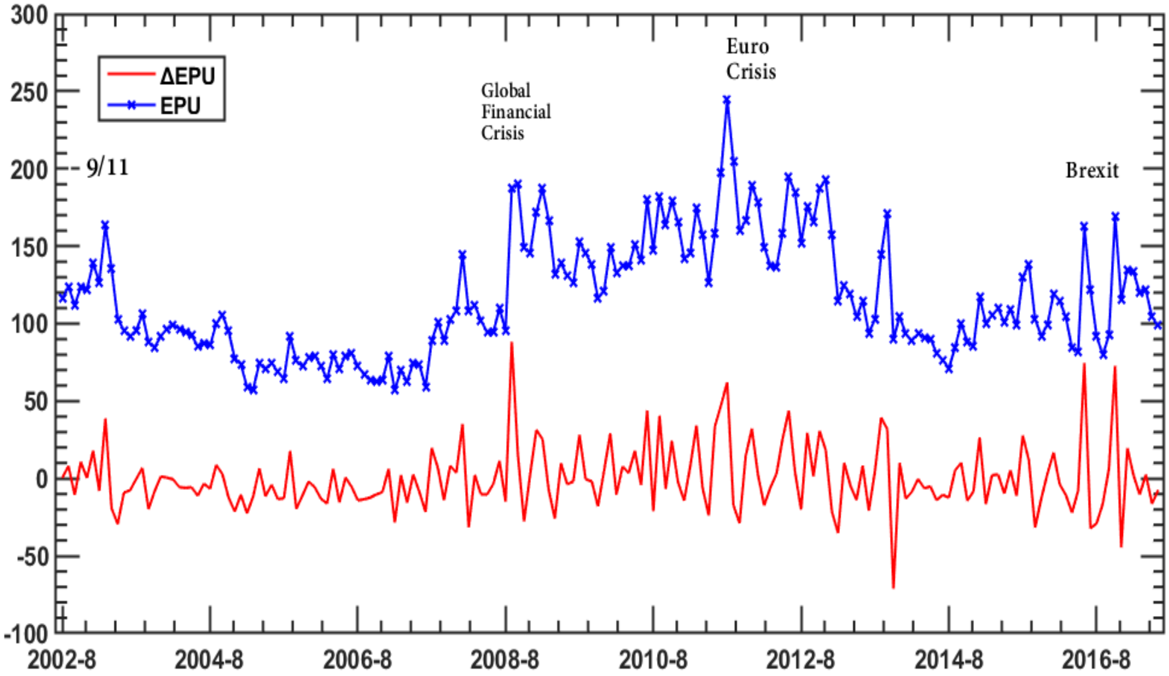

Figure 1. Economic Policy Uncertainty Index (EPU) and Innovation (ΔEPU). The EPU index data for the period July 2002 – June 2017 are extracted from www.policyuncertainty.com.

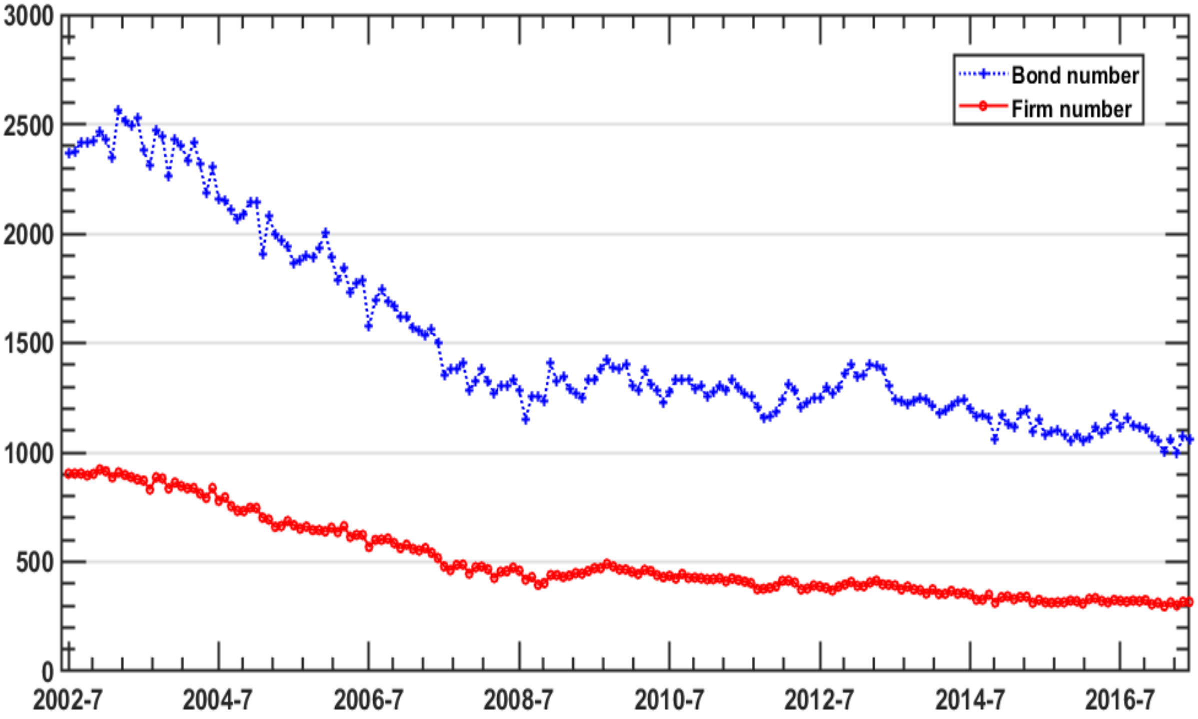

Figure 2. Numbers of bonds and firms for the Enhanced TRACE sample (2002-2017)

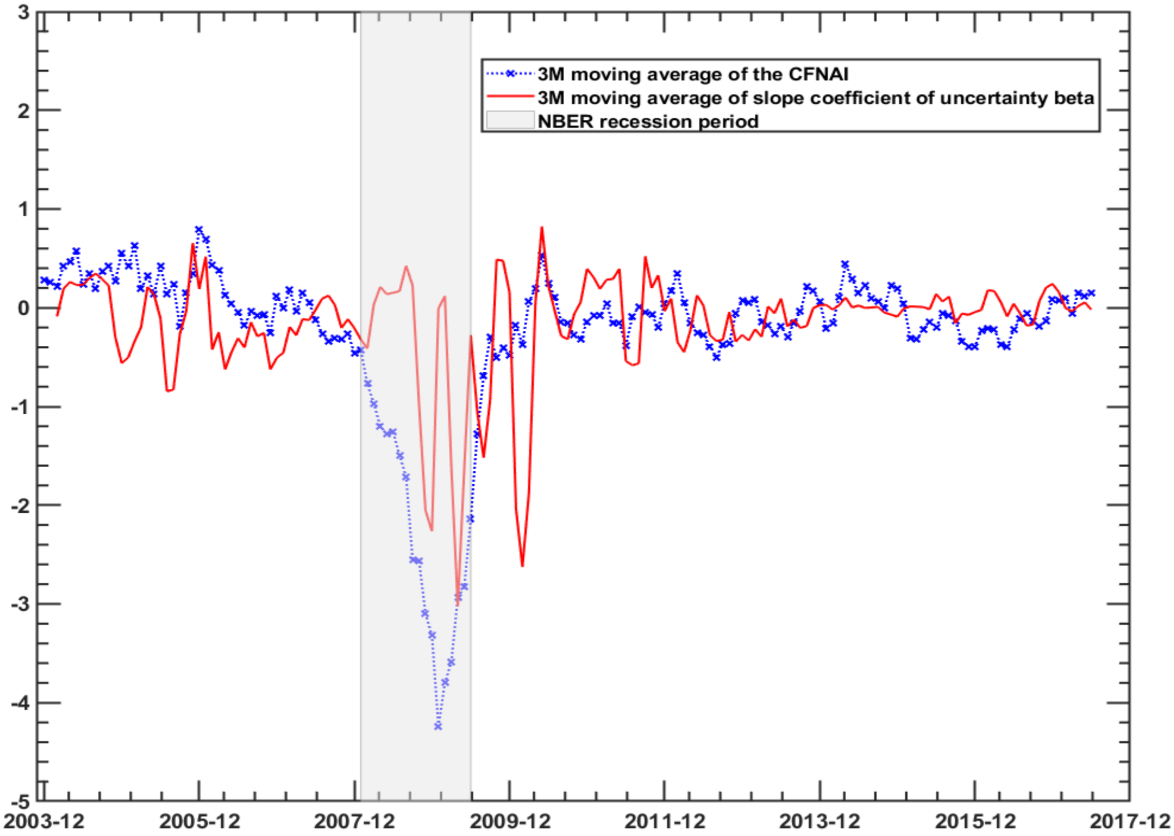

Figure 3. Slope Coefficient of Economic Policy Uncertainty Beta. In this figure, the solid line describes the three-month moving averages of the monthly slope coefficient of the economic uncertainty beta (Column 6 in Table 5) and the dotted line depicts the three-month moving averages of the monthly CFNAI index. The shaded area represents NBER recession periods.

Table 1. Uncertainty Measures

This table shows the information on the various uncertainty proxies over the period of 2002.07-2017.06. Panel A shows the source, sample and type of each uncertainty measure. Panel B shows AR(1) coefficients of each uncertainty series. *EPU_news*, *EPU_gov*, *EPU_cpi*, and *EPU_tax* are the four components of EPU and represent newspaper-based policy uncertainty, fiscal policy uncertainty, monetary policy uncertainty, and tax policy uncertainty, respectively.

Panel A: Some proxies of uncertainty

Name	Source	Sample	Type of uncertainty
EPU	Baker et al.(2016)	2002.07-2017.06	Economic policy
MU	Jurado et al.(2015)	2002.07-2017.06	Macroeconomic
FU	Ludvigson et al.(2018)	2002.07-2017.06	Finance
VIX	CBOE	2002.07-2017.06	Stock market

Panel B: AR(1) coefficients of various proxies of uncertainty

	EPU	EPU_news	EPU_gov	EPU_cpi	EPU_tax	MU	FU	VIX
AR(1)	0.82	0.67	0.95	0.85	0.96	0.98	0.99	0.86

Table 2. Summary Statistics

This table summarizes the data used in our empirical analysis. Panel A reports the cross-sectional mean, median, standard deviation and monthly percentiles of corporate bond characteristics including credit rating, issue size ($billion), time-to-maturity (years), age (years), and coupon rate (%). *Ratings* are in conventional numerical scores, where 1 denotes an AAA rating and 21 stands for a C rating. Panel B reports summary statistics for risk factors, Market, SMB, HML, DEF, TERM, Amihud Liquidity, ΔEPU, ΔEPU_news, ΔEPU_gov, ΔEPU_cpi, ΔEPU_tax, ΔMU, ΔFU, and ΔVIX for the full sample period. *Market*, *SMB*, and *HML* are the Fama-french three factors. The default factor (*DEF*) is the Moody's BAA corporate bond yield minus the Moody's AAA corporate bond yield. The term factor (*TERM*) is the yield on the 10-year Treasury bond minus the yield on the three-month Treasury bill. *Amihud Liquidity* is the corporate bond liquidity factor. *ΔEPU*, *ΔEPU_news*, *ΔEPU_gov*, *ΔEPU_cpi*, and *ΔEPU_tax* are the economic policy uncertainty factor and its four component factors. *ΔMU*, *ΔFU*, and *ΔVIX* are the macroeconomic uncertainty factor, financial uncertainty factor and volatility risk factor, respectively. Panel C reports the time-series factor correlations. Panel D summarizes betas for individual bonds estimated using Regression (2). The sample period is from July 2002 to June 2017.

Panel A: Bond characteristics

	Mean	SD	1st Pctl	Median	99th Pctl
Rating	6.83	3.86	1.00	6.00	21.00
Size	0.88	0.78	0.02	0.65	4.00
Maturity	6.69	6.63	1.05	4.29	28.76
Age	4.90	4.27	0.13	3.66	18.78
Coupon	5.55	1.96	0.85	5.70	9.80

Panel B: Summary statistics of factors

	Mean	SD	1st Pctl	Median	99th Pctl
Market	0.75	4.12	-10.35	1.17	10.19
SMB	0.21	2.29	-4.25	0.20	5.48
HML	0.05	2.50	-7.25	-0.17	7.76
DEF	1.09	0.47	0.57	0.96	3.09
TERM	2.03	1.05	-0.47	2.15	3.68
Amihud Liquidity	0.00	1.00	-4.82	0.15	1.94
ΔEPU	-0.00	21.33	-44.53	-3.77	74.54
ΔEPU_news	-0.06	34.45	-50.10	-8.05	142.00
ΔEPU_gov	-0.01	9.28	-36.41	-0.05	27.01
ΔEPU_cpi	-0.01	14.95	-43.95	-1.10	35.98
ΔEPU_tax	2.00	133.20	-531.26	-4.14	552.20
ΔMU	0.00	0.01	-0.03	-0.00	0.07
ΔFU	-0.00	0.04	-0.09	-0.00	0.13
ΔVIX	-0.06	4.47	-9.67	-0.79	18.89

Panel C: Factor correlations

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Market	1	1.00													
SMB	2	0.34	1.00												
HML	3	0.23	0.14	1.00											
DEF	4	-0.13	0.06	-0.15	1.00										
TERM	5	0.03	0.10	-0.01	0.20	1.00									
Liquidity	6	0.35	0.08	-0.07	-0.10	-0.02	1.00								
ΔEPU	7	-0.24	0.00	0.04	0.10	0.13	-0.35	1.00							
ΔEPU_news	8	-0.23	0.00	0.04	0.11	0.12	-0.36	0.96	1.00						
ΔEPU_gov	9	-0.03	-0.08	-0.12	0.26	0.11	0.09	0.04	0.00	1.00					
ΔEPU_cpi	10	-0.09	0.02	0.04	0.10	0.07	-0.07	0.13	-0.04	-0.03	1.00				
ΔEPU_tax	11	-0.08	0.04	-0.16	0.13	0.10	-0.03	0.18	0.04	0.02	0.04	1.00			
ΔMU	12	-0.29	-0.01	-0.00	-0.06	-0.08	-0.32	0.14	0.16	-0.07	-0.00	0.03	1.00		
ΔFU	13	-0.43	-0.11	-0.04	-0.10	-0.09	-0.41	0.17	0.18	-0.10	0.03	-0.04	0.52	1.00	
ΔVIX	14	-0.79	-0.21	-0.07	0.12	0.07	-0.42	0.28	0.27	-0.02	0.12	0.09	0.27	0.46	1.00

Panel D: Summary statistics of betas

	Mean	SD	1st Pctl	Median	99th Pctl
Return	0.50	4.97	-9.70	0.23	13.04
β_{MKT}	0.13	0.48	-0.49	0.05	2.00
β_{SMB}	-0.12	0.38	-1.24	-0.11	0.98
β_{HML}	0.10	0.46	-0.97	0.06	1.37
β_{DEF}	1.74	4.53	-7.82	1.35	15.06
β_{TERM}	-0.01	1.54	-4.37	0.10	3.36
β_{L}	0.55	1.34	-2.28	0.34	5.15
β_{EPU}	-0.00	0.06	-0.18	0.00	0.16

Table 3. Univariate Portfolios of Corporate Bonds Sorted by Economic Policy Uncertainty Beta

This table reports mean returns, alphas, betas, and bond characteristics for each decile portfolio sorted by economic policy uncertainty beta (β_{EPU}). Decile portfolios are formed each month by sorting individual corporate bonds based on their economic policy uncertainty beta (β_{EPU}) estimated from time-series Regression (2), where decile 1 (10) contains bonds with the lowest (highest) β_{EPU}. The portfolios are equal-weighted. Panel A reports the average β_{EPU}, the next-month average excess return, the characteristic-adjusted return, and the FF3-factor alphas. The last two columns show the differences in average β_{EPU}, monthly average excess returns, monthly average characteristic adjusted returns, and the differences in alphas. The average returns and alphas are defined in monthly percentage terms. Panel B reports average pre-ranking factor betas for each β_{EPU} portfolio, including the market beta (β_{MKT}), the size beta (β_{SMB}), the value beta (β_{HML}), the default beta (β_{DEF}), the term beta (β_{TERM}), and the liquidity beta (β_{L}). Average rating, size ($billion), maturity (years), age (years), and coupon (%) are calculated for each ex-post β_{EPU} portfolio. Newey-West adjusted t-statistics are presented in parentheses. *, **, and *** indicate the significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Mean uncertainty beta, excess returns and alphas of β_{EPU} decile portfolios

	1(Lowest)	2	3	4	5	6	7	8	9	10(Highest)	10-1	t-value
β_{EPU}	-0.08	-0.03	-0.02	-0.01	-0.01	0.00	0.01	0.01	0.03	0.08	0.16^{***}	(10.04)
Return	1.09	0.63	0.46	0.41	0.29	0.23	0.32	0.34	0.33	0.40	-0.69^{***}	(-2.65)
AdjRet	0.32	0.04	-0.02	-0.00	-0.09	-0.13	-0.07	-0.10	-0.14	-0.22	-0.53^{**}	(-2.41)
Return Alpha	0.94	0.43	0.29	0.30	0.18	0.12	0.21	0.24	0.23	0.25	-0.69^{**}	(-2.33)
AdjRet Alpha	0.37	-0.00	-0.05	0.01	-0.10	-0.13	-0.07	-0.08	-0.15	-0.22	-0.60^{**}	(-2.22)

Panel B: Mean values of other betas and bond characteristics of β_{EPU} decile portfolios

	1(Lowest)	2	3	4	5	6	7	8	9	10(Highest)
β_{MKT}	0.20	0.12	0.08	0.06	0.07	0.06	0.08	0.10	0.13	0.16
β_{SMB}	-0.14	-0.11	-0.11	-0.11	-0.11	-0.10	-0.11	-0.13	-0.14	-0.16
β_{HML}	0.14	0.09	0.08	0.07	0.07	0.06	0.07	0.07	0.06	0.07
β_{DEF}	3.24	1.70	1.19	1.04	0.89	0.90	0.89	1.01	1.23	1.30
β_{TERM}	0.10	0.04	0.04	0.02	0.02	0.00	0.01	-0.01	-0.02	-0.03
β_{L}	0.61	0.45	0.41	0.37	0.35	0.38	0.43	0.52	0.63	0.72
Rating	9.16	7.13	6.32	5.88	5.77	5.67	5.91	6.43	7.10	7.30
Size	0.86	1.09	1.09	1.16	1.13	1.11	1.11	1.06	0.99	0.98
Maturity	9.92	7.22	5.84	5.10	4.91	4.86	5.40	6.38	7.27	7.43
Age	7.46	5.87	5.39	5.21	5.21	5.18	5.09	5.13	5.19	5.36
Coupon	6.23	5.70	5.39	5.31	5.29	5.29	5.37	5.50	5.51	5.66

Table 4. Bivariate Portfolio Sorts Controlling for Conventional Risks and Bond Characteristics

This table reports characteristic-adjusted returns and alphas of the BJS (Black, Jensen and Scholes, 1972) time-series regression of the FF3-factor model, using adjusted returns for quintile portfolios with control for various cross-sectional effects. The bonds are first sorted into quintiles on each control variable each month and for bonds within each quintile portfolio, we further sort them into five portfolios on β_{EPU} (estimated using Regression (2)). The five portfolios sorted on are then averaged over each of the five control variable portfolios. All portfolios are rebalanced monthly and equally weighted. Conventional risk variables include β_{MKT}, β_{SMB}, β_{HML}, β_{DEF}, β_{TERM} , and β_{L}. Bond characteristics include credit rating, issue size ($billion), time-to-maturity (years), age (years), and coupon rate (%). The long-short returns/alphas for each characteristic portfolio are reported from 1 to 5. Furthermore, the column "H-L" refers to the long-short returns/alphas of portfolios sorted on β_{EPU}, averaged across characteristic quintiles. Newey-West adjusted t-statistics are reported in parentheses. *, **, and *** indicate the significance at the 10%, 5%, and 1% levels, respectively.

	Long-short returns for each quintile portfolio					Average		Long-short alphas for each quintile portfolio					Average	
Controls	1	2	3	4	5	H-L	*t-value*	1	2	3	4	5	H-L	*t-value*
β_{MKT}	-0.26**	-0.21**	-0.37***	-0.29**	-0.12*	-0.20**	(-2.22)	-0.35**	-0.28**	-0.36***	-0.26**	-0.09*	-0.23**	(-2.10)
β_{SMB}	-0.69***	-0.26**	-0.09	-0.26**	-0.13*	-0.23**	(-2.16)	-0.80***	-0.26**	-0.08	-0.28**	-0.00	-0.28***	(-2.63)
β_{HML}	-0.21**	-0.06	-0.20**	-0.18*	-0.19**	-0.17*	(-1.79)	-0.34**	-0.03	-0.21**	-0.18*	-0.21**	-0.19**	(-2.01)
β_{DEF}	-0.04	-0.26**	-0.29**	-0.17*	-0.34**	-0.22**	(-2.25)	-0.22**	-0.24**	-0.27**	-0.13*	-0.39**	-0.25**	(-2.51)
β_{TERM}	-0.21**	-0.18*	-0.24**	-0.32***	-0.32**	-0.25**	(-2.23)	-0.32***	-0.20*	-0.22**	-0.33**	-0.40**	-0.30***	(-2.62)
β_{L}	-0.02	-0.05	-0.20**	-0.18*	-0.71**	-0.23**	(-2.40)	-0.01	-0.05	-0.18**	-0.15*	-0.89***	-0.25***	(-2.67)
Rating	-0.11**	-0.01	-0.22**	-0.15*	-0.43**	-0.16*	(-1.71)	-0.10**	-0.02	-0.24**	-0.22**	-0.63**	-0.20*	(-1.88)
Size	-0.27**	-0.31*	-0.18*	-0.27**	-0.05	-0.24**	(-2.11)	-0.31**	-0.36**	-0.24**	-0.27**	-0.15*	-0.28**	(-2.15)
Maturity	-0.17*	-0.33***	-0.37**	-0.27**	-0.08	-0.25*	(-1.90)	-0.22**	-0.30**	-0.37**	-0.31**	-0.13*	-0.27**	(-2.05)
Age	-0.16**	-0.05	-0.37**	-0.57***	-0.27**	-0.26***	(-2.64)	-0.20**	-0.01	-0.36**	-0.54**	-0.35**	-0.29***	(-2.71)
Coupon	-0.01	-0.29**	-0.12*	-0.20*	-0.41**	-0.20**	(-2.03)	-0.01	-0.33**	-0.21**	-0.24*	-0.45**	-0.24**	(-2.41)

Table 5. Fama-MacBeth Cross-Sectional Regressions of Individual Bond Returns

This table reports the results of cross-sectional regressions of individual bonds using the Fama-Macbeth method. Panel A reports the time-series averages of the slope coefficients from the cross-sectional regressions of one-month-ahead corporate excess returns (in percentage) on the economic policy uncertainty beta (β_{EPU}), the market beta (β_{MKT}), the size beta (β_{SMB}), the value beta (β_{HML}), the default beta (β_{DEF}), the term beta (β_{TERM}), the liquidity beta (β_{L}), the volatility beta (β_{VIX}), the macroeconomic uncertainty beta (β_{MU}) and the financial uncertainty beta (β_{FU}), with and without controls. Control variables include credit rating, issue size ($billion), time-to-maturity (years), age (years), and coupon rate (%). Panel B shows the results from regressing monthly excess returns against β_{EPU} up to 15-month ahead after controlling for all the other predictive variables. Newey-West adjusted t-statistics are reported in parentheses. *, **, and *** indicate that the coefficients are significant at the 10%, 5%, and 1% levels, respectively.

Panel A: Fama-MacBeth regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept	0.283*	0.224**	0.193*	0.175*	-0.248*	-0.217	-0.297**	-0.274**	-0.223
	(1.85)	(2.07)	(1.70)	(1.72)	(-1.75)	(-1.54)	(-2.12)	(-2.02)	(-1.60)
β_{EPU}	-0.343***	-0.233**	-0.222***	-0.247**	-0.173***	-0.138**	-0.164***	-0.208***	
	(-3.24)	(-2.41)	(-2.74)	(-2.45)	(-2.68)	(-2.35)	(-2.73)	(-3.02)	
β_{EPU_res}									-0.168**
									(-2.58)
β_{MKT}		0.365**	0.404**	0.484**	0.327***	0.383***	0.195*	0.330**	0.406***
		(2.38)	(2.41)	(2.52)	(2.63)	(2.78)	(1.83)	(2.48)	(2.84)
β_{SMB}		0.135**	0.139*	0.134**	0.083	0.085*	0.086	0.103**	0.074
		(2.38)	(1.97)	(2.01)	(1.63)	(1.71)	(1.57)	(2.19)	(1.53)
β_{HML}		-0.119	-0.121*	-0.118*	-0.087	-0.077	-0.063	-0.090	-0.040
		(-1.57)	(-1.73)	(-1.85)	(-1.57)	(-1.34)	(-1.38)	(-1.46)	(-0.79)
β_{DEF}			-0.067	-0.072	-0.033	-0.004	-0.031	0.003	-0.019
			(-0.43)	(-0.49)	(-0.30)	(-0.04)	(-0.33)	(0.03)	(-0.19)
β_{TERM}			0.127	0.132	0.139*	0.152**	0.139*	0.118	0.158**
			(1.50)	(1.50)	(1.73)	(2.15)	(1.82)	(1.64)	(2.10)
β_{L}				0.307**	0.229**	0.234**	0.222**	0.231**	0.246***
				(2.04)	(2.41)	(2.51)	(2.32)	(2.34)	(2.67)
β_{VIX}						-0.174**			-0.200***
						(-2.48)			(-2.63)
β_{MU}							-0.147		
							(-1.14)		
β_{FU}								-0.157	
								(-1.37)	
Rating					0.225	0.222	0.251*	0.222	0.210
					(1.61)	(1.49)	(1.77)	(1.62)	(1.45)
Size					0.023	0.029	0.035	0.027	0.025
					(0.85)	(1.06)	(1.27)	(1.04)	(0.90)
Maturity					0.091*	0.094*	0.102**	0.099*	0.079
					(1.79)	(1.82)	(2.03)	(1.94)	(1.51)
Age					0.019	0.014	0.020	0.013	0.020
					(0.44)	(0.32)	(0.50)	(0.33)	(0.48)
Coupon					0.005	0.001	0.005	0.011	0.001
					(0.13)	(0.03)	(0.14)	(0.29)	(0.02)
Adj.R^2	0.054	0.195	0.236	0.248	0.370	0.380	0.384	0.378	0.380

Panel B: Long-term predictive power of policy beta

	n=3	n=6	n=9	n=12	n=15
Intercept	-0.231*	-0.227	-0.273*	-0.238	-0.080
	(-1.81)	(-1.63)	(-1.85)	(-1.61)	(-0.53)
β_{EPU}	-0.117**	-0.095**	-0.103**	-0.094**	-0.073*
	(-2.19)	(-2.13)	(-2.05)	(-1.99)	(-1.91)
β_{MKT}	0.351**	0.188	0.292**	0.247**	0.207
	(2.28)	(1.51)	(2.27)	(2.01)	(1.65)
β_{SMB}	0.056	0.002	-0.005	-0.004	-0.008
	(0.95)	(0.03)	(-0.07)	(-0.06)	(-0.16)
β_{HML}	-0.102**	-0.070	-0.146**	-0.087	-0.075
	(-2.42)	(-1.29)	(-2.46)	(-1.48)	(-1.33)
β_{DEF}	0.055	0.103	0.023	0.000	0.019
	(0.82)	(1.42)	(0.43)	(0.01)	(0.26)
β_{TERM}	0.093	0.054	0.005	0.101**	0.021
	(1.27)	(0.85)	(0.11)	(2.31)	(0.29)
β_{L}	0.188**	0.164**	0.106	0.132	0.198**
	(2.01)	(2.04)	(1.11)	(1.54)	(2.20)
β_{VIX}	-0.112	-0.116*	-0.090	-0.097	-0.119
	(-1.62)	(-1.86)	(-1.44)	(-1.53)	(-1.36)
Rating	0.256*	0.311*	0.312**	0.291**	0.239*
	(1.73)	(1.92)	(2.06)	(2.03)	(1.85)
Size	0.037	0.044	0.036	0.028	0.033
	(1.31)	(1.41)	(1.17)	(0.87)	(1.08)
Maturity	0.090*	0.089	0.098*	0.091	0.082
	(1.73)	(1.59)	(1.72)	(1.62)	(1.47)
Age	0.041	0.025	0.017	0.016	0.013
	(0.88)	(0.52)	(0.32)	(0.34)	(0.26)
Coupon	-0.013	-0.027	-0.012	-0.012	-0.025
	(-0.30)	(-0.75)	(-0.27)	(-0.27)	(-0.51)
Adj.R^2	0.369	0.361	0.355	0.342	0.334

Table 6. Portfolio Analysis and Cross-Sectional Tests by Bond Grade

This table reports average β_{EPU} (Panel A) and monthly characteristic-adjusted returns and alphas (Panel B) of each quintile portfolio by rating, and the cross-sectional regression results (Panel C) for each rating portfolio using the Fama-Macbeth method. The bonds are first sorted into rating portfolios (IG and HY) each month and for bonds within each rating portfolio, we further sort them into five portfolios on β_{EPU} (estimated using Regression (2)). All portfolios are rebalanced monthly and equally weighted. The column "5-1" refers to the difference in monthly returns between portfolio 5 (highest β_{EPU}) and portfolio 1 (lowest β_{EPU}). Newey-West adjusted t-statistics are reported in parentheses. *, **, and *** indicate that the coefficients are significant at the 10%, 5%, and 1% levels, respectively.

Panel A: Distribution of β_{EPU} by bond grade

β_{EPU}	1	2	3	4	5	5-1	t-value
IG	-0.05	-0.01	-0.00	0.01	0.04	0.08^{***}	(11.52)
HY	-0.09	-0.02	0.01	0.04	0.11	0.21^{***}	(10.11)

Panel B: Returns of β_{EPU} portfolios by bond grade

	Characteristic-adjusted returns							Alphas						
Rating	1	2	3	4	5	5-1	*t-value*	1	2	3	4	5	5-1	*t-value*
IG	0.06	0.03	-0.06	-0.05	-0.05	-0.11^{*}	(-1.72)	0.05	0.03	-0.07	-0.03	-0.05	-0.10	(-1.02)
HY	0.64	-0.15	-0.13	-0.14	-0.14	-0.78^{**}	(-1.99)	0.77	-0.19	-0.18	-0.19	-0.20	-0.97^{*}	(-1.87)

Panel C: Cross-sectional regressions of individual bonds by bond grade

	Intercept	β_{EPU}	β_{MKT}	β_{SMB}	β_{HML}	β_{DEF}	β_{TERM}	β_{L}	Rating	Size	Maturity	Age	Coupon	Adj.R^2
IG	-0.035	-0.101^{*}	0.060	0.041	-0.021	-0.094	0.011	0.169^{*}	0.108	0.015^{*}	0.111^{**}	0.010	0.010	0.388
	(-0.56)	(-1.68)	(1.15)	(1.47)	(-0.70)	(-1.52)	(0.23)	(1.70)	(1.21)	(1.72)	(2.13)	(0.68)	(0.63)	
HY	-3.554^{*}	-0.293^{**}	0.458^{**}	0.088	-0.172	-0.010	0.424^{**}	0.074	0.886^{**}	-0.152	0.095	-0.008	0.235	0.513
	(-1.97)	(-2.06)	(2.43)	(1.31)	(-1.53)	(-0.06)	(2.40)	(0.68)	(2.11)	(-1.14)	(0.87)	(-0.06)	(1.62)	

Table 7. The Role of Different Policy Uncertainty Components

This table reports the time-series averages of the slope coefficients from the Fama and MacBeth (1973) cross-sectional regressions of one-month-ahead corporate excess returns (in percentage) on the newspaper-based policy uncertainty beta (β_{EPU_news}), the fiscal policy uncertainty beta (β_{EPU_gov}), the monetary policy uncertainty beta (β_{EPU_cpi}), and the tax policy uncertainty beta (β_{EPU_tax}), respectively, controlling for the market beta (β_{MKT}), the size beta (β_{SMB}), the value beta (β_{HML}), the default beta (β_{DEF}), the term beta (β_{TERM}), the liquidity beta (β_{L}), the volatility beta (β_{VIX}), and bond characteristics (credit rating, size, time-to-maturity, age, and coupon). Newey-West adjusted t-statistics are reported in parentheses. *, **, and *** indicate that the coefficients are significant at the 10%, 5%, and 1% levels, respectively.

Variables	(1)	(2)	(3)	(4)
Intercept	-0.208	-0.193	-0.210	-0.206
	(-1.49)	(-1.35)	(-1.48)	(-1.50)
β_{EPU_news}	-0.145***			
	(-2.81)			
β_{EPU_gov}		-0.004		
		(-0.05)		
β_{EPU_cpi}			-0.008	
			(-0.16)	
β_{EPU_tax}				0.048
				(1.44)
β_{MKT}	0.386***	0.399***	0.399***	0.452***
	(2.74)	(2.96)	(2.82)	(2.86)
β_{SMB}	0.085*	0.080	0.076	0.059
	(1.71)	(1.52)	(1.49)	(1.07)
β_{HML}	-0.077	-0.111	-0.159*	-0.130*
	(-1.35)	(-1.46)	(-1.89)	(-1.80)
β_{DEF}	-0.009	0.016	-0.028	-0.021
	(-0.08)	(0.12)	(-0.24)	(-0.19)
β_{TERM}	0.153**	0.157**	0.112*	0.140**
	(2.08)	(2.34)	(1.72)	(2.08)
β_{L}	0.235**	0.284**	0.269**	0.273**
	(2.49)	(2.40)	(2.49)	(2.44)
β_{VIX}	-0.176**	-0.231***	-0.217***	-0.249**
	(-2.47)	(-2.68)	(-2.62)	(-2.52)
Rating	0.228	0.184	0.227	0.212
	(1.53)	(1.35)	(1.53)	(1.51)
Size	0.029	0.020	0.032	0.026
	(1.07)	(0.83)	(1.20)	(1.00)
Maturity	0.091*	0.100*	0.092*	0.083
	(1.75)	(1.86)	(1.75)	(1.60)
Age	0.010	0.016	0.026	0.034
	(0.23)	(0.33)	(0.55)	(0.75)
Coupon	0.000	0.009	0.000	-0.008
	(0.00)	(0.22)	(0.00)	(-0.22)
Adj.R^2	0.379	0.381	0.380	0.376

Table 8. Time-Varying Policy Risk Premia

This table reports the time-series averages of the slope coefficients from the Fama and MacBeth (1973) cross-sectional regressions of one-month-ahead corporate excess returns (in percentage) on the economic policy uncertainty beta (β_{EPU}), the market beta (β_{MKT}), the size beta (β_{SMB}), the value beta (β_{HML}), the default beta (β_{DEF}), the term beta (β_{TERM}), the liquidity beta (β_{L}), and the volatility beta (β_{VIX}) with and without controls. Control variables include credit rating, issue size ($billion), time-to-maturity (years), age (years), and coupon rate (%). The median of EPU index is used to determine the high vs. low economic policy uncertainty periods. Newey-West adjusted t-statistics are reported in parentheses. *, **, and *** indicate that the coefficients are significant at the 10%, 5%, and 1% levels, respectively.

	Low uncertainty (EPU≤ median)		High uncertainty (EPU>median)	
	(1)	(2)	(3)	(4)
Intercept	0.108*	-0.090	0.280	-0.352
	(1.70)	(-1.30)	(1.41)	(-1.22)
β_{EPU}	-0.049*	-0.036	-0.328**	-0.245**
	(-1.68)	(-1.31)	(-2.33)	(-2.31)
β_{MKT}	0.304*	0.229	0.788**	0.548**
	(1.87)	(1.41)	(2.19)	(2.57)
β_{SMB}	0.154**	0.157**	0.131	0.008
	(2.08)	(2.30)	(1.13)	(0.11)
β_{HML}	0.012	0.010	-0.197*	-0.170*
	(0.24)	(0.22)	(-1.78)	(-1.67)
β_{DEF}	0.010	0.005	-0.002	-0.014
	(0.24)	(0.11)	(-0.01)	(-0.07)
β_{TERM}	0.068	0.056	0.257**	0.253**
	(1.26)	(1.06)	(2.14)	(2.05)
β_{L}	0.071	0.037	0.638**	0.443***
	(1.38)	(0.86)	(2.33)	(2.86)
β_{VIX}	-0.101*	-0.081	-0.414	-0.273**
	(-1.78)	(-1.58)	(-1.49)	(-2.10)
Rating		0.079		0.373
		(1.58)		(1.35)
Size		-0.011		0.072
		(-0.85)		(1.45)
Maturity		0.068		0.122
		(1.16)		(1.52)
Age		-0.017		0.047
		(-0.67)		(0.53)
Coupon		0.024		-0.023
		(1.17)		(-0.32)
Adj.R^2	0.284	0.410	0.235	0.348
Fisher's permutation test (1000 times) for β_{EPU}:			(1) vs. (3): 0.279 (p-value=0.009) (2) vs. (4): 0.209 (p-value=0.000)	

Table 9. Univariate Portfolio Sorts by Policy Beta Estimated from Alternative Models

This table reports mean returns and alphas for each decile portfolio sorted by economic policy uncertainty beta (β_{EPU}). Decile portfolios are formed each month by sorting individual corporate bonds based on their economic policy uncertainty beta (β_{EPU}) estimated from two alternative time-series regression models: Model 1 (see Regression (6)) and Model 2 (see Regression (7)). Decile 1 is the portfolio with the lowest β_{EPU} and Decile 10 is the portfolio with the highest β_{EPU}. The portfolios are equal-weighted. Panel A and Panel B report the average β_{EPU}, the next-month average excess return, the characteristic-adjusted return, and the FF3-factor alphas for each decile. The last two columns show the difference in monthly average excess returns, monthly average characteristic adjusted returns, and the differences in alphas. Newey-West adjusted t-statistics are reported in parentheses. *, **, and *** indicate the significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Model 1

	1(Lowest)	2	3	4	5	6	7	8	9	10(Highest)	10-1	t-value
β_{EPU}	-0.09	-0.04	-0.02	-0.01	-0.01	-0.00	0.00	0.01	0.02	0.07		
Return	1.17	0.50	0.48	0.42	0.31	0.27	0.30	0.30	0.33	0.45	-0.71***	-2.72
AdjRet	0.38	-0.05	0.01	-0.00	-0.08	-0.12	-0.10	-0.14	-0.13	-0.12	-0.50**	-2.45
Return Alpha	1.03	0.31	0.30	0.27	0.17	0.14	0.19	0.19	0.22	0.34	-0.69**	-2.25
AdjRet Alpha	0.46	-0.07	-0.02	-0.03	-0.10	-0.13	-0.10	-0.13	-0.11	-0.10	-0.56**	-2.12

Panel B: Model 2

	1(Lowest)	2	3	4	5	6	7	8	9	10(Highest)	10-1	t-value
β_{EPU}	-0.09	-0.03	-0.02	-0.01	-0.01	-0.00	0.00	0.01	0.03	0.08		
Return	1.10	0.65	0.47	0.41	0.30	0.23	0.28	0.33	0.36	0.40	-0.70***	-2.80
AdjRet	0.31	0.02	0.01	0.00	-0.07	-0.15	-0.09	-0.12	-0.18	-0.19	-0.50**	-2.50
Return Alpha	0.95	0.46	0.30	0.30	0.19	0.11	0.18	0.21	0.23	0.26	-0.69**	-2.50
AdjRet Alpha	0.37	-0.01	-0.03	0.02	-0.07	-0.17	-0.08	-0.13	-0.17	-0.18	-0.54**	-2.32

Table 10. Cross-Sectional Regressions of Characteristic-Adjusted Returns

This table reports the time-series averages of the slope coefficients from the cross-sectional regressions of one-month-ahead characteristic-adjusted bond returns (in percentage) on the betas associated with economic policy uncertainty (β_{EPU}), market returns (β_{MKT}), firm size (β_{SMB}), book-to-market ratio (β_{HML}), default spreads (β_{DEF}), term spreads (β_{TERM}), liquidity factor (β_{L}), volatility factor (β_{VIX}), macroeconomic uncertainty (β_{MU}) and financial market uncertainty (β_{FU}), with and without controls. Control variables include credit ratings, issue size (\$billion), time-to-maturity (years), age (years), and coupon rates (%). Newey-West adjusted t-statistics are reported in parentheses. The signs *, **, and *** indicate that the coefficients are significant at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept	-0.038**	-0.049***	-0.043**	-0.041**	-0.194	-0.175	-0.170	-0.197	-0.188
	(-2.56)	(-2.67)	(-2.45)	(-2.39)	(-1.51)	(-1.37)	(-1.42)	(-1.61)	(-1.50)
β_{EPU}	-0.216***	-0.152**	-0.123***	-0.151***	-0.142***	-0.095**	-0.129***	-0.177***	
	(-2.74)	(-2.35)	(-2.69)	(-2.63)	(-2.62)	(-2.16)	(-2.64)	(-2.98)	
β_{EPU_res}									-0.140***
									(-2.73)
β_{MKT}		0.168**	0.186**	0.253**	0.261**	0.357***	0.181*	0.273**	0.369***
		(2.22)	(2.35)	(2.46)	(2.53)	(2.97)	(1.77)	(2.39)	(3.00)
β_{SMB}		0.065	0.079*	0.068	0.069	0.101**	0.067	0.070	0.095**
		(1.19)	(1.71)	(1.52)	(1.53)	(2.39)	(1.32)	(1.60)	(2.38)
β_{HML}		-0.144*	-0.115	-0.113*	-0.121*	-0.102	-0.105*	-0.134*	-0.065
		(-1.80)	(-1.55)	(-1.82)	(-1.89)	(-1.61)	(-1.80)	(-1.89)	(-1.12)
β_{DEF}			-0.031	-0.050	-0.039	-0.020	-0.053	-0.019	-0.041
			(-0.22)	(-0.41)	(-0.33)	(-0.17)	(-0.50)	(-0.17)	(-0.37)
β_{TERM}			0.161*	0.166*	0.171*	0.149*	0.155*	0.117*	0.149*
			(1.82)	(1.77)	(1.84)	(1.79)	(1.84)	(1.67)	(1.69)
β_{L}				0.167**	0.161**	0.178**	0.168*	0.198**	0.190**
				(2.02)	(2.05)	(2.39)	(1.97)	(2.24)	(2.56)
β_{VIX}						-0.151**			-0.165***
						(-2.37)			(-2.61)
β_{MU}							-0.104		
							(-0.98)		
β_{FU}								-0.103	
								(-1.05)	
Rating					0.050	0.044	0.050	0.045	0.041
					(1.37)	(1.15)	(1.38)	(1.27)	(1.13)
Size					0.028	0.033	0.036	0.031	0.030
					(0.90)	(1.06)	(1.18)	(1.00)	(0.98)
Maturity					0.006	0.006	0.013	0.009	0.001
					(0.45)	(0.43)	(0.84)	(0.60)	(0.08)
Age					0.002	-0.006	0.005	0.002	-0.005
					(0.05)	(-0.20)	(0.18)	(0.08)	(-0.16)
Coupon					0.016	0.015	0.005	0.016	0.019
					(0.62)	(0.52)	(0.19)	(0.67)	(0.71)
Adj.R^{2}	0.038	0.131	0.183	0.194	0.225	0.238	0.242	0.232	0.237

Table 11. GARCH-MIDAS Model Parameter Estimates

This table reports the estimates of the GARCH-MIDAS-X coefficients for corporate bond returns. The sample period is from October 1, 2002 to July 31, 2017. Twelve lags are used in the MIDAS equation and w_1 is set to 1, indicating the optimal weights are monotonically decreasing over the lags. *RV* denotes realized variance and *ΔEPU* represents EPU innovations. Panel A shows the results for return variance for the investment-grade bonds and Panel B reports the results of the high-yield bonds. AIC represents the Akaike information criterion, BIC represents Bayesian information criterion and LLF is the log-likelihood function. The numbers in parentheses are the p-values. The signs *, **, and *** indicate that the coefficients are significant at the 10%, 5%, and 1% levels, respectively.

Panel A. IG bond return

Model	μ	α	β	m	θ^X	w_2^X	LLF	AIC	BIC
RV	0.009***	0.111***	0.611***	0.048***	0.169***	15.870***	3919.49	-7826.99	-7789.66
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			
ΔEPU	0.009***	0.052***	0.935***	-4.926***	0.008***	49.996*	3910.54	-7809.08	-7771.75
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.073)			

Panel B. HY bond return

Model	μ	α	β	m	θ^X	w_2^X	LLF	AIC	BIC
RV	0.020***	0.116***	0.883***	0.000	0.025***	1.006***	2451.42	-4890.84	-4853.52
	(0.000)	(0.000)	(0.000)	(0.999)	(0.000)	(0.000)			
ΔEPU	0.021***	0.259***	0.733***	-2.842***	0.014***	16.312*	2575.97	-5139.94	-5102.62
	(0.000)	(0.000)	(0.000)	(0.000)	(0.005)	(0.096)			