Policy Uncertainty and Asset Pricing*

Brenno Sá†
FGV EPGE

Rafael Vetromille‡
FGV EPGE

March 20, 2024

Abstract

This paper aims to empirically examine the relationship between EPU and asset prices, with a specific focus on exploring the existence of a negative (or positive) risk premium associated with this factor. We find that firms with lower EPU beta, indicating a lower correlation to economic policy uncertainty, exhibit, on average, higher excess returns compared to their counterparts with higher exposure to EPU. Moreover, we find that a portfolio long on stocks that have low EPU Beta and short on stocks with high IIE beta, generate risk-adjusted return of 0.85% per month or almost 10.7% per year, controlling for market, size, book-to-market and momentum. We also find negative and significant alphas for the equal and value-weighted portfolios and a positive and significant risk premium.

Keywords: Asset pricing. Political uncertainty. Cross-section of stock returns. Risk premium
JEL: G11, G12, G18.

*We thank our advisor Felipe Iachan for his guidance and support throughout this research.

†FGV EPGE Escola Brasileira de Economia e Finanças, Fundação Getulio Vargas; brenno.goncalves@fgv.edu.br. This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001.

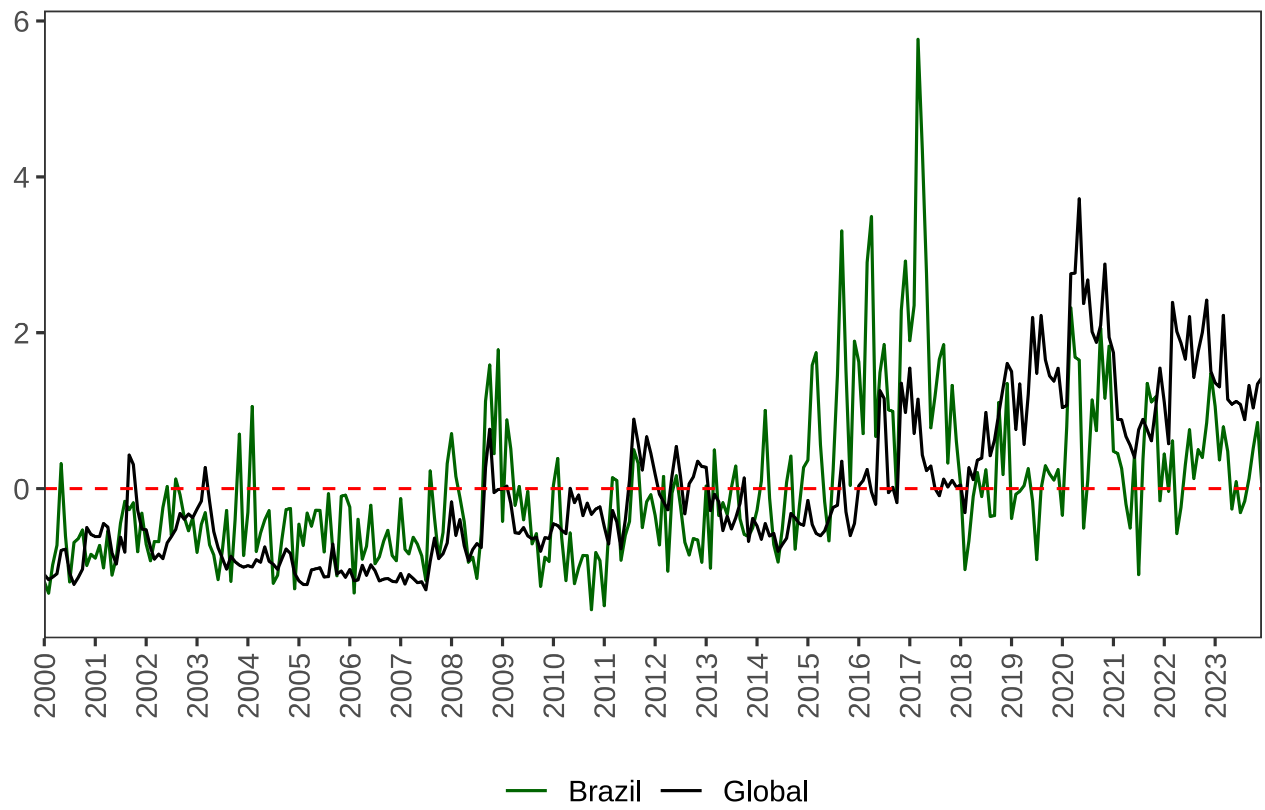
‡FGV EPGE Escola Brasileira de Economia e Finanças, Fundação Getulio Vargas; rafael.vetromille@fgv.br. This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001.

1 Introduction

Asset prices and political decisions have always been linked. Whether it is a presidential speech, a congress meeting or a central bank decision, they all reverberate in the financial markets, with prices going up or down and these market shifts affect agents' decisions. To measure such uncertainty, Baker et al. (2016), created a measure called Economic Policy Uncertainty (EPU), where they calculate the frequency of news about policy uncertainty in major newspapers, looking for keywords such as economy, policy and uncertainty in these articles.

The primary objective of this work is to empirically examine the previous propositions within the context of the Brazilian market a check if economic policy uncertainty is a priced factor. We can observe in Figure 1, where we have the standardized Brazilian and global EPU, that Brazil exhibits an index with higher volatility. This makes it interesting to understand how this risk is understood and priced in the Brazilian stock market.

Figure 1: EPU and Recessions



Notes: This figure illustrates the time-series data of Brazil's and Global Economic Policy Uncertainty Index (EPU) from January 2000 to December 2023, standardized for this period to have a mean of 0 and a standard deviation of 1. Data from Baker et al. (2016)'s website.

Specifically, our focus revolves around investigating the presence of a negative (or positive) risk premium associated with economic policy uncertainty (EPU) in Brazil. The notion of a negative risk premium posits that investors demand higher expected returns in compensation for exposure to heightened economic policy uncertainty. Additionally, we want to assess the predictive power of EPU in the Brazilian market, exploring whether variations in economic policy uncertainty can serve as a reliable indicator for future returns.

We find that an increase in EPU leads to a decrease in returns. We also find evidence that the EPU helps forecast returns at the 2, 3 and 12-month horizon.

In order to assess the risk premium in Brazil, we created 5 portfolios sorted on the firms exposure to the EPU, β^{EPU}, by doing a 36-month rolling regression of the firms' excess returns on the EPU and other control variables, such as market excess return, SMB (size factor), HML (book-to-market factor, WML (momentum factor) and IML (illiquidity factor) and also a High-Low portfolio, which is the difference between the highest and lowest β^{EPU} portfolios. We find that stocks on the lowest percentile portfolio generate up to 8.21% more annual returns than stocks in the highest percentile portfolio. These results are consistent with Pástor and Veronesi (2013) theoretical framework, where investors would demand a higher compensation for holding stocks that are negatively correlated to the EPU.

After creating these portfolios, we test to see if there is significant alpha for three different models, Sharpe (1964); Lintner (1965) CAPM, Fama and French (1992, 1993) three factor model, Carhart (1997) four factor model and Pástor and Stambaugh (2003) model. We find negative alphas for both the equal and value-weighted High-Low portfolios,with all equal-weighted portfolio alphas being statistically significant. This implies that stocks in the portfolio with lower correlation to the EPU generate approximately 8% higher returns on average than stocks in the portfolio with higher correlation.

We also tested the stock characteristics, to find out how the β^{EPU} is related to the characteristics. We find that firms with higher β^{EPU} have lower market cap and lower book-to-market while momentum doesn't have an impact. Lastly, to test for the risk premium, we use Fama and MacBeth (1973) regressions on the stocks excess returns. We find a negative risk premium implying that a portfolio long on stocks that have a low EPU beta and short on stocks that have a high EPU beta, generates a return of almost 1.12% in the following month, controlling for market, size, book-to-market and momentum.

Related Literature. Pástor and Veronesi (2013) use the EPU as the empirical counterpart to their theoretical model where they show that stock prices react to political news. In their paper, they show that political shocks lead to a risk premium, where the agents demand a higher compensation for bearing uncertainty about the future. They argument that during weaker economic conditions, like a recession for example, the political uncertainty is higher. This is due to an increased likelihood of government policy changes, adding an element of uncertainty regarding the adoption of specific new policies. The impact of political uncertainty extends to the stock market, contributing to an elevated volatility as political signals gain greater significance. Also, since the political uncertainty affects all firms, their returns are more correlated. This results in a risk premium, as political uncertainty is a non-diversifiable risk. The influence of political uncertainty on stock prices is more pronounced during economic downturns, because the agents don't know which new policy the government will adopt, leading to a stronger response to political signs.

Bali et al. (2017) tries to show empirically that economic uncertainty is important in the cross-section of stock returns. They estimate stock exposure to an uncertainty index. The index they use is developed by Jurado et al. (2015). They create portfolios sorted by the uncertainty β from regressing firms' excess returns on the uncertainty index and other controls. They find that stocks in the lowest decile generate 6% more annualized risk-adjusted return than stocks in the highest decile, in line with Pástor and Veronesi (2013) theoretical findings.

Another work that also corroborates with Pástor and Veronesi (2013) model, is from Brogaard and Detzel (2015). Similar to the previous work, they use the EPU to test the impact of economic policy uncertainty on the time series and cross section of asset prices. To do so, they create factor-mimicking portfolios following Breeden et al. (1989) and Ang et al. (2006) to measure the stocks exposure to the EPU. They also find a negative risk premium associated with the EPU and that the portfolio with highest β^{EPU} underperforms the lowest β^{EPU} portfolio by 5.53% per annum. Once again, confirming Pástor and Veronesi (2013) findings.

The results mentioned above are consistent with Merton (1973) and his ICAPM model, in which he states that changes in the future opportunity set affect agents demands. Therefore, changes in economic uncertainty are relevant, because they change future consumption and investment decisions.

Two recent works for the Chinese market disagree with the previous ones. The first, Chen et al. (2017), does a similar exercise as Brogaard and Detzel (2015), to test the predictive power of the EPU. They find that EPU negatively forecasts the Chinese market return, while Brogaard and Detzel (2015) finds a positive relation for the US.

The other work, Li (2017), shows that for China, the outcome is quite different, in fact, they are the opposite from the American case. He argues that, in the Chinese market, stocks with a higher β^{EPU} earn higher average returns than stocks with low β^{EPU}, leading to a positive risk premium rather than a negative risk premium, as seen both in theory and empirically for the US. According to the author, this is because the Chinese market is dominated by speculative trading, where the investors' decisions are irrational and therefore, the ICAPM idea that stocks that covariate positively with the EPU leads to lower returns cannot be applied to China.

Roadmap. The rest of the paper is organized as follows. Section 2 will address the theoretical evidence behind political uncertainty and risk premium. Section 3 describes the data used in our estimations. Section 4 tests for the predictive power of the EPU on stock returns and describes the portfolio construction. Section 5 tests for the risk premium of the stocks. Section 7 concludes the paper.

2 Theoretical Evidence

In his seminal paper, Merton (1973) states that in an intertemporal model, the agents demands are affected by changes in the future investment opportunities. The equilibrium between risk and return is given by the following:

$$E_t(R_{i,t+1} - R^f_{t+1}) = A \cdot Cov_t(R_{i,t+1}, R^m_{t+1}) + B \cdot Cov_t(R_{i,t+1}, X_{t+1}) \tag{1}$$

where $R_{i,t+1} - R^f_{t+1}$ is the excess return on asset i, R^m_{t+1} is the market return and X_{t+1} is a vector of state variables that shift the opportunities set, A signifies the relative risk aversion of market investors, while B denotes the covariance of the price of risk concerning alterations in the state variables. $Cov_t(R_{i,t+1}, R^m_{t+1})$ is the covariance between $R_{i,t+1}$ and R^m_{t+1} at time t, whichl means that the covariances depend on the information available at the time t. From the equation above, we can see that investors are compensated by bearing both market risk and risk related to shifts in the state variables.

Since the EPU measures policy uncertainty, increases in the EPU might affect future investment opportunities. In order to protect themselves, investors would rather hold assets that covariate positively with the EPU in spite of assets that covariate negatively with the EPU. Therefore, in order to compensate the investors that hold these risky assets, they would demand a premium.

Pástor and Veronesi (2013) explore this dynamic in their work and show us that political uncertainty is a relevant state variable that shifts the investment opportunity set. They construct a general equilibrium model that illustrates how political shocks influence asset prices. Changes in the government policy decision are the source of political uncertainty and these can be viewed as uncertainty about future government decisions. In their model, stock returns are influenced by three different shocks: economic shocks, political shocks and firm-specific shocks. Firm-specific shocks do not command a risk premium because they can be diversified. To the authors, the risk premium associated with policy uncertainty is what they call political risk premium and it compensates investors for the uncertainty about future policy decisions. They find that during weak economic conditions, the risk premium is mostly driven by the political shocks. In order to test the results of their model, they use the EPU as a proxy for political uncertainty and find evidence that corroborates with their model, where political risk commands a risk premium and this risk premium is higher during poor economic conditions.

3 Data

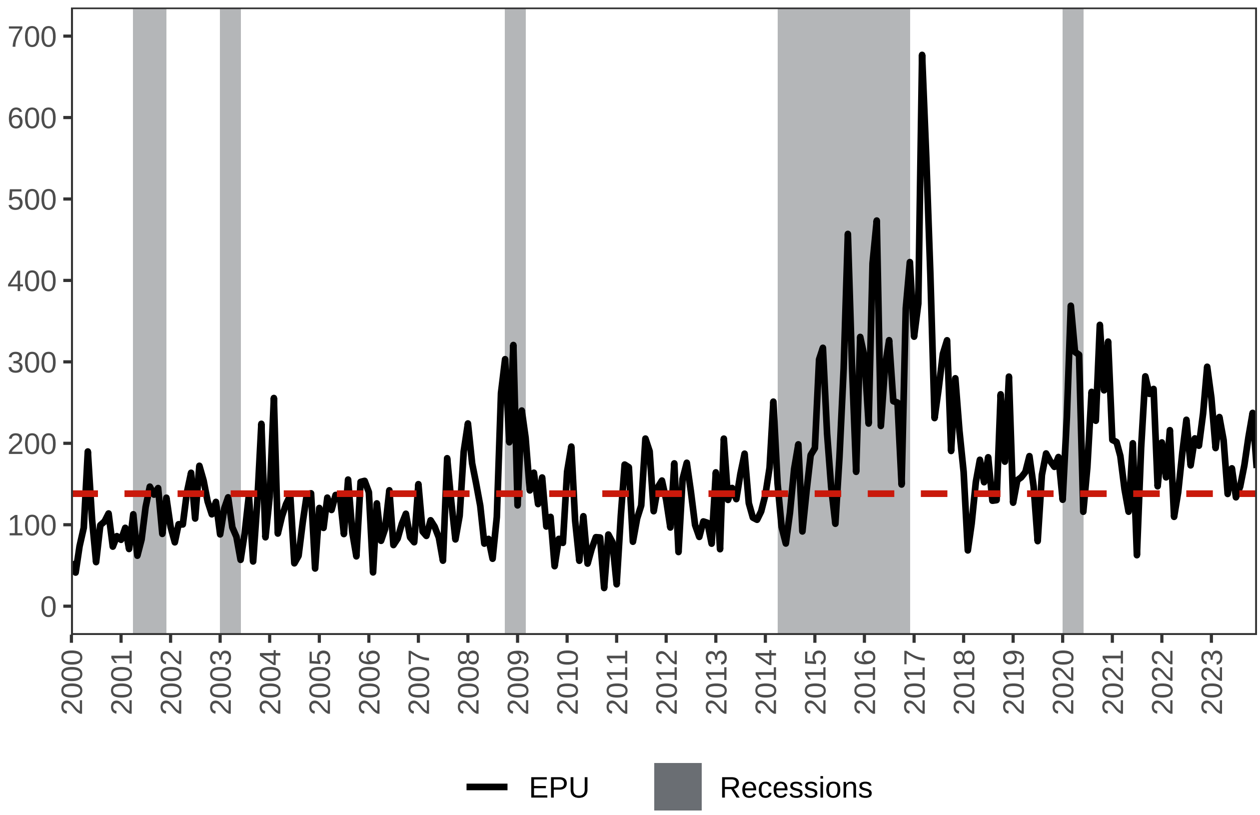
In this section, we detail the datasets used in our study. Next, we outline the criteria we used to filter and choose the appropriate assets that make up our dataset.

EPU: The Economic Policy Uncertainty Index (EPU) is a political uncertainty measure develop by Baker et al. (2016) initially for the US. The authors search digital archives of multiple newspapers and count the number of articles, on a monthly basis, that contain the following three words: "uncertainty" or "uncertain"; "economic" or "economy"; and one of the following policy terms: "Congress," "deficit," "Federal Reserve," "legislation," "regulation," or "White House" (including variants like "uncertainties," "regulatory," or "the Fed").

Comitê de Datação de Ciclos Econômicos (CODACE): It is a group that aims to establish benchmark chronologies for Brazilian economic cycles. According to the CODACE, from 2000 to 2022, Brazil had 20 quarters of recession. From the second quarter of 2001 to the fourth quarter of 2001, first and second quarters of 2003, from the fourth quarter of 2008 to the first quarter of 2009, from the second quarter of 2014 to the fourth quarter of 2016 and first and second quarters of 2020. When looking at the EPU data, the EPU starts rising just before the recession and also spikes around presidential elections. The mean value of the EPU log, from 2000 to 2023, is 4.94. Out of the 20 recessions periods, only 7 are below the average EPU, indicating that the EPU rises in face of a recession.

For the Brazilian case, the index uses data from the newspaper called *Folha de São Paulo*, starting in 1991. Again, on a monthly basis, they count the number of articles that contain the following terms in portuguese: "incerto" or "incerteza", "econômico" or "economia", and one or more of the following policy-relevant terms: "regulação", "déficit", "orçamento", "imposto", "banco central", "alvorada", "planalto", "congresso", "senado", "câmara dos deputados", "legislação", "lei", and "tarifa". Figure 2 plots the EPU for Brazil from 2000 to 2023. The shaded areas are quarters of recession as said by CODACE and the dashed line is the EPU average for the considered period. We can see that during and right before the recessions, the EPU rises. Also, during periods of high political instability the EPU had some of its highest levels.

Figure 2: EPU and Recessions



Notes: This figure plots the time-series data on Brazil's Economic Policy Uncertainty Index (EPU), over the period of January 2000 till December 2023. Data from Baker et al. (2016)'s website.

Economatica and NEFIN: For stock returns, we collected data from the Economatica database. First, we filtered the data in order to select stocks traded in the Brazilian Stock

Market (BOVESPA), both active and cancelled stocks. After that, we used the Brazilian Center for Research in Financial Economics of the University of São Paulo (NEFIN) eligibility criteria. They consider a stock traded in BOVESPA to be eligible in year t if it meets the following three criteria: i) the stock is the one with the highest trading volume for the firm during $t-1$; ii) the stock was traded in more than 80% of the days in year $t-1$ with volume greater than R$ 500.000,00 per day. In case the stock was listed in year $t-1$, the period considered goes from the listing day to the last day of the year; iii) the stock was initially listed prior to December of year $t-1$.

From the firms that survived the filter, we collected market capitalization and book-to-market data, also from Economatica. Additionally, we calculate the momentum for each firm, by computing each firm's cumulative return between months $t-2$ and $t-12$. We also created our own market return. For all the firms that were considered eligible, we calculated the value-weighted return, where the weight is the market cap from firm i in the previous month. For the risk factors, such as: small-minus-big (SMB), high-minus-low (HML), winners-minus-losers (WML), illiquid-minus-liquid (IML) and the risk-free rate, we used the NEFIN data.

4 Portfolio Analysis

The next step is to create our portfolios sorted by their exposure to the EPU, β^{EPU} sorted portfolios. First, we are going to estimate the β^{EPU} from the monthly rolling regression of excess stock returns (R^e) on the EPU log over a 36-month window, controlling for the market excess return, Fama and French (1992, 1993) size (SMB) and book-to-market (HML) factors, Carhart (1997) momentum factor (WML) and Pástor and Stambaugh (2003) illiquidity factor (IML):

$$R^e_{i,t} = \alpha_{i,t} + \beta^{MKT}_{i,t} MKT_t + \beta^{EPU}_{i,t} EPU + \beta^{SMB}_{i,t} SMB + \beta^{HML}_{i,t} HML_t \\ + \beta^{WML}_{i,t} WML_t + \beta^{IML}_{i,t} IML_t + \varepsilon_{i,t} \quad (2)$$

For each month, we form 5 portfolios based on the β^{EPU} value of the previous month, where portfolio 1 contains stocks in the lowest percentile, while portfolio 5 consists of stocks in the highest percentile. Additionally, we create a long-short portfolio, which is the difference between the highest and lowest percentile portfolios.

Table 1 presents the portfolios results. Newey and West (1987) t-statistics are in parentheses. The average β^{EPU} for each portfolio ranges from -4.82 to 5.17. We can see a

Table 1: Univariate portfolios of stocks sorted by β^{EPU}

		Panel A. Equal-weighted					**Panel B. Value-weighted**				
			CAPM	FF3	C4	PS5		CAPM	FF3	C4	PS5
Percentile	β^{EPU}	RET-RF	α_1	α_3	α_4	α_5	RET-RF	α_1	α_3	α_4	α_5
Low	-4.82	0.32 (0.58)	0.04 (0.13)	-0.03 (-0.11)	0.15 (0.58)	0.13 (0.51)	0.39 (0.81)	0.13 (0.5)	0.09 (0.35)	0.16 (0.59)	0.17 (0.49)
2	-1.59	0.47 (1.12)	0.22 (1.06)	0.21 (1.03)	0.29 (1.38)	0.27 (1.32)	0.48 (0.98)	0.2 (0.87)	0.21 (0.93)	0.22 (0.92)	0.22 (0.84)
3	0.24	0.4 (0.94)	0.15 (0.64)	0.12 (0.56)	0.23 (1.06)	0.2 (0.92)	0.32 (0.72)	0.05 (0.2)	0.05 (0.22)	0.15 (0.66)	0.13 (0.61)
4	2.10	0.33 (0.79)	0.08 (0.39)	0.06 (0.3)	0.11 (0.53)	0.07 (0.34)	0.29 (0.63)	0.03 (0.14)	0.03 (0.12)	0.05 (0.22)	0.02 (0.1)
High	5.17	-0.32 (-0.63)	-0.62 (-2.12)	-0.67 (-2.47)	-0.7 (-2.62)	-0.71 (-2.7)	0.02 (0.03)	-0.28 (-0.9)	-0.31 (-0.96)	-0.39 (-1.21)	-0.37 (-1.13)
High-Low		-0.65 (-1.74)	-0.66 (-1.74)	-0.64 (-1.66)	-0.84 (-2.2)	-0.85 (-2.18)	-0.37 (-0.89)	-0.41 (-1.02)	-0.39 (-0.97)	-0.55 (-1.26)	-0.53 (-1.2)

Notes: This table reports the performance of portfolios sorted by EPU beta (β^{EPU}). The stocks in our sample are grouped into quintile portfolios (from Low β^{EPU} to High β^{EPU}), and the portfolios are reformed each month. The first column presents the average β^{EPU} for the Low- to High- β^{EPU} portfolios. This table also presents the average excess returns (RET - RF), average alphas on CAPM model Sharpe (1964); Lintner (1965), Fama and French (1993) 3-factor model (α_3), average alphas on Carhart (1997) 4-factor model (α_4), and average alphas on the Pástor and Stambaugh (2003) 5-factor model (α_5). Panel A presents the performance of equal-weighted portfolios, and Panel B presents the performance of value-weighted portfolios. The last two rows present the performance difference between the High β^{EPU} and Low β^{EPU} portfolios. Newey and West (1987) adjusted t-statistics are given in parentheses.

decreasing pattern on the average excess returns for both the value and equal-weighted portfolios, from 0.39 to 0.02 to the former and 0.32 to -0.32 to the latter. We also find negative values for the High-Low portfolio, significant at the 10% level for the equal weighted portfolio, which means that the low β^{EPU} portfolio generates 0.65% higher monthly returns than the high β^{EPU} portfolio or 8.08% higher annual returns.

The table also reports the estimates for the alphas, the risk-adjusted returns for four different models. The intercept (α) is interpreted as the average excess return of the portfolio that is not attributed to sensitivity to the factors of the models we are using. In order to evaluate if the portfolio generates statistically significant risk-adjusted returns, we use the alpha's Newey and West (1987) t-statistic.

The risk-adjusted return, denoted as α_1, represents the intercept of the Capital Asset Pricing Model (CAPM) that incorporates a single factor, namely the market excess return (MKT). In contrast, α_3 refers to the risk-adjusted return in Fama and French (1992, 1993), which includes three factors: excess market return (MKT), the small-minus-big (SMB) factor, and the high-minus-low (HML). The α_4 value corresponds to the factor model proposed by Carhart (1997), which encompasses the previously mentioned factors in addition to the momentum factor, represented as winners-minus-losers (WML). Lastly, α_5 is aligned with the model proposed by Pástor and Stambaugh (2003), further extending the model by including the illiquidity, termed as illiquid-minus-liquid (IML).

We can see that α_1 decreases monotonically for the value-weighted portfolio, from 0.13 to -0.28. The alpha generated for the High-Low portfolio is -0.41 but not significant. For the equal-weighted one, the alpha ranges from 0.04 to -0.62 and the long-short alpha is -0.66% per month or 8.21% per year, significant at the 10% level. Moving to the second model, α_3 decreases from 0.09 to $-.03$ for the value-weighted portfolio and from -0.03 to -0.67 for the equal-weighted portfolio, generating a significant -0.64 estimate for the High-Low portfolio. α_4 and α_5 range from 0.16 to -0.39 and 0.17 to -0.37, respectively for the equal-weighted portfolio and from 0.15 to -0.7 and 0.13 to -0.71 for the value-weighted portfolio. The High-Low portfolios for the value-weighted generates significant alphas at the 5% level of -0.84 and -0.85.

Therefore, firms included in portfolio 1, which are negatively correlated with political uncertainty, demand a higher return compared to firms in portfolio 5. This is because investors incur risk by holding them during periods of heightened political uncertainty.

5 Risk Premium

Before estimating the risk premium for economic policy uncertainty, we want to check the characteristics for high and low β^{EPU} stocks. In order to do so, we will use Fama and MacBeth (1973) two-step regression to estimate these average characteristics. We run monthly cross-section regressions of the following specification and then take the time series average of the estimated coefficients:

$$\beta_{i,t}^{EPU} = \psi_t + \psi_t^{MKT}\beta_{i,t}^{MKT} + \psi_t^{Size}Size + \psi_t^{BM}BM + \psi_t^{Mom}Mom + \varepsilon_{i,t} \tag{3}$$

where $\beta_{i,t}^{EPU}$ is the rolling window estimated beta, $\beta_{i,t}^{MKT}$ is the estimated market beta, and $Size$ and BM are the stocks market cap and book-to-market, respectively.

Table 2 reports the results and Newey-West t-statistics are in parentheses. The first specification tells us that firms with higher β^{MKT} also have a higher β^{EPU}, with a significant coefficient. Although not significant, the negative coefficient on $Size$ implies that larger firms have lower political uncertainty betas. The negative and significant coefficient associated with book-to-market, means that firms with higher book-to-market ratio have lower β^{EPU}. The last coefficient, the momentum one, is zero. When including all the variables for the estimation, the β^{MKT} and size slopes are significant and maintain the same signal, positive and negative, respectively. the BM coefficient is still negative, but now not significant and Mom is positive but not significant.

Table 2: Average characteristics - EPU

	(1)	(2)	(3)	(4)	(5)
Intercept	-0.44 (-1.38)	0.26 (1.76)	0.41 (2.78)	0.31 (2.18)	-0.2 (-0.57)
β^{MKT}	0.61 (2.11)				0.71 (2.01)
Size		-0.03 (-1.29)			-0.04 (-1.92)
BM			-0.36 (-1.96)		-0.19 (-0.98)
Mom				0 (0.9)	0.01 (1.19)

Notes: This table presents the average values over time for the slope coefficients obtained from regression analyses. These analyses involve the uncertainty beta (β^{EPU}) and are based on stock-specific characteristics as detailed in Equation (3). The regressions are conducted on a cross-sectional basis each month. The t-statistics, adjusted according to Newey and West (1987), are provided in parentheses.

Using, once again, Fama and MacBeth (1973) regressions, we are going to check for the EPU risk premium. The Fama-MacBeth method consists on a two-step procedure. First, we run the 36-month rolling window regression, to estimate both β^{EPU} and β^{MKT}. Then, we run monthly cross-section regressions of the excess return on these estimates and also controls, such as market cap and book-to-market. The equation is the following:

$$R^e_{i,t+1} = \lambda_t + \lambda_t^{EPU}\beta_{i,t}^{EPU} + \lambda_t^{MKT}\beta_{i,t}^{MKT} + \lambda_t^{Size}Size + \lambda_t^{BM}BM + \lambda_t^{Mom}Mom + \varepsilon_{i,t+1} \quad (4)$$

where $R^e_{i,t+1}$ is the one month ahead excess return, $\beta_{i,t}^{EPU}$ and $\beta_{i,t}^{MKT}$ is the EPU and market beta, respectively. $Size$, BM and Mom are controls for firm size, book-to-market and momentum.

Lastly, we take the time-series average of the estimated coefficients (λ_t) to determine the risk premium. The results are shown in Table 3 and Newey-West t-statistics are in parentheses.

The first result, does not havy any control, only for the political uncertainty beta, and indicates a significant average slope of -0.09 for the β^{EPU}. The second column of the table follows controls for the market beta. The estimated coefficient for the EPU remains the same, -0.09, negative and significant. Column 3 follows the Fama and French (1992, 1993) model, controlling for the market, size and book-to-market. The average slope of the β_{EPU} is even more negative, -0.12 and still significant. The last column follows Carhart (1997) model, controlling for the same factors and the previous specification, along with momentum. We

Table 3: EPU Risk Premium

	(1)	(2)	(3)	(4)
Intercept	0.26	0.1	0.09	-0.05
	(0.62)	(0.24)	(0.2)	(-0.09)
β^{EPU}	-0.09	-0.09	-0.12	-0.12
	(-2.07)	(-1.82)	(-2.11)	(-2.26)
β^{MKT}		0.17	0.38	0.04
		(0.5)	(1.02)	(0.1)
Size			0.01	-0.01
			(0.59)	(-0.32)
BM			-0.29	0
			(-1.16)	(0)
Mom				0.01
				(1.56)
Adj. R^2	0.03	0.07	0.13	0.17

Notes: Notes: This table reports the time-series averages of the slope coefficients obtained from regressing monthly excess returns on the uncertainty beta (β^{EPU}) and a set of lagged predictive variables using the Fama and MacBeth (1973) methodology. Newey and West (1987) adjusted t-statistics are reported in parentheses.

find the same coefficient and before, -0.12 but with a higher t-statistic.

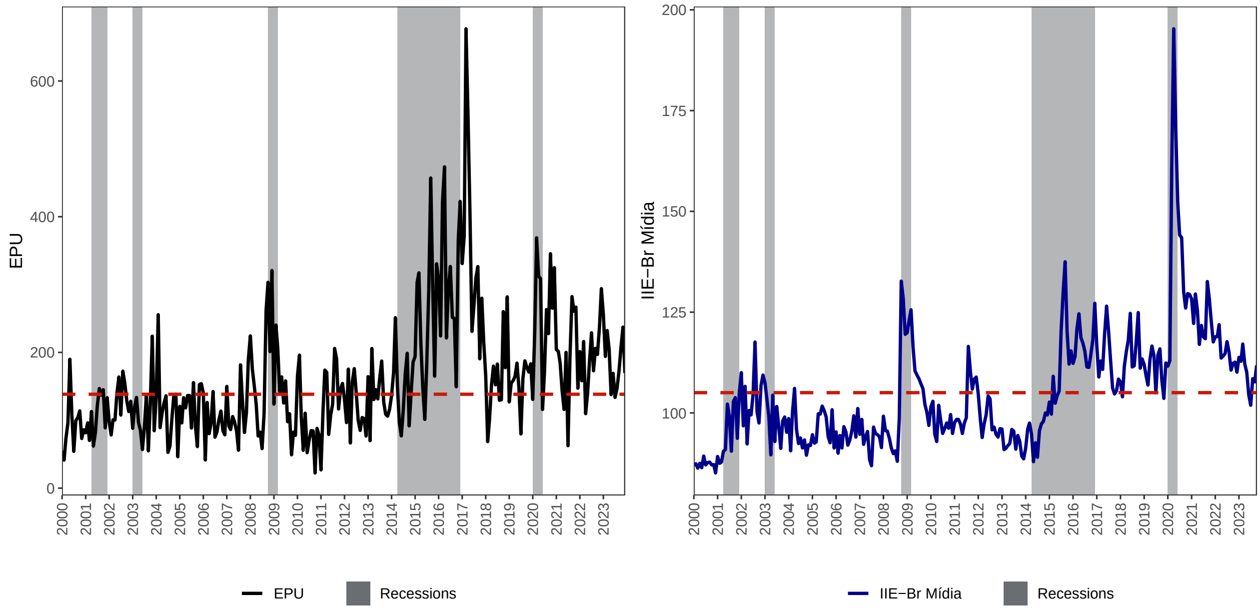
Our results are consistent with Pástor and Veronesi (2013) and Brogaard and Detzel (2015) findings, where the EPU commands a negative risk premium. So, for the Brazilian market, firms that are negatively correlated to the EPU, indeed demand a risk premium, because investors seek a higher return to keep these stocks. The results are also different from the Chinese market, as reported by Li (2017), where stocks in the lowest portfolio command a positive risk premium, due to the speculative nature of Chinese investors.

6 Robustness Checks

In order to test the validity of our results, we use another measure of uncertainty, the *Indicador de Incerteza da Economia Brasil* (IIE-Br). The IIE-Br is calculated by *Instituto Brasileiro de Economia* (FGV IBRE) and the index is composed of two measures: (i) IIE-Br *Mídia*, based on the frequency of news that mention uncertainty and (ii) IIE-Br *Expectativa* based on the dispersion of forecasts for the exchange rate, interest rate and inflation. While the EPU uses only one newspaper as it source, the IIE-Br uses 6 newspapers, *Folha de São Paulo*, *Valor Econômico*, *O Globo*, *Estado de São Paulo*, *Correio Braziliense* and *Zero Hora*. Since the EPU uses newspaper data, we will focus on the IIE-Br *Mídia* component and as we did in the EPU analysis, we used the IIE-Br *Mídia* log.

Figure 3 plots, side by side, the EPU and the IIE-Br *Mídia*. We can see that, even though they have different scales, they spike during recession periods and both measures start rising right when the recession period starts.

Figure 3: EPU, IIE and Recessions



Notes: This figure plots the time-series data on Brazil's Economic Policy Uncertainty index (EPU) and *Indicador de Incerteza da Economia Brasil na Mídia* (IIE-Br-Mídia), over the period of January 2000 till December 2023. Data from Baker et al. (2016)'s and IBRE's websites.

Table 4: Univariate portfolios of stocks sorted by β^{IIE}

		Panel A. Equal-weighted					Panel B. Value-weighted				
			CAPM	FF3	C4	PS5		CAPM	FF3	C4	PS5
Percentile	β^{IIE}	RET - RF	α_1	α_3	α_4	α_5	RET - RF	α_1	α_3	α_4	α_5
Low	-26.56	0.72	0.43	0.36	0.44	0.41	0.63	0.37	0.36	0.4	0.39
		(1.28)	(1.36)	(1.19)	(1.46)	(1.3)	(1.28)	(1.15)	(1.13)	(1.2)	(1)
2	-7.49	0.03	-0.25	-0.26	-0.09	-0.13	0.15	-0.13	-0.13	0.01	0
		(0.07)	(-1.13)	(-1.24)	(-0.46)	(-0.66)	(0.34)	(-0.55)	(-0.59)	(0.04)	(-0.01)
3	1.93	0.18	-0.06	-0.09	-0.02	-0.04	0.19	-0.09	-0.12	-0.05	-0.04
		(0.43)	(-0.35)	(-0.5)	(-0.11)	(-0.21)	(0.42)	(-0.41)	(-0.58)	(-0.24)	(-0.21)
4	11.16	0.59	0.34	0.33	0.35	0.32	0.54	0.28	0.3	0.27	0.27
		(1.47)	(1.66)	(1.64)	(1.66)	(1.5)	(1.18)	(1.09)	(1.2)	(1.01)	(1)
High	30.26	-0.31	-0.58	-0.63	-0.59	-0.6	-0.03	-0.32	-0.34	-0.38	-0.37
		(-0.62)	(-1.99)	(-2.4)	(-2.18)	(-2.3)	(-0.05)	(-1.17)	(-1.29)	(-1.3)	(-1.26)
High-Low		-1.03	-1.01	-0.99	-1.03	-1	-0.66	-0.69	-0.7	-0.78	-0.76
		(-2.41)	(-2.39)	(-2.34)	(-2.48)	(-2.37)	(-1.32)	(-1.42)	(-1.45)	(-1.5)	(-1.39)

Notes: This table reports the performance of portfolios sorted by IIE beta (β^{IIE}). The stocks in our sample are grouped into quintile portfolios (from Low β^{IIE} to High β^{IIE}), and the portfolios are reformed each month. The first column presents the average β^{IIE} for the Low- to High- β^{IIE} portfolios. This table also presents the average excess returns (RET - RF), average alphas on CAPM model Sharpe (1964); Lintner (1965), Fama and French (1993) 3-factor model (α_3), average alphas on Carhart (1997) 4-factor model (α_4), and average alphas on the Pástor and Stambaugh (2003) 5-factor model (α_5). Panel A presents the performance of equal-weighted portfolios, and Panel B presents the performance of value-weighted portfolios. The last two rows present the performance difference between the High β^{IIE} and Low β^{IIE} portfolios. Newey and West (1987) adjusted t-statistics are given in parentheses.

Using the same 36-month rolling-window regression, as Equation (2), we estimate the β^{IIE} as use it as the new sorting variable to create 5 portfolios and a long-short one. The results presented in Table 4 are quite similar to the results in Table 1. The portfolio long on stocks of high β^{IIE} and short on stocks of low β^{IIE} have negative average excess return for both the value and equal-weighted portfolios. The average excess return of the equal-weighted portfolio is significant at the 5% level. When looking at the alphas, once again, the results corroborate the EPU findings. They are all negative and the equal-weighted ones are all significant at the 5% level. These findings indicate that low IIE beta portfolios outperform the high IIE beta portfolios. As we can see, the risk-adjusted return of the low β^{IIE} is up to 1.03% per month higher than the high β^{IIE} or 13.1% per year.

Now, we estimate Equation (3) but using the β^{IIE} on the left side. Table 5 differs a bit from Table 2. The coefficients from β^{MKT} and *Size* remain the same, positive and negative, respectively, but former is not significant anymore. The average slope from *BM* is now positive and not significant. Lastly the *Mom* coefficient is negative and significant, while the EPU one was zero. When we include all the variables, the only significant one is momentum, with a coefficient of -0.07.

Table 5: Average characteristics - IIE

	(1)	(2)	(3)	(4)	(5)
Intercept	0.11 (0.07)	3.33 (2.16)	1.31 (1.8)	3.38 (2.64)	2.39 (1.56)
β^{MKT}	1.81 (0.91)				0.28 (0.12)
Size		-0.34 (-1.68)			-0.02 (-0.13)
BM			1.28 (0.96)		-0.35 (-0.28)
Mom				-0.07 (-1.65)	-0.07 (-1.65)

Notes: This table presents the average values over time for the slope coefficients obtained from regression analyses. These analyses involve the uncertainty beta (β^{IIE}) and are based on stock-specific characteristics as detailed in Equation (3). The regressions are conducted on a cross-sectional basis each month. The *t*-statistics, adjusted according to Newey and West (1987), are provided in parentheses.

Lastly, using Equation (4) and substituting the EPU beta fot the IIE beta, we estimate the risk premium. Table 6 reports the risk premium results. Even though smaller, the risk premium is still negative and significant throughout all the specifications, with the same value of -0.02 for every combination. The adjusted R^2 is also quite similar to the EPU one, ranging from 4% up to 17% for the IIE and 3% up to 17% for the EPU.

Table 6: IIE Risk Premium

	(1)	(2)	(3)	(4)
Intercept	0.26	0.22	0.21	0.02
	(0.62)	(0.53)	(0.45)	(0.04)
β^{IIE}	-0.02	-0.02	-0.02	-0.02
	(-2.64)	(-2.82)	(-2.87)	(-2.11)
β^{MKT}		0.04	0.19	-0.02
		(0.14)	(0.61)	(-0.05)
Size			0.03	0.02
			(1.3)	(0.92)
BM			-0.35	-0.09
			(-1.49)	(-0.37)
Mom				0.01
				(1.6)
Adj. R^2	0.04	0.08	0.13	0.17

Notes: This table reports the time-series averages of the slope coefficients obtained from regressing monthly excess returns on the uncertainty beta (β^{IIE}) and a set of lagged predictive variables using the Fama and MacBeth (1973) methodology. Newey and West (1987) adjusted t-statistics are reported in parentheses.

7 Conclusion

This study delved into the relationship between economic policy uncertainty (EPU) and asset prices, with a specific focus on exploring the existence of a risk premium associated with this factor. Through the construction of five portfolios sorted by β^{EPU} and a long-short portfolio, we examined the performance of firms. Our findings consistently support the theoretical framework proposed Pástor and Veronesi (2013), as well as the empirical evidence put forth by Bali et al. (2017), where they use Jurado et al. (2015) uncertainty measure.

The EPU positively forecasts the market return, where an increase in the EPU leads to a significant increase in the market return at the 2, 3, 6 and 12-month horizons. From our analysis on the EPU sorted portfolios, we find that firms with lower EPU beta, indicating a lower correlation to economic policy uncertainty, exhibit, on average, higher excess returns compared to their counterparts with higher exposure to EPU. Also, we find that a portfolio long on stocks that have low EPU beta and short on stocks with high EPU beta generate risk-adjusted return of 0.85% per month or almost 10.7% per year. Furthermore, when observing the characteristics of the stocks, we find that firms with higher β^{EPU} tend to be characterized by firms with high market beta, but low market capitalization and book-to-market while momentum doesn't seem to be relevant. In our exploration of the risk premium associated with the EPU, our results reveal a negative risk premium. This outcome aligns with both theoretical and empirical results mentioned above. The negative risk premium indicates that investors demand a higher expected return in order to hold assets that covariate negatively with policy uncertainty.

Using a different uncertainty measure, the IIE, we found similar results to the EPU. Negative average excess return for the equal and value-weighted portfolios, negative and significant alphas for the equal-weighted portfolio and a negative and significant risk premium.

References

Andrew Ang, Robert J. Hodrick, Yuhang Xing, and Xiaoyan Zhang. The cross-section of volatility and expected returns. *The Journal of Finance*, 2006.

Scott R. Baker, Nicholas Bloom, and Steven J. Davis. Measuring economic policy uncertainty. *The Quarterly Journal of Economics*, 2016.

Turan G. Bali, Stephen J. Brown, and Yi Tang. Is economic uncertainty priced in the cross-section of stock returns? *Journal of Financial Economics*, 2017.

Douglas T. Breeden, Michael R. Gibbons, and Robert H. Litzenberger. Empirical test of the consumption-oriented capm. *The Journal of Finance*, 1989.

Jonathan Brogaard and Andrew Detzel. The asset-pricing implications of government economic policy uncertainty. *Management Science*, 2015.

Mark M. Carhart. On persistence in mutual fund performance. *The Journal of Finance*, 1997.

Jian Chen, Fuwei Jiang, and Guoshi Tong. Economic policy uncertainty in china and stock market expected returns. *Accounting & Finance*, 2017.

Eugene F. Fama and Kenneth R. French. The cross-section of expected stock returns. *The Journal of Finance*, 1992.

Eugene F. Fama and Kenneth R. French. Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, 1993.

Eugene F. Fama and James D. MacBeth. Risk, return, and equilibrium: Empirical tests. *Journal of Political Economy*, 1973.

Kyle Jurado, Sydney C. Ludvigson, and Serena Ng. Measuring uncertainty. *American Economic Review*, 2015.

Xiao-Ming Li. New evidence on economic policy uncertainty and equity premium. *Pacific-Basin Finance Journal*, 2017.

John Lintner. The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. *The Review of Economics and Statistics*, 1965.

Robert C. Merton. An intertemporal capital asset pricing model. *Econometrica*, 1973.

Whitney K. Newey and Kenneth D. West. A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. *Econometrica*, 1987.

Ľuboš Pástor and Robert F. Stambaugh. Liquidity risk and expected stock returns. *Journal of Political Economy*, 2003.

Ľuboš Pástor and Pietro Veronesi. Political uncertainty and risk premia. *Journal of Financial Economics*, 2013.

William F. Sharpe. Capital asset prices: A theory of market equilibrium under conditions of risk. *The Journal of Finance*, 1964.