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Navigating Uncertainty: The Impact of Economic Policy on Stock Market Volatility

Examining the Effects Across the US, UK and EU

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ABSTRACT

The In this thesis I studied the relationship between economic policy uncertainty and stock market volatility across three regions: the United States, the United Kingdom, and the European Union. 703 monthly observations were used to construct a panel dataset on which I employ a fixed-effects regression model with Driscoll-Kraay standard errors. The research reveals a significant positive relationship between economic policy uncertainty and stock market, with the EU having the highest estimated coefficient while the UK had the lowest. This means that the EU seems to have the most responsive stock market volatility index to fluctuations in their own EPU index while the UK's seemed to be the least. The findings are consistent with previous literature highlighting the impact of policy-related uncertainty on investor behavior and market stability. These results suggest that economic policy uncertainty is a critical factor influencing market volatility, offering insight into the dynamics of the stock market which allows for market participants to make the necessary adjustments to investment strategies and policy-related decisions.

Keywords: Economic Policy Uncertainty, Stock Market Volatility

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CHAPTER 1 Introduction

Ambiguity surrounding economic policies can significantly impact financial markets, leading to fluctuations in stock market volatility and investor sentiment (Liu and Zhang, 2015). This study intends to investigate the nuanced relationship between policy uncertainty and stock market volatility, and compare this effect across countries. Through rigorous analysis, the findings of this study aim to provide crucial insight for investors, financial analysts, and policymakers, in an attempt to aid decision making and better risk assessment strategies in the face of uncertain economic conditions. Grasping and effectively managing these intricate dynamics are pivotal in nurturing market stability and fortifying the foundation for informed decision making within global financial markets. Recent findings by Dai et al. (2021) found that an aggravation of economic policy uncertainty increased the risk of triggering a stock market crash. Their findings emphasized the importance of proactive policies in mitigating a crash as they urged not only investors, but policymakers as well to take note of the influential role policy uncertainty had on stock market volatility. Altogether, researchers and experts in the field agree that policy uncertainty has a profound relationship with stock market volatility and further research into this relationship serves to advance our understanding of the bridge that connects the worlds of macroeconomics and finance.

Previous papers that have delved into the intricate relationship between policy uncertainty has consistently found that an increase in policy uncertainty tended to correspond with heightened levels of future stock market volatility. These papers emphasized on the key role on the predictive power that economic policy uncertainty has on stock market volatility. These studies underscore the importance of this relationship in enhancing our understanding of the market and its dynamics, along with facilitating more accurate assessments (Shahzad et al. 2017, Shaikh 2019, Li et al. 2020). One primary driver of this relationship is investor sentiment; in periods of highly uncertain economic conditions, consumer confidence and business confidence declines. This triggers a reaction in the stock market, reflected in stock prices and therefore stock market volatility. Additionally, policy stability acts as a signaling device to consumers and businesses, meaning increased policy uncertainty signals to investors a spike in volatility, driving down confidence further. Although these papers have answered the fundamental question – "What is the relationship between policy uncertainty and stock market volatility?" – they have not been able to draw cross country comparisons to understand the extent to which policy uncertainty affects different regions. This paper provides new insight through a cross-country comparison of this relationship in order to facilitate a better understanding of the reactiveness of their respective stock markets.

Instead of a singular economy, this study explores the relationship between policy uncertainty and stock market volatility in three areas: the United States, the United Kingdom, and the European Union region. The goal of this study is to prove that previous findings can be extended to a broader level of aggregation,

providing a more unified understanding of this relationship, enabling decision makers to expand their expertise to a broader area. The US, UK and EU region are suitable populations to study as their volatility indices are constructed in a similar manner. Additionally, although in different areas of the world, have all shown significant sensitivity to a similar set of global events, indicating linkages in their respective equity markets (Becker et al. 1995, Fraser and Oyefeso 2001). However, we do not expect them to behave exactly alike (Alexander 2015). Studies find differences in spreads among VIX (US), VFTSE (UK), and VSTOXX (EU). These differences might be attributed to the strong cultural differences among these nations which could drive investor sentiment. Ultimately, our study predicts that these differences might translate into varying degrees of responsiveness of the stock market to different levels of economic policy uncertainty, making this cross-country comparison particularly interesting when examining the extent to which previous findings can be extended. Therefore, the research question this paper investigates can be split into two central parts: How does economic policy uncertainty affect stock market volatility, and how this affect is different between the US, UK and the EU region.

The study uses a panel data method to perform a multiple linear regression. The dataset consists of an unbalanced panel, with monthly observations from the period 1995 to 2023 for the US, 2004 to 2019 for the UK, and 2000 to 2023 for the EU region. Since this paper aims to provide a deeper understanding in the fields of economics and finance, the study focuses on economic policy uncertainty defined by the EPU indices for each respective region. Stock market volatility will be measured by the well documented, comprehensive VIX, VFTSE, and VSTOXX indices. In order to limit biases in the findings the study uses a set of highly relevant control variables including gross domestic product, unemployment rate, and interest rate data.

I hypothesize that economic policy uncertainty will in fact have a positive effect on stock market volatility. This can be attributed to the effect policy uncertainty has on investor sentiment which in turn affects the stock market volatility. However, I expect that the degree of responsiveness of stock market volatility to changes in economic policy uncertainty will vary across countries, with the EU possibly displaying the largest spread. This potential difference is caused by the variety of member countries in the EU having economies that differ significantly in terms of macroeconomic standards. Since EU policies are interconnected but consist of a variety of differently developed economies, this might create sharper spikes in volatility due to some countries having extreme reactions to changes in economic policy uncertainty.

The analysis revealed that economic policy uncertainty does have a significant positive relationship with stock market volatility, with the EU's stock market being the most volatile in response to fluctuations in economic policy uncertainty. This aligns with the hypothesis of this study and provides insight into the nuances of stock market volatility drivers. The relationship between economic policy uncertainty and

stock market volatility is contemporaneous, meaning that changes in EPU have an immediate impact on market volatility. The findings also have implications for investors and policymakers and elucidate the importance of fostering a stable economic environment through policy to soothe the potential destabilization of stock markets than can often follow periods of heightened economic policy uncertainty.

The remaining chapters of this thesis are as follows: the Theoretical Framework will delve into the definition and motivation of the key concepts studied in this thesis, and will explain how these existing studies build a solid foundation for this study. The Data chapter with detail the data collection methods and transformations performed for the subsequent analysis. The method chapter will explain the design and implementation of the analysis. The Result and Discussion chapter will present the estimated findings derived from the analysis and provide interpretations in relation to the research question. It will also discuss potential limitations of the study. Finally, the Conclusion chapter will reiterate main findings, discuss broader and practical implications, as well as provide suggestions for further research.

CHAPTER 2 Theoretical Framework

2.1 EPU index: Origins and Insights

When discussing economic policy uncertainty and its impacts, it is imperative to discuss Bloom's (2009) seminal study analyzing the impact of uncertainty shocks. Using major real-world events such as the Cuban Missile Crisis and the assassination of JFK and their subsequent shocks on macroeconomic variables such as output and employment. Bloom's findings that policy uncertainty had an impact on both investor behavior and labor markets shed some light on the intricacies of the market and sensitivities to policy changes. Building on this, Bloom's (2014) work delves into the theoretical foundations of economic uncertainty as a concept, identifying economic policy, geopolitical events, and technological changes as key sources. He posits that uncertainty acts as a deterrent to economic activity by causing firms to delay investment and hiring, thus decreasing consumer confidence and increasing precautionary savings. These findings suggest that economic policy uncertainty can lead to significant increases in stock market volatility through its impact on business and consumer behavior. This work went on to inspire many others and even served as a framework as Bloom went on to develop the EPU index with Baker and Davis (2016).

For the purpose of this study, economic policy uncertainty is defined as Baker et al. (2016)'s EPU index: a comprehensive measure designed to quantify the degree of economic uncertainty attributable to policy-related factors. To understand what information this now widely used tool conveys we must delve into its three components.

1. Newspaper Coverage of Policy-Related Economic Uncertainty: The index utilizes the frequency of newspaper articles that contain terms related to economic policy uncertainty. Specifically, it counts articles that include terms from three sets of keywords: economic or economy, uncertain or uncertainty, and policy-related terms such as "regulation" or "deficit." The newspapers used for this purpose include major and influential publications that provide broad and representative coverage of economic and policy issues.

2. Tax Code Expirations: This component accounts for the number of federal tax code provisions set to expire in future years. The uncertainty associated with the potential changes in tax laws and regulations contributes to the overall economic policy uncertainty. Namely, the more tax code provisions are scheduled to expire, the higher the uncertainty.

3. Disagreement Among Economic Forecasters: The index also includes the dispersion in economic forecasts as reported by professional forecasters. This dispersion reflects the level of uncertainty among experts regarding future economic conditions, which is partly influenced by policy uncertainty.

By employing this construction, the EPU index hones in on the role the federal government plays in determining stability. By quantifying the level of uncertainty regarding economic policies, the EPU index was an innovative and comprehensive tool that could provide a measurable and consistent way to assess how uncertain policy environments evolve over time. These characteristics equip the EPU to help in identifying causal links between policy uncertainty and market and participants' behavior, enhancing the accuracy of predictive models that aim to capture the effect of policy-related events, and offer insights into how policy certainty or uncertainty can stabilize or destabilize markets.

Later that year Davis (2016) constructs a Global EPU index using GDP-weighted averages of national EPU values for 16 countries that account for two-thirds of global output. This model found that major events like the financial crisis in 2008-2009 that was originally birthed in the US, and its global impact on uncertainty. This extension indicates that EPU's comprehensive build has allowed for more accurate observation of the impact of uncertainty shocks on a global scale.

The EPU index is a form of quantitative content analysis. This type of analysis involves systematically analyzing the frequency of specific terms or themes within textual data to identify patterns and trends. In the case of the EPU index, the textual data comes from newspaper articles, tax code provisions, and economic forecasts, and the specific terms are related to economic policy uncertainty. The unique advantage of quantitative content analysis is its ability to transform qualitative data into quantitative data that can then be statistically analyzed. By converting the qualitative information from news articles, tax code expirations, and forecasters' disagreement into numerical data, the EPU index offers a way to track and analyze how policy-related uncertainty evolves over time and affects economic conditions. This form of analysis is crucial for understanding the impact of economic policy on financial markets, business decisions, and overall economic performance. The EPU index employs this method to provide an objective and replicable measure of economic policy uncertainty, making it a valuable tool for researchers.

2.2 Quantifying Stock Market Volatility

Stock market volatility represents the degree of variation in stock prices over time. It is a statistical measure that represents the extent of the dispersion of returns for a given security or market index. High volatility indicates a high degree of risk as the stock prices can change drastically over a short period, while low volatility suggests more stable stock prices.

In stock market volatility, historical volatility is based on past price movements, or implied, which is derived from the prices of financial instruments such as options, providing an estimate of how much the stock price has fluctuated in the past.

On the other hand, implied volatility (IV) is derived from option prices and is intended to reflect volatility expectations. It is also used to price options. Based on this it has both a forward-looking characteristic and is an insightful tool for risk premiums demanded by investors. This assists us to not only in anticipating market movements, but also in understanding how much additional return investors demand following increased uncertainty. Additionally, IV reflects total perceived risk sourced not only from historical movements but also future events. This makes it a comprehensive measurement of uncertainty. IV and therefore this study's measures of stock market volatility are quick to respond to new information including policy announcements and economic forecasts. This sensitivity enables investors and policy makers to understand the dynamics of investor behavior without experiencing huge lags. This means stock market volatility captures sentiment and expectations of market participants and their perception of future risk and uncertainty.
This study utilizes the VIX (US Volatility Index), VSTOXX (Euro STOXX 50 Volatility Index), and VFTSE (FTSE 100 Volatility Index) which are all measures of implied volatility.

Stock market volatility analysis is primarily a type of quantitative financial analysis. This analysis involves using statistical and mathematical models to assess the variability in stock prices and forecast future volatility. The form of analysis typically includes time-series analysis, regression analysis, or volatility modelling. The research done on stock market volatility in the past has been extensive and so provides multiple analysis styles that can serve as a foundation for our research.

In the context of this study, where stock market volatility is measured through VIX, VSTOXX, and VFTSE, the unit of analysis is simply market index volatility: The primary focus is on the volatility of specific market indices (S&P 500, Euro STOXX 50, FTSE 100), as captured by their respective implied volatility indices (VIX, VSTOXX, VFTSE). Each index represents a broad market, making the volatility measure a proxy for overall market sentiment and risk.

Friar's (2017) investigation between market volatilities in the United States (measured by VIX) and the United Kingdom (measured by VFTSE) revealed that past volatility data of an index affected present values of the index itself, aligning with theory stating that past expectations of high stock market volatility cause an increase in underlying volatility and drive-up expectations of future volatility. Alexander et al. (2015) delve into the intricacies of volatility products, such as VIX futures and options designed to hedge against or speculate on market volatility. Their research highlights the increasing

popularity and utility of these products in financial markets, particularly during periods of heightened uncertainty. The insights from Alexander et al. (2015) are directly relevant to our research on EPU and stock market volatility. Their findings that volatility products are effective in hedging against market uncertainty elucidate the importance of understanding the sources of stock market uncertainty. The insight our research will bring might enhance the ability of volatility products to mitigate the risk during increasingly uncertain times and thus highlights the practical implications of our study.

Shiller (1981) investigates the extent to which stock prices fluctuate relative to changes in dividends. Shiller's analysis suggests that stock prices exhibit excess volatility, moving more than can be justified by subsequent changes in dividends alone. This work highlights the potential for non-fundamental factors to influence stock prices, and suggest that investor sentiment and macroeconomic uncertainties, including EPU, could be significant contributors to stock market fluctuations. This research challenged the efficient market hypothesis and broadened our understanding of stock market volatility, encouraging researchers to consider a wider array of factors as determinants of stock market volatility, including EPU.

2.3 The Enduring Link Between Uncertainty and Market Volatility

Bernanke's (1983) seminal work on the effects of uncertainty on investment behavior provides a theoretical underpinning for our study by highlighting the critical role of uncertainty in economic decision-making. The author explores how uncertainty affects investment decisions that increased uncertainty – particularly in irreversible investments – lead to a “waiting” approach among investors, causing delays in investment and therefore cyclical investment patterns. This foundational theory on uncertainty-induced investment behavior has far-reaching implications for understanding stock market volatility. This paper supports the notion that EPU, similar to general economic uncertainty, can lead to similar significant fluctuations in financial markets, specifically that heightened EPU could lead to increased stock market volatility as investors adopt a more cautious approach, mirroring the “waiting” approach observed in cyclical investment patterns. This supports our hypothesis that EPU significantly impacts stock market volatility, and providing a crucial theoretical basis for our research.

Santa-Clara and Valkanov (2003) investigate the relationship between political cycles and stock market performance, revealing that excess stock returns are significantly higher during Democratic presidencies compared to Republican presidencies. This finding suggests that political leadership and associated policies can substantially influence market behavior. By establishing this clear link between political cycles and market performance, this paper underscores the relevance of studying political uncertainty as a factor affecting stock market volatility. By leveraging their analysis, our study aims to extend the investigation of the effects of policy uncertainty, providing a nuanced understanding of how EPU influences the stock market.

The fundamentals of forecasting play a pivotal role in this study. Accurate forecasting is essential in assessing the impact of various economic factors. Both the EPU and the measures for stock market volatility (VIX, VSTOXX, VFTSE) are constructed in a way that encompasses multiple reliable sources to provide a comprehensive understanding of the respective variables and are regarded as forward-looking models. These are then often used by investors, policymakers, and other market participants as predictive tools for market expectations. The study by Petropoulos et al. (2022) provides a thorough overview of forecasting methods and their practical applications, offering valuable insights for our investigation into the relationship between EPU and stock market volatility, with some insight into identifying the predictive power of EPU on stock market volatility.

This study aims to examine how economic policy uncertainty affects stock market volatility, with each volatility index (VIX, VSTOXX, VFTSE) serving as the dependent variable to capture the market's response to policy uncertainty across different regions (U.S., Eurozone, UK). By analyzing these indices, the study can provide insights into regional differences in market sensitivity to policy uncertainty.

The findings from Xu et al. (2023) provide an empirical foundation for our research. Their demonstration of the significant impact of climate policy uncertainty on stock markets underscores the importance of understanding the broader effects of EPU on stock markets. The comparative analysis between China and the US further justifies our cross-country approach in examining how EPU influences stock market volatility. By extending beyond traditional economic policies to include environmental regulations we see a more comprehensive analysis of EPU and its broader effects, drawing parallels to EPU's effects on stock market volatility as a predictor or explanation of market sentiment.

A study by Gulen and Ion (2016) finds empirical evidence supporting a strong negative relationship between firm-level capital investment and the aggregate level of uncertainty associated with future policy and regulatory outcomes. The authors then suggest that uncertainty in economic policies creates an environment of risk aversion among corporations, which can have downstream effects on financial markets.

Istiak and Serletis' (2018) analyses the impact of EPU on real economic activity in an attempt to build on the Baker et al. (2016) model. Using data from G7 countries they found that EPU is countercyclical, the impact of an uncertainty shock increased with size and is country specific.
These findings are vital for our study, as it suggests that the adverse effects of EPU on real output can extend to stock market volatility through changes in investor sentiments and expectations. These findings also support our hypothesis that EPU has a significant impact on stock market volatility, as economic policy-related instability often leads to increased market fluctuations and destabilized market

expectations. Additionally, this is a comparative analysis of EPU's impact across different G7 countries, highlighting variations in the magnitude and significance of the effects. This perspective is particularly relevant for our study, as we aim to analyze the impact of EPU on stock market volatility across the US, UK, and the EU. Their findings suggest that the relationship between EPU and economic indicators may vary by region, underscoring the importance of our context-specific analysis.

Liu and Zhang (2015) compare the EPU index with stock market volatility indices such as the VIX. Their empirical results demonstrate a positive correlation between EPU and stock market volatility, indicating that higher levels of policy uncertainty are associated with increased stock market volatility. Their demonstration of a robust relationship between policy uncertainty and market volatility supports our hypothesis that EPU is a significant driver of stock market fluctuation. Furthermore, their methodology provides a useful framework for our analysis. The research by Liu and Zhang supports our study by providing empirical evidence of the link between EPU and stock market volatility. These findings emphasize the necessity of considering policy uncertainty as a critical factor in market analysis. Additionally, their use of the EPU index aligns with our approach to measure policy uncertainty, validating its effectiveness in capturing the economic environment's uncertainty.

Shahzad et al. (2017) delve into how EPU and investor sentiment impact commodities returns and volatility and explore the predictive power of these factors on market behavior. The authors employ a sophisticated econometric approach to analyze the relationship between EPU, investor sentiment, and commodities returns and volatility. Using data on various commodities and employing the EPU index along with sentiment indicators, their findings reveal that both EPU and investor sentiment significantly predict commodities returns and volatility, indicating that higher policy uncertainty and negative sentiment are associated with increased market volatility. By demonstrating the predictive power of EPU and sentiment on market volatility, their study reinforces our hypothesis that policy uncertainty is a key driver of market fluctuations.

Al-Thaqeb and Algharabali (2019) review the impact of EPU on financial markets, macro and micro level, stock markets, corporate behavior, and risk management from existing literature using the EPU index as a key measure for uncertainty. Their findings that firms exercise more prudence during periods of higher uncertainty which in turn slow investments and employment and has an adverse effect on consumer spending are crucial in understanding the complex relationship between EPU and stock market volatility. Interestingly, the paper also finds that EPU evokes not only a local uncertainty shock but also a spillover effect to other countries.

Shaikh (2019) explores the direct relationship between EPU and the VIX, focusing on how changes in economic policy uncertainty impact the expected future volatility of the stock market. This study is

relevant as it provides a clear link between policy-related uncertainties and market sentiment, reflected in the VIX. The author uses monthly data on the EPU index and the VIX to assess the impact of EPU on market volatility over different time horizons. The study finds that higher levels of EPU are associated with increased implied volatility, suggesting that market participants adjust their expectations of future market risk in response to heightened economic policy uncertainty. Shaikh's research provides critical insights into the effects of EPU on implied volatility, which is directly relevant to our investigation of the impact of EPU on stock market volatility across different regions. By demonstrating that EPU significantly influences the VIX, the study supports our hypothesis that policy uncertainty is a crucial driver of market volatility. Additionally, Shaikh's methodology offers a robust framework for analyzing the relationship between EPU and market volatility, which can be adapted for our cross-country analysis.

Understanding the effect of EPU on stock market volatility is especially pertinent during periods of crisis. A paper by Dai et al. (2021) provides a clear demonstration of how EPU can influence market stability during crises, reinforcing the importance of considering policy uncertainty in understanding market dynamics. The paper examines EPU and its effect on stock market volatility during the COVID-19 pandemic. The empirical results imply that an increase of EPU increases the stock market crash risk, indicating that EPU can act as a critical factor in market stability. Similarly, a 2020 study by Baker et al. investigated the response of the stock market following the COVID-19 pandemic and found that the shocks in the US market following the pandemic were largely due to government restrictions on commercial activity. The sustained instability and subsequent policy uncertainty had lingering detrimental effects on the US stock market with the service industry struggling.

Based on previous research, I expect that my study will find a significant positive relationship between economic policy uncertainty and stock market volatility in all three regions. This relationship is contemporaneous, meaning it is a reflection of real-time sensitivities. Additionally, I hypothesize that the EU will have the most responsive stock market in terms of volatility to fluctuations in economic policy uncertainty due to their collection of economies that vary in several significant macroeconomic characteristics.

CHAPTER 3 Data

This chapter explains the process of collecting and consolidating all the data used in the subsequent analysis.

The study investigates the impact of Economic Policy Uncertainty (EPU) on stock market volatility across three regions: the United States, the United Kingdom, and the European Union. The sample consists of 703 monthly observations across different time periods, with the US contributing 336 observations from January 1995 to December 2022, the UK providing 179 observations from August 2004 to May 2019, and the EU supplying 188 observations from January 2000 to August 2015.

3.1 Primary Variables

The dependent variable for each region is the respective stock market volatility index—VIX for the US, VFTSE for the UK, and VSTOXX for the EU, labelled *Stock_market_volatility*. These indices measure market expectations of near-term volatility conveyed by stock index option prices. They are crucial for understanding the market's view on risk and uncertainty. The primary independent variable is the EPU index specific to each region, labelled as *three_component_EPU*, which quantifies the uncertainty in economic policies that could influence market behaviors. It is constructed from three components, newspaper coverage of policy-related economic uncertainty, tax code expirations, and disagreement amongst economic forecasters. Higher EPU values indicate greater uncertainty, which is hypothesized to lead to increased market volatility.

3.2 Control Variables

Data collection for this study involved sourcing control variables from reputable databases to ensure accuracy. Monthly unemployment rates, labelled as *Unemployment_rate_SA*, represent seasonally adjusted figures to account for regular seasonal fluctuations in employment. This was used to control for the effects of labor market conditions on stock market volatility. High unemployment can signal economic distress, potentially impacting market stability. Real GDP growth rates, labelled as *Real_GDP_growthongrowth_rate*, were included to capture the overall economic performance. Positive GDP growth is typically associated with economic expansion, while negative growth indicates contraction, both of which can influence market volatility. 10-year bond yield rates (*_year_bondyield_rate*), were used to represent long-term interest rates, reflecting the cost of borrowing and the risk premium. Bond yields impact investment decisions and economic activity, thereby affecting stock market volatility.

These control variables were obtained from the Federal Reserve Economic Data (FRED) for the United States, the Office for National Statistics (ONS) for the United Kingdom, and Eurostat for the European Union. This comprehensive data collection approach was used to construct a panel dataset that enabled a thorough examination of the relationship between EPU and stock market volatility across different regions.

Table 1.1 Descriptive Statistics of Primary Variables and Controls

	Mean	Std. dev.	Min	Max	Skewness
Stock_market_volatility	20.908	8.533	9.510	61.340	1.544
three_component_EPU	120.901	52.715	33.107	558.224	2.210
Unemployment_rate_SA	6.838	2.327	3.500	14.800	0.443
Real_GDP_growthongrowth_rate	0.142	4.794	-45.713	5.439	-7.638
_year_bondyield_rate	3.541	1.484	0.533	7.579	0.071

This table provides summary statistics for five key variables in the study: stock market volatility, the three-component EPU index, unemployment rate, real GDP growth rate, and the 10-year bond yield rate. The mean, standard deviation, minimum, maximum, and skewness values are given for each variable, offering insight on their distributions and central tendencies.

Stock market volatility values range from a minimum of 9.510 to a maximum of 61.340, indicating significant variability. The skewness value of 1.544 suggests a positive skew, meaning that there are more values concentrated on the lower end, with some extreme values on the higher end. The EPU has a mean of 120.901 and a standard deviation of 52.715, with values ranging from 33.107 to 558.224. The high skewness of 2.210 indicates a strong positive skew, suggesting that while most EPU values are relatively low, there are a few instances of very high EPU, reflecting periods of extreme economic policy uncertainty.

The unemployment rate has a mean of 6.838 and a standard deviation of 2.327. The skewness of 0.443 indicates a slight positive skew, showing a fairly symmetric distribution with a mild tendency towards higher unemployment rates. Real GDP growth rate shows a mean of 0.142 with a large standard deviation of 4.794, indicating substantial variability. The range is from -45.713 to 5.439, with a highly negative skewness of -7.638, suggesting a heavy left tail. This indicates that there are some extreme negative growth rates, which could represent economic recessions or downturns. The mean bond yield rate is 3.541 with a standard deviation of 1.484. The minimum and maximum values are 0.533 and 7.579, respectively. The skewness is 0.071, indicating that the distribution of bond yield rates is nearly symmetric.

3.3 Interaction Terms

In order to test which regions' three-component EPU had the most significant effect on their respective stock market volatility I constructed interaction terms in which the three-component EPU indices were multiplied by dummy variables representing each region. This process generated region-specific EPU variables: *EPU_US*, *EPU_UK*, and *EPU_EU*. Each of these variables captures the monthly EPU for their respective regions, allowing us to discern the individual impact of EPU on stock market volatility for the US, UK, and EU.

Table 1.2 Descriptive Statistics of Interaction terms

	Mean	Std. dev.	Max	Skewness
EPU_US	31.693	56.186	217.312	1.476
EPU_UK	33.581	68.466	558.224	2.639
EPU_EU	55.627	65.865	350.460	0.891

Note: Minimums are excluded as minimums for all three interaction terms are 0. This is because when an observation has a non-zero value for one region, the statistical software automatically registers it as a zero value for the other two regions.

This table provides summary statistics for the interaction terms constructed to analyze the effect of each country's EPU on their own stock market volatility. The mean, standard deviation, maximum, and skewness values are given for each variable.

The mean US EPU and UK EPU take on similar values of 31.693 and 33.581 respectively, whereas the EU EPU has a higher mean 55.627, indicating that on average the EU faces higher levels of policy-related economic uncertainty than the US or UK. All three terms have high standard deviations indicating large variability. Skewness indicates that the UK has a strong positive skew of 2.639, suggesting that there are a few instances of very high EPU, reflecting periods of extreme economic policy uncertainty in the UK. On the other hand, the EU has a skewness of 0.891 indicating that the distribution of EPU levels for the EU are nearly symmetric. The US EPU's skewness of 1.476 suggests a positive skew, meaning that there are more values concentrated on the lower end, with some extreme values on the higher end.

CHAPTER 4 Method

4.1 EPU as a Whole

To analyze the collected data, I used a multiple linear regression with fixed effects and Driscoll-Kraay standard errors, using the following regression equation:

$$(1) \quad Stock\_market\_volatility_{it} = \beta_0 + \beta_1\, three\_component\_EPU_{it} + \beta_2\, Unemployment\_rate\_SA_{it} + \beta_3\, Real\_GDP\_growthongrowth\_rate_{it} + \beta_4\, \_year\_bondyield\_rate_{it} + \epsilon_{it}$$

After running a preliminary regression, the Hausman test revealed that the fixed effects model was better suited to our panel data, aligning with the intuition that region-specific characteristics influencing stock market volatility remain constant over time. This is crucial for isolating the effect of the explanatory variables, specifically the three-component EPU, on stock market volatility. The fixed effects model effectively controls for unobserved heterogeneity, ensuring that the analysis accurately captures the impact of the variables of interest without being confounded by time-invariant regional characteristics.

Initially, clustered standard errors were used to address potential within-group correlation, which accounts for the fact that observations within the same region might be correlated over time. However, diagnostics revealed the presence of cross-sectional dependence, which compromises the integrity of the findings. Cross-sectional dependence occurs when errors across different regions are correlated at the same time point, likely due to global economic linkages and interdependencies affecting all regions simultaneously. Additionally, the diagnostics showed that the observations were not heteroskedastic, meaning that the variance of the errors was relatively constant across observations.

To address these issues, Driscoll-Kraay standard errors were used with the fixed effects model. Driscoll-Kraay standard errors adjust for both cross-sectional dependence and possible autocorrelation, providing robust standard errors that are reliable even when observations are correlated across panels and over time. This adjustment ensures that the estimated coefficients are reliable and that the statistical inferences made from the regression are valid. Given the presence of cross-sectional dependence, as indicated by Pesaran's test results, Driscoll-Kraay standard errors mitigate the impact of such dependencies, enhancing the robustness of the regression results.

4.2 Region-specific Analysis

The next part of the study involved assessing which region’s EPU had the largest effect on their respective stock market volatility index. To examine this effect, I first created region-specific EPU

interaction terms for the assessment of the impact of each region's EPU on their respective stock market volatility indices. I then conducted a regression using the same control variables. The regression model was specified as follows:

$$(2) \quad Stock\_market\_volatility_{it} = \beta_0 + \beta_1 EPU\_US_{it} + \beta_2 EPU\_UK_{it} + \beta_4 EPU\_EU_{it} + \beta_4 \boldsymbol{Control\ variables} + \epsilon_{it}$$

Utilizing the same methodology as before and given the presence of cross-sectional dependence and possible autocorrelation, the fixed effects model was estimated using Driscoll-Kraay standard errors. This method adjusts for cross-sectional dependence and provides robust standard errors that account for both autocorrelation and heteroskedasticity.

CHAPTER 5 Results & Discussion

This chapter delves into the findings from the study and offers interpretations in relation to the central research question.

The models were estimated using Fixed Effects with Driscoll-Kraay standard errors. Since both the dependent variable (stock maker volatility) and the primary independent variable (three-component EPU) are index values, this indicates the relationship between the relative changes in the indices. In practical terms, it means that higher economic policy uncertainty, as measured by the EPU index, is associated with higher stock market volatility.

5.1 Results

5.1.1 Model Fitness

In a panel data regression, the R-squared values represent the proportion of variance in the dependent variable (Stock Market Volatility) that is explained by the independent variables.

Table 2 R-squared Values for Regression Equations (1) and (2)

	(1)	(2)
Within	0.262	0.331
Between	0.916	0.548
Overall	0.315	0.264

Note: R-squared values for both regression outputs corresponding to equations (1) and (2) in methodology showing within-groups, between-groups and overall R-squared of the models.

The within R-squared reflects how well the model explains the variations within each region after accounting for region-specific characteristics. In this case, 26.2% of the variance in stock market volatility within each region over time is explained by model (1), while 33.1% is explained by model (2).

The between R-squared measures the proportion of the variance in the dependent variable that is explained by the independent variables across different regions. It reflects how well the model explains the variations between regions. Here, 91.6% of the variance in stock market volatility between different regions is explained by model (1) but only 54.8% is explained by model (2). This high value for model (1) suggests that the model does a very good job of capturing differences in volatility across regions.

The overall R-squared measures the proportion of the variance in the dependent variable that is explained by the independent variables, considering both within and between variations, and is a combination of the within and between R-squared values. In this case, 31.5% of the total variance in stock market volatility is explained by model (1) and 26.4% is explained by model (2) when considering both the within-region and between-region variations.

5.1.2 Regression Results

Table 3 Coefficients for Regression Equations (1) and (2)

	(1)	(2)
three_component_EPU	0.074***	-
	(0.006)	
EPU_US	-	0.117***
		(0.018)
EPU_UK	-	0.043**
		(0.017)
EPU_EU	-	0.139***
		(0.020)
Unemployment_rate_SA	0.977***	0.205
	(0.117)***	(0.315)
Real_GDP_growthongrowth_rate	-0.331***	-0.265***
	(0.056)	(0.100)
_year_bondyield_rate	2.443***	2.674***
	(0.220)	(0.462)
_cons	-3.354**	-2.788
	(1.523)	(3.689)

*Note: (1) and (2) represent the regression equations for each part of the analysis and correspond to the marked regression equations in the methodology. (1) studies the effect of EPU on stock market volatility as a whole whereas (2) studies the region-specific effect of EPU on stock market volatility to allow for a comparative analysis. Driscoll-Kraay standard errors are in parentheses below respective coefficients. *** and ** indicate significance at the 1% and 5% level, respectively.*

Results for model (1) indicate that a one-unit increase in the three-component EPU index is associated with a 0.074 unit increase in the stock market volatility index. This indicates that higher economic policy

uncertainty correlates with higher stock market volatility. This is a contemporaneous analysis as it estimates how EPU and stock market volatility move together.

Results for model (2) indicate that a one-unit increase in the US EPU index is associated with a 0.117 unit increase in the VIX. Similarly, a one-unit increase in UK EPU and EU EPU result in 0.043 and 0.139 unit increases in the VFTSE and VSTOXX, respectively. All three estimated coefficients are statistically significant at least the 5% level. This indicates that higher economic policy uncertainty in each region correlates with higher stock market volatility in their respective regions. However, the EU had the highest while the UK had the lowest estimated coefficients, indicating that changes in EPU evoked largest volatility spikes in the EU stock market and relatively smaller volatility shocks in the UK stock market.

Overall, the results indicate that economic policy uncertainty has a significant effect on stock market volatility, and this affect does vary between the US, UK and the EU. Specifically, the EU stock market is more volatile following economic policy uncertainty.

The estimated coefficients of the control variables had the expected signs and magnitudes. Since all three control variables are percentages, it means that a 1% increase in any of the controls evokes a unit increase in stock market volatility.

According to model (1), a 1% rise in monthly seasonally-adjusted unemployment rates is associated with a 0.977 unit increase in the stock market volatility index. This suggests that an increase in the unemployment rate by 1% leads to nearly a one-unit increase in stock market volatility. Similarly, a 1% increase in 10-year bond yield rate is associated with a 2.443 unit increase in stock market volatility. On the other hand, the negative coefficient -0.331 of real GDP growth indicates that a 1% increase in real GDP growth corresponds to a fall in stock market volatility. The constant term -3.354 indicates the level of stock market volatility if all other variables are 0. Although this might have theoretical meaning, indices and rates will realistically not be zero meaning this value does not have a direct meaningful interpretation in isolation. All values are significant at least at the 5% level indicating that the regression has produced meaningful predictors.

The estimated coefficient of unemployment rate and the constant term are not statistically significant and so cannot be interpreted. However, a 1% increase in real GDP growth is associated with a 0.265 unit decrease in stock market volatility, and a 1% rise in 10-year bond yield rate is associated with a 2.674 increase in stock market volatility, both significant at the 1% level.

5.2 Discussion

My results indicate that there is a significant relationship between EPU and stock market volatility. The results of this paper support the findings of various other studies cited in the Theoretical Framework of this paper.

Bernanke's (1983) findings that investors approach a more cautious approach when faced with heightened levels of uncertainty which causes significant fluctuations in the stock market. Although this study investigates general uncertainty, the findings align with the general notion that investor sentiment is highly responsive to changes in volatility.

Liu and Zhang (2015) that higher levels of policy uncertainty are associated with increased stock market volatility. Additionally, my findings align with the work done by Gulen and Ion (2016) who found a strong negative relationship between firm-level capital investment and the aggregate level of policy-related economic uncertainty. This risk aversion has downstream effects on financial markets, affecting stock market volatility.

Al-Thaqeb and Algharabali (2019) who found that increased EPU has negative impacts on financial markets such as the stock market, consumer spending, and investor sentiment also align with the findings of my study.

Finally, Shaik (2019) and Dai et al. (2021), all which share the general sentiment that increased levels of policy-related uncertainty are associated with a fall in investor sentiment and increased levels of stock market volatility. This indicates that EPU is a significant factor in explaining underlying stock market volatility.

Additionally, the signs for the coefficient of the control variables in the context of stock market volatility makes sense in terms of investor behavior due to several economic and psychological factors. Economic Growth and Stability:
Positive GDP growth, falling unemployment rates and decreasing interest rates (10-year bond yield rates) signifies a growing and stable economy where businesses typically perform well, profits increase, and the overall economic environment is positive. This stability reduces uncertainty in the markets, leading to lower volatility. Investors feel more confident about the future, which dampens the fluctuations in stock prices.

Strong GDP growth also often translates to higher corporate earnings. When companies are making more money, their stock prices tend to rise steadily, contributing to lower market volatility. Investors are also less likely to engage in speculative trading when earnings growth is predictable.

Additionally, during periods of increased economic growth (typically characterized by rise in real GDP growth and falling unemployment), investors' risk aversion tends to decrease. They are more likely to hold onto their investments for the long term, expecting continued growth. This long-term outlook reduces the frequency of stock price swings, leading to lower volatility.

Positive economic indicators, such as GDP growth, boost investor sentiment. When investors are optimistic about the economy, they are less likely to react to minor news events or short-term fluctuations. This collective calmness contributes to smoother market movements and lower volatility.

Lastly, Economic growth attracts more investment, both domestic and foreign. Higher levels of investment increase market liquidity, which helps to absorb shocks and reduces volatility. When there is more liquidity, large trades have a smaller impact on stock prices.

5.3 Limitations

Unfortunately, the validity of this study's findings might be compromised by potential sectoral differences within the stock markets of the US, UK, and EU. Different sectors (e.g., technology, finance, manufacturing) can have varying levels of sensitivity to EPU. This study aggregates stock market volatility at a national level, which might mask the nuances of how specific sectors respond to EPU. Technology stocks might react differently to policy uncertainty compared to traditional manufacturing sectors and so a failure to account for these sectoral differences could lead to an oversimplified understanding of the relationship between EPU and stock market volatility.

A possible limitation of this study is the overlooking of influence of international spillovers on stock market volatility. While the study focuses on the relationship between domestic EPU and stock market volatility within the US, UK, and EU, it does not account for the fact that economic policies and uncertainties in one region can influence the stock markets of other regions. For example, significant policy changes or economic uncertainty in the US can have spillover effects on European and UK markets due to the increased interconnectedness of financial markets. Ignoring these spillover effects might lead to an incomplete understanding of the market dynamics.

These limitations pave way for further research that extends from the work done in this thesis, which will be discussed in the next chapter.

CHAPTER 6 Conclusion

In this thesis I have studied the effect of economic policy uncertainty on stock market volatility across three regions for varying time periods, as well as investigated which region's stock market is most responsive to changes in policy-related economic uncertainty. Previous research does indicate that general uncertainty affects investor sentiment and consumer spending which has downstream effects on financial markets, but the EPU index as the primary independent variable incorporates three unique components – newspaper coverage, tax code expirations, and disagreements amongst economic forecasters – that provide a comprehensive outlook on policy-related economic uncertainty. Additionally, the comparison between the US, the UK and the EU and their respective stock market volatility indices using the EPU was yet to be explored. Therefore, the two components in the research question studied in this dissertation were: "How does economic policy uncertainty affect stock market volatility?", and "How this affect is different between the US, UK and the EU region?"

To answer these questions a sample of 703 observations was collected comprising of data from the US, the UK, and the EU, spanning across various time periods. Data was collected from governmental data collecting organizations and national stock market volatility indices. The fixed effects model revealed that there was a significant positive relationship between EPU and stock market volatility in all three regions, which the EU's stock market being the most responsive to changes in EPU and the UK being the least.

Therefore, the study concludes that EPU might be a significant driver of stock market volatility, and other research suggests this could be through impact on investor sentiment. These findings also indicate that unconventional forms of uncertainty have significant impacts on the stock market. Combined with other studies these findings suggest that spikes in policy-related uncertainty will have detrimental effects on the stability of the stock market.

6.1 Implications for Investors

The findings from this study have significant implications for investors. The positive relationship between EPU and stock market volatility suggests that investors need to be particularly cautious during periods of heightened policy-related uncertainty. Since EPU incorporates elements such as newspaper coverage, tax code expirations, and disagreements among economic forecasters, investors should closely monitor these indicators as part of their market analysis.

In practical terms, this means that during times of increased EPU, investors might consider diversifying their portfolios to mitigate risk. Preparation should be made for potential market turbulence so that investment strategies can be adjusted accordingly. For instance, when EPU is high, a shift towards bonds,

gold, or other safe-haven assets might be prudent. Furthermore, understanding that the EU's stock market is the most responsive to EPU changes while the UK's is the least can help investors tailor their strategies based on regional exposure. This nuanced understanding allows investors to make more informed decisions, potentially avoiding significant losses during volatile periods.

6.2 Implications for Policymakers

The study's findings also hold important implications for policymakers. The significant impact of EPU on stock market volatility highlights the need for clear and stable economic policies. Policymakers should strive to minimize uncertainty by providing transparent and consistent economic guidance involving clear communication strategies regarding policy changes and economic forecasts to reduce the negative effects of uncertainty on financial markets.

Additionally, since the study indicates that the EU's stock market is more sensitive to EPU changes, EU policymakers should be particularly mindful of the broader implications of their economic policies. Efforts to stabilize the economic environment, such as ensuring predictable tax policies and reducing regulatory uncertainty, could help in mitigating adverse effects and avoid the destabilizing of the stock market. For policymakers in the US and the UK, while the impacts are less pronounced, the same applies. By understanding the specific ways in which their policies contribute to economic uncertainty, policymakers can better manage investor sentiment and market stability, fostering a healthier economic environment.

6.3 Suggestions for Further Research

Further research can delve into the sectoral differences within stock markets to understand how EPU impacts various sectors differently. Different sectors of the economy react uniquely to policy changes and economic uncertainty due to their inherent differences, namely sensitivity to economic cycles, and regulatory environments. By analyzing sector-specific impacts, researchers can provide a more detailed understanding of how EPU affects stock market volatility. This approach can help investors tailor their strategies to mitigate risks associated with sector-specific vulnerabilities.

The potential influence of international spillovers can be another focus area for further research. Global financial markets are highly interconnected, meaning economic policies in one region can have ripple effects on other regions. Future studies should investigate how EPU in one region impacts stock market volatility in other regions, considering factors such as trade relationships and capital flows. This research could employ models that account for cross-market influences and provide insights into the global

transmission mechanisms. Understanding these spillover effects can help policymakers and investors better navigate the interconnected nature of global financial markets.

Another possible avenue for further research is to evaluate the impact of EPU on other financial markets. This analysis would enable investors to adjust and construct portfolios consisting of various financial instruments with varying sensitivities to EPU. The findings would aid in the comparison between responsiveness of different financial markets and instruments to minimize risk and help stabilize dividend-based wealth. This can in turn help diminish the negative effects of periods of heighted EPU on household wealth, helping policymakers angle policies aimed at stability and focusing on long-term growth rather having to dedicate a large number of resources to combat poverty spikes in times of economic policy uncertainty.

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