ISSN: 2278-3369

International Journal of Advances in Management and Economics

Available online at: www.managementjournal.info

RESEARCH ARTICLE

CAN ECONOMIC POLICY UNCERTAINTY PREDICT MAJOR US STOCK INDEX RETURNS?

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Abstract: Financial markets are uncertain, leading to noteworthy impacts on investor behavior, asset valuations, and overall economic performance. Specifically, economic policy uncertainty (EPU), stemming from fluctuations or unpredictability in governmental regulations, policies, and political environments, has become an increasingly pressing concern for investors and policymakers worldwide. In this study, we thoroughly analyze how EPU and other market and economic risk factors affect returns from major US indexes such as the Dow Jones Industrial Average, Russell 2000, S&P 500, and Nasdaq. We conduct a regression analysis (ordinary least squares) utilizing economic data collected over the past 21 (2002-23) years to uncover novel insights into the intricate interplay between EPU, other non-diversifiable risk factors, and financial markets. Our findings demonstrate that EPU is a good predictor of index returns. However, other market factors, particularly the VIX fear index, provide additional context and information. Finally, this study finds that the US stock market is so efficient that stock movements cause the uncertainty and fear indexes to change, not vice versa. Overall, although there is a significant relationship between the stock market, uncertainty, and fear indexes, investors cannot use such indexes to make any abnormal return.

Keywords: *Economic Policy Uncertainty, VIX; Fear Index.*

Article Received: 12 June 2024 **Revised: 28 June 2024** **Accepted: 28 June 2024**

INTRODUCTION

Uncertainty is a common occurrence in financial markets and greatly influences investor behavior, asset valuation, and overall economic performance. There is a vast literature-for example, Friedman (1968), Rodrik (1991), Higgs (1997), and Hassett and Metcalf (1999), among others-that considers the detrimental effects of monetary, fiscal, and regulatory policy uncertainty on an economy.

The relatively recent economic crises, such as the great recession of 2007-2009 and the spread of the COVID-19 virus, have renewed the focus on them, resulting in substantial scholarly attention on how uncertain situations may have an impact on a country's economic activities. Stock and Watson (2012) use macroeconomic uncertainty to investigate the factors behind the 2007-2009 recession and its slow recovery and come to a similar conclusion that policy uncertainty is a strong candidate for partly explaining subsequent poor economic performances. Bloom *et. al.* (2014) introduces uncertainty shocks as a new factor that influences business cycles. They show that microeconomic uncertainty rises sharply during economic crises; it particularly happened during the US Great Recession of 2007-2009.

Bachman *et. al.* (2013) use German economic uncertainty estimated from survey data and show that there is a negative relationship between output and uncertainty. Despite the interest among academicians in uncertainty-related research, they use different methods to measure the uncertainty prevailing in the economy at any point in time. Baker *et. al.* (2013) proposes a novel index to measure economic policy uncertainty (EPU) based on the frequency of media coverage of information related to economic uncertainty.

Uncertainty originating from changes or unpredictability in governmental policies, rules, and political situations is known as economic policy uncertainty. Their study concludes that the EPU index is a reliable measure of changes in economic uncertainty brought on by policy shifts. They provide evidence that the EPU index rose during the first and second Gulf Wars, the 9/11 attacks, and the 2011 debt ceiling battle. Baker et al. (2016) consider exploiting EPU indices for 12 countries.

Their results indicate that an increase in policy uncertainty innovation (equivalent to the actual EPU) during 2005-2012 predicted declines of about 6% in gross investment, 1.2% in industrial production, and 0.35% in employment. Recently, the importance of EPU has continued to grow and has become a major issue for investors and policymakers due to its ability to capture changes in non-diversifiable market and economic risk.

This index has been instrumental in many of the recent studies that have examined the impact of economic policy-related uncertainties on financial markets. Batabyal and Killins (2021) show that, for the Canadian market, EPU has an asymmetric impact on stock prices. An increase in EPU leads investors to hold lower-risk assets, whereas a decrease in uncertainty encourages investors to take more risk.

Following the line of inquiry in Baker *et. al.,* (2013, 2016), studies by Arouri et al. (2016), Christou *et. al.*, (2017), Balli *et. al.* (2017), Bahmani-Oskooee and Saha (2019), and Chiang (2019) demonstrate that stock returns are negatively correlated with EPU changes. Li and Zhong (2020), Chen *et. al.,* (2017), Xiong et al. (2018), Li *et. al.,* (2016), and Christou et al. (2017) report similar findings for China, India, and Pacific Rim markets. Arouri and Roubaud (2016) examine the relationship between economic policy uncertainty and Chinese, Indian, and U.S. stock market returns. They find that policy uncertainty in the USA and India negatively affects stock returns.

The discussion so far has addressed three important findings-first, EPU has the potential to account for the risk associated with economic performance as well as stock returns; second, the negative relationship between stock returns and EPU is an international phenomenon; and third, we now have a good indicator (EPU) to capture prevailing economic uncertainty. In this backdrop, our study examines how EPU affects important US stock market indices such as the DJIA, Russell 2000, S & P 500, and NASDAQ in the presence of other economic indicators such as oil prices, inflation, exchange rates, fear indices (VIX), consumer sentiment, book value to market value ratio, SMB, and interest rate spread.

What we are attempting to ascertain in this study is to examine the following three research questions: (i) is there a relationship between EPU, as given by Baker et al. (2013), and US stock returns? (ii) if EPU is an important economic indicator, then can it still be influential in the presence of other market and economic risk factors (such as VIX)? (iii) finally, is EPU (or VIX) a lead or a lagged variable? In order to address these questions, we perform a series of regressions, employing a variety of monthly economic and market data from the past twenty-one years. By closely examining the effects of EPU and different economic indicators, we strive to deliver a thorough assessment of the risks and opportunities related to EPU and other risk factors and to present an understanding of the underlying processes and channels through which uncertainty affects financial markets.

Our results show that initially EPU is an important factor impacting stock price movements. However, when economic and market factors have been introduced in the models, the influence of EPU becomes insignificant. In fact, the fear index (VIX) turns out to be the most important factor influencing stock price movements. However, impulse response functions make it clear that VIX is in fact a lagged variable as it follows the changes in stock returns. Thus, investors cannot exploit VIX to make any abnormal profit. This finding is also corroborated by the variance decomposition of index returns derived from Vector Auto regression models.

The remaining sections of this paper are organized as follows. Section II presents an overview of relevant literature on the impact of EPU on financial markets and identifies the gaps in existing research. Section III explains our data sources and methodology, outlining the key variables and analytical techniques we apply in our regression models. Section IV presents our empirical findings along with analyses of regression outcomes. Section V discusses the implications of our results for investors and policymakers. It also concludes the paper and suggests future research directions.

LITERATURE REVIEW

Karnizova and Li (2014), Li *et. al.,* (2015), Liu and Zhang (2015), and Orlik and Veldkamp (2014) show the negative relationship between stock returns and EPU. Using firm-level data and a new measure of economic uncertainty, Baker *et. al.,* (2016) find a relationship between policy uncertainty and increased stock market volatility, lower investment, and lower employment. The authors also have found that EPU has a significant detrimental impact on output, employment, and investment, both globally and locally. This quantifiable economic policy uncertainty index has become a very popular proxy for risk, encouraging academicians to use it in their studies.

Antonakakis *et. al.,* (2013), Kang *et. al.,* (2017), Christou *et. al.,* (2017), Guo *et. al.,* (2018), and Liow *et. al.,* (2018) also report an adverse effect of EPU on stock markets. Using a long dataset from 1900 to 2014, Arouri et al. (2016) have also shown a negative impact of EPU and argue that the effect becomes more persistent during high volatility periods. By using the index proposed by Baker *et. al.,* (2016), Li (2019) investigates how company cash policies in various foreign countries are affected by the unpredictability of economic policy. The study confirms a positive association between corporate cash holdings and economic policy uncertainty as well as the propensity to hold onto cash from operating cash flows.

Some studies focus on the use of EPU as a risk factor for non-US stock markets. The effects of EPU on the G-7 stock market returns and volatility are examined by Kundu and Paul (2022) by considering both bull and bear markets. According to their findings, an increase in EPU results in more market volatility and poorer immediate future returns, and it raises returns in the present period as investors demand higher uncertainty premiums.

Moreover, the impact of EPU on the market is significantly strong only in a down market. Using a Bayesian model, Christou *et. al.,* (2017) find evidence of a negative relationship between EPU and stock returns for six Pacific-Rim countries. It is also observed that the relationship does not change when international spillovers are allowed. Aydin *et. al.,* (2020) examine the causality between EPU and stock prices for BRIC countries, and their findings indicate that there is a unidirectional causality from EPU to stock prices for Brazil, whereas the causality is bidirectional for China. Mensi *et. al.,* (2014) report an absence of US EPU's impact on BRICS stock markets.

However, Aloui (2016) finds a negative relationship between US EPU and BRIC stock indices. Momin and Masih (2015) provide similar findings for the Indian stock market. Chiang (2020) examines the impact of changes in EPU on Japanese stock returns and suggests that a positive change in EPU causes a decline in stock returns and an increase in stock returns in contemporaneous and lagged periods, respectively.

The EPU is also treated as an important variable that influences economic indicators such as credit ratings and term-wise impacts. French and Li (2022) look into the connection between the overall foreign investment in the US and its economic policy uncertainty. According to the authors, short-term equity fund flows are shown to be adversely correlated with both the US and worldwide EPU, but over the medium term, this relationship is found to be reversed. Amani *et. al.,* (2022) investigate the effects of EPU on the US stock market index and other economic variables. Their findings suggest that improved stock market performance is related to deteriorating economic and political-economic conditions.

Boumparis *et. al.,* (2017) investigate the influence of economic policy risk on sovereign credit ratings in the Eurozone. They report that EPU reduces the credit ratings of all countries, but it affects the countries with lower credit ratings even more. For the G-7 countries, Benlagha and Hemrit (2021) show that EPU can produce a situation that worsens the spillover shocks between the yields on two-year sovereign bonds.

EPU has become such an important policy uncertainty indicator that many countries have started using it for research and policy-related decisions. Now, monthly EPU is available for many developing and emerging economies. According to Chen *et. al.,* (2014), economic uncertainty has a detrimental impact on business investment in China. Particularly, businesses frequently cut back on investment when economic policy uncertainty rises. EPU index is also used in studies related to real estate. The relationship between China's housing market and EPU is examined by Huang *et. al.,* (2020).

The property values in China housing market are positively influenced by EPU. The impact of economic policy uncertainty on the monthly performances of US real estate investment trusts (REITs) is examined by Hansz *et. al.,* (2022). They discover that a positive shock to EPU lowers current REIT returns while predicting larger future returns, suggesting the presence of a return reversion phenomenon. They also claim that equity REIT values are more significantly impacted by EPU than by mortgage REIT values.

Liming *et. al.,* (2020) investigate how exchange rate volatility in China is affected by economic policy uncertainty. They conclude that EPU significantly and favorably affects exchange rate volatility. They also note that the impact of EPU on exchange rate volatility varies from country to country. When compared to the US, Europe, and Japan, Hong Kong's EPU has little effect on the volatility of the exchange rate. Their study suggests that EPU should be used to evaluate exchange rate risk correctly.

Economic policy uncertainty is also considered to be an important risk factor in the banking industry. Bakhsh *et. al.,* (2022) use bank-level panel data from 19 countries to examine the non-linear link between economic policy uncertainty and bank lending. Their study shows that EPU reduces bank lending, although the effect varies depending on the bank and the market structure, and such an effect is felt more during crisis periods. The influence of EPU on bank liquidity generation in the US for the period 1985-2016 is examined in a study by Berger et al. (2017). EPU reduces overall liquidity generation, which shows that it has a detrimental effect on banks' capacity to carry out their primary duty of facilitating the transfer of liquid capital for beneficial uses. The effect of economic uncertainty on the relationship between monetary policy and bank risk is examined by Chen *et. al.,* (2022). Using a panel of 1100 public banks spread over 43 countries, the authors observe that the "risk-taking channel" of monetary policy is diminished during periods of high economic uncertainty.

The effect of EPU on risk spillover in the US commodities futures market is examined by Ren *et. al.,* (2022). The authors discover that EPU has an asymmetric and heterogeneous impact on risk spillover in the commodities futures market. The findings imply that at times of high EPU, the spillover of risk rapidly rises, and the market becomes highly interconnected. Bonaime *et. al.,* (2018) report that political and regulatory uncertainty is strongly adversely correlated with merger and acquisition activities.

The consequences of uncertainty related to taxes, government spending, monetary and fiscal policy, and regulatory changes are strong. Benchimol *et. al.,* (2023) demonstrate that stock markets respond more aggressively to monetary policy surprises during periods of high uncertainty.

DATA AND METHODOLOGY

The data used in this study have been collected from multiple sources. The economic data are collected from Federal Reserve Economic Data (FRED), SMB, and BV/MV data are collected from Fama-French's website on Dartmouth's webpage, and S & P 500, DJIA, and Russell 2000 data are collected from Wall Street Journal. Data collection for this study occurs on the final trading day of each month over 21 years, spanning from January 1, 2002 to December 31, 2022.

A logarithmic conversion has been used to determine the percentage change of each variable (except inflation, interest rate spread, BV/MV, and SMB). The value of the current month is divided by the value of the previous month, and the natural log of this value is multiplied by 100 to find the monthly percentage change. In the case of indices, the calculated percentage changes are considered as monthly index returns.

In the formulas below, abbreviations have been used to signify different variables used. *OIL*, *IP*, *CS*, *IRS*, *INF*, *EXR*, and *EPU* refer to the Brent oil index, industrial production, consumer sentiment, interest rate spread, inflation, the exchange rate of the US Dollar against the Euro, and economic policy uncertainty, respectively. *SMB, BV/MV*, and *VIX* correspond to small minus big (size premium prevailing in the market), return spread between firms based on Book-to-Market ratios, and market fear index, respectively. Indexes such as S & P 500, Dow Jones Industrial Average, Nasdaq, and Russell 2000 are given by *S & P*, *DJIA*, *NASD*, and *RUSSELL*, respectively.

It is also important to mention that *EPU* has been widely used across different financial and economic studies to show its impact on different financial markets. The *EPU* is calculated by collecting newspaper articles related to economic policy uncertainty. Then an algorithm scans these articles looking for keywords relating to uncertainty in economic policy, government, spending, tax policy, and other factors related to economic policy uncertainty.

Then, based on what words and how frequently they are used in these articles, a monthly index value is created, which ranges from 0 to 100. This value then becomes a representation of the level of economic policy uncertainty for that month, which can then be used by researchers, policymakers, economists, and investors as a proxy for risk.

Furthermore, while the EPU index, developed by Baker *et. al.,* (2016), is used to assess the level of economic policy uncertainty, there may be other factors that need to be included to consider the full picture. Because the EPU index relies solely on newspaper coverage, there may be other key details of uncertainty that are being missed. An example of this could be uncertainty from international trade agreements or different geopolitical events. Thus, other factors, such as the *VIX*, can be used to complement the EPU index to measure factors such as market anticipation of market volatility.

Overall, a comprehensive range of economic and market variables have been employed in this study to determine the effect of economic policy uncertainty on significant major indexes in the United States. The data used in this study covers an appropriate time period, and necessary transformations (as mentioned above) have been done for the regression analysis. We use the OLS (ordinary Least Squares) method for the estimation. Our base model consists of returns of indexes and contemporaneous changes in *EPU*, which can be expressed as follows:

$$R_{i,t} = \alpha_i + \beta_1(EPU_t), \quad (1)$$

where i is one of the index (DJIA, Russell 2000, S&P 500, and Nasdaq) returns used in the study. However, the lagged values of *EPU* are considered for an extended model given below:

$$R_{i,t} = \alpha_i + \beta_1(EPU_t) + \beta_2(EPU_{t-1}). \quad (2)$$

Next, we introduce economic risk factors in the model. These risk factors are not diversifiable since these are the sources of systematic risk. The model in equation (1) becomes as follows:

$$R_{i,t} = \alpha_i + \beta_1(EPU_t) + \beta_2(OIL_t) + \beta_3(IP_t) + \beta_4(CS_t) + \beta_5(IRS_t) + \beta_6(INF_t) + \beta_7(EXR_t). \quad (3)$$

Now, we introduce two Fama-French (1992) market risk factors – *SMB* and BV/MV – in the model. Additionally, we add the fear index (VIX) to the model. This behavioral factor is important because investors are inclined to give more weight to a loss of one dollar than to a gain of one dollar. The model in equation (1) becomes as follows:

$$R_{i,t} = \alpha_i + \gamma_1(EPU_t) + \gamma_2(SMB_t) + \gamma_3(BV/MV_t) + \gamma_4(VIX_t). \quad (4)$$

Finally, we introduce all the risk factors (market plus economic) in one model, which is given below:

$$R_{i,t} = \alpha_i + \beta_1(EPU_t) + \beta_2(OIL_t) + \beta_3(IP_t) + \beta_4(CS_t) + \beta_5(IRS_t) +$$

$\beta_6(INF_t) + \beta_7(EXR_t) + \gamma_2(SMB_t) + \gamma_3(BV/MV_t) + \gamma_4(VIX_t)$ (5)

Finally, we employ impulse response functions generated from VAR (Vector Autoregression) to find the relative impact of innovations in EPU and VIX on individual stock index returns and vice versa. Impulse functions are also able to tell how quickly the innovations are absorbed into the system. Moreover, it can detect the dominating behavior of one variable over the other in the presence of a set of exogenous variables.

Particularly, this may tell us whether prior knowledge of any risk factors allows investors to make abnormal returns. Variance decomposition derived from VAR is also used to find the percentage of the movements of EPU, VIX, and index returns captured by these endogenous variables.

ANALYSIS OF RESULTS

Table 1 shows the impact of *EPU* on the returns of the S & P 500, DJIA, Russell 2000, and Nasdaq. Results suggest that changes in *EPU* have a significant impact on index returns. As predicted, for all four indexes, the relationship with *EPU* is negative. Since *EPU* indicates stress on the economy based on information collected from published sources, the relationship between EPU and index returns should be negative. However, three concerns are there.

First, constants are significant, which may imply that other important factors may be missing in this simple model. Second, adjusted R^2s are very low, suggesting that a larger model may be able to perform better. Finally, *EPU* seems to explain the returns of big firms (S & P 500 and DJIA) better than small and high-tech firms (Russell and Nasdaq). Thus, we need to consider larger models, which include economic as well as market risk factors.

Table 1: Impact of EPU on Index Returns

Dependent Variables	Constant	*EPU*	Adj. R^2
S & P	-0.486	-0.014	0.035
	(-1.764)*	(-3.187)***	
DJIA	-0.480	-0.014	0.035
	(-1.794)*	(-3.175)***	
RUSSELL	-0.515	-0.012	0.013
	(-1.410)	(-2.076)**	
NASD	-0.672	-0.016	0.029
	(-1.989)**	(-2.908)***	

Note: *t*-values are reported in parentheses.*, **, and *** indicate significance at 10%, 5%, and1% level, respectively.

Table 2 exhibits the impact of *EPU* and lagged *EPU* on the returns of the S&P 500, DJIA, Russell, and Nasdaq. Results show that similar to Table 1, changes in *EPU* have a significant impact on returns.

For all four indexes, the relationship between returns and *EPU* is negative. The addition of the lagged *EPU* variable provides no impact on returns. Such a result is expected from an efficient stock market. In an efficient stock market such as the US, lagged *EPU* is stale information as the contemporaneous *EPU* has already been adjusted in the stock prices.

Similar to Table 1, there are three main concerns with the results of Table 2, which suggests that considering larger models with economic and market risk factors could be more appropriate.

Table 2: Impact of Contemporaneous and Lagged EPU on Index Returns

Dependent Variables	Constant	*EPU*	Lagged *EPU*	Adj. R^2
S & P	-0.508	-0.015	-0.003	0.030
	(-1.837)*	(-2.955)***	(-0.499)	
DJIA	-0.494	-0.015	-0.003	0.031
	(-1.840)*	(-3.030)***	(-0.632)	
RUSSEL	-0.539	-0.015	-0.006	0.011
	(-1.474)	(-2.167)**	(-.895)	
NASD	-0.706	-0.015	0.00005	0.022
	(-2.089)**	(-2.451)**	-(0.009)	

Note: *t*-values are reported in parentheses *, **, and *** indicate significance at 10%, 5%, and1% level, respectively.

Table 3 considers *EPU* and relevant economic factors. These economic factors are the sources of systematic risk, which cannot be diversified away by constructing well-diversified portfolios. *EPU* still explains the returns of S & P 500 and DJIA returns at the 5% level of significance. *EPU* weakly impacts Nasdaq, whereas it has no impact on Russell. Now, it seems that the consumer sentiment index (CS) and exchange rate (EXR) have the most noticeable impact on index returns. The coefficients for both variables are significant at the 1% level. The positive relationship between consumer sentiment and index returns indicates that when consumers are more confident about the economy, it boosts the demand for products, which, in turn, increases firm sales, cash flows, and stock prices.

Table 3: Impact of EPU and Economic Factors on Index Returns

Dependent Variables	Constant	*EPU*	*OIL*	*IP*	*CS*	*IRS*	*INF*	*EXR*	*Adj. R²*
S & P	-0.149	-0.149	-0.009	0.041	0.354	0.0002	1.342	0.480	0.274
	(-0.488)	(-2.149)**	(1.424)	(1.387)	(4.762)***	(.010)	(1.410)	(5.161)***	
DJIA	-0.258	-0.008	0.041	0.501	0.216	0.019	0.817	0.443	0.269
	(-2.154)**	(-2.154)**	(1.472)	(2.021)**	(5.027)***	(0.884)	(0.883)	(4.891)***	
RUSSEL	-0.186	-0.004	0.087	0.596	0.256	0.010	1.131	0.538	0.260
	(-0.462)	(-0.811)	(2.320)**	(1.769)*	(4.383)***	(0.327)	(0.900)	(4.374)***	
NASD	-0.421	-0.010	0.054	0.210	0.221	0.006	0.954	0.481	0.177
	(-1.059)	(-1.942)*	(1.449)	(0.632)	(3.846)***	(0.218)	(0.771)	(3.974)***	

Note: *t*-values are reported in parentheses. *, **, and *** indicate significance at 10%, 5%, and1% level, respectively.

The results also support the view that stronger dollar values against major currencies, such as the Euro, are good news for U.S. firms. Compared to the previous table, all adjusted R^2s have significantly improved. Adj. R^2 of 0.274 for the S & P 500 suggests that the model explains about 27% of the returns movements of the S&P 500 stocks. Adj. R^2s for models related to DJIA and Russell have also shown similar improvement compared to previous models.

Adj. R^2 for Nasdaq has made a small yet noticeable improvement. The reason could be the fact that Nasdaq is dominated by high-tech firms whose behavior may be different from others. Interest rate spread and inflation do not play any role in determining the returns of any of the indexes. Now, the constant term is significant only for DJIA, suggesting that this model may be improved by incorporating more relevant factors.

Table 4 shows the impact of *EPU* and relevant market factors on index returns. With this regression, *EPU* cannot explain the returns of any of the indexes. When considering market factors, the fear index, or *VIX*, exerts a significantly negative impact on index returns at the 1% significance level. The negative relationship between *VIX* and index returns indicates that when consumers are fearful and stressed about the market, then they are less likely to invest, causing index returns to fall.

Moreover, Adj. R^2s have increased significantly, showing that thus far, these models are the most accurate at representing the returns of the four major U.S. indexes. However, surprisingly, *SMB* and *BV/MV* have no influence on index returns. As these two variables are proxies for systematic risk prevailing in the market, these are expected to capture the presence of non-diversifiable risk in relatively well-diversified index returns. Apparently, *VIX* is able to capture the systematic risk of all the well-diversified indexes.

Table 4: Impact of EPU and Market Factors on Index Returns

Dependent Variables	Constant	*EPU*	*SMB*	*BV/MV*	*VIX*	*Adj. R^2*
S&P	-0.492	-0.003	-0.009	0.103	-0.143	0.516
	(-2.517)**	(-0.995)	(-0.118)	(1.582)	(-15.754)***	
DJIA	-0.478	-0.003	-0.044	0.053	-0.135	0.483
	(-2.438)**	(-0.956)	(-0.555)	(0.813)	(-14.777)***	
RUSSEL	-0.531	0.001	0.064	0.088	-0.171	0.411
	(-1.879)*	(0.165)	(0.553)	(0.937)	(-13.03)***	
NASD	-0.690	-0.004	0.026	0.236	-0.160	0.441
	(-2.686)***	(-1.009)	(0.248)	(2.776)***	(-13.389)***	

Note: *t*-values are reported in parentheses. *, **, and *** indicate significance at 10%, 5%, and1% level, respectively.

Table 5 is the most comprehensive model. It considers the impact of economic factors, market factors, and *EPU* on index returns. Surprisingly, *EPU* has no impact on any of the indexes. The important factors that merit attention are industrial production, consumer sentiment, exchange rate, and *VIX*. The first three factors have a positive effect on returns. On the other hand, the impact of *VIX* is strongly negative. However, in the presence of economic risk factors, the VIX's coefficients are now less than those in Table 4. The coefficient for industrial production (*IP*) suggests that when production is doing well, this phenomenon indicates a growing economy, which enhances investor confidence and causes indexes to increase. Likewise, the positive relationship between consumer sentiment and index returns indicates that when people have confidence in the economy, it causes sales growth, which in turn, boosts indexes as well as returns.

Table 5: Impact of EPU, Economic Factors, and Market Factors on Index Returns

Dependent Variables	Constant	EPU	OIL	IP	CS	IRS	INF	EXR	SMB	BV/MV	VIX	Adj. R^2
S&P	-0.282	-0.002	0.012	0.414	0.099	-0.005	0.827	0.267	0.022	0.116	-0.122	0.581
	(-1.207)	(-0.687)	(0.562)	(2.125)**	(2.875)***	(0.275)***	(1.126)	(3.676)***	(0.301)	(1.877)*	(-13.311)***	
DJIA	-0.394	-0.002	0.014	0.548	0.112	0.014	0.241	0.248	-0.016	0.062	-0.114	0.552
	(-1.681)*	(-0.643)	(0.648)	(2.807)***	(3.232)***	(0.844)	(0.327)	(3.400)***	(-0.218)	(1.006)	(-12.46)***	
RUSSEL	-0.358	0.003	0.058	0.650	0.128	0.004	0.510	0.292	0.122	0.116	-0.141	0.501
	(-1.071)	(0.688)	(1.840)*	(2.335)**	(2.603)**	(0.163)	(0.486)	(2.819)***	(1.145)	(1.320)	(-10.754)***	
NASD	-0.539	-0.003	0.020	0.309	0.091	0.001	0.577	0.222	0.056	0.246	-0.141	0.465
	(-1.675)*	(-0.754)	(0.646)	(1.148)	(1.918)*	(0.054)	(0.569)	(2.214)**	(0.543)	(2.888)***	(-11.159)***	

Note: *t*-values are reported in parentheses. *, **, and *** indicate significance at 10%, 5%, and1% level, respectively.

The stronger dollar value against the Euro supports index returns. A weaker dollar is sometimes thought to be favorable to businesses as it gives domestic firms more edge in global competition. In our case, that is not the case. *VIX* again suggests that it is very effective at explaining index returns because when investors are worried about the market, index returns suffer in a negative manner. The adjusted R^2s in this table are the highest among all the tables, signifying that including economic factors, market factors, and *EPU* into one model best explains the returns of the indexes.

To be more specific, this model explains the returns of S & P 500, DJIA, Russel 2000, and Nasdaq approximately 58%, 55%, 50%, and 47%, respectively. As *VIX* is a fear index, it may be more useful to explain returns in down markets than in up markets. Future research may examine this issue in more depth. Now, we try to find the relative impact of innovations in *EPU* and *VIX* on individual stock index returns and vice versa. Figure 1 exhibits the responses of US stock index returns, *EPU*, and *VIX* while keeping other variables as exogenous.

For every index, there are eight responses (four for both *EPU* and *VIX*). Figure 1a shows that the response of *VIX* to Dow Jones' innovations is larger than that of Dow Jones to *VIX* innovations. Moreover, when the responses of *VIX* to Dow Jones innovations are compared with that of *EPU* to Dow Jones innovations, the former is much stronger. The impact of *VIX* and *EPU* on returns is very mild and absorbed into the system very fast.

Thus, these findings suggest that US stocks, such as those in the Dow Jones, are so efficient that stock movements cause the fear index to change, not the other way around. Impulse response functions in Figure 1b, 1c, and 1d for other stock indexes reassure the findings for Dow Jones, indicating that movements of indexes made of large or small or technology stocks are equally able to send the message about the risk of the market and the uncertainty and fear indexes are relatively slow to influence stock prices.

That is, investors are not able to make abnormal returns using an economic uncertainty index or a fear index. In a nutshell, shock returns are lead variables, and economic uncertainty and fear indexes do not have any informational content to predict stock movements.

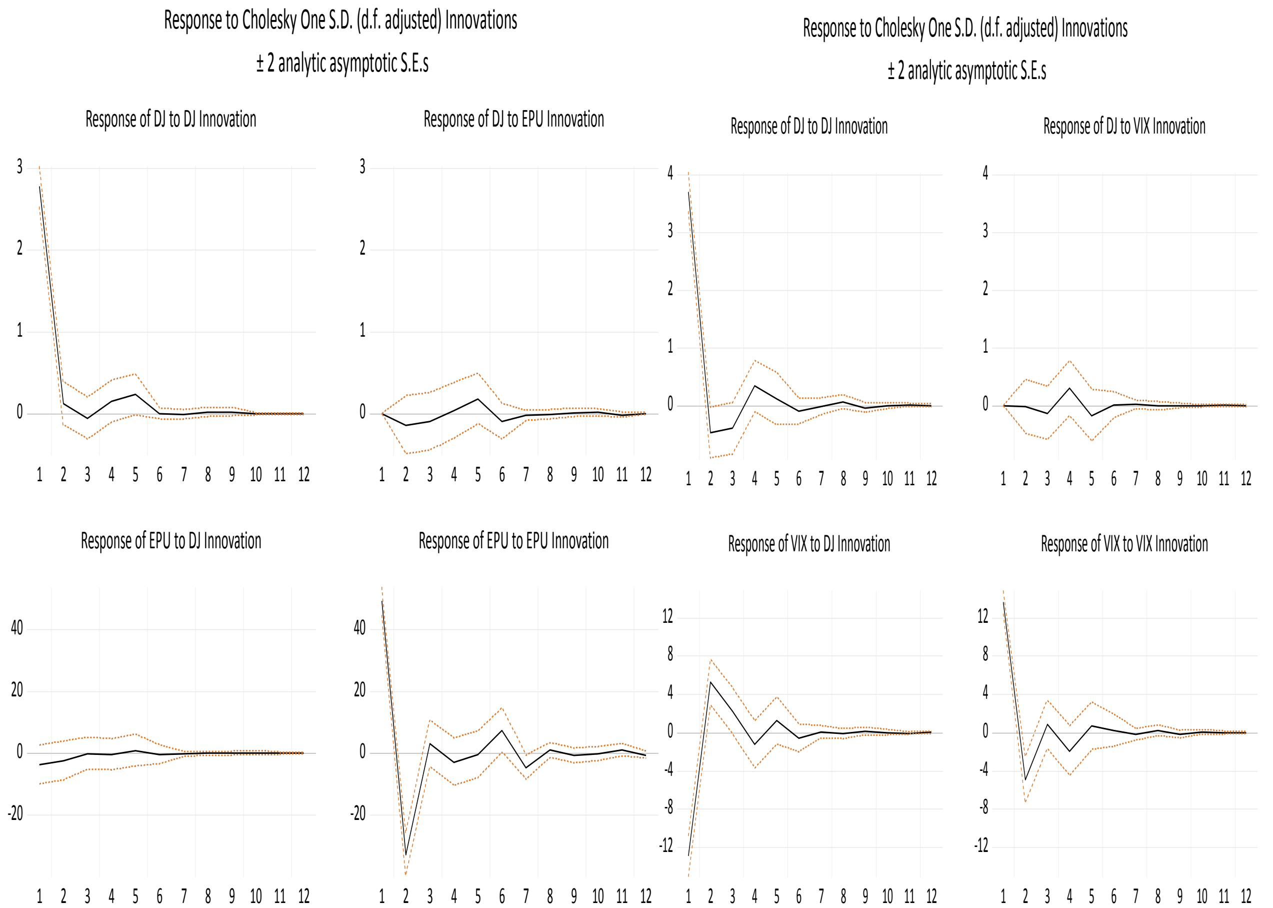

Figure 1a: IRF for DJIA, *EPU*, and *VIX*

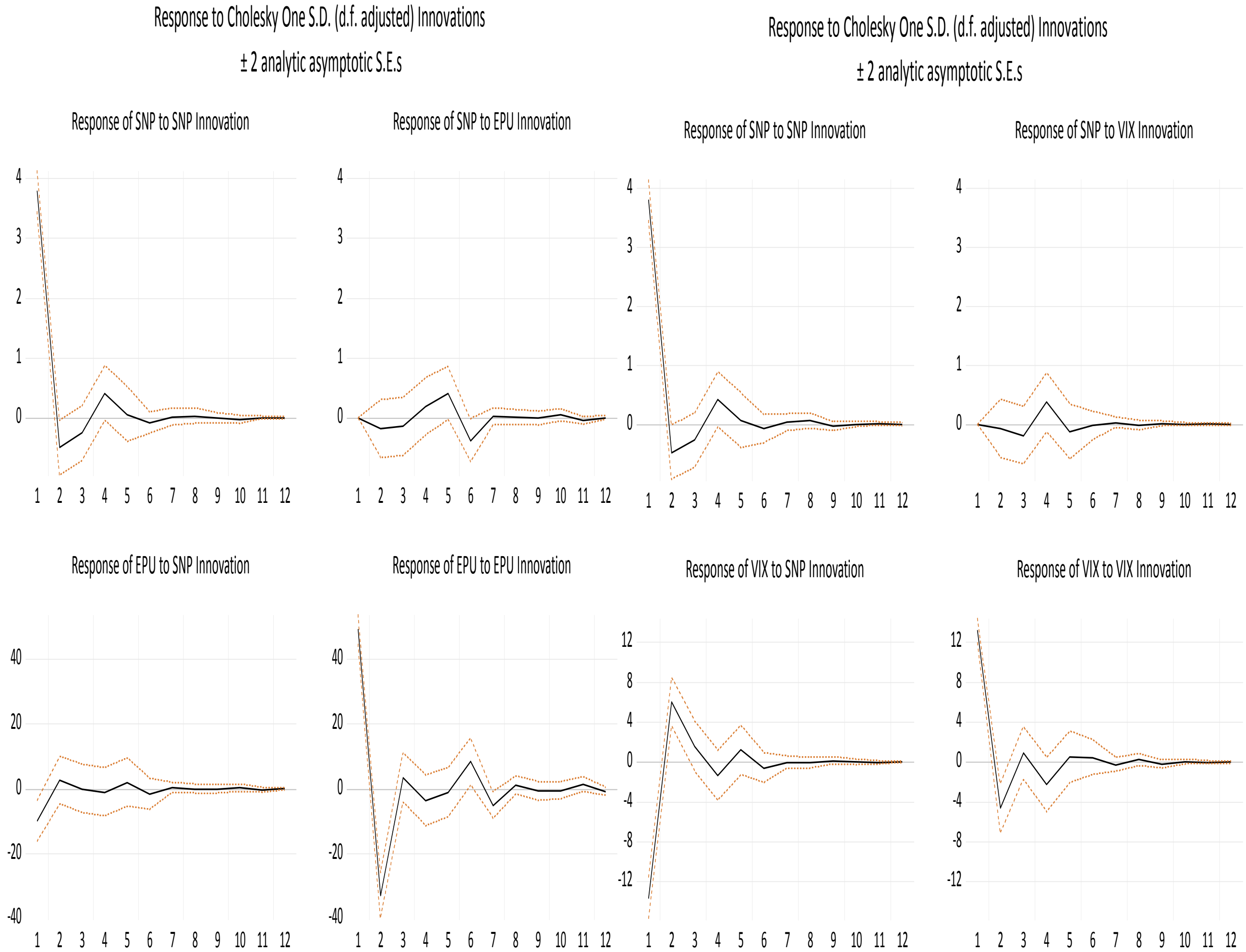

Figure 1b: IRF for S & P 500, *EPU*, and *VIX*

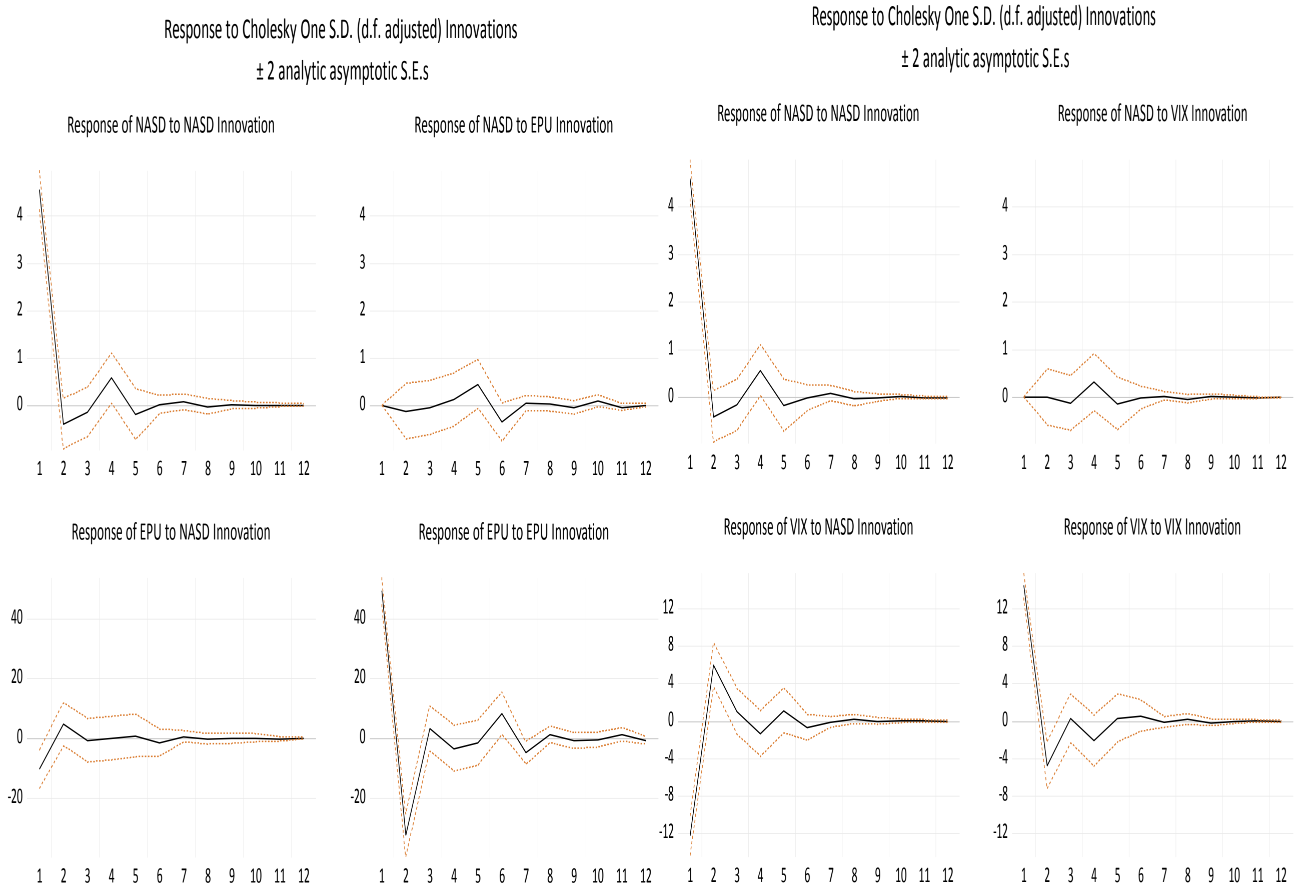

Figure 1c: IRF for NASDAQ, *EPU*, and *VIX*

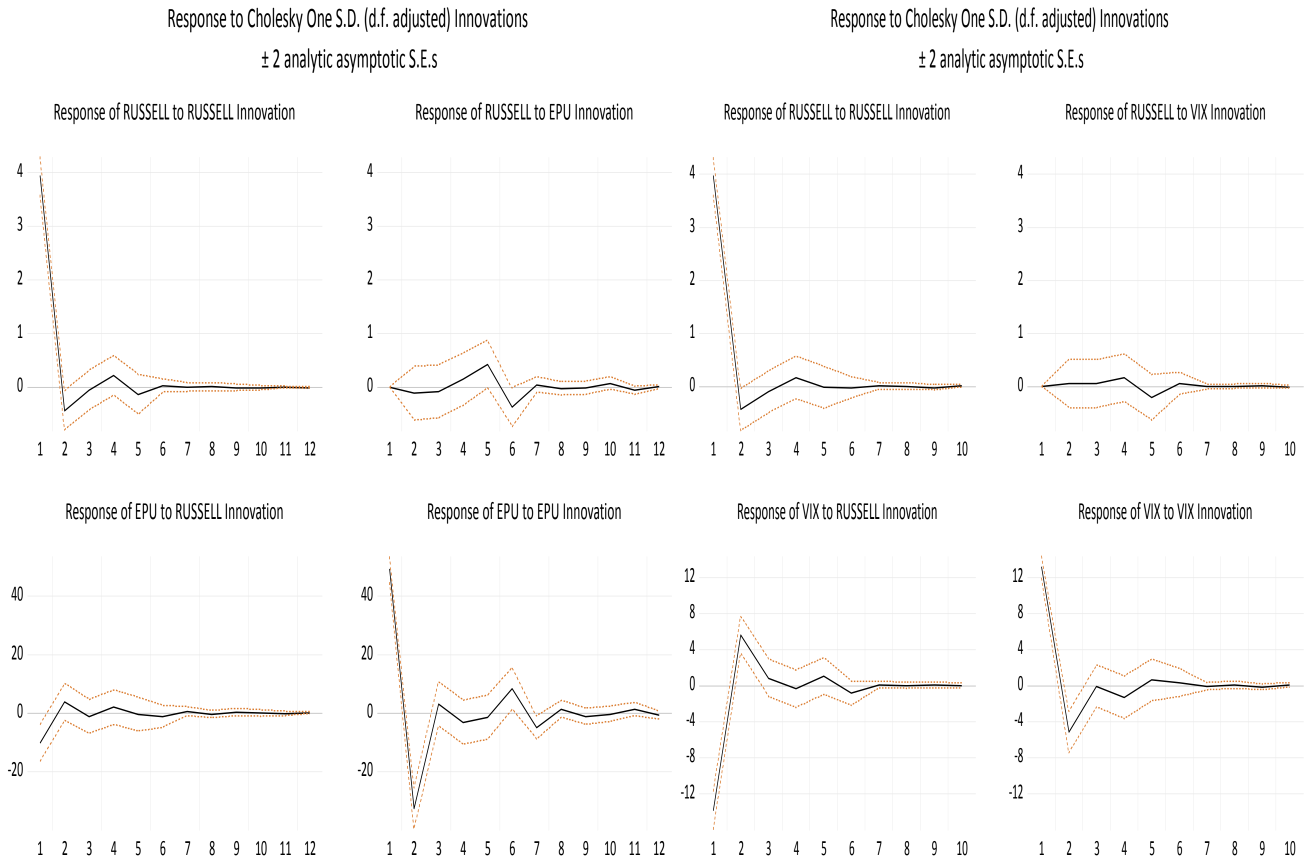

Figure 1d: IRF for Russell 2000, *EPU*, and *VIX*

Figure 1: Impulse Response Functions of US Stock Index Returns, EPU, and VIX

Note: Based on the ADF test, all the returns series are stationary.

Now, we try to find the relative impact of innovations in *EPU* and *VIX* on individual stock index returns and vice versa. Figure 1 exhibits the responses of US stock index returns, *EPU*, and *VIX* while keeping other variables as exogenous. For every index, there are eight responses (four for both *EPU* and *VIX*). Figure 1a shows that the response of *VIX* to Dow Jones' innovations is larger than that of Dow Jones to *VIX* innovations. Moreover, when the responses of *VIX* to Dow Jones innovations are compared with that of *EPU* to Dow Jones innovations, the former is much stronger. The impact of *VIX* and *EPU* on returns is very mild and absorbed into the system very fast.

Thus, these findings suggest that US stocks, such as those in the Dow Jones, are so efficient that stock movements cause the fear index to change, not the other way around. Impulse response functions in Figure 1b, 1c, and 1d for other stock indexes reassure the findings for Dow Jones, indicating that movements of indexes made of large or small or technology stocks are equally able to send the message about the risk of the market and the uncertainty and fear indexes are relatively slow to influence stock prices.

That is, investors are not able to make abnormal returns using an economic uncertainty index or a fear index. In a nutshell, shock returns are lead variables, and economic uncertainty and fear indexes do not have any informational content to predict stock movements.

Table 6 provides the variance decomposition from Vector Autoregression, which includes index returns, *EPU*, and *VIX* as indigenous variables. This table can tell us what percentage of the movements of these variables is captured by these three indigenous variables. Other variables are considered as exogenous variables in this case. This can confirm whether or not *VIX* and *EPU* have any informational content to explain the movements of US major stock indexes. Results show that all the indexes are almost fully explained by their own movements.

Approximately 4-6 percent movements of *EPU* are explained by stock index returns. *VIX* seems to be unrelated to EPU. However, approximately 50 percent of movements in *VIX* are explained by respective index returns. Such results clearly show that *VIX* is generally influenced by stock price movements. On the other hand, index returns are not impacted by *VIX* and *EPU*. This finding also confirms the results we have already discussed above.

Table 6. Variance Decomposition of Index Returns, EPU, and VIX

Period	**Variance Dec. of DJ**			**Variance Dec. of NASD**			**Variance Dec. of SNP**			**Variance Dec. of RUSSELL**		
	DJ	**EPU**	**VIX**	**NASD**	**EPU**	**VIX**	**SNP**	**EPU**	**VIX**	**RUSSEL**	**EPU**	**VIX**
2	99.858	0.059	0.083	99.942	0.010	0.048	99.859	0.134	0.006	99.863	0.081	0.056
6	99.481	0.282	0.236	99.855	0.043	0.103	99.664	0.208	0.128	99.807	0.102	0.092
12	99.480	0.284	0.236	99.855	0.043	0.103	99.664	0.209	0.128	99.806	0.102	0.092
	Variance Dec. of EPU			Variance Dec. of EPU			Variance Dec. of EPU			Variance Dec. of EPU		
	DJ	EPU	VIX	NASD	EPU	VIX	SNP	EPU	VIX	RUSSEL	EPU	VIX
2	4.211	95.636	0.153	5.071	94.841	0.087	4.985	94.783	0.232	5.568	94.225	0.207
6	4.229	95.558	0.213	5.109	94.717	0.174	5.058	94.554	0.388	5.607	94.143	0.250
12	4.230	95.557	0.213	5.109	94.717	0.174	5.059	94.553	0.389	5.608	94.142	0.250
	Variance Dec. of VIX			Variance Dec. of VIX			Variance Dec. of VIX			Variance Dec. of VIX		
	DJ	EPU	VIX	NASD	EPU	VIX	SNP	EPU	VIX	RUSSEL	EPU	VIX
2	51.853	0.421	47.727	48.228	0.377	51.395	56.276	0.225	43.499	56.097	0.155	43.749
6	52.505	0.849	46.646	48.462	0.651	50.887	56.535	0.640	42.825	56.223	0.367	43.410
12	52.503	0.854	46.643	48.461	0.652	50.886	56.533	0.643	42.824	56.222	0.369	43.409
Cholesky One S.D. (d.f. adjusted). Cholesky ordering: DJ EPU VIX. Standard errors: Monte Carlo (100 repetitions).												

CONCLUSION

In this study, we have examined how uncertainty impacts financial markets after thoroughly examining the effects of economic policy uncertainty and other economic and market indicators on major US indices. Our findings indicate that while EPU is a good indicator of index returns, other economic and market factors play a larger role in shaping the behavior of investors and the pricing of financial assets. In particular, our analysis highlights the VIX fear index as a major determinant of index returns. VIX appears to capture the risk of the market more than EPU does. Thus, VIX is probably a better proxy for prevailing market risk at any point in time. However, further investigation finds that stock market movements are the reason for the subsequent VIX movements, and thus, the former leads the latter, and the fear index cannot predict future price movements.

The implications of our research are significant for both investors and policymakers. Our research can assist investment choices and policy initiatives by improving knowledge of the fundamental issues that affect financial market performance. Furthermore, given that it offers insightful knowledge of market sentiment and can act as a precursor to potential market downturns, our findings suggest that investors and policymakers should pay close attention to the VIX fear index. Although the fear index goes up as the market becomes more volatile, it may feed itself as the panic grips the market.

Looking ahead, future research could build on our analysis by exploring the impact of the VIX fear index in emerging markets. Since emerging markets are believed to be not as efficient as developed markets, such as the US, economic uncertainty or fear index may have strong informational content to help the investors in these markets make abnormal returns. While our study has focused on major US indexes, the insights gained from this research can be extended to other developed markets and economies. Additionally, further research could examine the relationship between EPU and other economic and market factors to gain a more comprehensive understanding of how uncertainty affects financial markets. Also, future research may examine the impact of VIX in a "down" market versus that in an "up" market.

In conclusion, our study provides valuable insights into the relationship between economic policy uncertainty, the VIX fear index, and financial market performance. Our findings underscore the importance of monitoring market sentiment and considering a range of economic and market factors when making investment decisions or designing policy interventions. We are hopeful that our research will contribute to a better understanding of the numerous mechanisms that affect financial market performance as we try to decrease the possible dangers brought on by uncertainty.

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