Global Scientific JOURNALS

GSJ: Volume 14, Issue 3, March 2026, Online: ISSN 2320-9186
www.globalscientificjournal.com

The Influence of the United States of America Economic Policy Uncertainty on the Volatility of the South African Stock Markets

Takunda Batsirai Gomo

Takunda Batsirai Gomo is currently pursuing PhD degree program in Finance at Shanghai University

E-mail: takuelil2@gmail.com

KeyWords
Economic Policy Uncertainty, Johannesburg Stock Exchange, Stock Prices, volatility, Economic Policy Uncertainty

ABSTRACT

Purpose – The purpose of this article is to investigate how the economic policy uncertainty in the United States of America affects the volatility of the stock markets in South Africa between 2005 and 2024.

Design/methodology/approach – Design, technique, and strategy. The impact of U.S.-EPU on JSE volatility was investigated using the GARCH-X model. Analyzing U.S.-EPU levels, evaluating JSE volatility trends, and investigating how U.S.-EPU influences JSE volatility are the goals.
Findings – According to the findings, there is a positive correlation between the JSE stock market volatility and the U.S.-EPU, indicating that rising U.S.-EPU causes rising JSE stock price volatility. Furthermore, the data shows that stock market volatility falls as GDP levels rise. On the other hand, stock market volatility rises in tandem with inflation and currency rates.
Originality/value – This study integrates the investigation of EPU in the US with its impact on JSE volatility in a novel way. This cross-country approach, which adds fresh perspectives to developing markets and international finance research, is comparatively understudied. The paper tackles a critical problem considering the continuous changes and uncertainty in the global economy. The study makes use of a substantial time span that encompasses several economic cycles, crises, and policy changes by concentrating on the last 20 years. A thorough examination of patterns and changes over time is made possible by this longitudinal method.

Introduction

Economic Policy Uncertainty (EPU) was explained by (Francis & Chia, 2024) as the degree of unpredictability arising from economic policies, regulation amendments and other drivers of the economy. As highlighted by (Adeloye, et al., 2024), the uncertainty can raise financial market volatility. Business has become a global village, so policy uncertainties in the economy in one place can spill over to another economy that is trading or dependent on it (Aharon & Ali, 2025).

This is mostly seen in developing economies like the South African economy. Stock markets are considerably vulnerable to external shocks and policy uncertainty that can significantly impact their investment environment and volatility (Ramakau, et al., 2025). The paper aims to discuss how American EPU is related to the volatility of the leading South African stock exchange, known as the Johannesburg Stock Exchange (JSE).

The influence of EPU on developing economies: a review of the literature

This chapter consists of two sections. The first section is the Impact of EPU on emerging nations. The second section is the literature covering Theoretical perspectives on the effects of U.S.-EPU.

Influence of EPU in African nations

(Prasad, et al., 2009) claim that because of things like the illiquidity of their markets, the sluggish pace of economic development, the soundness of financial institutions, and stringent regulatory frameworks, emerging economies are growing increasingly susceptible to external shocks from established markets.

(Rani, et al., 2025) conducted a study using the GARCH-MIDAS model to examine the effects of the EPU on the volatility of the Indian stock market and currency rates between 2000 and 2021. To illustrate the impact of uncertainty on a national and international scale, the authors used the U.S_EPU as a stand-in for the worldwide EPU. The Global Financial Crisis and the COVID-19 pandemic were included as dummy variables to illustrate the impact of significant extreme market occurrences. The study discovered that during extreme market occurrences, the volatility of the Indian stock market increased in tandem with an increase in EPU.

(Ghani & Ghani, 2024) investigated the impact of EPU on the volatility of the growing Pakistani stock market as well as that of the developed USA, UK, and China using a GARCH-MIDAS model. Daily stock data and monthly EPU indices were employed. The study's findings showed that the USA's EPU index was a more accurate indicator of Pakistan's stock market volatility. Additionally, although it was not as significant as the US index, the UK's EPU index was also a predictor of the volatility of the Pakistani equities market.

(Hervé, 2023) examined the impact of oil shocks and the global EPU on the volatility of the stock markets in Mauritius and Botswana. Datasets from before and during the COVID-19 pandemic are used to demonstrate how oil shocks and global economic policy uncertainty (GEPU) affect the volatility of stock returns in these nations. The findings show that, prior to the COVID-19 epidemic, both GEPU and demand shocks related to oil consumption had favorable and noteworthy effects on stock volatility for these nations. Mauritius and Botswana have estimated volatility coefficients of 0.076 and 0.001, respectively. This implies that changes in oil demand could have a favorable impact on stock returns in these nations.

(Odionye, et al., 2024) provided unique insights on how the equity index and EPU relate to one another in Sub-Saharan African (SSA) countries. Third, there is additional evidence that economic policy uncertainty significantly lowers the equity index within the three identified structural break regimes but has negligible effects outside of them; fourth, the devastating impact of economic policy uncertainty on the equity index is more pronounced during the COVID-19 era, supporting its susceptibility to global shocks; and fifth, high levels of economic policy uncertainty have a negative short-term impact on the region's equity index, but its long-term negative effects are negligible.

(Oyetade & Muzindutsi, 2024) used a panel of 35 publicly traded commercial banks from seven African nations to examine the effect of EPU on African banks' performance between 2000 and 2022. The results showed that while sufficient capital buffers improve bank performance under stress, bank size has a detrimental effect on performance.

Theoretical perspectives on the influence of the U.S.-EPU

There are several theoretical frameworks that can assist in explaining the impact of the United States' economic policy uncertainty on the JSE stock markets. Some of the theories are discussed below.

Contagion theory

According to this theory, increased economic policy uncertainty in the U.S. can have a chain effect and spread to other countries through financial linkages. South Africa being an emerging country is susceptible to such contagious effects, hence increasing stock market volatility because of investor panic (Markwat, et al., 2009).

Information asymmetry theory

This theory suggests that investors make investment choices based on information that they have access to, which can be inaccurate or incomplete at times. In the event of an increase in economic policy uncertainty within the U.S., investors will perceive increased risk and rush to quality assets. This can then lead to declining demand for assets in South Africa as well as for its stock markets (Chourou, et al., 2021).

Political economic theory

This theory predicts that political factors determine economic policy decisions. When there is economic policy uncertainty in the U.S. the chance that decision-makers choose alternatives with political implications might worry investors. This, as (Parihar & Gupta, 2024) suggests, might cause a dip in investor confidence and capital flight from South Africa and lower its stock markets.

RESEARCH GAP

Most of the prior studies on economic policy uncertainty (EPU) are focused on the EPU of a specific country without examining how the foreign country, particularly the United States', powerful global economic driver's EPU affects other nations. There is also little research of this nature in emerging markets like South Africa. This study aims to fill in this gap by examining the specific effects of U.S. EPU on the Johannesburg Stock Exchange (JSE).

Methodology

The Generalized Autoregressive Conditional Heteroskedasticity with Exogenous Variables (GARCH-X) model was utilized. In (Osho & Oloyede, 2024), time series data with volatility clustering is caused by exogenous variables. They are most suited for GARCH-X modeling. This is because the GARCH-X model has the capability to capture time-varying patterns of movements of financial assets. This is a very practical model in risk modeling and financial econometrics.

With the GARCH-X model, this research estimates and comprehends the influence of the U.S-EPU on South African stock market volatility. This research uses several sources of data to be able to provide thorough analysis. Financial high-frequency data from reputable financial sources like market indices, trading volume and stock prices will be gathered. For the explanation of broader economic factors, macroeconomic information such as GDP growth, inflation and exchange rates will also be captured. To lend more depth to the analysis and better interpret the correlation between volatile stock markets and volatile economic policies, macroeconomic and financial information are included, lending structural consistency. In a bid to analyze the trend and pattern in the stock market volatility as well as economic policy uncertainty over time, time series analysis will be performed. We will estimate and predict the South African stock market volatility by employing the volatility modeling techniques i.e. the GARCH-X model. Through these methodologies, we will be able to determine the effect of the U.S. economic policy uncertainty on stock market volatility.

GARCH-X Model

The GARCH-X is an extension of the GARCH model. It includes exogenous variables. An exogenous variable is one whose value is external to the model and is determined outside the model. The main exogenous variable in this study is economic policy uncertainty, measured using the United States Economic Policy Uncertainty (EPU) index. The other control variables used are GDP, exchange rate, and inflation. The GARCH-X model is used to incorporate these variables. The GARCH-X model is suitable for this study's investigation of stock market volatility for several reasons.

It firstly allows the incorporation of exogenous variables hence making it possible to analyze the impact of macroeconomic variables and policy uncertainty on the volatility of the stock market. Second, the GARCH-X model portrays the dynamic nature of volatility that encapsulates persistence clustering and time-varying features of volatility. In conclusion the model aids in conditional variance estimation that is an important step towards understanding and predicting stock market volatility guiding investment decision and offering risk management solutions.

Model Specification

The GARCH-X model with the variables under study. In this case, the GARCH-X equation can be written as:

$$\delta_t^2 = \omega + \propto * \varepsilon_{t-1}^2 + \beta * \delta_{t-1}^2 + y_1 * USEPU_t + y_2 * GDP_t + y_3 * ER_t + y_4 * INF_t \quad (1)$$

δ_t^2 : represents the conditional variance or volatility of the stock price at time t.

ω : is the constant term (intercept).

$\propto$: quantifies how the conditional variance is affected by previously squared residuals.

β : quantifies the influence of previous conditional variances on the current conditional variance.

$USA\ EPU_t, GDP_t, ER_t, INF_t$: the independent variables for EPU which are GDP, exchange rate, and inflation rate, respectively.

$y_1, y_2, y_3\ and\ y_4$: Coefficients that measure the impact of each independent variable on the conditional variance.

This model specification estimates how uncertainty surrounding economic policies and other macroeconomic factors affect stock market volatility in South Africa. By revealing the strength and direction of these influences, the coefficients (y_1, y_2, y_3, y_4) allow for the examination of the relationships between the exogenous variables and stock market volatility.

Model Evaluation

To achieve the correct representation of volatility dynamics by the model, the Ljung-Box test is applied to test for residuals autocorrelation.

Interpretation and Analysis

To understand the impact of the U.S.-EPU on the JSE volatility, parameters of the GARCH-X models are interpreted. The primary focus of the analysis is on the coefficients and their statistical significance.

Diagnostic checks

Diagnostic tests were conducted to check for any problems with the GARCH-X model. Autocorrelation, heteroscedasticity and normality residuals were conducted. Tests for autocorrelation and the ARCH-LM test for heteroscedasticity were conducted. We checked the data and talked about how the validity of the models was affected.

The diagnosis tested for the presence of autocorrelation in the residuals, which would indicate that maybe some dynamics were missing that the model was not able to incorporate. To test for autocorrelation, the Ljung-Box test was employed. Autocorrelation would mean that model refinement needs to be achieved to correct for the missing dynamics.

Heteroscedasticity or the conditional variances changing over time was also tested. Residual heteroscedasticity was tested using the ARCH-LM test. The models' assumption of constant conditional variance might not have held, and adjustments would have been required if the test indicated significant heteroscedasticity. We tested the normality of the residuals to confirm that they behaved according to a Gaussian distribution. To check the distribution graphically, histograms and Q-Q plots were used.

The results of the tests were examined, and their significance for the model's validity were interpreted. Severe autocorrelation, heteroscedasticity, or non-normality of the residuals would have indicated potential specification or assumption issues with the model. Relief measures such as a refinement of the model or additional variables could have been suggested to address these issues.

Empirical findings

Descriptive Statistics

Insights regarding the monthly data can be gained by analyzing the descriptive statistics of economic policy uncertainty in the United States.

	USA_EPU	STOCKPRICE	EXCHANGERATE	GDP	INFLATION
Mean	144.812	0.018	11.667	3.07E+08	0.43
Median	133.998	0.024	11.605	3.16E+08	0.42
Maximum	503.963	0.281	19.725	3.84E+08	0.79
Minimum	44.783	-0.261	5.811	2.39E+08	0.17
Std. Dev.	67.387	0.092	4.091	37508231	0.13
Skewness	1.783	-0.112	0.231	-0.017	0.581
Kurtosis	8.407	4.392	1.694	1.693	3.913
Jarque-Bera	419.607	17.289	19.179	9.620	21.831
Probability	0.00	0.003	0.000	0.007	0.000

Table I. Descriptive statistics results

Notes: The data that was used was in its original form before any transformations

Source(s): Own elaboration

The EPU index average is 144.813, median is 133.998, max is 503.963 and min is 44.783. The standard deviation is 67.387, skewness is 1.783, kurtosis is 8.407, Jarque-Bera is 419.607 and prob is 0.000

The Log of stock price returns gives a mean of 0.018. This shows that the stock prices increased in the JSE. With a median of 0.024, a maximum of 0.281 and a minimum of -0.261. The standard deviation is 0.092, skewness is -0.112, kurtosis is 4.392, Jarque-Bera is 17.289 and the probability is 0.000

Mean GDP is approximately $307 million, median is approximately $316 million, max is approximately $384 million, and min is approximately $239 million. Standard deviation is 37,508,231, skewness is -0.017, kurtosis is 1.693, Jarque-Bera statistic is 9.620, and probability is 0.007.

The average exchange rate (ER) is 11.667, the median is 11.605, the maximum is 19.725, and the minimum is 5.811. The standard deviation is 4.091, the skewness is 0.231, the kurtosis is 1.694, the Jarque-Bera statistic is 19.179, and the probability is 0.000. Exchange rates are quoted against the US dollar.

The average inflation is 0.43%, the median 0.42%, the highest 0.79%, and the lowest 0.17%. Standard Deviation 0.13, Skewness 0.581, Kurtosis 3.913, Jarque-Bera 21.831 And Probability 0.000.

Unit root test

Variable	ADF Statistics	Order of integration	P-Value
USA_EPU	-4.370	I(0)	0.000
SP	-15.392	I(1)	0.000
ER	-12.595	I(1)	0.000
GDP	-15.879	I(1)	0.000
INF	-12.096	I(1)	0.000

Table II. Unit root test results

Notes: The data that was used was in its original form before any transformations

Source(s): Own elaboration

Unit root tests reveal the level of stationarity of variables. Order of integration reveals at what level variables achieved stationarity. For example, the U.S.A EPU series are stationary at level I(0). This implies they are not trending over time and have no unit root. CPI was, however, not stationary at level I(0) and had to be differenced I(1) to achieve stationarity. After this test, Stock returns were log transformed.

Correlation matrix

	USA_EPU	Log(SR)	ER	GDP	INF
USA_EPU	1	-0.386	-0.490	0.127	-0.542
log(SR)	-0.386	1	0.185	0.097	-0.112

ER	-0.490	0.185	1	0.296	0.458
GDP	0.127	0.097	0.296	1	-0.058
INF	-0.542	-0.112	0.458	-0.316	1

Table III.

Correlation matrix

Notes: Stock price data was transformed to its natural log before calculating stock returns, which will be used in the GARCH-X model

Source(s): Own elaboration

The correlation coefficients were examined for high absolute values, specifically looking for values exceeding 0.7 or below -0.7. From the output in the correlation matrix, none of the correlation coefficients exceed these thresholds. This indicates that there are no strong linear associations between the variables, which suggests that multicollinearity is not a concern in this analysis.

USA Economic policy uncertainty

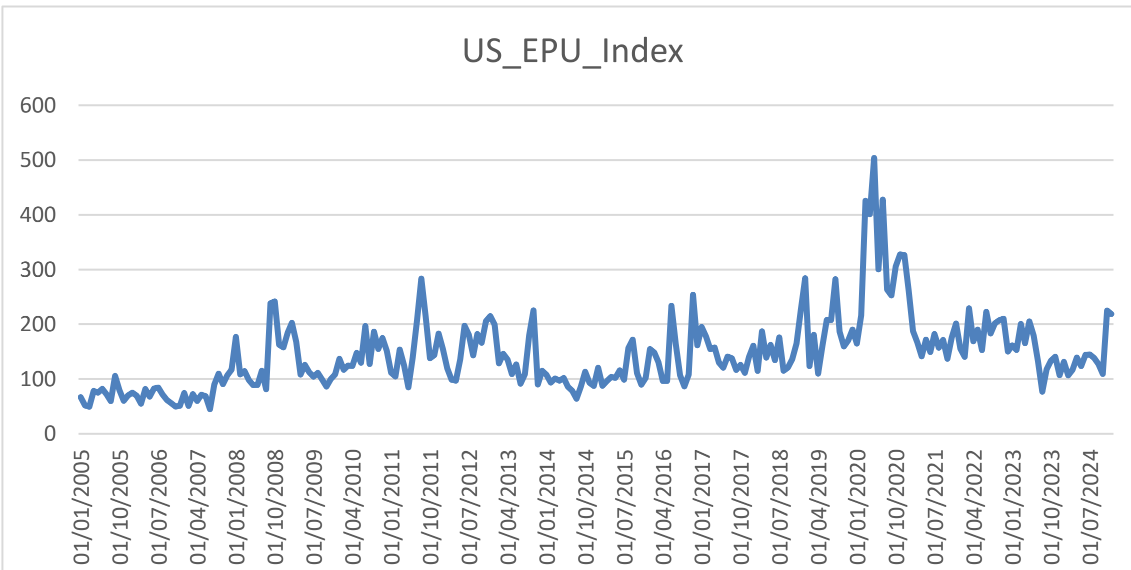

Figure I. **Source(s):** Own elaboration

U.S.-EPU Index

The Economic Policy Uncertainty Index is a measure that captures the level of uncertainty regarding economic policies in the United States. The data spans from January 2005 to December 2024, revealing fluctuations in the index that reflect changing economic conditions and events.

In December 2024, the EPU index is at 219, indicating a relatively high level of uncertainty. This marks a decline from 225 in November 2024, suggesting a slight easing of concerns in the economic policy landscape.

The index exhibits significant peaks and troughs over the observed period. For instance, the highest recorded value was 504 in May 2020, likely influenced by the uncertainties surrounding the COVID-19 pandemic and its economic implications. Conversely, the lowest point recorded was 45 in July 2007, reflecting a period of relative stability in economic policy prior to the financial crisis.

The EPU index shows considerable volatility, particularly during major economic events. For example, the index spiked to 428 in July 2020, likely due to the initial economic disruptions caused by the pandemic. The data also indicates periods of lower uncertainty, such as in August 2018, where the index was at 115, suggesting a time of more stable economic policy.

The consistent fluctuations in the EPU index suggest that economic policy uncertainty is highly sensitive to both domestic and international events. The Economic Policy Uncertainty Index for the United States reflects a dynamic and often volatile economic environment.

Stock prices in South Africa

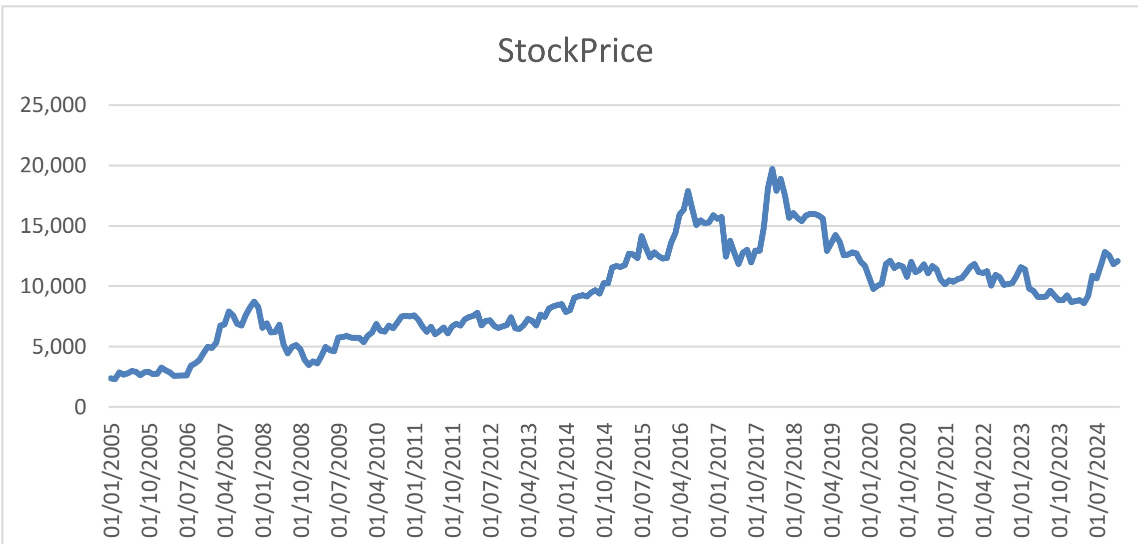

Figure 2.

JSE Stock prices

Source(s): Own elaboration

Interpretation of Stock Price Data

The provided stock price data spans from January 2005 to December 2024, showcasing the monthly closing prices of a particular stock.

The stock price has generally trended upward over the long term, starting at 2,371 in January 2005 and reaching 12,072 by December 2024. This reflects a significant increase in value over nearly two decades.

There are notable fluctuations in the stock price, particularly during certain periods. From 2007-2008, the stock price peaked at 8,732 in November 2007 but experienced a sharp decline in 2008, dropping to a low of 3,474 in December 2008. This decline can be attributed to the global financial crisis, which significantly impacted stock markets.

In 2020, the stock price dipped again to 10,200 in April 2020, likely due to the economic uncertainties caused by the COVID-19 pandemic, before rebounding to 12,536 by October 2024.

From 2021 onward, the stock price hovered around the 11,000 mark, indicating some level of stability. However, it has shown signs of recovery and growth, particularly in mid-2024 when it reached 12,827.

The stock price exhibits short-term volatility as well, with monthly changes reflecting market reactions to economic events, earnings reports, or geopolitical developments. For instance, a decline can be observed from 11,575 in January 2023 to 9,100 in June 2023 before a recovery began.

Implications

The upward trend in stock prices over the long term suggests positive investor sentiment and confidence in the company's growth or the broader market recovery after downturns.

The significant price fluctuations during economic downturn indicate that this stock is sensitive to broader market conditions, particularly during financial crises or periods of economic uncertainty.

Investors might consider the historical performance of the stock when making decisions. The observed trends suggest that while the stock can be volatile, it has a historical tendency to recover and grow over the long term.

The impact of the USA economic policy uncertainty on South African stock markets

Variable	Coefficient	Std. Error	z-Statistic	Prob.
	Variance Equation			
C	0.004	0.001	3.289	0.001
α	1.738	0.437	3.973	0.000
β	-0.132	0.275	-3.826	0.000
USA EPU	0.0014	0.000	3.720	0.000
GDP	-9.483	2.006	4.728	0.000
INFL	4.572	1.535	-2.974	0.003
ER	2.639	0.706	3.736	0.000

Table IV.

Estimation results of GARCH-X model **Source(s):** Own elaboration

The EPU of the U.S. is positively correlated with the stock market volatility of JSE. This means that as the EPU in America increases the stock market's volatility increases.

GDP is negatively correlated with the stock market volatility of South Africa. This means that as the GDP grows, the stock market's volatility reduces SA. On the other hand, when the GDI in SA decreases, volatility in the stock markets increases. The correlation is significant.

Exchange rate is positively correlated with the stock market volatility of JSE. This means that as the Exchange rates grows, the stock market's volatility increases. On the other hand, when the Exchange rates decrease, volatility in the stock markets decreases as well. The correlation is significant.

The coefficient for inflation is positive and statistically significant. The positive coefficient measures the influence of inflation on stock market volatility, indicating that as inflation rates increase, the South African stock market volatility increases.

Diagnostic test

The diagnostic test was conducted on a GARCH-X model to assess and evaluate various aspects of the model's performance and identify any potential issues or areas that require improvement. For diagnostic test, residual analysis were conducted as a method that evaluates the adequacy of a statistical model. It examines the differences between observed and predicted values. The differences are known as the residuals. This test assess if the model's assumptions are met and identify the potential patterns or deviations that may have influence on the accuracy and reliability of the model.

Residual tests

Testing for ARCH effects

Heteroscedasticity Test: ARCH test results at lag 1			
F-statistic	0.083	Prob. F(1,212)	0.963
Obs*R-squared	0.083	Prob. Chi- Square(1)	0.962
Heteroscedasticity Test: ARCH test results at lag 36			
F-statistic	0.336	Prob. F(24,166)	0.631
Obs*R-squared	3.794	Prob. Chi-Square(24)	0.631

Table V.

Heteroscedasticity Test: ARCH test results

Source(s): Own elaboration

From the results depicted in Table V, there is no evidence of heteroscedasticity (ARCH) in the model. The probability values were greater than 0.05 when the tests were conducted in both situations which are at lag length 1 and lag length 36. The same applies for the F-statistics and the chi-square statistics values. Hence, the model passed the residual tests since they proved no significant autocorrelation.

Testing for serial correlations

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|* |	.|* |	1	0.110	0.110	2.1281	0.157
	.|. |	2	0.047	0.037	2.4043	0.313
.|* |	.|* |	3	0.093	0.088	3.8878	0.286
.|. |	.|. |	4	0.083	0.068	5.0299	0.296
	.|. |	5	0.030	0.014	5.1072	0.415
.|* |	.|* |	6	0.138	0.130	8.7234	0.201
.|. |	.|. |	7	0.052	0.020	9.0969	0.258
.|* |	.|* |	8	0.097	0.085	10.781	0.226
.|. |	.|. |	9	0.057	0.025	11.27	0.269
.|. |	.|. |	10	-0.010	-0.038	11.375	0.341
.|. |	.|. |	11	0.054	0.047	11.799	0.391
.|. |	.|. |	12	0.032	-0.002	11.904	0.465
.|* |	.|* |	13	0.088	0.085	13.27	0.439
.|. |	.|. |	14	0.054	0.021	13.689	0.485
.|. |	.|. |	15	0.036	0.015	13.84	0.55
.|. |	.|. |	16	-0.024	-0.036	14.127	0.601
.|* |	.|. |	17	0.088	0.073	15.508	0.571
.|. |	.|. |	18	0.079	0.071	16.612	0.562
.|* |	.|. |	19	0.105	0.080	18.714	0.487
.|. |	.|. |	20	0.048	0.018	19.043	0.531

Table VI.
Using the Correlogram of standardized residuals

Source(s): Own elaboration

Table VI displays the results of autocorrelation and partial correlation tests. The probabilities are above 5 percent which means that the model does not suffer autocorrelation.

Partial Correlation	AC	PAC	Q-Stat	Prob*

.|* |	.|* |	1	0.123	0.123	2.728	0.110
*|. |	*|. |	2	-0.075	-0.088	4.329	0.126
.|. |	.|. |	3	-0.050	-0.029	5.142	0.173
.|. |	.|. |	4	-0.047	-0.045	5.893	0.219
.|. |	.|. |	5	-0.027	-0.024	6.213	0.298
.|. |	.|. |	6	0.009	0.004	6.215	0.412
.|. |	.|. |	7	0.011	0.000	6.215	0.527
.|. |	.|. |	8	0.013	0.007	6.216	0.635
*|. |	*|. |	9	-0.109	-0.118	9.485	0.406
.|. |	.|. |	10	0.033	0.061	9.596	0.489
.|* |	.|. |	11	0.092	0.062	11.090	0.448
.|. |	.|. |	12	0.000	-0.023	11.119	0.531
*|. |	*|. |	13	-0.133	-0.133	15.889	0.267
*|. |	*|. |	14	-0.169	-0.151	23.397	0.065
.|. |	.|. |	15	0.001	0.019	23.419	0.087
	.|. |	16	-0.005	-0.052	23.477	0.113
.|. |	*|. |	17	-0.036	-0.069	23.990	0.131
	.|. |	18	0.121	0.081	26.832	0.093
.|. |	.|. |	19	0.049	0.004	27.177	0.112
.|. |	.|. |	20	0.000	0.011	27.205	0.141

Table VII. Using the Correlogram of standardized residuals squared residuals

Source(s): Own elaboration

Table VII displays the results of the Correlogram of standardized residuals squared. The probability values are above 0.05 which means that there is no autocorrelation in the residuals.

The model using Normal Dist has passed the residual test.

Estimating the equation using the student-t

Heteroscedasticity Test: ARCH test results at lag 1			
	0.094	Prob. F(1,212)	0.847
Obs*R-squared	0.094	Prob. Chi-Square(1)	0.839
Heteroscedasticity Test: ARCH test results at lag 36			
F-statistic	0.510	Prob. F(36,141)	0.792
Obs*R-squared	31.619	Prob. Chi-Square(36)	0.792

Table VIII.

Heteroscedasticity Test: ARCH test results **Source(s):** Own elaboration

From the p-values of the F-statistic and the Obs*R-squared, we can conclude that the model has passed the Homoscedasticity Test.

Table 9 Correlogram of standardized residuals

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|. |	.|. |	1	0.059	0.059	0.508	0.492
.|. |	.|. |	2	0.014	0.011	0.509	0.791
.|. |	.|. |	3	0.064	0.064	1.116	0.787
.|. |	.|. |	4	0.047	0.042	1.402	0.857
.|. |	.|. |	5	-0.009	-0.012	1.487	0.927
.|* |	.|* |	6	0.098	0.097	3.161	0.801
.|. |	.|. |	7	0.016	0.004	3.167	0.881
.|* |	.|* |	8	0.091	0.093	4.605	0.811
.|. |	.|. |	9	0.032	0.017	4.708	0.871
.|. |	.|. |	10	-0.046	-0.054	5.456	0.871
.|. |	.|. |	11	0.017	0.020	5.465	0.871
.|. |	.|. |	12	-0.008	-0.025	5.550	0.871
.|. |	.|. |	13	0.042	0.055	5.768	0.871
.|. |	.|. |	14	0.023	0.010	5.804	0.871
.|. |	.|. |	15	-0.004	-0.008	5.853	0.871
*|. |	.|. |	16	-0.055	-0.051	6.870	0.871
.|. |	.|. |	17	0.060	0.058	7.430	0.871
.|. |	.|. |	18	0.039	0.053	7.611	0.871
.|. |	.|. |	19	0.072	0.073	8.503	0.871
.|. |	.|. |	20	0.019	0.011	8.517	0.871

Table IX.

Correlogram of standardized residuals **Source(s):** Own elaboration

The correlogram of standardized residuals shown in Table IX proves that there is no significant autocorrelation or partial correlation observed at different lags. The associated p-values are greater than 0.05. This supports the absence of significant autocorrelation.

Table 10 Correlogram of standardized residuals squared

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|. |	.|. |	1	0.096	0.096	0.162	0.932
.|. |	.|. |	2	0.068	0.068	0.564	0.908
.|. |	.|. |	3	0.131	0.130	0.653	1.020
.|. |	.|. |	4	0.137	0.136	0.799	1.064
.|. |	.|. |	5	0.105	0.108	0.806	1.094
.|* |	.|* |	6	0.213	0.215	3.136	0.917
.|. |	.|. |	7	0.110	0.112	3.136	0.994
.|. |	.|. |	8	0.130	0.138	3.213	1.039
.|. |	.|. |	9	0.110	0.107	3.214	1.071
*|. |	*|. |	10	0.044	0.039	4.235	1.053
.|. |	.|. |	11	0.120	0.117	4.252	1.077
.|. |	.|. |	12	0.068	0.049	4.669	1.082
.|. |	.|. |	13	0.155	0.158	5.117	1.086
.|. |	.|. |	14	0.112	0.107	5.117	1.097
.|. |	.|. |	15	0.068	0.073	5.543	1.099
*|. |	.|. |	16	0.033	0.047	6.949	1.087
.|. |	.|. |	17	0.172	0.162	7.814	1.083
.|. |	.|. |	18	0.119	0.131	7.831	1.094
.|. |	.|. |	19	0.134	0.135	7.952	1.099
.|. |	.|. |	20	0.095	0.096	8.017	1.103

Table X.

Correlogram of standardized residuals squared **Source(s):** Own elaboration

The associated p-values are larger than 0.05, further supporting the absence of significant autocorrelation.

The model using Student-t has passed the residual test.

Generalized Error

Testing for ARCH effects

Heteroscedasticity Test: ARCH test results at lag 1

F-statistic	0.158	Prob. F(1,212)	0.692
Obs*R-squared	0.159	Prob. Chi-Square(1)	0.690
	Heteroscedasticity Test: ARCH test results at lag 36		
F-statistic	0.148	Prob. F(36,142)	1.000
Obs*R-squared	6.456	Prob. Chi-Square(36)	1.000

Table XI. Heteroscedasticity Test: ARCH test results

Source(s): Own elaboration

No ARCH affects present. Hence the model does not suffer heteroscedasticity.

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|* |	.|* |	1	0.227	0.227	3.033	0.198
.|. |	.|. |	2	0.156	0.143	3.482	0.296
.|* |	.|* |	3	0.202	0.195	5.323	0.268
.|* |	.|. |	4	0.194	0.175	6.846	0.262
.|. |	.|. |	5	0.143	0.122	7.075	0.334
.|* |	.|* |	6	0.249	0.236	11.347	0.192
.|* |	.|. |	7	0.163	0.124	11.955	0.217
.|* |	.|. |	8	0.201	0.183	13.779	0.202
.|. |	.|. |	9	0.165	0.126	14.433	0.222
.|. |	.|. |	10	0.101	0.067	14.456	0.269
.|. |	.|. |	11	0.164	0.152	15.103	0.294
.|. |	.|. |	12	0.144	0.103	15.356	0.339
.|* |	.|* |	13	0.200	0.191	17.188	0.307
.|. |	.|. |	14	0.163	0.123	17.814	0.332
.|. |	.|. |	15	0.147	0.119	18.117	0.373
.|. |	.|. |	16	0.086	0.066	18.264	0.426
.|* |	.|. |	17	0.195	0.176	19.933	0.394
.|* |	.|. |	18	0.190	0.173	21.427	0.375
.|* |	.|. |	19	0.214	0.181	23.948	0.313
.|. |	.|. |	20	0.157	0.119	24.444	0.339

Table XII. **Source(s):** Own elaboration

Correlogram of standardized residuals

The results suggest that the squared standardized residuals do not exhibit significant autocorrelation or partial correlation at various lags.

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|* |	.|* |	1	0.232	0.232	3.263	0.187
.|. |	*|. |	2	0.053	0.038	3.991	0.255
.|. |	.|. |	3	0.059	0.075	4.578	0.326
.|. |	.|. |	4	0.078	0.085	4.813	0.430
.|. |	.|. |	5	0.063	0.063	5.330	0.501
.|. |	.|. |	6	0.101	0.107	5.354	0.624
.|. |	.|. |	7	0.103	0.096	5.368	0.740
.|. |	.|. |	8	0.103	0.099	5.383	0.839
*|. |	*|. |	9	-0.021	-0.026	9.306	0.530
.|. |	.|. |	10	0.121	0.150	9.327	0.623
.|. |	.|. |	11	0.184	0.160	10.531	0.604
.|. |	.|. |	12	0.103	0.075	10.546	0.689
*|. |	*|. |	13	-0.032	-0.032	15.247	0.410
*|. |	*|. |	14	-0.064	-0.048	22.289	0.186
.|. |	.|. |	15	0.099	0.122	22.321	0.213
.|. |	.|. |	16	0.089	0.054	22.435	0.244
.|. |	*|. |	17	0.065	0.040	22.940	0.266
.|* |	.|* |	18	0.220	0.187	25.728	0.220
.|. |	.|. |	19	0.152	0.104	26.131	0.241
.|. |	.|. |	20	0.104	0.110	26.143	0.276

Table XIII

Correlogram of standardized residuals squared **Source(s):** Own elaboration

The correlogram suggests that there is no significant autocorrelation or partial correlation between the squared standardized residuals at various lags. All the probability values are greater than 0.05, indicating a lack of significant autocorrelation.

The model using GED has passed the residual test.

Conclusion and recommendations

Firstly, the paper investigates the impact of United States of America EPU on the JSE volatility, secondly, it analyzes the economic policy uncertainty level in the United States and lastly it examines the JSE volatility patterns. The findings show that the uncertainty about US economic policy has an impact on the volatility of the JSE.

The study demonstrated a statistically significant positive correlation between the volatility of the JSE and the uncertainty surrounding US economic policy. Increased volatility in the JSE was linked to higher levels of uncertainty surrounding US economic policy.

The U.S.-EPU index shows consistent fluctuations suggesting that economic policy uncertainty is highly sensitive to both domestic and international events.

The stock price has generally trended upward over the long term, starting at 2,371 in January 2005 and reaching 12,072 by December 2024. This reflects a significant increase in value over nearly two decades.

Policy recommendations

The JSE is significantly impacted by the uncertainty surrounding US economic policy, therefore investors and policymakers in these nations must actively watch and evaluate changes in US economic policy. For this reason, it is vital to closely monitor signs of economic policy uncertainty, such as modifications to trade agreements, financial limitations, and regulatory frameworks. They can successfully identify potential hazards and opportunities that may arise within their respective domestic stock markets by regularly monitoring and assessing the market.

If you are investing in South Africa portfolio diversification can help to lessen the impact of the uncertainty surrounding US economic policy. By diversifying their investments across a range of industries geographies and asset classes investors can reduce their exposure to externally induced volatility. This might entail investing in domestic economic sectors that are less vulnerable to changes in U.S. policy or investigating investment opportunities in developing nations other than South Africa.

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