

Nexus among Economic Policy Uncertainty, Stock Returns and Macroeconomic Variables New Evidence from Developing Country's Stock Market Using NARDL Cointegration Approach

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Abstract

Uncertainty generates hype which creates difficulty to predict the returns in the stock market. To answer this phenomenon this study is carried out which aims to investigate the nexus of Economic Policy Uncertainty with Stock Return having macroeconomic variables as controlled, in Pakistan over the period of 2010 to 2022. A novel technique non-linear ARDL (NARDL) co-integration statistical approach to estimate and explore the asymmetric effect has been employed. The findings of this study show that a significant long-term co-integration exists between shifts in Economic Policy Uncertainty with stock returns in developing economy. We also found the short-run and long-run shocks (Positive and Negative) of Economic Policy Uncertainty have significant effect on stock return along with exchange rate and consumer price index. This means high uncertainty in economic policy can decrease the stock returns and low uncertainty (means high certainty) can increase the stock returns in Pakistan. More interestingly, we found an asymmetrical relationship between Shifts in Economic Policy Uncertainty with stock returns which means no symmetry or no linearity in the relationship. Concisely, inflows from positive Economic Policy Uncertainty shocks have a long-term negative impact on stock returns and negative Economic Policy Uncertainty inflows shocks have a long-term positive impact on stock returns in Pakistan. To overcome political instability, stock market declines, rising inflation, and currency devaluation, this study can be useful for policymakers, the government, regulatory authorities, investors, equity market, and so forth.

Keywords: Economic policy uncertainty; stock returns; macroeconomics variables; asymmetric cointegration.

JEL Classification: D8, E7, G4

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1. Introduction

While making any decision either by investor or Government, uncertainty factor is considerable for favorable results. On one side, the Government sets economic policies, which include tax rates, budgets, money supply, interest rates, as well as labor markets, property rights, and many other areas of government intervention in the economy. On the other side, investors decide their investment strategies on the basis of these economic policies. These policies can be divided into either fiscal policy that deals with government behavior related to taxes and spending, or monetary policy that deals with central bank behavior related to money supply and interest rates, Hu, Zhining et al. (2022). In connection with uncertainty, Baker et al. (2016) developed a new index called Economic Policy Uncertainty (EPU) based on the newspaper coverage frequency and economic-related policies reported in newspapers. EPU is an indicator of the economy which can support regulatory authorities or bodies to formulate appropriate monetary and fiscal policies along with trade regulations and others. Yaya et al. (2021). The Economic Policy Uncertainty index is used to measure also the uncertainty in fiscal, monetary, and other pertinent policies and investors check these reports to invest in stock markets. Like, recently multiple studies (Brogaard & Detzel, 2015; Wisniewski & Lambe, 2015; Arouri et al., 2016) concluded the impact of Economic Policy Uncertainty on the stock as well as bond markets is growing hence this EPU is also considered as a driver for the stock market uncertainty.

This uncertainty is considered as a significant factor which influences behavior of the investors. Uncertainty has long been considered as a significant factor that influences investors' behavior (Menzly et al., 2004; Bekaert & Hoerova, 2016). When comparing the effects of EPU on economic growth and monetary or fiscal policies, the results obtained much greater effects found on economic growth than fiscal or monetary policies, Handley and Limao (2015). According to Barrero et al. (2017), this uncertainty also influences significantly future investment decisions as well as the economic growth of developing countries. During the last 25 years a lavish enhancement was observed in many jurisdictions by role of economists (Katsoulacos et al., 2020). It seems a high priority that almost all economies wish their economic growth on the first rank. This growth is illustrated in various forms such as proper economic policies & financial policies and their stability, high-tech manufacturing techniques, increment in capital, skilled personnel and also advancement in social and political institutions (Sengupta & Puri, 2020).

According to Bekaert and Hoerova (2016), uncertainty looks like an important item that could harm investors in their investment decisions. High uncertainty pushes economic proper towards a depressing direction which causes weakening in the stock price as well as the earnings of the investors (Christou et al., 2017; Chiang, 2019). According to Sum (2012) when there is high uncertainty in the market then most investors are hesitant to go for spending or investment decisions. Various forms of uncertainty are observed in the market, such

as political, economic and financial policies. On uncertainty and stock market connection, Gulko (2002) argued that the stock market slowly and gradually crashes when there is a peak in political uncertainty. It might be that fluctuation comes in stock return as a result of policy uncertainty. Another reflection of his study is that economic policy uncertainty does not co-integrate with stock market volatility but for pricing the market assets it plays its key role.

In the light of global financial crises policy uncertainty was observed as the main concern and robust to tackle in 2009 in the United States due to Federal Open Market. During 2012 and 2013 the International Monetary Fund (IMF) suggested to US and European regulatory authorities that one of the main causes of abrupt weakening as well as slowdown in recoveries from 2008 to 2009 was uncertainty in monetary and fiscal policies. As uncertainty was considered a major issue to be sorted out by formulating effective strategies, in this connection, a new Economic Policy Uncertainty (EPU) has been introduced by Scott Baker, Nicholas Bloom, and Stevin Davis, researchers. This EPU is used as a proxy or index of Economic Policy Uncertainty. The syntax of index is capturing the ten leading newspapers of the US or articles which emphasized or highlighted the words such as “uncertain or uncertainty”, “economic or economy”, connected with “congress”, “legislations”, “Federal Reserves”, or even “White House” (Baker et al., 2012). Various authors argued on Economic policy uncertainties with different aspects, summarized in the Literature review part of this study.

In terms of the Pakistani economy, Choudhary et al. (2020) developed a similar index of EPU using four leading printed newspapers such as The Dawn, Express Tribune News, The News and Business Recorder. All the articles on related matters published in these newspapers were extracted to set the EPU index for Pakistan thus the data has been comprised from 2010 till the present. This EPU has been investigated with a concentration of various other proxies such as macroeconomic variables, Islamic and conventional stock returns in Australia, China, Japan and other countries but in Pakistan, this study has found the gap that is still exists and hence it is investigated in this research. Wide thoughts of numerous researchers pertaining to the negative effect of uncertainty on economic activities are found, such as Bernanke (1983) argued that firms’ investments declined if they face uncertainty. Similarly, Baker et al. (2012) concluded as the uncertainty increases in in economic policy the output level of firms reduces.

EPU from the perspective of the United States, has a negative impact on its equity market specifically rising risk premiums Brogard and Detzel (2015). Not limited to the US, the EPU with Stock returns has been investigated in other countries too like Chen et al. (2018) found significant results while investigating the impact of EPU on stock return prediction. They used monthly data from 16 countries (US, Japan, Australia, Brazil, China, South Africa, India, Ireland, Italy, Canada, France, UK, Spain, Russia, Germany, Netherlands and South Africa) and concluded that out of sixteen only 10 countries’ stock excess returns can be predictable using EPU of respective economies. Moreover, according to Zhang et al. (2019),

Global EPU (GEPU) has been studied on the volatility of the Chinese market.

In the first set of the data set, they found that changes in GEPU can be useful in the Stock volatility of the Chinese Stock market whereas the second data set supported the prediction of stock volatility through Global Economic Policy Uncertainty. The above discussed current studies are considered as the main motivation to carry out this study which examines the shifts in Economic Policy Uncertainty (EPU) on Stock Returns pertinent to the Pakistani Stock Market. Keeping in view the political instability of Pakistan which creates hypes in financial markets to predict the stock returns by investors, a few macroeconomic variables have been employed as controlled variables in this study such as Inflation (CPI used as Proxy) & Real Effective Exchange Rate (REER).

Our study adds contribution to literature as well as in fetching novelty in statistical techniques in terms of the following features:

Firstly, Economic Policy Uncertainty from the perspective of the Pakistani economy has been investigated with stock returns. Evidence indicated that no such type of study exists yet. Secondly, in this study two different shocks or shifts of Economic Policy Uncertainty have been introduced that can be treated as positive as well as negative shocks which tested individually on stock returns. Thirdly, as Shin et al. (2014) developed extensive model in ARDL (Auto Regressive Distributed Lag Model (ARDL) that is Non-Linear Auto Regressive Distributed Lag Model (NARDL), this latest statistical technique in terms of studied variables has been used. Finally, symmetrical or asymmetrical relationship has been considered withholding macroeconomic variables as controlled.

1.1 Significance of the Study

The study is beneficial for various types of investors either individual or firm-based, regulatory authorities, policymakers- economic & financial, financial institutions, stock market consultants and the Government as well.

2. Literature Review

Economic Policy Uncertainty has been investigated by various researchers either globally or by just capturing a few rich economies with the association of macroeconomic variables, exchange rates or stock returns separately. Mbanye (2023) conducted a study on EPU and Stock Liquidity using Brazilian firms from 2002 to 2015. His results demonstrated that EPU contributes excessively to stock liquidity for high-risk small companies. Kundu and Paul (2022) studied the effects of EPU on Stock market return and stock volatility using monthly data of G7 countries from 1998 to 2018. He considered bullish and bearish market approaches and concluded that an increase in EPU brings an increment in market volatility

and reduces the returns. Moreover, as a result of the positive uncertainty shock, volatility falls and return increases. In a specific way, he found an asymmetric relationship between EPU and risk & return. The impact of Shifts in EPU on the UK economy was examined by Nilavongse et al. (2020).

Global Economic Policy Uncertainty in terms of shifts affects only domestic industrial production, but the UK-EPU has a significant impact on its real exchange rate as they concluded in the study. Likewise, Chiang (2020) conducted his study on EPU with stock returns using data of the Japanese market and concluded that negative shifts in stock returns decrease the stock returns whereas positive shocks in EPU increase the stock returns. Predicting stock returns using numerous techniques has remained a challenge for investors for the past many years, such as conditional variance series seems to be used to detect the effects of stock price jumps/fluctuations. Value-at-risk (VaR) techniques are used to measure the downside risk. In explaining the excess stock returns this VaR is treated as a significant factor, Chen et al. (2018). According to Peng and Xiong (2006) financial market's behavior as well as the uncertainty of the stock market can be predicted or accessed by newspapers or media. Another study conducted by Kirange and Deshmukh (2016) argued that analyzing the content of headline news, which is classified as emotions, is one of the methods used to predict stock market prices. But in the recent study of EPU index developed by Baker et al. (2016) which is capable of explaining stock market behavior, following this index various studies conducted on the stock return such as Bahmani-Oskooee and Saha (2019), Chiang (2019), Bali et al. (2017) and Christou et al. (2017) concluded that with the shifts in EPU, the stock returns are negatively correlated.

Ongan and Gocer (2017), examined the association between Economic Policy Uncertainty with Stock Indices from the US perspective. They selected Dow Jones and Standard & Poor's with NASDAQ 100 using a monthly set of data starting from October 1985 to December 2016. As per their conclusion, US EPU supported the causal relationship from all the US stock linearly and non-linearly but NASDAQ 100 was highly affected in the short and long runs by the effects of US EPU. For the latest proxy of uncertainty, Economic Policy Uncertainty is quite useful to get robust results. Different studies were conducted that measured the impact of Economic Policy Uncertainty on variations of the stock market. Likewise, Mezrich and Ishikawa (2013), concluded from their study that EPU is irregularly more significant as compared to market volatility. Additionally, their findings also highlighted that Economic Policy Uncertainty is directly linked with fluctuation in stock market prices itself.

2.1 Research Hypotheses

Based on the above studies, we drafted our first hypothesis demonstrated as given:

H1: There is a Long-run Cointegration that exists between Shifts in Economic Policy Uncertainty and Pakistan Stock Returns.

Apart from studies on EPU with stock return that have been conducted individually, few more studies which employed macroeconomic variables too such as Abdalla and Murinde (2017) argued on the role of exchange rate and their co-integration with the stock market. They focused on emerging markets such as Pakistan, India, Philippines and Korea. Their studied period was from 1984 to 1994, and by using monthly data they concluded two different results; one of them found a unidirectional causal association between stock returns and exchange rates in Pakistan, India and Korea, whereas, the second of them concluded that there was no significant association for the Philippines. A similar approach of bivariate causality between exchange rates and stock prices was carried out by Granger et al. (2000). They employed that study from the perspective of Asian domain. The data from 1986-M1 to 1998-M6 in daily frequency have been used. They employed the VAR model for examining the causality and concluded differently for different countries. Using impulse response approach, for South Korea, the exchange rate led the stock prices and opposite results for the Philippines were observed. For Hong Kong, Taiwan, Singapore, Thailand and Malaysia the exchange rate indicates strong feedback relation but there was no force for such association observed for Indonesia and Japan. As numerous studies have been carried out to examine effects or association using two different variables as dependent and independent with additional macroeconomic variables as controlled variables, hence, our other hypothesis has been drafted as under for test.

H2: There is a significant effect of Positive and Negative Shocks of EPU on Stock Returns, Inflation (CPI) and the exchange rate of Pakistan.

In order to meet another objective of the study, this study has employed NARDL (Nonlinear Auto Regressive Distributed Lag Model) approach that was developed by Sine et al, (2014) which is the extension of the ARDL (Auto Regressive Distributed Lag Model). This model of NARDL is useful to examine dynamic error correction description by decomposing the model into two shocks such as positive and negative shocks in the short as well as long run which results in either symmetrical or asymmetrical effects of the studied exogenous variable on an endogenous variable (Mensi et al., 2017). Therefore, the study emphasized the above literature and designed another hypothesis which is associated to measure positive and negative shocks or shifts of EPU that is summarized as under.

H3: There is an asymmetrical relationship between Shifts in Economic policy Uncertainty in Pakistan and Pakistan Stock Returns.

3. Research Methodology

A quantitative nature of the study has been employed which captured time series data with monthly frequency for the period from M1 2010 to M12 2022. The positive and negative shocks or Shifts in EPU of Pakistan (SEPU) are used as the independent variable whereas Pakistan Stock Return's proxy is used as KSE-100 Index returns as the dependent variable. For controlled macroeconomic variables, Inflation and Real Effective Exchange rates have been considered. For Inflation, the proxy Consumer Price Index (CPI) and Real Effective Exchange Rate (REER) have been employed in our study. The data has been taken using three popular sources; for EPU, its website has been used, for stock returns and macroeconomic variables, Bloomberg terminal along with world bank data sources are used. In order to specify the econometric model, the first equation of our study looks like:

$$PSR_t = \beta_0 + \beta_1 SEPU_t + \beta_2 CPI_t + \beta_3 REER_t + \varepsilon_t \quad (1)$$

Here PSR is Pakistan Stock Returns, and SEPU is Shifts in Economic Policy Uncertainty of Pakistan.

Starting from the unit root test a series of econometric techniques have been employed, starting from Ordinary Least Square (OLS) to Optimal Lag Selection model specification. For examining the short and long-run relationship between SEPU and PSR, the Auto Regressive Distributed Lag Model (ARDL) which was proposed by Pesaran et al. (2001), has been employed. After that, an extensive model of nonlinear ARDL (NARDL) developed by Shin et al. (2014) has been used to check asymmetrical or symmetrical relationship among variables as proposed in the hypothesis as stated in equation (2). This NARDL is useful to examine dynamic error correction description by decomposing the model into two shocks such as positive and negative shocks in the short as well as long run which results in either symmetrical or asymmetrical effects of the studied exogenous variable on an endogenous variable (Mensi et al., 2017).

Following the series to meet the objective of the study, the significance of asymmetry or symmetry between studied variables and the magnitude of positive and negative shocks (equations 3 & 4) have been checked using the Wald test and NARDL Multiplier graph respectively. Finally, for stability in model, a popular technique CUSUM and CUSUMSQ was executed along with a diagnostic test. In order to test the hypothesis related to the asymmetric relationship, the original model has been decomposed into sub-model as equation 2:

$$\Delta PSR_t = \alpha_0 + \sum_{k=1}^{n1} \alpha_1 \Delta PSR_{t-k} + \sum_{k=0}^{n2} \alpha_2 \Delta SEPU_{t-k} + \sum_{k=0}^{n3} \alpha_3 \Delta ER_{t-k} + \sum_{k=0}^{n4} \alpha_4 \Delta Inf_{t-k}$$

$$+ \beta_1 PSR_{t-1} + \beta_2 SEPU_{t-1} + \beta_3 ER_{t-1} + \beta_4 \ln ft_{t-1} + \mu t \tag{2}$$

As the approach used is Nonlinear ARDL (NARDL), hence for positive and negative shocks measurement the model is further decomposed as equations 3 and 4:

$$POS = \ln SEPU_t^+ = \sum_{j=1}^t \Delta \ln SEPU_j^+ = \sum_{j=1}^t \max(\Delta \ln SEPU_j, 0) \tag{3}$$

$$NEG = \ln SEPU_t^- = \sum_{j=1}^t \Delta \ln SEPU_j^- = \sum_{j=1}^t \min(\Delta \ln SEPU_j, 0) \tag{4}$$

This POS is considered a positive shock of EPU and NEG measures negative shocks of the independent variable.

3.1 Empirical Results

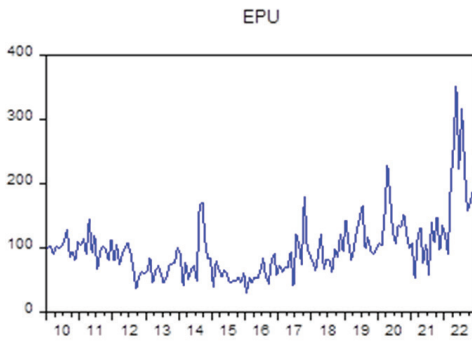


Figure 1: EPU of Pakistan Original Values

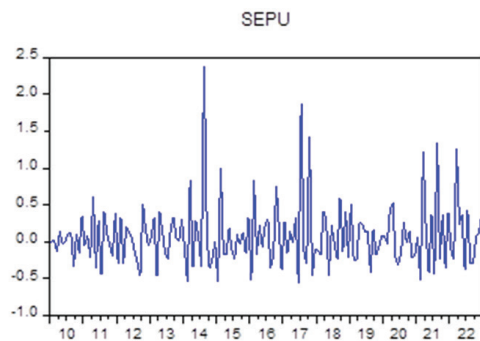


Figure 2: Shift in EPU (SEPU) of Pakistan

The actual data has been depicted in the graphical representation in figures 01 to 05 pertaining to economic policy uncertainty (EPU), shifts in economic policy uncertainty (SEPU), Pakistan stock returns (PSR), the real effective exchange rate (REER) and consumer price index (CPI) respectively. It has been observed that except REER and CPI rest of the variables do not have any trend whereas exchange rate and consumer price index have trend in series from the data from 2010 to 2022.

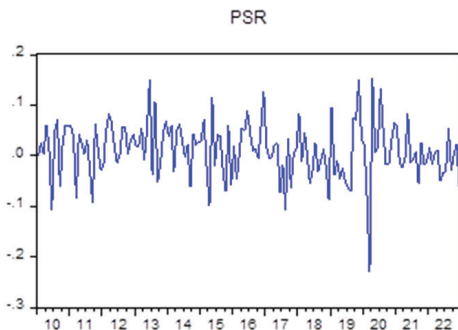


Figure 3: Pakistan Stock Returns

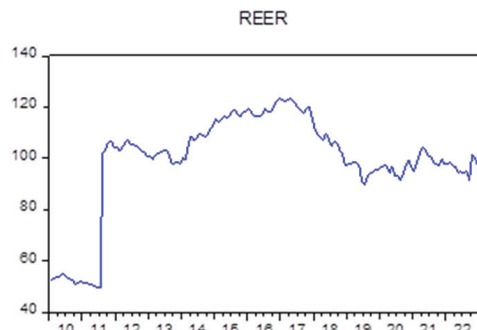


Figure 4: Real Effective Exchange Rate



Figure 5: Consumer Price Index (CPI)

From a descriptive point of view, the data seems to be normally distributed as in Table 01, all variables' residuals used in this study have a p value of Jarque-Bera test is more than 5% which confirms their normality. Whereas the average score of stocks returns is 1.08% with its highest statistic value of 15.26% along with a minimum of negative signs (22.86%) during 13 years. And shifts in economic policy uncertainty have an average score of 7.6% with its uppermost value of 2.378 along with the lowest in negative (0.548) observed. The controlled variables of the study in which real effective exchange rate's peak score is illustrated as 123.51 with a bottom of 49.66 along with its average value of 99.05. Another controlled variable used in this study is consumer price index which reaches a maximum at 14.9 statistics and minimum at 3.4 along with average point value at 7.99 as shown in table 01.

Table 1

Descriptive Statistics of Studied Variables

	PSR	EPU	SEPU	REER	CPI
Mean	0.010812	100.0647	0.07645	99.05716	7.799359
Median	0.01325	91.655	0.023975	101.8122	7.65
Maximum	0.1526	352.24	2.378177	123.5133	14.9
Minimum	-0.2285	30.06	-0.548009	49.66	3.4
Std. Dev.	0.055014	50.32276	0.435065	19.4983	2.434285
Skewness	-0.353973	2.03251	1.950196	-1.446279	0.545972
Kurtosis	4.790133	8.901507	9.378653	4.416468	3.026886
Jarque-Bera	24.08745	333.7891	363.3518	67.4263	7.75492
Probability	0.09	0.2109	0.05121	0.076322	0.020703
Sum	1.6867	15610.09	11.92616	15452.92	1216.7
Sum Sq. Dev.	0.469117	392518.9	29.33869	58928.5	918.4899
Observations	156	156	156	156	156

In order to meet the objective to check the long-term cointegration that exists among the studied, the first unit root test for stationarity has been employed (Table 2). It's a precondition to use ARDL that the data series should be stationary either at 1st difference I(I) or a combination of level I(0) and I(I). Two popular tests Augmented dicky fuller and Phillip Peron have been employed. Our studied variables met the criteria using both approaches. PSR and SEPU were already stationary at a level whereas REER and CPI were non-stationary at level but after applying 1st difference those variables became stationary and ready for further procedure.

Table 2
Unit-Root Test Results

Variables	Level		First Difference	
	ADF	PP	ADF	PP
PSR	-12.64***	-12.41***		
SEPU	-18.35***	-17.78**		
REER	-0.2942	-0.2678	-12.021***	-12.01***
CPI	0.76808	-0.3326	-9.4224	-9.5681***

Note: ** and *** depict the levels of significance and 5% and 1% respectively. ADF = Augmented Dicky Fuller and PP = Phillip Peron Tests of Unit Roots

After checking stationarity next optimal order of lag has been determined using Vector Auto Regression (VAR). There are different criteria used by various researchers but the most prominent are, from literature, Akaike Information Criterion (AIC), Hanan-Quinn Information Criterion (HQIC) and Schwarz Information Criterion (SIC). Here, AIC is used for ARDL as well as NARDL model specification (table 03). For appropriate models ARDL is specified at (1,1,0,1) and NARDL at (1,01,0,0).

Table 3
Optimal Lag and Model Specification criteria.

Model	AIC*	SIC	HQ	Model Specification
ARDL	5.4296	5.8346	5.5941	ARDL (1, 1, 0,1)
NARDL	5.2195	5.6228	5.7397	NARDL (1, 0, 1, 0, 0)

To test the first hypothesis of the study, NARDL bound test has been employed. As per the criteria if the f statistic is greater than upper bounds I(I) then it is confirmed that there is a long term co-integration that exists between variables. And if this value is less than lower bounds I(0) then results will be meeting as co-integration. But if the value of the f statistic lies in between upper and lower bounds then a conclusion cannot be drawn as either co-integration exists or not, for that decision, an error correction model will be used to confirm the

co-integration. Here, the f statistic (Table 04) is 28.13 whereas upper bounds at all probability values are lower than the f value, hence it is concluded that there is long-term co-integration that existed between Pakistan Stock Returns and Shifts in Economic Policy Uncertainty holding other variables constant. The hypothesis is supported.

Table 4
Bounds Test Result for testing Co-integration in Non-linear Model Specification

Model	F-Statistic	Upper Bound	Lower Bound
NARDL	28.13		
Critical Values			
10%		3.2	2.37
5%		3.67	2.79
3%		4.08	3.15
1%		4.66	3.65

Our next hypothesis is to examine the significant effects of positive and negative shocks of economic policy uncertainty on the Stock Returns of Pakistan in the long-run. To test the hypothesis, the original equation is decomposed into positive and negative shocks and Shin et al. (2014) developed Non-linear Auto Regressive Distributed Lag Model (NARDL) technique applied and results of short and long-run asymmetric relations were documented in table no. 5 and the 6 respectively. In the short run, only positive shocks of EPU were found significant ($p = 0.0728$) at a level of 10%. Whereas real effective exchange rate as well as consumer price index were found significant at a 5% and 1% respectively.

Table 5
Short-Run asymmetric relationship

Variables	Coefficient	St. Error	t-stat.	P
D(SEPU_POS)	-0.020513*	0.011352	-1.806993	0.0728
D(SEPU_NEG)	-0.019766	0.012283	-1.609211	0.1097
D(REER)	-0.000586**	0.000265	-2.208422	0.0288
D(CPI)	-1.058211***	0.001975	-535.912227	0

Note: *, ** & *** are significance levels at 10%, 5% and 1% respectively.

More specifically, for predicting a long-term asymmetric association as one of the objectives of the study, its results are presented in Table 6. We found all variables significant but at different levels of significance as short-run results were obtained. Positive shocks ($p = 0.0703$) and negative shocks ($p = 0.0839$) are significant at a 10% level, the exchange rate (0.0329) is at 5% and the consumer price index ($p = 0.000$) is significant at 1%.

Table 6
Long-run asymmetric relationship

Variables	Coefficient	St. Error	t-stat.	P
SEPU_POS	-0.021056*	0.011551	-1.822945	0.0703
SEPU_NEG	-0.020144*	0.011575	-1.740366	0.0839
REER	-0.000602**	0.000279	-2.153976	0.0329
CPI	-1.086212***	0.091001	-11.936235	0
C	0.031636	0.035901	0.88119	0.3797

Note: _POS and _NEG are positive and negative changes.

The coefficient of positive shocks in economic policy uncertainty is negative (-0.021056) and significant at 10%, which declares the inverse relationship between EPU_POS and the Stock returns of Pakistan. More clearly, if uncertainty in economic policy is increasing by one unit or information, then the returns of stocks will be decreased by 2.1 %. Hence an uncertain information in market leads to a decline in returns of stocks held by the investors. On the other side, the coefficient of negative shocks in economic policy uncertainty obtained were also negative (-0.020144) at a 10% significance level which posits the opposite association between EPU_NEG and the Stock returns of Pakistan. It can further be interpreted that if uncertainty in economic policy decreases by one unit or information, then the returns of stocks will be increased by 2.01 %. The investors. Returns of the stock in the market seem to be increased when there is less uncertain situation existing in the market or the market situation is more in certain conditions to be predicted.

Table 7
Asymmetrical Effect for Long NARDL Model

Null Hypothesis (Ho)	Alternative Hypothesis (Ha)	F-Statistic Value	Level of Significance	Decision	Symmetry/Asymmetry PSR & SEPU
Ho: $-\tau_3/\omega_0 = -\tau_4/\omega_0$	Ha: $-\tau_3/\omega_0 \neq -\tau_4/\omega_0$	1318.34	0.0012	Ho: Rejected $p < 5\%$ in Long-Run	Asymmetry relationship Exist No Symmetry
Ho: $\sum_{i=1}^q \omega_1^+ = \sum_{i=1}^q \omega_1^-$	Ha: $\sum_{i=1}^q \omega_1^+ \neq \sum_{i=1}^q \omega_1^-$	2			

Note: Ho: There is no Asymmetry, i-e Symmetry between PSR and SEPU

For controlled variables, such as exchange rate and consumer price index, both are significant and negative for long-run relationship which can be concluded as when there is one unit increase in real effective exchange rate then the stock return would decline up to a minor level of 0.06%, and with the one percent increase in inflation (CPI) observed in the market there will be a 10.8% decrease in the stock returns of Pakistan.

Another objective of this study is to investigate whether there is a symmetrical or asymmetrical relationship between the Stock Returns of Pakistan and shifts in Economic Policy Uncertainty. Using the NARDL approach we found both positive and negative shocks of EPU that have negative coefficients and a difference in magnitude sizes. Which infers the asymmetrical association between both variables (PSR & SEPU). In order to take more a robust test for examining asymmetrical relationships, the Wald test has been employed in which coefficients of positive and negative shocks of independent variable have been made equal with negative signs and divided by coefficient of lag dependent variable such as ($H_0: -\tau_3/\omega_0 = -\tau_4/\omega_0$). On the contrary, its alternative hypothesis depicts ($H_a: -\tau_3/\omega_0 \neq -\tau_4/\omega_0$) and its significance level confirms the rejection of the null hypothesis. As in this study, the null hypothesis advocates that there is no asymmetrical relationship that exists between SEPU and PSR. The result of the Wald test are summarized in the table 06. The f statistic is 1318.342 with a p value of 0.0012 which clearly rejects the null hypothesis and supports the alternative that there is an asymmetry between Pakistan Stock Returns and Shifts in Economic Policy Uncertainty. Hence, the non-linear relationship is validated.

Table 8
Diagnostic Inspection

Test	Problem	χ^2 p-value	Decision
LM	Serial correlation	0.7147	<i>Don't Exist</i>
Jarque-Bera	Normality	0.11901	<i>Exist</i>
Breusch Pagan			
– Godfrey	Heteroscedasticity	0.2644	<i>Don't Exist</i>
Ramsey RESET	Model Specification	0.6841	<i>Correctly Specified</i>
VIF	Multicollinearity	0.2163	<i>Don't Exist</i>
ECM (-1.0582)***	Speed of Adjustment	0.0000	<i>Desirable</i>
Adj. R ² (51.72%)	Model fitness		
CUSUM	Stability in Model	NA	<i>Stability Exist</i>
CUSUMSQ	Stability in Model	NA	<i>Stability Exist</i>

Several diagnostic tests were employed to confirm the reported results of the studied model. The coefficient of Error correction model (ECM) is negative and is significant at 1% which is desirable. It advocates the speed of adjustment towards the long-run (Table 8). The monthly adjustment is about 1.058 for the stock returns of Pakistan. To test the normality among residuals of studied variables, a popular technique Jarque-Bera test was used in which the null hypothesis suggests that the residuals are normally distributed and in the results of our NARDL model, we found that the p-value is insignificant ($p = 0.11901 > 5\%$) which confirms that null hypothesis cannot be rejected and hence data is normally distributed has been confirmed. Additionally, in order to check that data doesn't have any serial correlation issue, we tested the model using the Lagrange Multiplier (LM) test, which suggests if the p-value is

more than 5% then the data has no issue of serial correlation. In our model, the LM is insignificant ($p = 0.7147$) and it advocates that no serial correlation exists.

In order to detect the heteroscedasticity, a popular technique, namely Breusch Pagan Godfrey test has been used. Its null hypothesis stated that there is homoscedasticity in the data and hence the result of the studied model confirms ($p = 0.2644$) that the model has not suffered from the heteroscedasticity issue. For model specification, the Ramsey RESET test was used which also confirmed that the studied model is appropriately specified. The value of variance inflation factor (VIF) has been reported at (0.213), which is more than 5%, and it depicted that the data has no issue of multicollinearity. Finally, adjusted R2 is reported as 51.72%, which seems fit to the NARDL model specification.

Brown et al. (1975) suggested one of the prominent tests which checks stability in short-run and the long-run through the Cumulative Sum of Recursive Residuals (CUSUM) and Cumulative Sum of Squares of Recursive Residuals (CUSUMSQ). If the residuals of the optimum error-correction model are stable, it can be denoted by “S” otherwise for Un-stability in estimates, it shows “U”. The desirable results are that both should be stable.

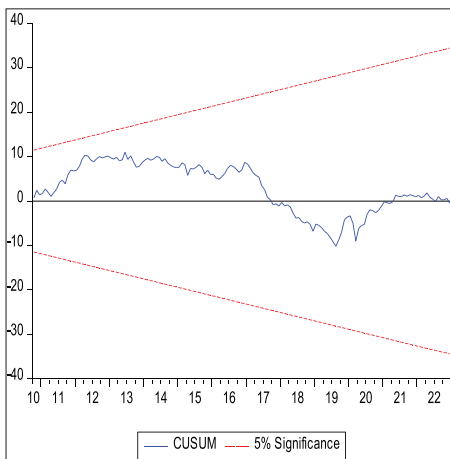


Figure 6: CUSUM

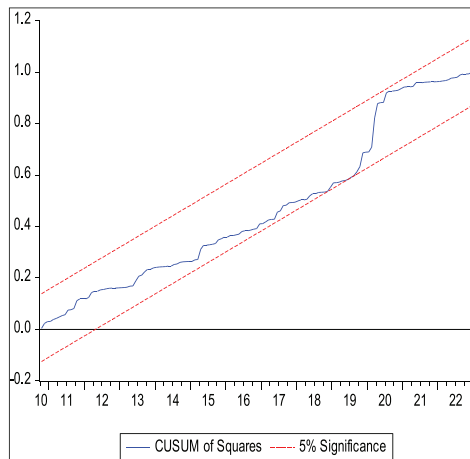


Figure 7: CUSUMSQ

Finally, asymmetric cumulative dynamic multiplier graphs have been accessed which show the pattern of adjustments of dependent variable (PSR) to its long-run equilibrium. Following POS and NEG shocks in the independent variable (EPU). As shown in fig. 08, the black color line illustrates the movement of Economic policy uncertainty due to positive change in stock return, whereas the black dotted line depicts the movement of EPU due to negative shocks in stock returns. The red dotted line shows an asymmetry plot with two red upper and lower lines indicating the class interval bound. This red dotted line touches both intervals which infers an asymmetry relationship. Moreover, black line moves down

indicating that positive EPU inflows shocks have a long-term negative impact on stock returns. In contrast, black dotted lines move up which highlights that the negative EPU inflows shocks have a long-term positive impact on stock returns. The positive shock is more prominent as compared to negative shock in the long run.

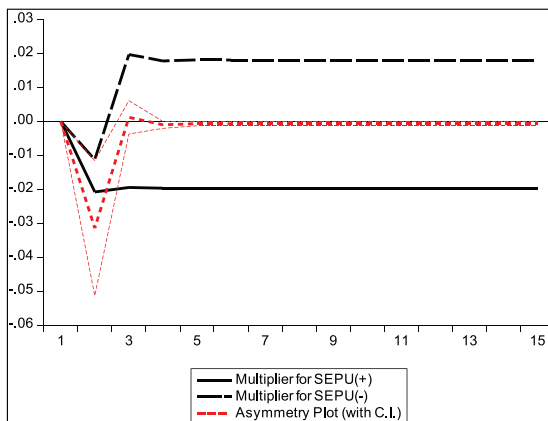


Figure 8: Dynamic Multiplier

Table 9
Hypotheses Summary

S.No	Description	Results
H_1	There is a Long-run Cointegration that exists between Shifts in Economic Policy Uncertainty and Pakistan Stock Returns.	Supported
H_2	There is a significant effect of Positive and Negative Shocks of EPU on Stock Returns, Inflation (CPI) and the exchange rate of Pakistan.	Supported
H_3	There is an asymmetrical relationship between Shifts in Economic Policy Uncertainty in Pakistan and Pakistan Stock Returns.	Supported

Note: H1-H3 are alternative hypotheses proposed in this study.

4. Conclusion

The main objective of this study was to investigate the nexus of Economic Policy Uncertainty with Stock Return having macroeconomic variables as controlled in Pakistan over the period of 2010 to 2022. The monthly data was obtained from Bloomberg terminal, World Bank, State Bank of Pakistan and CEIC global data websites. To meet the stated objective, this study employed a novel technique: non-linear ARDL (NARDL) co-integration

statistical approach to estimate and explore the asymmetric effect of shifts (changes) in Economic Policy Uncertainty on the stock returns of Pakistan, 100 stock Index keeping real effective exchange rate and consumer price index as controlled variables. The main significance of this technique is that it captures, simultaneously, short as well as long-term dynamics among studied/projected variables. There were three main hypotheses addressed in this study such as there is a long-run cointegration that exists between shifts in economic policy uncertainty and Pakistan stock returns, there is a significant effect of positive and negative shocks of EPU on stock returns, inflation (CPI) and the exchange rate of Pakistan and there is an asymmetrical relationship between shifts in economic policy uncertainty and stock returns. To test the hypotheses, a series of econometrics pre-requisites econometric tests were employed such as ADF & PP test for stationarity, Jarque-Bera (JB) for Normality, Lagrange Multiplier (LM) for serial correlation, Breusch Pagan Godfrey test for heteroscedasticity, Ramsey RESET for model specification, Variance Inflation Factor (VIF) for multicollinearity and CUSUM and CUSUMSQ for model stability. When all prerequisites were met then techniques for testing hypotheses were employed.

Such as Bounds Test, NARDL co-integration, and the Wald test. The findings of bounds test show that shifts in Economic Policy Uncertainty have significant long-term co-integration with stock returns in Pakistan. Similarly, for short-run except negative shocks, the positive shocks of EPU have a significant effect on stock return along with exchange rate and consumer price index. But the long-term positive and negative shocks of EPU have an inverse significant effect on the stock return along with negative and significant exchange rate and CPI on stock return in Pakistan. This means high uncertainty in economic policy can decrease the stock returns and low uncertainty (means high certainty) can increase the stock returns in Pakistan. More interestingly, we found an asymmetrical relationship between SEPU and stock returns which means no symmetry or linearity exists in the relationship. Concisely, positive EPU inflows shocks have a long-term negative impact on stock returns and negative EPU inflows shocks have a long-term positive impact on stock returns in Pakistan.

4.1 *Managerial Implications*

From this study, it is apparent that the policymakers in Pakistan are facing challenges to maintaining political stability in the country, which creates more uncertainty when any hypes are generated in the stock market. Also, inflation control is another challenge for them and finally control of depreciation in Pakistani Rupee (PKR) is considered as a big challenge for them. Thus, our study encourages the policymakers in Pakistan to formulate policies which ensure political and Government stability specifically in macroeconomic policies such as fiscal and monetary policy. There is a need for investors and speculators who can predict the stock market in a better way. For bureaucracy, there is also a need for implementation of proper governance system which decreases the uncertainty in the markets. Lastly, policies for building good international relations could be prioritized which assures the country that in

challenges and tough times the allies will support to uplift the economy as well as the country.

4.2 *Future Directions*

As this study is limited in terms of taking two macroeconomic variables as controlled variables such as REER and CPI, the scholars may use other variables like exchange rate, export or import, and FDI to examine the association. Moreover, EPU has been checked with the 100 Index of the Pakistani economy, other indices may be used to test the same hypotheses. Finally, the impact of Covid-19 can also be checked in such a relationship.

References

- Abdalla, I. S., & Murinde, V. (2017). Exchange rate and stock price interactions in emerging financial markets: evidence on India, Korea, Pakistan and the Philippines. *Applied financial economics*, 7(1), 25-35.
- Arouri, M., Estay, C., Rault, C., Roubaud, D. (2016) Economic policy uncertainty and stock markets: Long run evidence from the US. *Finance Research Letters* 2016, 18, 136-141.
- Bahmani-Oskooee M, & Saha S. (2019a) On the effects of policy uncertainty on stock prices. *J Econ Financ* 43, 764–778.
- Baker, S. R., Bloom, N., & Davis, S. J. (2016). Measuring economic policy uncertainty. *The Quarterly Journal of Economics*, 131(4), 1593-1636.
- Baker, S.E., Edwards R., & Doidge, M., (2012) How Many Qualitative Interviews Is Enough? Expert Voices and Early Career Reflections on Sampling and Cases in Qualitative Research. Working Paper. <http://eprints.brighton.ac.uk/11632/>.
- Barrero JM., Bloom N., Wright I., (2017) Short and long-run uncertainty (No. w23676). National Bureau of Economic Research.
- Bekaert G, & Hoerova M (2016) What do asset prices have to say about risk appetite and uncertainty? *Journal of Bank Finance*, 67, 103–118.
- Bernanke, B. S. (1983). Irreversibility, uncertainty, and cyclical investment. *The Quarterly Journal of Economics*, 98(1), 85-106.
- Brown, R. L., Durbin, J., & Evans, J. M. (1975). Techniques for testing the constancy of regression relationships over time. *Journal of the Royal Statistical Society: Series B (Methodological)*, 37(2), 149-163.

- Brogaard, J., & Detzel, A. (2015). The asset-pricing implications of government economic policy uncertainty. *Management science*, 61(1), 3-18.
- Chen CYH, Chiang TC, Härdle WK (2018) Downside risk and stock returns in the G7 countries: An empirical analysis of their long-run and short-run dynamics. *Journal of Banking & Finance*, 93, 21–32.
- Chiang T.C. (2019). Economic policy uncertainty, risk and stock returns: Evidence from G7 stock markets. *Finance Research Letters*, 29, 41–49.
- Chiang, T. C. (2020). Economic policy uncertainty and stock returns-evidence from the Japanese market. *Quantitative Finance and Economics*, 4(3), 430-458.
- Christou, C., Cunado, J., Gupta, R., & Hassapis, C (2017) Economic policy uncertainty and stock market returns in Pacific-Rim countries: Evidence based on a Bayesian panel VAR model. *Journal of Multinational Financial Management* 40, 92–102.
- Granger, C. W., Huangb, B. N., & Yang, C. W. (2000). A bivariate causality between stock prices and exchange rates: evidence from recent Asian flu. *The Quarterly Review of Economics and Finance*, 40(3), 337-354.
- Gulko, L. (2002). “Decoupling: If the U.S. Treasury Repays Its Debt, What Then?” *Journal of portfolio management* 28(3), 59-66.
- Handley K., & Limao N., (2015) Trade and investment under policy uncertainty: theory and firm evidence. *American Economic Journal: Economic Policy* 7(4), 189–222.
- Hu, Zhinning. (2022). Six types of government policies and housing prices in China. *Economic Modelling*, 108, 105764.
- Katsoulacos, Y., Avdasheva, S., & Benetatou, K. (2020). The role of economics: testing for the extent of effects-based enforcement and its relation to the judicial review in different countries. *Empirical_analysis_of_LSs_in_different_countries_260420* 33.
- Kirange, D. K., & Deshmukh, R. R. (2016). Sentiment Analysis of news headlines for stock price prediction. Comsoft, *An International Journal of Advanced Computer Technology*, 5(3), 2080-2084.
- Kundu, S., & Paul, A. (2022). Effect of economic policy uncertainty on stock market return and volatility under heterogeneous market characteristics. *International review of economics & finance*, 80, 597-612.

- Choudhary M. A., Pasha F., & Waheed M., (2020), Measuring Economic Policy Uncertainty in Pakistan, MPRA Working Paper No. 100013.
- Menzly L, Santos T, Veronesi P (2004) Understanding predictability. *J Political Economy* 112(1),1–47.
- Mensi, W., Hammoudeh, S., Shahzad, S. J. H., & Shahbaz, M. (2017). Modeling systemic risk and dependence structure between oil and stock markets using a variational mode e composition-based copula method. *Journal of Banking & Finance*, 75, 258-279.
- Mezrich, J., & Isikawa, Y. (2013). The uncertainty that matters, the drag on the market. Instinet, Quantitative Desk Strategies.
- Mbanyele, W. (2023). Economic policy uncertainty and stock liquidity: the role of board networks in an emerging market. *International Journal of Emerging Markets*, 18(1), 122-147.
- Ongan, S., & Gocer, I. (2017). The Relationships between Home Prices, Financial Literacy and Economic Policy Uncertainty: Empirical Evidence from the US Housing Market. *Journal of Applied Economics & Business Research*, 7(4), 232-242.
- Nilavongse, R., Michał, R., & Uddin, G. S. (2020). Economic policy uncertainty shocks, economic activity, and exchange rate adjustments. *Economics Letters*, 186, 108765.
- Peng, L., & Xiong, W. (2006). Investor attention, overconfidence and category learning. *Journal of Financial Economics*, 80(3), 563-602.
- Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of applied econometrics*, 16(3), 289-326.
- Sengupta, P., & Puri, R. (2020). Exploration of Relationship between FDI and GDP: A Comparison between India and Its Neighboring Countries. *Global Business Review* 21(2), 473-489.
- Shin, Y., Yu, B., & Greenwood-Nimmo, M. (2014). Modelling asymmetric cointegration and dynamic multipliers in a nonlinear ARDL framework. *Festschrift in honor of Peter Schmidt: Econometric methods and applications*, 281-314.
- Sum, V. (2012). How do stock markets in China and Japan respond to economic policy uncertainty in the United States? Available at SSRN 2092346.

Wisniewski, T. P., & Lambe, B. J. (2015). Does economic policy uncertainty drive CDS spreads? *International Review of Financial Analysis*, 42, 447-458.

Yaya, O. S., Abu, N., & Ogundunmade, T. P. (2021). Economic policy uncertainty in G7 countries: evidence of long-range dependence and cointegration. *Economic Change and Restructuring*, 54, 541-556.

Zhang, S., Yao, L., Sun, A., & Tay, Y. (2019). Deep learning-based recommender system: A survey and new perspectives. *ACM computing surveys (CSUR)*, 52(1), 1-38.



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