IMPACT OF GLOBAL ECONOMIC POLICY UNCERTAINITY AND OIL PRICE SHOCKS ON PAKISTAN'S STOCK MARKET

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Certificate

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Dedication

I dedicate this thesis to my beloved family, whose unwavering support, love, and encouragement have been my rock throughout this challenging academic journey. To my parents, whose sacrifices and boundless faith in my abilities have been my guiding light, I am forever grateful. My father's words of encouragement, wisdom have lifted my spirits during the most challenging times. My mother's heartfelt prayers have been the cornerstone of my thesis journey. In every moment of doubt or difficulty, her comforting words and reassuring presence have provided me with strength and solace. To my husband and in-laws for the steadfast support and encouragement during the final stages of my thesis mean the world to me. Your unwavering belief in my abilities and your endless patience have been invaluable. To my siblings, for their understanding, patience, and countless moments of joy that provided much-needed breaks from my studies. This achievement is as much yours as it is mine. Your unwavering belief in me has been the driving force behind my pursuit of knowledge, and I dedicate this work to you all, with heartfelt appreciation and love.

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ABSTRACT

The current study examines the impact of global economic policy uncertainty and oil price shocks, in conjunction with exchange rate and money supply on the Pakistan stock market and its various sectors. The results found global economic policy uncertainty is significantly and adversely affecting the stock market returns both in short and long run because Pakistan's economy is dependent on foreign capital inflows. The money supply has a positive and significant impact with one- month lag suggesting expansion in money supply leads to increased availability of funds. The exchange rate has a significant positive impact on returns of stock's market only in the short run. Analyzing individual sectors, the study reveals that in the long term, global economic policy uncertainty significantly and negatively affects the returns of the oil and gas sector in the stock market. In automobile assembler sector in the long run, global economic policy uncertainty has a negative significant impact on its returns with one-month lag. In cement sector, both in long and short run, the negative impact is insignificant since the sector demand is domestically oriented and does not depend on global uncertainty factors. In chemical sector, the negative impact is significant on returns both in the long and short run. However, the impact is negative but insignificant on returns of food and personal care sector because its demand is domestically oriented. Global economic policy uncertainty has negative and significant impact on returns of pharmaceutical sector with two-months lags. Furthermore, increases in Brent oil prices has a positive impact in the current month but negative impact after one-month lag on returns of Pakistan's stock market. The negative lag effect of oil prices shock may be due to the fact that oil prices are revised with lags in the country that create uncertainty in financial markets and investors become cautious due to potential impacts on inflation, interest rates, business and economic growth. At sectoral level both in the short and long run, increases in international oil prices has a significant and positive impact on returns in oil and gas sector because oil-producing companies benefit from higher oil prices. However, oil price shock has an insignificant impact on returns in cement sector. Oil prices shocks has significant and positive impact on returns in automobile assembler sector after one month-lag whereas it has insignificant impact on returns in chemical sector. Both in long and short run, Brent oil price shocks have insignificant impact on fertilizer, food and personal care and pharmaceutical sectors.

Keywords: Global economic policy uncertainty, Oil price shocks, Exchange rate, Money supply.

CHAPTER 1

INTRODUCTION

1.1. Introduction

The goal of this chapter is to present the main purpose of the study in detail. The current section (section 1.1) explains the main purpose and structure of this chapter. Section 1.2 explains the background of the study. Section 1.3 elaborates the problem statement of this study. Section 1.4 discusses the research questions of this study. Section 1.5 describes the research objectives of this study. Section 1.6 illustrates the research gap of this study in detail. Section 1.7 elaborates the research significance briefly. Section 1.8 illustrate the practical implications. Section 1.9 describes the summary of this chapter.

1.2. Background

Global economic policy uncertainty (GEPU) represents to the level of uncertainty and unpredictability surrounding government policies and regulations related to the economies around the world. It encompasses uncertainties arising from potential changes in fiscal policies, monetary policies, trade policies, taxation, regulatory frameworks, and other economic-related decisions made by the policymakers (Abel, 1983). Increased global economic uncertainty raised grave concerns on global financial market as several significant economic events like the global financial crises, and pandemic over the past several decades have altered the financial markets' dynamics (Kwon, 2020; Adam et al., 2022). The global financial market is usually dominated by the global leading financial markets, specifically the G5 markets (Ahir, Bloom, & Furceri, 2022). The international economic policy instability appears to have an adverse effect on the stock market especially during the financial crises (He et al., 2020). The stock markets of developing countries are exposed to the global economic uncertainty as they depend on the foreign investment and external debt (Chen & Demirer, 2022). In developing nations, domestic stocks markets are impacted by global economic uncertainty, particularly in small open economies like Pakistan (Sohail, Rahman, & Rahman, 2023).

In the oil-producing regions, political instability, conflicts, and wars can disrupt oil production and supply, resulting in sudden price spikes. Oil price shockwave have considerable effects on the global economy and financial markets (Zhang et al., 2022). Geopolitical risks associated with oil prices exert impact on stock returns under normal market conditions and also

contribute to an increase in market volatility under all market conditions (Khan et al., 2023). Most of the economies rely significantly on oil for daily operations, transport, and various economic functions, so it is widely regarded as a crucial economic driver. It is an undeniable fact that oil functions as the foundation of industrialization and is essential to the production of products and services. Hence, comprehending the affiliation of oil price disruptions and the stock market is crucial, as any oil price fluctuation can trigger economic instability and uncertainty prevailing in the countries that both import and export oil (Al-hajj, Al-Mulali, & Solarin, 2018).The production in Pakistan also depends on the consumption of oil. Therefore, the oil prices significantly affect Pakistan stock market's returns in both before and after the crises period. In the pre crises period, before the crises the impact is negative but in the post crises period the impact turns positive (Jebran et al., 2017). As Pakistan relies on oil imports, variations in prices of oil adversely influence the outcomes of the Pakistan stock market. Price fluctuations increase the production costs, which in turn has an adverse effects on enterprise execution and stock returns (Atiq & Farhan, 2018). Generally, the association between prices of oil and stock returns is subject to the level of a country's reliance on oil, as evidenced by shifts in economic indicators (Stockhammar & Österholm, 2017).

1.3. Statement of Problem

Pakistan, like many other developing countries, is complexly linked to the global economy, making it vulnerable to external shocks arising from uncertainties in economic policies worldwide (Ghani & Ghani, 2023). The dynamic nature of international trade markets, geopolitical tensions, and fluctuations in major economies can lead to higher levels of global economic policy uncertainty (Osei & Adam, 2021; Ashena & Lal, 2021), which may significantly influence the performance of Pakistan stocks market. Likewise, oil price shocks have been recognized as significant events that can have significant effects on Pakistan stock markets since the country is dependent on import of oil and thus vulnerable to fluctuations in oil prices (Fatima & Bashir, 2014), which can impact different sectors of stock market. This research seeks to investigate and evaluate the consequences of global economic policy uncertainty, oil price shocks, along with macroeconomic determinants such as exchange rates and money supply on the performance of Pakistan's stocks market and its different sectors.

1.4. Research Questions

1. Does global economic policy uncertainty significantly affect the PSX[1] index returns?
2. Does global economic policy uncertainty significantly affect the Pakistan stocks market's sectoral indices returns?
3. Which sectors in the Pakistan stocks market are susceptible to global economic policy uncertainty?
4. Does the oil price shock significantly impact the Pakistan stock market's index returns?
5. Does the oil price shock significantly impact the Pakistan stock market's sectorial indices returns?
6. Which sectors in the Pakistan stocks market are susceptible to oil price shock?

1.5. Research Objectives

1. To assess the effect of global economic policy uncertainty on the returns of Pakistan overall stocks market and returns of the market's various sectors.
2. To assess the effect of oil price shocks on Pakistan's stocks market returns and returns in different sectors of Pakistan's stock market.

1.6. Research Gap

Existing research has predominantly concentrated on global economic policy instability in advanced countries such as the US, China, and the UK, with limited attention given to its influence on emerging stock markets (Li etal., 2019 ; He, Wang, & Yin, 2020; Javaheri, Habibi & Amani,2022). Das, Kannadhasan and Bhattacharyya (2019) has examined the influence of United States economic policy unpredictability which is often cited as the research on the impact of global economic policy uncertainty on emerging stocks market. The study by Kannadhasana and Das (2020), aimed at comparing, and contrasting the consequences of the economic policy instability globally as well as the geopolitical risks on Asian emerging stock markets. Studying the impact of global economic policy uncertainty on emerging markets like Pakistan provides valuable insight, as these economies are frequently more susceptible to external disturbances and policy shifts. Ghani et al. (2022) evaluated the repercussion of global economic policy instability on fluctuations in the Pakistan stocks market and identified it as a significant predictor of the volatility.

[1] Pakistan Stock Exchange index is represented by KSE100 index which comprises of the largest market capitalization companies.

Nevertheless, domestic factors including macroeconomic indicators like money supply and exchange rates, are recognized to exert an influence on performance of Pakistan stock market in conjunction with instability in global economic policies. Examining the consequences of global economic policy instability, in conjunction with macroeconomic variables like money supply and exchange rates, on specific sectors within the Pakistan stock market would enhance the depth of the research. This approach recognizes that different sectors may exhibit distinct responses to uncertainty, shaped by factors such as their exposure to global markets, regulatory conditions, and demand patterns.

1.7. Significance of the Study

This research makes two key contributions to the body of literature. This research investigates into the intricate interplay between global economic policy uncertainty and specific macroeconomic metrics, including exchange rates and money supply, in relation to the performance of different sectors within the Pakistan stocks market. The study presents a comprehensive analysis that bridges the gap between global economic conditions and their localized effects on sectoral indices by quantifying the influence of global policy uncertainty besides domestic macroeconomic variables. This contribution is significant because it recognizes the interdependence between the global economy and the domestic economy and demonstrates how policy decisions and economic events beyond national borders can have repercussions in various sectors of the Pakistan's stock market. It enhances the current knowledge base by shedding light on the interplay of these variables and assess their impact on sectoral performance, risk perception, and investment patterns .This study is the sole examination as to how global economic policy uncertainty affects various sectors of the Pakistan stock market.

By analyzing the effects of an oil price surge along macroeconomic factors such as money supply and exchange rates on Pakistan's stock market sectors, investors will be able to identify sectors that are susceptible to oil price fluctuations. This information is necessary for effective risk management and portfolio diversification, allowing investors to make informed decisions to mitigate potential losses during periods of oil price volatility. The interaction among oil prices, exchange rates, and money supply can have implications for inflation. If oil price shocks are transmitted to higher inflation rates, central banks may adjust interest rates or monetary policies.

Understanding these relationships aids in predicting potential inflationary pressures and guiding monetary policy decisions.

1.8. Practical Implication

This research study has several practical implications for investors, policymakers and the government. Some of the practical implications are discussed below.

Investors

Based on the findings, investors may consider adopting a sustained investment approach instead of reacting impulsively to temporary market fluctuations. Staying invested through periods of uncertainty and oil price shocks can yield more favourable results in the long run.

Investors may remain mindful of the possibility of heightened volatility and uncertainty in stock markets. This will create awareness about their risk management strategies, including diversification of Portfolios.

Investors can adjust assets allocation strategies to include a mix of assets that are less sensitive to economic policy uncertainty and oil price variations, such as bonds, real estate, or international equities. Diversifying investments across various sectors and industries can minimize exposure to policy uncertainty of specific sector and oil price shocks.

Policymakers and Government

Policymakers can aim to create stable and predictable economic policy environments. Frequent changes in policy direction can erode investor confidence and disrupt financial markets.

Government/policy makers can implement and enforce regulations that protect investors from market manipulation, fraud, and insider trading, fostering trust in the financial System. Transparent and consistent communication of policy decisions and their rationale can play an important role in avoiding market uncertainty.

Collaborative efforts with international organizations and neighbouring countries can provide resources and support to manage the consequences of global economic policy instability and oil price shocks.

In sum, this study can provide beneficial perspective for policymakers, investors and governments. Investors can use this knowledge to make informed decisions and manage risks. Policymakers and governments can implement strategies to enhance market stability and economic resilience, ultimately benefiting both investors at home and abroad.

1.9. Summary of the chapter

This study comprises of 5 chapters in total. Chapter 1 discusses the brief background of global economic policy uncertainty and oil prices shocks on the Pakistan stock market as well as its sectors. Further, this chapter elaborates the problem statement, research questions, objectives, gap, and significance of the study. Chapter 2 deals with the existing literature regarding the global economic policy uncertainty and oil prices shocks along with macroeconomic determinants such as exchange rate and money supply on the stock markets of the world and also the Pakistan stock market. Chapter 3 represents the research methodology applied in this study. Chapter 4 describes data analysis and discussion to obtain the results of the study. Chapter 5 elaborates the conclusions of the overall findings and recommendations of the study.

CHAPTER 2
LITERATURE REVIEW

2.1. Introduction

This chapter reviews the literature on the impact of the global economic policy uncertainty (GEPU) and oil price shocks on the stocks markets in developing countries in general and in Pakistan in particular. Firstly, the studies focusing on GEPU & world stock market are reviewed. Secondly the studies on the stock market, GEPU and macroeconomic variables are considered. Thirdly, the studies on oil price shock and world stock market are reviewed. Finally, the theoretical underpinning consisting of prospect theory and the arbitrage pricing theory are discussed.

2.2. Studies Focusing on Global Economic Policy Uncertainty & World Stock Market

Extensive literature exists to explore the consequences of global economic policy ambiguity on the global capital market. Dakhlaoui and Aloui (2016) examined the connection between economic policy ambiguity in United States and the volatility of equity markets in the BRIC nations. Using a rolling cross-correlation method, the study reveals that mean return spill overs are negative, while volatility spill overs fluctuate between negative and positive values. The results indicated that simultaneously investing in the United States' and BRICs' stock markets are risky.

Yu et al. (2018) examined global economic policy uncertainty (GEPU) effects on the Chinese stock market's volatility and its propensity for prediction. To analyse the relationship between GEPU index and the Shanghai Composite index (SCI), the author used the GARCH-MIDAS[2] model on monthly. The association between GEPU and Chinese stock market's volatility is found to be positive and statistically significant, demonstrating integration into the world economy. Furthermore, the GARCH-MIDAS model, incorporating both GEPU and Realized Volatility (RV) which examines changes in returns for an investment product by evaluating its historical returns within a period, surpasses other models in terms of predictive accuracy, affirming the relevance of GEPU in forecasting fluctuations within the Chinese stock market. This underscores GEPU's position as an additional long-term factor influencing Chinese stock market's volatility.

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[2] Generalized Autoregressive Conditional Heteroscedasticity–Mixed-Data Sampling (GARCH-MIDAS) model

Using the factor-augmented SVAR[3] method, Hoque and Zaidi (2019) explored the influence of geopolitical risk, global economic policy uncertainty (GEPU), and changes in crude oil prices on Malaysian stock prices. The findings reveals that how global economic policy uncertainty affects different sectors and situations varies. Generally, the negative impacts outweigh the positive ones. In highly volatile situations, this uncertainty has a greater influence on stock returns. This confirms a complex, varied, and state-specific connection between global economic policy uncertainty and stock returns in Malaysia's different sectors. Geopolitical risk may have an indirect consequence on stock market, but its significant influence is channelled indirectly through mechanisms such as global economic policy uncertainty and energy disruptions. Geopolitical risk exacerbates the adverse impacts of global economic policy uncertainty on the stock market. On aggregated and sectorial stock prices, oil-related shocks have asymmetric effects, with world's economic instability amplifying oil demand shocks and geopolitical risk amplifying oil supply shocks. These results suggest that both GEPU and disruptions in crude oil demand serve as non-diversifiable risk factors that have predictive value for stock market returns. To preserve financial stability, policymakers must regulate the markets, and investors must respond to future disruptions in these factors.

Global economic policy uncertainty (GEPU) is a significant global phenomenon capable of influencing both economic and stock market performance. Hoque and Zaidi (2020) evaluates the consequences of GEPU on the stock market of Malaysia. The results indicate an adverse impact of GPU which stands for global policy uncertainty on the stock market of Malaysia, with a more pronounced effect in time of high market uncertainties. This asymmetric association between GEPU and returns on stock market has implications for asset pricing.

Tiyaki and Tiyaki (2019) used the ARDL method to examine the immediate and prolonged macroeconomic factors affecting Turkish stock returns that are influenced by both domestic and foreign economic policy uncertainty. This study used various indices and economic indicators, including the list includes financial indicators like stock market indices (BIST100 and BIST industrial index), economic data comprise of macroeconomic determinants such as the CPI which stands for consumer price index and is used to measure the inflation, industrial production index

[3] Factor-augmented SVAR method is a technique to take into account information from a large data-set with inclusion a few variables in VAR models. This can be done by extending the VAR model with structural factors.

(IP), REER which stands for the real effective exchange rate(REER) mean value of Turkish currency in US dollars , financial instruments (interest rate (IR)), and factors affecting the economy (geopolitical threats and economic policy instability).Short-term BIST stock returns are affirmatively impacted by fluctuations in the REER, IPI, and to measure the inflation the CPI. Conversely, variations in GEPU, IR, and the financial crises especially the GFC which is the Global Financial Crisis which took place in 2008 have adverse consequences on the returns of the stock. Long-term returns on stock are adversely affected by fluctuations in international economic policy uncertainty, while other variables exhibit positive effects on these returns.

Belcaid and Ghini (2019) analyse in what way the economic policy uncertainty (EPU) determine long-term variability in the stock market of Morocco across multiple nations. The study employs a GARCH-MIDAS model to analyse returns on daily basis and monthly uncertainty data, differentiating between the long-period persistence and short-period fluctuations in variability. Prior to the time of GFC in 2008, the correlation between EPU and Moroccan stock market variations was typically not significant, with exceptions for the United States and Germany. However, after the crisis, post-crisis GARCH-MIDAS models reveal significant explanatory power of EPU for long-run volatility, particularly in France, Spain, and the United States. These findings offer insights to policymakers and portfolio managers for informed decision-making and optimizing asset allocation strategies.

Alqahtani and Martinez (2020) examine the association among (EPU) and the indices of stock market of Gulf Cooperation Council (GCC) monthly. Long-term stock prices in Bahrain and Kuwait are negatively influenced by both United States and (GEPU), with the influence of United states economic policy threat being relatively stronger. However, these uncertainties have no effect on other GCC markets. During times of heightened global economic policy unpredictability, these markets provide an option for diversifying international portfolios.

Irani, Athari, and Hadood (2022) investigates the influence of country-specific risks, including macroeconomic factors, political and economic risks, as well as GEPU, on the prices stock of Turkish tourism companies. Based on the results, sustained decreases in stock prices are linked to heightened political and economic threats, GEPU, and fluctuations in real exchange rates. Over the short term, real exchange rates and GEPU exert a negative influence on prices of stock, while political risk has a affirmative effect.

Appling the methodology which consist of Non-ARDL and Quantile models, Javaheri, Habibi and Amani (2022) examined how EPU and economic determinants influence the United States stock market index. The findings suggest that a decrease in economic and economic-political factors will elevate the US stock market index. The findings depict that the link among inflation and GDP factors is nonlinear. Using quantitative regression, similar findings revealed asymmetric effects of inflation measured by the CPI and economic output measured by the GDP on stock market transactions.

Using the GARCH-MIDAS and DCC-MIDAS models, Hashmi et al. (2022) evaluate how GEPU impacts fluctuation for longer period and correlations within crude oil and United States stock markets industry-level. The findings reveal that GEPU is favourably associated with long-run variability in the financial and consumer non-essential consumer goods sectors, while adversely associated with materials, IT, communication technology services, and energy. Conversely, across all industries, long-run correlations reveal a positive relationship with GEPU. Except for a tiny exception, Energy and Materials consistently retain high correlations. Low correlations are routinely seen in the consumer staples industry. Long-term investors and politicians can learn from these findings.

Dai and Peng (2022) using the TVP-VAR model, to analyse the spill over influence of volatility in the economic policy uncertainty index of china on different markets, including stock markets, commodities (gold), and energy. The results indicate that the sectors of consumer discretionary spending, industry, public utilities, and finance are systemically significant. Furthermore, fiscal policy and trade policy have a greater influence on the spill over effect than monetary policy and exchange rate policy. Rapid oil spill overs caused by COVID-19 had a notable influence on the spill-over volatility in the stock market.

2.3. Stock Market, Global Economic Policy Uncertainty and Macroeconomic Variables

This section reviews the previous research on the link among stock market, GEPU and macroeconomic variables particularly the influence of exchange rate and the money supply on the stock market.

2.3.1. Studies Focusing Global Economic Policy Uncertainty and Exchange Rate in the World

This section covers the studies on relationship among the GEPU and the exchange rate.

Krol (2014) analysed the influence of economic and EPU on exchange rate fluctuations in ten countries. It found that both domestic and United States economic policy uncertainty enhanced exchange rate variability for certain currencies. In time economic downturns, integrated industrial economies are more volatile due to domestic and United States economic policy uncertainty. Conversely, less integrated emerging economies experience increased volatility primarily during challenging economic periods due to domestic economic policy unpredictability. Additionally, overall economic unpredictability plays a role in exchange rate fluctuation, although to a somewhat lesser degree. These results are consistent with past research indicating a negative association between economic performance and exchange rate instability, highlighting the detrimental effects of economic policy uncertainty.

Juhro and Phan (2018) evaluate the consequences of EPU on exchange rate fluctuation across ten ASEAN nations. The results indicate that EPU accurately predicts the exchange rates of six of ten currencies, with a boost of one standard deviation causing depreciation. Economic policy unpredictability also predicts a rise in exchange rate volatility for all ten ASEAN countries, from 0.107% to 0.645%. Consistently, these findings hold true even when considering the Global Financial Crisis, and they remain consistent across various forecasting timeframes and subsets of time periods.

Liming, Ziqing, and Zhihao (2020) examines the consequences of economic policy uncertainty (EPU) on China's fluctuations in exchange rates. Utilizing quantile regression, the study highlights the asymmetric and diverse consequences of EPU on different markets. It is found that EPU has a noteworthy and positive influence on exchange rate fluctuation across all quantiles. Furthermore, the effect of EPU on exchange rate fluctuation varies across economies, with significant impacts observed for the U.S., Europe, and Japan, whereas Hong Kong's EPU demonstrates no considerable correlation with exchange rate volatility.

Aslan and Acikgoz (2021) examine the influence of GEPU on exports flows in 28 developing market economies. GEPU is measured using a partial least square (PLS) factor loading model and the EPU index of 24 countries. The empirical findings indicate that real external income is the most influential variable on export flows, whereas the real exchange rate is the least influential variable. GEPU exerts a notable and adverse impact on export volumes. Some important policy implication is that the consequences of the real exchange rate on export volume is

overshadowed by the GEPU, which may necessitate policymakers to take alternative forms of action. If the GEPU is high, devaluation of the exchange rate, which is the most frequently used policy instrument to increase exports, may not be effective.

Ashena and Lal (2021) analyze the influence of GEPU on the variability of exports, imports, and exchange rate variables in Iran. The methodology opted for the study was the dynamic conditional correlation model of GARCH (DCC-GARCH). The correlation between these variables was analysed. The results indicate that world's economic policy volatility has a noteworthy influence on exports, imports, and real exchange rates. The study specifies that fluctuations in global economic policy may have various effects on Iran's trade with other nations. When making decisions, policymakers must consider how global economic developments affect the domestic economy and closely monitor the interplay between domestic markets and global conditions

Aggarwal & Saradhi (2023) investigates the connection among domestic and EPU and the stock market in India. The stock market, domestic EPU (DEPU), and global EPU (GEPU) in India exhibit a long-term equilibrium, according to tests including co-integration, Granger causality, and impulse response functions. The stock market and DEPU are found to be causally related in both directions, whereas GEPU and the stock market are not. Additionally, there exists a bidirectional causal relationship. This helps policymakers in India plan for financial stability and directs financial actions.

Maydybura et al. (2023) analysed the effects of negative and positive uncertainty variations on exchange rates using the Granger causality test and a novel multiple asymmetric threshold nonlinear ARDL (MATNARDL) model. In contrast to the nonlinear ARDL model, which affirms the effect in only three nations, the MATNARDL technique confirms the nonlinear impact across all nations. The application of Granger causality to the quantile test produces a variety of effects across quantiles. This improved framework illuminates the effect of economic policy unpredictability on exchange rates in the E7 nations and offers guidance to state banks for shaping interventions in foreign currency markets.

2.3.2. Studies focusing on Stock Market, Exchange rate & Money supply in the World

Ratanapakorn and Sharma (2007) conducted evolving assessment among the returns of United States' stock market in and macroeconomic indicator applying the vector error correction model and the co-integration technique by Johansen. The findings reveal that between 1975 and 1999, the long-term interest rate negatively correlates with US stock prices. Their findings indicated that industrial output along with other macroeconomic indicators positively correlated with stock prices.

Humpe and Macmillan (2009) conducted the co-integration analysis as to assess the long term association of the macroeconomic determinants with the stock market of unites states and the Japan. The macroeconomic determinants which includes the M2 which is money supply, long period interest rate, industrial production, money supply and for the inflation the CPI. The finding indicates that money supply adversely affect the stock prices in Japanese stock market whereas the industrial production influences positively. The inflation measured through CPI and the interest rate tend to effect negatively the prices stocks in United State.

Masuduzzaman (2012) aims to investigate the enduring and temporary relationships among macroeconomic determinants and returns of stock market in Germany and the United Kingdom during the period from 1999 to 2011.There are many techniques involved in the study such as the applied co-integration by Johansen, variance decomposition, impulse response functions and an error-correction model were utilized. The finding revealed that the CPI used for inflation, interest rates, exchange rates, and money supply led to short-term adaptations and enduring fluctuations in stock prices.

Rakhal (2018), assess the outcome of particular macroeconomic factors remittances, money supply, and exchange rate together with the interest rate on performance of the stock market by reviewing international and Nepalese literature. Based on the study, remittances and money supply contribute affirmatively to stock market, while interest rates and exchange rates exert a adverse influence.

Chang et al. (2019) examined the impact of macroeconomic determinants on the prices of stock of KSE-100 index and whether or not this relationship has changed as a result of the financial crisis. An autoregressive distributed lag model and variance decomposition analysis are employed in the study. Results indicate that Treasury bill together with the exchange rate and interest rate have an adverse long period consequence on stock prices while CPI and IP have a favourable

influence. However, only CPI has a long-term positive influence on Stock prices. According to the study, the influence of macroeconomic variables on investment and policy decisions is substantial, and investors may consider making adjustments in light of the financial crisis.

Asravor and Fonu (2019) using the ARDL model, examine the evolving relationship between macroeconomic indicators such as FDI, Money Supply, Human and returns of stock market over the extended and immediate periods. FDI as well as the interest rates favourably affect the returns of stock market, while consumer price index along money supply have a adversely affects, according to empirical evidence.

Naseem et al. (2019) assessed the correlation among the KSE-100 stock index and key macroeconomic factors (exchange rate, M2 for money supply, CPI for consumer price index rate which is used to measure the inflation and interest rate). The analysis found that the Pakistani stock market maintains an enduring equilibrium association with a set of macroeconomic variables, with short-term discrepancies being rectified.

2.3.3. Global Economic Policy Uncertainty & Pakistan Stock Market

In the following subsection, the studies on the GEPU and Pakistan stock market have been reviewed.

Liu et al. (2022) examines a nonlinear connection between EPU, crude price fluctuations, and stock market returns was observed across 25 countries which also includes Pakistan. A panel smooth transition regression model is applied. The findings suggest that oil price fluctuation has an adverse influence on returns of stock, which is exacerbated by economic policy uncertainty. The response is pronounced, with oil-exporting nations since they are affected more than oil-importing nations. However, developing nations are more vulnerable to oil price variability compared to developed nations. The crisis has a noteworthy effect on the affiliation among oil price variability and stock market returns.

Ghani et al. (2022) analyse the influence of the EPU index and macroeconomic determinants on stock market fluctuation in Pakistan using the GARCH-MIDAS model. Results shows that the economic policy instability has predictive ability, with oil prices being the strongest predictor. All macroeconomic indicators including the interim interest rate, the exchange rate which is the value of one currency in expressed in term of other currency, the money supply, fdi,

price of gold, and for inflation the CPI, can be used to forecast stock market's fluctuations. Nevertheless, the extended interest rate has no influence during the sample period. Forecast data fusion is also advantageous for fluctuation prediction.

Ghani and Ghani (2023) focusing on the America, China, and the United Kingdom, examine the impact of EPU indices on stock market fluctuation in Pakistan. The GARCH-MIDAS model and approach to combining forecast along with the GARCH-MIDAS model were used to assess the performance of these indices. Results indicate that the US EPU index is additional accurate forecaster of stock fluctuations in Pakistan, whereas the UK EPU index provides useful information for predicting equity market volatility. Throughout the studied period, the EPU indices of Pakistan and China did not provide substantial predictive information for forecasting volatility.

Das, Kannadhasan, and Bhattacharyya (2019) examines the influence of United states EPU, geopolitical risk (GPR), and financial stress (FS) on twenty-four developing stock markets, including Pakistan. Results reveal diverse effects with a notable influence of EPU over GPR and FS. Additionally, a stronger causality-in-mean is observed, along with limited predictability in extreme higher tail events. These findings hold significance for investors in emerging markets, enabling them to diversify and formulate strategies during economic turbulence. Disruptions originating in the US can transmit globally through investment channels, trade connections, and political agreements, influencing stock markets' vulnerability to disturbances. Further research could delve into these channels and factors determining an economy's impact on US-based EPU/GPR/FS.

Using quantile regression, Kannad, hasana, and Das (2020) assess and distinguish the influence of EPU and geopolitical threats related disruptions on emerging stock markets in the region of Asia which includes Pakistan stock market using the quantile regression. EPU consistently exhibits a negative association across all quantiles, while Geopolitical Risk (GPR) shows a negative association in the lower quantiles and an affirmative relationship in the intermediate and upper quantiles. The adverse influence of EPU is greater than the adverse influence of GPR, and the link between EPU and GPR and returns on stock is misappropriate. The findings add an additional perspective to the current body of work and are essential for the portfolio allocation decisions of market participants in emerging markets. The authors mentioned in the future direction to contemplate sectoral stock indexes in a future investigation of their exposure to EPU and GPR.

A review of the above studies indicates that previous studies were focused mainly on developed countries' stock markets which includes US, UK, Germany, Turkey and Asian developing stock markets like Pakistan, China, and Malaysia. They studied the economic policy uncertainty and its relationship with different aspects such as crude price fluctuation, stock market volatility, geopolitical risk, and financial duress in broader and cross country framework using panel data and different approaches of econometric estimations.

The previous studies have not investigated the consequences of the GEPU on the Pakistan stocks market and sectors such as the oil and gas, automobile assembler, chemical and fertilizer within the stock market. The present study is different from the previous studies since it exclusively focuses on the influence of the GEPU along with other macro policy variables i.e. money supply and exchange rate on the stock market in Pakistan at sectoral level using time series data.

To inspect the consequences of the GEPU, money supply and exchange rate on the returns of Pakistan stock market at sectoral level, the following hypotheses have been developed which will be tested empirically in the next chapter:

Pakistan Stock Market (PSX)

H_0: Global economic policy uncertainty doesn't significantly impact the returns of the Pakistan Stock Market.

H_1: Global economic policy uncertainty significantly impact the returns of the Pakistan Stock Market.

H_0: The exchange rate doesn't significantly negatively impact the Pakistan Stock Market returns.

H_2: The exchange rate significantly negatively impact the Pakistan Stock Market returns.

H_0: The money supply doesn't significantly positively impact the Pakistan Stock Market returns.

H_3: The money supply significantly positively impact the Pakistan Stock Market returns.

Oil and Gas Sector

H_0: Global economic policy uncertainty doesn't significantly impact the returns of the oil and gas sector.

H_4: Global economic policy uncertainty significantly impact the returns of the oil and gas sector.

H_0: The exchange rate doesn't significantly negatively impact the oil and gas sector returns.

H_5: The exchange rate significantly negatively impact the oil and gas sector returns.

H_0: The money supply doesn't significantly positively impact the oil and gas sector returns.

H_6: The money supply significantly positively impact the oil and gas sector returns.

Automobile Assembler Sector

H_0: Global economic policy uncertainty doesn't significantly impact the returns of the automobile assembler sector.

H_7: Global economic policy uncertainty significantly impact the returns of the automobile assembler sector.

H_0: The exchange rate doesn't significantly negatively impact the automobile assembler sector returns.

H_8: The exchange rate significantly negatively impact the automobile assembler sector returns.

H_0: The money supply doesn't significantly positively impact the automobile assembler returns.

H_9: The money supply significantly positively impact the automobile assembler sector returns.

Cement Sector

H_0: Global economic policy uncertainty doesn't significantly impact the returns of the cement sector.

H_{10}: Global economic policy uncertainty significantly impact the returns of the cement sector.

H_0: The exchange rate doesn't significantly negatively impact the cement sector returns.

H_{11}: The exchange rate significantly negatively impact the cement sector returns.

H_0: The money supply doesn't significantly positively impact the cement returns.

H_{12}: The money supply significantly positively impact the cement sector returns.

Fertilizer Sector

H_0: Global economic policy uncertainty doesn't significantly impact the returns of the fertilizer sector.

H_{13}: Global economic policy uncertainty significantly impact the returns of the fertilizer sector.

H_0: The exchange rate doesn't significantly negatively impact the fertilizer sector returns.

H_{14}: The exchange rate significantly negatively impact the fertilizer sector returns.

H_0: The money supply doesn't significantly positively impact the fertilizer sector returns.

H_{15}: The money supply significantly positively impact the fertilizer sector returns.

Chemical Sector

H_0: Global economic policy uncertainty doesn't significantly impact the returns of the chemical sector.

H_{16}: Global economic policy uncertainty significantly impact the returns of the chemical sector.

H_0: The exchange rate doesn't significantly negatively impact the chemical sector returns.

H_{17}: The exchange rate significantly negatively impact the chemical sector returns.

H_0: The money supply doesn't significantly positively impact the chemical sector returns.

H_{18}: The money supply significantly positively impact the chemical sector returns.

Food and Personal Care Sector

H_0: Global economic policy uncertainty doesn't significantly impact the returns of the food and personal care product sector.

H_{19}: Global economic policy uncertainty significantly impact the returns of the food and personal care product sector.

H_0: The exchange rate doesn't significantly negatively impact the food and personal care product sector returns.

H_{20}: The exchange rate significantly negatively impact the food and personal care product sector returns.

H_0: The money supply doesn't significantly positively impact the food and personal care product sector returns.

H_{21}: The money supply significantly positively impact the food and personal care product sector returns.

Pharmaceutical Sector

H_0: Global economic policy uncertainty doesn't significantly impact the returns of the pharmaceutical sector.

H_{22}: Global economic policy uncertainty significantly impact the returns of the pharmaceutical sector.

H_0: The exchange rate doesn't significantly negatively impact the pharmaceutical sector returns.

H_{23}: The exchange rate significantly negatively impact the pharmaceutical sector returns.

H_0: The money supply doesn't significantly positively impact the pharmaceutical sector returns.

H_{24}: The money supply significantly positively impact the pharmaceutical sector returns.

2.4. Oil Price Shocks and World Stock Market

This section reviews the previous studies on the crude oil shocks and stock market.

Basher et al. (2012) proposes a structural vector auto regression model to analyse the dynamic link among exchange rate (ER), prices of oil and stock prices in emergent markets. The model is based on stylized facts and captures the immediate impact of oil price disruptions, such as a drop in stock prices and United States dollar exchange rates. It also records observed patterns concerning oil price fluctuations, such as production disruptions and stock price increases in evolving markets.

Aloui, Aissa, and Ben (2016) and Kayalar et al. (2017) used copula approach to examine the affiliation among exchange rates, prices of crude oil together with stock market indices. The findings of the research reveal that stock indices and exchange rates in the majority of oil-exporting nations are highly dependent on crude prices. Emerging oil importer markets, on the other hand, are least affected by oil price disruptions.

Jain and Biswal (2016) examine the connection between global gold prices, prices of unrefined oil, exchange rate comprise of the USD-INR, and Indian stock market. The results indicate that declining prices of gold and oil in the India's currency and the Sensex benchmark stock index. The study advocates for considering gold as a valuable asset class for investors. It also underscores the importance of implementing dynamic policies in India to manage fluctuations in exchange rates which is the value of one currency expressed in term of another and stock market fluctuations by leveraging gold and crude oil prices as tools or equipment. Kumar (2019) Contains additional evidence regarding crude price, ER, and price of stock dynamics in the perspective of the Indian economy. Nonlinear ARDL evidence suggests asymmetry among prices of oil, exchange rates, and stock returns.

In the global context, Arfaoui and Rejeb (2017) investigate the co-dependences between oil, U.S. dollar, gold, and prices of stock, and determine their immediate indirect and direct links. Results indicate that there are substantial interconnections between all markets. There is an inverse correlation among oil and prices of stock, with oil prices significantly and affirmative influenced by both gold and the United States dollar. The oil price is impacted by oil futures prices and Chinese crude imports. In contrast, the gold price repercussion due to variations in oil prices, the United States dollar, and the stock market. The dollar of United States faces negative effects from the stock market, as well as fluctuations in oil and precious metal prices. Indirect effects consistently reveal global interconnections and highlight the financialization of commodity markets.

Wen et al. (2020) causal relationship between the oil demand shock, oil risk shock, and the Chinese stock market's risk-return relationship, excluding the influence of the oil supply shock The variation of ambiguity in the stock market of china is notably marked by variations in the energy market, whereas the volatility of uncertainty typically has a limited effect on the United states dollar and Chinese yen exchange rate. In time of adverse periods, the study also highlights the increased risk transfer from the energy market's increased uncertainty volatility to the Chinese stock market.

Roubaud and Arouri (2018) evaluate the association between the stock market, oil prices and exchange rates while considering economic policy uncertainty. The analysis employed a multivariate Markov switching vector autoregressive model. Results indicate significant non-

linear relationships, stronger connections during periods of volatility, and oil's active role in price shock transmission.

Mollick and Sakaki (2018) investigated the reaction of 14 main currency/USD pairs to oil and global equity returns from 1999 to 2017, with a focus on the global financial crisis and oil price rise. Results demonstrate substantial and significant positive and negative impacts on commodity currencies, with GARCH models displaying greater coefficients for global equity returns.

Aravind et al. (2018) examine how uncertainty in the financial market prompts investors to transfer capital from equities to alternatives such as Gold, Oil, and the Dollar. They have examined the dominance of Gold-Oil-Dollar exchange rates on the Indian stock market. The stock market consistently outperformed Gold, Oil, and the Dollar. The GARCH (1, 1) model confirmed the enduring impact of Gold-Oil-Dollar rates on the fluctuation of the stock market. Intriguingly, the EGARCH model demonstrated an inverse leverage effect, indicating that greater Gold-Oil-Dollar rates would increase stock market volatility. According to diagnostic experiments, fluctuations of prices of crude oil had a greater influence on stock market volatility. The research provides investors, financial planners, policymakers, and researchers with valuable insights by addressing important macroeconomic issues pertaining to financial markets.

Singhal et al. (2019) investigates the connection between Mexico's stock market index, oil prices globally, gold prices and the ER. The study has applied the Auto regressive distributive lag Bound testing co-integration methodology. Results indicate that gold prices have an affirmative consequence on Mexico's stock prices, whereas oil prices have an adverse consequence. The study's findings have implications for monetary and fiscal policies, given the dominance of prices of crude oil on stock markets and ER.

Prabheesh and Garg (2020) examine the correlation among returns of stock price and returns of oil price during the pandemic in main net oil importers in Asia. The DCC-GARCH model indicates a positive co-movement, indicating that falling oil prices had an adverse consequence on the stock market.

Hung (2020) examines the interrelationships between world’s commodity markets (gold and crude oil) and capital markets in Hungary (stock and exchange rate) in terms of time and

frequency. The results indicate that the correlations between global commodity markets and Hungarian financial markets are persistent and dynamic. Short-term impacts of commodity markets on Hungarian financial markets are substantial, whereas long-term effects of stock and exchange markets on crude oil and gold markets are reversed. These findings highlight the interdependence of the commodity and finance sectors, assisting investors with risk management and portfolio construction.

Employing quantile regression and quantile-on-quantile regression, Joo and park (2021) analysed the consequences of fluctuations in oil prices on stock markets in ten significant importer of oil. The variations in prices of oil have uneven consequences on returns of stock, dependent on the level of returns on stocks and oil market conditions. Increasing oil price fluctuations adversely impact returns of stock when both are low, but positively affects stock returns during oil price variations is low and returns on stock are high.

Applying the NARDL method, Ajala et al. (2021) assess the unequal repercussion of oil prices on both the ER and prices of stock. Results show an enduring association among crude price, price of stocks and exchange rate. The linear Granger causality test (GCT) indicates that both oil prices and exchange rates can serve as predictors for forecasting stock prices. The Dick-Panchenko non-parametric and nonlinear (GCT) demonstrates unidirectional causality at the 10% level among exchange rate and stock price and at the 1% and 10% levels among crude price and exchange rate. This research suggests using revenue from rising oil prices to improve infrastructure and ensure capital market stability for oil-exporting nations.

Chen et al. (2022) examines the influence of extreme risks from the energy market and the USD/CNY exchange rate, focusing on uncertainty volatility, on the Chinese stock market. It utilizes Conditional Value-at-Risk to assess both upside and downside risks. The results suggest that the stock market in china is extra responsive to changes in uncertainty and volatility in the energy market compared to the United States dollar and Chinese yen exchange rate. During the Chinese exchange rate system reform, ambiguity in the United States dollar and Chinese yen exchange rate poses some risk, however, volatility in the energy market poses a greater contagion risk to the Chinese stock market, particularly during adverse periods.

Zhang et al. (2022) predicted crude oil prices using the geopolitical risk index and a moving average strategy. It is discovered that geopolitical risk trends can accurately forecast oil prices

within and beyond the observed period. In addition, the study revealed that geopolitical risk trends provide valuable information beyond the fundamentals of finance, commodities, and energy. A rise in geopolitical risk disrupts economic activity and crude production, leading to decrease in oil prices. This emphasizes the significance of geopolitical risk as a crucial factor influencing oil price fluctuations.

Dada and Akinlo (2022) analysed the impact of oil price shocks 22 sub-Saharan African (SSA) countries using the NARDL technique. Positive oil price disruptions increased remittance inflows in oil-importing nations, whereas oil price declines decreased remittances. The effects on oil-exporting nations were contingent on the Brent and West Texas Intermediate crude price indices. In short term, adverse disruptions decreased remittances in oil-importing nations and increased them in oil-exporting nations. The research proposes that oil-importing countries should use increased remittances to promote economic activities and counterbalance the adverse consequences of rising intercontinental oil prices, while countries that export oil should use higher oil price revenue to offset the decline in remittances.

2.4.1. Oil Price Shocks and Pakistan's Stock Market

This section reviews and evaluates the previous research on the crude oil price shocks and the Pakistan stock market. These included Jebran et al. (2017), Malik and Rashid (2017), Yu et al. (2018), Waheed et al. (2018), Shabir et al. (2020), Usman and Siddique (2019), Hanif (2020), Aziz and Hussain (2021), Khan et al. (2021), Ali et al. (2022), Baber and Burhan (2022), Nusair and Olson (2022), and Ahmed and Mohammad (2022).

Jebran et al. (2017) has evaluated the influence of oil price variability on stock market in Pakistan prior and following the financial crisis. A substantial over the extended period correlation among oil price volatility and stock market in Pakistan prior and following the financial crisis was found. The EGARCH model demonstrated a positive impact on returns on stock during both sub-periods, whereas the GARCH model demonstrated substantial results only after the crisis. The majority of variations were explained by self-innovation, and oil price fluctuations had an adverse influence during the prior crises period but a positive impact during the period following crises. This implies that who shape financial decision and financial stakeholders keenly observe the oil price as a pivotal element determining returns of stock market.

Malik and Rashid (2017) investigated the return and variability spill over between global oil prices and Pakistani sector equities. The bivariate VAR (1)-AGARCH (1,1) model was used to determine the best oil/equity portfolio weights and hedge ratios. The findings suggest that there is no immediate price transfer between global prices of oil and the Pakistan Stock Exchange's sectors, only unanticipated disruptions affect sectoral stock returns. The best portfolio allocations and hedging ratios vary by sector, which is of interest to policymakers, hedge fund managers, investors, and market participants.

Yu et al. (2018) asses the world's EPU consequences on enduring fluctuations and correlations in stock markets of United States at industry level and crude oil. GEPU is affirmatively associated with long-term fluctuation in the financial and consumer cyclical sectors, while it is adversely associated with volatility in energy sectors, the materials, telecommunication services, information technology. Conversely, across all industries, sustained associations reveal a positive relationship with GEPU. Except for a tiny exception, Energy and Materials consistently retain high correlations. Low correlations are routinely seen in the consumer staples industry.

Waheed et al. (2018) examines how oil prices dominance over the stock returns of Pakistani firms over the period from 1998 to 2014. Results show substantial affirmative effects of variation in prices of oil on stock returns of firm, with lagging changes negatively affecting industries except tobacco and jute. A rise in prices of commodity typically the oil serves as a positive barometer for the stock market, leading to higher stock returns for companies in Pakistan. To diminish the long-term adverse effects of crude prices, managers and policymakers should develop sensible policies, such as purchasing company stock during rising oil prices and hedging activities.

Usman and Siddique (2019) examines the impact on macroeconomic variables, oil prices, and index returns of FDI and FPI on Pakistan stock market returns. To analyse volatility, the GARCH (1, 1) model and least squares method were used. The findings suggest macroeconomic determinants have an insignificant effect on returns of index, with negative correlations between ER and interest rate and index returns. Oil prices, foreign direct investment and Pakistan stock market returns are all positively correlated.

Shabir, Kousar, and Batool (2020) assess the repercussions of oil prices and gold on the Pakistani capital market. For the analysis, the ARDL model was used. Gold and energy prices have a substantial consequence on the capital market. The practical implication for the investor is that

they should invest in gold to preserve asset value and earn additional returns, as inflation reduces money's value. Gold investments can help reduce inflation pressure to a sustainable level.

Hanif (2020) investigated the consequences of price changes on global markets, particularly oil, on stock returns at the Pakistan Stock Exchange (PSX). The analysis techniques like descriptive statistics, stationary testing, Johansen co-integration, correlation, and regression analysis were used. Results indicate that 1% oil prices result in positive stock returns for conventional and Islamic indices. Other markets, including gold and foreign exchange, exhibit more negative indicators. The study recommends that investors monitor the oil, gold, and currency markets when making investment decisions, and that policymakers maintain exchange rate stability to prevent capital outflow. This study is the inaugural examination of how global markets impact PSX stock returns.

Aziz and Hussain (2021) explored how the crude market, gold market, and GEPU affect the Pakistani capital market. The study utilizes (EGARCH) model. The results suggest that fluctuations in the gold market substantially effect capital market returns. When gold market volatility is high, it tends to lead to lower capital market volatility, and vice versa. However, no significant volatility effects spreading from oil prices and unpredictability in the global economic policy observed in capital market returns. These results provide investors and policymakers with vital insights into the factors that influence stock market volatility.

Fluctuations in crude oil prices have substantial repercussions on both developed and developing economies. Investors are keen to understand how these price changes affect worldwide financial markets, especially in terms of capital market returns. So khan et al. (2021) used a DARDLS model to analyse the influence of oil prices together macroeconomic determinant on Pakistan's capital market growth. The result indicates that crude prices, remittance inflow, and fdi tend to have an affirmative impact on the Pakistan capital market, while exchange rates have an adverse effect. In order to estimate the outcome of the Pakistani capital market, the research study recommends that government, policymakers, and investors evaluate potential variations in fdi, exchange rates, oil prices and personal remittance inflow.

Ali et al. (2022) investigated Pakistan's sectoral stock market returns as affected by the asymmetries of crude supply and demand disruptions. The findings indicated that oil supply and demand disruptions had a symmetric impact on certain industries like electricity generation,

chemicals, and fertilizers. The study emphasized the significance of recognizing global oil price fluctuations and implementing comprehensive risk management strategies. For effective policy responses, the study suggested raising policy rates during oil-specific demand disruptions, reducing fossil fuel consumption, and promoting alternative structural and technological approaches to decrease production-related fossil fuel intensity.

Baber and Burhan (2022) investigated the consequences of oil price upheaval on Pakistan stock exchange sectorial indices. Oil price fluctuations significantly affect global economies, particularly those of oil-importing nations like Pakistan. Sectors with high sensitivity to oil prices experience significant impacts. The study suggests the investors closely monitor energy prices when making stock market investment decisions, as certain industries are more susceptible to fluctuations, affecting their performance.

Nusair and Olson (2022) investigate the association among oil prices, exchange rates, and capital returns in Pakistan. Employing a quantile ARDL model, it assesses the relationships under different market conditions that are bullish, bearish, and normal. The results show that currency exchange rates and crude oil prices have consequences on stock prices. vary depending on market conditions. Interestingly, the currency market's condition does not alter the effects of these factors. These insights carry significant implications for Pakistani government authorities and stakeholders. The nuanced understanding of these relationships aids policymakers in making informed decisions and targeted strategies to effectively manage market fluctuations.

Ahmed and Mohammad (2022) studied the association among crude price fluctuations and daily capital returns in the power sector prior to and throughout the COVID-19 crisis. The study applied a panel VAR model and GCT to ascertain the effectiveness of oil prices in predicting returns. The results indicate that oil disruptions have an inverse relationship with daily firm stock returns, and that this relationship weakens during the pandemic. Understanding this asymmetric association helps managers and investors make better investment decisions in equities.

Khan, Saleem and Ozkan (2023) investigated the effect of crude price fluctuations and international political threats on the returns and upheaval of the Pakistani stock market. A non-parametric quantile causality methodology was implemented. The analysis exhibit that geopolitical tensions impacting the oil price concerns dominate stock returns in standard state of market and market volatility in market conditions. Based on its findings, the research provides policy

recommendations for academia, enterprises, and the Pakistani government. The study emphasizes the importance of analysing the association among crude prices, geopolitical risks, and capital market dynamics in Pakistan in light of distinct market trends.

From the above literature the study formulates the following hypotheses which will be tested using econometric estimation.

Pakistan Stock Market

H_0: Oil price shocks doesn't significantly impact the returns of the Pakistan Stock Market.

H_1: Oil price shocks doesn't significantly impact the returns of the Pakistan Stock Market.

H_0: The exchange rate doesn't significantly negatively impact the Pakistan Stock Market returns.

H_2: The exchange rate significantly negatively impact the Pakistan Stock Market returns.

H_0: The money supply doesn't significantly positively impact the Pakistan Stock Market returns.

H_3: The money supply significantly positively impact the Pakistan Stock Market returns.

Oil and Gas Sector

H_0: Oil price shocks doesn't significantly impact the returns of the oil and gas sector.

H_4: Oil price shocks significantly impact the returns of the oil and gas sector.

H_0: The exchange rate doesn't significantly negatively impact the oil and gas sector returns.

H_5: The exchange rate significantly negatively impact the oil and gas sector returns.

H_0: The money supply doesn't significantly positively impact the oil and gas sector returns.

H_6: The money supply significantly positively impact the oil and gas sector returns.

Automobile Assembler Sector.

H_0: Oil price shocks doesn't significantly impact the returns of the automobile assembler sector.

H_7: Oil price shocks significantly impact the returns of the automobile assembler sector.

H_0: The exchange rate doesn't significantly negatively impact the automobile assembler sector returns.

H_8: The exchange rate significantly negatively impact the automobile assembler sector returns.

H_0: The money supply doesn't significantly positively impact the automobile assembler sector returns.

H_9: The money supply significantly positively impact the automobile assembler sector returns.

Cement Sector

H_0: Oil price shocks doesn't significantly impact the returns of the cement sector.

H_{10}: Oil price shocks significantly impact the returns of the cement sector.

H_0: The exchange rate doesn't significantly negatively impact the cement sector returns.

H_{11}: The exchange rate significantly negatively impact the cement sector returns.

H_0: The money supply doesn't significantly positively impact the cement sector returns.

H_{12}: The money supply significantly positively impact the cement sector returns.

Fertilizer Sector

H_0: Oil price shocks doesn't significantly impact the returns of the fertilizer sector.

H_{13}: Oil price shocks significantly impact the returns of the fertilizer sector.

H_0: The exchange rate doesn't significantly negatively impact the fertilizer sector returns.

H_{14}: The exchange rate significantly negatively impact the fertilizer sector returns.

H_0: The money supply doesn't significantly positively impact the fertilizer sector returns.

H_{15}: The money supply significantly positively impact the fertilizer sector returns.

Chemical Sector

H_0: Oil price shocks doesn't significantly impact the returns of the chemical sector.

H_{16}: Oil price shocks significantly impact the returns of the chemical sector.

H_0: The exchange rate doesn't significantly negatively impact the chemical sector returns.

H_{17}: The exchange rate significantly negatively impact the chemical sector returns.

H_0: The money supply doesn't significantly positively impact the chemical sector returns.

H_{18}: The money supply significantly positively impact the chemical sector returns.

Food and Personal Care Sector

H_0: Oil price shocks doesn't significantly impact the returns of the food and personal care product sector.

H_{19}: Oil price shocks significantly impact the returns of the food and personal care product sector.

H_0: The exchange rate doesn't significantly negatively impact the food and personal care product sector returns.

H_{20}: The exchange rate significantly negatively impact the food and personal care product sector returns.

H_0: The money supply doesn't significantly positively impact the food and personal care product sector returns.

H_{21}: The money supply significantly positively impact the food and personal care product sector returns.

Pharmaceutical Sector.

H_0: Oil price shocks doesn't significantly impact the returns of the pharmaceutical sector.

H_{22}: Oil price shocks significantly impact the returns of the pharmaceutical sector.

H_0: The exchange rate doesn't significantly negatively impact the pharmaceutical sector returns.

H_{23}: The exchange rate significantly negatively impact the pharmaceutical sector returns.

H_0: The money supply doesn't significantly positively impact the pharmaceutical sector returns.

H_{24}: The money supply significantly positively impact the pharmaceutical sector returns.

2.5. Theoretical Underpinning

The theories used in the study are as follows:

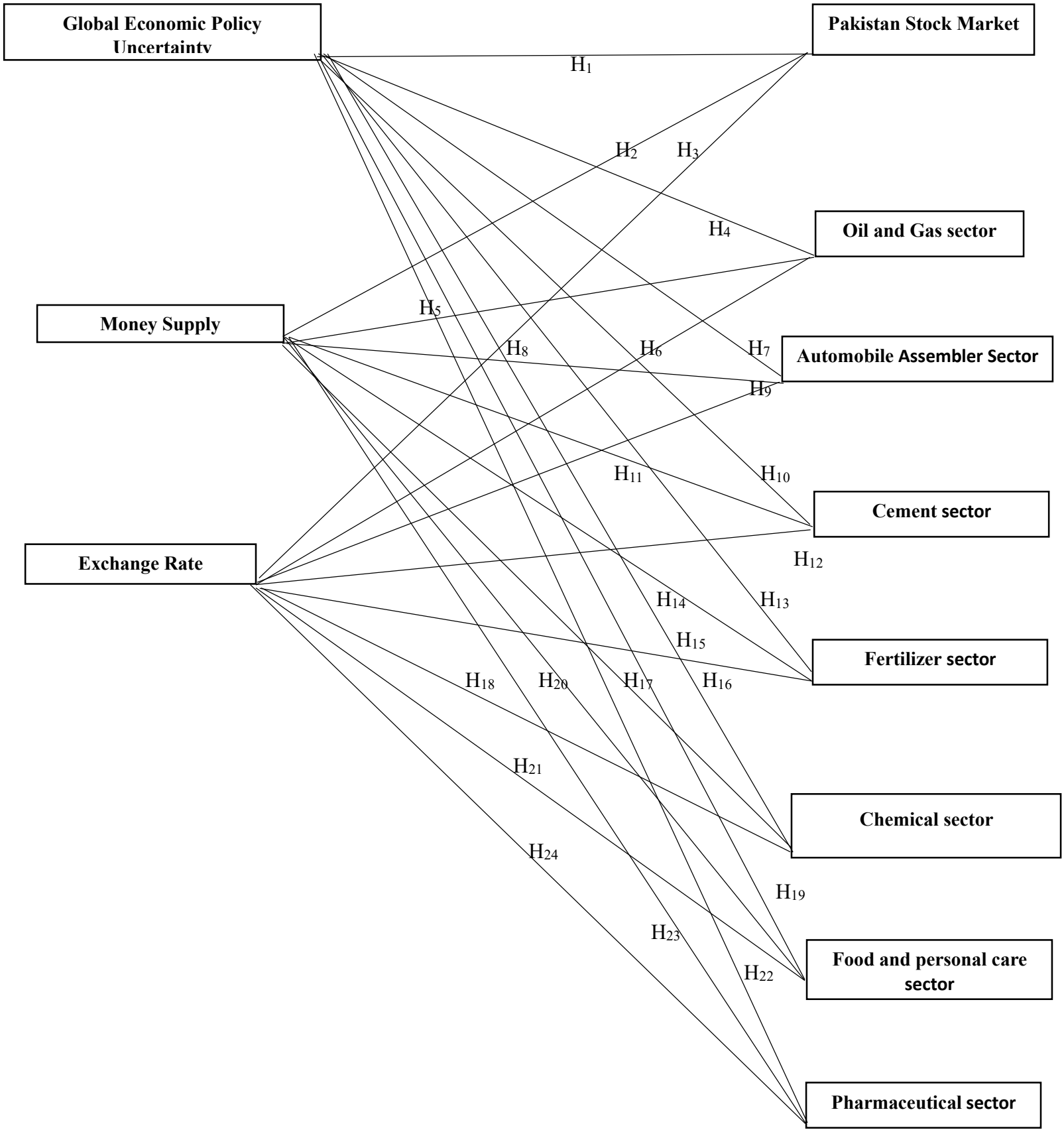
2.5.1. Prospect Theory

Prospect theory is a foundational concept in behavioural economics that seeks to elucidate the decision-making processes of individuals when they are confronted with situations involving risk and uncertainty (Kahneman & Tversky, 2013). This theory offers valuable insights into the way people perceive and assess potential gains and losses, shedding light on how these perceptions influence their decision-making processes. In the scenario of the influence of GEPU on capital returns, prospect theory provides an explanation for why individuals may respond in diverse ways to both positive and negative shifts in policy uncertainty people assess potential gains and losses by comparing them to a reference point, often their current financial state or the existing status quo. This theory posits that the emotional impact of potential losses is more prominent than the joy derived from equivalent gains. This psychological bias leads individuals to be more inclined to avoid losses rather than actively seek out gains. When we employ prospect theory to analyse the influence of GEPU on capital returns, we can expect a more pronounced negative response to rising policy ambiguity compared to the positive response seen with decreasing uncertainty. This is because heightened policy uncertainty tends to create a riskier and less predictable environment. Worried about possible negative outcomes, investors who are averse to losses may become more cautious and opt to either sell off their investments or decrease their exposure to the stock market. This selling activity can exert downward pressure on stock returns. Conversely, a decrease in global economic policy uncertainty might bring a sense of relief, reducing perceived risks. However, due to the principle of loss aversion, the positive effect on stock returns may not be as strong as the negative impact. Investors might be less inclined to take on additional risk and increase their stock holdings in response to reduced uncertainty, resulting in a less pronounced or attenuated effect on stock returns. In summary, according to prospect theory, individuals' reactions to shifts in policy uncertainty are asymmetrical, primarily due to their aversion to losses. Negative changes or increases in uncertainty tend to trigger more substantial negative responses, leading to significant declines in stock prices and, consequently, negative returns. Conversely, positive changes or reductions in uncertainty may have a less pronounced positive impact on stock prices, resulting in more modest increases in returns.

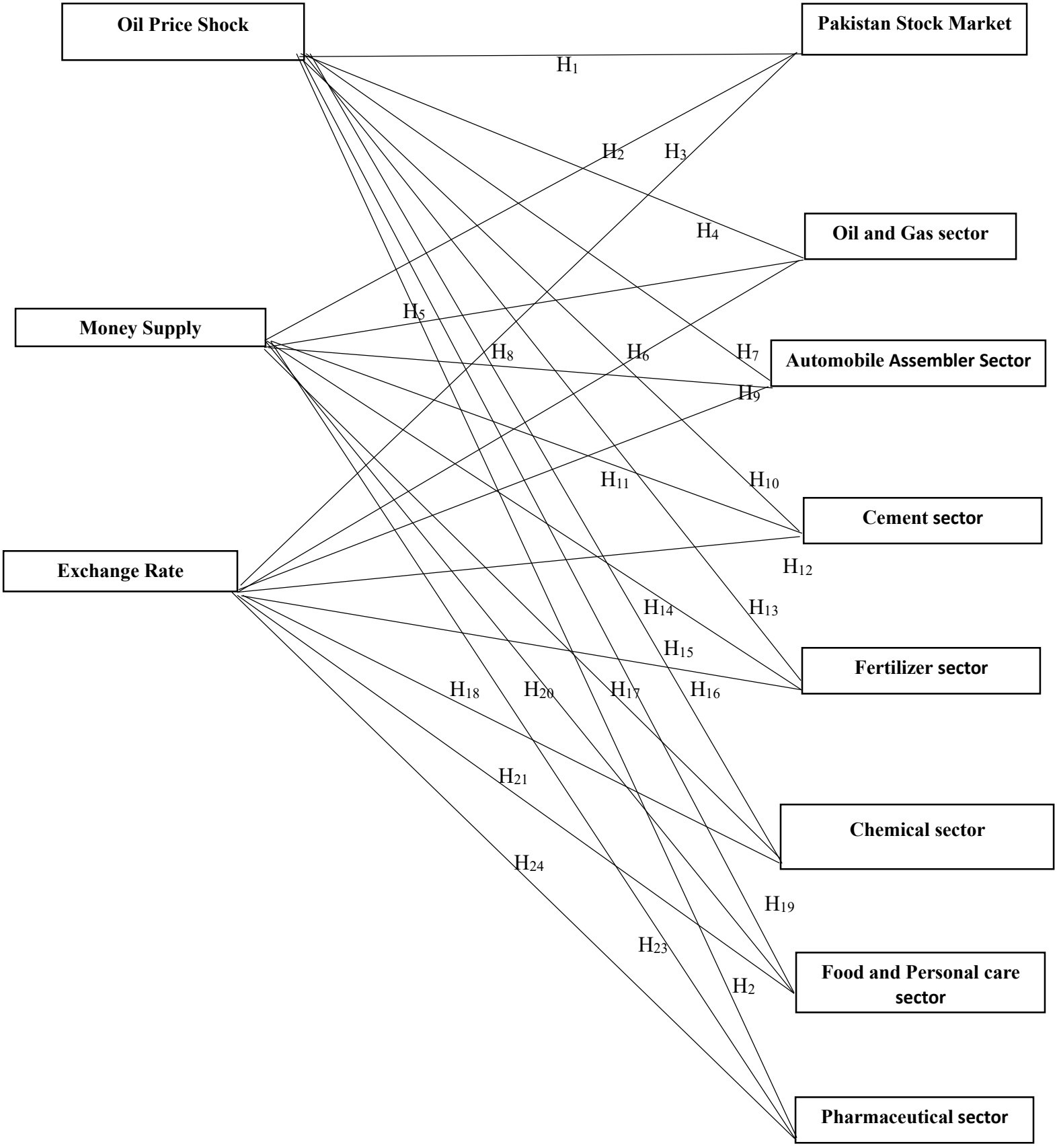
2.5.2. Arbitrage Pricing Theory

Pertaining to the scenario of analysing the dominance of an oil price shock on sectorial returns within the Pakistan stock exchange, the study will employ the arbitrage pricing theory. This theory posits that various categories of macroeconomic variables, including GDP, money supply, and exchange rates, are interconnected with financial assets (Solnik, 1983). Furthermore, the securities exhibit a linear association with other macroeconomic indicators such as money supply and exchange rates. The study adopts a model where returns are evaluated with regard to a range of macroeconomic variables. Among these variables are crude oil prices, exchange rates, and money supply, which serve as explanatory factors in the model. The model assumes a linear relationship, meaning that the acknowledgment of stock returns to fluctuations in these descriptive variables is linear.

2.6. Conceptual framework on the Impact of Global Economic Uncertainty on the Pakistan stock market.



2.7. Conceptual framework on the Impact of Oil Price Shock on the Pakistan Stock market.



2.8. Conclusion of the Chapter

The studies mentioned above have delved into the repercussions of GEPU on the stock markets of various nations and regions. Each study has employed a diverse range of methodologies, encompassing various models such as GAARCH and different ARDL models. Notably, GEP tends to emerge as a significant predictor of volatility, affecting not only the stock markets but also the exchange rates of different countries. The GEPU has been responsible for instigating variations and fluctuations in stock markets worldwide, including the Pakistan capital market. Both the GEPU index and macroeconomic variables have been identified as predictors of volatility in numerous stock markets, including Pakistan's. It's worth noting that the link among GEPU and capital market returns exhibits asymmetry, which carries implications for asset pricing. Alterations in GEPU tend causes negative outcome on stock returns, particularly over the long term.

The impact of a crude oil shock varies across countries, contingent upon whether a nation has a trade surplus or deficit in oil. Countries heavily reliant on oil exports often witness significant dependencies between their stock indices and exchange rates and crude oil prices. Conversely, emerging markets that are net oil importers often less affected by disruptions prices of oil. Furthermore, the repercussion of oil price variability on capital returns is not consistent and depends on both the state of capital market particularly the stock market and the oil market dynamics.When both stock returns and oil price fluctuation are low, rising oil price fluctuations tends to have an adverse consequences on stock returns. Nevertheless, in situations of elevated stock returns and oil prices fluctuation is low, it can have a positive impact. While unexpected oil shocks can affect stock market returns in Pakistan, they are not significantly influenced by short-term oil transmission. Additionally, GEPU and disruptions in crude oil demand emerge as non-diversifiable risk determinants used to predict future capital market returns.According to those studies that assess the consequences of the macroeconomic determinants on the capital market, the money supply positively influences the stock market while the exchange rate adversely affect the capital market particularly the stocks.

CHAPTER 3
RESEARCH METHODOLOGY

3.1. Introduction

This chapter discusses research philosophy, research approach, research design, population and sample of the study, sample technique, data description, justification for inclusion of the indices, statistical tools, unit root test methods, ARDL model and its assumptions, residual diagnostic and description of variables.

3.2. Research Philosophy

The research philosophy of positivism has been selected for this study because it is suitable for exploring and measuring outcomes. Positivism is philosophical and research approach that prioritize empirical observations, scientific methods, and the objective analysis of observable phenomena. It emerged during the mid -19th century and made substantial contribution in shaping the natural and social sciences. Positivism is characterized by its focus on verifiable facts, quantifiable data, and the systematic application of logic and reason (Park, Konge, & Artino 2020). To evaluate the consequences of global economic policy uncertainty on stock market and oil prices, the study employ the positivist methodology and use quantitative data.

3.3. Research Approach

This study uses a deductive approach to provide ideas on how the returns of the Pakistan stock market represented by the PSX index as well as its sectoral indices are affected by GEPU and oil price shocks. To assess these hypotheses, the study employs a deductive method in which specific conclusions are derived from general principles or theories. Positivism in the context of this study is making use of numerical data to evaluate the outcome of GEPU and oil price shocks on the Pakistan stock market.

3.4. Research Design

This study utilizes an explanatory research design with the objective of establishing an empirical relationship. It investigates the impact of GEPU, oil price shocks, and other macroeconomic determinants such as money supply and exchange rate on returns of Pakistan stock market as well as its various sectors. The study also contains clear testable hypotheses, research questions and the explanation for the observed phenomena. In this study an exploratory research design is adopted. The exploratory research design explores research questions which

have not been studied in depth earlier (Saunders et al., 2012). The sample size and the quantitative data methods for this study indicate that it comprise of the explanatory research design.

3.4.1. Population of the Study

In research, a population refers to the entire group of individuals, items, or phenomena that are of interest to the researcher and to which they want to generalize their findings. The population represents the larger universe from which a sample is drawn and about which conclusions are made (De Vos et al.,2002 ; De Vos et al.,2005).

The study's target population is the listed companies on Pakistan Stock Exchange. Presently, more than 522 companies are listed on Pakistan Stock Exchange with a Market Capitalisation of more than PKR 7.2 Trillion. These companies are comprised of 37 sector. The study uses PSX index which represents the overall performance of the Pakistan stock market, while sectorial indices illustrate the performance of specific sectors.

3.4.2. Sample

A sample refers to a subset of individuals, items, or phenomena selected from a larger population for the purpose of study. Rather than studying the entire population, researchers select a representative sample to draw conclusions about the population as a whole (De Vos et al., 2011).

The PSX index is composed of 375 companies listed on the Pakistan Stock Exchange (PSX), collectively holding a market capitalization of PKR 7,756 billion (equivalent to US$27 billion).The sectorial indices included the oil and gas, automobile assembler, cement, fertilizer, chemical, food and personal care products and pharmaceutical sectors.

3.4.3. Sample size

Sample size in a research study refers to the number of individuals, items, or observations included in the sample. It is a crucial consideration in research design, as the size of the sample directly affects the validity, reliability, and statistical power of the study's findings (Kadam & Bhalerao, 2010).

The data for the PSX index and the Pakistan stock market sectorial indices used in the study are from January 2009 to May 2023. The data on the PSX and the sectorial indices contained 173 monthly observations.

3.4.4. Sampling Technique

Sampling technique refers to the procedure used to select a subset of individuals, items, or observations from a larger population for the purpose of research (Scholar, 2021). Random sampling method in this study is used to select sample sectors of stock market from the population in such a way that every individual has an equal chance of being chosen and every possible sample of a given size has the same chance of being selected (Sekaranet et al., 2016). The sectors for which the data was not available has been filtered out.

3.4.5. Data Collection

The KSE100 index represents the PSX index which comprised of the largest market capitalization companies. The data of KSE100 index as well as the Pakistan stock exchange sectoral indices from 2009 to 2023 were collected from the Business Recorder's website. The KSE100 index representing the PSX index and sectoral indices of the Pakistan stock market were studied in relation to Global Economic Policy Uncertainty (GEPU), Brent oil price shocks, and macroeconomic drivers such as money supply and the currency rate. Information about the global economic policy uncertainties has been collected from the website economic policy uncertainty (Economic Policy Uncertainty, 2023). Brent oil price information has been obtained from the website of the Energy Information Administration, United States (Energy Information Administration USA, 2023). The exchange rate and money supply data have been obtained from website State Bank of Pakistan (SBP, 2023).

3.5. Justification for Inclusion of the Indexes

3.5.1. Impact of Global Economic Policy Uncertainty on the Indexes

3.5.1.1. PSX Index

The PSX index is a key stock market index in Pakistan, comprising the top 100 corporations that are listed on the Pakistan Stock Exchange. It plays a crucial role as an indicator of Pakistan's overall stock market performance. The PSX index is highly responsive to a range of economic and geopolitical factors, including global economic policy uncertainty. Similar to other emerging markets, Pakistan's stock market can be notably influenced by shifts in global economic conditions and policy changes, making it a compelling area of study when exploring the effect of economic policy uncertainty.

3.5.1.2. Oil and Gas Sector Index

The oil and gas sector is vital to Pakistan's economy, influenced by global economic policies, energy regulations, and trade agreements. It's integral to the nation's energy security and economic stability, serving as a key economic indicator. Changes in global policies directly impact its profitability. Additionally, the sector's interconnectedness with global energy markets and economies makes it valuable for studying the global impact of economic policy uncertainty.

3.5.1.3. Automobile Assembler Sector Index

The performance of Pakistan's automobile assembler sector is a key economic indicator, reflecting the health of the automotive industry and broader economic conditions, including consumer spending and industrial production. This sector is a significant employer and recipient of investments, making it sensitive to economic policy changes like trade agreements and tax policies. Moreover, economic policy uncertainty can influence consumer sentiment, affecting automobile purchases. Additionally, the sector's reliance on global supply chains exposes it to disruptions from policy changes, such as tariffs or trade agreements, impacting operations and profitability.

3.5.1.4. Cement Sector Index

The performance of Pakistan's cement sector is a crucial economic indicator, reflecting the state of construction, infrastructure, and broader economic conditions. It's influenced by government infrastructure spending and real estate activity. The sector's operations rely on complex supply chains, and changes in economic policies can disrupt these chains, affecting profitability. Economic policy uncertainty can impact the real estate market, influencing cement demand. Monitoring the sector's stock market index offers insights into how policy uncertainty influences real estate and construction sectors.

3.5.1.5. Chemical Sector Index

The chemical sector in Pakistan serves as a crucial economic indicator, reflecting the state of the industry and broader economic conditions, including manufacturing activity, trade dynamics, and regulatory changes. It is closely linked to manufacturing and exports, making it sensitive to changes in economic policies, such as trade agreements, tariffs, and export incentives, which can directly affect its profitability and export potential. Additionally, the sector relies on

intricate supply chains, including raw materials and global sourcing, and policy changes can disrupt these chains, impacting the sector's operations and profitability.

3.5.1.6. Fertilizer Sector Index

The fertilizer sector is vital for Pakistan's agriculture-dependent economy. Economic policy changes, including subsidies and trade regulations, directly impact its profitability and agriculture as a whole. Fertilizer availability and affordability are critical for food security, and economic policy uncertainty can affect both, impacting agricultural production and food supply. The sector relies on complex supply chains, involving raw materials like natural gas, transportation networks, and distribution channels. Economic policy changes can disrupt these supply chains, affecting the sector's operations and profitability.

3.5.1.7. Food and Personal Care Products Sector Index

The food and personal care products sector is consumer-centric, producing essential everyday goods. It's directly affected by consumer sentiment and spending habits influenced by economic policy uncertainty. These products are staples, and policy changes can impact their affordability and availability, serving as sensitive indicators of economic conditions. Economic policy uncertainty has potential to influence changes in consumer behaviour and spending habits, which can be detected by observing fluctuations in the stock market index of a specific sector. Additionally, the sector relies on complex supply chains, and policy changes can disrupt these chains, affecting operations and profitability.

3.5.1.8. Pharmaceutical Sector Index

The pharmaceutical sector is crucial for public health, affected by economic policy uncertainty that impacts healthcare policies, spending, and drug pricing. It indicates public health-related economic effects, as it affects accessibility and affordability of medicines. This sector heavily invests in research and innovation, with funding and research priorities influenced by policy uncertainty. It engages in global markets, and policy changes, such as trade agreements, affect exports and profitability.

3.5.2. Impact of Oil Price Shocks on the Indexes

3.5.2.1. PSX Index

Oil is a vital element of Pakistan's economy, and its price fluctuations have far-reaching economic consequences. The PSX index, a pivotal stock market indicator in Pakistan, offers

essential insights into how oil price shocks reverberate through the wider economy. Oil price shocks directly affect energy expenses in Pakistan, impacting sectors such as transportation, manufacturing, and agriculture. Elevated oil prices can raise production costs, potentially reducing businesses' profitability, a factor mirrored in the PSX index. Oil price shocks can contribute to inflation, influencing consumer purchasing power and spending patterns.

3.5.2.2 Oil and Gas Sector Index

Pakistan's oil and gas sector is vital, supplying energy and revenue through exploration, production, and distribution. It's a crucial indicator of how oil price shocks directly impact the energy industry. These shocks swiftly and significantly affect sector companies involved in extraction, processing, and distribution, making them highly sensitive to price shifts. The effects of oil price fluctuations ripple through related industries and the overall economy. Monitoring the sector's response to oil price shocks provides insights into potential economic consequences, both within the sector and across the broader economy.

3.5.2.3. Automobile Assembler Sector Index

The automobile sector's connection to fuel prices, influencing consumer vehicle choices based on efficiency and costs, directly impacts sales and profitability. Complex supply chains, from raw materials to distribution, are integral to the sector, making it sensitive to oil price shocks that disrupt transportation and material availability. Oil price shifts also affect consumer behaviour by altering fuel costs, potentially reducing spending in other areas, thus impacting the overall economy and potentially influencing automobile sales and stock market performance.

3.5.2.4. Cement Sector Index

The cement sector's profitability is highly sensitive to energy costs, which escalate with rising oil prices, directly impacting its financial health. Furthermore, the sector relies on efficient transportation of raw materials and cement products, and higher oil prices can inflate transportation expenses, eroding cost competitiveness. Due to its integral role in construction and infrastructure development, oil price shocks can disrupt projects by elevating costs, potentially causing delays and reducing demand for cement products, thus affecting the sector's sales and performance.

3.5.2.5. Chemical Sector Index

The chemical industry's profitability is strongly tied to energy costs, which surge with higher oil prices, posing challenges to its competitiveness. Furthermore, many chemicals rely on

petroleum-based feed stocks, leading to increased production costs as oil prices rise. The industries intricate supply chains, encompassing raw material acquisition and distribution, are vulnerable to disruptions stemming from oil price shocks, impacting its overall operations and profitability. Given its role as a key supplier to multiple sectors, fluctuations in oil prices can influence demand for chemical products, subsequently affecting the sector's sales and revenue.

3.4.2.6 Fertilizer Sector Index

The fertilizer sector is heavily influenced by energy costs, which increase with rising oil prices, directly impacting its profitability. Additionally, fertilizers depend on raw materials that can be affected by oil price fluctuations, influencing production costs and prices. The sector's complex supply chains, involving raw material sourcing, manufacturing, and distribution, are susceptible to disruption from oil price shocks, which can have important repercussions on its operations and overall profitability.

3.5.2.7 Food and Personal Care Products Sector Index

The food and personal care products sector, producing everyday essentials, is highly influenced by economic conditions. Elevated oil prices can escalate transportation and production costs, affecting consumer spending. These products, considered staples, respond to economic policy changes, acting as economic condition indicators. Complex supply chains underpin the sector, susceptible to oil price shocks that disrupt operations and profitability. Monitoring this sector explains the repercussions of oil price disruptions on consumer spending, the availability of essential goods, and supply chain dynamics, all of which shape economic conditions and stock market performance.

3.5.2.8. Pharmaceutical Sector Index

The pharmaceutical industry's energy-intensive nature makes it vulnerable to oil price shocks, affecting operational expenses and profitability. Additionally, the sector's complex supply chains, involving raw material sourcing and distribution, can be disrupted by oil price variability, impacting operations and profitability. EPU linked to oil price shocks can influence healthcare policies and spending, directly affecting pharmaceutical product accessibility, affordability, sales, and revenue.

3.6. Data Analysis and Techniques

The E-Views student version 12 software has been used as the statistical tool in the study for the analysis.

3.7. Data Nature

The times series data of relevant variables is used in this study. It contains monthly stock returns for PSX index and its sectorial indices particularly the oil and gas, automobile assembler, cement, chemical, fertilizer, pharmaceutical and the food and personal care sectors. In addition, the data on monthly exchange rate, money supply and global economic policy uncertainty and Brent oil price for 15 years is also used. The monthly data has been used for all relevant variables. The previous studies related on subject has also employed the monthly data (Baber & Burhan, 2022; Nusair & Olson, 2022; Ghani etal., 2022).

3.8. Return Formula

The return of the PSX and sectorial indices has been calculated using the following formula (Saeed, 2012). This formula has been used in previous study (Njindan Iyke, 2020; Sehgal & Sehgal, 2021; Kurniawan, 2021).

Return = Rt =Ln (Pt/Pt-1)

Where Rt= Return for Given Period‘t’

Pt= Ending price

Pt-1 = Opening price

ln = Natural Log

3.9. Unit Root Test Methods

The stationarity of series is a necessary requirement for estimation of parameters of econometric models. If a time series is stationary it implies that it has a constant mean and constant variance over time which is a prerequisite for the calculation of reliable test statistics of parameters. The estimation with non-stationary variables may bring spurious results leading to an incorrect conclusion. Therefore, a series should be stationary. Thus, this study uses two-unit root tests to check stationarity; i) Augmented Dickey-Fuller (ADF) and ii) Philip-Perron tests for detecting the order of integration of the variables (Herrnaz, 2017).

3.9.1. Augmented Dickey Fuller (ADF) Test

The conventional technique for evaluating unit root is the Augmented Dickey Fuller (ADF) test. Let's suppose this study is testing the unit root and have a series y_t. The evaluation of the unit root is as follows using the ADF.

$$\Delta y_t = \mu + \delta Y_{t-1} - + \sum^{k}_{t-1} \boldsymbol{\beta}_i \Delta y_{t-i} + e_t$$

$$\delta = \acute{\alpha} - 1$$

$$\acute{\alpha} = y_{t-1}$$

$$\Delta y_t = \text{first difference of } y_t \text{, i. e. } y_t - y_{t-1}$$

The null hypothesis of ADF is $\delta = 0$ against the alternative hypothesis of $\delta < 0$. If we don't reject null hypothesis the series is non-stationary whereas the rejection means the series is stationary (Perron & Vogelsang, 1992).

3.9.2. Phillips Perron (PP) Test

The Phillips-Perron (PP) test offers substitute method for detecting a unit root in a time series. It follows this structure

$$\Delta y_t = \pi y_{t-1} + \beta_i D_{t-i} + e_t$$

Where e_t is a I (0) with zero mean and D_{t-i} is a component of deterministic trend.

The hypothesis evaluated regarding $\pi = 0$. Because PP is a parametric free estimation, it does not require to clarify the type of serial correlation of Δy_t under the null hypothesis, this is the primary disparity between the ADF and PP tests .Consequently, the procedure for calculating the value of p using the t-ratio changes (Perron, 1997). Moreover, to counter the problem with the autocorrelation and heteroskedasticity, the PP adjusts the statistics. The ADF test's methodology for assessing hypotheses is similar (Maddala & Kim, 1998). While there's been a suggestion by Caner and Kilian (2001) that (PP) test is more reliable than the (ADF) test. However, issues like size distortion and limited test power make both tests less suitable for extensive financial data. According to Shrestha & Bhatta (2018) Phillips- Perron test is actually less reliable than ADF test.

3.10. Autoregressive Distributed Lag Model

Pesaran, M. H. & Shin, Y. (1999) introduced the Autoregressive Distributed Lag (ARDL) model. It is a framework for modelling the long-run relationships and short-run dynamics between variables in a time series context. It allows for analysing the equilibrium or steady-state connection

between the dependent variable and the explanatory variables (Pesaran & Pesaran 1997; Pesaran & Shin 1999; Pesaran et al. 2001).

The ARDL model offers a useful solution for econometric analysis, accommodating variables with different orders of integration. It is effective even with small sample sizes, a departure from traditional cointegration tests like Johansen method, which demand larger samples. This feature makes ARDL advantageous for studies with limited data. Moreover, ARDL enables the joint estimation of long and short-term relationships in a single equation, streamlining analysis and fostering a deeper understanding of dynamic interactions across varying timeframes. This integrated approach enhances the model's comprehensiveness compared to separate equation methodologies (Mohamed, Liu, & Nie, 2021).

3.11. Assumptions for ARDL Model

The assumptions for the ARDL Model are described as follows (Yoong et al.,2020):

a) Autocorrelation-free data is the fundamental requirement for an ARDL model. This means model requires that error terms to have no autocorrelation with one another.

b) The data should exhibit homoscedasticity, meaning that there should be no heteroskedasticity, which essentially implies that the variance and mean of the data should remain constant across the model.

c) The data should be a normally distributed.

d) The data should exhibit stationarity at either I (0) which represents the level or I(1) that represents the first difference, or at both the level and first difference. Importantly, if any variable in the data is stationary at I (2), the ARDL model cannot be applied.

3.12. Residual Diagnostic

Residuals serve as a valuable tool for assessing whether a model has effectively captured the data's information (Pagan & Hall, 1983). The following residual tests are important for econometric models to examine issues related to similarity between the distribution of a given dataset and a theoretical distribution, serial correlation, heteroskedasticity and structural changes in time series data (Gregory & Hansen, 1996).

3.12.1. Quantile-Quantile Plot

A Quantile-Quantile (Q-Q) plot is a statistical technique applied to evaluate the similarity between the distribution of a given dataset and a theoretical distribution, typically the normal distribution. It offers a visual comparison between observed quantiles (data values) and expected quantiles from the selected theoretical distribution (Lodder &Hieftje, 1988). If the nodes in a Q-Q plot closely follow a straight line (often a 45-degree line), the data set conforms to the expected distribution. This line's deviations can disclose departures from the theoretical distribution, enabling statisticians and data analysts to identify patterns, outliers, and deviations from normality in their data. Q-Q diagrams are a useful instrument for exploratory data analysis and hypothesis testing, as they facilitate the evaluation of data distribution assumptions and model validity (Easton & McCulloch, 1990).

3.12.2. Breusch-Godfrey LM Test

A statistical test called the Breusch-Godfrey test, often referred to as the Breusch-Godfrey LM (Lagrange Multipliers) is used to identify serial correlation or autocorrelation in the residuals of a regression model, especially in time series data. The assumption that errors in regression analysis are independent is violated by autocorrelation, which occurs when the residuals of a regression model are associated over time. This test is employed to assess whether the residuals of a regression model display a correlation pattern over different time points. If the test reveals a significant serial correlation, it suggests that the model may not effectively capture temporal dynamics, and that additional adjustments or more advanced modelling techniques may be required (Breusch & Godfrey, 1981).

3.12.3. CUSUM Test

The Cumulative Sum (CUSUM) test is a statistical technique used to track data changes or adjustments over time. It is especially useful for detecting structural changes in time series data where there may be a change in the underlying process generating the data. The CUSUM test identifies when these adjustments occur and provides a method for monitoring the process's stability (Lucas, 1982).

3.12.4. Heteroskedasticity

It refers to the irregular distribution or dispersion of residuals in regression analysis. The Breusch-Pagan testis utilized to examine the heteroskedasticity of time series data set (Breusch

& Pagan, 1979). Heteroskedasticity is a statistical phenomenon in which the variances of a predicted variable are not constant over time. This is visible if the residual errors exhibit a widening or narrowing pattern over time. Thus, homoscedasticity signifies "equal spread," while heteroskedasticity indicates "unequal spread." In econometrics, variance is often used as a measure of spread, and therefore, heteroskedasticity refers to the presence of unequal variances (Schwert, William, & Seguin, 1990). If the p-value is below 0.05, it is statistically significant to reject the null hypothesis of homoscedasticity and we accept the alternative hypothesis of heteroskedasticity (Alabi et al., 2020).

3.13.5. Harvey Test

The Harvey test is a statistical method used to identify heteroskedasticity, a situation in regression models where the spread of errors changes at various levels of independent variables, contradicting the assumption of consistent variance (Harvey, 1976). Detecting heteroskedasticity is crucial in regression analysis to ensure unbiased and efficient parameter estimates. If the Harvey test detects heteroskedasticity, corrective measures like employing robust standard errors or data transformation can be implemented to address this issue (Birau, 2012).

3.12.6. White Test

The White test is a statistical technique in regression analysis employed to identify heteroskedasticity, which occurs when the changeability of error terms in a regression model differs across various levels of independent variables (White, 1980). Heteroskedasticity can affect the accuracy of regression outcomes and contradicts the assumption of uniform error variance. The White test checks for systematic patterns of heteroskedasticity in residuals by regressing squared residuals on independent variables. If there's a significant relationship, it indicates the presence of heteroskedasticity, requiring adjustments like heteroskedasticity-robust standard errors or data transformations for valid regression analysis (Wooldridge, 1990).

3.13. Econometric Model: ARDL Model-Global Economic Policy Uncertainty and Pakistan Stock Market

An ARDL model that is specifically designed to capture the long-term relationships between variables is called the long run ARDL model. It makes it possible to analyse the connection between the explanatory and responsive variables that is in equilibrium or steady-state. The co-integration method used here is called bounds testing, which is developed by Pesaran, M.

H., & Shin, Y. (1999). The ARDL model avoids the assumption that all variables must be incorporated in the same order is restrictive unlike other co-integration methods such as Johansen co-integration method. This means that I (0) and I (1) variables can coexist in the analysis, and variables can have different lag lengths. The ARDL model simultaneously evaluates both the model's enduring and interim parameters. Through linear transformations, it allows the creation of an Error Correction Model (ECM) that integrates short-term and long-term association while retaining the knowledge of long-term dynamics. Additionally, it offers the advantage of providing consistent and reliable results, even when there are limited observations available.

The ARDL co-integration test model is used to determine if there is a long-term relationship among the variables. The Co-integration equation is given below.

$$\Delta \ln PSX = \beta_0 + \beta_1 ln\mathrm{PSX}_{t-i} + \beta_2 lnGEPU_{t-1} + \beta_3 lnM2_{t-1} + \beta_4 lnExrate_{t-1} + \sum_{i=1}^{a} \beta_{5,i} \Delta ln\mathrm{PSX}_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta lnGEPU_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta lnM2_{t-1} + \sum_{i=0}^{d} \beta_{8,i} \Delta lnExrate_{t-1} + \varepsilon_{it}$$

Where,

lnPSX= log of return of PSX

LnPSXt-i = lagged value of the return of PSX

$lnGEPU_{t-i}$= lagged value of the GEPU

$M2_{t-i}$= lagged value of the Money Supply

Exrate= lagged value of the Exchange rate

Δ = the first-order differential operator

a,b,c and d are the maximum lag orders

In this equation, β_0 denotes intercept and ε_{it} the error term. The $\beta_1 \ldots\ldots \beta_4$ are the long-run coefficients. Likewiseβ_5, β_6,β_7, $and\ \beta_8$, represent short-run coefficients. The variables lnPSX, lnGEPU, M_2, and Exrate represent return on Pakistan stock index, global economic policy uncertainty index, money supply and exchange rate, respectively.

After the estimation of the long run bound test following the ECM, which is estimated using the following equation.

$$\ln PSX = \beta_0 + \sum_{i=1}^{a} \beta_{5,i} \Delta \ln PSX_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta \ln GEPU_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta \ln M2_{t-1} + \sum_{i=0}^{b} \beta_{8i} \Delta \ln Exrate_{t-1} + \beta_{9,i} ECT_{t-1} + \varepsilon_{it}$$

In the above model, the coefficients from β_5 to β_8 are short-term dynamic coefficients that help the model reach an equilibrium state. β_9 the coefficient of the error correction term (ECT) characterizes how the model adjusts back to its long-term equilibrium following a short-term shock. The error correction coefficient should be negative and statistically significant. The larger the magnitude of the ECT, the faster the adjustment to equilibrium. A negative error correction coefficient indicates that there is a tendency for the dependent variable to correct downward deviations from its long-run equilibrium. This means that in the short run, if the dependent variable moves away from its equilibrium level, it will adjust downwards to return to that equilibrium level over time (Nkoro & Uko, 2016).

3.13.1. ARDL Model Oil and Gas Sector

The co-integration equation of ARDL model for oil and gas sector to ascertain if there is a long-term association among the variables. The Co-integration equation is given below.

$$\Delta \ln Oilngas = \beta_0 + \beta_1 lnOilngas_{t-i} + \beta_2 lnGEPU_{t-1} + \beta_3 lnM2_{t-1} + \beta_4 lnExrate_{t-1} + \sum_{i=1}^{a} \beta_{5,i} \Delta ln \text{Oilngas}_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta lnGEPU_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta lnM2_{t-1} + \sum_{i=0}^{d} \beta_{8,i} \Delta lnExrate_{t-1} + \varepsilon_{it}$$

Where,

lnOilngas= log of return of Oil and gas

$\ln Oilngas_{t-i}$ = lagged value of the return of Oil and gas

$GEPU_{t-i}$= lagged value of the GEPU

$M2_{t-i}$= lagged value of the Money Supply

Exrate= lagged value of the Exchange rate

Δ = the first-order differential operator

a,b,c and d are the maximum lag orders

In this equation, β_0 denotes intercept and ε_{it} the error term. The $\beta_1 \ldots\ldots \beta_4$ are the long-run coefficients. Likewise $\beta_5, \beta_6, \beta_7, and\ \beta_8$, represent short-run coefficients. The variables LnOil and gas, GEPU, M_2, and Exrate represent return on Oil and gas sector, global economic policy uncertainty index, money supply and exchange rate, respectively.

After the estimation of the long run bound test then comes the succeeding step, ECM is estimated using the following equation.

$$\ln oilngas = \beta_0 + \sum_{i=1}^{a} \beta_{5,i} \Delta \ln oilngas_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta \ln GEPU_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta \ln M2_{t-1} + \sum_{i=0}^{b} \beta_{8i} \Delta \ln Exrate_{t-1} + \beta_{9,i} ECT_{t-1} + \varepsilon_{it}$$

β_9 the coefficient of the error correction term (ECT) characterizes how the model adjusts back to its long-term equilibrium following a short-term shock. The error correction coefficient should be negative and statistically significant. The larger the magnitude of the ECT, the faster the adjustment to equilibrium. A negative error correction coefficient indicates that there is a tendency for the dependent variable to correct downward deviations from its long-run equilibrium. This means that in the short run, if the dependent variable moves away from its equilibrium level, it will adjust downwards to return to that equilibrium level over time (Nkoro & Uko, 2016).

3.13.2. ARDL Model Automobile Assembler Sector

The co-integration equation of ARDL model for automobile assembler sector to ascertain if there is a long-term association among the variables and is given below.

$$\Delta \ln auto = \beta_0 + \beta_1 lnauto_{t-i} + \beta_2 lnGEPU_{t-1} + \beta_3 lnM2_{t-1} + \beta_4 lnExrate_{t-1} + \sum_{i=1}^{a} \beta_{5,i} \Delta ln\text{auto}_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta lnGEPU_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta lnM2_{t-1} + \sum_{i=0}^{d} \beta_{8,i} \Delta lnExrate_{t-1} + \varepsilon_{it}$$

Where,

lnauto= log of return of Automobile assembler sector

$lnauto_{t-i}$ = lagged value of the return of automobile assembler

$GEPU_{t-i}$= lagged value of the GEPU

$M2_{t-i}$= lagged value of the Money Supply

Exrate= lagged value of the Exchange rate

Δ = the first-order differential operator

a,b,c and d are the maximum lag orders

In this equation, β_0 denotes intercept and ε_{it} the error term. The $\beta_1 \ldots\ldots \beta_4$ are the long-run coefficients. Likewise $\beta_5, \beta_6, \beta_7, and\ \beta_8$, represent short-run coefficients.The variables lnauto, GEPU, M_2, and Exrate represent return on automobile assembler sector, global economic policy uncertainty index, money supply and exchange rate, respectively.

After the estimation of the long run bound test following the ECM, which is estimated using the following equation.

$$\text{lnauto} = \beta_0 + \sum_{i=1}^{a} \beta_{5,i} \Delta \text{lnauto}_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta \text{lnGEPU}_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta \text{ln M2}_{t-1} + \sum_{i=0}^{b} \beta_{8i} \Delta \text{lnExrate}_{t-1} + \beta_{9,i} \text{ECT}_{t-1} + \varepsilon_{it}$$

β_9 the coefficient of the error correction term (ECT) characterizes how the model adjusts back to its long-term equilibrium following a short-term shock. The error correction coefficient should be negative and statistically significant. The larger the magnitude of the ECT, the faster the adjustment to equilibrium. A negative error correction coefficient indicates that there is a tendency for the dependent variable to correct downward deviations from its long-run equilibrium. This means that in the short run, if the dependent variable moves away from its equilibrium level, it will adjust downwards to return to that equilibrium level over time (Nkoro & Uko, 2016).

3.13.3. ARDL Model Cement Sector

The co-integration equation of ARDL model for cement sector to ascertain if there is a long-term relationship among the variables and is given below.

$$\Delta \text{lncem} = \beta_0 + \beta_1 lncem_{t-i} + \beta_2 lnGEPU_{t-1} + \beta_3 lnM2_{t-1} + \beta_4 lnExrate_{t-1} + \sum_{i=1}^{a} \beta_{5,i} \Delta lncem_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta lnGEPU_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta lnM2_{t-1} + \sum_{i=0}^{d} \beta_{8,i} \Delta lnExrate_{t-1} + \varepsilon_{it}$$

Where,

lncem= log of return of cement sector

lncem_{t-i} = lagged value of the return of cement

$GEPU_{t-i}$= lagged value of the GEPU

$M2_{t-i}$= lagged value of the Money Supply

Exrate= lagged value of the Exchange rate

Δ = the first-order differential operator

a,b,c and d are the maximum lag orders

In this equation, β_0 denotes intercept and ε_{it} the error term. The $\beta_1 \ldots\ldots \beta_4$ are the long-run coefficients. Likewise β_5, β_6,β_7, $and\ \beta_8$, represent short-run coefficients. The variables lncem, GEPU, M_2, and Exrate represent return on cement sector, global economic policy uncertainty index, money supply and exchange rate, respectively.

After the estimation of the long run bound test following the ECM, which is estimated using the following equation.

$$\text{lncem} = \beta_0 + \sum_{i=1}^{a} \beta_{5,i} \Delta \text{lncem}_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta \text{lnGEPU}_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta \text{ln M2}_{t-1} + \sum_{i=0}^{b} \beta_{8i} \Delta \text{lnExrate}_{t-1} + \beta_{9,i} \text{ECT}_{t-1} + \varepsilon_{it}$$

β_9 the coefficient of the error correction term (ECT) characterizes how the model adjusts back to its long-term equilibrium following a short-term shock. The error correction term coefficient should be negative and statistically significant. The larger the magnitude of the ECT, the faster the adjustment to equilibrium. A negative error correction coefficient indicates that there is a tendency for the dependent variable to correct downward deviations from its long-run equilibrium. This means that in the short run, if the dependent variable moves away from its equilibrium level, it will adjust downwards to return to that equilibrium level over time (Nkoro & Uko, 2016).

3.13.4. ARDL Model Fertilizer Sector

The co-integration equation of ARDL model for fertilizer sector to ascertain if there is a long-term relationship among the variables. The Co-integration equation is as follows.

$$\Delta \text{lnfert} = \beta_0 + \beta_1 lnfert_{t-i} + \beta_2 lnGEPU_{t-1} + \beta_3 lnM2_{t-1} + \beta_4 lnExrate_{t-1} + \sum_{i=1}^{a} \beta_{5,i} \Delta ln\text{fert}_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta lnGEPU_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta lnM2_{t-1} + \sum_{i=0}^{d} \beta_{8,i} \Delta lnExrate_{t-1} + \varepsilon_{it}$$

Where,

lnfert= log of return of fertilizer sector

$lnfert_{t-i}$ = lagged value of the return of fertilizer sector

$GEPU_{t-i}$= lagged value of the GEPU

$M2_{t-i}$= lagged value of the Money Supply

Exrate= lagged value of the Exchange rate

Δ = the first-order differential operator

a,b,c and d are the maximum lag orders

In this equation, β_0 denotes intercept and ε_{it} the error term. The $\beta_1 \ldots\ldots \beta_4$ are the long-run coefficients. Likewiseβ_5, β_6,β_7, $and\ \beta_8$, represent short-run coefficients. The variables lnfert, GEPU, $M_{2,}$ and Exrate represent return on fertilizer sector, global economic policy uncertainty index, money supply and exchange rate, respectively.

After the estimation of the long run bound test following the ECM, which is estimated using the following equation.

$$lnfert = \beta_0 + \sum_{i=1}^{a} \beta_{5,i} \Delta \ln fert_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta \ln GEPU_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta \ln M2_{t-1} + \sum_{i=0}^{b} \beta_{8i} \Delta \ln Exrate_{t-1} + \beta_{9,i} ECT_{t-1} + \varepsilon_{it}$$

β_9 the coefficient of the error correction term (ECT) characterizes how the model adjusts back to its long-term equilibrium following a short-term shock. The error correction coefficient should be negative and statistically significant. The larger the magnitude of the ECT, the faster the adjustment to equilibrium. A negative error correction coefficient indicates that there is a tendency for the dependent variable to correct downward deviations from its long-run equilibrium. This means that in the short run, if the dependent variable moves away from its equilibrium level, it will adjust downwards to return to that equilibrium level over time (Nkoro & Uko, 2016).

3.13.5. ARDL Model Food and Personal Care Products Sector

The co-integration equation of ARDL model for food and personal care products sector to ascertain if there is a long-term relationship among the variables. The Co-integration equation is as follows.

$$\Delta \ln F\&P = \beta_0 + \beta_1 ln F\&P_{t-i} + \beta_2 lnGEPU_{t-1} + \beta_3 lnM2_{t-1} + \beta_4 lnExrate_{t-1} + \sum_{i=1}^{a} \beta_{5,i} \Delta ln F\&P_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta lnGEPU_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta lnM2_{t-1} + \sum_{i=0}^{d} \beta_{8,i} \Delta lnExrate_{t-1} + \varepsilon_{it}$$

Where,

lnF&P= log of return food and personal care sector

$lnF\&P_{t-i}$ = lagged value of the return of food and personal care sector

$GEPU_{t-i}$= lagged value of the GEPU

$M2_{t-i}$= lagged value of the Money Supply

Exrate= lagged value of the Exchange rate

Δ = the first-order differential operator

a,b,c and d are the maximum lag orders

In this equation, β_0 denotes intercept and ε_{it} the error term. The $\beta_1 \ldots\ldots \beta_4$ are the long-run coefficients. Likewise $\beta_5, \beta_6, \beta_7, and\ \beta_8$, represent short-run coefficients. The variables lnF&P, GEPU, M_2, and Exrate represent return on food and personal care sector, global economic policy uncertainty index, money supply and exchange rate, respectively.

After the estimation of the long run bound test following the error correction model, which is estimated using the following equation.

$$\ln F\&P = \beta_0 + \sum_{i=1}^{a} \beta_{5,i} \Delta \ln F\&P_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta \ln GEPU_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta \ln M2_{t-1} + \sum_{i=0}^{b} \beta_{8i} \Delta \ln Exrate_{t-1} + \beta_{9,i} ECT_{t-1} + \varepsilon_{it}$$

β_9 the coefficient of the error correction term (ECT) characterizes how the model adjusts back to its long-term equilibrium following a short-term shock. The error correction coefficient should be negative and statistically significant. The larger the magnitude of the ECT term, the faster the adjustment to equilibrium. A negative error correction coefficient indicates that there is

a tendency for the dependent variable to correct downward deviations from its long-run equilibrium. This means that in the short run, if the dependent variable moves away from its equilibrium level, it will adjust downwards to return to that equilibrium level over time (Nkoro & Uko, 2016).

3.13.6. ARDL Model Pharmaceutical Sector

The co-integration equation of ARDL model for pharmaceutical sector to ascertain if there is a long-term relationship among the variables. The Co-integration equation is as follows.

$$\Delta\text{lnpharma}=\beta_0+\beta_1 ln\text{Pharma}_{t\text{-}i}+\beta_2 lnGEPU_{t\text{-}1}+\beta_3 lnM2_{t\text{-}1}+\beta_4 lnExrate_{t\text{-}1}+\sum_{i=1}^{a}\beta_{5,i}\Delta ln\text{pharma}_{t-1}+\sum_{i=0}^{b}\beta_{6,i}\Delta lnGEPU_{t-1}+\sum_{i=0}^{c}\beta_{7,i}\Delta lnM2_{t-1}+\sum_{i=0}^{d}\beta_{8,i}\Delta lnExrate_{t-1}+\varepsilon_{it}$$

Where,

lnpharma= log of return pharmaceutical sector

$\text{lnpharma}_{t\text{-}i}$ = lagged value of the return of pharmaceutical sector

$GEPU_{t\text{-}i}$= lagged value of the GEPU

$M2_{t\text{-}i}$= lagged value of the Money Supply

Exrate= lagged value of the Exchange rate

Δ = the first-order differential operator

a,b,c and d are the maximum lag orders

In this equation, β_0 denotes intercept and ε_{it} the error term. The $\beta_1 \ldots\ldots \beta_4$ are the long-run coefficients. Likewise $\beta_5, \beta_6, \beta_7,$ *and* β_8, represent short-run coefficients. The variables Lnpharma, GEPU, M_2, and Exrate represent return on pharmaceutical sector, global economic policy uncertainty index, money supply and exchange rate, respectively

After the estimation of the long run bound test following the error correction model, which is estimated using the following equation.

$$\text{lnpharma}=\beta_0+\sum_{i=1}^{a}\beta_{5,i}\Delta\text{lnpharma}_{t-1}+\sum_{i=0}^{b}\beta_{6,i}\Delta\text{lnGEPU}_{t-1}+\sum_{i=0}^{c}\beta_{7,i}\Delta\text{ln M2}_{t-1}+\sum_{i=0}^{b}\beta_{8i}\Delta\text{lnExrate}_{t-1}+\beta_{9,i}\text{ECT}_{t-1}+\varepsilon_{it}$$

β_9 the coefficient of the error correction term (ECT) characterizes how the model adjusts back to its long-term equilibrium following a short-term shock. The error correction coefficient should be negative and statistically significant. The larger the magnitude of the ECT, the faster the adjustment to equilibrium. A negative error correction coefficient indicates that there is a tendency for the dependent variable to correct downward deviations from its long-run equilibrium. This means that in the short run, if the dependent variable moves away from its equilibrium level, it will adjust downwards to return to that equilibrium level over time (Nkoro & Uko, 2016).

3.13.7. ARDL Model Chemical Sector

The co-integration equation of ARDL model for chemical sector to ascertain if there is a long-term relationship among the variables. The Co-integration equation is as follows.

$$\Delta \text{lnchem} = \beta_0 + \beta_1 ln\text{chem}_{t-i} + \beta_2 lnGEPU_{t-1} + \beta_3 lnM2_{t-1} + \beta_4 lnExrate_{t-1} + \sum_{i=1}^{a} \beta_{5,i} \Delta ln\text{chem}_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta lnGEPU_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta lnM2_{t-1} + \sum_{i=0}^{d} \beta_{8,i} \Delta lnExrate_{t-1} + \varepsilon_{it}$$

Where,

lnchem= log of return chemical sector

lnchem_{t-i} = lagged value of the return of Chem sector

$GEPU_{t-i}$= lagged value of the GEPU

$M2_{t-i}$= lagged value of the Money Supply

Exrate= lagged value of the Exchange rate

Δ = the first-order differential operator

a,b,c and d are the maximum lag orders

In this equation, β_0 denotes intercept and ε_{it} the error term. The $\beta_1 \ldots\ldots \beta_4$ are the long-run coefficients. Likewise $\beta_5, \beta_6, \beta_7, and\ \beta_8$, represent short-run coefficients. The variables Lnchem, GEPU, M_2, and Exrate represent return on chemical sector, global economic policy uncertainty index, money supply and exchange rate, respectively.

After the estimation of the long run bound test following the ECM, which is estimated using the following equation.

$$\text{lnchem} = \beta_0 + \sum_{i=1}^{a} \beta_{5,i} \Delta \text{lnchem}_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta \text{lnGEPU}_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta \ln M2_{t-1} + \sum_{i=0}^{b} \beta_{8i} \Delta \text{lnExrate}_{t-1} + \beta_{9,i} \text{ECT}_{t-1} + \varepsilon_{it}$$

β_9 the coefficient of the error correction term (ECT) characterizes how the model adjusts back to its long-term equilibrium following a short-term shock .The error correction coefficient should be negative and statistically significant. The larger the magnitude of the ECT, the faster the adjustment to equilibrium. A negative error correction coefficient indicates that there is a tendency for the dependent variable to correct downward deviations from its long-run equilibrium. This means that in the short run, if the dependent variable moves away from its equilibrium level, it will adjust downwards to return to that equilibrium level over time (Nkoro & Uko, 2016).

3.14. Econometric Model: ARDL Model- Oil price Shocks and Pakistan Stock Market

The ARDL co-integration test model is employed to ascertain if there is a long-term relationship among the oil price shocks and returns of the Pakistan stock market. The co-integration equation is as follows.

$$\Delta \text{lnPSX} = \beta_0 + \beta_1 \text{lnPSX}_{t-i} + \beta_2 \text{lnbrent}_{t-1} + \beta_3 \text{lnM2}_{t-1} + \beta_4 \text{lnExrate}_{t-1} + \sum_{i=1}^{a} \beta_{5,i} \Delta \text{lnPSX}_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta \text{lnbrent}_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta \text{lnM2}_{t-1} + \sum_{i=0}^{d} \beta_{8,i} \Delta \text{lnExrate}_{t-1} + \varepsilon_{it}$$

Where,

LnPSX= log of return of PSX

LnPSXt-i = lagged value of the return of PSX

lnbrent_{t-i}= lagged value of the brent oil price

M2_{t-i}= lagged value of the Money Supply

Exrate= lagged value of the Exchange rate

Δ = the first-order differential operator

a,b,c and d are the maximum lag orders

In this equation, β_0 denotes intercept and ε_{it} the error term. The $\beta_1 \ldots\ldots \beta_4$ are the long-run coefficients. Likewise $\beta_5, \beta_6, \beta_7, \ and\ \beta_8$, represents short-run coefficients. The variables LnKSE100, brent, M_2, and Exrate represent return on Pakistan stock index, brent oil price, money supply and exchange rate, respectively.

After the estimation of the long run bound test following the ECM, which is estimated using the following equation.

$$\ln PSX = \beta_0 + \sum_{i=1}^{a} \beta_{5,i} \Delta \ln PSX_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta \ln brent_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta \ln M2_{t-1} + \sum_{i=0}^{b} \beta_{8i} \Delta \ln Exrate_{t-1} + \beta_{9,i} ECT_{t-1} + \varepsilon_{it}$$

In the above model, the coefficients from β_5 to β_8 are short-term dynamic coefficients that help the model reach an equilibrium state. β_9 the coefficient of the error correction term (ECT) characterizes how the model adjusts back to its long-term equilibrium following a short-term shock .The error correction coefficient should be negative and statistically significant. The larger the magnitude of the ECT, the faster the adjustment to equilibrium. A negative error correction coefficient indicates that there is a tendency for the dependent variable to correct downward deviations from its long-run equilibrium. This means that in the short run, if the dependent variable moves away from its equilibrium level, it will adjust downwards to return to that equilibrium level over time (Nkoro & Uko, 2016).

3.14.1. ARDL Model Oil and Gas Sector

The co-integration equation of ARDL model for oil and gas sector to ascertain if there is a long-term relationship among the variables. The Co-integration equation is as follows.

$$\Delta \ln Oilngas = \beta_0 + \beta_1 lnOilngas_{t-i} + \beta_2 lnbrent_{t-1} + \beta_3 lnM2_{t-1} + \beta_4 lnExrate_{t-1} + \sum_{i=1}^{a} \beta_{5,i} \Delta ln Oilngas_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta lnbrent_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta lnM2_{t-1} + \sum_{i=0}^{d} \beta_{8,i} \Delta lnExrate_{t-1} + \varepsilon_{it}$$

Where,

lnOilngas= log of return of Oil and gas

$lnOilngas_{t-i}$ = lagged value of the return of Oil and gas

$brent_{t-i}$= lagged value of the brent oil price

$M2_{t-i}$= lagged value of the Money Supply

Exrate= lagged value of the Exchange rate

Δ = the first-order differential operator

a,b,c and d are the maximum lag orders

In this equation, β_0 denotes intercept and ε_{it} the error term. The $\beta_1 \ldots\ldots \beta_4$ are the long-run coefficients. Likewise $\beta_5, \beta_6, \beta_7, and\ \beta_8$, represent short-run coefficients. The variables ln Oil and gas, brent, M_2, and Excrete represent return on Oil and gas sector, brent oil price, money supply and exchange rate, respectively.

After the estimation of the long run bound test following the ECM, which is estimated using the following equation.

$$\ln oilngas = \beta_0 + \sum_{i=1}^{a} \beta_{5,i} \Delta \ln oilngas_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta \ln brent_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta \ln M2_{t-1} + \sum_{i=0}^{b} \beta_{8i} \Delta \ln Exrate_{t-1} + \beta_{9,i} ECT_{t-1} + \varepsilon_{it}$$

In the above model, the coefficients from β_5 to β_8 are short-term dynamic coefficients that help the model reach an equilibrium state. β_9 the coefficient of the error correction term (ECT) characterizes how the model adjusts back to its long-term equilibrium following a short-term shock .The error correction coefficient should be negative and statistically significant. The larger the magnitude of the ECT, the faster the adjustment to equilibrium. A negative error correction coefficient indicates that there is a tendency for the dependent variable to correct downward deviations from its long-run equilibrium. This means that in the short run, if the dependent variable moves away from its equilibrium level, it will adjust downwards to return to that equilibrium level over time (Nkoro & Uko, 2016).

3.14.2. ARDL Model Automobile Assembler Sector

The co-integration equation of ARDL model for automobile assembler sector to ascertain if there is a long-term relationship among the variables. The Co-integration equation is as follows.

$$\Delta \ln auto = \beta_0 + \beta_1 lnauto_{t-i} + \beta_2 lnbrent_{t-1} + \beta_3 lnM2_{t-1} + \beta_4 lnExrate_{t-1} + \sum_{i=1}^{a} \beta_{5,i} \Delta ln\text{auto}_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta lnbrent_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta lnM2_{t-1} + \sum_{i=0}^{d} \beta_{8,i} \Delta lnExrate_{t-1} + \varepsilon_{it}$$

Where,

lnauto= log of return of Automobile assembler sector

$lnauto_{t-i}$ = lagged value of the return of automobile assembler

$brent_{t-i}$= lagged value of the brent oil price

$M2_{t-i}$= lagged value of the Money Supply

Exrate= lagged value of the Exchange rate

Δ = the first-order differential operator

a,b,c and d are the maximum lag orders

In this equation, β_0 denotes intercept and ε_{it} the error term. The $\beta_1 \ldots\ldots \beta_4$ are the long-run coefficients. Likewise $\beta_5, \beta_6, \beta_7, and\ \beta_8$, represent short-run coefficients. The variables lnauto, lnbrent, M_2, and Exrate represent return on automobile assembler sector, oil price, money supply and exchange rate, respectively.

After the estimation of the long run bound test following the ECM, which is estimated using the following equation.

$$lnauto = \beta_0 + \sum_{i=1}^{a} \beta_{5,i} \Delta lnauto_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta lnbrent_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta ln\ M2_{t-1} + \sum_{i=0}^{b} \beta_{8i} \Delta lnExrate_{t-1} + \beta_{9,i} ECT_{t-1} + \varepsilon_{it}$$

β_9 the coefficient of the error correction term (ECT) characterizes how the model adjusts back to its long-term equilibrium following a short-term shock .The error correction coefficient should be negative and statistically significant. The larger the magnitude of the ECT, the faster the adjustment to equilibrium. A negative error correction coefficient indicates that there is a tendency for the dependent variable to correct downward deviations from its long-run equilibrium. This means that in the short run, if the dependent variable moves away from its equilibrium level, it will adjust downwards to return to that equilibrium level over time (Nkoro & Uko, 2016).

3.14.3. ARDL Model Cement Sector

The co-integration equation of ARDL model for cement sector to ascertain if there is a long-term relationship among the variables. The Co-integration equation is as follows.

$\Delta \text{lncem} = \beta_0 + \beta_1 lncem_{t-i} + \beta_2 lnbrent_{t-1} + \beta_3 lnM2_{t-1} + \beta_4 lnExrate_{t-1}$

$+ \sum_{i=1}^{a} \beta_{5,i} \Delta lncem_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta lnbrent_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta lnM2_{t-1} + \sum_{i=0}^{d} \beta_{8,i} \Delta lnExrate_{t-1} + \varepsilon_{it}$

Where,

lncem= log of return of cement sector

lncem_{t-i} = lagged value of the return of cement

brent_{t-i}= lagged value of the brent oil price

$M2_{t-i}$= lagged value of the Money Supply

Exrate= lagged value of the Exchange rate

Δ = the first-order differential operator

a,b,c and d are the maximum lag orders

In this equation, β_0 denotes intercept and ε_{it} the error term. The $\beta_1 \ldots\ldots \beta_4$ are the long-run coefficients. Likewise $\beta_5, \beta_6, \beta_7, and\ \beta_8$, represent short-run coefficients. The variables lncem, brent, M_2, and Exrate represent return on cement sector, brent oil price, money supply and exchange rate, respectively.

After the estimation of the long run bound test following the ECM, which is estimated using the following equation.

$\text{lncem} = \beta_0 + \sum_{i=1}^{a} \beta_{5,i} \Delta \text{lncem}_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta \text{lnbrent}_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta \text{ln } M2_{t-1} +$

$\sum_{i=0}^{b} \beta_{8i} \Delta \text{lnExrate}_{t-1} + \beta_{9,i} \text{ECT}_{t-1} + \varepsilon_{it}$

β_9 the coefficient of the error correction term (ECT) characterizes how the model adjusts back to its long-term equilibrium following a short-term shock .The error correction coefficient should be negative and statistically significant. The larger the magnitude of the ECT, the faster the adjustment to equilibrium. A negative error correction coefficient indicates that there is a tendency for the dependent variable to correct downward deviations from its long-run equilibrium. This means that in the short run, if the dependent variable moves away from its equilibrium level, it will adjust downwards to return to that equilibrium level over time (Nkoro & Uko, 2016).

3.14.4. ARDL Model Fertilizer Sector

The co-integration equation of ARDL model for fertilizer sector to ascertain if there is a long-term relationship among the variables. The Co-integration equation is as follows.

$$\Delta \text{lnfert}=\beta_0 + \beta_1 lnfert_{t-i}+\beta_2 lnbrent_{t-1}+\beta_3 lnM2_{t-1}+\beta_4 lnExrate_{t-1} +\sum_{i=1}^{a} \beta_{5,i}\Delta ln\text{fert}_{t-1} + \sum_{i=0}^{b} \beta_{6,i}\Delta lnbrent_{t-1} + \sum_{i=0}^{c} \beta_{7,i}\Delta lnM2_{t-1} + \sum_{i=0}^{d} \beta_{8,i}\Delta lnExrate_{t-1} +\varepsilon_{it}$$

Where,

lnfert= log of return of fertilizer sector

lnfert_{t-i} = lagged value of the return of fertilizer sector

brent_{t-i}= lagged value of the brent oil price

$M2_{t-i}$= lagged value of the Money Supply

Exrate= lagged value of the Exchange rate

Δ = the first-order differential operator

a,b,c and d are the maximum lag orders

In this equation, β_0 denotes intercept and ε_{it} the error term. The $\beta_1 \ldots\ldots \beta_4$ are the long-run coefficients. Likewise $\beta_5, \beta_6, \beta_7, and\ \beta_8$, represent short-run coefficients. The variables lnfert, brent, M_2, and Exrate represent return on fertilizer sector, Brent oil price money supply and exchange rate, respectively.

After the estimation of the long run bound test following the ECM, which is estimated using the following equation.

$$\text{lnfert} =\beta_0 +\sum_{i=1}^{a} \beta_{5,i}\Delta \ln \text{fert}_{t-1} + \sum_{i=0}^{b} \beta_{6,i}\Delta\text{lnbrent}_{t-1} + \sum_{i=0}^{c} \beta_{7,i}\Delta\ln M2_{t-1} + \sum_{i=0}^{b} \beta_{8i}\Delta\text{lnExrate}_{t-1} + \beta_{9,i}\text{ECT}_{t-1} + \varepsilon_{it}$$

β_9 the coefficient of the error correction term (ECT) characterizes how the model adjusts back to its long-term equilibrium following a short-term shock .The error correction coefficient should be negative and statistically significant. The larger the magnitude of the ECT, the faster the adjustment to equilibrium. A negative error correction coefficient indicates that there is a tendency for the dependent variable to correct downward deviations from its long-run equilibrium. This

means that in the short run, if the dependent variable moves away from its equilibrium level, it will adjust downwards to return to that equilibrium level over time (Nkoro & Uko, 2016).

3.14.5. ARDL Model-Food and Personal Care Products Sector

The co-integration equation of ARDL model for food and personal care products sector to ascertain if there is a long-term relationship among the variables. The Co-integration equation is as follows.

$$\Delta \ln F\&P = \beta_0 + \beta_1 ln F\&P_{t-i} + \beta_2 lnbrent_{t-1} + \beta_3 lnM2_{t-1} + \beta_4 lnExrate_{t-1} + \sum_{i=1}^{a} \beta_{5,i} \Delta ln F\&P_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta lnbrent_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta lnM2_{t-1} + \sum_{i=0}^{d} \beta_{8,i} \Delta lnExrate_{t-1} + \varepsilon_{it}$$

Where,

lnF&P= log of return food and personal care sector

$lnF\&P_{t-i}$ = lagged value of the return of food and personal care sector

$brent_{t-i}$= lagged value of the brent oil price

$M2_{t-i}$= lagged value of the Money Supply

Exrate= lagged value of the Exchange rate

Δ = the first-order differential operator

a,b,c and d are the maximum lag orders

In this equation, β_0 denotes intercept and ε_{it} the error term. The $\beta_1 \ldots\ldots \beta_4$ are the long-run coefficients. Likewise $\beta_5, \beta_6, \beta_7, and\ \beta_8$, represent short-run coefficients. The variables lnF&P, brent, M_2, and Exrate represent return on food and personal care sector, brent oil price, money supply and exchange rate, respectively.

After the estimation of the long run bound test following the ECM, which is estimated using the following equation.

$$\ln F\&P = \beta_0 + \sum_{i=1}^{a} \beta_{5,i} \Delta \ln F\&P_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta \ln brent_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta \ln M2_{t-1} + \sum_{i=0}^{b} \beta_{8i} \Delta \ln Exrate_{t-1} + \beta_{9,i} ECT_{t-1} + \varepsilon_{it}$$

β_9 the coefficient of the error correction term (ECT) characterizes how the model adjusts back to its long-term equilibrium following a short-term shock .The error correction coefficient

should be negative and statistically significant. The larger the magnitude of the ECT, the faster the adjustment to equilibrium. A negative error correction coefficient indicates that there is a tendency for the dependent variable to correct downward deviations from its long-run equilibrium. This means that in the short run, if the dependent variable moves away from its equilibrium level, it will adjust downwards to return to that equilibrium level over time (Nkoro & Uko, 2016).

3.14.6 ARDL Model Pharmaceutical Sector

The co-integration equation of ARDL model for pharmaceutical sector to ascertain if there is a long-term relationship among the variables. The Co-integration equation is as follows.

$$\Delta \text{lnpharma} = \beta_0 + \beta_1 ln\text{pharma}_{t-i} + \beta_2 lnbrent_{t-1} + \beta_3 lnM2_{t-1} + \beta_4 lnExrate_{t-1} + \sum_{i=1}^{a} \beta_{5,i} \Delta ln\text{pharma}_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta lnbrent_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta lnM2_{t-1} + \sum_{i=0}^{d} \beta_{8,i} \Delta lnExrate_{t-1} + \varepsilon_{it}$$

Where,

lnpharma= log of return pharmaceutical sector

lnpharma_{t-i} = lagged value of the return of pharmaceutical sector

brent_{t-i}= lagged value of the brent oil price

$M2_{t-i}$= lagged value of the Money Supply

Exrate= lagged value of the Exchange rate

Δ = the first-order differential operator

a,b,c and d are the maximum lag orders

In this equation, β_0 denotes intercept and ε_{it} the error term. The $\beta_1 \ldots\ldots \beta_4$ are the long-run coefficients. Likewise,$\beta_5, \beta_6, \beta_7, \ and \ \beta_8$, represent short-run coefficients. The variables lnpharma, brent, M_2, and Exrate represent return on pharmaceutical sector, brent oil price, money supply and exchange rate, respectively.

After the estimation of the long run bound test following the ECM, which is estimated using the following equation.

$\text{lnpharma} = \beta_0 + \sum_{i=1}^{a} \beta_{5,i} \Delta \text{lnpharma}_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta \text{lnbrent}_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta \text{ln M2}_{t-1} + \sum_{i=0}^{b} \beta_{8i} \Delta \text{lnExrate}_{t-1} + \beta_{9,i} \text{ECT}_{t-1} + \varepsilon_{it}$

β_9 the coefficient of the error correction term (ECT) characterizes how the model adjusts back to its long-term equilibrium following a short-term shock .The error correction coefficient should be negative and statistically significant. The larger the magnitude of the ECT, the faster the adjustment to equilibrium. A negative error correction coefficient indicates that there is a tendency for the dependent variable to correct downward deviations from its long-run equilibrium. This means that in the short run, if the dependent variable moves away from its equilibrium level, it will adjust downwards to return to that equilibrium level over time (Nkoro & Uko, 2016).

3.14.7 ARDL Model Chemical Sector

The co-integration equation of ARDL model for chemical sector to ascertain if there is a long-term relationship among the variables. The Co-integration equation is as follows.

$\Delta \text{lnchem} = \beta_0 + \beta_1 ln\text{F\&P}_{t-i} + \beta_2 lnbrent_{t-1} + \beta_3 lnM2_{t-1} + \beta_4 lnExrate_{t-1} + \sum_{i=1}^{a} \beta_{5,i} \Delta ln\text{chem}_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta lnbrent_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta lnM2_{t-1} + \sum_{i=0}^{d} \beta_{8,i} \Delta lnExrate_{t-1} + \varepsilon_{it}$

Where,

lnchem= log of return chemical sector

lnchem_{t-i} = lagged value of the return of Chem sector

brent_{t-i}= lagged value of the brent oil price

$M2_{t-i}$= lagged value of the Money Supply

Exrate= lagged value of the Exchange rate

Δ = the first-order differential operator

a,b,c and d are the maximum lag orders

In this equation, β_0 denotes intercept and ε_{it} the error term. The $\beta_1 \ldots\ldots \beta_4$ are the long-run coefficients. Likewise $\beta_5, \beta_6, \beta_7, \; and \; \beta_8$, represent short-run coefficients. The variables

lnchem, brent, M_2, and Exrate represent return on chemical sector, Brent oil price, money supply and exchange rate, respectively.

After the estimation of the long run bound test following the ECM, which is estimated using the following equation.

$$\text{lnchem} = \beta_0 + \sum_{i=1}^{a} \beta_{5,i} \Delta \text{lnchem}_{t-1} + \sum_{i=0}^{b} \beta_{6,i} \Delta \text{lnbrent}_{t-1} + \sum_{i=0}^{c} \beta_{7,i} \Delta \ln M2_{t-1} + \sum_{i=0}^{b} \beta_{8i} \Delta \text{lnExrate}_{t-1} + \beta_{9,i} ECT_{t-1} + \varepsilon_{it}$$

β_9 the coefficient of the error correction term (ECT) characterizes how the model adjusts back to its long-term equilibrium following a short-term shock .The error correction coefficient should be negative and statistically significant. The larger the magnitude of the ECT, the faster the adjustment to equilibrium. A negative error correction coefficient indicates that there is a tendency for the dependent variable to correct downward deviations from its long-run equilibrium. This means that in the short run, if the dependent variable moves away from its equilibrium level, it will adjust downwards to return to that equilibrium level over time (Nkoro & Uko, 2016).

3.15. Description of Variables

Table 3.1 Variables description

Sr. No.	Name of Variable	Data Source	Description
1	**GEPU (Economic policy uncertainty current weighted GDP)**	Global Economic policy Uncertainty	The GEPU Index consist of the GDP-weighted mean of national EPU indices for 21 countries that comprise two-thirds of global production. Each national EPU index reflects the relative frequency of a triumvirate of terms pertinent to the economy, uncertainty, and policy-related matters in domestic newspaper articles.
2.	**Exchange Rate**	SBP	An exchange rate is the worth of United States dollar expressed in terms of another Pakistani Rupees. The end-of-month exchange rate is Rs. /US$ (Finance division, 2023). The exchange rate and return relationship is negative. If the local currency's value relative to the US dollar has decreased, it will have a negative impact on cash flows and reduce the return. If the sector engages in exports, the exchange rate will have a positive relationship with returns (Ahmed et al., 2010).
3.	**Brent spot price**	US Energy Information Administration	The Brent spot price is the current market value of one barrel of Brent crude oil. One of the most vital crude oils is Brent crude benchmarks on the global market. It is derived from several North Sea oil fields and is extensively used as a crude oil pricing reference worldwide.
4.	**Broad Money**	SBP	The State Bank of Pakistan's other deposits (including those at NBFIs and those that have gone unclaimed), as well as demand and time deposits including (foreign currency deposits held by residents) with scheduled institutions, together constitute broad money, which is a measure of the monetary supply. The most important economic indicator for forecasting inflation is M2 (Finance division, 2023).

			The link between the money supply and returns is favourable in the near run because rising the money supply enhances liquidity. Over time, an increase in money supply raises inflation, which has a detrimental impact on returns (Sadia saeed, 2012).
5.	**PSX (KSE100)**	Business Recorder	The KSE100 represents the PSX index. In November 1991, the KSE-100 Index was launched with a base value of 1,000 points. The Index's top 100 businesses account for almost 80% of the total market capitalization of all companies listed on the stock exchange, which were selected based on sector representation and greatest market capitalization. Based on market capitalization, one business is picked from each industry, and the remaining companies are chosen in descending order of market capitalization. Since it measures overall return, dividends, bonuses, and privileges are all taken into consideration.
6.	**Cement Index**	Business Recorder	The Cement Index reflects the performance of companies involved in the production and distribution of cement and related products. The cement index consists of the 17 companies. The current market capitalization of the cement index is 384,906.7 million which has declined from 411,883.3 million in 2022. So there was -6.5 percent change.
7.	**Oil & Gas Index**	Business Recorder	This index includes companies engaged in the exploration and production of oil and gas. The oil and gas index consist of the 13 companies. The current market capitalization of the oil and gas index is 999325 million which has declined from 1047216.3 million in 2022. So there was -4.79 percent change.
8.	**Automobile Assembler Index**	Business Recorder	This index tracks the performance of companies engaged in the assembly and manufacturing of automobiles in Pakistan. The automobile assembler consists of 11 companies. It has current market capitalization 228,212.1 million which was 311,233.8 million in 2022. So there was -26.7 percent change.

9.	**Chemical Index**	Business Recorder	This index track the performance of companies involved in the chemical sector listed on the Pakistan Stock Exchange (PSX). This index would include companies engaged in the production, distribution, and marketing of various chemical products. The chemical index consists of 22 companies. The current market capitalization is 360,937.9 million which 413,891.4 million in 2022 was. So there is -12.8 percent change.
10.	**Fertilizer Index**	Business Recorder	This index track the performance of companies involved in the fertilizer sector listed on the Pakistan Stock Exchange (PSX). The fertilizer sector consists of 6 companies. The current market capitalization is 491,310.2 million which was 527,337.7 million in 2022 .So there is -6.8 percent change.
11.	**Food and personal care Index**	Business Recorder	This index track the performance of companies involved in the production and distribution food and personal care products. The index consists of 18 companies. The current market capitalization is 578,708.0 million which was 710,931.7 million in 2022 .So there is -18.6 percent change.
16.	**Pharmaceuticals Index**	Business Recorder	This index track the performance of companies involved in the manufacturing and distribution of pharmaceutical products and medications. The index consists of 10 companies. The current market capitalization is 163,813.5 million which 252,064.8 million in 2022. So there is -35 percent change.

3.16. Conclusion of the Chapter

The present chapter of the dissertation explain the research philosophy, research approach, research design which composed of the population of the study, sample, sample size, sampling technique and the data collection. This chapter further includes ARDL model assumptions as well as the residual diagnostics, econometric models and the description of the variables used in the study.

CHAPTER 4
EMPIRICAL RESULTS AND DISCUSSION

4.1. Introduction

After review of literature and development of methodology in the previous chapters, this chapter presents descriptive statistics, applies unit root test to examine the stationarity and presents empirical results along with residual diagnostics.

4.2. Descriptive Statistics

The table 4.1 presents the descriptive statistics of the data variables. According to the table, the Brent spot price has the mean 9336, and median of 8956 with a standard deviation of 0.444. The maximum and the minimum values are 25078 and 3022 respectively. The skewness value is 1 which means the data is skewed to right. The kurtosis value 4 is greater than 3 so its leptokurtosis, meaning the data has fatter tails than a normal distribution. .

Moving to exchange rate, it has average of 123, median of 105 with a standard deviation of 44. The maximum and the minimum value are 285 and 79 respectively. The skewness value is 2 which means the data is skewed to right. The kurtosis value is 5 shows leptokurtosis, or larger tails than a normal distribution in the data. It implies more radical values.

The money supply has average value 13594, and median of 11960 with a standard deviation of 6978. The data exhibits positive skewness with a skewness value of 1, indicating a right-skewed distribution. Additionally, the kurtosis value of 2 suggests that the data has relatively less deviation from a normal distribution at its tails. It implies less extreme values. The maximum and minimum values are 29500 and 4734.

The global economic policy uncertainty has a mean value 24568 and median 16208 with standard deviation 17913.Th maximum and the minimum values are 88008 and 7187respectively. The skewness value is 1 so the data is skewed to right whereas the kurtosis value is 4, larger tails than a normal distribution in the data.

Table 4.1. Descriptive Statistics

	GEPU	BRENT OIL	EXRATE	M2	PSX	OIL &GAS	AUTO	CEMENT	CHEM	FERT	FOOD &PERSONAL CARE	PHARMA
Mean	24568	9336	123	13594	30069	3527	4985	3698	2626	6592	920	742
Median	16208	8956	105	11960	33902	3697	4995	3871	1977	7381	899	738
Maximum	88008	25078	285	29500	50592	5547	12606	8943	6068	14967	1307	1230
Minimum	7187	3022	79	4734	5377	988	378	542	561	451	620	380
Std. Dev.	17913	4614	44	6978	13582	998	3617	2366	1486	4180	173	202
Skewness	1	2	2	1	0	0	0	0	1	0	0	0
Kurtosis	4	5	5	2	2	3	2	2	2	2	2	2
Sum	4250180	1615158	21288	2351786	5201895	610221	862398	639681	454320	114032	159232	128396
Sum Sq. Dev.	55200000000	3660000000	3320.8	8380000000	31700000000	1710000000	22500000000	963000000	380000000	3000000000	514876	7057456

				000 0								
Observations	173	173	173	173	173	173	173	173	173	173	173	173

Now moving to the descriptive statistics of the returns in stock market's indices, the mean value of the return of PSX is 30069 whereas median is 33902 with standard deviation 13582. The maximum and the minimum values are 50592 and 5377.The skewness is 0 which implies that data is approximately symmetric while the kurtosis is 2 which indicates that the data deviates less from a normal distribution in the ends.

The oil and gas returns are characterized by a mean of 3527, a median of 3697, and a standard deviation of 998. The highest and lowest values observed in this dataset are 5547 and 988, respectively. The skewness value is 0 which implies that the data is approximately symmetric while the kurtosis is 3 that indicates that the data so its mesocratic having the same thickness as a normal distribution.

Automobile assembler index return has the mean value 4985, median of 4995 and a standard deviation of 3617. The maximum and the minimum values 12606 and 378. The skewness value is 0 the data is symmetric. The kurtosis value is 2, implying that the data deviate less from a normal distribution in the end.

The cement sector returns have an average value of 2626, median 1977 and the standard deviation is 1486. The maximum and the minimum values are 6068 and 561. The skewness and kurtosis values 0 meaning data is symmetric and 2, the data deviate less from a normal distribution in the end.

The chemical sector return has the mean value 2626 and median 1977. The maximum and the minimum values are 6068 and 561.The standard deviation is 1486. The skewness is 1 and the kurtosis is 2.

The mean value of the return of the fertilizer sectors is 6592, median is 7381 and the standard deviation is 4180. The maximum and the minimum value are 14967 and 451. The skewness is 0 while the kurtosis is 2.

The food sector return has an average value 920 and median 899. The standard deviation is 173. The maximum and the minimum value are 1307 and 620. The skewness value is 0 while the kurtosis value is 2. The sum and sum of square deviation is 159232 and 5148716 respectively. The return of the pharmaceutical has the mean value 742, and median 738 with standard deviation 202. The highest and the lowest values are 1230 and 380. The skewness value is 0 while the kurtosis is 2.

4.3. Unit Root Tests

Stationarity of series is an important requirement for estimation of parameters of econometric models. By stationarity we mean that mean and variance of a time series are both constant[4] over time which is a prerequisite for the calculation of reliable test statistics of parameters. According to Granger and Newbold (1974), estimation with non-stationary variables may generate erroneous results and lead to misleading conclusions. Consequently, importantly series must be stationary. This study utilizing two-unit root tests to determine stationarity; i) Augmented Dickey-Fuller (ADF) and ii) Philip-Perron tests to check stationarity.

All values of variables either in natural log form or in percentages, therefore, the calculated coefficients will represents the elasticities of variables. To check the stationarity, the results of the ADF and Phillips Perron tests are presented in Table 4.1. The values of ADF and Phillips-Perron (PP) test indicate that most of the variables are stationary in level except LnBRENTOIL, LnEXRATE and LM2 but that are stationary in first difference at 5% level of significance. At level, the values of most of the variables of ADF and PP tests are lower than the critical values reported in the table at 5% level of significance. Hence, variables are non-stationary in level. However, at first difference level the, values of ADF and PP tests are higher than the critical values reported in table at 5% significance level. Hence, variables are stationary in first difference. This suggest that our model is I(1) of variables. In such cases econometrician Pesran (2001)

recommended that for estimation purpose, the best technique is Autoregressive Distributed Lags Model.

4.4. Autoregressive Distributed Lag (ARDL) Model

After trying various specifications of regression, we have selected ARDL (Autoregressive Distributed Lag) model to determine the relationship between global economic policy uncertainty and returns of stock markets along with other relevant macroeconomic variables in Pakistan. As discussed earlier, ARDL approach is used when order of integration of the variables are stationary in first difference i.e. In this way, ARDL approach gives unbiased estimates of model

Table 4.2. Unit root test results

Variables	ADF-Test		PP-Test	
	At level	At first Difference	At level	At first Difference
LnGEPU	-4.370838*	-10.73486*	4.136691*	*-18.52106
Ln BRENTOIL	-1.851238	-9.630369*	-1.931098	-9.506355*
Ln EXRATE	0.324314	-8.844203*	1.066846	-8.720121*
LM2	-2.217569	-3.150754	*-6.787446	43.57082*
PSX	-13.21706*	- 11.51035*	-13.35741*	-61.73174*
OIL&GAS	-13.73983*	-10.92499*	-13.73983*	-94.49378*
AUTO	-12.97055*	-9.341442*	13.00799*	-77.25211*
CEMENT	-12.02448*	-11.20723*	-12.02483*	-72.51786*
CHEM	-12.41858*	-12.36736*	-12.40794*	-80.34577*
FERT	-13.87550*	-9.449780*	-14.10418*	-119.8342*
FOOD &PERSONAL CARE	-11.48218*	-9.340627*	-11.55221*	-86.86455*
PHARMA	-11.25392*	-9.974352*	-11.29987*	-86.91899*

Test Values:	**Critical**	**1% level**	**-4.012944**	**1% level**	**4.012944**
		5% level	**-3.436475**	**5% level**	**-3.436475**
		10% level	**-3.142358**	**10% level**	**-3.142358**

4.5. Impact of Global Economic Policy Uncertainty on Pakistan's Stock Market.

4.5.1. Impact of GEPU on PSX Returns

First, the co-integration is checked. To evaluate the null hypothesis of no co-integration, a bound test is performed. In this test, the choice of the maximum lag length plays a crucial role. We have 172 monthly data observations with 3 parameters and their lags.

In the initial step, the long-term coefficients are estimated, and the Akaike Information Criterion (AIC) is employed to determine the optimal lag length for these coefficients. The results of long-run estimation have been reported in Table 4.3.

Table 4.3. Long run estimation result of returns of PSX and GEPU

Variables		
	Coefficient	**t-Statistics**
PSX(-1)	-0.052279	-0.670924
GEPU	-0.047944	-1.8374**
GEPU (-1)	0.065631	2.5357**
Money Supply	-0.086619	-0.40454
Money Supply(-1)	0.500858	2.08365*
Money Supply-2)	-0.460678	-2.20139*
Exchange rate	-0.372974	-1.579921
Exchange rate(-1)	0.390351	1.589794
Constant	0.189815	2.41676*

R-squared	0.135355
Adjusted R-squared	0.092657
F-statistic	3.170018
Durbin-Watson stat	1.975409
Bound test	37.18998

*and** denote significance at 5% and 10 % level respectively

4.5.1.1. Long Run Relation

We have used multivariate model to assess the effect of global economic policy uncertainty (GEPU) on the Pakistan stock market. GEPU has a negative and significant impact on the returns of Pakistan's PSX index in the long run[5], as shown in table 4.3. A one percentage point increase in global economic policy uncertainty index leads to a decrease of 0.0479 return of PSX index. The lag dependent variable of PSX has a negative sign with one-month lag period but the coefficient is not significant. It may be due to the reasons that the stock market in Pakistan is exposed to the GEPU as it depends on the foreign investment and external debt. In addition, stocks markets are negatively impacted by GEPU, particularly in small open economies like Pakistan

Furthermore, the results indicate that exchange rate has negative but insignificant relationship with returns of PSX Index. Nevertheless, the negative sign indicate that a devaluation of the PKR makes imports more expensive, especially for commodities, raw materials, and intermediate goods. This can increase production costs for businesses, potentially leading to higher inflation. Higher costs and inflationary pressures can negatively affect corporate profitability, impacting stock returns

The money supply has negative but insignificant effect on returns of the PSX index. However, soon the negative effect of the money supply on returns of the PSX index is eroded which turned out to be positive which is significant at 5 %. One percent increase in the expansionary money supply leads to an increase of 0.500858 in returns of the PSX with period of

one-month lag. It may be due to the reasons that an expansion of the money supply increases the overall liquidity in the financial system. Investors, armed with more cash, are likely to allocate funds to various assets, including stocks, contributing to higher demand and potentially positive stock returns.

However, the second lag of the money supply negatively affects the returns of the PSX index. It may be due to the investors' perceptions that an excessive increase in money supply can lead to inflationary pressures. If investors anticipate a significant rise in prices, it may erode the real value of corporate earnings and reduce the purchasing power of consumers. This inflation concern can lead to a negative sentiment in the stock market.

Table 4.3 shows F-statistic at 3.17 is high and significant suggesting the collective Csignificance and importance of all regressions. DW is at 1.97 which is close to 2 suggests no evidence of autocorrelation. The bound test results suggest that calculated F-statistic 37.18 is higher than upper bound critical values at 5% level of significance (2.79 to 3.67). It indicates the existence of a co-integrating between variables. The long-run coefficients have been estimated. Using the Akaike Information Criterion (AIC) of lag selection, the optimal length was determined for the long-run coefficients.

Table 4.4.Short run estimation result of returns of PSX and GEPU

Variables		
	Coefficient	**t-Statistics**
D(GEPU)	-0.047944	-2.041241*
D(Money Supply)	-0.0.086619	-0.476705
D(Money Supply(-1))	0.46067	2.601470*
D(Exchange rate)	0.3729	-1.725087**
CointEq(-1)*	-1.052279	-13.80367*
R-squared	0.559495	
Adjusted R-squared	0.548881	

(F-statistic)	37.18998	
Durbin-Watson stat	1.975409	
Breusch-Godfrey F- stats	0.4346	Prob (2,160)
	0.64	
Breusch-Pagan- Godfrey F-stats	1.655	Prob (8,162)
	0.11	

* and ** denote significance at 5% and 10 % level respectively

4.5.1.2. Short Run Dynamics

Following the estimation of the long-term coefficients, the subsequent step in ARDL analysis involves estimating Error Correction Model (ECM). ECM is a dynamic model that links a variable's current change to the gap between its past value and its long-term equilibrium. It is used to analyse the short-term connection between co-integrated variables and how quickly they adjust to their long-term equilibrium relationship. Table 4.4 reports the results. The error correction terms emerged as negative and statistically significant confirming the existence of stable long-run relationship among variables. It also suggests that after a shock, there is an approximately 103% adjustment toward long-run equilibrium within one year.

The R^2 at 0.559 indicates that the independent variables which are global economic policy uncertainty, money supply and exchange rate cause 55.1% changes in the stock market returns whereas DW is close to 2 at 1.97 suggesting no evidence of autocorrelation.

The result indicates that in short-run global economic policy uncertainty has a negative and significant impact on returns in the stock market of Pakistan as shown in table 4.4. However, the money supply and exchange rate have no significant effects on stock market returns in the short run.

4.5.1.3. Diagnostic Tests

Diagnostic tests are conducted to observe the problems in estimation relating to similarity between the distribution of a given dataset and a theoretical distribution, serial correlation, heteroskedasticity and structural changes in time series data. The diagnostic tests indicate no problem of serial correlation, and heteroskedasticity. The value of the Breusch-Godfrey serial

correlation F- stats value is 0.434. The p value in this test is greater than 0.05 so there exist no serial correlation as shown in table 4.44. For the heteroskedasticity the Breusch-Pagan-Godfrey test is used. The value for the F-stats heteroskedasticity is 1.655. The p value in this test is greater than 0.05 so there is homoscedasticity and no evidence of heteroskedasticity. This suggested that the model's approximate parameters were correct and might offer helpful insights into the effects of government economic policies and stock market regulations in Pakistan.

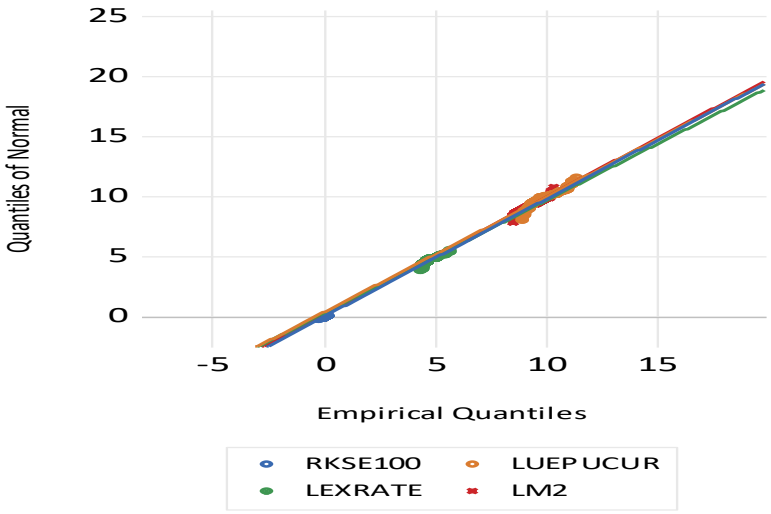


Figure 4.1 Quantile quantile plot of PSX and GEPU

Figure 4.1 shows the quantile quantile plot which depicts that the data points on the Q-Q plot adhere to a straight line that closely follows the line of equality (a 45-degree diagonal line), As the figure 1 indicates that the data closely adhere to a normal distribution (Easton & McCulloch, 1990). This is the ideal scenario, as the closer the points are on to the line, the better the fit to the normal distribution. Cumulative sum (CUSUM) test is utilized for the systematic alteration of the parameters as shown in the figure 4.2. CUSUM do not cross the critical value line at 5% showing the stability of estimated parameters. So, the parameters could be used for policy purpose.

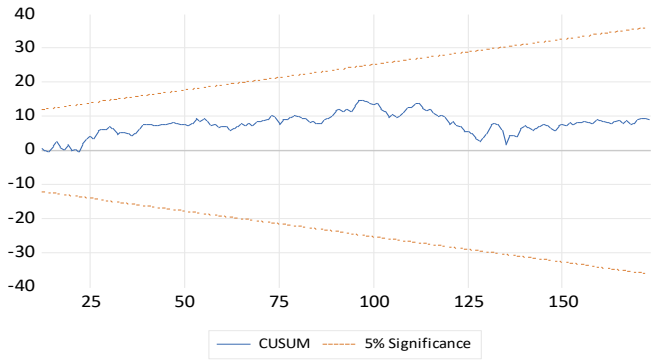


Figure 4.2. CUSUM plot of GEPU and PSX

4.5.2. Impact of GEPU on Returns of Oil and Gas Sector

4.5.2.1. Long Run Relation

Again, the long run coefficients are discussed here first. The long run is a situation in which all factors of production and cost of a firm are flexible. This may occur in a period of greater than five years. Global Economic Policy Uncertainty (GEPU) is significantly and negatively related with returns of oil and gas sector index of Pakistan's stock market, as shown in table 4.5. A one percentage point increase in global economic policy uncertainty index lead to a decline to 0.10 percent in the return of oil and gas index. The first lag of the GEPU index is negative and insignificant. The second lag of the GEPU is positive as adverse effects are eroded after two month lag period and investors do not show the bearish behaviour, so the returns are not negatively affected. The lag dependent variable with one-month lag period of oil and gas sector is insignificant.

Table 4.5. Long run estimation result of return of Oil and Gas sector and GEPU

Variables		
	Coefficient	**t-Statistics**
Oil and gas (-1)	-0.108233	-1.482
GEPU	-0.101488	-3.073600*
GEPU (-1)	-0.034372	-0.9872

GEPU (-2)	0.149543	3.6090*
Exchange rate	-0.009164	1.15260
Money Supply	0.279836	-1.2555
Money Supply (-1)	-0.307900	-0.1589
Constant	0.179992	2.2046**
R-squared	0.173622	
Adjusted R-squared	0.138134	
F-statistic	4.892332	
Durbin-Watson stat	1.984732	
Bound test (F-statistic)	46.53339	

* and ** denote significance at 5% and 10 % level respectively

Furthermore, the results indicate that exchange rate has a negative and insignificant impact on returns of oil and gas Index. It may be due to the fact that devaluation of PKR against US dollar negatively affects the behaviour of investors. The money supply positively affects the returns of the oil and gas index but coefficient is insignificant. This is possibly due to the reason that an increase in the money supply increases the financial capacity of investors to buy more stock in the market.

Table 4.5 shows the significant and high F-Statistic is at 4.89 suggests the collective significance and importance of all regressions. The R^2 at 0.173622 explains 17.3% variation of the data whereas DW at 1.98 is close to 2 indicating no evidence of autocorrelation.

The bound test result shows that calculated F-statistic 46.53 is higher than upper bound critical values at 5% significance level (2.79 to 3.67).It indicates the existence of a co-integrating between variables as shown in table 4.5). The long-run coefficients have been estimated using the Akaike Information Criterion (AIC) of lag selection and the optimal length was determined for the long-run coefficients.

4.5.2.2. Short Run Dynamics

After the estimation of the long-term coefficients, the subsequent step in ARDL analysis involves estimating the Error Correction Model (ECM). The results are presented in Table 4.6.

Table 4.6. Short run estimation results of returns of Oil and Gas sector and GEPU

Variables		
	Coefficient	**t-Statistics**
D(GEPU)	-0.101488	-3.316687*
D(GEPU(-1))	-0.149543	-4.921791*
D(Money Supply)	0.279836	1.212104
CointEq(-1)*	-1.108233	-15.43945*
R-squared	0.602485	
Adjusted R-squared	0.595344	
Durbin-Watson stat	1.984732	
Breusch-Godfrey F-stats	0.297 0.743	Prob.F(2,161)
Harvey test F-stats	0.423 0.91	Prob.F(8,162)

* and ** denote significance at 5% and 10 % level respectively

The R^2 at 0.602 indicates that the independent variables which are global economic policy uncertainty, money supply and exchange rate cause causes 60.2% changes in the stock market returns of oil and gas sector whereas DW at 1.98 is close to 2 suggesting no evidence of autocorrelation as shown in table 4.6. The error correction terms emerged as negative and statistically significant confirming an existence of stable long-run relationship among variables. It also suggests that after a shock, there is an approximately 110% adjustment toward long-run equilibrium within one year.

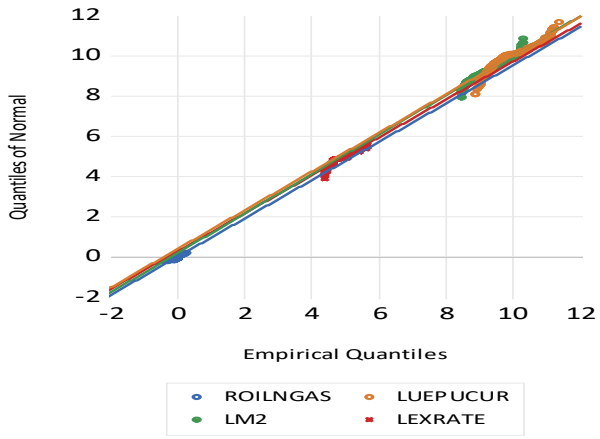


Figure 4.3. Quantile quantile plot of Oil and Gas sector and GEPU

4.5.2.3. Diagnostic Tests

The diagnostic tests indicate no problem of serial correlation, and heteroskedasticity. The value of the Breusch-Godfrey serial correlation F-stats value is 0.297 and the p value is greater than 0.05, so there exists no serial correlation as shown in table 4.5. The value for Harvey test F-stats heteroskedasticity is 0.423 and the p value is greater than 0.05 so there is homoscedasticity. This suggested that the model's approximate parameters were correct and might offer helpful insights into the effects of government economic policies and stock market regulations in Pakistan.

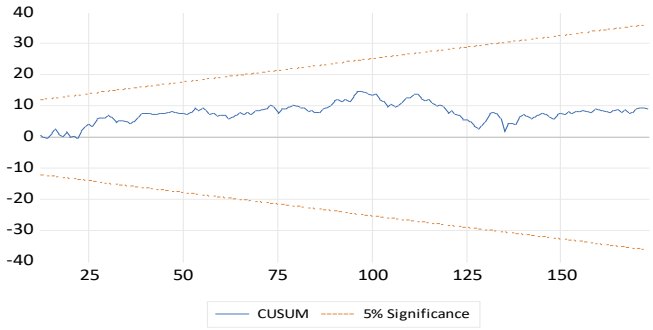


Figure 4.4 CUSUM plot of Oil and Gas sector and GEPU

Figure 4.3 shows the quantile quantile plot which depicts that the data points on the Q-Q plot adhere to a straight line that closely follows the line of equality (a 45-degree diagonal line), As the figure 1 indicates that the data closely adhere to a normal distribution (Easton & McCulloch, 1990). This is the ideal scenario, as the closer the points are on to the line, the better the fit to the normal distribution. Cumulative sum (CUSUM) test is utilized for the systematic alteration of the

parameters as shown in the figure 4.4. CUSUM do not cross the critical value line at 5% showing the stability of estimated parameters. So, the parameters could be used for policy purposes.

4.5.3 Impact of GEPU on Returns of Automobile Sector

4.5.3.1. Long Run Relation

Global Economic Policy Uncertainty has a negative and insignificant effect on returns of Automobile Assembler sector of Pakistan's stock market, as shown in table 4.7. There are four lags of dependent variable of the Automobile Assembler returns index. The one-month lag period of Automobile Assembler return is negative and insignificant. The second lag dependent variable of Automobile Assembler sector has a significant and positive impact after two months lag period. A one percentage point increase in return of Automobile Assembler index in the previous two month lead to increase of 0.1595 percent in return of Automobile Assembler index in the current month. The third lag is also positive whereas the four months lag is negative and significant. A one percentage point increase in return of Automobile Assembler index in the previous three months lead to increase of 0.1271 percent in return of Automobile Assembler index in the current month whereas one percentage point increase in return of Automobile Assembler index in the previous. Four months lead to decrease of 0.205030 in return of Automobile Assembler index in the current month.

The positive lag-dependent effect on stock returns of Automobile Assemblers sector indicate that, over time, market participants in Pakistan gain confidence and clarity leading to positive returns. The possible reasons for this relationship may be due to the fact that Automobile Assemblers sector is sensitive to global economic policies due to their dependence on international trade (Haque, Rashid, & Ahmed, 2021). A positive lag-dependent effect is related to increased demand for automobile or improved market conditions for their products in the aftermath of global economic policy changes.

The negative lag-dependent effects indicate that investors in Pakistan become more risk-averse over time in response to prolonged uncertainty. The negative lag-dependent effect on stock returns suggest that the impact of a global economic downturn takes time to be fully reflected in the performance of Automobile Assemblers. The reasons for this relationship may be due to the fact that increased economic policy uncertainty globally disrupts the supply chains, leading to increased costs and reduced profitability for the assemblers, reflected in negative stock returns after some lags.

The exchange rate has positive insignificant relationship with returns of Automobile Assembler Index. The money supply has also positive but insignificant effects on the returns of the Automobile Assembler index. The first lag of the money supply has positive and significant effect on the returns of the Automobile Assembler index. A one percent increase in the money supply leads to increase in the returns of the Automobile Assembler index by 0.7106 percent in the first lag period. It may be due to the fact that an expansion in money supply contributes to increased consumer liquidity, leading to higher spending on automobiles. As consumer demand rises, the profitability and stock returns of Automobile Assemblers increases albeit with a delay.

However, the second lag of money supply has negative effects on the returns of the automobile assembler sector. This negative effect may be due to the possibility of reduction in consumer demand and profitability after two lag period .A one percent increase in the money supply leads to decrease in the returns of the Automobile Assembler sector by 0.6901 percent in the second lag period. The third lag of the money supply negatively affects but insignificant. The negative lag effects of money supply are due to the fact that investors might be concerned about the potential overvaluation of stocks in response to an increase in money supply. As market participants reassess valuations, it leads to a correction in stock prices after some lags.

Table 4.7. Long run estimation result of returns on Automobile Assembler sector and GEPU

Variables		
	Coefficient	**t-Statistics**
Automobile assembler (-1)	-0.047328	-0.625155
Automobile assembler (-2)	0.159523S	2.152431*
Automobile assembler (-3)	0.127176	1.733479**
Automobile assembler (-4)	-0.205030	-2.830432*
GEPU	-0.038638	-1.082386
GEPU (-1)	-0.078147	-1.833723**
GEPU (-2)	-0.005263	-0.125354

GEPU (-3)	0.094507	2.676165*
Exchange Rate	0.044201	0.667761
Money supply	0.508014	1.510291
Money supply (-1)	0.710679	2.016332*
Money supply (-2)	-0.690112	-1.932799*
Money supply (-3)	-0.539691	-1.575186
Constant	0.163017	1.475198
R-squared	0.099140	
Adjusted R-squared	0.060214	
F-statistic	2.546895	
Durbin-Watson stat	2.057135	
Bound test (F-statistic)	14.50570	

* and ** denote significance at 5% and 10 % level respectively

The significant and high F-Statistic at 2.546895 suggests collective importance of all regressions. DW is close to 2 at 2.05 suggesting no autocorrelation.

The bound test results suggest that calculated F-statistic 14.50 is higher than upper bound critical values at 5% significance level (2.79 to 3.67). It indicates the existence of a co-integrating relation between variables, as shown in figure 4.7. The long-run coefficients have been estimated using the Akaike Information Criterion (AIC) of lag selection and the optimal length was determined for the long-run coefficients.

4.5.3.2 Short Run Dynamics

After the estimation of the long-term coefficients, the next step in ARDL analysis involves estimating short run coefficients using Error Correction Model (ECM). ECM is used to analyse

the short-term connection between co-integrated variables and how quickly they adjust to their long-term equilibrium relationship. The results are presented in Table 4.8.

Table 4.8.Short run estimation result of returns on Automobile Assembler sector and GEPU

Variables		
	Coefficient	**t-Statistics**
D(Automobile Assembler (-1))	-0.081670	-0.707979
D(Automobile Assembler (-2))	0.077854	0.775969
D(Automobile Assembler (-3))	0.205030	2.894950*
D(GEPU)	-0.038638	-1.153537
D(GEPU (-1))	-0.089244	-2.625876*
D(GEPU (-2))	-0.094507	-2.821567*
D(Money Supply)	0.508014	1.990755*
D(Money Supply)	1.229803	4.811338*
D(Money Supply)	0.539691	2.035537*
Cointegration(-1)	-0.965658	-7.66085*
R-squared	0.616518	
Adjusted R-squared	0.594674	
Durbin-Watson stat	1.976664	
Breusch-Godfrey F stats	0.039 0.961	Prob. F (2,152)
Breusch-Pagan- Godfrey F-stats	1.035 0.4200	Prob. F (13,154)

* and ** denote significance at 5% and 10 % level respectively

The R^2 at 0.6165 indicates that the independent variables which is global economic policy uncertainty, money supply and exchange rate cause causes 61.6% changes in the stock market returns of automobile sector of Pakistan stock market. Negative and statistically significant error correction terms indicated the existence of a stable long-run relationship between variables. It also suggests that, following a disturbance, there is a 96.5% adjustment toward long-term equilibrium within one year.

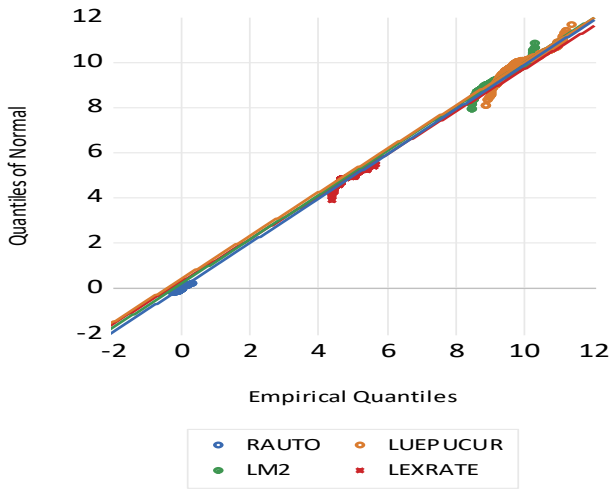


Figure 4.5 Quantile quantile plot of Automobile Assembler sector and GEPU

4.5.3.3 Diagnostic Tests

Diagnostic tests are conducted to observe the problem in estimation. The DW-statistics is at 1.97. If the Durbin-Watson statistic is between 1.5 and 2.5, it is considered indicative of no significant autocorrelation. A value below 1.5 might suggest positive autocorrelation, while a value above 2.5 might suggest negative autocorrelation. The DW-statistics is 1.97, thus it can be drawn that there is no evidence of autocorrelation.

The diagnostic tests indicate no problem of serial correlation, and heteroskedasticity. The value of the Breusch-Godfrey serial correlation F-stats value is 0.039 and the p value is greater than 0.05, so there exists no serial correlation as shown in table 4.8. The value for Breusch-Pagan-Godfrey F-stats heteroskedasticity is 1.035 and the p value is greater than 0.05 so there is homoscedasticity. This suggested that the model's approximate parameters were correct and might offer helpful insights into the effects of government economic policies and stock market regulations in Pakistan.

The Quantile quantile plot depicts that return on automobile sector and the money supply data lies on the line of equality and adhere the normal distribution whereas the exchange rate and the global economic policy uncertainty data points deviate below the line of equality, it suggests that the tails of the data distribution have lighter tails (i.e., fewer extreme values) than those of a normal distribution as shown in figure 4.5 (Easton & McCulloch, 1990). This indicates negative skewness. Cumulative sum (CUSUM) test is utilized for the systematic alteration of the parameters as shown in the figure 4.6. The plot demonstrate that the model is stable, as the plot of the CUSUM do not cross the critical value line at 5% showing the stability of estimated parameters. Thus, this parameter could be used for policy purposes.

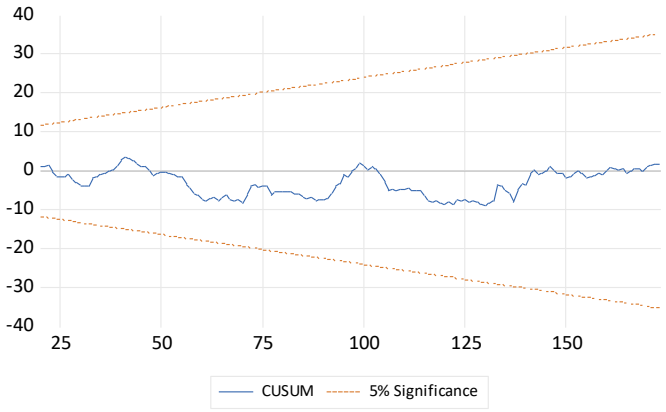


Figure 4.6 CUSUM plot of automobile assembler sector and GEPU

4.5.4. Impact of GEPU on Returns of Cement Sector

4.5.4.1. Long Run Relation

Global Economic Policy Uncertainty has a negative but insignificant impact on returns of cement index of Pakistan's stock market as shown in table 4.9. The lag dependent variable of cement sector is also insignificant with one-month lag period. The exchange rate has a significantly negative relationship with, returns of cement. One percent increase in the US dollar against Pakistani rupees leads to a decrease in the returns of cement sector index by 1.12 percent. The first lag effect of the exchange rate is positive but insignificant. Changes in the exchange rate reflects broader economic conditions. A significantly negative relationship in this equation indicate that a depreciating currency is associated with economic downturns, leading to reduced construction

activity and, subsequently, lower demand for cement affecting the returns of cement sector adversely.

The money supply has a negative and significant effect on the returns of the cement index. A one percent increase in the money supply leads to decrease of 0.049 percent in the returns of the cement index. This may be due to the reason that an increase in money supply may lead to a depreciating local currency. This, in turn, can increase the cost of importing inputs and materials, negatively affecting profit margins and stock returns for cement companies.

Table 4.9.Long run estimation results of returns on Cement sector and GEPU

Variables		
	Coefficient	**t-Statistics**
Cement (-1)	0.042205	0.561430
GEPU	-0.048547	-1.231742
GEPU(-1)	0.059234	1.499403
Money Supply	-0.049014	-3.012893*
Exchange rate	-1.128239	3.030186*
Exchange rate(-1)	1.176352	-1.410120
Constant	0.146049	1.194172
R-squared	0.107497	
Adjusted R-squared	0.074844	
F-statistic	3.292144	
Durbin-Watson stat	1.978374	
Bound test (F-statistic)	32.84854	

* and ** denote significance at 5% and 10 % level respectively

Table 4.9 shows the F-Statistic at 3.29 suggests collective importance of all regressions. DW is close to 2 at 1.97 which suggest no evidence of autocorrelation.

The bound test results confirm that calculated F-statistic 32.84 is greater than upper bound critical values at 5% significance level (2.79 to 3.67). It indicates the existence of a co-integration between the variables as shown in Table 4.9. The long-run coefficients have been estimated using the Akaike Information Criterion (AIC) of lag selection, and the optimal length was determined for the long-run coefficients.

4.5.4.2. Short Run Dynamics

Error Correction Model estimation follows the estimation of the long-run coefficients as the concluding step in ARDL analysis. The results are presented in Table 4.10.

Table 4.10. Short run estimation results of return on Cement sector and GEPU

Variables		
	Coefficient	**t-Statistics**
D(GEPU)	-0.048547	-1.349828
D(Exchange rate)	-1.128239	-3.407132*
Co-integration (-1)	-0.957795	-12.97107*
R-squared	0.506022	
Adjusted R-squared	0.500142	
Durbin-Watson stat	2.046184	
Breusch-Godfrey F stats	0.518 0.59	Prob. F (2,162)
Breusch-Pagan- Godfrey F-stats	0.722 0.632	Prob. F (6,164)

* and ** denote significance at 5% and 10 % level respectively

The error correction terms turned out to be statistically significant and negative, supporting the stability of the long-term relationships between the variables. It also indicates that, following a disturbance, there is a 95.7% adjustment toward long-term equilibrium within one year. The R^2 at 0.506 indicates that the independent variables that are the global economic policy uncertainty,

money supply and exchange rate cause 50.6% changes in the returns of cement sector of Pakistan stock market.

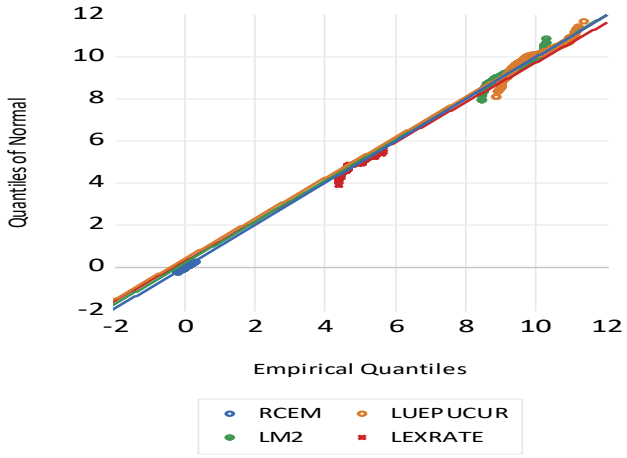


Figure 4.7 Quantile quantile plot of Cement sector and GEPU

4.5.4.3. Diagnostic Tests

Diagnostic tests are conducted to observe the problems in estimation related to serial correlation and heteroskedasticity. The DW-statistics is at 12.046. If the Durbin-Watson statistic is between 1.5 and 2.5, it is considered indicative of no significant autocorrelation. A value below 1.5 might suggest positive autocorrelation, while a value above 2.5 might suggest negative autocorrelation. The DW-statistics is 1.97, thus it can be drawn that there is no evidence of autocorrelation.

Further, the diagnostic tests indicate no problem of serial correlation, and heteroskedasticity. The value of the Breusch-Godfrey serial correlation F stats value is 0.5180 and the p value is higher than 0.05 so there exist no serial correlation. The value for the F-stats heteroskedasticity is 0.722 and p value is higher than 0.05 so there is homoscedasticity. This suggested that the model's approximate parameters were correct and might offer helpful insights into the effects of government economic policies and stock market regulations in Pakistan.

The Quantile quantile plot depicts that return on cement sector and the money supply data adhere to the line of equality indicating that data closely adhere to a normal distribution whereas the exchange rate and the global economic policy uncertainty data points deviate below the line of equality, it suggests that the tails of the data distribution have lighter tails (i.e., fewer extreme values) than those of a normal distribution as shown in figure 4.7 (Easton & McCulloch,1990). This indicates negative skewness. Cumulative sum (CUSUM) test is utilized for the systematic alteration of the parameters as demonstrated in the figure 4.8. The plot demonstrate that the model is stable, as the plot of the CUSUM do not cross the critical value line at 5% suggesting the stability of estimated parameters. Thus, the parameters can be used for policy purposes.

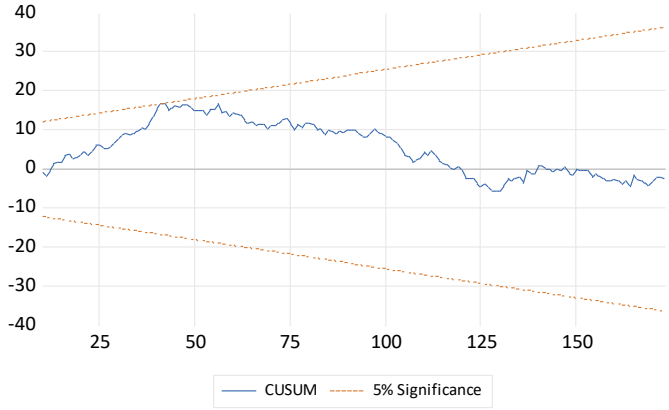


Figure 4.8 CUSUM plot of Cement sector and GEPU

4.5.5. Impact of GEPU on Returns of Chemical Sector

4.5.5.1. Long Run Relation

Global Economic Policy Uncertainty has significant and negative effect on returns of chemical index of Pakistan's stock market as shown in table 4.11. A one percentage point increase in global economic policy uncertainty index lead to a decline 0.0654 return of Chemical index.

Table 4.11. Long run estimation results of returns on Chemical sector and GEPU

Variables		
	Coefficient	**t-Statistics**
Chemical(-1)	0.027994	0.361316

GEPU	-0.065480	-1.878957**
GEPU(-1)	0.007841	0.189493
GEPU(-2)	0.059758	1.732524**
Exchange rate	-0.024596	-0.364745
Money Supply	0.006193	0.201061
Constant	0.050844	0.474185
R-squared	0.040315	
Adjusted R-squared	0.005204	
F-statistic	1.148230	
Durbin-Watson stat	1.979902	

* and ** denote significance at 5% and 10 % level respectively

The first and second lag of the global economic policy uncertainty on the chemical index return are positive and significant at 10% level. A one percentage point increase in the global economic uncertainty index leads to increase in the returns of the chemical index by 0.0078 percent and 0.0597 percent in the first and second lags, respectively. This may be due to the investor risk appetite as in certain situations, investors adopt a "risk-on" behaviour when global economic policy uncertainty increases and seek higher returns by investing in riskier assets, such as stocks in industries like chemicals.

The exchange rate also has insignificantly negative relationship with, returns of chemical. The money supply has positive but insignificant effects the returns of the chemical index. The bound test results suggest that calculated F-statistic 31.55 is larger than upper bound critical values at 5% significance level (2.79 to 3.67). It indicates the existence of a co-integrating between variables, as shown in table 4.11. The long-run coefficients have been estimated. Using the Akaike Information Criterion (AIC) of lag selection, the optimal length was determined for the long-run coefficients.

4.5.5.2. Short Run Dynamics

Error Correction Model estimation follows the estimation of the long-run coefficients as the concluding step in ARDL analysis. The results are presented in Table 4.12.

Table 4.12. Short run estimation results of returns on Chemical sector and GEPU

Variables		
	Coefficient	**t-Statistics**
D(EPUCUR)	-0.065480	-2.034859*
D(EPUCUR(-1))	-0.059758	-1.842768**
Co-integration(-1)	-0.972006	-12.71286*
R-squared	0.497500	
Adjusted R-squared	0.491518	
Durbin-Watson stat	1.985496	
Breusch-Godfrey F stats	0.5154 0.59	Prob. F (2,162)
Breusch-Pagan- Godfrey F-stats	0.728 0.627	Prob. F (6,164)

*and ** denote significance at 5% and 10 % level respectively

The error correction term is negative and statistically significant, supporting the stability of the long-term relationships between the variables. It also indicates that, following a disturbance, there is a 97.2% adjustment towards long-term equilibrium within one year. R^2 at 0.497 explains 49.7% of the variance in the data.

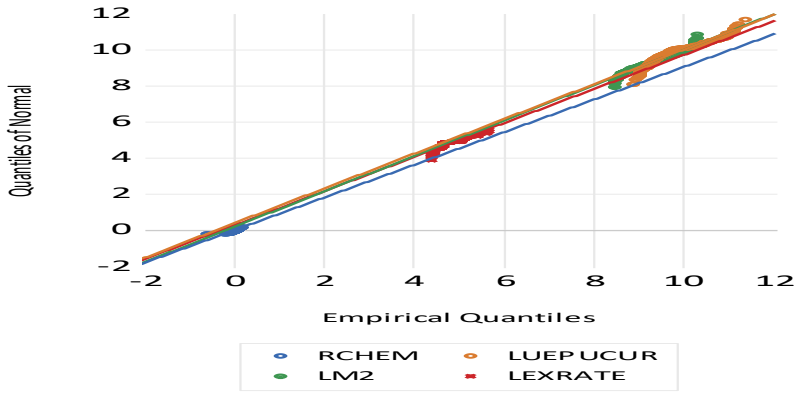


Figure 4.9 Quantile quantile plot of Chemical sector and GEPU

4.5.5.3 Diagnostic Tests

Diagnostic tests are conducted to observe the problems in estimation. The DW-statistics is 1.98, thus it can be ascertained that there is no autocorrelation. The diagnostic tests as shown in table 4.12 indicate no evidence of serial correlation, and heteroskedasticity. The value of the Breusch-Godfrey serial correlation F-stats value is 0.5154 and the p value is larger than 0.05 so there exist no serial correlation. The value for the F-stats heteroskedasticity is 0.7288 and the p value is greater than 0.05 so there is homoscedasticity. This suggested that the model's approximate parameters were correct and might offer helpful insights into the effects of government economic policies and stock market regulations in Pakistan

Figure 4.9 shows the quantile quantile plot that depicts that only the money supply lies data lies adhere the line of equality and adhere the normal distribution whereas the exchange rate and the global economic policy uncertainty and the return on the chemical sector data points deviate below the line of equality, it suggests that the tails of the data distribution have lighter tails (i.e., fewer extreme values) than those of a normal distribution (Easton & McCulloch, 1990). This indicates negative skewness. Cumulative sum (CUSUM) test is utilized for the systematic alteration of the parameters as shown in figure 4.10. The plot demonstrate that the model is stable, as the plot of the CUSUM do not cross line at 5%.

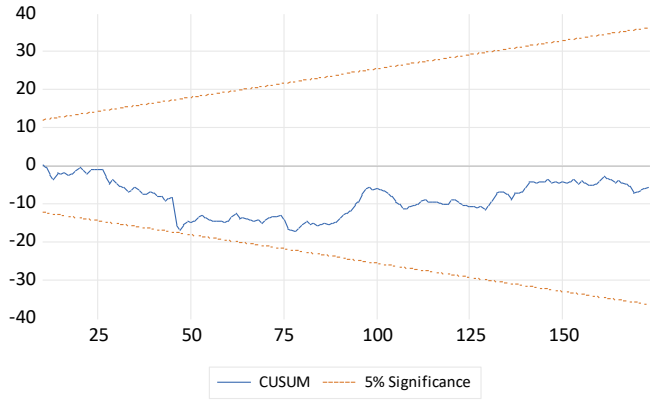


Figure 4.10. CUSUM plot of Chemical sector and GEPU

4.5.6. Impact of GEPU on Returns of Food and Personal Care Sector

4.5.6.1 Long Run Relation

Global economic policy uncertainty has an insignificant and negative impact on returns of food and personal care index of Pakistan's stock market, shown in table 4.13. The first lag of the global economic policy uncertainty on the food and personal care index is positive but insignificant impact. There are three lags periods of the lag dependent variables of returns of food and personal care product index. The first lag period is positive and insignificant. The second lag period also positively affects and is significant. One percent increase in the second lag leads to increase in the current period return of the food and personal care product index by 0.2201 percent. The third lag is negative and significant so the one percent increase in the third lag leads to decrease in the current period returns of the food and personal care product index by 0.1583 percent.

Table 4.13. Long run estimation results of returns on Food and personal care products sector and GEPU

Variables		
	Coefficient	**t-Statistics**
Food and personal care(-1)	0.093479	1.17464
Food and personal care(-2)	0.220136	2.87951*

Food and personal care(-3)	-0.158386	-2.04901*
GEPU	-0.004301	-0.159028
GEPU(-1)	0.042889	1.576414
Exchange rate	-0.087225	-1.7078**
Money supply	0.006243	0.259273
Constant	-0.026750	-0.372799
R-squared	0.103353	
Adjusted R-squared	0.064368	
F-statistic	2.651113	
Durbin-Watson stat	1.979134	
Bound test (F-statistic)	11.18210	

* and ** denote significance at 5% and 10 % level respectively

The exchange rate has significant and negative impact on returns of food and personal care index at 10% level. A negative relationship shows that a depreciating currency is associated with lower demand for food and personal care goods because of higher cost affecting the returns of in the sector adversely.

The money supply has positive but insignificant impact on the returns of the food and personal.

The significant F-Statistic at 2.01 suggests collective importance of all regressors. DW is 1.979 suggesting no autocorrelation. The bound test results suggest that calculated F-statistic 11.18 is larger than upper bound critical values at 5% significance level (2.79 to 3.67) .It indicates the existence of a co-integrating between variables, as shown in table 4.13. The long-run coefficients have been estimated. Using the Akaike Information Criterion (AIC) of lag selection, the optimal length was determined for the long-run coefficients.

4.5.6.2. Short Run Dynamics

Error Correction Model estimation follows the estimation of the long-run coefficients as the concluding step in ARDL analysis. The results are presented in Table 4.14.

Table 4.14. Short run estimation results of returns on Food and personal care products sector and GEPU

Variables			
	Coefficient	**t-Statistics**	
D(Food and personal care(-1))	-.0.061750	-0.617588	
D(Food and personal care(-2))	0.158386	2.098882*	
D(GEPU)	-0.004301	-0.175067	
Co-integration(-1)	-0.844771	-7.569647*	
R-squared	0.493798		
Adjusted R-squared	0.484595		
Durbin-Watson stat	1.979		
Breusch-Godfrey F stats	1.37	Prob. F (2,159)	0.25
Breusch-Pagan- Godfrey F-stats	1.79	Prob. F (7,161)	0.092

* and ** denote significance at 5% and 10 % level respectively

The error correction terms is statistically significant and negative, supporting the stability of the long-term relationships between the variables. It also indicates that, following a disturbance, there is an 84.4% adjustment towards long-term equilibrium within one year.

R^2 at 0.493 explains 49.3% of the variance in the data, while DW is close to 2 at 1.979 indicates no autocorrelation as shown in table 4.14.

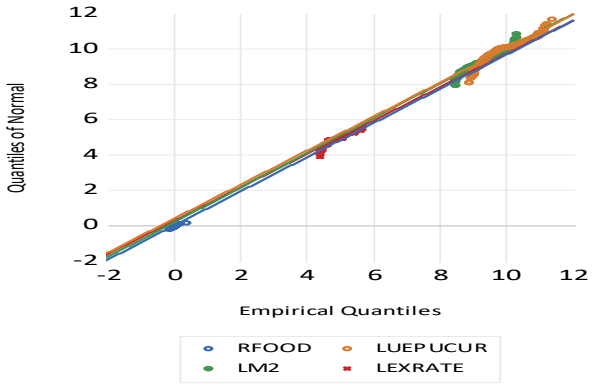


Figure 4.11 Quantile quantile plot of Food and Personal Care sector and GEPU

4.5.6.3. Diagnostic Tests

Diagnostic tests are conducted to observe the problems in econometric estimation. The DW-statistics is 1.97, thus it can be suggested that there is no evidence of autocorrelation. The diagnostic tests indicate no evidence of serial correlation, and heteroskedasticity. The value of the Breusch-Godfrey serial correlation F-stats value is 1.3717 and the p value is larger than 0.05 so there exist no serial correlation .The value for the F-stats heteroskedasticity is 1.79 and the p value is larger than 0.05 so there is homoscedasticity as shown in table 4.14. This suggested that the model's approximate parameters were correct and might offer helpful insights into the effects of government economic policies and stock market regulations in Pakistan.

As shown in figure 4.11, the quantile quantile plot that depicts that only the return on food and personal care sector data adhere the line of equality and adhere the normal distribution whereas the exchange rate and the points deviate below the line of equality, it suggests that the tails of the data distribution have lighter tails than those of a normal distribution. This indicates negative skewness. The data of the global economic policy uncertainty and the money supply data points deviate above the line of equality, it suggests that the tails of the data distribution have heavier tails (i.e., more extreme values) than those of a normal distribution. This indicates positive skewness (Easton & McCulloch, 1990). Cumulative sum (CUSUM) the test is utilized for the systematic alteration of the parameters as shown in the figure 4.12. The plot demonstrate that the model is stable, as the plot of the CUSUM do not cross the critical value line at 5%.

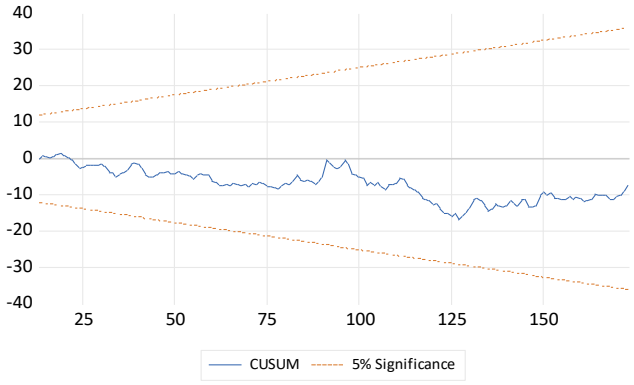


Figure 4.12 CUSUM plot of Food and Personal Care sector and GEPU

4.5.7. Impact of GEPU on returns of Pharmaceutical sector

4.5.7.1. Long run relation

Global Economic Policy Uncertainty has a positive but insignificant impact on returns of pharmaceutical index of Pakistan's stock market, as shown in table 4.15. The first lag of the global economic policy uncertainty on the pharmaceutical index is negative but insignificant impact. However, second lag is also negative and significant at 10% level. This may be due to the reasons that economic policy uncertainty affect public health related issue adversely on account of accessibility and affordability of medicines.

However, the third lag of GEPU positively affects the returns of the pharmaceutical sector and is significant at 5% level. It might be due to investors' sentiments who anticipate it positively which can contribute to positive sentiment in this sector. Positive investor sentiment may drive buying activity and increase stock returns.

There is only one lag dependent variable of the returns of pharmaceutical index. The lag dependent variable is positive and significant at 10% level. One percent increase in the first lag leads to increase in the current period return of the pharmaceutical Index by 0.138559. The exchange rate has insignificantly negative relationship with, returns of pharmaceutical index. The money supply also negatively affects but effect on the returns of the Pharmaceutical coefficient is insignificant.

The significant and high F-Statistic at 2.005 suggests collective importance of all regressors. DW is 2.01 suggesting no autocorrelation.

Table 4.15. Long run estimation results of returns on Pharmaceutical sector and GEPU

Variables		
	Coefficient	**t-Statistics**
Pharmaceutical (-1)	0.138559	1.810710*
GEPU	0.036495	0.794244
GEPU(-1)	-0.002405	-0.044118
GEPU(-2)	-0.093599	-1.7224*
GEPU(-3)	0.115965	2.55355**
Exchange rate	-0.105804	-1.181108
Money Supply	-0.006618	-0.160879
Constant	0.005433	0.038032
R-squared	0.066845	
Adjusted R-squared	0.026524	
F-statistic	1.657804	
Durbin-Watson stat	2.01	
Bound test (F-statistic)	10.29	

* and ** denote significance at 5% and 10 % level respectively

The bound test results suggest that calculated F-statistic 10.29 is larger than upper bound critical values at 5% significance level (2.79 to 3.67). It indicates the existence of a co-integrating between variables, as shown in table 4.15**.** The long-run coefficients have been estimated. Using the Akaike Information Criterion (AIC) of lag selection, the optimal length was determined for the long-run coefficients.

4.5.7.2. Short Run Dynamics

Error Correction Model estimation follows the estimation of the long-run coefficients as the concluding step in ARDL analysis. The results are presented in Table 4.16.

The error correction terms turned out to be statistically significant and negative, supporting the stability of the long-term relationships between the variables. It also indicates that, following a disturbance, there is an 86.1% adjustment towards long-term equilibrium within one year.

R^2 at 0.457 explains 45.7% of the variance in the data, while DW is 2.01indicates no autocorrelation.

Table 4.16. Short run estimation results of returns on Pharmaceutical and GEPU

Variables		
	Coefficient	**t-Statistics**
D(GEPU)	0.036495	0.853673
D(GEPU(-1))	-0.022366	-0.512303
D(GEPU(-2))	-0.115965	-2.698108*
Co-integration(-1)	-0.861441	-11.41551*
R-squared	0.457072	
Adjusted R-squared	0.447260	
Durbin-Watson stat	2.005881	
Breusch-Godfrey F stats	1.032 0.358	Prob. F (2,160)
Breusch-Pagan- Godfrey F-stats	1.035 0.4082	Prob. F (7,162)

* and ** denote significance at 5% and 10 % level respectively.

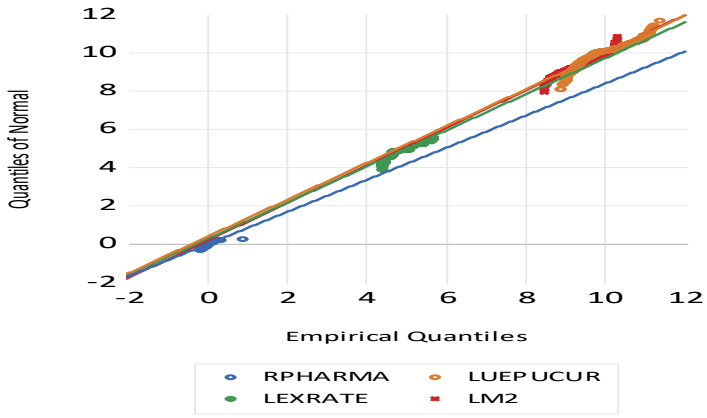


Figure 4.13 Quantile quantile plot of Pharmaceutical sector and GEPU

4.5.7.3. Diagnostic Tests

Diagnostic tests are conducted to observe the problems in estimation. The DW-statistics is 2.0, thus it can be suggested that there is no evidence of autocorrelation as shown in table 4.16. The diagnostic test indicates no serial correlation, and heteroskedasticity. The value of the Breusch-Godfrey serial correlation F-stats value is 1.0320 and the p value is larger than 0.05 so there is no existence of serial correlation. The value for the F-stats heteroskedasticity is 1.035 and the p value is larger than 0.05 so there is homoscedasticity. This suggested that the model's approximate parameters were correct and might offer helpful insights into the effects of government economic policies and stock market regulations in Pakistan.

Figure 4.13 shows the quantile quantile plot, which significantly depicts the data of return on pharmaceutical sector. There is minor deviation of the money supply below the line of equality, it suggests that the tails of the data distribution have lighter tails than those of a normal distribution. This indicates negative skewness. The data of the global economic policy uncertainty and the exchange rate data points deviate above the line of equality, it suggests that the tails of the data distribution have heavier tails than those of a normal distribution (Easton & McCulloch, 1990). This indicates positive skewness. The stability of the parameters is examined using a stability test. Cumulative sum (CUSUM) test is utilized for the systematic alteration of the parameters as shown in the figure 4.14. The plot demonstrate that the model is stable, as the plot of the CUSUM do not cross the critical value line at 5%. This indicates there exists stability of estimated parameter and therefore these parameters can be used for policy purposes.

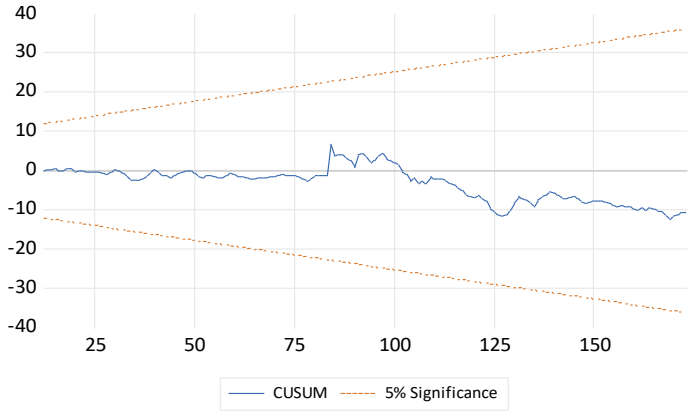


Figure 4.14 CUSUM plot of Pharmaceutical sector and GEPU

4.5.8. Impact of GEPU on returns of Fertilizer sector

4.5.8.1. Long Run Relation

Global economic policy uncertainty has an insignificant but negative impact on returns of fertilizer index of Pakistan's stock market, as shown in table 4.17. The first, second and third lags of the global economic policy uncertainty on the returns of fertilizer index are insignificant. There is only one lag dependent variable of the returns of fertilizer index which is negative and insignificant.

Table 4.17. Long run estimation results of returns on Fertilizer sector and GEPU

Variables		
	Coefficient	**t-Statistics**
Fertilizer (-1)	-0.070941	-1.4358
GEPU	-0.012757	-0.3864
GEPU (-1)	0.027843	0.75719
GEPU (-2)	-0.032742	-0.44203
GEPU (-3)	0.020322	0.4044

Exchange rate	-0.185018	-0.57861
Exchange rate(-1)	-0.130562	-0.2444
Exchange rate(-2)	0.2595524	0.642152
Exchange rate(-3)	0.152254	0.649953
Money Supply	0.331297	1.2635
Money Supply(-1)	-0.627895	-1.965122
Money Supply(-2)	0.827787	2.2539**
Money Supply(-3)	-0.603346	-1.7068
Constant	0.213515	1.614577**
R-squared	0.078937	
Adjusted R-squared	0.002182	
F-statistic	1.028425	
Durbin-Watson stat	1.939422	
Bound test	36.20304	

* and ** denote significance at 5% and 10 % level respectively

The exchange rate has insignificantly negative relationship with, returns of fertilizer index. There are also the three lags of the exchange rate. The first lag is negative whereas the second and the third lag are positive and insignificant. The money supply positively and insignificantly affects the returns of the fertilizer. The first lag of money supply is negative and is insignificant. The second lag of money supply is positive and is statistically significant. A one percent increase in the money supply leads to increase in the returns of the fertilizer index with two period lag by 0.8277 percent. This may be due to the reason that an increase in money supply may increase the demand for fertilizer positively affecting profit margins and stock returns for fertilizer companies. The third lag is negative but it is insignificant. The F-Statistic at 1.028425 do not suggests collective importance of all regressors. DW is 1.939 indicates no autocorrelation.

The bound test results suggest that calculated F-statistic 36.20 is larger than upper bound critical values at 5% significance level (2.79 to 3.67). It suggests that there appears to be a co-integrating relationship among variables, as shown in table 4.17**.** The long-run coefficients have been estimated. Using the Akaike Information Criterion (AIC) of lag selection, the optimal length was determined for the long-run coefficients.

Table 4.18.Short run estimation results of returns on Fertilizer sector and GEPU

Variables		
	Coefficient	**t-Statistics**
D(GEPU)	-0.012757	-0.314780
D(GEPU(-1))	0.012419	0.301642
D(GEPU(-2))	-0.020322	-0.502576
D(exchange rate)	-0.185018	-0.466954
D(exchange rate(-1))	-0.411778	-0.974402
D(exchange rate(-2))	-0.152254	-0.392421
D(Money Supply)	0.331297	1.089525
D(Money Supply(-1))	-0.224441	-0.741524
D(Money Supply(-2))	0.6033468*	1.974772*
Co-integration	-1.070941	-13.62559*
R-squared	0.561906	
Adjusted R-squared	0.537263	
Durbin-Watson stat	1.939422	
Breusch-Godfrey F stats	2.105	Prob. F (2,154)
	0.125	

Breusch-Pagan- Godfrey F-stats	0.534	Prob. F (13,156)
	0.900	

* and ** denote significance at 5% and 10 % level respectively

4.5.8.2. Short Run Dynamics

An Error Correction Model estimation follows the estimation of the long-run coefficients as the concluding step in ARDL analysis. The results are presented in table 4.18.

The error correction terms turned out to be statistically significant and negative, supporting the stability of the long-term relationships between the variables. It also indicates that, following a disturbance, there is a 107% adjustment towards long-term equilibrium within one year.

R^2 at 0.561 explains 56.1.7% of the variance in the data, while DW is close to 2 at 1.93 indicates no autocorrelation.

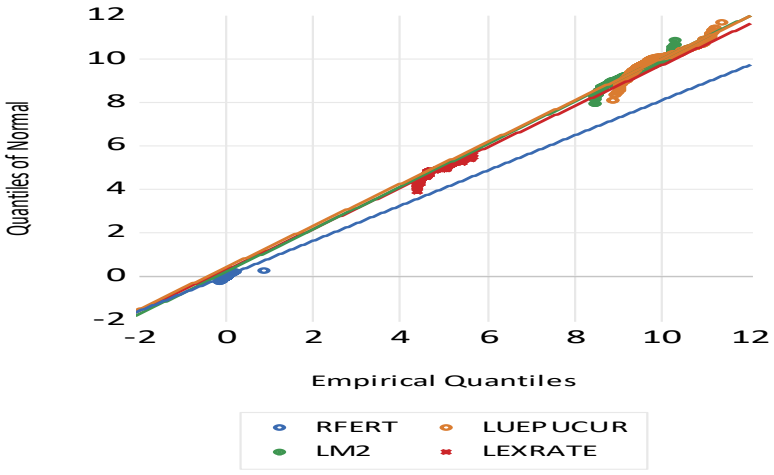


Figure 4.15 Quantile quantile plot of Fertilizer sector and GEPU

4.5.8.3. Diagnostic Tests

Diagnostic tests are conducted to observe the problem in estimation. The DW-statistics is 1.93, thus it can be suggested that there is no evidence of autocorrelation as shown in table 4.18. The diagnostic test indicates no evidence of serial correlation, and heteroskedasticity. The value of the Breusch-Godfrey serial correlation F-stats value is 2.105 and the p value is larger than the 0.05 so there exist no serial correlation .The value for the F-stats heteroskedasticity is 0.53 and the p value is greater than 0.05 so there is homoscedasticity. This suggested that the model's approximate

parameters were correct and might offer helpful insights into the effects of government economic policies and stock market regulations in Pakistan.

Figure 4.15 shows the Quantile quantile plot which significantly depicts that the data on return on fertilizer sector. There is minor deviation of the exchange rate below the line of equality, it suggests that the tails of the data distribution have lighter tails than those of a normal distribution. This indicates negative skewness. The data of the global economic policy uncertainty and the money supply data points deviate above the line of equality, it suggests that the tails of the data distribution have heavier tails than those of a normal distribution (Easton & McCulloch, 1990). This indicates positive skewness return on fertilizer sector. The stability of the parameters is examined using a stability test. Cumulative sum (CUSUM) the test is utilized for the systematic alteration of the parameters as shown in the figure 4.16. The plot demonstrate that the model appears to be stable, as the plot of the CUSUM do not cross the critical value line at 5%. This indicates stability of estimated parameters. Thus this parameters can be used for policy purposes.

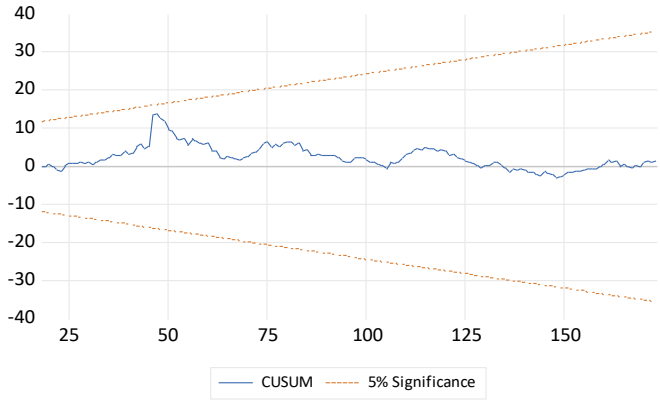


Figure 4.16 CUSUM plot of Fertilizer sector and GEPU

4.6. Impact of Oil Price Shock on Pakistan Stock Market

Not only does economic policy uncertainty impact Pakistan's stock market prices and its various sectors, but also oil price shocks have an effect. In the following sections, we will analyse the influence of oil price shocks on the Pakistan Stock Market and its diverse sectors. We will utilize the Brent oil index to assess its impact on stock returns in Pakistan, employing a Multivariate Model to examine the effects of the Brent oil index

4.6.1. Impact of Brent Oil Price Shock on PSX

4.6.1.1. Long Run Relation

Table 4.19 reveal that increases in Brent oil prices has a significant and positive impact on returns of PSX index of Pakistan's stock market in the long run. A one percentage point increase in Brent oil prices index lead to an increase of 0.1265 percent in PSX index return. It may be due to the fact that investors often interpret higher oil prices as a sign of economic vitality. Positive sentiment can lead to increased demand for stocks across various sectors, contributing to higher stock returns.

The one-month lag effect of the Brent oil prices on PSX return with coefficient at 0.1807 is significant with a negative sign. The negative effect may be due to the fact that Pakistan relies on oil imports, variations in prices of oil adversely influence the outcomes of the Pakistan stock market. Price fluctuations increase the production costs which in turn has an adverse effects on enterprise execution and stock returns.

The second month lag effect of the Brent oil prices on PSX return is significant and positive at 0.1185. In case of an in oil prices in international market, it may require 1-2 months by the government to revise or pass on oil prices. The third month lag effect of the Brent oil prices on PSX return is significant and positive at 0.0731.

The money supply has an insignificant negative affect on the returns of the PSX. However, money supply has a positive significant effect on the PSX with one lag period. One percent increase in the money supply in the previous month leads to increase in the stock return of PSX by 0.5597 percent. It may be due to the fact that an expansion of the money supply increases the overall liquidity in the financial system. Investors with more available cash, allocate funds to various assets, including stocks, contributing to higher demand and potentially positive stock returns.

The second lag effect of money supply is negative and significant. One percent increase in money supply leads to decline in the returns of the PSX by 0.4223 percent in the second lag period. This is mainly due the fact that an excessive increase in money supply may lead to inflationary pressures. If investors anticipate a significant rise in prices, it may erode the real value of corporate earnings and reduce the purchasing power of consumers. This inflation concern can lead to a negative sentiment in the stock market.

The exchange rate has negative significant effect on the returns of PSX. One percent increase in the US dollars against Pakistan rupees leads to decline in the returns of the PSX by 0.4914 percent. This is mainly due the fact that a devaluation of the PKR makes imports more expensive, especially for commodities, raw materials, and intermediate goods. This can increase production costs for businesses, potentially leading to higher inflation. Higher costs and inflationary pressures can negatively affect corporate profitability, impacting stock returns.

Soon the negative impact of the exchange rate is eroded after the one-month lag period. The first lag effect of exchange rate is positive and significant. A one percent increase in the exchange rate US dollars against Pakistani rupees in the previous month leads to increase in the returns of the PSX in the current month by 0.5565 percent. It may be due to the fact that a devalued currency makes locally produced goods and services more competitive in international markets. Export-oriented companies, whose revenues are in foreign currencies, may benefit from increased competitiveness and higher earnings in PKR terms, potentially leading to positive stock returns. In addition, multinational companies with significant overseas revenue streams in foreign currencies experience increased earnings when translated into PKR after a devaluation. This can positively impact their financial performance and stock returns. The significant and high F-Statistic at 3.078705 suggests collective importance of all regressors.

Table 4.19. Long run estimation results of returns on PSX and Brent oil

Variables		
	Coefficient	**t-Statistics**
PSX(-1)	-0.083327	-1.067473
Brent oil	0.126506	3.14330*
Brent oil(-1)	-0.180773	-2.82681*
Brent oil(-2)	0.118561	1.8299**
Brent oil(-3)	-0.073097	-1.8374**
Money Supply	-0.184288	-0.914479

Money Supply (-1)	0.559720	2.42931*
Money Supply (-2)	-0.422368	-2.09532*
Exchange rate	-0.491427	-2.11538*
Exchange rate (-1)	0.556559	2.34997*
Constant	0.22130	1.829987
R-squared	0.162219	
Adjusted R-squared	0.109528	
F-statistic	3.078705	
Durbin-Watson stat	2.030014	
Bound test	38.96239	

* and ** denote significance at 5% and 10 % level respectively

The R^2 at 0.162219 explains 16.22% variations of the data whereas DW is close to 2 at 2.03 indicating no autocorrelation.

The bound test results suggest that calculated F-statistic 38.96 is larger than upper bound critical values at 5% significance level (2.79 to 3.67). It indicates the existence of a co-integrating between variables as shown in table 4.19. The long-run coefficients have been estimated. The long-run coefficients have been estimated. Using the Akaike Information Criterion (AIC) of lag selection, the optimal length was determined for the long-run coefficients.

4.6.1.2. Short Run Dynamics

The error correction terms emerged as negative and statistically significant at 1% level as demonstrated in table 4.20, confirming an existence of stable long-run relationship among variables. It also suggests that after a shock, there is an approximately 108% adjustment toward long-run equilibrium within one year.

The R^2 at 0.590558 explains 59.055% variation of the data whereas DW is close to 2 at 2.03 indicating no autocorrelation.

Table 4.20. Short run estimation results of returns on PSX and Brent oil

Variables		
	Coefficient	**t-Statistics**
D Brent oil	0.126506	3.237119*
D Brent Oil (-1)	-0.045465	-1.127971
D Brent Oil(-2)	0.073097	1.895019**
D Money Supply	-0.184288	-1.069768
D Money Supply (-1)	0.422368	2.455484*
D Exchange rate	-0.491427	-2.344289*
Co-integration(-1)	-1.083327	-14.13198**
R-squared	0.590558	
Adjusted R-squared	0.575487	
Durbin-Watson stat	2.0300	
Breusch-Godfrey F stats	0.347	Prob. F (2,157) 0.707
Harvey test F-stats	1.191	Prob. F (10,159) 0.300

* and ** denote significance at 5% and 10 % level respectively

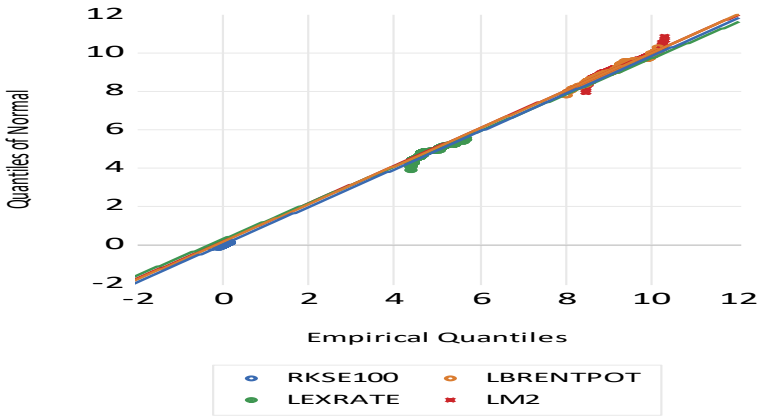


Figure 4.17 Quantile quantile plot of PSX and Brent oil

4.6.1.3. Diagnostic Tests

Diagnostic tests are conducted to observe the problems in estimation relating to similarity between the distribution of a given dataset and a theoretical distribution, serial correlation, heteroskedasticity and structural changes in time series data. The diagnostic tests as reported in table 4.20 indicate no problem of serial correlation, and heteroskedasticity. The DW-statistics is 2.03, thus it can be suggested that there is evidence of no autocorrelation. The value of the Breusch-Godfrey serial correlation F-stats value is 0.347 and the p value is greater than 0.05 so there exist no serial correlation. The value for the F-stats heteroskedasticity is 1.191 and the p value is larger than 0.05 so there is homoscedasticity. This suggests that estimated parameters of the model can provide useful understandings for the implications of government policies and regulation relating to stock market in Pakistan.

As shown in figure 4.17, the quantile quantile plot depict that the return on KSE100 sector and money supply lies data lies adhere the line of equality and adhere the normal distribution whereas there is a minor deviation of the exchange rate below the line of equality, it suggests that the tails of the data distribution have lighter tails than those of a normal distribution. This indicates negative skewness. The data of the Brent oil points deviate above the line of equality, it suggests that the tails of the data distribution have heavier tails (i.e., more extreme values) than those of a normal distribution (Easton & McCulloch, 1990). This indicates positive skewness. The consistency of the parameters is assessed with the help of stability test. Cumulative sum (CUSUM) test indicates the systematic change in the parameters as shown in the figure 4.18. The model is stable since the

plot of both the CUSUM do not cross the critical value line at 5%, suggesting the stability of estimated parameters. Thus these parameter can be used for policy purposes carefully.

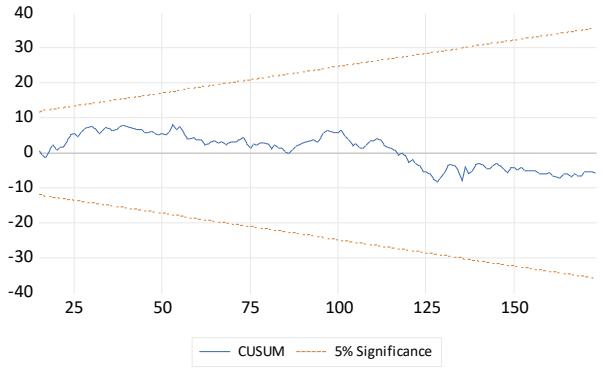


Figure 4.18 CUSUM plot of PSX and Brent oil

4.6.2. Impact of Brent Oil Price on Oil and Gas Sector

4.6.2.1. Long Run Relation

Table 4.21 reveals that in the long run, increases in Brent oil prices has a significant and positive effect on returns oil and gas index of Pakistan's stock market. A one percentage point increase in Brent oil prices index lead to an increase of 0.1984 percent on oil and gas return. It may be due to the fact that higher oil prices directly contribute to increased revenue for oil and gas companies. This is because they can sell their oil and gas products at higher prices, leading to improved top-line performance. The one-month lag effect of the Brent oil prices on oil and gas index return is insignificant and negative at 0.0123. However, the second lag effect is negative and significant. It may be due to the reason that investors may interpret a rapid increase in oil prices as a sign of economic instability or geopolitical risks. This negative sentiment lead to reduced confidence in the oil and gas sector, affecting stock returns.

The money supply has an insignificant negative effect on the returns of the oil and gas sector. The exchange rate has a negative insignificant effect on the returns of the oil and gas sector. The first lag effect of exchange rate is positive and insignificant.

The significant and high F-Statistic at 6.77 indicates the collective significance of all the regressors. The R2 at 0.2254 explains 22.54% variation of the data whereas DW is 2.0298 suggesting no evidence of autocorrelation.

Table 4.21.Long run estimation results of returns on Oil and Gas sector and Brent oil

Variables		
	Coefficient	**t-Statistics**
Oil and gas (-1)	-0.164124	-1.751366*
Brent oil	0.198466	2.518422**
Brent oil (-1)	-0.012373	-0.100935
Brent oil (-2)	-0.199116	-2.6025**
Exchange rate	-0.443108	-1.463321
Exchange rate (-1)	0.497241	1.643348**
Money supply	-0.043677	-1.413698
Constant	0.278367	1.670420**
R-squared	0.225410	
Adjusted R-squared	0.192146	
F-statistic	6.776289	
Durbin-Watson stat	2.029820	
Bound test	48.32256	

* and ** denote significance at 5% and 10 % level respectively

For co-integration, the bound test results suggest that calculated F-statistic 48.32 is higher than upper bound critical values at 5% significance level (2.79 to 3.67). It indicates the existence of a co-integrating between variables, demonstrated in table 4.21.

4.6.2.2. Short Run Dynamics

Error Correction Model estimation follows the estimation of the long-run coefficients as the concluding step in ARDL analysis. The results are presented in table 4.22

The error correction terms turned out to be statistically significant and negative, supporting the stability of the long-term relationships between the variables. It also indicates that, following a disturbance, there is a 116.4% adjustment towards long-term equilibrium within one year.

R^2 at 0.627 explains 62.7% of the variance in the data, while DW is close to 2 at 2.02 indicating no autocorrelation.

Table 4.22. Short run estimation results of returns on Oil and Gas sector and Brent oil

Variables		
	Coefficient	**t-Statistics**
D Brent oil	0.198466	4.025805
D Brent oil (-1)	0.199116	3.711649
D Exchange rate	-0.443108	-1.743592*
Cointegration	-1.164124	-15.73347**
R-squared	0.627397	
Adjusted R-squared	0.620703	
Durbin-Watson stat	2.029820	
Breusch-Godfrey F stats	0.870413 0.420	Prob. F (2,161)
Harvey test F-stats	3.2 0.0033	Prob. F (7,163)

* and ** denote significance at 5% and 10 % level respectively

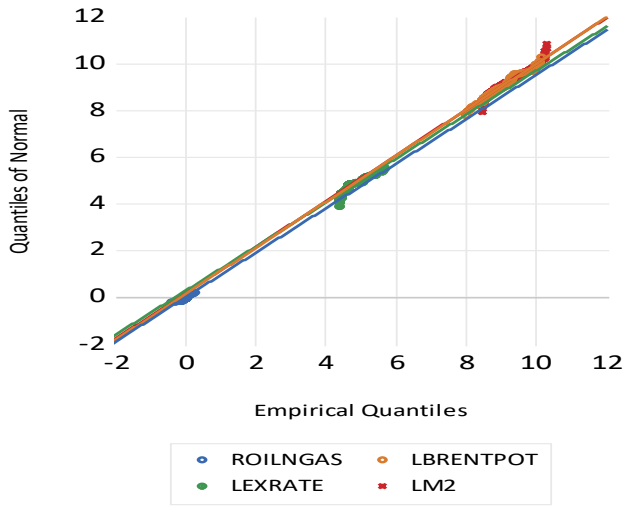


Figure 4.19 Quantile quantile plot of Oil and Gas sector and Brent oil

4.6.2.3. Diagnostic Tests

Diagnostic tests are conducted to observe the problems in estimation. The DW-statistics is 2.02, thus it can be suggested that there is no autocorrelation as shown in table 4.22. The diagnostic test indicates no evidence of serial correlation, and heteroskedasticity. The value of the Breusch-Godfrey serial correlation F stats value is 0.870413 and p value is larger than 0.05, so there exist no serial correlation. The value for the F-stats heteroskedasticity is 3.2 and p value is lower than 0.05 so there is heteroskedasticity. This suggested that the model might offer helpful insights into the effects of government economic policies and stock market regulations in Pakistan.

Figure 4.19 shows the quantile quantile plot which depicts that return on oil and gas sector data significantly follows the line of equality and there is minor deviation of the exchange rate below the line of equality, it suggests that the tails of the data distribution have lighter tails than those of a normal distribution (Easton & McCulloch, 1990). This indicates negative skewness. The money supply data points deviate above the line of equality; it suggests that the tails of the data distribution have heavier tails than those of a normal distribution. This indicates positive skewness. The Brent oil closely follows the line of equality; it indicates that the data closely follows a normal distribution. This is the ideal scenario, and the closer the points are to the line, the better the fit to the normal distribution.The stability of the parameters is examined using a stability test. Cumulative sum (CUSUM) test is utilized for the systematic alteration of the parameters as shown in the figure 4.20. The plot demonstrate that the model is stable, as the plot do not cross the critical

value line at 5%. This indicates stability of estimated parameters. So these parameters can be used for policy purposes.

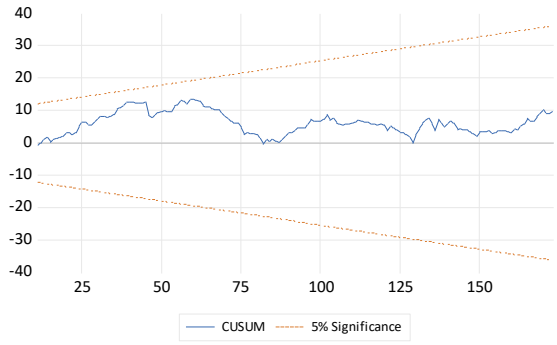


Figure 4.20 CUSUM plot of Oil and Gas sector and Brent oil

4.6.3 Impact of Brent Oil Price on Cement Sector

4.6.3.1. Long Run Relation

Table 4.23 shows that in the long run, increases in Brent oil prices has an insignificant and positive impact on returns cement index of Pakistan's stock market. The money supply has an insignificant positive effect on the returns of the cement sector. The money supply negatively and insignificantly affects the stock returns with the one lag period. However, the second lag of the money supply is positive as well as the significant. A one percent increase in the money supply leads to increase in the return of the cement index by 0.689557 percent after one month.

The exchange rate has a negative and significant effect on the returns of the cement sector. One percent increase in the US dollars against Pakistan rupees leads to decline in the returns of the cement sector by 1.222739 percent. This is mainly due to the fact that a devaluation of the PKR makes cement sector input more expensive. This can increase production costs for businesses, potentially leading to higher inflation. Higher costs and inflationary pressures can negatively affect corporate profitability, impacting stock returns adversely.

Table 4.23. Long run estimation results of returns on Cement sector and Brent oil

Variables		
	Coefficient	**t-Statistics**

Cement (-1)	0.040355	0.526050
Brent oil	0.053038	0.866484
Brent oil (-1)	-0.063043	-1.02737
Exchange rate	-1.222739	-3.23160**
Exchange rate(-1)	1.318183	3.42529**
Money supply	-0.393755	0.375153
Money supply (-1)	0.689557	-0.565280
Constant	0.209810	1.143577
R-squared	0.10350	
Adjusted R-squared	0.065003	
F-statistic	2.68838	
Durbin-Watson stat	2.009	
F-statistics (Bound test)	31.725	

* and ** denote significance at 5% and 10 % level respectively

However, the negative impact of the exchange rate is eroded shortly after one-month lag period. The first lag impact of exchange rate is positive and significant. A percent increase in the exchange rate US dollars against Pakistani rupees in the previous month leads to increase in the returns of the cement sector stocks. It may be due to the fact that a devalued currency makes locally produced goods and services more competitive in international markets. Export-oriented cement companies, whose revenues are in foreign currencies benefit from increased competitiveness and higher earnings in PKR terms, potentially leading to positive stock returns.

As reported in table 4.23, the F-Statistic at 2.688 is significant and indicates the collective significance of all the regressors. The R^2 at 0.10350 explains 10.35% variations of the data whereas DW is close to 2 at 2.009 indicating no evidence of autocorrelation.

The bound test results imply that calculated F-statistic 31.725 is higher than upper bound critical values at 5% significance level (2.79 to 3.67) suggesting that there appears to be a co-integrating relationship among variables

4.6.3.2. Short Run Dynamics

Error Correction Model estimation follows the estimation of the long-run coefficients as the concluding step in ARDL analysis. The results are presented in table 4.24

The error correction terms turned out to be statistically significant at 1 % and negative, supporting the stability of the long-term relationships between the variables. It also indicates that, following a disturbance, there is a 95.9% adjustment towards long-term equilibrium within one year.

R^2 at 0.53812 explains 53.8% of the variance in the data, while DW is close to 2 at 2.009 suggesting no autocorrelation.

Table 4.24. Short run estimation results of returns on Cement sector and Brent oil

Variables		
	Coefficient	**t-Statistics**
D(Brent oil)	0.053038	0.889349
D(Exchange rate)	-1.222739	-3.649734
D(Money Supply)	0.117015	0.415730
Cointegration	-0.959645	-12.74827*
R-squared	0.53812	
Adjusted R-squared	0.494898	
Durbin-Watson stat	2.009	
Breusch-Godfrey F stats	0.107179	Prob. F (2,161)
	0.898	

Breusch-Pagan- Godfrey F-stats	0.777 0.607	Prob. F (7,163)

* and ** denote significance at 5% and 10 % level respectively

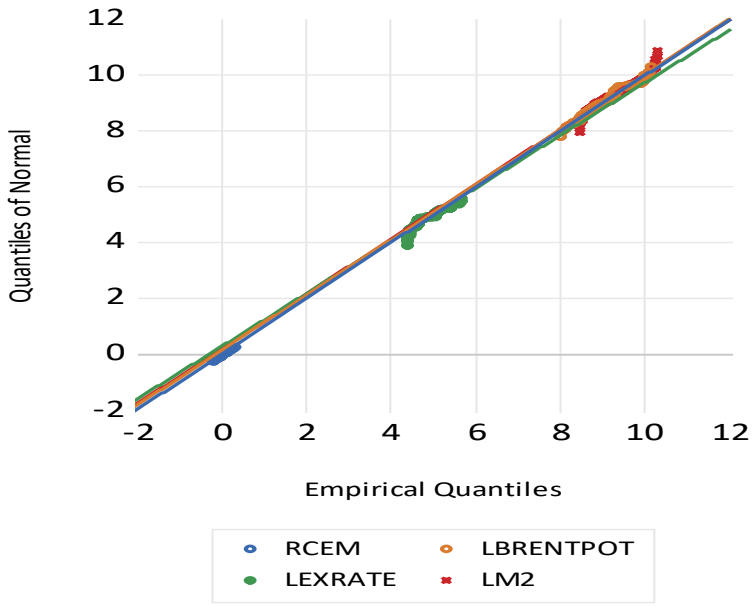


Figure 4.21 Quantile quantile plot of Cement sector and Brent oil

4.6.3.3. Diagnostic Tests

Diagnostic tests are conducted to observe the problem in estimation. Table 24 demonstrate the DW-statistics that is 1.993, thus it can be suggested that there is no problem of autocorrelation. The diagnostic test indicates no evidence of serial correlation, and heteroskedasticity. The diagnostic test indicates no problem of serial correlation, and heteroskedasticity. The value of the Breusch-Godfrey serial correlation F stats value is 0.107179 and the p value is higher than 0.05 so there exist no serial correlation. The value for the F-stats heteroskedasticity is 0.777 and p value is greater than 0.05 so there is homoscedasticity. This suggested that the model's approximate parameters were correct and might offer helpful insights into the effects of government economic policies and stock market regulations in Pakistan

As figure 4.21 shows the quantile quantile plot which depicts that return on cement sector data follows the lines of equality and the exchange rate minor deviate below the line of equality, it suggests that the tails of your data distribution have lighter tails than those of a normal distribution. This indicates negative skewness. The money supply data points deviate above the line of equality;

it suggests that the tails of the data distribution have heavier tails than those of a normal distribution (Easton & McCulloch, 1990). This indicates positive skewness. The Brent oil closely follows the line of equality; it indicates that the data closely follows a normal distribution. This is the ideal scenario, and the closer the points are to the line, the better the fit to the normal distribution. The stability of the parameters is examined using a stability test.

Cumulative sum (CUSUM) test is utilized for the systematic alteration of the parameters as shown in the figure 4.22. The plot demonstrate that the model is stable, as the plot of both do not cross the critical value line at 5%. This indicates stability of estimated parameters. Therefore, this parameter may be used for policy purposes.

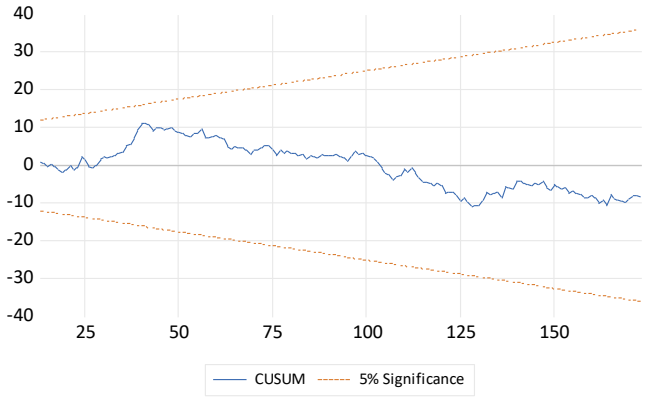


Figure 4.22 CUSUM plot of Cement sector and Brent oil

4.6.4. Impact of Brent Oil Price on Automobile Assembler Sector

4.6.4.1. Long Run Relationship

Table 4.25 reveal that increases in Brent oil prices has an insignificant and negative impact on returns automobile assembler index of Pakistan's stock market in the long run. This may be due to the fact that higher oil prices lead to increased fuel costs, impacting consumers' disposable income. As fuel costs rise, consumers may cut back on spending, including purchasing new automobiles which in turn negatively affect the demand for cars and, consequently, the returns of automobile assemblers.

The one-month lag effect of the Brent oil prices on Automobile Assembler return is positively significant at 0.3215. This may be due to the investors' sentiments as rising oil prices

may lead to a shift in consumer preferences toward more fuel-efficient or high-performance vehicles that can lead to increased sales and higher returns in the sector.

In addition, the Brent oil prices negatively significantly affects the automobile assembler with the two-month lag effect. A one percentage point increase in Brent oil prices lead to a decrease of 0.2408 percent on return of Automobile Assembler. It may be due to the lag involves in revision of prices in the domestic market after increase in oil prices in international market.

There are four lag effect of the dependent variable Automobile Assembler. The first three lag of the automobile assembler are positive but only the second lag dependent of automobile assembler is significant. One percent increase in the automobile assembler index returns leads to an increase of 0.1628 percent in the returns of the automobile assembler in second lag period. In the fourth lag period the returns of the automobile assembler negatively significantly affect the returns of the

Table 4.25. Long run estimation results of returns of Automobile Assembler sector and Brent oil

Variables		
	Coefficient	**t-Statistics**
Automobile Assembler (-1)	0.001619	0.022149
Automobile Assembler (-2)	0.162864	2.200642*
Automobile Assembler (-3)	0.120086	1.673609**
Automobile Assembler (-4)	-0.156415	-2.161316*
Brent oil	-0.093308	-1.651616**
Brent Oil (-1)	0.321512	3.709742*
Brent Oil (-2)	-0.240841	-4.250982*
Exchange rate	0.063183	0.186938
Exchange rate (-1)	-0.672419	-1.233138
Exchange rate (-2)	0.664429	1.940025*
Money Supply	0.325201	1.107415

Money Supply (-1)	0.502392	1.497375
Money Supply (-2)	-0.867272	-3.007359*
Constant	0.231533	1.319860
R-squared	0.241833	
Adjusted R-squared	0.177832	
F-statistic	3.778585	
Durbin-Watson stat	2.018293	
Bound test	8.820857	

* and ** denote significance at 5% and 10 % level respectively

Automobile assembler. One percent increase in the automobile assembler index returns leads to decrease in the returns of the automobile assembler by 0.1564 percent.

The money supply has an insignificant positive impact on the returns of the Automobile Assembler sector. The money supply also positively insignificantly affects the stock returns with the one lag period. However, the second lag of the money supply is negative and significant. A one percent increase in the money supply leads to decrease in the return of the automobile assembler index by 0.867 percent.

The exchange rate has positive insignificant impact on the returns of the Automobile assembler sector. The first lag impact of exchange rate is negative and insignificant. The second month lag effect of the exchange rate is positive and significant. One percent increase in the US dollars against Pakistan rupees leads to increase in the returns of the automobile sector by 0.6644 percent.

The exchange rate has positive insignificant impact on the returns of the Automobile assembler sector. The first lag impact of exchange rate is negative and insignificant. The second month lag effect of the exchange rate is positive and significant. One percent increase in the US dollars against Pakistan rupees leads to increase in the returns of the automobile sector by 0.6644 percent.

The bound test results suggest that calculated F-statistic 8.82 is higher than upper bound critical values at 5% significance level (2.79 to 3.67) suggesting that there appears to be a co-integrating relationship among variables, as shown in table 4.25.

Table 4.26. Short run estimation result of returns of Automobile Assembler sector and Brent oil

Variables			
	Coefficient	**t-Statistics**	
D(Automobile Assembler(-1))	-0.126536	-1.073422	
D(Automobile Assembler (-2))	0.036329	0.362904	
D(Automobile Assembler (-3))	0.156415	2.207493*	
D(Brent Oil)	-0.093308	-1.706857**	
D(Brent Oil (-1))	0.240841	4.436840*	
D(Exchange rate)	0.063183	0.197694	
D(Exchange rate(-1))	-0.664429	-2.138554*	
D(Money Supply)	0.325201	1.302298	
D(Money Supply (-1))	0.867272	3.489411*	
Cointegration (-1)	-0.871846	-6.726801*	
R-squared	0.632253		
Adjusted R-squared	0.611306		
Durbin-Watson stat	2.018293		
Breusch-Godfrey F stats	0.0926	Prob. F (2,152)	0.911
Breusch-Pagan-Godfrey F stats	0.998	Prob. F (13,154)	0.455

* and ** denote significance at 5% and 10 % level respectively

4.6.4.2 Short Run Dynamics

Error Correction Model estimation follows the estimation of the long-run coefficients as the concluding step in ARDL analysis. The results are presented in Table 4.26.

The error correction terms turned out to be statistically significant at 1 % and negative, supporting the stability of the long-term relationships between the variables. It also indicates that, following a disturbance, there is a 87.1% adjustment towards long-term equilibrium within one year. The R^2 at 0.6322 explains 63.22% variation of the data whereas DW is 2 indicating no autocorrelation.

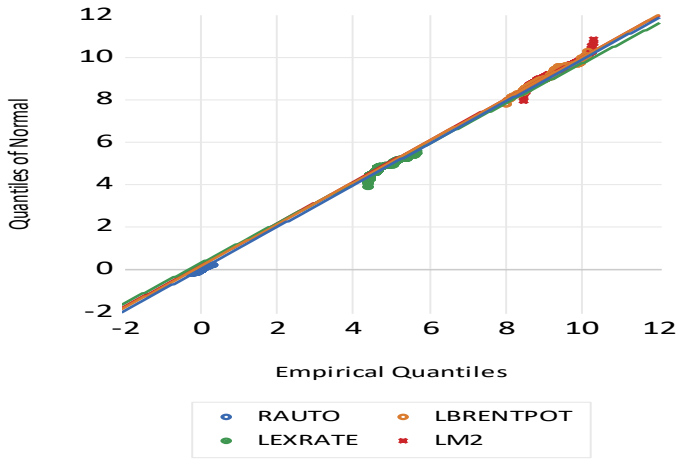


Figure 4.23 Quantile quantile plot of Automobile Assembler sector and Brent oil

4.6.4.3 Diagnostic Tests

Diagnostic tests are conducted to observe the problems in econometrics estimation. The DW-statistics is 2.01 as shown in table 4.26, thus it can be suggested that there is no autocorrelation. The diagnostic test indicates no evidence of serial correlation, and heteroskedasticity. The diagnostic test indicates no problem of serial correlation, and heteroskedasticity. The value of the Breusch-Godfrey serial correlation F stats value is 0.0926 and p value higher than 0.05 so there is no serial correlation. The value for the F-stats heteroskedasticity is 0.998 and p value greater than 0.05, so there is homoscedasticity. This suggested that the model's approximate parameters were correct and might offer helpful insights into the effects of government economic policies and stock market regulations in Pakistan.

As shown in figure 4.23, the quantile quantile plot depicts that there is a minor deviation of the exchange rate below the line of equality, it suggests that the tails of the data distribution have lighter tails than those of a normal distribution. This indicates negative skewness. The money supply data points deviate above the line of equality; it suggests that the tails of the data distribution have heavier tails than those of a normal distribution (Easton & McCulloch, 1990). This indicates positive skewness. The return on automobile sector and Brent oil closely follows the line of equality, it indicates that the data closely follows a normal distribution. This is the ideal scenario, and the closer the points are to the line, the better the fit to the normal distribution. The consistency of the parameters is assessed with the help of stability test. Cumulative sum (CUSUM) test shows the systematic change in the parameters as shown in figure 4.24. The plot indicate that the model is stable since the plot of both do not cross the critical value line at 5%, which indicates the stability of estimated parameters. Thus this parameter can be used for policy purposes.

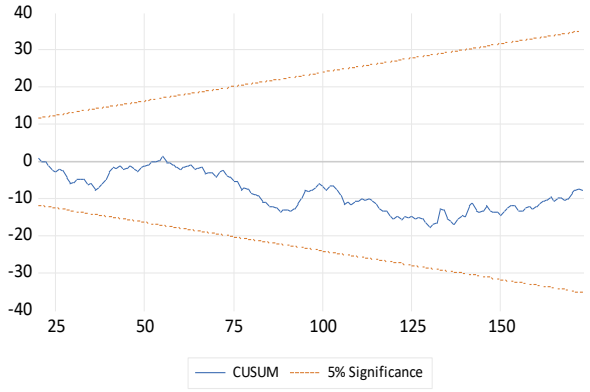


Figure 4.24 CUSUM plot of Automobile Assembler sector and Brent oil

4.6.5. Impact of Brent Oil on Chemical Sector

4.6.5.1. Long Run Relation

Table 4.27 reveal that in the long run, increases in Brent oil prices has an insignificant and positive impact on returns chemical sector of Pakistan's stock market. There are five period lag effects of the Brent oil. The first four lags effect are negative an insignificant. The fifth month lag effect has negative and significant impact. A one percentage point increase in Brent oil prices lead to a decrease of 0.1103 on returns chemical sector. The long lag effect may be due to lags involves in revision of oil prices in domestic market following in the international market. The negative effect may be due to the fact that chemical industry relies on petroleum-based raw materials. An

increase in Brent oil prices can raise the cost of these inputs, leading to higher production costs for chemical companies and resulting in reduced profit margins and lower returns in the sector.

Table 4.27. Long run estimation results of returns on Chemical sector and Brent oil

Variables		
	Coefficient	**t-Statistics**
Chemical(-1)	0.015196	0.189417
Brent Oil	0.078059	1.394021
Brent Oil (-1)	-0.030718	-0.336777
Brent Oil (-2)	-0.071513	-0.747088
Brent Oil (-3)	0.067717	0.699910
Brent Oil (-4)	0.037287	0.401348
Brent Oil (-5)	-0.110314	-1.923473*
Exchange rate	-0.408589	-1.243260
Exchange rate (-1)	0.479266	1.438249
Money supply	0.121780	0.343347
Money supply(1)	0.014102	0.035015
Money supply(2)	0.145785	0.381930
Money supply(3)	-0.414224	-1.090912
Money supply(4)	-0.614667	-1.543375
Money supply(5)	0.709797	2.050735**
Constant	0.295992	1.624267
R-squared	0.133219	

Adjusted R-squared	0.047681
F-statistic	1.55742
Durbin-Watson stat	2.002804
Bound test	30.66255

* and ** denote significance at 5% and 10 % level respectively

There is one lag effect of the dependent variable Chemical sector index which is positive but insignificant.

The money supply has an insignificant positive impact on the returns of the Chemical sector. There are five-month lag effect of the money supply on the chemical index return. The first two lag effects are positive and insignificant at 0.014102 and 0.145785. The third and fourth lag of the money supply is negative and insignificant. However, the fifth lag the money supply is positive and significantly influences the money supply. A one percent increase in the money supply leads to an increase in the return of the chemical returns by 0.7097 percent.

The exchange rate has negative but insignificant effect on the returns of the Chemical sector. Soon the adverse effect of the exchange rate is eroded after the one-month lag period. The first lag impact of exchange rate is positive but insignificant.

Table 4.28. Short run estimation result of returns on Chemical sector and Brent oil

Variables		
	Coefficient	**t-Statistics**
D (Brent oil)	0.078059	1.423452
D (Brent oil) (-1)	0.076823	1.326244
D (Brent oil) (-2)	0.005310	0.090278
D (Brent oil) (-3)	0.073027	1.266629
D (Brent oil) (-4)	0.110314	1.974836*

D (Exchange rate)	-0.408589	-1.362420	
D (Money Supply)	0.121780	0.417094	
D (Money Supply)(-1)	0.173309	0.595434	
D (Money Supply)(-2)	0.319094	1.328089	
D (Money Supply)(-3)	-0.095130	-0.330623	
D(Money Supply)(-4)	-0.709797	-2.498981*	
Co integration(-1)	-0.984804	-12.54382*	
R-squared	0.540926		
Adjusted R-squared	0.508555		
Durbin-Watson stat	2.00280		
Breusch-Godfrey F stats	0.178	Prob. F (2,150)	0.836
Breusch-Pagan-Godfrey F stats	0.986	Prob. F (15,152)	
	0.472		

* and ** denote significance at 5% and 10 % level respectively

F-Statistic at 1.55742 indicates the joint significance of all the regressors. DW is 2.002804 suggesting no evidence of autocorrelation.

The bound test results as shown in table 4.27 suggest that calculated F-statistic 30.7 is just above the higher bound critical values at 5% significance level (2.79 to 3.67) suggesting that there appears to be a co-integrating relationship among variables.

4.6.5.2. Short Run Dynamics

Error Correction Model estimation follows the estimation of the long-run coefficients as the concluding step in ARDL analysis. The results are presented in Table 4.28

The error correction terms turned out to be statistically significant at 1 % and negative, supporting the stability of the long-term relationships between the variables. It also indicates that, following

a disturbance, there is a 98.4% adjustment towards long-term equilibrium within one year. The R^2 at 0.540 explains 54% variation of the data whereas DW is 2 indicating no autocorrelation.

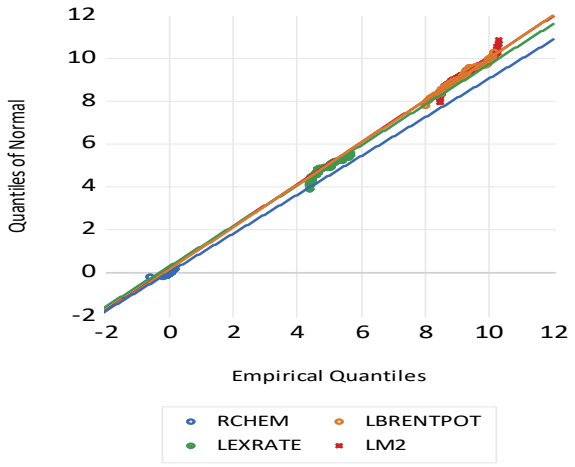


Figure 4.25 Quantile quantile plot of Chemical sector and Brent oil

4.6.5.3. Diagnostic Tests

Diagnostic tests are conducted to observe the problems in estimation. The DW-statistics is 2.0, thus it can be deduced that there is no autocorrelation as shown in table 28. The diagnostic test indicates no evidence of serial correlation, and heteroskedasticity. The diagnostic test indicates no problem of serial correlation, and heteroskedasticity. The value of the Breusch-Godfrey serial correlation F stats value is 0.178 and p value is higher than 0.05 so there is no serial correlation. The value for the F-stats heteroskedasticity is 0.986 and p value is greater than 0.05 so there is homoscedasticity. This suggested that the model's approximate parameters were correct and might offer helpful insights into the effects of government economic policies and stock market regulations in Pakistan.

As shown in figure 4.25, the quantile quantile plot depicts that return on chemical sector data significantly deviate and there is minor deviation exchange rate below the line of equality, it suggests that the tails of the data distribution have lighter tails than those of a normal distribution. This indicates negative skewness. The Brent oil and money supply closely follows the line of equality, it indicates that the data closely follows a normal distribution (Easton & McCulloch,

1990). This is the ideal scenario, and the closer the points are to the line, the better the fit to the normal distribution. The stability of the parameters is examined using a stability test.

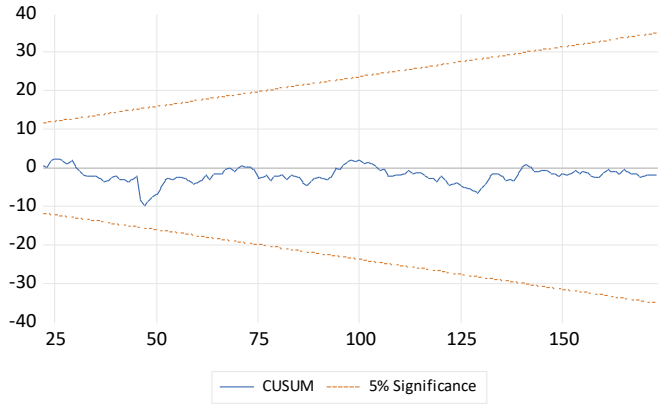


Figure 4.26 CUSUM plot of Chemical sector and Brent oil

Cumulative sum (CUSUM) test is utilized for the systematic alteration of the parameters as shown in the figure 4.26. The plot demonstrate that the model is stable, as the plot of the CUSUM do not cross the critical value line at 5%. Thus, this parameter could be used for policy purposes.

4.6.6 Impact of Brent Oil on Fertilizer Sector

4.6.6.1. Long Run Relations

Table 4.29 reveal that increases in Brent oil prices has a positive impact on returns Fertilizer sector of Pakistan's stock market which is significant at 10 percent in the long run. A one percentage point increase in Brent oil prices lead to an increase of 0.1087 percent on returns Fertilizer sector. It may be due to the fact that the fertilizer industry in Pakistan heavily relies on natural gas as a feedstock for the production of urea. Natural gas prices are often linked to oil prices. When oil prices increase, it can lead to lower natural gas prices, reducing the production costs for fertilizer companies and improving profit margins and returns in the sector.

Table 4.29. Long run estimation result of returns on Fertilizer sector and Brent oil

Variables		
	Coefficient	**t-Statistics**

Fertilizer(-1)	-0.089094	-1.115342
Fertilizer(-2)	-0.019408	-0.244995
Brent Oil	0.108706	1.670265**
Brent Oil (-1)	-0.087463	-0.855628
Brent Oil (-2)	-0.001315	-0.019914
Exchange rate	-0.252972	-0.621694
Exchange rate (-1)	-0.107524	-0.163194
Exchange rate (-2)	0.414410	1.000472
Money supply	0.035035	0.102026
Money supply(1)	-0.541907	-1.402040
Money supply(2)	0.451296	1.318714
Constant	0.116003	0.588516
R-squared	0.079916	
Adjusted R-squared	0.015859	
F-statistic	1.247585	
Durbin-Watson stat	1.944268	
Bound test	18.56206	

* and ** denote significance at 5% and 10 % level respectively

There are two period lag effects of the Brent oil. Both the lags effects are negative and insignificant. There are two lag effect of the dependent variable Fertilizer sector index which are negative and insignificant. The money supply has an insignificant positive effect on the returns of the Fertilizer sector. The first month lag effect of the money supply on the fertilizer sector is negative but insignificant. The second lag effect is positive but insignificant. A one percent increase in the money supply leads to increase in the return of the Fertilizer index by 0.451296 in

Table 4.30.Short run estimation result of returns of Fertilizer sector and Brent oil

Variables			
	Coefficient	**t-Statistics**	
D Fertilizer(-l)	0.019408	0.250869	
D Brent oil	0.108706	1.7311**	
D Brent oil (-1)	0.001315	0.020627	
D Exchange rate	-0.252972	-0.655524	
D Exchange rate (-1)	-0.414410	-1.093584	
D Money Supply	0.035035	0.120807	
D Money Supply(-1)	-0.451296	-1.543841	
Cointegration(-1)	-1.108502	-9.754996*	
R-squared	0.562372		
Adjusted R-squared	0.543462		
Durbin-Watson stat	1.944268		
Breusch-Godfrey F stats	3.48	Prob. F (2,156)	0.033
Breusch-Pagan-Godfrey F stats	0.258	Prob. F (11,158)	0.992

* and ** denote significance at 5% and 10 % level respectively

the second month lag. The exchange rate has negative but insignificant effect on the returns of the Fertilizer sector. The exchange rate with one lag has negative insignificant impact on the returns of the fertilizer sector. The second month lag effect of exchange rate is positive but insignificant so no conclusion is drawn.

The table 4.29 reports the F-statistic at 1.247 indicates collective insignificance of all the regressors. The R^2 at 0.0799 explains 7.9% variation of the data whereas DW is close to 2 at 1.94 suggesting no autocorrelation.

The bound test results suggest that calculated F-statistic 1.247 is lower than upper bound critical values at 5% significance level (2.79 to 3.67). It suggests that there exists no co-integrating relationship among variables.

4.6.6.2. Short Run Dynamics

Error Correction Model estimation follows the estimation of the long-run coefficients as the concluding step in ARDL analysis. The results are presented in Table 4.30.

The error correction is statistically significant at 1 % and negative, supporting the stability of the long-term relationships between the variables. It also indicates that, following a disturbance, there is a 110% adjustment towards long-term equilibrium within one year. The R^2 at 0.540 explains 54% variation of the data whereas DW is close to 2 at 1.944268 indicating no autocorrelation.

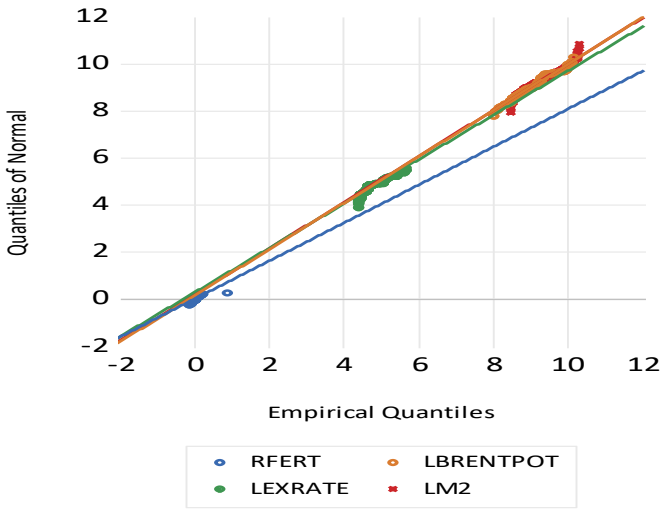


Figure 4.27 Quantile quantile plot of Fertilizer sector and Brent oil

4.6.6.3. Diagnostic Tests

Diagnostic tests are conducted to observe the problems in estimation. The DW-statistics is 1.944 as mentioned in table 4.30, thus it can be drawn that there is no autocorrelation. The value

of the Breusch-Godfrey serial correlation F stats value is 3.48 and p value is lower than 0.05. The value for the F-stats heteroskedasticity is 0.258 and p value is greater than 0.05 so there is homoscedasticity. This suggested that the model might offer helpful insights into the effects of government economic policies and stock market regulations in Pakistan. As the figure 4.27 shows the quantile quantile plot which depicts that return on fertilizer sector data significantly deviate and there is minor deviation exchange rate below the line of equality, it suggests that the tails of the data distribution have lighter tails than those of a normal distribution. This indicates negative skewness. The money supply data points slightly deviate above the line of equality; it suggests that the tails of the data distribution have heavier tails than those of a normal distribution. This indicates positive skewness. The Brent oil and money supply closely follows the line of equality, it indicates that the data closely follows a normal distribution (Easton & McCulloch, 1990).This is the ideal scenario, and the closer the points are to the line, the better the fit to the normal distribution.The stability of the parameters is examined using a stability test. Cumulative sum (CUSUM) test is utilized for the systematic alteration of the parameters as shown in the figure 4.28. The plot demonstrate that the model is stable, as the plot of the CUSUM do not cross the critical value line at 5%. This indicates stability of parameter. Thus, this parameter may be used for policy purposes.

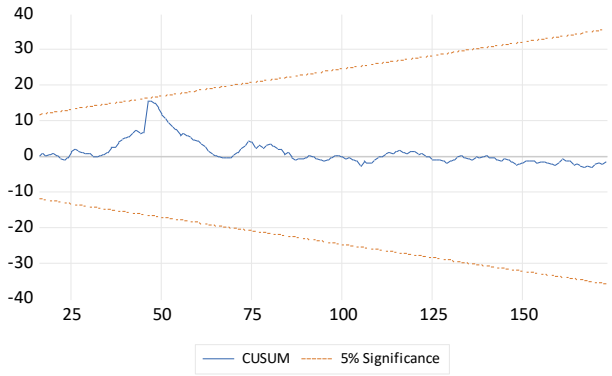


Figure 4.28 CUSUM plot of Fertilizer sector and Brent oil

4.6.7. Impact of Brent Oil on Food and Personal Care Product Sector

4.6.7.1. Long Run Relation

Table 4.31 show that increases in Brent oil prices has a positive but insignificant impact on returns Food and personal care sector of Pakistan's stock market in the long run. There are two period lag effects of the Brent oil. The one-month lag effect is negative and significant at 10%

level. A one percentage point increase in Brent oil prices lead to a decrease of 0.1131 percent on return of Food and personal care index. A negative relationship shows that an increasing oil price is associated with higher cost and lower demand for food and personal care goods affecting the returns of in the sector adversely. The second month lag effect is positive but insignificant.

Table 4.31. Long run estimation results of returns of Food and Personal Care Products sector and Brent oil

Variables		
	Coefficient	**t-Statistics**
Food and personal care products(-1)	0.071238	0.910387
Food and personal care products(-2)	0.215107	2.724246*
Brent Oil	0.053953	1.215698
Brent Oil (-1)	-0.113193	-1.622075**
Brent Oil (-2)	0.044238	0.977218
Exchange rate	-0.161391	-0.587165
Exchange rate (-1)	0.172022	0.389510
Exchange rate (-2)	0.016627	0.059886
Money supply	0.100472	0.439736
Money supply(1)	0.173394	0.669347
Money supply(2)	-0.280200	-1.235619
Constant	0.060375	0.452712
R-squared	0.091520	
Adjusted R-squared	0.028271	
F-statistic	1.446980	

Durbin-Watson stat	1.916994
Bound test	9.232822

* and ** denote significance at 5% and 10 % level respectively

There are two lag effects of the dependent variable Food and personal care sector index. The first month lag is positive and insignificant whereas the second month lag is also positive but it is significant. One percent increase in the food and personal care index returns leads to increase in the first lag of the food and personal care index return by 0.2151 percent.

The money supply has an insignificant positive impact on the returns of the Food and personal care product sector. The first and second-months lags effects of the money supply on the food and personal care product sector are positive but insignificant.

The exchange rate has negative but insignificant effect on the returns of the food and personal care product sector. Both exchange rate one and second lags effects are positive but insignificant. F-Statistic at 1.44698 indicates collective insignificance of all the repressors. The R^2 at 0.0915 explains 9.15% variations of the data whereas DW is 1.916 suggesting no autocorrelation.

The bound test results presented in table 4.31 suggest that calculated F-statistic 9.23 is higher than upper bound critical values at 5% significance level (2.79 to 3.67). It suggests that there is a co-integrating relationship among variables.

4.6.7.2. Short Run Dynamics

Error Correction Model estimation follows the estimation of the long-run coefficients as the concluding step in ARDL analysis. The results are presented in table 4.32

The error correction terms turned out to be statistically significant at 1 % and negative, supporting the stability of the long-term relationships between the variables. It also indicates that, following a disturbance, there is a 71.3% adjustment towards long-term equilibrium within one year. The R^2 at 0.4855explains 48.55% variation of the data whereas DW is close to 2 at 1.916 indicating no autocorrelation.

Table 4.32. Short run estimation results of Food and Personal Care Products and Brent oil

Variables		
	Coefficient	**t-Statistics**
D Food and personal care(-1)	-0.215107	-2.785977*
D Brent Oil	0.053953	1.259637
D Brent Oil (-1)	-0.044238	-1.011671
D Exchange rate	-0.161391	-0.619567
D Exchange rate (-1)	-0.016627	-0.066147
D Money supply	0.100472	0.516753
D Money supply(1)	-0.280200	1.427731
Co-integration (1)	-0.713654	-6.879885*
R-squared	0.485573	
Adjusted R-squared	0.463344	
Durbin-Watson stat	1.916994	
Breusch-Godfrey F stats	2.51 0.083	Prob. F (2,156)
Breusch-Pagan-Godfrey F stats	0.796 0.624	Prob. F (11,158)

* and ** denote significance at 5% and 10 % level respectively

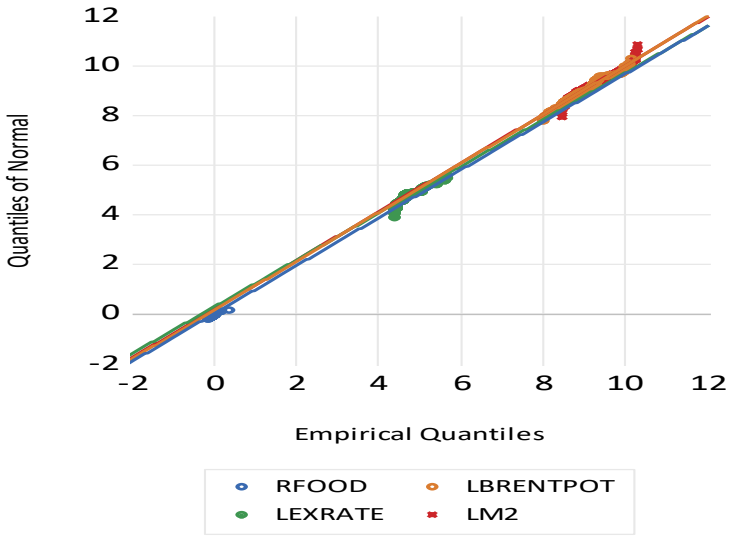


Figure 4.29 Quantile quantile plot of Food and Personal Care Products sector and Brent oil

4.6.7.3. Diagnostic Tests

Diagnostic tests are conducted to observe the problems in econometric estimation. The DW-statistics is 1.916 as reported in table 32, thus it can be deduced that there is no autocorrelation. The diagnostic test indicates no evidence of serial correlation, and heteroskedasticity. The diagnostic test indicates no problem of serial correlation, and heteroskedasticity. The value of the Breusch-Godfrey serial correlation F-stats value is 2.51and p value is larger than 0.05 so there exist no serial correlation. The value for the F-stats heteroskedasticity is 0.7969 and p value is greater than 0.05 so there is homoscedasticity. This implied that estimated parameters of the model were true and can provide useful insights for the implications of government policies and regulation relating to stock market in Pakistan.

The figure 4.29 shows the quantile quantile plot depicts that the of return on food sector data and exchange rate data slightly deviate below the line of equality, it suggests that the tails of the data distribution have lighter tails than those of a normal distribution. This indicates negative skewness. The money supply data points slightly deviate above the line of equality; it suggests that the tails of the data distribution have heavier tails than those of a normal distribution. This indicates positive skewness. The Brent oil closely follows the line of equality; it indicates that the data closely follows a normal distribution. This is the ideal scenario, and the closer the points are to the line, the better the fit to

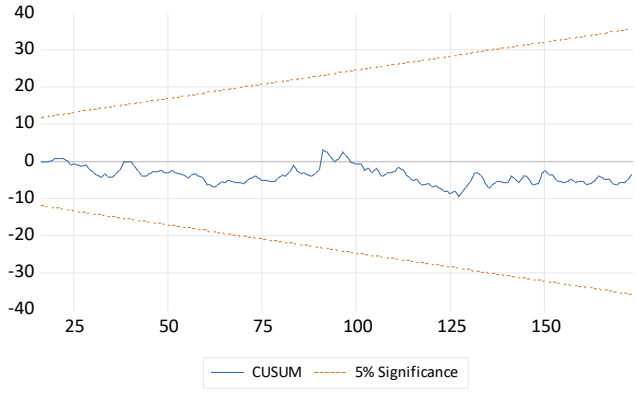


Figure 4.30 CUSUM plot of Food and Personal Care Products sector and Brent oil

the normal distribution (Easton & McCulloch,1990). The consistency of the parameters is assessed with the help of stability test. Cumulative sum (CUSUM) test is useful for the systematic change in the parameters as shown in the figure 4.30. The plot depict that the model appears to be stable since the plot of the CUSUM do not cross the critical value line at 5%. This indicates stability of estimated parameters, so this parameter can be used for policy purposes.

4.6.8. Impact of Brent Oil on Pharmaceutical sector

4.6.8.1. Long Run Relation

Table 4.33 indicates that in the long run, increases in Brent oil prices has a negative but insignificant effect on returns Pharmaceutical sector of Pakistan's stock market. Nevertheless, negative sign shows that an increasing oil price is associated with higher cost and lower demand for Pharmaceutical products affecting the returns in the sector adversely. There are two period lag effects of the Brent oil, but both are insignificant.

There are three lag effect of the dependent variable of Pharmaceutical sector. All three are insignificant.

The money supply and its first lag has a positive but insignificant effect on the returns of the Pharmaceutical sector. The second lag effect is negative and significant at 10%. A one percentage increase in the money supply leads to decrease in the return of the Pharmaceutical sector by 0.6607 percent in the second month of a lag. This may be due to the investors' perceptions that an excessive increase in money supply in the long run can lead to inflationary pressures. If investors

anticipate a significant rise in prices, it may erode the real value of corporate earnings and reduce the purchasing power of consumers. This inflation concern can lead to a negative sentiment in the stock market.

The exchange rate has negative and insignificant effect on the returns of Pharmaceutical sector. The exchange rate has positive but insignificant impact on the returns of the Pharmaceutical sector in the first month lag. The second month lag of exchange rate is negative and insignificant.

Table 4.33. Long run estimation results of returns of Pharmaceutical sector and Brent oil

Variables		
	Coefficient	**t-Statistics**
Pharmaceutical (-1)	0.108913	1.375091
Pharmaceutical (-2)	0.095755	1.201501
Pharmaceutical (-3)	-0.086314	-1.090396
Brent Oil	-0.042566	-0.564022
Brent Oil (-1)	-0.065773	-0.556851
Brent Oil (-2)	0.067916	0.885493
Exchange rate	-0.158587	-0.335278
Exchange rate (-1)	0.431244	0.564525
Exchange rate (-2)	-0.220733	-0.457827
Money supply	0.616870	1.557703
Money supply(1)	0.025684	0.057327
Money supply(2)	-0.660799	-1.685069**
Constant	0.271965	1.138258
R-squared	0.085615	

Adjusted R-squared	0.015278
F-statistic	1.217205
Durbin-Watson stat	1.994402
Bound test	10.75263

* and ** denote significance at 5% and 10 % level respectively

F-Statistic at 1.217 suggests the no joint significance of all the regressors. The R^2 at 0.0856 explains 8.56% variations of the data whereas DW is close to 2 at 1.99 suggesting no autocorrelation. The bound test results suggest that calculated F-statistic 10.75 is higher than upper bound critical values at 5% significance level (2.79 to 3.67) suggesting there is a co-integrating relationship among variables as reported in table 4.33.

4.6.8.2. Short Run Dynamics

Contrary to the long run, an increase money supply has a positive and significant effect on returns Pharmaceutical sector of Pakistan's stock market in the short run. This may be due to the fact that an expansion of the money supply increases the overall liquidity in the financial system. Investors, armed with more cash allocate more funds to various assets, including stocks, contributing to higher demand and potentially positive stock returns in the Pharmaceutical sector.

Error Correction Model estimation follows the estimation of the long-run coefficients as the concluding step in ARDL analysis. The results are presented in table 4.34.

The error correction terms turned out to be statistically significant at 1 % and negative, supporting the stability of the long-term relationships between the variables. It also indicates that, following a disturbance, there is a 88.1% adjustment towards long-term equilibrium within one year. The R^2 at 0.468218 explains 46.82% variation of the data whereas DW is close to 2 at 1.994 indicating no autocorrelation.

Table 4.34. Short run estimation results of return of Pharmaceutical sector and Brent oil

Variables

	Coefficient	t-Statistics
D Pharmaceutical (-1)	-0.009440	0.91816
D Pharmaceutical (-2)	0.086314	1.112313
D Brent Oil	-0.042566	-0.584113
D Brent Oil (-1)	-0.067916	-0.920216
D Exchange rate	-0.158587	-0.354497
D Exchange rate (-1)	0.220733	0.507667
D Money supply	0.616870	1.838078**
D Money supply(1)	0.660799	1.940512*
Cointegration (1)	-0.881647	-7.425746
R-squared		0.468218
Adjusted R-squared		0.441629
Durbin-Watson stat		1.994402
Breusch-Godfrey F stats	0.147	Prob. F (2,154) 0.863
Breusch-Pagan-Godfrey F stats	0.824	Prob. F (12,156) 0.625

* and ** denote significance at 5% and 10 % level respectively

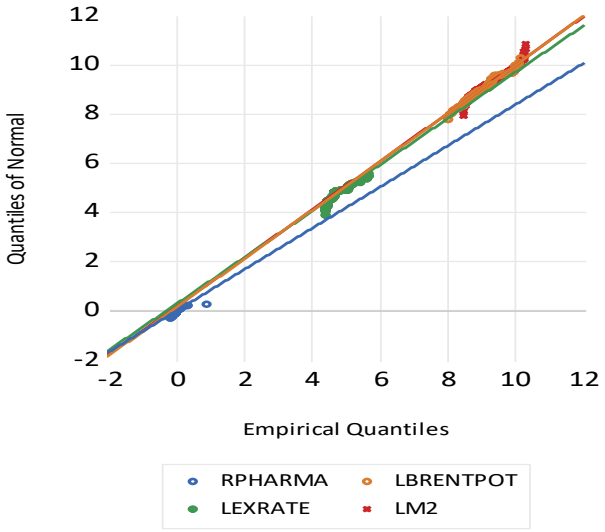


Figure 4.31 Quantile quantile plot of Pharmaceutical sector and Brent oil

4.6.8.3. Diagnostic Tests

Diagnostic tests are conducted to observe the problem in estimation. Table 34 reports that the DW-statistics is 1.99, thus it can be suggested that there is no autocorrelation. The diagnostic test indicates no evidence of serial correlation, and heteroskedasticity. The value of the Breusch-Godfrey serial correlation F stats value is 0.1473 and p value is higher than 0.05 so there exist no serial correlation. The value for the F-stats heteroskedasticity is 0.824 and p value is higher than 0.05 so there is homoscedasticity. This suggested that the model's approximate parameters were correct and might offer helpful insights into the effects of government economic policies and stock market regulations in Pakistan.

The quantile quantile plot as shown in figure 4.31 depicts that the return on pharmaceutical sector data significantly and exchange rate data slightly deviate below the line of equality, it suggests that the tails of the data distribution have lighter tails than those of a normal distribution. This indicates negative skewness. The money supply data points slightly deviate above the line of equality; it suggests that the tails of the data distribution have heavier tails than those of a normal distribution. This indicates positive skewness. The Brent oil closely follows the line of equality; it indicates that the data closely follows a normal distribution. This is the ideal scenario, and the closer the points are to the line, the better the fit to the normal distribution (Easton & McCulloch, 1990). The stability of the parameters is examined using a stability test. Cumulative sum (CUSUM) test is useful for the systematic change in the parameters as shown in the figure 4.32.

The plot depict that the model is stable since the plot of the CUSUM do not cross the critical value line at 5%. This indicates stability of estimated parameter. Thus this parameter may be used for policy purposes.

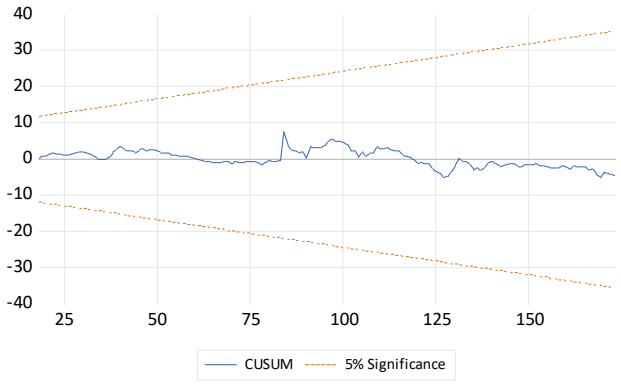


Figure.32 CUSUM plot of pharmaceutical and Brent oil

4.9.1. Summary table of the results on the impact of the Global Economic Policy Uncertainty on the Pakistan Stock Market.

H_1	Global Economic Policy Uncertainty significantly impact the returns of the Pakistan Stock Market.	Accepted
H_2	The exchange rate significantly negatively impact the Pakistan Stock Market returns.	Rejected
H3	The money supply significantly positively impact the Pakistan Stock Market returns	Accepted
H_4	Global Economic Policy Uncertainty significantly impact the returns of the oil and gas sector.	Accepted
H_5	The exchange rate significantly negatively impact the oil and gas sector returns.	Rejected
H_6	The money supply significantly positively impact the oil and gas sector returns.	Rejected
H_7	Global Economic Policy Uncertainty significantly impact the returns of the automobile assembler sector.	Accepted
H_8	The exchange rate significantly negatively impact the automobile assembler sector returns.	Rejected
H_9	The money supply significantly positively impact the automobile assembler sector returns.	Accepted
H_{10}	Global Economic Policy Uncertainty significantly impact the returns of the cement sector.	Rejected
H_{11}	The exchange rate significantly negatively impact the cement sector returns.	Accepted
H_{12}	The money supply significantly positively impact the cement sector returns.	Accepted
H_{13}	Global Economic Policy Uncertainty significantly impact the returns of the fertilizer sector.	Rejected
H_{14}	The exchange rate significantly negatively impact the fertilizer sector returns.	Rejected
H_{15}	The money supply significantly positively impact the fertilizer sector returns.	Accepted
H_{16}	Global Economic Policy Uncertainty significantly impact the returns of the chemical sector.	Accepted
H_{17}	The exchange rate significantly negatively impact the chemical sector returns.	Rejected
H_{18}	The money supply significantly positively impact the chemical sector returns.	Rejected

H_{19}	Global Economic Policy Uncertainty significantly impact the returns of the food and personal care product sector.	Rejected
H_{20}	The exchange rate significantly negatively impact the food and personal care product sector returns.	Accepted
H_{21}	The money supply significantly positively impact the food and personal care product sector returns.	Rejected
H_{22}	Global Economic Policy Uncertainty significantly impact the returns of the pharmaceutical sector.	Accepted
H_{23}	The exchange rate significantly negatively impact the pharmaceutical sector returns.	Rejected
H_{24}	The money supply significantly positively impact the pharmaceutical sector returns.	Rejected

4.9.2. Summary table of the results on the impact of the Oil Price Shocks on the Pakistan Stock Market.

H_1	Oil Price Shocks significantly impact the returns of the Pakistan Stock Market.	Accepted
H_2	The exchange rate significantly negatively impact the Pakistan Stock Market returns.	Accepted
H3	The money supply significantly positively impact the Pakistan Stock Market returns.	Accepted
H_4	Oil Price Shocks significantly impact the returns of the oil and gas sector.	Accepted
H_5	The exchange rate significantly negatively impact the oil and gas sector returns.	Accepted
H_6	The money supply significantly positively impact the oil and gas sector returns.	Rejected
H_7	Oil Price Shocks significantly impact the returns of the automobile assembler sector.	Accepted
H_8	The exchange rate significantly negatively impact the automobile assembler sector returns.	Accepted
H_9	The money supply significantly positively impact the automobile assembler sector returns.	Accepted
H_{10}	Oil Price Shocks significantly impact the returns of the cement sector.	Rejected
H_{11}	The exchange rate significantly negatively impact the cement sector returns.	Accepted
H_{12}	The money supply significantly positively impact the cement sector returns.	Rejected
H_{13}	Oil Price Shocks significantly impact the returns of the fertilizer sector.	Accepted
H_{14}	The exchange rate significantly negatively impact the fertilizer sector returns.	Rejected
H_{15}	The money supply significantly positively impact the fertilizer sector returns.	Rejected
H_{16}	Oil Price Shocks significantly impact the returns of the chemical sector.	Accepted
H_{17}	The exchange rate significantly negatively impact the chemical sector returns.	Rejected
H_{18}	The money supply significantly positively impact the chemical sector returns.	Accepted
H_{19}	Oil Price Shocks significantly impact the returns of the food and personal care product sector.	Accepted
H_{20}	The exchange rate significantly negatively impact the food and personal care product sector returns.	Accepted

H_{21}	The money supply significantly positively impact the food and personal care product sector returns.	Rejected
H_{22}	Oil Price Shocks significantly impact the returns of the pharmaceutical sector.	Rejected
H_{23}	The exchange rate significantly negatively impact the pharmaceutical sector returns.	Rejected
H_{24}	The money supply significantly positively impact the pharmaceutical sector returns.	Accepted

4.10. Summary of the Chapter

This chapter is composed of descriptive statistics, unit root tests such as the Augmented Dickey-Fuller (ADF) and Philip-Perron to examine the stationarity and presents empirical results as well its residual diagnostics. The empirical results shows empirical examination on global economic policy uncertainty and Brent oil prices shocks on the Pakistan stock market as well its various sectors which the stock market is composed of.

CHAPTER 5
CONCLUSIONS AND POLICY RECOMMENDATIONS

5.1. Introduction

The current section (section 5.1) illustrates the introduction of the chapter and structure of the remaining chapter. Section 5.2 illustrates the conclusion of the study. Section 5.3 elaborates the policy recommendations. Section 5.4 describes the summary of the chapter.

5.2. Conclusion

The study examined the effects of the global economic policy uncertainty (GEPU) on the Pakistan stock market and its sectorial indices including the other macroeconomic determinants that enable the transmission of GEPU on the stock market. The study also examined the effects of oil price shocks on the Pakistan stock market and its sectoral indices in the presence of the macroeconomic determinants that also affect the stock market.

After verification of stationarity through ADF and Phillips-Perron tests, the bond test was used to investigate long-run relationship among GEPU, oil price shock, Pakistan stock market index, its sectorial indices, exchange rate and money supply. ARDL Model was used for exploring the short-term and long-term relationship along with the relevant diagnostic tests.

The results suggested that in the long term, GEPU has a negative and significant effect on returns of Pakistan's stock market. The negative effects may be due to the reason that the stock market in Pakistan is exposed to the global economic uncertainty as it depends on the foreign investment and capital inflows from abroad. Furthermore, in the long run, the exchange rate has a negative but insignificant impact on returns of Pakistan's stock market. The negative effect of exchange rate may be due to the reasons that a devaluation of the PKR makes imports more expensive, especially for commodities, raw materials, and intermediate goods. Higher costs combined with inflationary pressures negatively affect corporate profitability, impacting stock returns adversely. On the other hand, money supply has positive and significant impact on the returns of Pakistan's stock market with a period of one-month lag suggesting expansion in money supply leads to increased availability of funds to investors that affect the investors' behavior and returns on investment in stock market.

The results show that in the short-run GEPU also has a negative and significant impact on returns of Pakistan's stock market whereas the exchange rate and money supply have no significant effects in the short run on the stock market returns. The error correction term turned out to be negative and statistically significant confirming the existence of stable long-run relationship among variables. This indicates that following a shock, after one month approximately 103% adjustment towards achieving long-term equilibrium is accomplished.

Sectoral analysis of the stock market shows that in the long run GEPU has a significant and negative impact on returns of oil and gas sector. The exchange rate has negative but insignificant impact whereas money supply has positive but insignificant impact on returns of oil and gas sector. In the short run, the negative effect of GEPU are robust on the returns in this sector. These negative effects are reflection of the fact that investors perceive global economic policy uncertainty as a sign of economic instability or geopolitical risks impact their sentiment leading to reduced confidence in the oil and gas sector, affecting stock returns.

In automobile assembler sector in the long run, GEPU has a negative but insignificant impact on its returns. The exchange rate has a positive but insignificant impact on the returns of automobile assembler sector whereas money supply has positive and significant effect on the returns of the automobile assembler sector after a one-month lag period. In the short run, the adverse effects of GEPU are robust on the returns in automobile assembler sector. The reasons for this relationship underlined the fact that increased economic policy uncertainty globally disrupts the supply chains, leading to increased costs and reduced profitability for the assemblers, reflected in negative stock returns after some lags.

In cement sector, both in long and short run, the negative impact GEPU is insignificant on returns of the sector because cement sector demand is domestically oriented therefore its demand is unaffected by the external factors. However, the sector is adversely affected by exchange rate and money supply changes. In chemical sector, GEPU has a significant and negative impact on returns of index both in the long and short run. It's mainly because of the fact that uncertainty in economic policies disrupt global supply chains, affecting the sourcing of raw materials and distribution of finished products for chemical companies. Supply chain disruptions lead to increased costs, lower production efficiency, and ultimately, reduced returns for the sector. On the other hand, GEPU has a negative but insignificant impact on returns of food and personal care Index both in the long and short run. It's mainly because of the fact that food and personal care

sector demand is domestically oriented therefore its demand is unaffected by the external factors. However, the impact is negative and significant on returns of pharmaceutical index of Pakistan's stock market with two-month lags. It is noteworthy that the pharmaceutical sector is critical or public health, affected by economic policy uncertainty that affects healthcare policies, spending, and drug pricing often lead to higher prices of medicines and thus impacting the returns in the sector adversely.

However, not only GEPU but also oil price shocks affect Pakistan's stock market prices and its different sectors. Key findings for this study indicate that in the long run, increases in Brent oil prices has a significant and positive impact on returns of Pakistan's stock market. It is because of the fact that investors interpret higher oil prices as a sign of economic strength and stability, it can contribute to positive sentiment in the overall stock market. Thus, positive investor sentiment drive buying activity and increase stock returns. However, one-month lag's effects of the Brent oil prices is significant and negative. The negative one-month lag's effects of oil prices shock may be because of the fact that increased oil prices also create uncertainty in financial markets and investors become cautious due to potential impacts on inflation, interest rate, and overall economic growth. This can lead to increased market volatility and shifts in investment strategies. In addition, negative effects of higher oil prices lead to weakening the domestic currency because oil is an essential imported input for the economy which increases the demand for foreign currency. A depreciating currency can increase the cost of servicing external debt that is denominated in the foreign currency.

The findings at sectoral level shows that in the long run, increases in international oil prices has a significant and positive impact on returns in oil and gas sector of stock market. This is primarily because oil-producing companies gain advantages from elevated oil prices. The oil and gas sector also gets a significant and positive impact on returns in the short run as a result of increases in international oil prices. In cement sector, the findings show that in the long run, increases in Brent oil prices has an insignificant and negative impact on returns in this sector. It is mainly because of the fact that cement sector demand is domestically oriented therefore, its demand is unaffected by the higher oil prices. The result shows that both in the short and long run, increases in Brent oil prices has significant and positive impact on returns automobile assembler index after one month-lag. On the other hand, results indicate that in the long run, increases in Brent oil prices has insignificant impact on returns of the chemical sector. However, in the short

run the effect on return of chemical sector remained insignificant but after four month-lags the effect on return became significant and positive. This may be due to the investor risk appetite as in certain situations, investors adopt a "risk-on" behaviour and seek higher returns by investing in riskier assets, such as stocks in chemicals.

Both in long and short run, increases in Brent oil prices has a positive impact on returns of fertilizer sector. It is noteworthy that fertilizer industry in Pakistan heavily relies on natural gas as a feedstock for the production of urea. When oil prices increase, it can lead to lower natural gas prices, reducing the production costs for fertilizer companies and improving profit margins and stocks' returns in the sector. In food and personal care sector, both in long and short run, Brent oil prices have insignificant impact on returns of the sector. Notably, in food and personal care sector, demand is domestically oriented therefore its demand is unaffected by international oil prices and thus, this sector's returns are unaffected. In pharmaceutical sector, the Brent oil prices has negative but insignificant impact on returns of the sector both in long and short run. Although result is insignificant, the negative sign implies that an increasing oil price is associated with higher cost and lower demand for pharmaceutical products and may affect the returns in the sector adversely.

5.3. Policy Recommendations

The negative impact of global economic policy uncertainty (GEPU) has some policy recommendations for stock markets in Pakistan. These recommendations are aimed at reducing volatility, maintaining investor confidence, and ensuring the stability of financial markets. Some policy recommendations should be considered by the government, institutions and investors to address the impact of GEPU.

Government

The government need to prioritize clear and transparent communication of economic policies to investors in order to reduce uncertainty. Consistent and open communication can help reduce uncertainty and prevent speculative behaviour.

The government should ensure coordination between fiscal and monetary policies. Consistency and synchronization between these policies can enhance market stability and investor confidence.

The government can promote investors' awareness to help investors understand the potential risks and rewards associated with investing in the stock market.

The government should avoid abrupt changes in economic policies which can contribute to a stable investment environment. Frequent policy shifts can amplify uncertainty and deter investors.

Policies needs to be formulated to the specific economic situation and challenges faced by the country. The goal is to create a resilient economic environment that can bear the effect of global economic policy uncertainty in order to facilitate sustainable growth.

Pakistan can collaborate with international organizations and other nations to address shared challenges related to economic uncertainty. Collective efforts can help diminish the global impact of uncertainties.

Investors

Investors should explore the possibilities of diversification of investment portfolios that can help mitigate risks associated with stock market uncertainty. Investors should be aware of the benefits of holding a mix of assets, including stocks, bonds, and other investments.

Oil Price Shocks

The one-month lag effect of the Brent oil prices on PSX return with coefficient at 0.1807 is significant with a negative sign. The negative impact of oil price shocks with one lag on stock markets in Pakistan is significant due to its vulnerability to external economic factors. Oil price shocks can result in increased costs of production, reduced consumer spending power, and overall economic uncertainty. The following policy recommendations should be considered to address these challenges:

Government

The government should work on diversifying the economy away from heavy dependence on oil. Investing in other sectors like agriculture, manufacturing, technology, and services can help reduce vulnerability to oil price fluctuations.

The government should consider rationalizing or gradually phasing them out the subsidies to reduce the fiscal burden during times of high oil prices.

The government can establish emergency reserves or contingency funds to alleviate the impact of oil price shocks. These funds can be used to provide targeted support to affected industries or vulnerable populations.

Investing in infrastructure projects that are less reliant on oil can stimulate economic growth and reduce the impact of oil price shocks. This might include projects related to electric transportation, renewable energy, and technology.

The government should adopt counter cyclical fiscal policies by adjusting public spending and taxation to support economic stability during periods of oil price shocks.

Encouraging diversification of trade partners can help reduce reliance on a few countries for oil imports.

The government should focus on building and maintaining investor confidence. Clear communication about policy responses, market stability, and long-term economic goals can help prevent panic in the stock market.

Policies that promote energy efficiency in industries and households can help reduce the overall impact of oil price shocks on the economy. This might involve offering incentives for energy-saving technologies and practices.

Encouraging savings and investments within the country can provide a buffer against external shocks. Policies that promote domestic resource mobilization and investment can enhance economic resilience. For example, raising tax to GDP ratio and providing incentives to foreign investors can attract foreign investment and provide a buffer against external shocks.

Policy responses needs to be tailored to the specific economic situation and challenges faced by the country. The goal is to create a resilient economic environment that can withstand the effect of oil price shocks and facilitate sustainable growth.

Institutions

SBP response remained slow to monetary policy, it needs to adjust monetary policy timely to address potential inflationary pressures resulting from higher oil prices. This could involve fine-tuning interest rates and money supply to maintain price stability.

SBP should manage country's foreign exchange reserves prudently to mitigate the potential negative impacts on their currencies during periods of oil price volatility.

Developing financial instruments like hedging products or insurance against oil price fluctuations can help businesses and investors manage risk and decrease their vulnerability to fluctuations in oil prices.

Investors

Exploring diversification of investment portfolios can help mitigate risks associated with oil price shocks. Investors should be aware of the benefits of holding a mix of assets, including stocks, bonds, and other investments.

5.4. Limitations of the study

In this study, we empirically examined the impact of global economic policy uncertainty and oil price shocks on the stock market returns of Pakistan. However, findings of the study may be interpreted with caution since the study has several limitations. Firstly, stock market returns can be influenced by a wide range of factors beyond just economic policy uncertainty, such as macroeconomic policy changes, geopolitical events, market sentiment, and industry-specific factors. Secondly, findings of the study focusing on Pakistan may not be directly applicable to other countries. The impact of global economic policy uncertainty on stock market returns can vary depending on the country's economic structure, regulatory environment, market maturity, and other factors.

Likewise, studying the impact of international oil price shocks on the stock market returns of Pakistan involves several limitations. Firstly, while international oil price shocks can have a direct impact on certain sectors such as energy, transportation, and manufacturing, the overall impact on the stock market may be indirect and complex. The extent to which oil price changes affect different industries and sectors within the stock market can vary making it difficult to isolate and quantify the overall effect.

Secondly, stock market of Pakistan is not insulated from global financial markets. It is influenced by global economic conditions, investor sentiment, and capital flows. Therefore, the impact of international oil price shocks on Pakistan's stock market may be influenced by broader global market dynamics, making it difficult to attribute stock market movements solely to oil price changes.

Finally, findings of the effects of oil price shocks on Pakistan may not be directly applicable to other countries. The impact of oil price shocks on stock market returns can vary depending on the country’s economic structure, regulatory environment, and market maturity, and other factors. Therefore, findings of the study may be interpreted with caution with these limitations.

5.5. Summary of the Chapter

This chapter illustrate the conclusion drawn based on the findings of the study and the policy recommendation for stock market’s investors, government and state bank of Pakistan. This chapter also contains the limitations of this study.

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Appendix

The values in the tables of the long run and the short run equations are extracted from below ARDL test tables for each respective sector. The values of coefficients, T –stats, R square, adjusted R square, F-statistics, Durbin-Watson stat and bound test are mentioned in the long run equation table of each sector. In the short run equation tables, the values of short run coefficients, Co-integration, T –stats, R square, adjusted R square, Breusch- Godfrey, Breusch- Pagen Godfrey are mentioned for the each respective sector whose value is extracted from the below test tables. The value of T –stats, R square, adjusted R square is different for both the long run and the short run equations.

ARDL Model

GEPU and KSE100

LONG RUN

Dependent Variable: RKSE100

Method: ARDL

Date: 08/14/23 Time: 17:50

Sample (adjusted): 2009M03 2023M05

Included observations: 171 after adjustments

Maximum dependent lags: 4 (Automatic selection)

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (4 lags, automatic): LEPUCUR LM2 LEXRATE

Fixed regressors: C

Number of models evaluated: 500

Selected Model: ARDL(1, 1, 2, 1)

Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
RKSE100(-1)	-0.052279	0.077921	-0.670924	0.5032

LEPUCUR	-0.047944	0.026093	-1.837437	0.0680
LEPUCUR(-1)	0.065631	0.025882	2.535718	0.0122
LM2	-0.086619	0.214116	-0.404542	0.6863
LM2(-1)	0.500858	0.240375	2.083653	0.0388
LM2(-2)	-0.460678	0.209266	-2.201394	0.0291
LEXRATE	-0.372974	0.236071	-1.579921	0.1161
LEXRATE(-1)	0.390351	0.245535	1.589794	0.1138
C	0.189815	0.078541	2.416767	0.0168

R-squared	0.135355	Mean dependent var	0.011560
Adjusted R-squared	0.092657	S.D. dependent var	0.056219
S.E. of regression	0.053552	Akaike info criterion	-2.965146
Sum squared resid	0.464579	Schwarz criterion	-2.799795
Log likelihood	262.5200	Hannan-Quinn criter.	-2.898054
F-statistic	3.170018	Durbin-Watson stat	1.975409
Prob(F-statistic)	0.002301		

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Long Run Form and Bounds Test
Dependent Variable: D(RKSE100)
Selected Model: ARDL(1, 1, 2, 1)
Case 2: Restricted Constant and No Trend
Date: 08/14/23 Time: 17:52
Sample: 2009M01 2023M05
Included observations: 171

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.189815	0.078541	2.416767	0.0168
RKSE100(-1)*	-1.052279	0.077921	-13.50436	0.0000
LEPUCUR(-1)	0.017686	0.018926	0.934512	0.3514
LM2(-1)	-0.046438	0.022154	-2.096139	0.0376
LEXRATE(-1)	0.017377	0.048952	0.354976	0.7231
D(LEPUCUR)	-0.047944	0.026093	-1.837437	0.0680
D(LM2)	-0.086619	0.214116	-0.404542	0.6863
D(LM2(-1))	0.460678	0.209266	2.201394	0.0291
D(LEXRATE)	-0.372974	0.236071	-1.579921	0.1161

* p-value incompatible with t-Bounds distribution.

Levels Equation

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEPUCUR	0.016808	0.018088	0.929198	0.3542
LM2	-0.044131	0.020917	-2.109854	0.0364
LEXRATE	0.016513	0.046424	0.355708	0.7225
C	0.180385	0.073478	2.454932	0.0151

EC = RKSE100 - (0.0168*LEPUCUR -0.0441*LM2 + 0.0165*LEXRATE + 0.1804)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)

			Asymptotic: n=1000	
F-statistic	37.18998	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66
			Finite Sample:	
Actual Sample Size	171		n=80	
		10%	2.474	3.312
		5%	2.92	3.838
		1%	3.908	5.044

SHORT RUN

ARDL Error Correction Regression

Dependent Variable: D(RKSE100)

Selected Model: ARDL(1, 1, 2, 1)

Case 2: Restricted Constant and No Trend

Date: 08/14/23 Time: 17:53

Sample: 2009M01 2023M05

Included observations: 171

ECM Regression

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LEPUCUR)	-0.047944	0.023488	-2.041241	0.0428
D(LM2)	-0.086619	0.181703	-0.476705	0.6342
D(LM2(-1))	0.460678	0.177084	2.601470	0.0101
D(LEXRATE)	-0.372974	0.216206	-1.725087	0.0864

CointEq(-1)*	-1.052279	0.076232	-13.80367	0.0000

R-squared	0.559495	Mean dependent var	-0.000401
Adjusted R-squared	0.548881	S.D. dependent var	0.078764
S.E. of regression	0.052902	Akaike info criterion	-3.011930
Sum squared resid	0.464579	Schwarz criterion	-2.920068
Log likelihood	262.5200	Hannan-Quinn criter.	-2.974656
Durbin-Watson stat	1.975409		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	37.18998	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

GEPU and Oil and Gas sector

Long Run

Dependent Variable: ROILNGAS
Method: ARDL
Date: 08/14/23 Time: 18:25
Sample (adjusted): 2009M03 2023M05
Included observations: 171 after adjustments
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)

Dynamic regressors (4 lags, automatic): LEPUCUR LEXRATE LM2

Fixed regressors: C

Number of models evaluated: 500

Selected Model: ARDL(1, 2, 0, 1)

Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
ROILNGAS(-1)	-0.108233	0.072998	-1.482694	0.1401
LEPUCUR	-0.101488	0.033019	-3.073600	0.0025
LEPUCUR(-1)	-0.034372	0.039742	-0.864863	0.3884
LEPUCUR(-2)	0.149543	0.032309	4.628589	0.0000
LEXRATE	-0.009164	0.062659	-0.146248	0.8839
LM2	0.279836	0.263238	1.063054	0.2893
LM2(-1)	-0.307900	0.262492	-1.172989	0.2425
C	0.179992	0.100553	1.790027	0.0753

R-squared	0.173622	Mean dependent var	0.007709
Adjusted R-squared	0.138134	S.D. dependent var	0.075899
S.E. of regression	0.070462	Akaike info criterion	-2.421821
Sum squared resid	0.809287	Schwarz criterion	-2.274842
Log likelihood	215.0657	Hannan-Quinn criter.	-2.362183
F-statistic	4.892332	Durbin-Watson stat	1.984732
Prob(F-statistic)	0.000049		

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Long Run Bounds Test

Dependent Variable: D(ROILNGAS)

Selected Model: ARDL(1, 2, 0, 1)

Case 2: Restricted Constant and No Trend

Date: 08/14/23 Time: 18:27

Sample: 2009M01 2023M05

Included observations: 171

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.179992	0.100553	1.790027	0.0753
ROILNGAS(-1)*	-1.108233	0.072998	-15.18179	0.0000
LEPUCUR(-1)	0.013683	0.025971	0.526871	0.5990
LEXRATE**	-0.009164	0.062659	-0.146248	0.8839
LM2(-1)	-0.028063	0.028609	-0.980935	0.3281
D(LEPUCUR)	-0.101488	0.033019	-3.073600	0.0025
D(LEPUCUR(-1))	-0.149543	0.032309	-4.628589	0.0000
D(LM2)	0.279836	0.263238	1.063054	0.2893

* p-value incompatible with t-Bounds distribution.

** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEPUCUR	0.012347	0.023496	0.525482	0.6000
LEXRATE	-0.008269	0.056568	-0.146175	0.8840
LM2	-0.025323	0.025788	-0.981947	0.3276
C	0.162414	0.089827	1.808070	0.0724

EC = ROILNGAS - (0.0123*LEPUCUR -0.0083*LEXRATE - 0.0253*LM2 +
0.1624)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	46.53339	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66
			Finite Sample: n=80	
Actual Sample Size	171			
		10%	2.474	3.312
		5%	2.92	3.838
		1%	3.908	5.044

ARDL Error Correction Regression

Dependent Variable: D(ROILNGAS)

Selected Model: ARDL(1, 2, 0, 1)

Case 2: Restricted Constant and No Trend

Date: 08/14/23 Time: 18:30

Sample: 2009M01 2023M05

Included observations: 171

ECM Regression

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LEPUCUR)	-0.101488	0.030599	-3.316687	0.0011
D(LEPUCUR(-1))	-0.149543	0.030384	-4.921791	0.0000
D(LM2)	0.279836	0.230868	1.212104	0.2272
CointEq(-1)*	-1.108233	0.071779	-15.43945	0.0000

R-squared	0.602485	Mean dependent var	-0.000296
Adjusted R-squared	0.595344	S.D. dependent var	0.109433
S.E. of regression	0.069613	Akaike info criterion	-2.468604
Sum squared resid	0.809287	Schwarz criterion	-2.395115
Log likelihood	215.0657	Hannan-Quinn criter.	-2.438786
Durbin-Watson stat	1.984732		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	46.53339	10%	2.37	3.2

K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

GEPU and Automobile Sector

Dependent Variable: RAUTO

Method: ARDL

Date: 08/14/23 Time: 19:02

Sample (adjusted): 2009M06 2023M05

Included observations: 168 after adjustments

Maximum dependent lags: 4 (Automatic selection)

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (4 lags, automatic): LEPUCUR LEXRATE LM2

Fixed regressors: C

Number of models evaluated: 500

Selected Model: ARDL(4, 3, 0, 3)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
RAUTO(-1)	-0.047328	0.075705	-0.625155	0.5328
RAUTO(-2)	0.159523	0.074113	2.152431	0.0329
RAUTO(-3)	0.127176	0.073365	1.733479	0.0850
RAUTO(-4)	-0.205030	0.072438	-2.830432	0.0053
LEPUCUR	-0.038638	0.035697	-1.082386	0.2808
LEPUCUR(-1)	-0.078147	0.042617	-1.833723	0.0686
LEPUCUR(-2)	-0.005263	0.041983	-0.125354	0.9004
LEPUCUR(-3)	0.094507	0.035314	2.676165	0.0083
LEXRATE	0.044201	0.066193	0.667761	0.5053
LM2	0.508014	0.336368	1.510291	0.1330

LM2(-1)	0.710679	0.352461	2.016332	0.0455
LM2(-2)	-0.690112	0.357053	-1.932799	0.0551
LM2(-3)	-0.539691	0.342620	-1.575186	0.1173
C	0.163017	0.110505	1.475198	0.1422

R-squared	0.209392	Mean dependent var	0.019541
Adjusted R-squared	0.142652	S.D. dependent var	0.079510
S.E. of regression	0.073620	Akaike info criterion	-2.300136
Sum squared resid	0.834673	Schwarz criterion	-2.039805
Log likelihood	207.2114	Hannan-Quinn criter.	-2.194481
F-statistic	3.137445	Durbin-Watson stat	1.976664
Prob(F-statistic)	0.000353		

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Long Run Form and Bounds Test

Dependent Variable: D(RAUTO)

Selected Model: ARDL(4, 3, 0, 3)

Case 2: Restricted Constant and No Trend

Date: 08/14/23 Time: 19:02

Sample: 2009M01 2023M05

Included observations: 168

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.163017	0.110505	1.475198	0.1422
RAUTO(-1)*	-0.965658	0.135138	-7.145743	0.0000
LEPUCUR(-1)	-0.027542	0.028673	-0.960545	0.3383
LEXRATE**	0.044201	0.066193	0.667761	0.5053
LM2(-1)	-0.011110	0.031116	-0.357059	0.7215

D(RAUTO(-1))	-0.081670	0.122654	-0.665855	0.5065
D(RAUTO(-2))	0.077854	0.104041	0.748294	0.4554
D(RAUTO(-3))	0.205030	0.072438	2.830432	0.0053
D(LEPUCUR)	-0.038638	0.035697	-1.082386	0.2808
D(LEPUCUR(-1))	-0.089244	0.037020	-2.410687	0.0171
D(LEPUCUR(-2))	-0.094507	0.035314	-2.676165	0.0083
D(LM2)	0.508014	0.336368	1.510291	0.1330
D(LM2(-1))	1.229803	0.345262	3.561946	0.0005
D(LM2(-2))	0.539691	0.342620	1.575186	0.1173

* p-value incompatible with t-Bounds distribution.

** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEPUCUR	-0.028521	0.029353	-0.971679	0.3327
LEXRATE	0.045773	0.068788	0.665429	0.5068
LM2	-0.011505	0.032379	-0.355342	0.7228
C	0.168815	0.112152	1.505230	0.1343

EC = RAUTO - (-0.0285*LEPUCUR + 0.0458*LEXRATE - 0.0115*LM2 +
0.1688)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)

			Asymptotic: n=1000	
F-statistic	11.44059	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66
			Finite Sample: n=80	
Actual Sample Size	168			
		10%	2.474	3.312
		5%	2.92	3.838
		1%	3.908	5.044

ARDL Error Correction Regression

Dependent Variable: D(RAUTO)

Selected Model: ARDL(4, 3, 0, 3)

Case 2: Restricted Constant and No Trend

Date: 08/14/23 Time: 19:03

Sample: 2009M01 2023M05

Included observations: 168

ECM Regression

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RAUTO(-1))	-0.081670	0.115356	-0.707979	0.4800
D(RAUTO(-2))	0.077854	0.100331	0.775969	0.4390
D(RAUTO(-3))	0.205030	0.070823	2.894950	0.0043
D(LEPUCUR)	-0.038638	0.033495	-1.153537	0.2505
D(LEPUCUR(-1))	-0.089244	0.033986	-2.625876	0.0095

D(LEPUCUR(-2))	-0.094507	0.033494	-2.821567	0.0054
D(LM2)	0.508014	0.255187	1.990755	0.0483
D(LM2(-1))	1.229803	0.255605	4.811338	0.0000
D(LM2(-2))	0.539691	0.265134	2.035537	0.0435
CointEq(-1)*	-0.965658	0.126051	-7.660858	0.0000

R-squared	0.616518	Mean dependent var	0.001288
Adjusted R-squared	0.594674	S.D. dependent var	0.114163
S.E. of regression	0.072682	Akaike info criterion	-2.347755
Sum squared resid	0.834673	Schwarz criterion	-2.161804
Log likelihood	207.2114	Hannan-Quinn criter.	-2.272287
Durbin-Watson stat	1.976664		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	11.44059	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

GEPU and Cement sector

Dependent Variable: RCEM
Method: ARDL
Date: 08/25/23 Time: 02:00
Sample (adjusted): 3 173
Included observations: 171 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (3 lags, automatic): LUEPUCUR LEXRATE LM2
Fixed regressors: C
Number of models evaluated: 128
Selected Model: ARDL(1, 1, 1, 0)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
RCEM(-1)	0.042205	0.075175	0.561430	0.5753
LUEPUCUR	-0.048547	0.039414	-1.231742	0.2198
LUEPUCUR(-1)	0.059234	0.039505	1.499403	0.1357
LEXRATE	-1.128239	0.374470	-3.012893	0.0030
LEXRATE(-1)	1.176352	0.388211	3.030186	0.0028
LM2	-0.049014	0.034759	-1.410120	0.1604
C	0.146049	0.122301	1.194172	0.2341

R-squared	0.107497	Mean dependent var	0.011623
Adjusted R-squared	0.074844	S.D. dependent var	0.088032
S.E. of regression	0.084674	Akaike info criterion	-2.059942
Sum squared resid	1.175829	Schwarz criterion	-1.931336
Log likelihood	183.1250	Hannan-Quinn criter.	-2.007759
F-statistic	3.292144	Durbin-Watson stat	2.046184
Prob(F-statistic)	0.004379		

ARDL Long Run Form and Bounds Test
Dependent Variable: D(RCEM)
Selected Model: ARDL(1, 1, 1, 0)
Case 2: Restricted Constant and No Trend
Date: 08/25/23 Time: 02:01
Sample: 1 174
Included observations: 171

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.146049	0.122301	1.194172	0.2341
RCEM(-1)*	-0.957795	0.075175	-12.74088	0.0000
LUEPUCUR(-1)	0.010686	0.029794	0.358673	0.7203
LEXRATE(-1)	0.048113	0.076903	0.625639	0.5324
LM2**	-0.049014	0.034759	-1.410120	0.1604
D(LUEPUCUR)	-0.048547	0.039414	-1.231742	0.2198
D(LEXRATE)	-1.128239	0.374470	-3.012893	0.0030

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LUEPUCUR	0.011157	0.031157	0.358093	0.7207
LEXRATE	0.050233	0.080247	0.625986	0.5322
LM2	-0.051174	0.036416	-1.405265	0.1618
C	0.152485	0.127382	1.197069	0.2330

EC = RCEM - (0.0112*LUEPUCUR + 0.0502*LEXRATE -0.0512*LM2 + 0.1525)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	32.84854	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66
Actual Sample Size	171	Finite Sample: n=80		
		10%	2.474	3.312
		5%	2.92	3.838
		1%	3.908	5.044

ARDL Error Correction Regression
Dependent Variable: D(RCEM)
Selected Model: ARDL(1, 1, 1, 0)
Case 2: Restricted Constant and No Trend
Date: 08/25/23 Time: 02:02
Sample: 1 174
Included observations: 171

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LUEPUCUR)	-0.048547	0.035966	-1.349828	0.1789
D(LEXRATE)	-1.128239	0.331140	-3.407132	0.0008
CointEq(-1)*	-0.957795	0.073841	-12.97107	0.0000

R-squared	0.506022	Mean dependent var	0.001049
Adjusted R-squared	0.500142	S.D. dependent var	0.118330
S.E. of regression	0.083660	Akaike info criterion	-2.106726
Sum squared resid	1.175829	Schwarz criterion	-2.051609
Log likelihood	183.1250	Hannan-Quinn criter.	-2.084361
Durbin-Watson stat	2.046184		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	32.84854	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Table of Corrections

SR	Remark & Correction Required	Remark & Correction incorporated	Page number
1	Condense two paragraphs of abstract into one paragraph.	Remark addressed	15
2	Remove the alphabetical numbering of the hypothesis and assign each hypothesis numerical number	Remarked addressed	16-19 27-29
3	Make conceptual framework of the study	Remarked addressed	32-33
4	Summary table of the results	Remarked addressed	147-150
5	Categorize the policy recommendations for the government, institutions and the investors	Remarked addressed	155-158
6	Mention the limitations of the study	Remarked addressed	159