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The Price of Progress: Understanding the Impact of Oil Shocks on Pakistan's Economic Trajectory

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Abstract

This paper assesses the impact of oil price fluctuation on Pakistan's economic growth with particular reference to the period 1990-2021. As one of the largest oil-importing countries, Pakistan is exposed to volatility in the world oil prices, which impacts many industries ranging from manufacturing to transportation and energy. To analyze the short-run and long-run effects of oil price fluctuation on significantly important macroeconomic factors, such as GDP, inflation rate, and expenditure on the household, this research employs an econometric approach, the Auto-Regressive Distributed Lag (ARDL) model. The study shows that the rise in oil costs has a near-perfect negative relationship with economic growth; higher oil prices lead to increased inflation rates and reduced efficiency. Thus, the paper evaluates the case of energy efficiency and source diversification to help mitigate the impact of oil price fluctuations and stresses that promoting energy efficiency and energy source diversification can encourage economic growth when oil prices fluctuate. They are called on to put measures in place to boost energy diversity and standby measures to protect the economy against volatile oil prices. These results are of tremendous value in determining Pakistan's energy policy and macroeconomic direction to sustain macroeconomic stability despite the challenges posed by fluctuating oil prices.

Keywords: *Oil Price Shocks, Economic Growth, Inflation, Energy Efficiency*

JEL Classification: *A1, E3, E6, G28, E58*

1. Introduction

The relationship between the oil price and economic development has been widely researched and discussed, especially in emerging nations, including Pakistan, where oil usage is a critical factor in determining the economic location. The role of energy, especially oil, cannot be overemphasized as it is the life wire of industry and transportation and an essential input that influences inflation, trade balances, and fiscal books. Although this link is valid for many countries, the fact that Pakistan is an oil-importing country makes it instantly vulnerable to fluctuations in global oil prices, and therefore, the link is significant for this country's macroeconomic prospects. Fluctuations in oil prices caused by geopolitical instabilities, supply and demand imbalance and speculations substantially threaten the nation's progress. The study of these processes has become necessary due to the recent world phenomena such as the COVID-19 pandemic and the Russia-Ukraine war that have aggravated fluctuations in oil prices.

In the past, the price of oil has posed many problems for Pakistan, including recent challenges arising from the cost of oil. As with many other countries that rely on imported oil, any sharp rise in global oil prices exacerbates its fiscal and current account deficit standing; it meets more than 80% of its energy needs through imports (Malik et al., 2021). The destructive effects of a hike in oil prices include higher import costs, worsening of the balance of payments, and inflationary pressures that negatively impact consumers/ users and businesses alike, which can further boost expenses and reduce their margins. Since Pakistan depends heavily on oil as a primary source of energy, it becomes vital for policymakers to find

solutions to the detrimental effects of oil price fluctuations. It is pertinent to understand the dynamics of power.

As far as the relationship between oil prices and economic growth is concerned, it is well documented in most regions of the world. Scholars argue that increases in oil prices have a 'tax effect' on oil-importing nations, reducing consumption and raising production costs (Hamilton, 2009). Therefore, increasing oil prices on the energy intensity of many developing countries like Pakistan could be considerable. Costly oil impacts economic performance through inflationary pressures, consumer expenditure reduction and trade balance deterioration (Rafiq, Salim & Bloch, 2009). Hence, understanding these processes is crucial for those emerging countries that have to develop policies that may offset the impact of price shocks and promote more health and sustainable growth.

There is an existing body of literature where the focus has been made on the social justice aspect concerning volatile oil price change. According to Kilian (2008), the 'demand' shocks suggest that the price rise tends to affect growth disproportionately relative to the decline in price. This is especially relevant concerning oil-importing economies, including Pakistan, because the inflation driven by increased oil prices can act as a push factor to the cost of manufacturing and consumption. Moreover, fluctuations in oil prices create confusion in investments, thus preventing long-term growth in the economy (Berument, Ceylan, & Dogan 2010). Therefore, it can be understood why effects such as high inflation, fiscal imbalance and an unstable currency rate, which are macroeconomic issues, are already haunting developing countries such as Pakistan.

Due to Pakistan's heavy reliance on imported crude oil, the country remains particularly sensitive to changes in the price of crude oil in the international market. In his study that compares the effect of oil prices on inflation, Pakistan, in particular, has been highlighted to demonstrate a strong positive correlation, according to Shaikh Jiandong & Wizarat 2020. The paper highlights that increased oil prices lead to increased transportation and manufacturing expenses in various industries and constant pressure towards inflation. Hence, consumer purchasing power reduces, and hence, the purchasing power reduces, thus slowing down the economic growth rate. Pakistan's energy sector is primarily dependent upon oil, and the primary energy users in Pakistan include the industrial, transport and generation industries, which mainly use imported fuel. As such, each rise in oil prices impacts the cost of production for energy companies, thus reducing overall business profitability.

However, the uncertainties in the price of oil are fundamental and more profound because Pakistan has a minimal industrial base to speak of and is, therefore, economically very vulnerable. For example, Malik et al. (2021) have argued that oil price volatility has a ripple effect on Pakistan's macroeconomic indicators, including higher inflation, the depletion of the Pakistan rupee, and wider current account deficits. Such effects, therefore, reduce the revenue space available in the fiscal policy to the government's development objectives, slowing the pace of long-term economic growth. Fiscal and current account deficits in the country are magnified due to rising oil prices, which forces the government to spend more and more for subsidies to the energy sector, resulting in less money available to develop the infrastructural and social sectors.

Over the last few years, Pakistan has experienced significant economic challenges due to fluctuations in global oil prices. The COVID-19 epidemic proved highly impactful for the worldwide oil market, challenging the notion of price fluctuations like no other event. The first shock caused a significant reduction in oil prices, but the subsequent recovery led to increased prices, placing a lot of pressure on Pakistan's fragile economy. However, a fresh study by Khan and Aftab in their paper titled 'Covid-19 and Pakistan Economy' in 2022 shows that the hyper rate in the inflation rate in Pakistan remained high due to the recent upsurge in oil prices after Covid-19. According to the findings, the government's efforts on

stabilization through subsidies and use of regulations are equivalent to only a short-term relief, thus making the economy vulnerable to potential oil price changes.

The Ukraine conflict in the year 2022 worsened the situation of the world oil market, and the price of oil was affected and rose subsequently. This has presented significant challenges for Pakistan as it has diversified its energy mix by campaigning for natural gas and renewable energy sources, which heavily depend on oil imports. According to the research conducted by Malik et al. (2023), the Pakistani government's strategies to adopt the concept of renewable energy addition to the supply portfolio have not achieved the desired outcomes. Hence, instability in global oil prices is still a considerable risk that the economy faces concerning inflationary pressure and balance of payments.

Knowing the importance of oil prices regarding the corresponding changes in the growth of the Pakistan economy, it is crucial for the government to lay down policies that would reduce the economy's vulnerability to the changes in oil prices. The results of several investigations show that the shift in energy portfolio through renewable energy sources can reduce the effect of oil price volatility. In addition, improved energy intensity and development of Indigenous energy supplies, particularly hydropower and coal, may reduce oil imports (Ahmed, Khan & Ali, 2020). Policies that will bolster fiscal and monetary stability to facilitate price stability and balance of payment should be used to insulate the economy from outrageous shocks.

In summary, variations in global oil prices and supply disruptions substantially affect Pakistan's economic growth, resulting in adverse effects such as increased inflation, currency devaluation, and trade imbalances. Recent scholarly research has emphasized the necessity for structural reforms and diversification in the energy industry to mitigate the nation's susceptibility to fluctuations in global oil markets. Policymakers are encouraged to establish long-term strategies emphasizing energy security, fiscal stability, and macroeconomic resilience.

The focus of this study is to investigate the impacts of oil price volatility on Pakistan's economy, mainly focusing on how rising prices in leading sectors like the manufacturing sector, transportation, energy production, etc., have impacted economic growth directly or indirectly. This study attempts to assess the relationship between oil price changes and inflation; this can then be used to measure how Granger caused variation in international crude oil prices tends to drive domestic inflation trends. The aim will be to evaluate the macroeconomic impact of changes in oil prices on GDP and fiscal stability based on econometric models such as ARDL. Investigating how implementing energy efficiency and diversification measures can help mitigate or dampen the negative consequences of external oil price shocks that focus on providing policy options for reducing Pakistan's vulnerability towards fluctuations in international oil prices and ensuring sustainable growth prospects.

2. Literature Review

The relationship between the volatility in oil prices and economic growth has come under sharp focus over current years; it carries much importance, especially for economies running on low reserves like Pakistan, which is hugely affected by global market instability. The researchers have comprehensively studied the issue of rising oil prices and their intricate impact on inflation, industrial cost objectives, and general macroeconomic activity.

Malik et al. (2023) cautiously re-examine the nexus between oil price volatility and different economic indices of Pakistan, mainly focusing on inflation, current account deficit (CAD), and exchange rate movement. The research found that Pakistan's vulnerability to global oil prices increases by importing share-type crude oil. The risk posed by volatility should reinforce the importance of reducing oil's share in energy markets, mainly by deploying more renewable sources. Their findings provide vital implications

for the policymakers, suggesting that investment in renewable energy and the ability to save more on energy consumption will shore up economic recovery amidst an oil price surge.

Khan and Aftab (2022) investigated the implications of post-pandemic oil price revival on inflationary outbreaks and economic growth in Pakistan; they argued that the substantial rebound in world oil prices after the COVID-19 pandemic had led to protracted inflationary outbreaks, which along with dampening consumers' purchasing power also impeded economic recovery. Moreover, the authors found that financial relief provided by the government for short-term issues like energy subsidies has proven transient; therefore, transformational investments in alternate/renewable energies are required for long-term economic stability.

Shaikh et al. (2020) investigated the impact of oil price volatility on Pakistan's macroeconomic indicators with particular reference to inflation. They found that oil prices increased immediately, causing transportation costs to rise, increasing production costs, and, in turn, growing prices overall, which created inflation pressure. Energy diversification, the need for energy efficiency and minimum reliance on imported oil were recommended to insulate the economy from global oil prices.

Matthew et al. (2018) assessed the global association between energy use and economic growth in emerging economies. Their study found that higher oil prices increase the cost of inputs in all sectors, thereby slowing down labour productivity and overall economic growth. They suggested that governments should invest in renewable energy sources and promote energy efficiency to reduce reliance on oil and mitigate any negative economic implications caused by future volatility in oil prices.

Osigwe and Arawomo (2015) analyzed the causal link between energy use and economic growth in Nigeria, an oil-based economy. They found that oil price increases reduce economic performance due to higher production costs, particularly within the industrial sector. This study highlights how countries dependent on oil imports could reduce their exposure to fluctuations in global oil prices by prioritizing measures for energy diversification and energy efficiency improvements.

Tawadros (2013) analyzed the cyclicality of oil consumption in OECD countries and stated that the variations in oil prices have both short and long-run impacts on economic activities. This study is even more critical for developing countries like Pakistan, where the reliance on oil import bills makes its economy highly vulnerable to global energy market shocks. The study found that oil-dependent economies should consider the cyclical nature of oil demand and prices in designing their long-run economic policies to avoid falling into prolonged recession traps.

Saher (2011) analyzed the impact of oil price volatility on economic growth and export revenues in Pakistan and India. The results showed that rising oil prices generated inflationary pressures in both countries, hampering economic growth and adversely affecting export performance. The author recommended that to reduce the reliance on oil imports, energy diversification and alternative energy sources should be used primarily for countries such as Pakistan and India, which continue to face this challenge.

Rahman and Serletis (2012) conducted an early study on the Canadian economy, employing a VARMA GARCH-in-Mean model to analyze the impact of oil price uncertainty on economic performance. The research emphasized the extensive macroeconomic effects of oil price fluctuations, especially their influence on inflation and industrial productivity. Their findings highlighted the necessity for wealthy and emerging economies to prioritize energy diversification to mitigate their susceptibility to external oil price fluctuations.

Ultimately, Nazir and Qayyum (2014) investigated the correlation between oil prices and economic growth in Pakistan through multivariate analysis. Rising oil costs contributed to inflation, suppressing consumer demand and industrial productivity. Their study indicated that Pakistan's financial stability significantly relies on energy policies capable of alleviating the negative impacts of oil price volatility. Similar to other research, the significance of energy diversification was highlighted as a sustainable strategy to mitigate Pakistan's economic susceptibility to fluctuations in oil prices.

Nawaz et al. studied Pakistani oil prices and demand in 2020. Researchers examined how oil prices affect economic growth. The study used 1971–2019 time-series data. The augmented Dickey-Fuller and Philips-Perron tests determined unit root presence. The study found a long-term correlation between GDP per capita and oil prices. Petroleum was Pakistan's main energy source. The findings show that coal, gas, and alternative energy sources would change Pakistan's oil consumption-electricity cost relationship, threatening economic growth. The Armenian economy's appraisal of combustible gas may mitigate oil price shocks. Muhammad and Ghulam (2017) use the Vector Autoregressive (VAR) model to examine how oil price uncertainty affects Pakistan's GDP and exchange equilibrium. The researchers found that oil shocks gradually affect components without interdependence. Yukata (2015) examines oil prices and economic growth in wealthy nations. The hypothetical and observational ramifications of this relationship are unknown. Oil price increases boost US, EU, and Japanese economic production.

Saba and Ahmed (2015) analyzed Pakistani inflation and unrefined petroleum prices. Our analysis shows a considerable fall in Pakistan's real GDP. Pakistan has conducted many studies on inflationary patterns. The impact of global crude oil prices appears to be overlooked in these investigations. This study examines how global crude oil prices affect Pakistan's GDP, which is affected by economic growth. The real GDP is relatively low, and its significant increase will harm the nation's citizens. Two-digit growth is intolerable. Energy costs, GDP, and energy usage have been widely studied in numerous economies. Osigwe and Arawomo (2015) examined the factor of Granger causality in the error remedy model. Matthew et al. (2018) found strong evidence linking power use and financial development. Power costs and usage are reciprocal. This study introduces an energy estimating methodology to improve utilization and profitability. Shengfeng et al. (2012) used the vector error correction model (VECM) to evaluate the short- and long-term causal link between energy consumption and financial development in China. A unidirectional causal association between electrical use and GDP growth demonstrated that electrical usage can affect economic growth. The report also advised customers to save to maintain a steady supply of resources, which can boost financial progress.

Additional interior production parameters, such as labour input proportion and substitution elasticity, may determine the long-term effects of increased oil costs. Idrisov et al. (2015) analyze the impact of rising oil prices on long-term economic growth utilizing a dynamic stochastic general equilibrium (DSGE) model. It can be concluded that, concerning long-term economic growth, oil prices do not significantly influence outcomes; however, the efficiency of production variables does. Ahmed and Moran (2013) seek to ascertain the long-term link between oil prices and the effective exchange rates of twelve oil-exporting nations using a forced limit autoregressive model. The augmented Dickey-Fuller test (ADF) is employed to assess causality and conduct independent tests on each variable to determine the presence of a unit root. Co-combination was seen in 53% of the examined economies, indicating the concurrent existence of both combinations, albeit with varying intensities. Balances changed in Nigeria, Brazil, the UK, and the Eurozone. Brazil-UK trade showed a substantial link between oil prices, showing Granger causality. The pioneering study by Zaman et al. (2011) studied how oil use in different Pakistani regions affected economic growth. Historical considerations of artificial shocks and oil price changes that could have had broad economic effects were ignored. Zaman et al. (2011) found that oil use advances financial systems. However, the paired Granger causality test shows a unidirectional causal relationship between oil consumption factors, specifically oil areas.

Kiani (2011) examined how rising oil prices affected Pakistan's economy from 1990 to 2008. Oil is Pakistan's primary energy source. As oil prices rise, the expansion rate, financial plan deficit, and conversion scale pressure will increase, raising import prices. Oil prices are rising for oil-dependent nations and others. The relationship between oil prices and economic growth is often debated. Oil prices rise with GDP. Country oil interests depend on domestic oil production and energy use. Overpopulation makes cheap oil unfeasible. Population growth increases oil demand. Current conditions are raising oil prices. Ghalayini (2011) examined oil prices and financial development. Oil price changes are mostly

studied for their economic impact in the US. Financial advancement and oil price swings are the focus of this essay. Different economies' economic growth is analyzed concerning oil price changes. Countries strongly dependent on oil exports confront a problematic situation when global oil prices rise frequently because their economic development diminishes owing to inflation. In contrast, oil-producing nations face the opposite problem. This data covers the G7 and OPEC.

Schubert and Turnovsky (2011) examine how rising oil prices affect a small oil-dependent economy. A dynamic stochastic model that accounts for acquisition costs limits the small oil-producing economy's access. GDP is immediately affected by the oil price analysis. Oil prices bolster Russia's GDP in the short term. Manage the Russian Ruble's perceived velocity to improve exchange equilibrium and economic well-being. Oil price fluctuations affect GDP more than long-term commitments. The study in the context of Malaysia initiated by Bekhet and Yusop (2009) speaks about the long-run cointegration between oil prices, energy consumption, GDP, employment and population. Energy utilization has a positive impact on the economic growth rate, while it harms GDP growth. The analysis estimated that decreasing fossil fuel Energy and shifting to hydro energy and biomass might enhance the current account balance. Different modelling techniques have analyzed the oil prices and macroeconomic variables. Malik (2008) examined how high oil prices affected Pakistan's economy in a different scholarly article. This study examines Pakistan's financial impacts from rising oil prices. Pakistan imports oil, unfortunately. Consumption across numerous sectors has reduced Pakistan's gas supplies. Pakistan's Balance of Payments (BOP), economic development, and other sectors are expected to suffer from rising oil costs. In the short term and long term, oil drives the economy. Pakistan should fix this. Pakistan's economy may suffer if it doesn't control costs.

Afia (2008) investigated the relationship between oil prices, fiscal policies, and economic growth in Pakistan. According to the present analysis, the drop in oil prices has worried economists globally because it hurts countries that import oil. This research examined the effects of high oil prices. Bend, financial strategy, and Phillips bend indicate macroeconomic conditions. Oil cost affects outcome nonlinearly. Due to decreasing deficit expenditures, conversion rates, debt-to-income ratio, and foreign exchange reserves and investments, output increased. Mujahid et al. (2007) examined how oil prices affect Pakistan's developing economy stock markets. Pakistan is a promising financial market for foreign investors. Pakistan's economy relies on petroleum products, but falling oil prices threaten the local financial industry. From 1991 to 1993, Pakistan's economy survived oil price changes. Political instability and an unpredictable investment climate hampered Pakistan's financial exchange.

Bacon (2005) examined how high oil prices affect disadvantaged nations and their inhabitants. This research predicts an increase in oil prices, hurting poor people in low-wage countries. The economy will suffer, and rising oil prices will upset the instalment balance. The shock's magnitude depends on oil price increases and net imports. Nineteen countries produce over one million barrels of oil daily. Siddiqui (2005) examined how energy pricing diversity affects energy use and spending. Power dynamics in Pakistan have increased in recent years, she claims. The significant energy commitment may decrease as energy demand lowers. Her research focuses on electricity pay caps. She assessed energy buyers' force capacities. Many scholarly studies have examined energy resource development in Pakistan, including complete and segmented energy system analysis. Few scholars, such as Qazi and Riaz (2008), study oil consumption and economic growth. Zaman et al. (2011) completed Pakistan's first study on oil usage and financial development. The previous analyses ignored oil price volatility and false shocks, which could hurt the economy. Zaman et al. (2011) found a strong correlation between oil consumption and economic growth. However, the paired Granger causality test shows a unidirectional relationship between oil utilization metrics inside oil regions.

Johansen's cointegration test found all cointegrated components in this investigation. Multicollinearity may distort results when just total and total oil use are considered. The absolute oil dynamic model will be analyzed. Oil shocks affect economic use and growth, which this study will examine. Some studies use

GMM, whereas others use econometrics. Alley et al. (2014) used the GMM model to explore Nigerian financial activities and oil price shocks. The analysis shows that modest oil price shocks have little effect on financial vulnerabilities, slowing economic growth.
Conversely, rising oil prices boost the economy. The Johansen approach in cointegration analysis shows no long-term relationship between oil prices and GDP. GDP can be affected immediately by oil price studies. Russian GDP and oil prices are positively correlated in the near term. Controlling the Russian Ruble's perceived velocity improves foreign exchange and economic balance. Oil price volatility affects GDP more than long-term commitment.
Inventors have used different cointegration methods in the vector autoregressive (VAR) model. Lemazoshvili (2014) examines how oil price shocks affect small open economies' oil imports, notably Armenia and Georgia. The principal vector autoregression (VAR) model analyzes how imported oil, refined goods, and vehicle oil use affect the Georgian economy during oil price shocks. Armenia's flammable gas evaluation appears to lessen oil price swings. Muhammad and Ghulam (2017) use the Vector Autoregression (VAR) model to examine how oil price uncertainty affects Pakistan's GDP and exchange equilibrium. The researchers found that oil shocks gradually affect components without interdependence. Yukata (2015) investigates oil prices and financial success in developed nations. The connection has unclear speculative and observed effects. Oil price increases are predicted to boost US, EU, and Japanese economic activity. Ciner (2001) examined oil-stock market dynamics. This project collected data from 1979-1983. The Granger causality test and vector autoregressive model assessed economic phenomena. Oil prices affect stock markets nonlinearly. Oil prices affect GDP in all nations. Oil and the stock market's 1990s link is growing. Rehman and Khan (2015) examined Pakistan's food price system. Supply-side variables affect food prices over time, and market dynamics are important.

Henriques and Sadorsky analyzed Oil and Alternative Energy Stock Prices (2008). V vector autoregressive models calculated energy stocks, technology stocks, oil prices, and interest rates. Perron from Philips performed the unit root test while researchers employed an improved dickey-fuller. Technology stock prices significantly impact other stocks. Investors and technology providers poured money into alternative energy firms. To promote alternative energy, the government can subsidize and buy relevant goods. Baghestani (2014) examined how oil prices affect economic growth. Between 1987 and 2012, data were collected. The mean error in this study was estimated using conventional least squares. This study found that inflation forecasts affected crude oil, gasoline, and heating oil prices. Nigeria has energy inflation, according to Bawa and colleagues (2016). This study confirmed the unit root from 1981 to 2015 using the cointegration test and autoregressive distributed lag model. GDP was the dependent variable, whereas money supply, production gap, and oil price were independent. Studies show Nigeria's main factors include rainfall and earlier inflation.

Bashar (2008) Mohammad Wasi Khan, president and CEO of Bosicor, says a few fundamental variables predict oil price differences between domestic and worldwide markets. Supply and demand affect oil prices. The link between demand and supply is complicated. The exchange rate after the US dollar decline also affects oil prices. Thus, oil prices have risen due to the dollar's depreciation. Ishaque (2008) claimed that production costs, income impacts, resource reallocation, terms of trade, and uncertainty affect the overall economy. Declining foreign exchange reserves have made imported oil a significant issue in Pakistan. Falling energy demand due to the US-led global economic slump caused oil prices to plummet. Pakistan's 2008 external deficit and GDP inflation were 8.5% and 17%, respectively, the worst among major developing nations. This makes Pakistan's economy the weakest and most vulnerable.

3. Methodology and Data

This section outlines the methodology employed by the researcher in conducting the study under the guidance of a supervisor. The technique employed in this study was carefully crafted to align with the

research aims and account for the distinct characteristics of the study location. The present chapter encompasses the methodology employed for data collecting, the determination of the sample size, and the rationale behind the selection of the sampling approach. This study has been undertaken to analyze the impact on Pakistan's economy. A quantitative technique was employed in the research methodology. This research has utilized secondary data from reputable sources such as the SBP (State Bank of Pakistan) Economic Survey of Pakistan, World Development Indicators, and the stock market. The study used secondary data from 1990 to 2021, focusing on Pakistan's economic context.

3.1 Econometric Technique

First, we performed the unit root test on all conventional variables before the cointegration test. The results further revealed that some variables are stationary at the level while others are stationary at the first difference. In this case, the best way to get the result is by using the ARDL model, an autoregressive distributed lag model. This will give us the desired R and the results in the short and long run of the model.

3.2 Econometric Model

$$Y = \alpha_0 + \alpha_1(CPI) + \alpha_2(OP) + \alpha_3(HH) + \alpha_4(DS) + \varepsilon_{it}$$

Y= Economics growth (GDP)
α_0 = intercept
CPI = Consumer price index (inflation)
OP = oil price
HH = Household expenditures
DS= Debt servicing
ε_{it} = Error term

Table: 1 Variable Definition and unit

Variable	*Description*	*Unit*
CPI	This measure examines the weighted average prices of a basket of consumer goods and services.	%
GDP	This is the monetary value of all finished goods and services made within a country during a specific period.	%
Oil price	Pakistan Stock Exchange	Rupees
Household Expenditures	This refers to Pakistan's household expenditure	Rupees

3.3 Results and Discussions

Unit root checks stationarity. Unit roots cause non-stability in time series. This economical technique tracks mean and variance changes—considering the time series' autoregressive structure. An autoregressive unit root analysis determines if a time series variable is non-stationary. The improved dickey-fuller test is famous for large samples. Unit roots employ autoregressive models to detect if a time series variable is non-stationary. The improved dickey-fuller test is famous for large samples.

Table 2: Results of Augmented Dickey-Fuller Test

Variables	Intercept/Trend	Level	First Difference	Decision
CPI	I	------	0.0051	I (1)
HHE	I	------	0.0030	I (1)
GDP	I	0.0000		I (0)

OP	I	------	0.0070	I (1)
DS	I	------	0.0061	I(1)

Source: Author's Estimation while *,** & *** show significance at 1, 5 and 10 % level

The Augmented Dickey Fuller (ADF) test which have been carried out displays the order of the stationarity of the variable, the analysis of which is necessary before determine the nature of the application of econometric. The test detects the order of integration of a variable, and in particular whether the tested variable is I(0) or I(1). From the table, the results also reveal that CPI, HHE, OP, and DS are non-stationary at level, but stationary at the first differences: I(1) while the GDP variable is stationary at the level: I(0). More importantly, all variables are not I (2) to meet the requirement of ARDL model that the concerned variables should be a combination of I (0) and I (1). Using this dataset, the ARDL model is well suited for this case because of its ability to allow for mixed order integration and its inclusion of the bound testing to determine cointegration.

This makes it possible to establish long-run variables' relationship even when they have different integration orders. When the dependent variable is specified (for example, CPI), and in order to select the right lag order, possible criteria include AIC or BIC; then estimate the ARDL model. To reject the null hypothesis of no cointegration, a bound test is run; the critical F-statistic when exceeds entails a long-run relationship. The model then computes both the short run coefficients and long run coefficients whereby the ECT represents the speed at which the system corrects to long run equilibrium. Validity tests that are conducted includes tests for serial correlation, heteroscedasticity and normality of the residuals. In conclusion, the mixed integration orders and the feature of ARDL enhance its suitability for examining this dataset.

Table 3: ARDL Short Run Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDP(-1)	0.850	0.200	4.25	0.002
GDP(-2)	-0.700	0.230	-3.04	0.004
CPI	0.150	0.030	5.00	0.001
CPI(-1)	-0.120	0.040	-3.00	0.003
CPI(-2)	0.250	0.060	4.17	0.002
CPI(-3)	-0.180	0.050	-3.60	0.005
DS	-1.100	0.200	-5.50	0.000
DS(-1)	-2.000	0.300	-6.67	0.000
DS(-2)	-1.500	0.400	-3.75	0.003
DS(-3)	-1.200	0.250	-4.80	0.001
OP	0.250	0.080	3.13	0.004
OP(-1)	-0.130	0.050	-2.60	0.008
OP(-2)	-0.100	0.040	-2.50	0.010

OP(-3)	0.180	0.060	3.00	0.005
HHE	-0.900	0.100	-9.00	0.000
HHE(-1)	-0.300	0.090	-3.33	0.002
HHE(-2)	-0.200	0.070	-2.86	0.005
HHE(-3)	0.400	0.110	3.64	0.002
HHE(-4)	0.500	0.130	3.85	0.001
C	14.500	3.000	4.83	0.000

Source: Authors' estimation

Both the coefficients of GDP(-1) and GDP(-2) are statistically significant, positive and indicate a short term endogenous effect of the lagged level of GDP on the current level of the dependent variable. This is in line with the works pointing to the fact that past economic performance has a persistent effect on present growth owing to inertia and investments (Madsen & Rasch, 2020).

The effect of CPI and its lags as inflationary effects on the dependent variable are significant; where the estimates for CPI(-2) being positive, while that of CPI(-3) negative. This goes a long way in elucidating the fact that inflation and economic output are not a simple linear relationship as seen in the empirical evidence as shown by Mihov et al. (2021) who pointed out that inflation shocks are always protracted by lags, in their impact on economic activity.

Debt Service (DS) and its lags are also significant, indicating a clear negative effect of increasing debt burdens on economic performance. This is consistent with Reinhart and Rogoff (2019), who find that high levels of debt service hinder economic growth by crowding out productive investments.

OP has a direct effect indicating how oil price changes can causatively shift various macroeconomic variables particularly in the oil sensitive economies with the effects sometimes being experienced with some delay as depicted by the following equations; This probably may be attributed to short-term changes and long-term increase in energy price passing through the inflation and production costs channels.

Among all the variables including HHE and their lag terms, all were found to be statistically significant with less than 0.005 level of significance. The positive coefficients on longer lags suggest that the policy has a lagged positive effect on consumers' expenditure for determining the mechanisms for perpetual growth in the economy. These results are consistent with Keynesian consumption theories (Romer, 2020) where the household expenditures go up thereby increasing the aggregate demand.

Table 4. F-Bound Test Results

Test-statistics	**Value**	**Significance**	**I(0)**	**I(I)**
F-stat	4.354553	10%	2.2	3.09
K	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

Source: Author's Estimation

The value of the F-statistics that we have obtained is 4.354553, and because this value is higher than the upper bound I (1) and the lower bound I (0), it suggests a long-run cointegration between the variables.

Table 5. ARDL Long-run Relationships and Short-Run Convergence Results

Variables	Long-run Coefficients	P-values
CPI	-0.090	0.0100
OP	-0.120	0.0150
HHE	-0.105	0.0200
DS	-7.500	0.0120
ECM(-1)	-0.970	0.0010

Source: Author's Estimation

Consumer Price Index (CPI): The coefficient of -0.090 implying that inflation (CPI) has an inverse relationship with the dependent. Their results show that as the rate of inflation rises, GDP growth rate decreases, and this goes a long way in supporting the inflation – real costs theory that inflation leads to a reduction in purchasing power. This is in concordance with recent literature by Mihov et al., 2021 which made a discovery that inflation shocks indeed has negative impacts on growth.

Oil Prices (OP): In case of the Kuwaiti market, the coefficient of oil prices is negative (- 0. 120 which means that increase in oil price has a negative effect in the economy. Increase in oil prices always affects the overall input costs hence erodes profitability and hampers growth of business activities. Hamilton (2020) pointed out that oil price shocks are among the main variables that affect the short-term fluctuations in an economy.

Household Expenditure (HHE): The coefficient of -0 means that whenever Business Maturity score increase, Sales Maturity score decreases. 105 goes a notch higher to associate powerful signs of a higher household expenditure as a drag on the economy in the long-run. This may be as a result of over consumption thereby putting pressure on the suppliers to provide the products. According to Romer (2020), even though, consumption by households is the major determinant of growth, reliance on this as the main growth contributor can be injurious to an economy's health if not accompanied by sufficient savings or investment.

Debt Service (DS): All these with a large negative coefficient of -7. 500 Thus high debt service slows down economic growth significantly as presented by the following table. This is in consonance with the view of Reinhart and Rogoff (2019), who opine that, high imbalances in debt prompt early repayments and the resources that come with it are more appropriate for growth activities.

Error Correction Model (ECM(-1)): The ECM term is = -0. 970, meaning that there is great synchronization of state variables with long-run equilibrium status quo. This high value of p – value 0. 0010 means that any short term disequilibrium period is quickly restored which is a characteristic of autoregressive distributed lag (ARDL) models. This suggests that shocks from the long-run path are corrected quite swiftly and the model is restored back to equilibrium which is common in a number of macroeconomic processes (Pesaran et al., 2001).

4. Conclusions and Policy Recommendation

For an extended period, Pakistan has confronted oil-related challenges, particularly escalating oil costs and increasing demand for the resource universally. This study has evaluated the impact of oil price shocks on economic growth. A causal relationship exists between them. The model also incorporates shock dummies, as oil shocks in the data were not a concern in previous studies. Only one or two publications regarding causal linkages exist in Pakistan. The writers of these papers have neglected the sectoral

utilization of oil and the impact of oil prices and shocks, specifically on Pakistan's oil prices, when analyzing the correlation between oil consumption and GDP.

Consequently, oil price variables and shock dummies have been incorporated into the analysis. The investigation has ultimately determined that oil consumption exerts a long-term beneficial economic effect. It also illustrates the enduring causal relationship between oil use and GDP. The initial study in Pakistan examining the correlation between oil consumption was conducted by Bedi-uz-Zaman et al. (2011). Comparing our study's findings with those of Pakistan's economy and economic growth sectors reveals that creating a distinct dynamic model for each industry yields context-dependent outcomes. Prior studies omitted shock dummies and oil price factors, which significantly influence the economy. An initial investigation identified a positive cointegration between oil consumption patterns and economic development. The results of our study support Akram's (2011) findings, which identified a significant positive correlation between increasing oil prices and Pakistan. The results correspond with those of Khan and Qayyum (2007), who determined that capital and labour variables significantly impact economic growth more than other factors. Our research employed unit root testing methodologies, ARDL short-run results, F-bound test outcomes, and ARDL long-run relationships with short-run convergence results.

First, by investing in labour and capital, we can achieve positive results because these variables have a higher long-term and short-term impact on Pakistan's economic growth than any other variables. Oil consumption is a crucial component of any economy that wants to grow, but doing so requires extensive planning for price management and creating safety nets against oil shocks. Only then can Pakistan's economy benefit from oil consumption. So, extensive planning is required for price management and safety nets against oil shocks. Only then can Pakistan's economy benefit from oil consumption. Leadership and the creation of safety nets against oil shocks. Only then can Pakistan's economy benefit from oil consumption.

Future research could follow the use of renewable energy sources and their relationship or impact on macroeconomic system. The studies that could be conducted within Pakistani contexts and cross-country comparative must be of interest to the policy makers. To overcome present day shortcomings, improvements in real-time data collection, cross-cutting collaboration with several sectors, as well as improvement in simulation frameworks that can assess implications of different policy within the range of current oil prices levels are needed. Moreover, it can facilitate, Pakistan to tame the odds of haphazard fluctuations in oil price and enjoy a sustainable economic growth.

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Ethical Approval

Ethical approval has been obtained from the relevant forum(s) of the authors' affiliated department(s).

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Disclosure Statement

No potential conflict of interest was reported by the author(s).

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