

**Oil Rents, Macroeconomic Determinants and Economic Growth in Pakistan: An
Autoregressive Distributed Lag (ARDL) Analysis**

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ABSTRACT

The purpose of the research study is to examine the impact of Oil Rents and some Macroeconomic Determinants on Economic Growth in Pakistan using the Autoregressive Distributed Lag (ARDL) modelling approach. The study investigates the dynamic relationship between Economic Growth (GDP) and other Macroeconomic indicators such as Oil Rents (OIL), Consumer Price Index (CPI), Foreign Direct Investment (FDI), Gross Capital Formation (GCF), and Unemployment (UNEMP) for the period 1971–2021. The unit root test of Augmented Dickey–Fuller (ADF) was used to check the stationarity characteristics of the variables. The findings indicate that the variables are co-integrated at mixed orders, with CPI, GCF, and OIL being stationary at level $I(0)$, and the remaining variables FDI and UNEMP being stationary at level $I(1)$. The results confirm the appropriateness of the ARDL approach for analyzing short-run and long-run relationships because none of the variables are integrated at order $I(2)$. The optimal lag structure ARDL (1,1,0,1,1,0) was determined by the Akaike Information Criterion (AIC), and the ARDL model was estimated using this structure. The empirical results show that the explanatory variables together have an impact on Economic Growth as supported by the statistically significant F-statistics. The ARDL bounds testing approach confirms the existence of a strong long-run cointegration relationship between GDP, Oil Rents, and Selected Macroeconomic Determinants as the calculated F-statistics is greater than the upper critical bounds at all conventional significance levels. The long-run estimation results show that Gross Capital Formation has a positive and highly significant impact on Economic Growth, which indicates that investment and capital accumulation play a vital role in improving the economic performance of Pakistan. Likewise, the long-run effect of Oil Rents is positive and statistically significant, indicating that the use of oil-related economic activities is a positive contributor to growth if used properly. Although Inflation and Foreign Direct Investment (FDI) are found to have a negative effect on GDP in the long run, the size of this negative effect is small. Meanwhile, Unemployment does not have a statistically meaningful impact on GDP. The short-run ARDL Error Correction Model (ECM) results also support the existence of a stable adjustment mechanism towards the long-run equilibrium. The Error Correction coefficient is negative and highly significant, which suggests that deviations from equilibrium are corrected quickly over time. The short-run determinants are found to be Gross Capital Formation, which is the most important positive determinant of Economic Growth, while short-run changes in Inflation and Oil Rents do not show statistically significant effects. The Model Diagnostic tests, such as the Breusch–Godfrey Serial Correlation Test, Breusch–Pagan–Godfrey Heteroskedasticity Test, Jarque–Bera

Normality Test, Ramsey RESET Test, and CUSUM Test, confirm that the estimated model is statistically sound, correctly specified, and has no major econometric issues.

Keywords: Oil Rents, Consumer Price Index (CPI), Foreign Direct Investment (FDI), Gross Capital Formation (GCF), Unemployment (UNEMP)

INTRODUCTION

Economic growth is one of the most significant indicators of economic progress and national development as it reflects the growth of production capacity, improvement in income levels, creation of employment and improvement in overall welfare. In developing economies, economic growth is a necessary condition for improving the national income, but it is also important for poverty reduction, social development, institutional development and long-term economic stability. In Pakistan, economic growth has been a key policy priority since independence but a stable and sustainable growth path has been elusive because of structural weaknesses, macroeconomic instability, external vulnerabilities and limited productive capacity. The performance of Pakistan's economy has been quite volatile with some periods of rapid growth and others of economic slowdown due to domestic and international shocks. When Pakistan became an independent economy in 1947, it had only a few industries, poor institutional capacity, and economic problems. The economy of the country was predominantly agricultural and had very little industrial base and physical infrastructure at the time of independence. The agricultural sector was the main source of livelihood and employment and played a significant role in national production and exports. But reliance on agriculture also made the economy vulnerable to the effects of climatic conditions, productivity limitations and variations in agricultural output. In the years to come, Pakistan tried to restructure its economy by investing in industries, encouraging investments, building infrastructure, and connecting with international markets. Despite all these efforts, economic growth was still not uniform and there were frequent internal and external constraints. In the initial few decades following independence, Pakistan's economic growth was comparatively robust compared to other developing nations. The 1960s were a significant time of economic growth, marked by industrialization, modernization of agriculture, infrastructure development, and growth of investment activities. The economic policies of this period focused on private sector involvement, industrialization and modernization of agriculture through technology. These advances helped to boost output and the economy's performance. But the gains from this growth were accompanied by rising income inequalities and regional inequalities, which posed social and economic challenges. Moreover, reliance on outside help and low level of diversification of productive structure exposed weaknesses in later periods. The economic performance of Pakistan during the 1970s was affected by major structural and political changes. Nationalization policies during this period had a major impact on industrial operations, investment and the confidence of the private sector. Meanwhile, the world economic shocks, especially the rise in international oil prices, put further pressure on Pakistan's external sector and domestic inflation. Oil price changes were important for production costs and economic stability because energy is a basic factor in industrial production, transportation, agriculture and commercial activities. The 1970s experience highlighted the need for energy availability and macroeconomic management for sustaining economic growth. In the 1980s, Pakistan had a relatively good economic performance, as external inflows increased, agriculture expanded and manufacturing activities increased. Economic activity was sustained by foreign assistance, remittances and investment inflows, which helped to boost growth rates. But structural issues were not addressed, such as low domestic saving rates, export diversification, reliance on imported energy resources and fiscal imbalance. These weaknesses remained to affect the economic performance of Pakistan in the following decades. The 1990s were a time of economic instability, with slow growth, rising fiscal deficits, external debt pressures, political instability and falling investment. Macroeconomic instability emerged as a significant constraint on economic development, due to inflationary pressures, exchange rate volatility and balance of payments problems, which impacted investor confidence. In this time, Pakistan carried out a number of economic liberalization, privatization

and foreign investment measures. But the potential gains from these reforms were limited by institutional weaknesses, uneven implementation of policy and continued structural issues. During the early 2000s, Pakistan had a better economic performance, which was bolstered by financial sector reforms, foreign investment, growth in consumer markets and capital inflows. During this period, the economy experienced strong growth, with positive developments in industrial production and service sector activities. This growth model was, however, accompanied by an increase in energy demand, imports and dependence on external resources. The surge in economic activity made energy security a critical issue as the power supply and fuel shortages started to affect industrial productivity and economic growth. In the subsequent years, the energy crisis emerged as one of the most critical issues that posed a threat to Pakistan's economic development. Regular power shortages, rising fuel prices and reliance on imported petroleum products had a negative impact on industry production, investment decisions and business operations. Limited energy supplies caused a decline in productivity, higher operating expenses, and a less competitive domestic industry. Pakistan is heavily dependent on imported oil to meet its energy needs and changes in global oil prices have put significant strain on the country's trade balance, inflation rate and fiscal position. Hence, the significance of energy related factors has been growing in the understanding of the dynamics of economic growth in Pakistan. The inflation, external debt, exchange rate volatility, low investment and lack of competitiveness in industries have remained the challenges for the economic performance of Pakistan in recent years. The country has had economic booms but long-term growth has been elusive. The high rate of population growth, unemployment pressures, lack of capital accumulation and reliance on external resources have added to the sustainable development challenges. The conditions show the need to study the factors affecting economic growth and the interactions between macroeconomic variables. There are several factors which affect the economic growth of Pakistan and not any single factor. The economic performance is determined by investment related activities, foreign direct investment, inflationary conditions, interest rate policies, trade performance and availability of energy. Of these, the oil-related variables have become more important as the availability of oil directly affects production capacity and economic efficiency. Oil rents and oil market conditions can influence investment decisions, inflation patterns, government finances and external sector stability. Hence, the relationship between oil rents and macroeconomic determinants is crucial to assess the economic growth process in Pakistan. The experience of Pakistan has proved that economic growth has a close relationship with efficient utilization of resources, macroeconomic stability and productive investment. The country has a great potential in human resources, geographical location and growing markets, but to realize sustainable growth, it is necessary to overcome the structural constraints and increase the efficiency of economic resources. The linkages between energy factors and macroeconomic variables are an important aspect of Pakistan's growth story, especially since energy is a vital input in practically all productive sectors of the economy. In this regard, the study of the effect of oil rents and some macro-economic factors on economic growth gives a full picture of the economic performance of Pakistan. The dynamic relationship between oil-related factors, investment, foreign direct investment, inflation, interest rates and economic growth calls for analysis via a dynamic framework as these variables affect one another over time. It is, therefore, crucial to assess the short run fluctuations as well as the long run relationships of these economic indicators to understand the channels by which macroeconomic conditions influence the growth path of Pakistan. Energy availability is one of the basic factors affecting the economic development since it is used in almost all productive activities of an economy. Reliable and affordable energy supplies are critical to industrial production, transportation, agriculture, trade, and service sector activities. Energy plays a special role in developing countries like Pakistan, as the need of the hour is to increase energy consumption continuously for the economic transformation and industrial expansion. But, the energy related issues such as reliance on petroleum products, volatility of international oil prices, energy crisis and growing demand for fuel resources have been a major constraint in Pakistan's economic development process. The impact of these challenges has been far-reaching on economic growth, inflation, investment choices and external sector stability. Oil is one of the most significant sources of energy in the world and fluctuations in oil markets affect economic performance in several ways. Oil revenues can be significant sources of financial resources for oil-

producing economies, which can be used to fund government spending, infrastructure investments, and economic diversification. But, in an oil importing economy like Pakistan, oil price and oil related income changes can have different economic impacts. Pakistan has also been dependent on petroleum products imports due to its low domestic oil production capacity in comparison to the energy demand. Thus, the fluctuations of international oil prices affect the cost of imports, production costs, inflationary pressures, and macroeconomic stability. The significance of oil rents in the economic growth is complicated due to the fact that the effect of oil rents is dependent on the way in which the rents of the resources are generated, managed and utilized in the economy. Oil rents can have positive effects on economic performance, by providing additional financial resources for investment, infrastructure development and productive activities. Sustainable use of oil revenues can boost the economy's capacity to develop industry, invest in energy infrastructure and boost productive sectors. But if the revenues from these resources are not managed efficiently, they can constrain economic development and can make economies more vulnerable. Where resource revenues are not being productively reinvested, reliance on natural resource income can lower the incentive to diversify the economy and innovate. In Pakistan, oil rents and energy-related factors affect economic growth in a few interrelated ways. Energy is an important input to production processes, so fluctuations in the availability and price of oil will impact the cost structure of firms and industries. Increased oil prices lead to higher transportation and production costs, which may lead to lower competitiveness of industry and lower investment incentives. Likewise, reduced energy availability may limit industrial production and productivity. Hence, energy variables are an important pathway by which oil variables affect economic growth. Investment is one of the key linkages between oil rents and economic growth. Investment is seen as one of the main factors of economic growth since it leads to more capital formation, better production capacity and technological development. Energy conditions have always played a role in the performance of investments in Pakistan. A reliable and cost-effective energy supply helps to attract investment in industry by minimizing production risk and operating costs. On the other hand, energy scarcity and high oil prices may deter private investment by raising business costs and lowering expected profits. Oil-related factors can thus indirectly affect economic growth by affecting investment and capital accumulation. Another significant pathway in which oil-related conditions influence economic growth is foreign direct investment (FDI). Foreign investment is an important source of capital for developing economies, as well as for acquiring advanced technology, managerial skills, and competitiveness. Pakistan has been trying to lure FDI in a number of sectors such as energy, manufacturing, infrastructure, and services. But the energy instability has been a key consideration for foreign investors. Stable supply of energy is seen as vital to production efficiency and business continuity. Hence, changes in oil markets and domestic energy situation can affect the investment attractiveness of Pakistan. The influence of oil rents on inflation is also important in the context of Pakistan. Energy prices have a significant impact on overall prices due to the fact that prices for energy products are used in the production of transportation, manufacturing, electricity generation and agriculture. Rising oil prices on the international market can lead to rising production costs in the domestic market, which can lead to cost push inflation. Inflation can have a negative impact on economic growth because it can lead to a decrease in the purchasing power of consumers, uncertainty, and a reduction in investment activities. Thus, oil-related factors may have an indirect effect on economic growth via their effect on inflationary conditions. Another significant macroeconomic indicator related to oil and energy conditions is interest rates. When energy prices rise, central banks tend to change their monetary policy responses. Fuel price hikes have often been a cause of inflationary pressures in Pakistan and monetary authorities have had to respond to them by adjusting interest rates. Increasing interest rates can help to dampen inflationary pressures by curbing aggregate demand, but they can also have a negative impact on investment and economic growth by making borrowing more expensive. Oil-related inflation shocks can therefore lead to intricate linkages between energy markets, monetary policy, investment and economic activity. Another aspect of Pakistan's dependence on oil is the external sector. Pakistan is a major importer of petroleum products and as the oil prices rise in the world, the import bill of the country also rises, which puts pressure on trade balance. A higher oil import bill can lead to an increase in foreign exchange demand, affect exchange rates and external debt problems. The

depreciation of the exchange rate can also contribute to the inflation in the country by increasing the prices of imported goods, which can complicate the management of the economy. Thus, oil reliance is connected to the overall macroeconomic stability. The link between oil rents and economic growth is thus multifaceted, including direct and indirect effects via investment, foreign capital inflows, inflation, interest rates and external sector conditions. Oil-related resources can be a driver of economic development if they enable productive activities and economic transformation. But overreliance on oil revenues or oil price volatility can pose problems for sustainable development. The situation is especially critical for Pakistan as the country's economic performance has been impacted by energy shortages, escalating fuel prices, and external payment pressures on numerous occasions. In addition to oil-related factors, other macroeconomic factors like gross capital formation, FDI, inflation and interest rates also have a considerable impact on the economic growth process in Pakistan. These variables are not independent, but rather they are interrelated and affect economic outcomes in complex dynamic ways. For instance, increased investment can lead to increased productivity and growth, but investment decisions are subject to macroeconomic stability, financing conditions, and the availability of energy. Likewise, FDI can help to drive economic growth, but foreign investors need to have stable economic conditions, reliable infrastructure and predictable policy oriented environments. The economic history of Pakistan shows that energy security and macro-economic stability are interlinked. Sustainable economic growth needs not only to be accompanied by an increase in energy supply, but also by an increase in the efficiency of energy use, a decrease in external energy dependence and a promotion of productive investment. The relationship between oil-related variables and macroeconomic variables is thus a crucial one to understand Pakistan's growth performance. The nature of these relationships makes it necessary to use an econometric model that is able to account for short term adjustments and long term relationships when analysing oil rents and selected macroeconomic determinants. Economic variables like GDP growth, oil rents, investment, FDI, inflation, and interest rates can vary from period to period and can have different effects in the short and long run. Hence, the need for a dynamic modelling framework to study the impact of oil-related factors and macroeconomic conditions on the economic growth process in Pakistan. The economic growth in Pakistan is a result of the interplay of a number of economic factors such as availability of energy, investment performance, foreign capital inflows, inflationary situation, monetary policy and developments in the external sector. The past experience of Pakistan has shown that economic growth has not always been smooth and uninterrupted as the changes in one macroeconomic variable have affected other variables of the economy. Oil price changes, for example, can impact production costs, inflation, trade balances, fiscal conditions, and investment decisions and ultimately have an impact on overall economic activity. Thus, the study of economic growth should take into account the interdependence of various macroeconomic variables and not just one of them. Oil rents and energy-related factors play a significant role in Pakistan's economy as energy availability is a key determinant of the productivity and competitiveness of key economic sectors. Petroleum products and other energy sources are essential to manufacturing industries, transportation systems, agriculture and commercial activities. Any disruption in energy supply or significant increase in oil prices can increase production costs and reduce economic efficiency. The consequences of the fluctuations in international oil markets on economic performance are direct and indirect in Pakistan where reliance on petroleum imports is still high. The higher oil prices lead to higher import bill, inflationary pressures and difficulties in maintaining external sector stability. On the other hand, better energy management and efficient use of resources can facilitate industrial growth and economic development. The link between oil rents and economic growth is also linked to the investment climate in the country. Investment is a key determinant of economic growth as it expands productive potential, fosters technological progress and creates jobs. But economic stability, infrastructure and production costs are important factors for investment decisions. Energy insecurity has always been a challenge for business and industries in Pakistan and has been a hindrance in investment activities. Regularly facing energy shortages and escalating fuel prices adds to the uncertainty of operations and diminishes the appeal of domestic and foreign investment. Hence, oil-related conditions have an impact on economic growth, not only because of the availability of oil, but also because of their effect on capital formation. Another area of significance that

affects the economic growth of Pakistan is foreign direct investment. External capital is needed in developing economies to overcome their domestic savings constraints and to speed up their industrial development. FDI helps the economy grow by bringing in financial resources, advanced technologies, managerial skills and access to international markets. But foreign investors take into account several macro-economic factors before investing, such as energy security, inflation stability, exchange rate conditions and policy consistency. These have affected Pakistan's ability to attract and retain foreign investment. Uncertainty regarding energy, especially reliance on imported oil and energy price volatility, may impact investor confidence and impact the overall impact of FDI on economic growth. Another major factor influencing the oil rent/economic performance relationship is inflation. Domestic prices are significantly influenced by energy prices, as the cost of transport, industrial production, electricity generation, and agriculture are all affected by energy prices. Rising global oil prices have often led to inflationary pressures in Pakistan, as it drives up the cost of production and distribution. High inflation erodes the purchasing power of households, raises uncertainty for businesses, and could deter long-term investment. Furthermore, inflation poses a policy problem as it is difficult to manage inflation without tightening the monetary policy, which can also reduce economic growth. Thus, oil price inflation shocks can have significant interactions between energy markets, monetary policy and economic growth. Interest rates are also a key macroeconomic channel by which economic conditions affect growth performance. Interest rates are tools that monetary authorities use to control inflation, credit conditions and financial stability. But, when interest rates change, they have significant consequences for investment and economic activity. A higher interest rate will increase the cost of borrowing, which can deter private investment and slow down business growth. Conversely, reduced interest rates can stimulate investment and consumption, but can lead to inflationary pressures if not accompanied by sufficient productive capacity. Interest rate policies have often been used to address inflationary pressures in Pakistan due to energy price hikes, exchange rate pressures and external imbalances. This illustrates the close linkages between oil-related developments, monetary conditions and economic growth. These macroeconomic factors interact to form a dynamic economic environment in which short-term changes can have long-term implications. For instance, a sharp rise in oil prices could lead to a rise in inflation initially, but the long-term effect could depend on the way businesses, policy makers and consumers react to the changing environment. In the same way, better investment and foreign capital inflows can boost economic growth, but this will be contingent upon energy supplies and macroeconomic stability. Hence, it is necessary to examine these relationships in a manner that takes into account both short-term impacts and long-term adaptations. The economic problems faced by Pakistan over the last few years have further underscored the significance of these dynamic relationships. The economy has been grappling with the problems of external debt burden, exchange rate volatility, fiscal deficit, inflation, and the lack of competitiveness in the industrial sector. The problems are frequently interrelated, and energy dependence is one of the important linkages between domestic and international economic conditions. The external sector and economic management of Pakistan is under pressure due to the rise in international commodity prices, geopolitical uncertainties and high oil prices. Therefore, understanding what drives economic growth is becoming more relevant to enhance economic resilience and sustainability. This implies that the short-run fluctuations and the long-run structural interactions between oil rents, macroeconomic determinants and economic growth are present. These complexities can be difficult to capture in traditional economic analysis, which focuses on static relationships, as macroeconomic variables may change over time. The impact of oil rents, investment, FDI, inflation and interest rate changes on economic growth can be delayed and can be different in the short and long term. Hence, a dynamic econometric model is needed to explore the impact of these variables on each other in the Pakistani economic context. The ARDL modelling approach is suitable for analyzing such relationships as it enables both short run and long run effects among the economic variables to be investigated. Macroeconomic variables often have different statistical properties and the ARDL method can be used to investigate the relationship between variables that are integrated at different levels, such as level and first difference. Moreover, the method offers information on adjustment processes, since it determines the speed with which economic variables come back to their equilibrium levels following short-term shocks. This is especially

important for Pakistan as the economy has faced multiple shocks in terms of energy prices, inflation, investment volatility and external sector pressures. The use of dynamic ARDL model for Pakistan's economic data enables a thorough evaluation of the impact of oil rents and selected macroeconomic variables on economic growth over the years. The analysis takes into account the interactions between the oil-related factors, investment, foreign direct investment, inflation and interest rates, which helps to give a more comprehensive picture of the mechanisms driving Pakistan's economic performance. This is because this approach acknowledges that economic growth is not a function of one factor alone but of ongoing interactions between different economic factors. To sum up, the energy-related factors and macroeconomic conditions have played a role in the economic growth path of Pakistan. The oil dependence, the performance of investments, foreign capital inflows, inflation dynamics, and monetary conditions all influence the country's economic performance. This is important because the sustainable economic growth depends on the efficient use of energy resources, encouragement of productive investments, foreign capital inflows and macroeconomic stability. A dynamic analysis using ARDL modelling approach offers an appropriate empirical framework to study these relationships and the contribution of oil rents and macro-economic factors to the economic growth process in Pakistan. The impact of oil-related factors on economic growth thus depends on the relative magnitude of the positive impact of energy availability and resource management and the negative impact of external vulnerability and price instability.

Scope & Problem

Economic growth is one of the key goals of developing economies, especially for a nation like Pakistan which is plagued by macroeconomic instability, inadequate investment, inflationary pressures, unemployment, and poor utilization of natural resources. Although Pakistan has a huge potential in energy resources and foreign investment inflows, the country has been facing varying economic growth performance over the past few decades. The role of oil resources in economic development is still a topic of discussion, as availability of natural resources does not necessarily lead to economic growth. The natural resource dependence can have positive growth implications in developing economies in terms of revenue generation, financing investments, and industrial development, but can also pose problems like inefficient resource use, external vulnerability, and reliance on fluctuating global commodity markets. Hence, it is crucial to grasp the real impact of oil rents on Pakistan's economic development to formulate appropriate economic policies. Some of the macroeconomic factors that affect Pakistan's economic performance are inflation, foreign direct investment, gross capital formation and unemployment. Inflation can impact economic growth in a number of ways, including by decreasing purchasing power, raising production costs, and inducing uncertainty among investors. Likewise, foreign direct investment is seen as a significant source of capital, technology transfer, and employment creation, but the impact of FDI is contingent upon institutional quality, investment efficiency and domestic economic conditions. Gross capital formation is a key determinant of productive capacity and long-term economic growth, and unemployment is a measure of the economy's capacity to make full use of its human resources. These factors interact with each other to form a complicated economic landscape, where some factors can have short run and long run impacts on economic growth. While the factors affecting economic growth in Pakistan have been studied extensively in the past, there is limited empirical literature on the simultaneous effect of oil rents and some macroeconomic variables in a dynamic setting. The importance of oil rents, in addition to other macroeconomic variables, has been comparatively under-researched, and many existing studies have concentrated on individual variables like foreign direct investment, inflation or capital formation. In addition, economic variables are frequently found to be integrated differently. Therefore, the usual regression methods are not suitable for describing short-run fluctuations and long-run equilibrium relationships. Hence, a thorough econometric study is needed to examine the dynamic relationship between oil rents, macroeconomic determinants and economic growth in Pakistan. This study aims to fill this research gap by using the Autoregressive Distributed Lag (ARDL) modelling approach to investigate the effect of oil rents and some macroeconomic factors on economic growth of Pakistan. The ARDL method

is especially appropriate since it enables the study of variables of mixed order of integration ($I(0)$ and $I(1)$) and estimates both short-run dynamics and long-run relationships. The study uses GDP as an indicator of economic growth and analyzes the impact of oil rents, CPI, FDI, gross capital formation and unemployment on the economic performance of Pakistan, giving a comprehensive picture of the factors affecting the economy. This study is based on the annual macroeconomic data of Pakistan for the period 1971 to 2021. The analysis is based on the following questions: Is there a stable long-run relationship between economic growth and the determinants of economic growth selected for the analysis? How does the short-run adjustment process work? What is the magnitude and direction of the effect of each of the determinants of economic growth on economic growth? The study does not focus on sectoral growth patterns or regional variations in Pakistan; it focuses on overall national level economic performance. The results have significant policy implications for resource management, investment promotion, and inflation control and for sustainable economic growth. This study contributes to the current body of literature on the dynamics of economic growth in developing economies and offers empirical insights for policy recommendations for Pakistan's future economic planning, by focusing on the importance of oil rents and important macroeconomic variables.

LITERATURE REVIEW

Concept of Economic Growth

Economic growth is one of the most studied concepts in economics because it is a measure of the increase in the productive potential of an economy and its capacity to produce more income in the future. Economic growth is typically expressed in terms of the change in real Gross Domestic Product (GDP), which is the overall value of goods and services produced in an economy, but adjusted for inflation. Sustainable economic growth is seen as a key factor in improving living standards, lowering unemployment, creating investment opportunities and improving social welfare. Economic growth is of special significance for developing economies as it is the basis for reducing poverty, industrial development, technological progress and enhancing public services. Economic growth is affected by a mix of economic, institutional and structural factors. Long-term growth relies on the capacity of an economy to boost productivity, build physical and human capital, foster innovation and allocate resources efficiently, whereas short-term economic fluctuations rely on the opposite. Sustained growth is difficult in developing countries due to factors such as limited capital, infrastructure, technological capacity, macroeconomic instability and external dependence. So, the question of what factors affect economic growth continues to be a major focus of economists and policy makers. Numerous factors have affected the economic growth in the context of Pakistan. In the past, the country's growth performance has been largely reliant on agriculture productivity, industrial growth, investment activities, foreign capital inflows, energy supply and macroeconomic stability. While the country has enjoyed relatively high growth rates in the past, the ability to sustain a growth trajectory has been difficult due to frequent fiscal pressures, inflationary episodes, external imbalances and structural weaknesses. Therefore, the determinants of economic growth in Pakistan should be studied in the light of traditional growth determinants and emerging economic issues like energy dependence and resource related vulnerabilities.

Oil Rents and Natural Resource-Based Income

Oil rents are the economic value of oil resources once the costs of oil production are subtracted. Countries can generate extra income from natural resource rents, which can be used for economic development by investing in infrastructure, industrial capacity, education and public services. Natural resources can generate economic opportunities in countries with rich natural resources, as it can generate financial resources in addition to the traditional economic activities. The connection between oil rents and economic growth is complex, as oil rents can have both positive and negative economic impacts. The good news is that oil

money can help the economy grow by providing more funds for the government, investment, infrastructure, and development projects. Resource income can also alleviate financial constraints by generating extra resources for capital accumulation and economic modernization. The economic impact of oil rents, however, is highly dependent on the management and utilization of resource revenues and their conversion into productive economic activities. If oil revenues are used effectively in productive areas, they can help to promote long-term economic development. On the other hand, over-reliance on resource income can lead to economic vulnerabilities due to less incentive to diversify, greater sensitivity to international price volatility, and volatility in government revenues. Thus, the effect of oil rents on economic growth depends not only on the availability of resources, but also on the efficiency of investment and the institutional capacity and economic policies. The notion of oil rents needs special attention for Pakistan as it is not one of the world's leading oil producing economies. Rather, Pakistan's energy structure is highly reliant on imported petroleum products to satisfy its energy needs. Thus, the economic impact of oil in Pakistan is mainly linked with the cost of energy, reliance on imports, volatility of international oil prices, and their impact on macroeconomic stability, rather than with the volume of oil production.

Energy Dependence and Economic Growth

Energy availability is an essential factor for economic development as all productive sectors rely on the availability of energy supplies. Energy resources are needed continuously for industrial production, transportation, agriculture, trade and service activities. In developing countries, energy shortages and high energy costs can have a significant impact on economic growth by reducing production efficiency, business costs, and investment. Energy issues have always been a part of Pakistan's economic development. The country has been facing chronic problems of electricity shortages, rising demand for energy and reliance on imported fuels. Petroleum products are a significant part of Pakistan's energy consumption and international price fluctuations have significant implications for the domestic economic situation. Rising oil prices lead to higher import costs, higher production costs, and inflationary pressures. Energy is an important input in production processes and has been extensively studied in the economic literature in relation to economic growth. As economies expand, energy consumption tends to rise, as more industries, transportation systems and households need more energy. Meanwhile, insufficient energy supplies can hinder economic growth by impairing production capacity. Hence, there is a dynamic relationship between energy and economic growth. Energy dependence has impacted the performance of the economy in Pakistan in several ways. First, the higher energy prices make production more expensive for industries, making them less competitive and less profitable. Secondly, uncertainty of energy prices deters investment as firms struggle to plan production activities. Thirdly, reliance on imported oil puts strain on the balance of payments, especially when international oil prices are high. These factors illustrate the close relationship between energy conditions and the macroeconomic stability and economic growth.

Oil Rents and Economic Growth

There has been a great deal of interest in the link between oil rents and economic growth, as natural resource wealth does not necessarily lead to better economic performance. Oil resources can fuel growth if revenues are channeled into productive investments, infrastructure and economic diversification. But resource income can have a limited growth effect if economies become too dependent on natural resources or if the income is poorly used. Oil-related income may affect growth in developing economies by affecting capital accumulation and public investment. Resource revenues can be used by governments to invest in infrastructure, transport, energy and industry. These activities boost productive capacity and can help boost economic growth. But oil-related factors can have negative impacts on growth as well, via cost and stability channels. High oil prices lead to high production costs, low household purchasing power and inflationary pressures. Rising international oil prices can further impact the trade balances and external financing needs of oil importing countries like Pakistan. Thus, the impact of oil-related factors on economic growth will

vary depending on whether the positive impact of energy availability and resource management outweighs the negative impact of external vulnerability and oil price instability.

Macroeconomic Determinants and Economic Growth

There are several macroeconomic factors that affect economic growth such as investment, foreign direct investment, inflation, interest rates, etc. These variables interact with oil-related variables and together influence economic performance. Investment is one of the most significant factors affecting economic growth as it enhances the productive capacity and capital formation. Increased investment leads to increased industrial growth, technological advancement and job creation. Macroeconomic uncertainty, energy shortages, and financial constraints have impacted investment performance in Pakistan. Stable energy conditions and effective economic management are thus crucial for attracting investment activities. Foreign direct investment is also important in fostering economic growth through external capital, technology transfer and access to international market. FDI can supplement domestic investment and boost productivity in developing countries. But macroeconomic stability, energy availability, inflation conditions, and institutional quality have an impact on foreign investors. Hence, the oil-related instability and macroeconomic uncertainty can impact the foreign investment potential of Pakistan. Another key determinant of economic growth is inflation. Although inflation can be a by-product of economic growth, high inflation can have a negative impact on growth by eroding purchasing power, creating uncertainty, and deterring investment. Energy prices are a significant contributor to inflationary pressures as they affect transportation, production and distribution costs. Interest rates affect financial conditions, investment decisions, and borrowing costs, which all impact growth. An increase in interest rates could make it more expensive to invest, and a decrease in interest rates could stimulate economic activity. But the monetary authorities have to weigh growth goals against inflation and financial stability. In general, the conceptual relationship between oil rents, energy dependence and macroeconomic factors suggests that economic growth in Pakistan is driven by a web of interdependent factors. Investment, inflation, external stability and business confidence are affected by oil-related conditions, and macroeconomic policies determine the effectiveness of energy resources in economic development. Hence, it is important to study these relationships in a dynamic perspective to understand the factors influencing the economic growth of Pakistan

Supporting Theories

Resource Curse Theory

One of the most popular theories to explain why countries with rich natural resources do not necessarily grow better than those with less natural resources is the Resource Curse Theory. The theory was born from the observation that some resource-rich economies, especially those relying on oil and mineral resources, have been developing at a slower rate, have been economically unstable, and have not diversified well, despite having valuable natural resources. This theory states that natural resource abundance can generate opportunities and economic problems, depending on the quality of natural resource management, institutional effectiveness, and economic structure. From this point of view, the use of natural resources like oil can have a positive impact on economic development through the generation of government revenues, foreign exchange earnings and public investment. Resource income can be utilized for infrastructure development, productive capacity development and industrialization. Thus, oil rents can be a significant contributor to economic growth, if managed and invested in productive sectors. But the Resource Curse Theory also identifies a number of ways in which resource dependence can have a detrimental effect on economic performance. Relying too heavily on resource revenues can also diminish the incentive to diversify the economy, as governments and companies become overly dependent on resource income. The economies of resource-dependent countries can also be affected by international

commodity price fluctuations, as the prices of resources in the international market have a direct impact on the national income and government revenues. One of the other arguments related to resource dependence is that resource revenues can affect investment decisions and economic decision-making. If resource income is not properly directed to productive activities, it may not result in sustainable economic growth. Rather, the economies can suffer from inefficient resource allocation, lower productivity growth, and less development of manufacturing and technological industries. Although Pakistan is not a big oil exporter, the Resource Curse view offers some insights in relation to Pakistan. The economic ties between Pakistan and oil are mainly energy dependency and vulnerability to international oil market volatility. The country's dependence on petroleum products imports is a vulnerability because of the increasing import costs, inflationary pressures and external sector imbalances. Thus, the importance of this perspective is in the understanding of the impact of oil-related variables on economic stability and economic growth performance rather than explaining the consequences of large-scale domestic oil production.

Solow Growth Theory

Solow Growth Theory, or the neoclassical growth model, is one of the basic theories that explains long-run economic growth. The theory focuses on the role of capital accumulation, labor growth and technological progress in the production of economic output. In this model, growth is mainly explained by the growth of physical capital, the growth of labor resources and the growth of productivity due to technological progress. Investment in capital stock is an important factor in the Solow model. The more money that is invested, the more machinery, infrastructure, equipment, and other productive assets that economies can acquire to increase production capacity. Gross capital formation is thus regarded as an important indicator of economic growth as it enhances the productive capacity of the economy. The theory also implies that if the economy is to grow for a long period of time, then capital accumulation alone will not suffice because the contribution of additional capital will eventually decrease due to diminishing returns. So, technological advancement is crucial for sustaining productivity growth and ensuring sustainable growth. Economies that are able to successfully implement new technologies and increase production efficiency can achieve greater economic performance. Solow Growth Theory is an important explanation of the role of investment and capital formation in economic development in the context of Pakistan. Lack of investment, infrastructure and technological development are always a problem in Pakistan. Capital accumulation has been low, limiting productive capacity and performance in the long term. So, more investment, better infrastructure and better productivity are key to boosting economic growth. The theory also provides a connection between energy availability and capital productivity. Energy is needed to run industrial machines, transport goods and services, and to power production facilities, so insufficient energy supply can limit the productivity of physical capital. Energy shortages and high fuel prices in Pakistan can decrease the productivity of the existing capital resources which can limit the contribution of investment to economic growth. Moreover, the Solow model provides an explanation of the significance of foreign direct investment. FDI can help in capital accumulation through the availability of more funds and the transfer of new and improved technologies. Foreign investment can boost productivity and promote economic growth via technology transfer and production process improvement.

Endogenous Growth Theory

Endogenous Growth Theory is an extension of traditional growth theories that focuses on the fact that economic growth is not only driven by external technological progress, but also endogenous within the economic system. This theory emphasizes the need for knowledge creation, innovation, human capital formation, research, and investment decisions in explaining long-term economic growth. Endogenous growth theory contrasts with traditional growth theories that assume that technological progress is an exogenous factor, and instead holds that technological progress is an outcome of economic activities like investment in education, research and development, and innovation. Thus, policies that encourage the

accumulation of knowledge and productivity enhancement can lead to continuing economic growth. The theory focuses on the fact that investment can have a wider impact than just the accumulation of physical capital. Investments in technology, skills and organizational improvements can generate positive spillover effects, which can boost productivity in other sectors of the economy. Likewise, foreign direct investment can help drive endogenous growth through the transfer of new technologies, enhanced management skills, and greater linkages with international markets. Endogenous Growth Theory offers a significant explanation to Pakistan about the role of FDI, investment and productivity improvement. Foreign investment has been made in various sectors in Pakistan, but the benefits of growth will be realized if the country can absorb technology and build its own productive capacity. The benefits of FDI can be restricted if there is a lack of infrastructure, skilled manpower and institutional support. The theory also emphasizes the need for economic diversification. Those economies which rely on narrow sources of income may encounter problems in achieving sustainable growth. Hence, Pakistan's economic growth should be geared towards diversifying production structures, technological progress, and productivity growth. Macroeconomic stability also has an impact on endogenous growth mechanisms through the effects of inflation and interest rates on investment incentives and innovation activities. The high level of inflation and the uncertainty of the financial situation could make it less likely that long-term investments would be made, which would limit the opportunities for productivity growth. Thus, macroeconomic stability is crucial to fostering a conducive environment for sustainable economic growth.

Energy and Growth

The Energy-Growth Nexus is an explanation of the relationship between energy availability and economic development. Energy is regarded as a basic factor of production because industrial processes, transport, agriculture and services are constantly using energy. This view implies that the two are linked, since a rise in economic activity tends to lead to a rise in energy use. Energy and growth can be related in various ways. Economic growth can lead to higher energy consumption by industries and households. Concurrently, better energy availability can foster economic growth through production activities and productivity. Thus, there can be dynamic interactions between energy and economic growth. The energy-growth relationship is of special significance in developing countries like Pakistan, where energy shortages can have a major impact on economic development. Limited electricity supply, reliance on imported fuels, and high energy prices can diminish industrial productivity and deter investment. Thus, energy security is a key factor in sustainable economic growth. The oil sector is a key part of Pakistan's energy sector as petroleum products are extensively utilized in the transportation, industrial, and power generation sectors. Oil price fluctuations affect production costs, inflation and external sector conditions. Thus, oil-related factors may have several impacts on economic growth, such as investment behavior, price stability, and trade performance. The Energy-Growth Nexus also provides an explanation of the importance of energy management policies for economic development. Greater energy efficiency, energy diversification and less reliance on imported fuels can lead to better economic stability and long-term growth. Therefore, solving Pakistan's energy problems is closely related to the issues of productivity, investment, and sustainable economic development. Overall, these theoretical approaches offer a solid base for studying the link between oil rents, macroeconomic factors and growth. Theories of the resource curse, Solow Growth Theory, Endogenous Growth Theory, and the Energy-Growth Nexus account for the importance of resource dependence, investment and capital accumulation, productivity and innovation, and energy availability for economic performance, respectively. These theories collectively help to analyze the effect of oil rents, investment, FDI, inflation and interest rates on the economic growth of Pakistan.

Supply of Oil Rents and Economic Growth

There is a large empirical literature on the link between natural resource revenues and economic growth. Initial research on resource-rich economies yielded conflicting results; some have found that resource

income has a positive impact on development, while others have pointed to economic problems stemming from resource dependence. The variations in results suggest that natural resources do not automatically lead to economic success; rather, their impact is dependent on how well revenues are managed and turned into productive economic activities. In fact, several empirical studies have shown that oil rents can have a positive effect on economic growth, as they can be used to finance investment, infrastructure, and public spending. In resource-rich economies, resource revenues have helped to fuel economic growth by boosting government revenue and financing major development initiatives. In countries that have been able to control their resource wealth, oil revenues have been used to diversify their economies, to invest in technology and to increase productive capacity. But other empirical evidence has found a negative correlation between resource dependence and economic growth. The studies suggest that countries with high natural resource revenues may face slower economic growth due to over-dependence on commodity exports, price sensitivity to global market prices, and less incentives to diversify their economies into other sectors. Experience in a number of resource-rich countries indicates that oil price volatility can lead to substantial volatility in government revenues, investment patterns and economic planning. The mixed empirical results on the oil rents and growth indicate that the nature of the relationship depends on the economic structure and resource management practices. Resource income can have a positive effect on growth in economies that reinvest the funds in productive activities. On the other hand, if resource revenues lead to dependence and to a less diversified economy, the growth effects can be restricted or even negative. This literature is relevant for countries like Pakistan because it helps to understand the impact of oil on economic performance in terms of energy costs, dependency on imports and macroeconomic stability. Pakistan is not a big oil exporter, but the fluctuations in the international oil market have an impact on the country's economic performance because of the country's dependence on petroleum products imports.

Energy Efficiency and Energy Productivity in the Economy

Since energy is a basic input to production activities, the link between energy and economic growth has been widely studied in empirical research. Numerous studies have shown that energy availability is a key factor in the growth of the economy, especially in developing countries where industrialization and infrastructure development are dependent on rising energy demand. The empirical studies have generally confirmed that inadequate energy supply has a negative impact on economic growth, through lower industrial productivity, higher production costs and lower investment. Lack of energy pose operational challenges for companies, decreases competitiveness, and stifles growth of productive industries. The impacts are especially pronounced in developing nations with underdeveloped energy infrastructure. Research on the impact of oil price volatility has also revealed significant impacts on macroeconomic performance. Rising oil prices internationally tend to cause inflation, as fuel prices affect transport, production and distribution costs. Increasing oil prices also lead to higher import costs and put pressure on foreign exchange reserves for oil importing economies. These conditions can have adverse impacts on economic growth, as they can diminish the ability to invest and create macroeconomic uncertainty. There is empirical evidence from developing economies that energy security is closely related to economic development. Stable energy supplies are associated with better industrial performance and investment opportunities in countries. Economies with energy scarcity and/or heavily reliant on imported fuels, on the other hand, tend to be constrained in growth. In Pakistan, there are several empirical studies that have pointed out the significance of energy availability for economic growth. Energy shortages, increasing fuel costs and reliance on imported petroleum are significant factors affecting industrial performance and overall economic activity. The results indicate that energy related variables are important to include in the study of Pakistan's economic growth dynamics.

Investment and Economic Growth

Investment is well known as one of the most significant factors of economic growth. There have been many empirical studies on the relationship between gross capital formation and economic performance, and most of them have concluded that there is a positive relationship between investment and growth. The more invested, the more productive capacity is increased, through the increase of physical capital, the improvement of infrastructure and the improvement of the efficiency of production. Empirical evidence from both developed and developing countries has demonstrated that higher investment rates are associated with more robust economic growth, as investment leads to higher productivity and employment. Investment in infrastructure, manufacturing, energy systems and technology has especially powerful impacts on long-term economic development. But empirical evidence also shows that the effect of investment is related to economic conditions and investment efficiency. A high level of investment does not necessarily lead to high growth if investment is not allocated efficiently or if the macroeconomic environment is unstable and productivity gains are lower. So, the quality of investment is as significant as the quantity of investment. In Pakistan, empirical studies have consistently emphasized the importance of investment for economic growth. It has been observed that low capital formation has hampered the economic growth by restricting the industrial growth and productivity improvement. Political instability, energy shortage, financial constraints, and macroeconomic instability have had an impact on investment performance in Pakistan. The investment relationship is also significant with oil-related factors. Stable energy conditions promote investment, as do fuel shortages and high fuel prices, because they limit production uncertainty. Thus, investment is one of the important links by which energy conditions affect economic growth.

FDI and Economic Growth

Foreign direct investment has been the subject of much attention in the economic literature due to its role as a source of external capital, technological transfer and international integration. The relationship between FDI and economic growth has been explored in many empirical studies, which have found positive impacts of FDI, especially in developing countries. Empirical evidence indicates that FDI is a source of economic growth, as it brings capital, advanced technology, better management and productivity. Foreign investors can also introduce knowledge and expertise that can boost the efficiency of domestic industries. Moreover, FDI can create jobs and enhance export potential. But empirical evidence also indicates that the impact of FDI is subject to domestic economic conditions. Foreign investment may not be fully utilized in countries with poor infrastructure, macroeconomic instability and limited technological capacity. Thus, the effect of FDI is contingent on the absorptive capacity of domestic economies, as well as the capacity of investment to be integrated into productive sectors. Empirical studies have yielded mixed results for Pakistan on the impact of FDI on economic growth. There are also studies that have found a positive relationship, which indicates that foreign investment can promote the development of industry and economic growth. Other studies have highlighted that political uncertainty, energy scarcity, security issues and macroeconomic uncertainty have constrained the positive impact of FDI on growth. Foreign investors need to be confident of the infrastructure and production environment, which is why energy conditions are especially significant in attracting FDI. Hence, indirectly, oil-related factors and energy availability impact economic growth through the impact on investment attractiveness.

Inflation, Interest Rate and Economic Growth

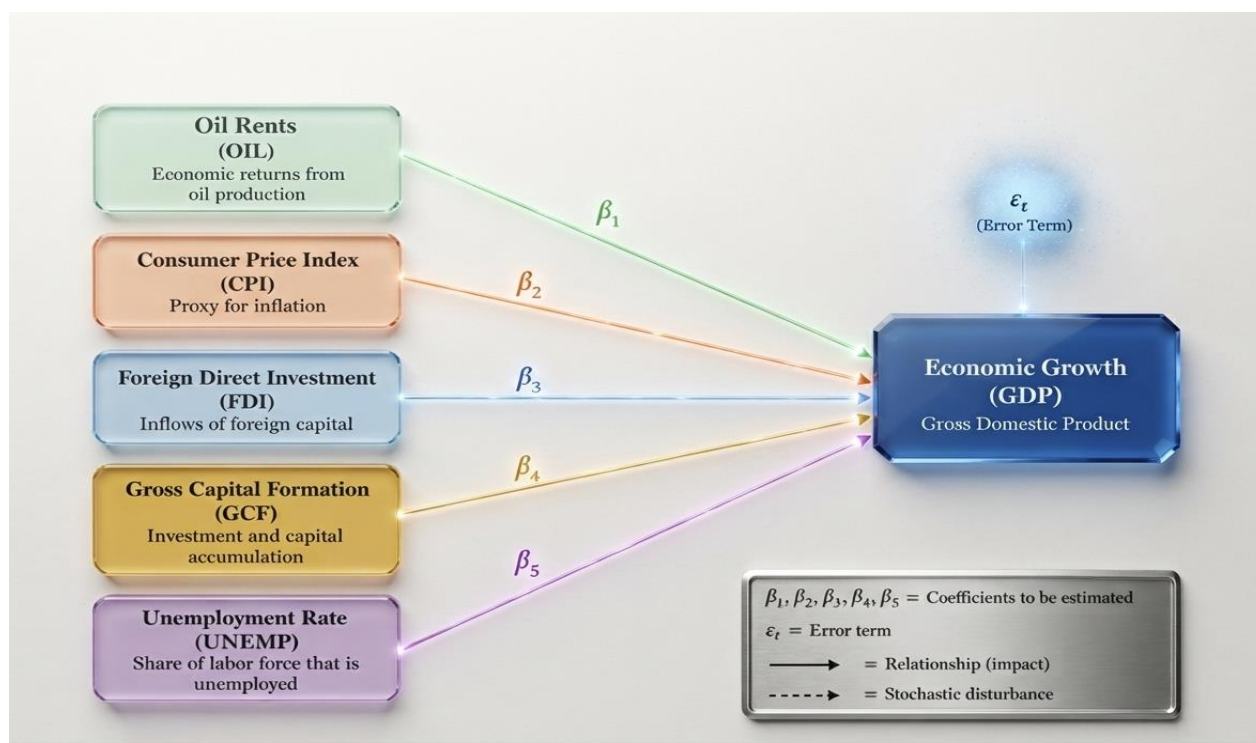
Inflation and interest rates are macroeconomic variables that have an impact on economic growth by affecting consumption, investment and financial stability. Empirical research has indicated that moderate inflation can coexist with economic growth, while high inflation has a negative impact on economic performance. High inflation lowers the purchasing power, raises economic uncertainty and deters investment. When future costs and returns are not certain, businesses may be hesitant to expand. Further,

inflation can make domestic industries less competitive because it can lead to higher production costs. In developing economies, inflation is frequently affected by the price of energy, exchange rate fluctuations and supply-side constraints. Oil prices often lead to inflationary pressures as they have a significant impact on transportation and production costs. Hence, the link between oil factors and growth can be mediated by inflation pathways. There have also been mixed results regarding interest rates. Rising interest rates can help to curb inflation, but can also make borrowing more expensive and deter investment. Reducing interest rates can stimulate investment and economic activity, but can lead to inflationary pressures if economic capacity is constrained. Hence, the policy considerations of monetary policy have to be made with a balance between controlling inflation and promoting growth. Based on the empirical evidence, Pakistan has found that inflation and interest rates have been important factors in the economic performance. High inflation and monetary tightening have been correlated with lower investment and economic growth. The results of this study emphasize the need for macroeconomic stability in sustainable development.

Data Estimation Methods

The methodology used in this study is quantitative research methodology, which is used to analyze the impact of oil rents and some macroeconomic variables on economic Growth in Pakistan from 1971 to 2021. The quantitative approach is suitable since it allows the empirical study of the relationship between economic variables using statistical and econometric methods. The study uses secondary time-series data from reliable national and international sources such as World Bank's World Development Indicators (WDI), International Monetary Fund (IMF), State Bank of Pakistan (SBP), Pakistan Economic Survey and Pakistan Bureau of Statistics (PBS). These sources contain consistent and internationally comparable macroeconomic information which is appropriate for the study of determinants of the economic growth of Pakistan. The dependent variable of the study is economic growth measured by Gross Domestic Product (GDP) and the independent variables are Oil Rents (OIL), Consumer Price Index (CPI), Foreign Direct Investment (FDI), Gross Capital Formation (GCF) and Unemployment (UNEMP). Oil rents are the economic returns from oil production, after subtracting the costs of extraction, and are added to measure the impact of natural resource revenues on economic performance. CPI is an indicator of inflation, FDI is an indicator of foreign investment in the economy, Gross Capital Formation is an indicator of domestic investment and accumulation of capital, and the unemployment rate is an indicator of the percentage of the labor force that is not working but actively looking for work.

Research Paradigm



Where (GDP) denotes economic growth, (OIL) represents oil rents, (CPI) is the Consumer Price Index, (FDI) refers to Foreign Direct Investment, (GCF) denotes Gross Capital Formation, (UNEMP) represents the unemployment rate, (beta-0) is the intercept, (beta-1)–(beta-5) are the estimated coefficients of the explanatory variables, and ϵ_t is the stochastic error term. The stationarity properties of the variables are first checked using the Augmented Dickey–Fuller (ADF) unit root test to identify the order of integration for each series before estimating the empirical model. The ADF test is used because it is one of the most popular tests to detect the presence of a unit root in time-series data. The findings show that Consumer Price Index (CPI), Gross Capital Formation (GCF) and Oil Rents (OIL) are stationary at level, $I(0)$, while Foreign Direct Investment (FDI) and Unemployment (UNEMP) are stationary after first differencing, $I(1)$. The variables are integrated at mixed orders, and none of the variables are integrated at the second difference, $I(2)$, which makes the ARDL modelling approach suitable for the analysis. The study uses the autoregressive distributed lag (ARDL) bounds testing approach of Pesaran, Shin and Smith (2001) to estimate the short-run and long-run relationships between the variables. The ARDL methodology is preferred because it allows for the integration of variables at different orders, namely $I(0)$ and $I(1)$; it is efficient in terms of relatively small sample size; and it estimates both the long-run equilibrium relationships and the short-run dynamic adjustments. Moreover, the ARDL method offers consistent and unbiased long run estimates and does not require the condition of integration of all the variables in the same order. The Akaike Information Criterion (AIC) is used to determine the optimum lag length for the ARDL model, which aims to maximize the information gained from the model while minimizing the number of parameters. The best lag structure found for the study using the AIC selection criterion is ARDL (1,1,0,1,1,0) which is used for the subsequent estimation. Once the best lag structure is identified, the ARDL Bounds Test is performed to check if there is a long-run equilibrium relationship between economic growth, oil rents and the chosen macroeconomic variables. The null hypothesis is that there is no cointegration between the variables, while the alternative hypothesis is that there is a long-run relationship between the variables. The F-statistic is estimated and

found to be greater than the upper critical value at all conventional significance levels, which indicates that the variables are cointegrated and that both long-run and short-run coefficients are estimated correctly. The long run estimation results show that Gross Capital Formation has a positive and highly significant effect on economic growth, which shows that investment and capital accumulation is an important factor in the long run performance of the economy of Pakistan. Oil rents also have a positive and statistically significant effect on GDP, indicating that the efficient management and productive use of oil-related revenues have a positive effect on economic growth. The long run coefficients of CPI and FDI are negative with relatively small magnitude as compared to the other variables. Unemployment does not have a statistically significant impact on economic growth in the long run. The short-run dynamics are estimated using the Error Correction Model (ECM) of the ARDL specification. The Error Correction Term (ECT) is negative and significant, suggesting a stable correction mechanism that allows deviations from the long-run equilibrium to be corrected over time. The size of the ECT indicates that short-run shocks lead to a relatively quick adjustment to disequilibrium. The short-run factors are found to be statistically insignificant, except for Gross Capital Formation, which is the most important positive determinant of economic growth. Several post-estimation diagnostic tests are performed to make sure the estimated model is reliable and robust. The Breusch–Godfrey Serial Correlation LM Test shows that there is no serial correlation in the residuals, and the Breusch–Pagan–Godfrey test shows that the model is not heteroskedastic. The Jarque–Bera test indicates that the residuals are normally distributed, while the Ramsey RESET test shows that the model is correctly specified and that there is no functional form misspecification. The stability of the estimated coefficients is also checked using the CUSUM and CUSUM of Squares (CUSUMSQ) tests. The results show that the estimated coefficients stay within the critical bounds during the sample period, which means that the model is structurally stable. All these diagnostic and stability tests confirm that the estimated ARDL model is consistent with the classical econometric assumptions and the results are reliable and stable for analyzing the relationship between oil rents, macroeconomic variables and economic growth in Pakistan.

Description of Variables

Details of Variables	Symbols	Measurement/Proxy	Units	Data Sources
Gross Domestic Product (Economic Growth)	GDP	Annual GDP Growth (Annual %)	Percentage of GDP	World Development Indicators (World Bank)
Oil Rents	OIL	Oil Rents (% of GDP)	Percentage of GDP	World Development Indicators (World Bank)
Consumer Price Index	CPI	Consumer Price Index (2010 = 100)	Index	World Development Indicators (World Bank)
Foreign Direct Investment	FDI	Foreign Direct Investment, Net Inflows (% of GDP)	Percentage of GDP	World Development Indicators (World Bank)

Gross Capital Formation	GCF	Gross Capital Formation (% of GDP)	Percentage of GDP	World Development Indicators (World Bank)
Unemployment	UNEMP	Unemployment, Total (% of Total Labor Force)	Percentage of GDP	World Development Indicators (World Bank)

Overall of ADF Test Results

Variables	ADF Statistics	P-Values	Stationarity Level	Order of Integration
CPI	-4.701735	0.0003	Level stationary	I(0)
FDI	-5.319884	0.0000	First difference stationary	I(1)
GCF	-10.41817	0.0000	Level stationary	I(0)
OIL	-3.932119	0.0036	Level stationary	I(0)
UNEMP	-6.867140	0.0000	First difference stationary	I(1)

The variables were tested for stationarity using the Augmented Dickey-Fuller (ADF) unit root test. The null hypothesis of the ADF test is that the variable has a unit root (is non-stationary). The results demonstrate that all the variables have p-values less than 5% which means that the null hypothesis is rejected. The results indicate that CPI, GCF, and OIL are stationary at their levels, i.e., they are I (0) stationary. FDI and UNEMP, on the other hand, are stationary after taking the first difference, suggesting that they are integrated of order one I (1). The variables are a mixture of I(0) and I(1) processes, with no variables being integrated at order I(2), so the dataset meets the stationarity requirement for applying the Autoregressive Distributed Lag (ARDL) bounds testing approach to investigate the long-run relationships among the variables.

Descriptive Statistics

Statistic	CPI	FDI	GCF	GDP	OIL	UNEMP
Mean	9.046978	0.682778	3.755210	4.709630	1.071715	3.816660
Median	8.094066	0.540996	3.956653	4.451701	0.559786	3.971500
Maximum	26.66303	3.035719	18.53185	10.21570	8.681537	7.827000
Minimum	2.529328	-0.062662	-9.696397	-1.274087	0.159470	0.398000
Std. Deviation	5.088976	0.649215	6.258112	2.215819	1.482992	2.121888

Skewness	1.523102	2.073455	-0.136625	-0.081022	3.363102	0.134908
Kurtosis	5.649321	7.511740	3.090035	3.137012	15.64062	2.013889
Jarque-Bera	33.95472	78.23471	0.172441	0.093814	427.1400	2.177532
Probability	0.000000	0.000000	0.917392	0.954176	0.000000	0.336632
Observations	50	50	50	50	50	50

The descriptive statistics give a description of the variables used in the study and their distribution. The results indicate that the average values of CPI, FDI, GCF, GDP, OIL, and UNEMP are 9.05, 0.68, 3.76, 4.71, 1.07, and 3.82, respectively. The standard deviation results indicate that there were relatively higher fluctuations in the case of GCF (6.26) and CPI (5.09) whereas there were comparatively lower fluctuations in the case of FDI (0.65) and OIL (1.48). There is a wide range of variation in the variables over the study period, as shown by the minimum and maximum values. The skewness values show that the distributions of CPI, FDI and OIL are positive skewed, meaning that there are more observations in the lower end of the distribution with some extreme high values. GCF and GDP, on the other hand, exhibit minor negative skewness, indicating relatively symmetrical distributions. The kurtosis values show that the distribution of CPI, FDI, and OIL are leptokurtic (kurtosis greater than 3), meaning that they have heavier tails and extreme observations. The other variables have distributions that are approximately normal. The Jarque-Bera test results show that GCF, GDP and UNEMP are normally distributed as their probability values are greater than 0.05. The probability values of CPI, FDI and OIL, however, are less than 5% significance level, so these variables are slightly deviated but acceptable further econometric analysis.

Correlation Statistics

Variables	CPI	FDI	GCF	GDP	OIL	UNEMP
CPI	1.000	0.090	-0.098	-0.159	0.256	-0.369
FDI	0.090	1.000	-0.117	-0.289	-0.202	-0.183
GCF	-0.098	-0.117	1.000	0.569	0.196	0.219
GDP	-0.159	-0.289	0.569	1.000	0.301	0.196
OIL	0.256	-0.202	0.196	0.301	1.000	-0.214
UNEMP	-0.369	-0.183	0.219	0.196	-0.214	1.000

The correlation matrix displays the correlations between the variables used in the study. The results show that there is no serious multicollinearity problem as the most of the variables have weak to moderate correlation. The highest positive correlation is found between GDP and GCF (0.569) which shows moderate positive correlation between economic growth and gross fixed capital formation. The correlation between GDP and OIL (0.301) is also positive, but relatively weak. The correlation between CPI and UNEMP is negative (-0.369) which indicates that as the unemployment rate increases, the CPI decreases in the sample period. Similarly, FDI shows weak negative relationships with GCF (-0.117), GDP (-0.289), OIL (-0.202), and UNEMP (-0.183). All the correlation coefficients are less than 0.80, which is the usual limit for severe

multicollinearity of the explanatory variables. Thus, the variables are suitable for further econometric analysis.

ARDL Estimation Results (Dependent Variable: GDP)

Variable	Coefficient	Std. Error	T-Statistic	P-Value
GDP(-1)	-0.2323	0.1429	-1.6257	0.1119
CPI	0.0529	0.0611	0.8662	0.3915
CPI(-1)	-0.1540	0.0606	-2.5396	0.0151**
FDI	-0.7636	0.3868	-1.9741	0.0553*
GCF	0.1841	0.0423	4.3519	0.0001***
GCF(-1)	0.1215	0.0474	2.5653	0.0142**
OIL	0.1537	0.2022	0.7599	0.4517
OIL(-1)	0.3181	0.1993	1.5962	0.1183
UNEMP	0.0271	0.1256	0.2159	0.8301
Constant	5.4633	1.0985	4.9733	0.0000***

The short-run dynamic effect of CPI, FDI, GCF, OIL and UNEMP on GDP growth is examined in 4The ARDL estimation. GDP Persistence. The coefficient of the lagged GDP term GDP (-1) is negative (-0.2323), but statistically insignificant (P= 0.1119). This suggests that in the short run, the growth rate of GDP in the previous period is not statistically significant for the growth rate of GDP in the current period. Effect of inflation (CPI). The effect of the current value of CPI on GDP is positive but not significant ($\beta = 0.0529$, P= 0.3915). The lagged inflation effect CPI (-1) is negative and statistically significant ($\beta = -0.1540$, P= 0.0151), however. This implies that a rise in the inflation rate in the previous period has a negative impact on economic growth. The results suggest that inflationary pressures could negatively affect economic performance in the long run as a 1-unit increase in the previous year CPI causes a corresponding decrease in GDP growth by about 0.154 units. Foreign Direct Investment (FDI) and its impact. FDI has a negative effect on GDP ($\beta = -0.7636$) and is marginally significant at the 10% level (P= 0.0553). This means that an increase in FDI will lead to a decrease in GDP growth in the short run. The negative correlation could be because foreign investment takes time to boost productivity, or because FDI can lead to higher imports, repatriation of profits, or adjustment costs. Gross Capital Formation (GCF). The positive and highly significant effect of GCF on GDP growth is $\beta = 0.1841$, P= 0.0001. This indicates that investment activities strongly contribute to economic growth. The lagged value of GCF is also positive and significant ($\beta = 0.1215$, P= 0.0142), which indicates that capital formation has immediate and delayed positive impact on GDP. Hence, investment accumulation is an important factor in improving economic performance. Impact of Oil Prices (OIL). The current oil price effect is positive, but not statistically significant ($\beta = 0.1537$, P= 0.4517). The lagged oil effect is also positive but insignificant ($\beta = 0.3181$, P= 0.1183). This implies that the oil price changes are not statistically significant in influencing the GDP growth rate over the period of study. The impact of Unemployment (UNEMP). Unemployment coefficient is positive but

not statistically significant ($\beta = 0.0271$, $P = 0.8301$). This means that fluctuations in unemployment are not a major determinant of short-run fluctuations in GDP growth.

Model Specification and Goodness of Fit

Model Information	Value
Dependent Variable	GDP
Estimation Method	ARDL
Selected ARDL Model	ARDL(1,1,0,1,1,0)
Sample Period	1971–2021
Observations	50
Lag Selection Criterion	AIC
R-Squared	0.5681
Adjusted R-Squared	0.4709
F-Statistics	5.8450
Prob(F-Statistics)	0.0000
Durbin–Watson Statistics	1.9681
AIC	3.9695

The ARDL model was estimated using GDP as the dependent variable and the Akaike Information Criterion (AIC) was used to select the model. The optimal lag structure that was selected was ARDL (1,1,0,1,1,0) which means that GDP and some explanatory variables need to be lagged to include their dynamic effects. The model is based on annual data from 1971 to 2021, which is a total of 50 observations. Goodness of Fit. The R-squared value of 0.5681 shows that about 56.81% of the variations in GDP growth can be explained by the combination of CPI, FDI, GCF, OIL and UNEMP variables in the ARDL model. The other variation is due to other factors not included in the model. The adjusted R-squared value of 0.4709 also shows that the model has a reasonable explanatory power, as after adjusting for the number of explanatory variables, the model still accounts for approximately 47.09% of the variations in GDP. Overall Model Significance. The F-statistic value is 5.8450 and the probability value is 0.0000, which means that the model is statistically significant at the 1% level. Thus, the null hypothesis of no effect of all the explanatory variables together on GDP is rejected. This shows that the changes in GDP are explained by the changes in CPI, FDI, GCF, OIL and UNEMP together. Autocorrelation Test. The Durbin–Watson statistic is 1.9681, which is close to the benchmark value of 2. This implies that the model residuals have no serious first order serial correlation, which means that the ARDL estimates are reliable. Information Criterion. The AIC value of 3.9695 was used for selecting the optimal lag length. The model with the lowest AIC among the tested models is the ARDL (1,1,0,1,1,0) model, which is the most appropriate dynamic structure for the data. The overall statistical significance and the explanatory power of the ARDL model are moderate. The high value of the F-statistic indicates that the economic variables included in the model have a significant impact on

GDP growth. Moreover, the Durbin-Watson statistic shows that there are no serious autocorrelation issues with the model, and hence the estimated results are valid. The variables are a combination of I(0) and I(1) processes and the ARDL model meets the basic goodness of fit requirements, so the next step is to examine the ARDL Bounds Test for cointegration to see if there is a long-run equilibrium relationship between GDP, CPI, FDI, GCF, OIL and UNEMP.

ARDL Bounds Test for Cointegration (GDP Model)

Test Statistics	Value
F-Statistics	11.65269
K (Number of Regressors)	5

The ARDL Bounds test was performed to check for the existence of a long run equilibrium relationship between GDP, CPI, FDI, GCF, OIL, and UNEMP. The calculated F-statistics value is 11.65269 and has five regressors (K = 5), which is greater than the upper bound critical value at all conventional significance levels. Specifically, the calculated F-statistic is greater than the upper bound value of 1% (4.833), 5% (3.781), and 10% (3.264). Thus the null hypothesis of no cointegration is rejected, and the long run relationship between the variables is strong. This result suggests that GDP and its determinants are co-moving over time and that they are in long run equilibrium. Therefore, the ARDL methodology is suitable to be used for further analysis of the long-run coefficients and short-run dynamics using Error Correction Model (ECM).

Long-Run ARDL Coefficients (Levels Equation)

Variables	Coefficient	Std. Error	T-Statistics	Prob.
CPI	-0.081978	0.048327	-1.696315	0.0976
FDI	-0.619647	0.309351	-2.003052	0.0520
GCF	0.247957	0.042153	5.882302	0.0000
OIL	0.382816	0.173604	2.205105	0.0333
UNEMP	0.022009	0.102061	0.215646	0.8304

The long-run ARDL coefficients were estimated to see the long-run effects of CPI, FDI, GCF, OIL and UNEMP on GDP. The results show that Gross Capital Formation (GCF) has a positive and highly significant long run effect on GDP with coefficient 0.247957 (P= 0.0000). This suggests that an increase in GCF of one unit is associated with an increase in GDP of about 0.248 units, which further highlights the significance of investment and capital accumulation in the process of long-run economic growth. The OIL variable also has a positive and statistically significant impact on GDP ($\beta = 0.382816$, P= 0.0333), which means that an increase in oil-related factors will positively affect the economic growth in the long run. The coefficient of CPI is negative (-0.081978) and statistically insignificant at the 5% level (P= 0.0976) in the long run, meaning that inflation has a negative impact on GDP. Likewise, FDI has a negative coefficient (-0.619647) and is slightly significant (P= 0.0520) which suggests that FDI does not provide immediate long-run growth benefits during the study period. The negative impact can be due to problems like repatriation of profits, reliance on imports or inefficient use of foreign investment. The UNEMP coefficient is positive

but not statistically significant ($\beta = 0.022009$, $P = 0.8304$), indicating that in this model, unemployment does not significantly affect GDP in the long run. Overall, the long run ARDL results indicate that capital formation (GCF) and oil factors are important drivers of economic growth, whereas inflation and foreign direct investment (FDI) have negative long run relationships with GDP, and unemployment does not have a significant long run effect. These results validate the existence of long-run economic relationships between the variables and emphasize the role of investment and resource-related variables in the performance of GDP.

ARDL Error Correction Model (ECM) & Short-Run Dynamics

Variable	Coefficient	Std. Error	t-Statistics	Prob.
D(CPI)	0.0529	0.0479	1.1050	0.2757
D(GCF)	0.1841	0.0287	6.4105	0.0000***
D(OIL)	0.1537	0.1515	1.0146	0.3164
CointEq(-1) (ECM)	-1.2323	0.1272	-9.6853	0.0000*

The Error Correction Model (ECM) was estimated to investigate the short run dynamics and the speed of adjustment of the long run equilibrium relationship between GDP, CPI, GCF and OIL. The results show that the coefficient of the error correction term CointEq (-1) is negative and statistically significant ($\beta = -1.2323$, $P = 0.0000$), which is consistent with the presence of a stable long-run adjustment mechanism. The coefficient implies that about 123.23% of the disequilibrium of the previous period is corrected during the current period, which means that GDP quickly returns to its long-run equilibrium after short-run shocks. The first difference of CPI [D (CPI)] is positively associated with GDP, but it is not statistically significant ($\beta = 0.0529$, $P = 0.2757$), meaning that short-term inflation fluctuations are not significantly affecting economic growth. Likewise, D (OIL) has a positive but not significant effect on GDP ($\beta = 0.1537$, $P = 0.3164$), indicating that short run movements of oil factors have no significant impact on GDP over the period of study. D (GCF) is however found to have a positive and highly significant effect on GDP ($\beta = 0.1841$, $P = 0.0000$). This means that the growth of gross capital formation is a major factor in the short run growth of the economy. The short-run elasticity of GDP with respect to capital formation is about 0.184. Overall, the ECM results indicate that the model has a valid short-run adjustment process, and that GDP is sensitive to short-run fluctuations around the long-run equilibrium. The results indicate that capital formation is the most significant short-run factor of economic growth, whereas inflation and oil-related factors do not have a significant short-run effect. The negative and significant error correction coefficient also supports the presence of a stable long-run relationship between the variables.

Model Diagnostics

Model Statistics	Value
R-squared	0.7146
Adjusted R-Squared	0.6960
Durbin-Watson Statistic	1.9681

AIC	3.7295
Schwarz Criterion	3.8824

The short-run dynamics and the speed of adjustment to the long-run equilibrium are explained by the Error Correction Model (ECM) results. The error correction term CointEq (-1) is negative (-1.2323), and statistically significant (p-value = 0.0000), which is consistent with the idea that deviations from the long-run equilibrium are corrected over time. The coefficient suggests that about 123.23% of the disequilibrium is corrected in one period, which indicates a fast convergence towards the equilibrium. The Gross Fixed Capital Formation (GCF) in the short run has a positive and statistically significant relationship with GDP (coefficient = 0.1841, $P < 0.01$), indicating that capital investment is a factor that contributes to economic growth. In the short run, however, the coefficients of Oil Rent (OIL) and CPI are positive but not statistically significant, meaning that in the short term, their impact on GDP is not statistically confirmed.

Serial Correlation LM Test Result

Test Statistics	Value
F-statistic	0.2843
Prob. F(2,38)	0.7541
Obs*R-squared	0.7372
Prob. Chi-Square(2)	0.6917

The Breusch–Godfrey Serial Correlation LM test was used to check for serial correlation in the residuals of the ARDL model. The null hypothesis of this test is that there is no serial correlation between the residuals. The test results show that the F-statistic value is 0.2843 with a probability value of 0.7541, while the Obs*R-squared value is 0.7372 with a Chi-square probability value of 0.6917. Both probability values are higher than the 5% significance level ($P > 0.05$), meaning that the null hypothesis of no serial correlation cannot be rejected. This means that there are no serial correlation problems in the residuals. Hence, the estimated ARDL model is statistically valid and the results are not influenced by the autocorrelation of the error terms.

Breusch Pagan Godfrey Heteroskedasticity Test

Test Statistics	Value
F-statistic	1.4814
Prob. F(9,40)	0.1882
Obs*R-squared	12.4995
Prob. Chi-Square(9)	0.1866
Scaled explained SS	7.8753

Prob. Chi-Square(9)	0.5468
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Breusch–Pagan–Godfrey heteroskedasticity test was performed. The null hypothesis of this test is that there is no heteroskedasticity (residuals are homoskedastic). The test results indicate that the F-statistic is 1.4814 with a probability value of 0.1882 and the Obs*R-squared value is 12.4995 with a Chi-square probability value of 0.1866. Also, the explained SS value for the scaled is 0.5468. All the probability values are greater than 5% significance level ($P > 0.05$), so the null hypothesis of no heteroskedasticity can be accepted. This means that the variance of the residuals is constant and the model is not affected by heteroskedasticity. Thus, the estimated ARDL coefficients are efficient and reliable, and the results of the regression are valid for further economic interpretation.

Normality Test

Test Statistics	Value
Jarque–Bera Statistic	0.334
Probability	0.846
Observations	50

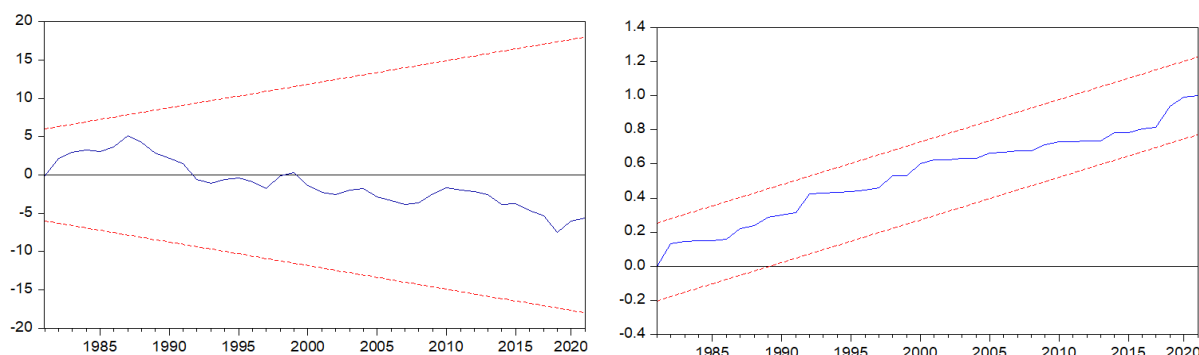
The Jarque–Bera normality test was used to test the normality of the residuals of the ARDL model. The null hypothesis of the test is that the residuals are normally distributed. The results show that the Jarque–Bera statistic is 0.334 with a probability value of 0.846 based on 50 observations. Since the probability value is greater than the 5% significance level ($P = 0.846 > 0.05$), the null hypothesis cannot be rejected. This means that there is no normality problem in the model and the residuals are normally distributed. Hence, the normality assumption is considered as satisfied for the estimated ARDL model and the regression results are statistically reliable for further interpretation.

Ramsey Test

Test Statistics	Value
T-Statistic	1.5280
Prob. t-Statistic	0.1346
F-Statistics	2.3348
Prob. F-Statistics	0.1346

The Ramsey RESET test was conducted. The null hypothesis of the Ramsey test is that the model is properly specified and that there are no omitted nonlinear relationships between the variables. The results show that the t-statistic is 1.5280 with a probability value of 0.1346, while the F-statistics is 2.3348 with a probability value of 0.1346. The probability value is higher than the 5% significance level ($P = 0.1346 > 0.05$), which means that the null hypothesis cannot be rejected. Thus, the Ramsey RESET test validates the ARDL model and rejects the functional form error and omitted variable issues. This means that the chosen model structure is suitable and the estimated coefficients can be used for economic interpretation.

CUSUM and CUSUM of Squares Stability Tests



The CUSUM of Squares (CUSUMSQ) test looks at the stability of the estimated model by plotting the cumulative sum of the squared recursive residuals over the sample period. The results reveal that the blue cumulative sum line stays entirely within the 5% critical bounds (shown by the red dotted lines), which means that there are no structural breaks or parameter instability. The null hypothesis of parameter stability is not rejected because the cumulative sum does not go beyond the critical boundaries. This suggests that the estimated ARDL model is structurally stable over the period of study and that the long-run and short-run coefficient estimates are valid for policy analysis. Likewise, the CUSUM test examines the stability of the recursive residuals with respect to time. The CUSUM plot demonstrates that the cumulative sum of recursive residuals stays within the 5% significance limits for the entire sample period, which means that the estimated regression coefficients do not change significantly over time. The result implies that the economic growth, oil rents, consumer price index, foreign direct investment, gross capital formation and unemployment relationship is stable during the period of study. The results of both the CUSUM and CUSUM of Squares tests indicate that the estimated ARDL model is structurally stable and parameter instability free. The recursive residuals are stable suggesting that the model is correctly specified and can give reliable and robust estimates for the analysis of the effect of oil rents and selected macroeconomic determinants on economic growth in Pakistan. This makes the estimated model suitable for making valid policy implications.

Overall Results of Diagnostic Tests

Diagnostic Tests	Test Results	Decision
Residual Normality	Jarque–Bera Probability = 0.846	The residuals are normally distributed, confirming that the normality assumption is satisfied.
Heteroskedasticity	Probability Values > 0.05	The model does not suffer from heteroskedasticity, indicating that the residual variance remains constant.
Serial Correlation	Breusch–Godfrey LM Test Probability = 0.7541	No evidence of serial correlation exists, confirming that the residuals are independent over time.

Model Specification	Ramsey RESET Test Probability = 0.1346	The functional form of the model is correctly specified, indicating no model misspecification problem.
Parameter Stability	CUSUM test remains within the 5% critical boundaries	The estimated coefficients are stable throughout the sample period, indicating parameter stability.
Structural Stability	CUSUMSQ test remains within the 5% critical boundaries	The model exhibits structural stability, with no evidence of structural breaks during the study period.

CONCLUSION

The effect of Oil rents and some Macroeconomic Variables on Economic Growth in Pakistan has been explored using the Autoregressive Distributed Lag (ARDL) modelling technique. To explore the dynamic relationship between economic growth (gross domestic product (GDP)) and macroeconomic variables, namely oil rents (OIL), Consumer Price Index (CPI), Foreign Direct Investment (FDI), Gross Capital Formation (GCF) and Unemployment (UNEMP), annual time-series data were used for the period 1971–2021. To identify the order of integration of the variables, the Augmented Dickey–Fuller (ADF) unit root test was first performed. The results showed that the variables CPI, GCF, OIL were stationary at level (I (0)), while the variables FDI and UNEMP were stationary after first differencing (I (1)). None of the variables were integrated at the second order, I (2), so the ARDL methodology was deemed suitable for estimating the short-run and long-run relationship between the variables. The empirical results suggest that the selected macroeconomic variables are important determinants of economic growth in Pakistan. ARDL bounds testing procedure established the presence of long-run cointegration relationship between GDP, oil rents, CPI, FDI, GCF and unemployment, indicating that the variables are in long-run stable equilibrium despite the short-run fluctuations. This finding shows that the long-run fluctuations in economic growth are systematically related to the changes in these macroeconomic indicators. The long run estimation results show that gross capital formation is the most important factor in economic growth. The positive and significant coefficient of GCF indicates that the increase in investment has a significant impact on productive capacity, infrastructure development, industrial growth and sustainable economic development. Therefore, the accumulation of capital becomes a very important factor in the long-term performance of the economy of Pakistan. The results also show that oil rents have a positive and statistically significant effect on long-run economic growth. This implies that the income from oil-related resources can positively impact national development through enhanced government revenues, increased energy availability and productive investments. But the economic returns from oil rents are critically reliant on good governance, transparent management and efficient allocation of resource revenues. Without adequate institutional arrangements, high levels of natural resource income can lead to economic vulnerabilities and reduce the developmental impact of natural resource wealth. The consumer price index (CPI) is negatively related to economic growth in the long run. This suggests that the negative impacts of inflationary pressures on economic performance are related to uncertainty, investment, purchasing power and economic efficiency. Likewise, foreign direct investment shows negative correlation with GDP growth, which means that foreign direct investment inflows have not been able to make positive contribution to Pakistan's economy during the study period. This outcome could be due to repatriation of profits by multinational companies, low level of integration between foreign companies and local industries, reliance on imported inputs, or investment in sectors with low productive spillover effects. By contrast, the unemployment rate has no statistically significant effect on economic growth, indicating that other structural and institutional factors might be more important for

the country's overall economic performance than the state of the labor market. The short run dynamics estimated by the Error Correction Model (ECM) further support the stable long run adjustment process. The negative and statistically significant error correction term provides evidence that short-run deviations from the equilibrium are corrected over time, enabling the economy to slowly return to the long-run growth path. The explanatory variables continue to show positive and statistically significant short-run effects on GDP growth, with gross capital formation remaining the key driver of economic growth. On the other hand, short-term fluctuations in oil rents and inflation do not have a statistically significant short-term impact on economic growth. The results show that investment activities have immediate and long-term economic effects while the effects of other macroeconomic variables are more significant in the long term. A series of diagnostic and stability tests were conducted to test the robustness and reliability of the estimated ARDL model. The diagnostic results show that there is no serial correlation, heteroskedasticity or residual non-normality, which means that the model meets the basic conditions for valid statistical inference. Moreover, the Ramsey RESET test confirms that the estimated model is correctly specified, and the stability tests confirm that the estimated coefficients are stable over the sample period. On the whole, these diagnostic results give robust support to the reliability and consistency of the estimated ARDL model in estimating the relationship between oil rents, macroeconomic variables and economic growth in Pakistan. From the empirical results, there are several policy recommendations. Policymakers should focus on strategies that boost the gross capital formation through domestic investment, infrastructure development, industrialization, and a conducive business environment. Capital formation is the most important driver of economic growth and policies that encourage productive investment should continue to be at the heart of Pakistan's long-term development policy. Second, there should be more focus on enhancing the management and use of oil-related revenues. Resource revenues should be invested in the productive sectors, such as energy infrastructure, technological development, industrial modernization and economic diversification, rather than used for short-term fiscal expenditures. Improving institutional quality, transparency and accountability will be key to ensuring that oil rents do not lead to economic volatility but to sustainable economic development. Third, the need for macroeconomic stability should continue to be a policy priority. The adverse effect of inflation on economic growth is a reminder of the need for sound monetary and fiscal policies to ensure price stability. Good inflation management can help build investor confidence, lower economic uncertainty, and aid in long-term economic planning while helping to support sustainable growth. Fourth, Pakistan should shift its emphasis from quantity to quality and developmental impact of FDI. Foreign investment in technology intensive sectors, export-oriented manufacturing, value added production and employment creation sectors should be encouraged through policies. Furthermore, institutional capacity building, better governance and the removal of regulatory impediments can help to increase the role of FDI in domestic economic development through better linkages between foreign and domestic firms. Fifth, while the direct impact of unemployment on GDP growth is not statistically significant, the creation of jobs is a key goal for inclusive and sustainable development. Education, vocational training, technical skills, entrepreneurship and human capital development investments can boost labor productivity, increase workforce competitiveness and create more jobs, which can contribute to long-term economic development. In last, the study shows that the economic growth of Pakistan is mainly due to productive investment, utilization of the resources of oil industry and good macroeconomic management. A comprehensive policy framework is needed to support sustainable economic development, which must simultaneously foster capital formation, bolster resource governance, ensure macroeconomic stability, boost the effectiveness of FDI and strengthen institutional capacity. If these policy measures are successfully implemented in present or future, Pakistan would be able to transform its natural resource wealth into sustainable economic growth, increased productivity, competitiveness and long-term economic resilience.

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