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Petroleum Industry Act and Investment in Nigeria

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Abstract. This paper investigates the impact of petroleum industry act on investment in Nigeria over the period 1990–2025. Petroleum Industry Act Dummy, Crude Oil Price, Oil Revenue and Oil Production was used as a stand in for petroleum industry act while Gross Fixed Capital Formation was used as a proxy for Investment. Secondary data were sourced from the Central Bank of Nigeria (CBN), statistical Bulletin, World Bank World Development Indicator (WDI) and OPEC, Annual Statistical Bulletin. The Augmented Dickey-Fuller unit root test was employed to examine the stationarity properties of the variables, while the Auto-Regressive Distributed Lag model was utilized to estimate both short-run and long-run dynamics. The bounds testing approach confirms the existence of a long-run relationship between the variables. Empirical findings reveal petroleum industry act dummy and oil production had a positive but significant relationship with gross fixed capital formation while oil price and oil revenue had a negative and insignificant relationship with gross fixed capital formation. It was concluded that petroleum industry act had a significant impact on investment in Nigeria. It was recommended amongst other that the Nigerian Upstream Petroleum Regulatory Commission and the Nigerian National Petroleum Company Limited should ensure strict and transparent implementation of the Petroleum Industry Act by strengthening regulatory certainty, simplifying licensing procedures, and enforcing compliance. This will sustain investor confidence and further stimulate capital formation in the petroleum sector.

Keywords: Petroleum Industry Act Dummy, Crude Oil Price, Oil Revenue, Oil Production Gross Fixed Capital Formation was used as a proxy for Investment.

1. Introduction

The petroleum sector remains a major driver of economic growth and investment in resource-rich economies, particularly in developing countries where it contributes significantly to government revenue and foreign exchange earnings. Despite its importance, the sector has faced persistent challenges such as regulatory uncertainty, weak institutional frameworks, and declining investment inflows, which have limited its performance. Globally, the petroleum industry attracts over 500 billion United States dollars annually in upstream and downstream investments, underscoring its strategic importance in global energy and development. In response to these challenges, governments implement reforms aimed at improving efficiency, transparency, and investment attractiveness. The Petroleum Industry Act represents one of such reforms designed to reposition Nigeria's petroleum sector for sustainable development.

The Petroleum Industry Act can be defined as a comprehensive legal, fiscal, and regulatory framework governing petroleum sector operations. The Organization of the Petroleum Exporting Countries (OPEC, 2023) describes petroleum sector reforms as essential instruments for improving investment stability and fiscal predictability in oil-producing economies. The Nigerian Upstream Petroleum Regulatory Commission (NUPRC, 2024) explains the Petroleum Industry Act as a governance framework aimed at enhancing regulatory efficiency, revenue generation, and investment climate in Nigeria's upstream petroleum sector. The World Bank (2022) notes that petroleum sector reforms are designed to reduce uncertainty, strengthen institutions, and attract long-term capital inflows into extractive industries. Prior to such reforms, data from the Central Bank of Nigeria (CBN, 2021) indicate that petroleum sector

investment in Nigeria declined by over 20 percent between 2015 and 2020, reflecting the impact of policy instability and regulatory uncertainty.

The Petroleum Industry Act improves investment through regulatory clarity, a more competitive fiscal regime, stronger institutional governance, and commercialization of national oil companies. These measures reduce investment risk and enhance investor confidence. However, empirical reports from the International Energy Agency (IEA, 2023) indicate that while reforms generally improve investment conditions, actual inflows depend heavily on implementation quality, security environment, and macroeconomic stability, suggesting that policy reforms alone may not guarantee immediate investment growth. In Nigeria, the enactment of the Petroleum Industry Act in 2021 marked a major reform after decades of policy delays and declining investment performance. According to the Nigerian Upstream Petroleum Regulatory Commission (2024), Nigeria's share of global upstream investment fell from about 5 percent in the early 2000s to less than 2 percent by 2019, while the CBN (2021) reported a decline of over 30 percent in foreign direct investment inflows into the oil and gas sector between 2010 and 2020. The Nigerian National Bureau of Statistics (NBS, 2023) further confirms that capital importation into the petroleum sector remained volatile during this period, reflecting weak investor confidence prior to the reform. These trends highlight the urgent need for policy intervention to restore competitiveness and improve investment inflows.

Recent statistical evidence suggests gradual improvement following the Petroleum Industry Act. For example, the Nigerian Upstream Petroleum Regulatory Commission (2024) reports that crude oil production increased from about 1.4 million barrels per day in 2022 to about 1.55 million barrels per day in 2024, and further improvements were recorded in subsequent years. The Organization of the Petroleum Exporting Countries (OPEC, 2025) also indicates that Nigeria's production approached 1.8 million barrels per day in 2026, reflecting improved operational stability. The NNPCL, (2024) Annual Report) recorded a 64 percent increase in profit to about 3.6 billion United States dollars in 2024, reflecting improved efficiency following commercialization reforms. In addition, the Nigerian Investment Promotion Commission (NIPC, 2025) reports over 5.5 billion United States dollars in new oil and gas investment commitments between 2022 and 2025, indicating renewed investor confidence. The Central Bank of Nigeria (2024) also records a 23 percent increase in capital importation into the oil and gas sector between 2022 and 2024. Furthermore, the Dangote Group (2026 Project Report) confirms a 19 billion United States dollars investment in a refinery with a capacity of 650,000 barrels per day, representing one of the largest downstream investments in Africa.

However, the Nigerian Upstream Petroleum Regulatory Commission (2024) reports that oil theft and pipeline vandalism still account for about 7 percent of total production losses, constraining full investment gains. Empirical evidence presents mixed results on the impact of petroleum reforms on investment. The World Bank (2023 Nigeria Development Update) finds that regulatory reforms generally improve investment sentiment, but actual inflows depend on security conditions, infrastructure availability, and policy consistency. Similarly, the International Monetary Fund (IMF, 2024 Country Report on Nigeria) acknowledges that while the Petroleum Industry Act improves fiscal stability, investment responses remain uneven due to structural constraints. On the positive side, studies such as those reported by the Nigerian Upstream Petroleum Regulatory Commission (2024) and supported by sectoral analysis indicate that improved fiscal frameworks under the Act have begun to enhance investment decision-making and contract efficiency. However, the persistence of divestments by multinational oil companies and continued operational risks creates uncertainty regarding long-term investment growth, thereby establishing a clear gap in empirical consensus.

This gap is further reinforced by the contradiction between policy expectations and actual investment outcomes. While the Petroleum Industry Act was expected to significantly boost investment inflows, reports from the Central Bank of Nigeria (2024) and Nigerian Upstream Petroleum Regulatory Commission (2024) indicate that investment recovery remains gradual and uneven. This inconsistency motivates further empirical investigation into whether the Petroleum Industry Act has significantly influenced investment performance in Nigeria's petroleum sector.

2. Literature Review

2.1 Conceptual Literature

2.1.1 Petroleum Industry Act

The Petroleum Industry Act has emerged as one of the most far-reaching and consequential legislative reforms in Nigeria's petroleum sector, attracting substantial scholarly and policy attention due to its

broad implications for governance, fiscal sustainability, institutional restructuring, and socio-economic development. As a comprehensive legal framework, the Act has been conceptualized differently by various scholars and institutions, reflecting its inherently multi-dimensional character as both an economic and regulatory reform instrument. Iledare (2021) describes the Act as a transformational legal framework aimed at improving governance, fiscal transparency, and institutional efficiency within the oil and gas industry, emphasizing its alignment with global best practices. This perspective is particularly insightful in explaining the governance and transparency components of the Act; however, it pays limited attention to the social inclusion mechanisms such as host community development, which are central to the Petroleum Industry Act. In a similar vein, Adeniyi (2021) views the Act as a comprehensive reform policy designed to reposition Nigeria's petroleum sector for global competitiveness through fiscal restructuring and regulatory clarity. While this definition effectively captures the investment-driven and economic objectives of the Act, it appears somewhat narrow because it underplays environmental sustainability and community participation.

Similarly, Sylva (2021) characterizes the Petroleum Industry Act as a landmark legislation that provides legal, governance, regulatory, and fiscal frameworks necessary for ensuring sustainable development and shared prosperity in the petroleum industry. This view is broad and reflects the intentions of policymakers, though it tends to be normative by assuming smooth implementation without accounting for institutional bottlenecks that may hinder its effectiveness. Equally, the Nigeria Extractive Industries Transparency Initiative (2022) conceptualizes the Act as a mechanism for promoting transparency, accountability, and improved revenue management in Nigeria's extractive sector. This interpretation is highly relevant for governance and anti-corruption discourse, yet it does not fully capture the commercialization and investment attraction objectives embedded in the Act. In addition, the Nigerian National Petroleum Company Limited (2022) views the Petroleum Industry Act as a framework that enables the transformation of the national oil company into a commercially viable and profit-oriented entity operating under international standards. This perspective is useful in explaining the commercialization dimension of the Act, although it is institution-specific and does not sufficiently address broader regulatory and socio-economic implications. Conclusively based on the various perspectives, the Petroleum Industry Act can be generally conceptualized as a comprehensive legal and institutional reform framework that restructures Nigeria's petroleum industry through improved governance, transparent fiscal regimes, commercialization of state-owned enterprises, enhanced investment climate, and the integration of host community development for sustainable outcomes. The varying scholarly views collectively suggest that the Petroleum Industry Act is not limited to a single objective but rather operates as an integrated development framework that links energy sector reforms with economic growth, institutional restructuring, and social inclusion.

2.1.2 Investment

Investment remains central in economics because it explains capital formation, productivity growth, and long-term economic development. Keynes (1936) conceptualizes investment as additions to capital stock driven by expected future returns and profitability. This study's view is that Keynes' definition is highly useful in explaining investment fluctuations in the short run, especially through expectations and interest rates; however, it underestimates the role of institutional quality and structural constraints in developing economies. Similarly, Fisher (1930) defines investment as the sacrifice of present consumption for future income, emphasizing intertemporal choice. The study's view is that this explanation is strong in capturing rational decision-making and time preference, but it assumes ideal market conditions and does not fully reflect uncertainty and market imperfections common in real economies. Also, Samuelson (2009) sees investment as expenditure on capital goods such as machinery and infrastructure that increase productive capacity. The study's view is that this definition clearly captures the physical aspect of investment, but it is limited because it ignores financial and human capital investment, which are increasingly important in modern economies.

Consequently, Todaro (2015) explains investment as a key driver of economic development through capital accumulation, technological progress, and employment creation. The study's view is that this perspective is very relevant for developing countries like Nigeria, as it directly links investment to growth outcomes, although it tends to assume that investment automatically translates into development without addressing inefficiencies or governance challenges. Acemoglu (2019) situates investment within the context of institutional quality, arguing that strong institutions shape incentives and determine investment outcomes. The study's view is that this is a major

improvement on earlier theories because it explains cross-country differences in investment performance, although it may place less emphasis on short-term macroeconomic factors such as interest rate movements. World Bank (2020) defines investment as the allocation of resources to productive activities aimed at generating returns and supporting sustainable development. The study's view is that this is a broad and policy-relevant definition, but it tends to generalize investment behavior without reflecting country-specific realities.

Furthermore, IMF (2022) views investment as a key driver of productivity, structural transformation, and inclusive growth. The study's view is that this highlights the macroeconomic importance of investment in stabilizing and transforming economies, although it is more descriptive and less analytical at the micro-level. While, OECD (2025) defines investment, particularly foreign direct investment, as long-term ownership and control in enterprises across borders. The study's view is that this clarifies the international dimension of investment and is useful for global capital flow analysis, but it focuses more on external investment rather than domestic investment dynamics. Conclusively, investment can be conceptualized as the allocation of resources into productive activities with the expectation of future returns, economic growth, and development. The different perspectives show that investment is shaped not only by expectations and savings decisions but also by institutions, policies, and macroeconomic conditions.

3. Theoretical Literature

3.1 Institutional Theory

The Institutional theory was propounded by North (1990). The theory is based on the belief that institutions defined as the formal and informal rules governing social, political, and economic interactions determine economic performance by shaping incentives, reducing uncertainty, and structuring human behaviour. In essence, it argues that economic outcomes such as investment, growth, and development are not driven only by market forces but are strongly influenced by the quality of institutional arrangements in a country. The assumption of theory is that individuals and firms operate under constraints created by institutions, and these institutions either promote or hinder economic efficiency depending on how well they are designed and enforced. It also assumes that stable, transparent, and credible institutions reduce transaction costs, encourage trust, and create an enabling environment for investment, while weak institutions increase uncertainty and discourage long-term economic commitments. Proponents of the theory, such as North (1990), argue that countries with strong institutions tend to attract higher levels of investment because investors are confident in property rights protection, policy stability, and contract enforcement. Similarly, later institutional economists like Acemoglu (2019) support the view that inclusive institutions are key determinants of economic prosperity and investment inflows, as they create fair and predictable economic systems.

However, critics of the theory argue that it places excessive emphasis on institutions while underestimating the role of market forces, entrepreneurship, and macroeconomic factors such as interest rates and exchange rate movements. Some also contend that institutional quality alone does not guarantee investment inflows if other economic fundamentals are weak. The relevance of the theory to the study is very significant. The Petroleum Industry Act represents a major institutional reform aimed at restructuring governance, improving regulatory clarity, and enhancing transparency in the petroleum sector. By creating clearer regulatory agencies, strengthening fiscal rules, and improving accountability, the Act reduces uncertainty and builds investor confidence. This aligns directly with the core argument of institutional theory that strong and stable institutions encourage investment by reducing risk and transaction costs. Therefore, the theory provides a strong analytical framework for explaining how institutional reforms under the Petroleum Industry Act influence both domestic and foreign investment in Nigeria's oil and gas sector.

3.2 Neoclassical Investment Theory

The Neoclassical Investment theory was developed by Marshall (1890) and later refined by Jorgenson (1963). The theory is based on the belief that investment decisions by firms are determined by the objective of profit maximization, where firms invest when the expected return on capital exceeds the cost of acquiring and using that capital. It emphasizes that investment is influenced by factors such as interest rates, taxes, depreciation, and the marginal productivity of capital. The main assumption of the Neoclassical Investment Theory is that firms are rational and aim to maximize profits under conditions of perfect or near-perfect information. It also assumes that investment is a function of the user cost of capital, meaning that changes in interest rates, taxation, depreciation, and capital costs directly influence investment decisions. Additionally, the theory

assumes that markets are efficient and that firms respond optimally and continuously to changes in economic incentives in order to maintain equilibrium. Proponents of the theory, such as Marshall (1890) and Jorgenson (1963), argue that investment responds systematically to changes in the cost of capital and expected profitability. They maintain that reductions in interest rates, tax incentives, or depreciation allowances increase investment by lowering the user cost of capital, thereby encouraging firms to expand productive capacity.

On the other hand, critics of the theory argue that it is overly restrictive because it assumes perfect information, rational behaviour, and immediate adjustment to policy changes, which are not always realistic in developing economies. They further contend that the theory does not adequately account for uncertainty, institutional constraints, and delays in investment implementation. The relevance of the theory to the study is that it provides a strong explanation of how fiscal reforms influence investment decisions. The Petroleum Industry Act introduced new tax structures, royalty regimes, and fiscal incentives that directly affect the cost of capital in the petroleum sector. According to this theory, when the cost of investment decreases or expected returns improve, firms are more likely to increase investment in exploration, production, and downstream activities. Therefore, the theory is useful for explaining how changes in the fiscal and cost structure under the Petroleum Industry Act influence both domestic and foreign investment inflows in Nigeria's oil and gas industry.

3.3 Empirical Literature

Clement et al. (2026) examined the effect of the PIA on Production Sharing Contract cost recovery analysis, especially under the management budgeting of oil and gas in the Niger Delta. The study examines the impact of reforms in fiscal aspects, governance frameworks, and transparency conditions that PIA has brought on the cost recovery process, investment choices, and revenue sharing between the Nigerian government and international oil companies. The mixed-methods design was used, which included documentary analysis of the PIA and current PSC frameworks, and secondary data on trends in cost recovery before and after the implementation of the Act. The quantitative analysis was conducted on ground of descriptive statistics, regression analysis as well as paired sample t-tests to determine significant differences in cost recovery ratios, budget allocations and government take based on the pre and post-PIA regimes. The findings indicate that the recoverable cost margins are statistically significant ($p < 0.05$) reduced in the new structure, and the share of government revenue is moderately increased. Results also reveal that although the PIA increases regulatory transparency and responsibility, its cost recovery requirements and financial liabilities are stricter, and they are likely to change investment behavior and project sustainability in the long-term.

Nneemeka and Eze (2025) examined the petroleum industry act economic impact on Nigerian petroleum sector using policy analysis, economic data review and comparative assessment with global best practice. The findings revealed that the petroleum industry act has improves governance, with NNPC Limited recording a 28% profit increases in 2024. However, regulatory uncertainties such as the blocked shell divestment, continues to deter investors, while government revenue has increased, oil theft and fiscal leakages remain major challenges

Borha and Olujobi (2025) adopted a policy-empirical analysis covering the period 2021–2024, incorporating variables such as gas commercialization, carbon emissions policy, renewable energy alignment, and long-term investment sustainability. Their findings indicated that gas commercialization positively drives short-term investment, while weak alignment with global energy transition goals negatively affects long-term sustainable investment inflows. The study concluded that the PIA supports immediate investment expansion but may undermine future sustainable investment prospects. Similarly, Nwoko (2025), using a descriptive empirical method with data from 2021–2024, examined variables including host community trust fund, community conflict levels, operational disruptions, and investment stability. The findings showed that the host community trust fund significantly reduces conflict and operational disruptions, which in turn positively influences investment stability in oil-producing regions. The study concluded that the PIA indirectly promotes investment by improving community relations.

Macaulay and Radha (2024) examined the inconsistencies in the Petroleum Industry Act, 2021 and the Nigeria Upstream Petroleum Host Communities Development Regulations, 2022 aim at fostering sustainable prosperity and harmonious relationship between the settlors and the host communities in Nigeria. The work adopts doctrinal method wherein the researchers deploy primary and secondary data. In the primary data, the work used information from various statutory provisions as well as case laws. In the secondary source, the research adopts and analyses information from textbooks,

journal papers and internet materials. Also, the researchers interviewed some board of trustees' members of the host communities' development trust and the natives in the host communities with a view to elicit data on the impact of the PIA, 2021 and its regulation 2022 on the welfare and wellbeing of the host communities. The research found that the PIA 2021 chapter 3 and NUPHCDR 2022 donate powers to the Settloi and the BoT for example, to incorporate the HCDT. Again, the Act makes the Settloi's representatives the principal signatory to the account of the HCDT.

Adebisi and Ezebuiro (2023) analyzed the Petroleum industry Act and how the new law has impacted various actors in the Nigerian Oil and Gas Sector. This research was conducted using a doctrinal legal research approach which was backed by a contextual legal framework that include citations to online sources, literature reviews, case studies analysis, and an assessment of key judicial enactments. In conducting this library-based study, primary and secondary legal sources as well as pertinent existing literature on Petroleum Industry Act 2021 were explored. Various conceptual, empirical and theoretical frameworks such as Resource Curse, Domanial and Sustainable Development theories were used to support the research work. At the end the study, was able to find out that the Act established a framework for effective legal, regulatory and fiscal governance of the Upstream, Midstream, Downstream and the Host Communities, even though there were gaps which the Act left to be filled. Finally the study recommended that Gas flaring should be stopped; host community trust fund resources should be properly managed; Payment of 3% for upstream exploration revenue to host community should be reviewed upwards while 30% for frontier exploration should be reduced.

Adebisi and Ezebuiro (2023), using a doctrinal approach supported by sectoral data covering the post-PIA period (2021–2022), examined variables such as regulatory clarity, fiscal transparency, oil sector performance, and foreign direct investment inflows. Their findings showed that regulatory clarity and improved fiscal transparency exert a positive effect on investment inflows, while lingering implementation gaps slightly dampen the magnitude of this effect. The study concluded that the PIA has a positive but implementation-dependent impact on investment in Nigeria's petroleum sector. In a related study, Borha and Olujobi (2023) analyzed data spanning 2021to 2023 using an analytical and institutional review method, focusing on variables such as institutional quality, regulatory enforcement, legal certainty, and investment inflows. The results revealed that while legal certainty under the PIA positively influences investor confidence, weak institutional quality and poor enforcement mechanisms negatively affect actual investment outcomes. The study concluded that the Act produces mixed investment effects, largely constrained by governance challenges.

Isallah (2023) explore the PIA's provisions on CSR and taxation, identify the Act's implementation challenges and improvement opportunities, propose an integrated framework for monitoring and evaluating the PIA's impact on CSR and taxation over time, and recommend measures for enhancing the PIA's impact on CSR and taxation support for sustainable development in Nigeria's upstream oil and gas sector. This study adopts the qualitative desk review method to analyse the existent literature, reports, and documents regarding the PIA's provisions on CSR and taxation. The findings reveal that the PIA's provisions greatly emphasize CSR initiatives and taxation transparency in improving responsible ethical business behaviour. An integrated framework for monitoring and evaluating the PIA's impact over time is developed.

Furthermore, Green (2023) applied a sectoral quantitative analysis using data from 2019–2022, incorporating variables such as production sharing contract (PSC) terms, government take, profitability, and upstream investment levels. The findings revealed that improved PSC terms and reduced government take increase profitability and significantly stimulate upstream investment, while transparency reforms also positively affect investor confidence. The study concluded that the PIA has a strong positive and significant effect on upstream oil investment. In addition, Imoisi, Aidonojie and Edetalehn (2023) employed a legal-empirical review method using post-PIA data (2021–2023), focusing on variables such as taxation structure, commercialization of the national oil company, regulatory efficiency, and private sector participation. Their findings showed that improved taxation frameworks and commercialization policies positively influence private investment, while some regulatory ambiguities exert a mild negative effect. The study concluded that the PIA is broadly investment-friendly but requires further regulatory refinement.

Onuh (2021) uses the doctrinal research method to discuss using existing literature the possibility of the changes in the PIA to help Nigeria achieve its economic objectives contained in Chapter two of the constitution. The paper finds that because Government failed severally in business such that it decided to

privatise its businesses, it is doubtful if the new Government wholly owned NNPC limited will fare better. Thus, the Petroleum Industry Act may not have the desired impact on the economy of Nigeria as to go a long way in achieving Nigeria's economic objectives

Moreso, Nwuke (2021), used a policy analysis with empirical insights covering the transition period around 2020–2021, examining variables such as regulatory reform, policy uncertainty, investor expectations, and sectoral growth. The findings indicated that while regulatory reform positively affects long-term expectations, policy uncertainty surrounding certain provisions negatively impacts immediate investment decisions. The study concluded that the PIA presents both opportunities and risks, resulting in an overall mixed impact on investment. In another study, Akpan (2021) utilized a legal-empirical method focusing on pre- and post-PIA comparisons (2018–2021), examining variables such as militancy, community agitation, investor risk perception, and capital inflows. The results indicated that reductions in militancy and agitation significantly lower investor risk, thereby positively influencing investment decisions, although the effect was still emerging at the time of the study. The conclusion drawn was that the PIA enhances investment attractiveness through risk reduction mechanisms.

3.4 Gaps and Value Addition

The reviewed empirical literature on the Petroleum Industry Act and investment in Nigeria presents a rich but fragmented body of evidence, largely dominated by qualitative, policy-oriented, and short-term analytical approaches. A careful evaluation reveals that most studies concentrate on sector-specific outcomes, institutional reforms, and stakeholder perceptions rather than adopting a comprehensive macroeconomic perspective. For instance, studies such as Clement et al. (2026) and Green (2023) employ quantitative techniques but are largely confined to upstream sector dynamics like cost recovery, production sharing contracts, and profitability, thereby limiting their scope to industry-level investment behavior. Similarly, Borha and Olujobi (2025) and Nwoko (2025) provide insights into gas commercialization and host community relations, respectively, but their analyses are restricted to short post-PIA periods (2021–2024), which constrains their ability to capture long-run investment dynamics.

Furthermore, a significant proportion of the literature—including Adebisi and Ezebuiro (2023), Macaulay and Radha (2024), Isallah (2023), and Onuh (2021)—relies heavily on doctrinal, legal, and qualitative desk review methods. While these studies provide valuable insights into regulatory frameworks, governance structures, and institutional provisions of the PIA, they lack rigorous econometric estimation capable of quantifying the macroeconomic impact of the Act on investment. Even studies that incorporate empirical elements, such as Imoisi et al. (2023) and Nwuke (2021), largely adopt policy review or mixed-method approaches with limited time coverage and without integrating broader macroeconomic control variables. Additionally, variables employed across the literature are highly fragmented, focusing on institutional quality, taxation, host community trust funds, and regulatory efficiency, with little attention given to key macroeconomic drivers such as crude oil price, oil production, and oil revenue in a unified framework.

From a geographical standpoint, although all studies are situated within Nigeria, many are either sector-specific (particularly upstream petroleum) or regionally focused (e.g., Niger Delta), thereby limiting their generalizability to the overall economy. Methodologically, there is a clear dominance of survey, qualitative, and short-term post-policy analyses, with very few studies adopting a robust time series econometric approach capable of capturing both short-run and long-run relationships. Against this backdrop, a clear gap emerges. Existing studies have not sufficiently examined the macroeconomic impact of the Petroleum Industry Act on investment using a comprehensive time series framework that integrates both policy effects and key oil sector fundamentals. Specifically, there is an absence of studies that model investment proxied by gross fixed capital formation as a function of the Petroleum Industry Act (captured as a policy dummy), alongside critical variables such as crude oil price, oil production, and oil revenue over an extended period. Moreover, the reliance on short post-Petroleum Industry Act data fails to account for pre-reform dynamics, thereby limiting the ability to isolate and evaluate the structural impact of the Act.

Therefore, this study fills this gap by adopting a time series econometric approach over the period 1990 to 2025, incorporating both pre- and post-Petroleum Industry Act regimes. By doing so, it provides a more robust and dynamic assessment of how institutional reform in the petroleum sector interacts with key macroeconomic variables to influence investment in Nigeria. This approach not only departs from the predominantly qualitative and survey-based literature but also offers a more comprehensive and policy-relevant understanding of the long-run investment implications of the Petroleum Industry Act.

4. Methodology

This study used ex-post facto research design. The ex-post factor research design was used because the facts has been established and cannot be manipulated by the researcher while secondary data were collected from the Central Bank of Nigeria (CBN), statistical Bulletin, World Bank World Development Indicator (WDI), and OPEC, Annual Statistical Bulletin on Petroleum Industry Act Dummy (PIAD), Crude Oil Price (COP), Oil Revenue (OREV) and Oil Production (OPV) were used to proxy Petroleum industry Act while Gross Fixed Capital Formation was used to proxy investment The Augmented Dickey Fuller (ADF) method was used in order to do the unit root test on the model that was developed. Taking into consideration the results of the ADF, the research used the Auto-regressive Distributive Lag (ARDL).

4.1 Model Specification

The model for this study is anchored on the institutional theory propounded by North (1990), which emphasizes the role of institutions defined as formal rules, regulations, and governance structures in shaping economic performance and investment outcomes. The theory posits that well-structured institutional frameworks reduce uncertainty, improve transparency, and lower transaction costs, thereby creating a conducive environment for investment. In Nigeria, the Petroleum Industry Act represents a significant institutional reform designed to strengthen regulatory clarity, enhance fiscal governance, and improve efficiency in the petroleum sector. As a result, the introduction of the Act is expected to influence investment behaviour by improving the institutional environment within which economic agents operate.

Based on this theoretical foundation, investment proxied by Gross Fixed Capital Formation is modeled as a function of institutional reform captured by the Petroleum Industry Act dummy, alongside key oil sector variables that influence investment in an oil-dependent economy. These variables are incorporated to reflect both institutional and structural determinants of investment in Nigeria.

Thus, the functional form of the model is specified as:

GFCF=f (PIAD, COP, OREV, OPV) *1*

The mathematical model could be symbolically expressed as;

$$GFCF= \beta_0 + \beta_1 PIAD + \beta_2 COP + \beta_3 OREV + \beta_4 OPV \quad 2$$

This is further expressed in its econometric form as:

$$GFCF= \beta_0 + \beta_1 PIAD + \beta_2 COP + \beta_3 OREV + \beta_4 OPV + e \quad 3$$

Where:

GFCF = Gross Fixed Capital Formation, PIAD = Petroleum Industry Act Dummy, OREV = Oil Revenue, OPV = Oil Production. COP = Crude Oil Production, f = functional relationship β_0 = Intercept of relationship in the model/constant B_1-B_4 = Coefficients of each independent or explanatory variable e= Stochastic or Error term.

4.2 Description of Variables in the Model

Gross Fixed Capital Formation (GFCF): This to the total value of investment in fixed assets within an economy over a given period. Gross Fixed Capital Formation is used to proxy investment and is measured in billions of naira annually

Petroleum Industry Act Dummy (PIAD): This is a dummy variable used to capture the effect of the Petroleum Industry Act (PIA). It typically takes: 1 represents period after the implementation of the Petroleum Industry Act while 0 represents period before the Petroleum Industry Act. An increase in Petroleum Industry Act Dummy is expected to increase Gross Fixed Capital Formation because the Act improves transparency, regulatory certainty, and investment incentives, thereby attracting more capital investment. Therefore, it was expected that Petroleum Industry Act Dummy will be positively related with gross fixed capital formation. Thus, $\beta_1>0$

Crude Oil Price (COP): This represents the international market price of crude oil, usually measured in US dollars per barrel. An increase in crude oil prices will typically leads to higher revenues and profitability in the oil sector, which encourages both government and private investors to increase capital investment, consequently, it was hypothesized that crude oil price will have a positive relationship with gross fixed capital formation. Crude oil price is used to proxy petroleum industry act and is measured in US$ Thus, $\beta_2>0$

Oil Revenue (OREV): This refers to the income generated by the government from oil-related activities such as exports, taxes, and royalties. An increase in oil revenue enhances government spending capacity, particularly on infrastructure and capital projects. It was assumed that oil revenue will have a positive relationship with gross fixed capital formation. Oil revenue is used to proxy petroleum industry act and is measured in billions of naira annually. Hence, $\beta_3>0$

Oil Production (OPV): This measures the volume of crude oil produced within a given period, often expressed in barrels per day. An increase in oil

production boosts export earnings and economic activity, which stimulates investment in capital goods and infrastructure, accordingly, it was hypothesized that oil production will have a positive relationship with gross fixed capital formation. Oil production is used to proxy petroleum industry act and is measured in US$ Thus, $\beta_4>0$

5. Empirical Data Analysis

Table 1: Descriptive Statistics

	GFCF	PIAD	COP	OREV	OPV
Mean	8936.775	0.166667	53.36389	3428.750	1504722.
Median	8734.790	0.000000	53.29000	3969.900	1500000.
Maximum	11445.86	1.000000	111.6700	8879.000	1900000.
Minimum	6860.440	0.000000	12.72000	71.90000	1000000.
Std. Dev.	1385.007	0.377964	31.88759	2556.188	297902.1
Skewness	0.261259	1.788854	0.371184	0.148291	-0.105225
Kurtosis	1.730662	3.200000	3.055957	2.953624	1.530083
Jarque-Bera	2.826366	21.36000	2.789917	1.774295	3.307418
Probability	0.243367	0.000023	0.247843	0.411829	0.191339
Sum	321723.9	6.000000	1921.100	123435.0	54170000
Sum Sq. Dev.	67138599	5.000000	35588.64	2.29E+08	3.11E+12
Observations	36	36	36	36	36

Source: *E-view 13 Output*

The descriptive statistics of the variables provide important insight into their behaviour over the study period. The mean value of GFCF is 8936.775, indicating the average level of gross fixed capital formation, with minimum and maximum values of 6860.440 and 11445.86 respectively. This suggests a moderate range of variation over time. The standard deviation of 1385.007 shows that deviations from the mean are not excessively large, implying relative stability in capital formation. The distribution is slightly positively skewed with a skewness value of 0.261259, indicating that higher values occur marginally more frequently than lower ones. The kurtosis value of 1.730662 reveals a platykurtic distribution, suggesting a flatter shape relative to the normal distribution. The Jarque-Bera statistic of 2.826366 with a probability of 0.243367 indicates that the null hypothesis of normality cannot be rejected, implying that GFCF is normally distributed.

For PIAD, the mean value of 0.166667 reflects that the policy variable is active in only a small proportion of the observations. Its minimum and maximum values of 0 and 1 confirm its binary nature. The standard deviation of 0.377964 indicates low variability, which is expected for a dummy variable since observations cluster around the two possible outcomes. The skewness value of 1.788854 shows a strong positive skew, reflecting the dominance of zero values over ones. The kurtosis of 3.200000 suggests a slightly leptokurtic distribution. The Jarque-Bera statistic of 21.36000 with a probability of 0.000023 leads to the rejection of the null hypothesis of normality, indicating that PIAD is not normally distributed, which is consistent with its dummy structure and does not pose a problem for further econometric analysis. The crude oil price (COP) has a mean of 53.36389, with values ranging from 12.72 to 111.67, indicating significant fluctuations over the study period. The relatively high standard deviation of 31.88759 confirms substantial volatility, meaning that observations deviate widely from the mean. The skewness value of 0.371184 indicates a mild positive skew, suggesting a slight tendency toward higher values. The kurtosis of 3.055957 is close to that of a normal distribution, indicating no extreme peaks or outliers. The Jarque-Bera statistic of 2.789917 with a probability of 0.247843 suggests that the null hypothesis of normality cannot be rejected, confirming that COP is normally distributed.

Oil revenue (OREV) records a mean of 3428.750, with a wide range between 71.90 and 8879.000, indicating large fluctuations over time. The standard deviation of 2556.188 is quite high, showing that oil revenue deviates substantially from its mean and is highly volatile. The skewness value of 0.148291 indicates that the distribution is approximately symmetric, while the kurtosis of 2.953624 is very close to the normal benchmark of 3, suggesting a near-normal distribution. The Jarque-Bera statistic of 1.774295 and its probability of 0.411829 further confirm that the variable is normally distributed since the null hypothesis of normality cannot be rejected. Oil price volatility (OPV)

has a mean value of 1,504,722, with minimum and maximum values of 1,000,000 and 1,900,000 respectively, indicating a fairly wide range. The standard deviation of 297,902.1 suggests moderate dispersion relative to its scale, meaning that while fluctuations exist, they are not excessively extreme. The skewness value of -0.105225 indicates a slight negative skew, implying that lower values occur slightly more frequently than higher ones. The kurtosis of 1.530083 shows a platykurtic distribution, indicating a flatter distribution with fewer extreme values. The Jarque-Bera statistic of 3.307418 with a probability of 0.191339 indicates that the null hypothesis of normality cannot be rejected, suggesting that OPV is normally distributed.

Conclusively, the analysis shows that most of the variables exhibit moderate to high variability, with oil-related variables such as COP and OREV showing greater deviations from their mean due to their inherent volatility, while GFCF and OPV display more stability. The skewness and kurtosis values generally indicate approximate symmetry and absence of extreme outliers, except for the dummy variable PIAD which is naturally skewed. The Jarque-Bera test results confirm that all variables, except PIAD, are normally distributed. Given that the majority of the variables satisfy the normality assumption and that the non-normality of PIAD is expected and not problematic, it is appropriate to proceed with further econometric analysis such as unit root testing and subsequent model estimation.

Unit Root Test

A unit root test known as the Augmented Dickey Fuller (ADF) test was used in the research project to determine the order of integration of the variables that were being investigated. This was done in order to pick the proper approach and prevent false regression.

Table 2: Unit Root Test Using Augmented Dickey Fuller (ADF)

Variables	Levels		First Difference		Order of Integration	P-value
	T. Statistics	5% Critical Value	T. Statistics	5% Critical Value		
LGFCF	0.473097	-2.954021	10.80739	-2.954021	I(1)	0.0000
LCOP	-1.245893	-2.958404	-5.339290	-2.951125	I(1)	0.0001
LOREN	-2.451875	-2.948404	-5.490192	-2.951125	I(1)	0.0001
LOPV	-3.731039	-2.948404			I(0)	0.0004

Source: Extracts from E-view 13. * Level of significance at 5%

We examined all of the research variables using Augmented Dickey Fuller (ADF) tests to see whether they were stationary or non-stationary series, following the guidelines provided by table. 2. At the initial difference I(1), the stationarity test indicated that LGFCF, LCOP and COP, stationary, whereas OPV is stationary at level I(0). The variables show either mixed-order integration or stationarity of level and initial differences when we analyse their stationarity. The Autoregressive Distributive Lag (ARDL) technique was used to analyse the data. Both the first difference (I(1)) and the stationary at level I(0) may be handled by this method. The ARDL test is the most appropriate analytical technique to utilise since it looks at the relationship between the independent and dependent variables in terms of both short-term and long-term trends.

Co-integration Test

Table 3: ARDL Bound Test

Test Statistics	Value	K
F-statistics	7.582670	4

Significance	I (0)	1(1)
10%	2.75	3.99
5%	3.95	4.77
1%	4.76	6.67

Source: *Authors computation 2026*

From table 3 the bound test result indicates that there exist long run relationships amongst the variables as the F-statistic value of 7.582670 exceeds both the lower and upper bound critical values. Thus, we reject the null hypotheses of no long run relationship and accept its alternative. This means that there is a long-run relationship between Petroleum Industry Act and Investment in Nigeria.

Short and Long-Run Estimation Results for the Model

The results of the short and long-run dynamics association of the model are presented in table 4.4 below

Table 4.4: ARDL Short and Long-run Result for the Model

Short Run Coefficient				
Variable	Coefficient	Std. Error	t-Statistics	Prob
D(PIAD(-2)	-0.444139	0.161310	-2.753332	0.0057
D(LCOP-2)	-0.317064	0.099835	-3.175881	0.0002
D(LOREV)	-0.114081	0.097157	-1.174195	0.2548
D(LOPV)	0.242428	0.450721	0.537866	0.5969
ECM(-1)	-0.571852	0.120047	-4.763428	0.0001
Long Run Coefficient				
Variable	Coefficient	Std. Error	t-Statistics	Prob
PIAD	0.167166	0.077483	2.157454	0.0394
LCOP	-0.028472	0.100672	-0.282816	0.7793
LOREV	-0.045441	0.063665	-0.713755	0.4811
LOPV	0.791135	0.316988	2.495789	0.0185
C	0.833625	0.180823	4.608720	0.0002
Adj R^2 =0.388487 , F-statistics = 2.563784 (0.030509), DW = 2.237082				

Source: *Authors computation using E-view 13 2026*

The coefficient estimates for the error correction term, ECM (-1) has a negative value and is significant at the 0.05 level. It suggests that the model will reach long-run equilibrium at a rate of 0.57% every year. This means that a yearly adjustment speed of 0.57% may fix the mistake from the previous year. The independent variables (PIAD, LCOP, OREV & LOPV) explain 39% of the total variance in the dependent variable (LGFCF), according to the adjusted R-Square (R2) value. As a whole, the model is noteworthy since the F-statistic is significant at the 5% level of significance. Without serial correlation, the model would not work, according to the Durbin-Watson statistics of 2.237082 which is close to 2.

Table 3 displays the model's short-and long run outcome. The value of petroleum industry act dummy (PIAD) and the logarithm coefficient of crude oil price (LCOP) had a negative but significant relationship with the log value of gross fixed capital formation (LGFCF) while the log value of oil revenue reported a negative but insignificant relationship with the log value of gross fixed capital formation (LGFCF). However, the logarithm value of oil production (LOPV) had a positive but insignificant relationship with the log value of gross fixed capital formation (LGFCF) in the short-run

Equally, table 3, shows that the outcome of the long-run result that the coefficient of petroleum industry act dummy (PIAD) and the log value of oil production (LOPV) exacted a positive and significant relationship with the log value of gross fixed capital formation (LGFCF) while the log values of crude oil price (LCOP) and the log value of oil revenue (LOREV) exhibited a negative and insignificant relationship with the log value of gross fixed capital formation (LGFCF) in the long-run.

Diagnostic Test

Table 5: Ramsey Reset Test, Serial Correlation LM Test and Homoscedasticity Test Results

	F-Statistic	Prob-Value
Ramsey Reset Test	0.019262	0.8915
Breusch-Godfrey Serial Correlation LM Test	4.217507	0.0788
Breusch-Pagan-Godfrey Heteroskedasticity Test	1.517087	0.2112

Source: *Authors computation 2026*

From Table 5, the results of the diagnostic test shows that the linearity test using Ramsey Reset test indicates that the f-statistic (0.019262) with computed p-value of 0.8915 which is greater than 5 percent (0.05) critical value, hence the study reject the null hypothesis and conclude that the model is correctly specified. The result of the Serial or Autocorrelation Test using Breusch-Godfrey Serial Correlation LM Test shows that the f-statistic is 4.217507, with a Chi-Square probability value is 0.0788. This indicates that the probability value of about 8 percent (0.0788) is greater than 5 percent (0.05) critical value; hence the study confirms no serial correlation in the model. The result of the

heteroscedasticity test using Breusch-Pegan-Godfrey test shows that the f-statistic is 1.517087 with a Chi-Square probability value of 0.2112 The result suggests that there is no evidence of heteroskedasticity in the model since the probability Chi-square value is more than 5 percent (P >0.05). So, residuals do have constant variance which is desirable in regression meaning that residuals are Homoscedastic.

Figure 1: Normality Test

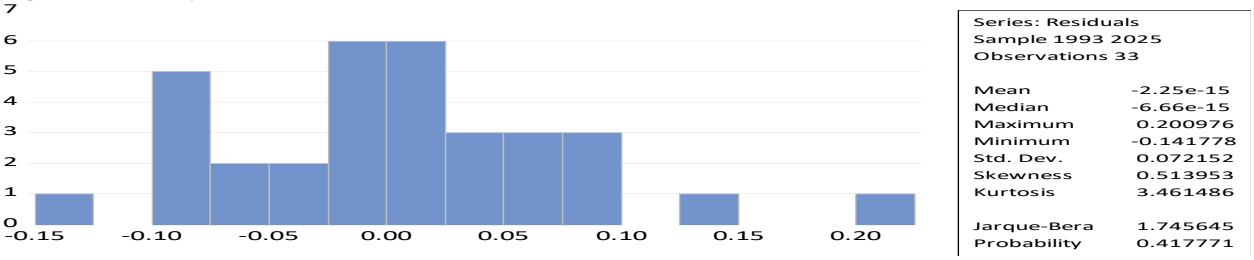
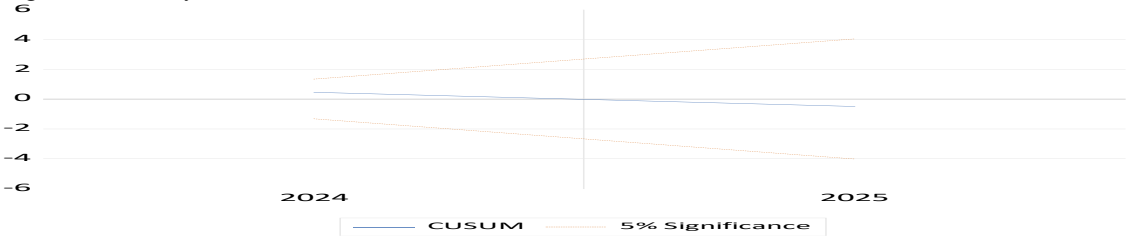


Figure 1, shows summary of the normality test with Jarque-Bara value of 1.745645 and a corresponding probability value of 0.417771 more than 0.05 level of significance, indicating that the residuals are normally distributed

Figure 2: Stability Test



6. Discussion of Findings

6.1 Petroleum Industry Act Dummy and Gross Fixed Capital Formation in Nigeria.

The result for Petroleum industry act dummy shows a positive coefficient of 0.167166 with a probability value of 0.0394, which is statistically significant at the 5% level. This implies that the implementation of the Petroleum Industry Act is associated with an increase in gross fixed capital formation, suggesting that policy reforms in the petroleum sector have enhanced investor confidence and stimulated capital investment. The significance of the variable indicates that institutional and regulatory improvements play a crucial role in driving capital formation in Nigeria. Therefore, the Petroleum Industry Act appears to be an important driver of investment in the economy. This finding is consistent with Adebisi and Ezebuiro (2023), who found that improved regulatory clarity and fiscal transparency under the Petroleum Industry Act exert a positive effect on investment inflows in Nigeria.

6.2 Crude Oil Price and Gross Fixed Capital Formation in Nigeria.

The coefficient of crude oil price is -0.028472 with a probability value of 0.7793, indicating that it is not statistically significant. Although the negative sign suggests that increases in crude oil prices may reduce gross fixed capital formation, the lack of significance implies that oil price fluctuations do not have a meaningful direct impact on capital formation within the study period. This may be due to structural inefficiencies and weak transmission mechanisms in the Nigerian economy that prevent oil price gains from translating into productive investment. This result aligns with Nwuke (2021), who reported that despite favorable regulatory reforms, policy uncertainties and structural challenges limit the extent to which oil-related gains translate into actual investment outcomes in Nigeria.

6.3 Oil Revenue and Gross Fixed Capital Formation in Nigeria.

Oil revenue has a negative coefficient of -0.045441 with a probability value of 0.4811, indicating that it is also statistically insignificant. This suggests that increases in oil revenue do not significantly contribute to gross fixed capital formation, and in fact may have a weak inverse relationship with investment. The negative sign could reflect issues such as misallocation of oil revenues, corruption, or excessive consumption spending rather than productive investment. The insignificance further implies that oil revenue has not been effectively channeled into capital development in Nigeria. This finding is supported by Nneemeka and Eze (2025), who observed that although oil revenues

have increased, persistent fiscal leakages and inefficiencies continue to hinder their effective translation into meaningful investment outcomes.

6.4 Oil Production and Gross Fixed Capital Formation in Nigeria.

The result for oil production reveals a positive coefficient of 0.791135 with a probability value of 0.0185, which is statistically significant at the 5% level. This indicates that increases in oil production significantly enhance gross fixed capital formation, suggesting that higher production levels generate resources that can be invested in capital projects. The magnitude of the coefficient shows a strong positive impact, highlighting the importance of production capacity in driving economic investment. This implies that improving oil production efficiency can significantly boost capital formation in Nigeria. This finding is in line with Green (2023), who found that improvements in upstream sector performance, including production-related dynamics, significantly stimulate investment in the petroleum sector.

7. Conclusion and Recommendation

7.1 Conclusion

The study on the impact of petroleum industry act on investment suggest that petroleum industry act dummy and oil production had a positive but significant relationship with gross fixed capital formation while oil price and oil revenue had a negative and insignificant relationship with gross fixed capital formation. Hence, it was concluded that petroleum industry act had a significant impact on investment in Nigeria

7.2 Recommendations

The Nigerian Upstream Petroleum Regulatory Commission and the Nigerian National Petroleum Company Limited should ensure strict and transparent implementation of the Petroleum Industry Act by strengthening regulatory certainty, simplifying licensing procedures, and enforcing compliance. This will sustain investor confidence and further stimulate capital formation in the petroleum sector.

Also, the Central Bank of Nigeria in collaboration with the Federal Ministry of Finance should intensify policies aimed at economic diversification by promoting investment in non-oil sectors such as agriculture, manufacturing, and technology. This will reduce over-reliance on crude oil price movements and stabilize capital formation.

Furthermore, the Nigeria Extractive Industries Transparency Initiative and the Budget Office of the Federation should strengthen monitoring and accountability mechanisms to ensure that oil revenues are efficiently allocated to productive capital projects, particularly infrastructure development, rather than recurrent expenditures.

Finally, the Ministry of Petroleum Resources alongside the Nigerian Upstream Petroleum Regulatory Commission should implement policies to boost oil production by improving security in oil-producing regions, investing in modern extraction technologies, and rehabilitating critical oil infrastructure to enhance output and, in turn, increase capital formation.

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