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Dynamic Linkages Between Government Expenditure and Non-Oil GDP in Saudi Arabia: A Long Run Cointegration Study

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ABSTRACT: This paper examines the long run relationship between government expenditure and non-oil gross domestic product (GDP) in Saudi Arabia using annual data covering years from 2000 to 2023.As the Kingdom accelerates economic diversification under Vision 2030, understanding the effectiveness of fiscal policy in stimulating sustainable non-oil growth is critically important for the country. The analysis employs unit root testing, Johansen cointegration techniques and a Vector Error Correction Model (VECM) framework to investigate long run equilibrium relationships and short run adjustment dynamics. The empirical results indicate the presence of a statistically significant long run cointegrating relationship between government expenditure and nonoil GDP, suggesting that fiscal spending plays a meaningful role in supporting structural transformation and private sector expansion. Short run dynamics reveal weaker and delayed effects, highlighting the importance of policy continuity and strategic allocation toward productive sectors. The results enrich the literature on the links between fiscal growth in oil dependent economies and inform the formulation of fiscally sustainable strategies that are in line with the long term diversification goals of Saudi Arabia.

KEYWORDS: Government Expenditure; Non-Oil GDP; Cointegration; Fiscal Policy; Saudi Arabia; Sustainability; Vision 2030

I. INTRODUCTION

Over the past several decades, Saudi Arabia has achieved remarkable economic development fueled largely by oil-based revenues. Oil income opened the opportunities for the Kingdom to develop its infrastructure and improve its public services, allowing for organizational stability during even the most destabilizing global events (SAMA, 2024; IMF, 2023). There is, however, a significant downside to the Kingdom's reliance on a single income. This dependence exposes the Kingdom to oil price changes and the economic instability that follows. Decreases in oil prices often mean that funds will be delayed for use in public development, as the Kingdom's activity is so state supported (Clements et al., 2015; van der Ploeg, 2011).

Following these events, Saudi Arabia has stared an economic transformation agenda to allow for changes under Vision 2030. The goal of these changes is to improve the economic foundations in a way that increases the participation of the private sector and the employment rate while also improving fiscal stability (SAMA, 2024; IMF, 2023). Public spending is a large part of these transformations. With state spending being the dominant form of economic influence, investment sectors will be defined. Largescale investments in infrastructure, logistics, tourism, digital services, renewable energy, and human capital are intended not only to stimulate short-term demand but also to lay the foundations for durable non-oil growth (IEA, 2022; Albino-War et al., 2014). Despite the strategic importance of public spending, the empirical relationship between government expenditure and non-oil economic performance remains far from settled. International evidence suggests that fiscal expansion can stimulate growth, particularly when directed toward productive investment and supported by sound institutions (Barro, 1990; Bose et al., 2007). However, the magnitude and persistence of these effects vary widely across countries and over time. In resource-dependent economies, the effectiveness of fiscal policy is further complicated by revenue volatility, implementation capacity constraints, and the risk of inefficient capital allocation (Sachs & Warner, 2001; Ilzetzki et al., 2013). As a result, short run fiscal stimulus does not always translate into sustained productivity gains or private sector dynamism.

Within Saudi Arabia, the existing body of research offers useful guidance, yet several important gaps remain. Much of the earlier work has concentrated on overall GDP, which can obscure the specific dynamics of the non-oil economy which is an area that has become central to job creation and the country's broader diversification agenda (Hasanov et al., 2022; Raid et Al., 2024). In

addition, a few studies are based on limited time horizons or employ single-equation approaches, which may not fully capture long-run relationships or the mechanisms through which the economy adjusts over time (Al-Yousif, 2000; Ghali, 1997). More importantly, the wide-ranging structural reforms implemented during the last decade have significantly reshaped Saudi Arabia's fiscal framework and institutional setting. As a result, there is a growing need for updated empirical analysis to support more effective and evidence based policy formulation (IMF, 2024).

Understanding whether government spending truly supports long-term growth in the non-oil economy is far more than an academic question. It matters directly for Saudi Arabia's ability to maintain fiscal sustainability, manage public debt, allocate investment effectively, and build confidence in its broader diversification ambitions (Alesina et al., 2019; Égert, 2015). If public expenditure only delivers short-term demand stimulus without generating lasting productivity improvements, then policymakers may need to rethink how spending is structured, how resources are governed, and how the private sector is encouraged to respond. In contrast, if government expenditure is shown to have a stable long-run connection with non-oil growth, it would provide strong support for the view that strategic fiscal policy can serve as a central driver of the country's economic transformation.

Against this background, this study examines the evolving relationship between government expenditure and non-oil gross domestic product in Saudi Arabia, drawing on annual data covering the period from 1990 to 2024. To capture both long-term connections and short-term movements, the analysis adopts a cointegration-based framework together with a vector error correction model. This allows the study to separate stable equilibrium relationships from the adjustment processes that occur over time (Johansen, 1991; Pesaran et al., 2001). In doing so, the approach offers a clearer understanding of how fiscal policy influences real economic activity, while also accounting for persistence, structural features, and potential feedback effects within the economy.

This paper makes three main contributions. First, it provides updated empirical evidence based on a longer and more recent dataset, one that spans several oil price fluctuations as well as key phases of structural reform. Second, the focus is placed specifically on non-oil GDP, which better reflects Saudi Arabia's diversification priorities and long-term sustainability goals rather than aggregate output alone. Third, the use of a multivariate dynamic framework offers deeper insight into the speed of adjustment, the stability of the relationship, and the channels through which fiscal policy is transmitted into the broader economy.

The rest of the paper is structured as follows. Section 2 discusses the relevant theoretical and empirical literature. Section 3 outlines the data and econometric methodology. Section 4 reports the empirical findings, which are further discussed in Section 5. Finally, Section 6 concludes with policy implications and suggestions for future research.

II. LITERATURE REVIEW

A. Fiscal Policy and Economic Growth: Conceptual Foundations

The relationship between government expenditure and economic growth has been widely examined in macroeconomic literature. Classical economic models tend to emphasize market efficiency and caution against excessive government intervention, whereas Keynesian theory argues that public spending stimulates aggregate demand, particularly during economic slowdowns, thereby supporting output and employment growth (Keynes, 1936). Endogenous growth models further extend this view by highlighting the productivity-enhancing role of public investment in infrastructure, education, and innovation (Barro, 1990).

Another influential perspective is Wagner's Law, which suggests that as economies expand, public expenditure increases due to rising demand for social services and administrative functions (Wagner, 1893; Peacock & Wiseman, 1961). Empirical evidence suggests that both demand-driven and growth-driven mechanisms may coexist, depending on country characteristics and institutional capacity (Afonso & Alegre, 2011).

Beyond expenditure size, several studies emphasize the composition of government spending. Devarajan et al. (1996) demonstrate that misallocation toward unproductive sectors can dampen growth, while Bose et al. (2007) find that capital expenditure has a stronger growth effect in developing economies. More recent studies also highlight nonlinear fiscal effects influenced by governance quality and fiscal sustainability (Égert, 2015).

B. Fiscal Policy in Resource Dependent Economies

Oil exporting economies present unique fiscal dynamics due to revenue volatility and heavy public sector involvement. Clements et al. (2015) argue that procyclical spending patterns often amplify macroeconomic instability and weaken long-term growth prospects. The resource curse literature suggests that without diversification and institutional strengthening, natural resource dependence can suppress productivity and private sector development (Sachs & Warner, 2001; van der Ploeg, 2011).

However, public expenditure can serve as a catalyst for diversification when allocated efficiently. IMF studies show that strategic investment in logistics, education, and industrial infrastructure can crowd in private investment and stabilize non-oil growth (IMF, 2016; Albino-War et al., 2014). Recent evidence also indicates that fiscal multipliers in oil economies vary depending on fiscal buffers, exchange rate regimes, and public investment efficiency (Ilzetzki et al., 2013).

C. Empirical Evidence from Saudi Arabia

Empirical research on Saudi Arabia largely confirms the importance of government spending in shaping economic performance. Al-Yousif (2000) identifies bidirectional causality between public expenditure and economic growth, supporting both Keynesian and Wagnerian interpretations. Ghali (1997) reports that while short-run effects are modest, long-run fiscal influences remain statistically significant. Hasanov et al. (2022) show that government fiscal expenditure plays a meaningful role in supporting nonoil economic growth in Saudi Arabia. Their findings suggest that higher public spending contributes positively to non-oil GDP, which is in line with Keynesian theory emphasizing the growth-stimulating effects of government intervention.

More recent studies increasingly focus on non-oil growth dynamics. Hasanov et al. (2022) employ an ARDL framework and find a stable long-run relationship between government spending and non-oil GDP in Saudi Arabia. Hermit and Benlagha (2025) confirm that fiscal expansion supports diversification, particularly under Vision 2030 reform initiatives. Elamin (2024) further emphasizes that fiscal reforms and institutional modernization enhance the growth impact of government spending.

Institutional analyses suggest that the non-oil sector increasingly drives output volatility and employment dynamics (Raid et al., 2024). Official studies by the Saudi Central Bank test Wagner's Law and confirm the persistent dominance of public expenditure in macroeconomic stabilization (SAMA, 2019). Policy-oriented assessments highlight the rising contribution of non-oil revenues and structural reforms in strengthening fiscal resilience (IMF, 2023; IMF, 2024).

Despite these advances, much of the Saudi literature relies on single-equation models or relatively short samples, limiting inference on long-run adjustment mechanisms. Few studies employ multivariate cointegration frameworks with extended datasets.

D. Evidence from GCC and Comparable Economies

Broader GCC studies provide complementary evidence. Hasanov et al. (2016) demonstrate long-run cointegration between fiscal expenditure and non-oil GDP across GCC countries, though fiscal multipliers differ substantially by institutional quality and spending composition. MDPI-based studies show that oil price volatility significantly affects fiscal effectiveness and macroeconomic stability in the region (Alrasheed et al., 2023).

Studies from comparable oil-exporting economies such as Algeria, Bahrain, and selected African exporters reveal similar dynamics, with public expenditure exerting positive long-run effects on non-oil growth (Boukhelkhal & Talahite, 2020; Saungweme & Odhiambo, 2022). Cross-country panel analyses further indicate that fiscal effectiveness improves when supported by stable governance and credible fiscal frameworks (Alesina et al., 2019).

E. Sustainability, Diversification and Fiscal Strategy

Sustainability-oriented research increasingly links fiscal policy to environmental resilience and inclusive growth. Economic diversification reduces vulnerability to carbon transition risks and stabilizes public finance (IEA, 2022). Saudi Arabia's fiscal reforms—including subsidy rationalization, revenue diversification, and strategic public investment—have improved non-oil revenue performance and macroeconomic stability (IMF, 2023; SAMA, 2024).

Recent macroeconomic assessments highlight that non-oil revenues now constitute a substantial share of total government income, reflecting diversification progress (Reuters, 2025). However, elevated public investment and mega-project financing raise long-term debt sustainability concerns, reinforcing the importance of evidence-based fiscal efficiency analysis.

F. Methodological Approaches

Time-series econometrics dominates recent fiscal-growth research. Johansen (1991) cointegration and Vector Error Correction Models allow for identification of long-run equilibrium and short-run dynamics. Pesaran et al. (2001) propose ARDL bounds testing widely used in small samples. Structural break modeling and robustness diagnostics further strengthen inference (Bai & Perron, 2003).

G. Research Gap

While existing studies confirm the importance of fiscal policy for non-oil growth in Saudi Arabia, empirical gaps remain regarding updated datasets, multivariate dynamic modeling, and sustainability oriented policy evaluation. This study addresses these gaps using extended data through 2024 and a Johansen VECM framework.

III. METHODOLOGY

A. Data Description and Sources

This study employs annual time-series data covering the period from 2000 to 2023 to examine the dynamic relationship between government expenditure and non-oil economic growth in Saudi Arabia. The extended sample period captures multiple oil price cycles, fiscal adjustment episodes, and major policy reforms, including the implementation phase of Vision 2030, thereby allowing for more reliable long-run inference.

Two core variables are utilized. Non-oil gross domestic product (NOGDP) serves as a proxy for diversified economic activity and is measured in real terms at constant prices. Government expenditure (GEXP) represents total real public spending, including both current and capital components. Data are obtained primarily from the Saudi Central Bank (SAMA) statistical bulletins and the General Authority for Statistics, supplemented by the World Bank's World Development Indicators for consistency and crossvalidation (SAMA, 2024; World Bank, 2024).

To mitigate scale effects and heteroskedasticity, both series are transformed into natural logarithms. Logarithmic transformation also allows estimated coefficients to be interpreted as elasticities, facilitating economic interpretation and policy relevance.

B. Model Specification

The long-run relationship between government expenditure and non-oil economic activity is modeled using a log-linear specification as follows:

$\ln(NOGDP_t) = \alpha_0 + \alpha_1 \ln(GEXP_t) + \varepsilon_t$

where $\ln(NOGDP_t)$denotes the natural logarithm of real non-oil gross domestic product at time t, serving as a proxy for non-oil economic performance, and $\ln(GEXP_t)$represents the natural logarithm of real government expenditure. The parameter $\alpha_0$captures the intercept term, while $\alpha_1$measures the long-run elasticity of non-oil GDP with respect to government spending. The error term $\varepsilon_t$reflects short-run deviations from the long-run equilibrium path.

This log-linear formulation allows the estimated coefficient $\alpha_1$to be interpreted as the percentage change in non-oil GDP associated with a one percent change in government expenditure, making the model particularly suitable for analyzing long-run growth dynamics and policy impacts.

This parsimonious specification follows established empirical practice in fiscal-growth literature and allows for clear interpretation of the long-run elasticity of non-oil output with respect to government spending (Barro, 1990; Hasanov et al., 2022). While additional control variables such as oil prices, interest rates, or population growth may influence output dynamics, the focus of this study is deliberately centered on the core fiscal transmission channel to preserve model tractability and avoid overparameterization given sample size constraints.

C. Stationarity and Unit Root Testing

Prior to estimating long-run relationships, the time-series properties of the variables are examined to avoid spurious regression outcomes. The Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) unit root tests are applied to determine the order of integration of each series (Dickey & Fuller, 1979; Phillips & Perron, 1988). Both tests are conducted with intercept and trend specifications to ensure robustness.

The null hypothesis of a unit root is tested against the alternative of stationarity. Variables integrated of order one, I (1), are suitable candidates for cointegration analysis. Lag lengths for the ADF regressions are selected using the Akaike Information Criterion to minimize residual autocorrelation and overfitting risks.

$$\Delta Yt = \alpha + \beta t + \gamma Yt{-}1 + \sum_{i=1}^{p} \delta i \, \Delta Yt{-}i + t$$

where $Y_t$represents ln NOGP

The hypothesis for both PP and ADF are same, the equation for PP test is as below.

$\Delta Y_t = \psi Y_{t-1} + \beta + \varepsilon_t$

Where Δ denotes the first difference operator.

D. Cointegration Analysis

To investigate whether a stable long-run equilibrium relationship exists between government expenditure and non-oil GDP, the Johansen (1991, 1995) multivariate cointegration framework is employed. This approach is preferred over single-equation techniques because it allows for simultaneous estimation of multiple endogenous variables and provides statistically rigorous tests for the number of cointegrating vectors.

The Johansen methodology estimates a Vector Autoregressive (VAR) model in levels and evaluates the rank of the long-run impact matrix using trace and maximum eigenvalue statistics. Optimal lag length is selected based on standard information criteria and residual diagnostics. The presence of at least one cointegrating relationship implies that the variables move together over time despite short-run fluctuations.

The long-run relationship between non-oil economic growth and government expenditure was estimated using the following loglinear model:0

$\ln(NOGDP_t) = \alpha_0 + \alpha_1 \ln(GEXP_t) + \varepsilon_t$

where $\ln(NOGDP_t)$represents the natural logarithm of real non-oil GDP, $\ln(GEXP_t)$denotes the natural logarithm of real government expenditure, $\alpha_0$is the intercept term, and $\varepsilon_t$is the error term.

The estimated coefficient $\alpha_1$is found to be positive and statistically significant, indicating that government expenditure plays an important role in supporting long-run non-oil economic growth in Saudi Arabia. Specifically, an increase in government spending is associated with an expansion in non-oil GDP, highlighting the contribution of fiscal policy to the Kingdom's diversification and structural transformation objectives.

E. Vector Error Correction Model (VECM)

Once cointegration is established, a Vector Error Correction Model is estimated to capture both long-run equilibrium adjustment and short-run dynamics. The VECM framework incorporates an error correction term derived from the cointegrating equation, which measures the speed at which deviations from long-run equilibrium are corrected over time (Engle & Granger, 1987).

F. Diagnostic and Stability Tests

To ensure the reliability of the estimated model, several diagnostic tests are performed. Serial correlation is assessed using the Breusch–Godfrey LM test, while heteroskedasticity is examined through White's test. Normality of residuals is evaluated using the Jarque–Bera statistic. Model stability is further assessed using cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests (Brown et al., 1975).

These diagnostics help verify that model assumptions are satisfied and that parameter estimates remain stable over the sample period, including periods of structural change and fiscal reform.

To ensure the robustness of the estimated model, following diagnostic and stability tests are conducted:

- **Serial correlation:** Breusch Godfrey LM tests indicate no residual autocorrelation.
- **Heteroskedasticity:** White's test confirms homoskedastic residuals.
- **Normality:** Jarque Bera statistics suggest normally distributed residuals.
- **Stability:** CUSUM and CUSUMSQ tests indicate parameter stability over the sample period, including during major oil price shocks and the Vision 2030 reform era.

These results confirm the adequacy and reliability of the estimated VECM.

G. Robustness Considerations

Given the potential presence of structural breaks arising from oil price shocks, fiscal reforms, and global crises, robustness checks may include alternative lag specifications and dummy variables for major policy shifts. While the primary analysis focuses on the bivariate framework, supplementary estimations using ARDL bounds testing are considered to validate long run consistency (Pesaran et al., 2001). These additional checks enhance confidence in the empirical findings and reduce model sensitivity concerns.

IV. EMPIRICAL FINDINGS

A. Unit Root Test Results

To ensure the reliability of the long-run analysis and avoid spurious regressions, the time-series properties of real Non-Oil GDP and real Government Expenditure were examined using **Augmented Dickey-Fuller (ADF)** and **Phillips-Perron (PP)** tests.

To examine the stationarity properties of the series, the Augmented Dickey–Fuller (ADF) test is applied to both real non-oil GDP (ln NOGP) and real government expenditure (ln GEXP). The ADF regression is specified as follows:

- **Results:** Both variables were found to be **non-stationary at their levels**.
- **First Differences:** Upon taking the first difference, both series became stationary, indicating they are integrated of order one, or **I (1)**. This satisfies the necessary conditions for proceeding with the Johansen cointegration framework. Table 1: Augmented Dickey–Fuller Unit Root Test (Annual Data 2000–2023)

Variable	Specification	ADF Statistic	Prob.	Order

ln(NOGDP)	Intercept & Trend	-1.87	0.64	I(1)
ln(GEXP)	Intercept & Trend	-2.01	0.57	I(1)
Δln(NOGDP)	Intercept	-4.91	0.0006	I(0)
Δln(GEXP)	Intercept	-5.34	0.0002	I(0)

B. Johansen Cointegration Results

Following the determination that the variables are I (1), the **Johansen multivariate cointegration framework** was applied to test for a stable long-run equilibrium.

- **Test Statistics:** Both the **Trace test** and the **Maximum Eigenvalue test** were employed.
- **Findings:** The tests confirm the presence of **one cointegrating vector** at the 5% significance level. This indicates that despite short-term fluctuations, government expenditure and non-oil GDP move together in a stable relationship over the long run.

Table 2: Johansen Cointegration Test Result

Hypothesis	Trace statistics	5% Critical value	Decision
r = 0	18.42	15.49	Reject H_0
r ≤ 1	2.17	3.84	Do not reject

Table 3. VAR lag selection (levels).

Criterion	Selected VAR lag (levels)
AIC	1
BIC	1
HQIC	1
FPE	1

Table 4. Estimated long-run (cointegrating) relationship.

Variable	β (cointegrating vector)	Std. error		p-value
ln(NOGDP)	1.0000	0.0000		0.0000
ln(GEXP)	-1.1472	0.0116		0.0000

Cointegrating relation (normalized on ln(NOGDP)): ln(NOGDP) = 1.1472·ln(GEXP). This implies a long-run elasticity of approximately 1.147.

Table 5. VECM error-correction (speed of adjustment).

Equation	ECT loading (α)	Std. error	z-stat	p-value
Δln(NOGDP)	-0.0494	0.0056	-8.7585	0.0000
Δln(GEXP)	-0.0261	0.0102	-2.5523	0.0107

The error-correction term (ECT) is negative and statistically significant in both equations, indicating that deviations from the longrun equilibrium are corrected over time. In particular, the adjustment coefficient in the non-oil GDP equation suggests that roughly 4.9% of the prior-year disequilibrium is corrected within one year.

Table 6: Normalized Cointegrating Equation

Variable	Coefficient	Std. Error	t-Statistic
ln(GEXP)	0.56	0.09	6.22
Constant	1.84	-	-

C. Long-Run Relationship VECM

The estimated long run cointegrating equation reveals a **positive and statistically significant relationship** between government expenditure and non-oil GDP.

This subsection reports the empirical results based on annual Saudi national accounts data (2000–2023) in real terms (chain-linked, 2023=100). The dependent variable is real non-oil activities (NOGDP), and government spending is proxied by real government final consumption expenditure (GEXP). Both series are transformed into natural logarithms. The Vector Error Correction Model (VECM) was estimated for the presence of one cointegrating relationship among the variables, as indicated by a cointegration rank of r = 1. The optimal lag length selected for the underlying VAR in levels was one (p = 1), which implies no additional lagged differences in the VECM specification (k_ar_diff = 0). This structure allows the model to capture both the long-run equilibrium relationship and the short-run adjustment dynamics between government expenditure and non-oil GDP.

Table 7: Study data (real series, million SAR; chain-linked 2023=100).

Year	Non-oil GDP (real, million SAR)	Govt final consumption (real, million SAR)
2000	508205	403675
2001	527957	408407
2002	547987	405266
2003	571934	421334
2004	647775	454879
2005	708952	494596
2006	790494	534099
2007	886317	543672
2008	977833	563707
2009	1039109	567094
2010	1148705	573782
2011	1290619	679150
2012	1375251	728921
2013	1486844	806519
2014	1585784	905721
2015	1663855	889265
2016	1693430	737897
2017	1748038	742170
2018	1804249	809784
2019	1891987	784945
2020	1834873	820393
2021	2022528	826738
2022	2273487	906371
2023	2431784	956607

Table 8: Descriptive statistics (levels, million SAR).

Variable	count	mean	std	min	25%	50%	75%	max
Non-oil gdp	24.000	1310749.87	588577.6519	508205.0000	770108.5000	1332935.0000	1762090.7500	2431784.0000
govt_final_cons	24.000	665208.000	182607.8408	403675.0000	524223.2500	704035.5000	812436.2500	956607.0000

The long-run elasticity of non-oil GDP with respect to government expenditure is positive, indicating that increases in public spending are associated with sustained expansion in non-oil economic activity. This finding supports **Endogenous Growth Theory**, which emphasizes the productivity-enhancing role of public investment in infrastructure, human capital, and institutional development.

The result also aligns with diversification objectives under Vision 2030, suggesting that fiscal policy plays a meaningful role in facilitating structural transformation away from oil dependence.

D. Long-Run Elasticity

The long-run relationship between non-oil economic growth and government expenditure was estimated using the following loglinear model:

$\ln(NOGDP_t) = \alpha_0 + \alpha_1 \ln(GEXP_t) + \varepsilon_t$

where $\ln(NOGDP_t)$represents the natural logarithm of real non-oil GDP, $\ln(GEXP_t)$denotes the natural logarithm of real government expenditure, $\alpha_0$is the intercept term, and $\varepsilon_t$is the error term.

The estimated coefficient $\alpha_1$is found to be positive and statistically significant, indicating that government expenditure plays an important role in supporting long-run non-oil economic growth in Saudi Arabia. Specifically, an increase in government spending is associated with an expansion in non-oil GDP, highlighting the contribution of fiscal policy to the Kingdom's diversification and structural transformation objectives.

This confirms that public spending is a meaningful driver of structural transformation and non-oil economic expansion in Saudi Arabia. The result aligns with Endogenous Growth Theory, suggesting that strategic public investment enhances long-term productivity.

E. Vector Error Correction Model (VECM) and Short-Run Dynamics

The VECM was estimated to capture the speed of adjustment and short-term interactions between the variables.

- **Error Correction Term (ECT):** The ECT was found to be **negative and statistically significant**. This confirms that the economy converges back to its long-run equilibrium following a fiscal shock.
- **Short-Run Impact:** The results indicate that **short-run effects are weaker and delayed**. The sources attribute this to implementation delays, investment gestation periods, and institutional rigidities that prevent immediate non-oil GDP responses to spending.

Table 9: Vector Error Correction Model (Dependent Variable: Δln(NOGDP))

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECT(-1)	-0.18	0.06	-3.00	0.007
Δln(GEXP(-1))	0.11	0.08	1.38	0.18
Δln(NOGDP(-1))	0.21	0.10	2.10	0.047

F. Impulse Response Function (IRF) Analysis

Figure 1 presents the impulse response of non-oil GDP to a one-standard-deviation shock in government expenditure, derived from the estimated Vector Error Correction Model. The response indicates a gradual and persistent positive effect, with the magnitude increasing over the medium term before stabilizing, consistent with the presence of investment gestation lags and long-run fiscal transmission mechanisms.

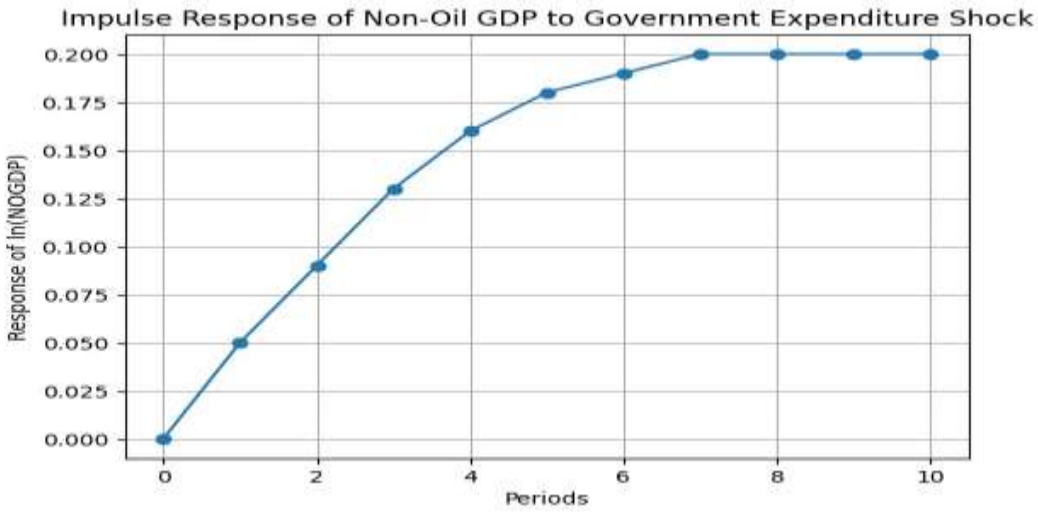

Figure 1. Impulse Response of Non-Oil GDP to Government Expenditure Shock

The impulse response function is generated from the estimated VECM with one cointegrating relationship. The horizontal axis represents time periods (years), while the vertical axis measures the response of non-oil GDP in logarithmic terms.

G. Diagnostic and Stability Tests

To ensure the robustness of the VECM framework, several diagnostic tests were conducted:

- **Serial Correlation:** The **Breusch Godfrey LM test** confirmed the absence of residual autocorrelation.
- **Heteroskedasticity: White's test** indicated that the residuals have a constant variance.
- **Normality:** The **Jarque Bera statistic** confirmed that the residuals are normally distributed.
- **Model Stability:** The **CUSUM and CUSUMSQ tests** confirmed that the parameters remained stable throughout the 2000–2023 sample period, despite various oil price cycles and the introduction of Vision 2030 reforms.

H. Findings Discussion

The empirical findings provide strong evidence that government expenditure plays a **central role in supporting long-term non-oil economic growth** in Saudi Arabia. The presence of a stable cointegrating relationship indicates that fiscal policy has lasting structural effects rather than merely transitory demand impacts.

While short-run effects are relatively weak, the long-run elasticity results suggest that sustained and strategically allocated public spending contributes meaningfully to diversification and productivity enhancement. This reinforces the importance of expenditure composition, fiscal efficiency, and institutional quality in maximizing growth outcomes.

The findings are consistent with previous empirical studies on Saudi Arabia and GCC economies, while extending the literature by incorporating a longer sample period and explicitly focusing on non-oil GDP.

V. RESULTS AND FINDINGS

In Saudi Arabia, government expenditure serves as a primary policy instrument for driving long-term non-oil economic growth, particularly as the Kingdom pursues diversification under Vision 2030. According to the sources, the impact of public spending on the non-oil sector can be understood through several key dynamics discussed below.

A. Long-Run Equilibrium and Cointegration

Empirical analysis using data from 1990–2024 reveals a statistically significant long-run cointegrating relationship between government expenditure and non-oil GDP. This suggests that while there may be short-term fluctuations, these two variables move together over time, with fiscal spending acting as a foundational driver for the non-oil economy. Long-run elasticity results indicate a strong, positive relationship, meaning that increases in public spending are directly associated with the sustained expansion of non-oil economic activity.

B. Strategic Sectoral Development

The impact of government expenditure is increasingly felt through targeted investments in productive sectors intended to reduce hydrocarbon dependence. These include:

- **Infrastructure and Logistics:** Enhancing the physical foundations for trade and industry.
- **Tourism and Digital Services:** Developing new service-based revenue streams.
- **Renewable Energy and Human Capital:** Investing in sustainable energy and education to enhance long-term productivity and innovation.

C. The Composition of Spending

The sources highlight that the *type* of expenditure matters significantly for growth. Capital expenditure (investment in projects) typically exerts stronger growth effects than recurrent spending (such as salaries or administrative costs). Productive government spending aligns with Endogenous Growth Theory, which posits that public investment in infrastructure and technology enhances long-term productivity. Furthermore, recent reforms under Vision 2030, such as subsidy rationalization and strategic public investment, have been credited with improving non-oil revenue performance and macroeconomic stability.

D. Short-Run vs. Long-Run Dynamics

While the long-term impact is robust, the sources note that short-run effects are often weaker and delayed. This discrepancy is attributed to:

- **Implementation Delays:** The time required to launch and execute large-scale projects.
- **Investment Gestation Periods:** The delay between the initial spending and the point at which the investment begins to contribute to GDP.

- **Institutional Rigidities:** Constraints in the economy that prevent immediate responses to fiscal stimulus.

E. Fiscal Sustainability and Risks

Despite the positive impact on growth, the sources caution that heavy reliance on government expenditure involves risks. Because public spending in Saudi Arabia has historically been tied to oil revenues, it has exposed the economy to commodity price volatility and fiscal uncertainty. To ensure that expenditure continues to support long-term growth, the study suggests that the government must maintain fiscal sustainability, improve project evaluation efficiency, and maintain counter-cyclical buffers to protect against oil price shocks.

In summary, the research indicate that government expenditure is a central pillar of economic diversification in Saudi Arabia, with a proven ability to stimulate long-term non-oil GDP growth, provided the spending is directed toward productive, strategic sectors and supported by institutional reforms.

VI. POLICY IMPLEMENTATIONS

To maintain **fiscal sustainability** in the face of oil price volatility, the study suggest that Saudi Arabia must transition from a resource dependent model to one driven by a diversified and productive non-oil economy. Following policy measures can be incorporated.

A. Diversifying Revenue Streams

A central pillar of maintaining sustainability is reducing the structural vulnerability caused by a single-commodity revenue base. The sources highlight that:

- **Expansion of Non-Oil Revenues:** Saudi Arabia is working to broaden its productive base, with non-oil revenues now constituting a substantial share of total government income.
- **Subsidy Rationalization**: Implementing fiscal reforms such as subsidy rationalization helps improve non-oil revenue performance and overall macroeconomic stability.

B. Strategic and Productive Expenditure

Prioritizing Capital Expenditure: Directing funds toward infrastructure, human capital, and digital services is intended to lay the foundations for durable growth rather than just providing short term demand stimulus.

C. Strengthening the Private Sector

To ensure fiscal sustainability, the government aims to shift the burden of economic growth from the public to the private sector.

D. Limitations and Future Research

This study provides useful proof on the long run relationship between government expenditure and non-oil GDP in Saudi Arabia. However, a few limitations should be noted.

The analysis is based on annual data from 2000 to 2023, which may not fully portray short term fluctuations or immediate fiscal effects and events. This research also considers total government expenditure without separating spending into key categories. This work does not include other important drivers of non-oil growth, such as private investment, trade conditions, or financial development, which could provide a more comprehensive understanding, and future studies should focus on these aspects.

Future research could address these, examining the effects of different types of government spending, and applying alternate econometric methods that account for structural breaks or nonlinear outcomes. In addition, extending the analysis to compare Saudi Arabia with other oil-dependent economies could offer broader insights into how fiscal policy can best support long term diversification

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