From Oil Reliance to Economic Resilience: Panel Data Evidence on Diversification Drivers in the GCC over Two Decades

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Abstract

This study investigates the macroeconomic drivers of economic diversification in the Gulf Cooperation Council (GCC) countries over the period 2000–2023. Given the region's heavy reliance on oil revenues, the paper examines how trade openness, foreign direct investment (FDI), government spending, financial development, human capital, and oil price volatility affect diversification. Using panel data for six GCC countries, we apply a robust econometric framework that includes panel ARDL, panel VAR, panel Granger causality tests, and forecast error variance decomposition (FEVD) to capture both short-run and long-run relationships. The results show that trade openness, FDI, and human development significantly promote diversification, while oil price volatility exerts a strong negative effect, supporting the resource curse hypothesis. Government spending is statistically insignificant, and financial development, though positive, has no significant direct impact. The FEVD analysis highlights the persistence of diversification and the dominant roles of trade openness and FDI. Our findings offer policy-relevant insights, suggesting that GCC countries should promote targeted FDI, strengthen financial sector reforms, and invest in human capital to achieve sustainable economic diversification and reduce vulnerability to oil shocks

Keywords: Economic diversification, Gulf Cooperation Council, oil dependence, trade openness, foreign direct investment, panel data.

JEL Classification : F21, F43, C33, E62 ;O53, Q43

1. Introduction

Economic diversification, particularly in resource-rich economies, is crucial for achieving economic resilience, job creation, and long-term growth (Dias Paião Júnior and Ferraz, 2024). It reduces reliance on volatile commodities like oil and broadens government revenue sources, enhancing stability (IMF, 2016). In the Gulf Cooperation Council (GCC), comprising Saudi Arabia, UAE, Kuwait, Qatar, Bahrain, and Oman, oil and gas have long dominated GDP and government budgets. This dependence exposes economies to oil price shocks, leading to fiscal deficits and economic downturns (Callen et al., 2014; IMF, 2016).

To mitigate this, GCC states have launched major diversification initiatives. Saudi Arabia's Vision 2030, the UAE's Economic Diversification Agenda, and Qatar's National Vision 2030 aim to expand non-oil sectors like manufacturing, tourism, financial services, and technology (General Secretariat for

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Development Planning, 2008; Kingdom of Saudi Arabia, 2016; Crupi & Schiliro, 2023). Projects like Saudi Arabia's NEOM—an advanced $500 billion city—and Dubai's rise as a financial and tourism hub exemplify this shift (PIF, 2025).

Despite such efforts, progress remains uneven (Aker & Aghaei, 2019). Structural barriers persist across the GCC, including the rentier model, overdependence on hydrocarbons, and weak human capital development (Mishrif, 2018). While Saudi Arabia and the UAE have reduced their reliance on oil, Bahrain and Oman struggle due to limited resources and smaller market sizes. The success of diversification depends on several factors, including trade openness, FDI, government spending, financial development, human capital, and oil price volatility (Mahroum & Al-Saleh, 2016; IMF, 2016; Sweidan, 2020; IMF, 2024).

Trade openness facilitates access to global markets, technology transfer, and expertise, promoting diversification (Frankel & Romer, 2017). Similarly, FDI contributes by injecting capital, innovation, and management skills (Makiela & Ouattara, 2018). Government spending on infrastructure, education, and industrial development can also catalyze diversification (Gelb, 2010). However, excessive reliance on public-sector investment may lead to inefficiencies and delay private-sector development (IMF, 2016).

Financial sector development is essential for diversification, as efficient markets improve capital allocation, reduce liquidity constraints, and support entrepreneurship (Adeola & Evans, 2017; Popov, 2018; Amjed & Shah, 2021). Human capital development further supports transformation by enhancing productivity and innovation capacity (Hanushek & Woessmann, 2008; Lashitew et al., 2021). Yet, in many GCC countries, underdeveloped financial markets and labor force imbalances, particularly the reliance on expatriates, limit the full potential of these drivers.

Oil price volatility remains a core obstacle. The resource curse hypothesis explains how high dependence on natural resources leads to slower diversification due to rent- seeking, currency overvaluation, and institutional weaknesses (Sachs & Warner, 2001). Economic shocks like the 2014-2016 oil price collapse and the COVID-19 pandemic underscored the urgent need for diversified, shock-resilient economies (Sweidan, 2020; Lashitew et al., 2021).

While many studies have explored individual drivers of diversification (e.g., Sweidan, 2020), there is limited research assessing their combined effects in the GCC. Most lack robust econometric analysis that captures both short- and long-term dynamics.

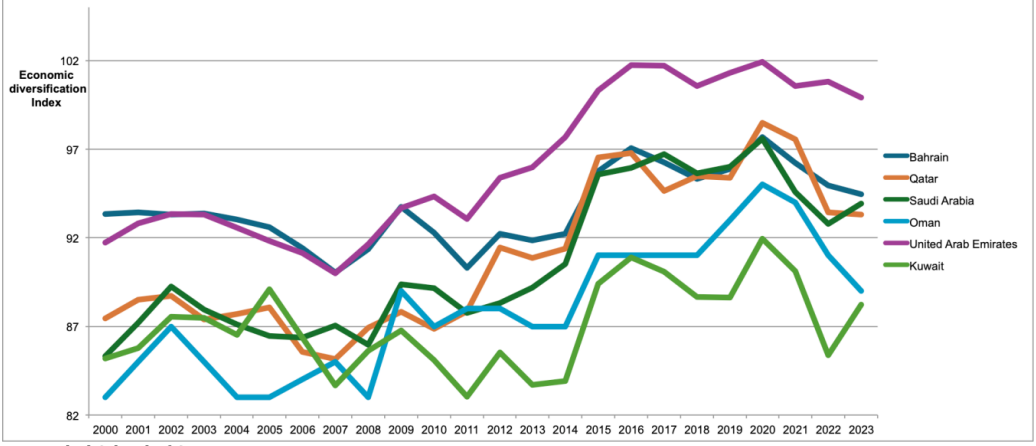
This study fills these gaps by using panel data methods, including the panel Autoregressive Distributed Lag (ARDL) model, panel Vector Autoregression (VAR), and panel Granger causality, to examine how trade openness, FDI, government spending, financial and human capital development, and oil price volatility impact economic diversification in the GCC. The findings will provide evidence-based insights into the effectiveness of current policies and offer recommendations to strengthen economic resilience and sustainability

2. Evolution of Economic Diversification in the GCC countries

This section provides a snapshot of the evolution of economic diversification in the GCC countries

from 2000 to 2023, examining key trends, policy shifts, and challenges using data from the global Economic Diversification Index (EDI) published by the Mohammed Bin Rashid School of Government.

Figure 1. Evolution of Economic Diversification in GCC over the period 2000-2023



Bin Rashid School of Government.

The EDI, derived using Principal Component Analysis (PCA), provides a comprehensive measure of economic diversification by integrating factors such as sectoral GDP distribution, export complexity, and government revenue diversification. The data from 2000 to 2023 reveals different trends across the six GCC economies.

As shown in Figure 1, Bahrain and the UAE have consistently exhibited high levels of economic diversification. Since the early 2000s, both countries have had EDI values above 90, indicating a relatively diversified economy compared to their GCC counterparts. Bahrain's financial sector and manufacturing base contributed to its resilience, while the UAE capitalized on tourism, real estate, and logistics to reduce its dependence on oil (World Bank, 2021). By 2023, Bahrain's EDI had risen to 94.45, and the UAE reached an impressive 99.92, the highest in the region.

Saudi Arabia and Kuwait have shown a gradual upward trend in economic diversification, particularly after 2016. Saudi Arabia’s Vision 2030 reforms, which prioritize investments in technology, entertainment, and renewable energy, have played a key role in this shift (IMF, 2024). In 2000, Saudi Arabia’s EDI was 85.32, increasing to
89.15 in 2010 and further improving to 93.93 by 2023. Kuwait, while still reliant on oil, has implemented measures to expand its financial services sector and public-private partnerships, with its EDI rising from 85.20 in 2000 to 88.23 in 2023.

Qatar experienced a significant rise in economic diversification between 2000 and 2010, with the government investing heavily in infrastructure and sports-related industries, including preparations for the 2022 FIFA World Cup. However, fluctuations in EDI suggest periodic disruptions, likely driven by global energy market dynamics and geopolitical factors. In 2000, Qatar's EDI was 87.45, then declined slightly to 86.85 in 2010 before rebounding significantly to 93.30 in 2023.

Oman, despite efforts to promote tourism and fisheries, has faced constraints due to fiscal deficits and slower implementation of diversification reforms (Prasad et al., 2025). Its EDI increased from 83.20 in 2000 to 87.14 in 2010, reaching 89.32 by 2023.

Despite the notable progress, GCC economies continue to face challenges in achieving full diversification. Structural constraints such as dependence on government spending, volatility in global commodity markets, and the need for greater private sector involvement remain critical barriers (International Monetary Fund, 2024). Mishrif (2018) finds that GCC countries struggle with major structural impediments to economic diversification, including the rentier state development model, diversification outside the hydrocarbon sector, industrialization, and human capital development.

The evolution of economic diversification in the GCC reflects both progress and persistent challenges. While Bahrain and the UAE have led the way, Saudi Arabia and Kuwait have made steady advancements, with Qatar and Oman showing mixed progress. Lashitew et al. (2021) found that Oman lags far behind in tertiary education enrollment, research and development expenditure, credit access, and new firm entry rates, all of which are crucial for enabling diversification. Future efforts will require sustained policy reforms, enhanced human capital development, and innovation-driven economic models to ensure long-term sustainability beyond dependence on oil.

3. Literature review

Several economic theories provide insight into the drivers and barriers of economic diversification. The Dutch disease hypothesis suggests that resource-rich countries struggle to diversify due to currency appreciation and crowding out of non-resource sectors. Resource booms, such as oil windfalls, often lead to overvalued exchange rates that reduce the competitiveness of non-oil exports, thereby concentrating economic activity in the resource sector (Sachs & Warner, 2001). This structural imbalance has been documented in oil-exporting countries, including GCC nations (Arezki et al., 2018), prompting calls for mitigation policies such as sovereign wealth funds and exchange rate stabilization.

Endogenous growth theory highlights the role of human capital, innovation, and infrastructure in diversification (Romer, 1990). Countries investing in education, R&D, and technological progress tend to develop resilient non-oil sectors. A skilled labor force enhances productivity and facilitates sectoral shifts away from resource dependency (Hanushek & Woessmann, 2008). Studies find strong links between human

capital and diversification. For example, Hendrix (2019) observed that 40 oil- and gas-dependent economies with higher human capital experienced greater non-resource-sector growth.

Similarly, Lashitew et al. (2021) found that countries with high-quality human capital were more diversified. Norway illustrates this by using oil revenues to strengthen the education and technology sectors. Conversely, countries like Angola, with low human capital investment, continue to lag (Prasad et al., 2025).

In the GCC, labor markets are dual in nature. Nationals largely occupy public sector jobs, while expatriates dominate the private sector (Rahman & Al-Azm, 2023). Despite government efforts to increase national participation in sectors like logistics and tourism, preferences for public employment persist due to better pay and job security (Lashitew et al., 2021). This hinders productivity growth and knowledge-based diversification. Although education reforms and workforce localization policies have been introduced, their impact remains mixed (Nour, 2013).

Government policies are central to diversification. Public investment in education, infrastructure, and technology can help shift economies toward higher-value industries (Delechat et al., 2024). Tax incentives and R&D grants also stimulate entrepreneurship in the non-oil sector (Callen et al., 2014; Criscuolo et al., 2022). Callen et al. argue that realigning incentives for firms and workers is critical in GCC strategies. Costa Rica's success in using education and health investments to attract FDI and diversify its economy is often cited (Delechat et al., 2024). The IMF (2016) supports this view, emphasizing the importance of macroeconomic stability, improved business environments, labor market reforms, and access to finance. Investment in human capital and infrastructure is essential to enhance competitiveness.

Trade openness also contributes to diversification. It facilitates technology transfer, market access, and the expansion of the export base (Frankel & Romer, 2017). Martincus and Gómez (2010) found that reduced tariffs helped Colombia diversify exports through new products. Countries with liberal trade regimes tend to be more diversified (Makhlouf et al., 2015; Gnangnon, 2020). The GCC has pursued regional economic integration to support non-oil sectors, though commodity dependence limits the effectiveness of trade liberalization alone. Delechat et al. (2024) argue that trade policies should be paired with industrial strategies that build competitive non-resource sectors.

FDI plays a vital but complex role. FDI brings capital, technology, and expertise, often spurring growth in sectors like logistics, tourism, and real estate (Harding & Javorcik, 2011; Aker & Aghaei, 2019). Some research suggests that FDI fosters diversification through value chain linkages (Harding & Javorcik, 2011; Kireyev, 2021). However, others find that FDI can reinforce resource dependency if directed at oil and gas (Jolo et al., 2022). In a study of 14 resource-rich countries, including GCC states, Jolo et al. found that inward FDI negatively affected diversification, possibly because it supported resource-based growth. AL Bassam (2015) noted that FDI in Saudi Arabia focused on capital-intensive industries, limiting broader diversification. Furthermore, many foreign investors are attracted to low-tax regimes and incentives, without meaningful contributions to local development. Yet, countries such as the UAE and Qatar have

improved outcomes by implementing regulatory reforms and establishing free zones to attract multinationals (Prasad et al., 2025).

Government spending has been another pillar of diversification efforts. Infrastructure projects, smart cities, and renewable energy initiatives have received significant state investment across the GCC (Sy et al., 2012). Education and industrial development have also benefited. Gelb (2010) emphasized that such investments can stimulate non-oil growth. However, overreliance on public-sector-led development creates inefficiencies and can hinder private sector growth (IMF, 2016). State-led diversification efforts may not be sustainable if they fail to transition to market-driven mechanisms (Cherif & Hasanov, 2014). Moreover, challenges such as bureaucratic barriers, corruption, and a lack of transparency limit private-sector dynamism (Sala-i-Martin et al., 2015).

A strong financial sector is essential to support diversification, facilitate access to credit, and promote entrepreneurship. The IMF (2016) and others argue that well-functioning financial systems enhance capital allocation and reduce liquidity constraints. Jolo et al. (2022) found that financial development was the most influential factor for diversification in their study of 14 resource-rich countries, estimating an 8.5% increase in diversification with financial sector growth. However, many GCC financial systems remain underdeveloped, with credit access skewed toward large state-backed firms. This constrains small and medium enterprises and limits private sector contributions to diversification (IMF, 2016).

Human capital development supports economic transformation by improving productivity and encouraging innovation. Despite ongoing investments, GCC countries still face structural issues due to the dominance of expatriates in the workforce (Hanushek & Woessmann, 2008; Hendrix, 2019). Jolo et al. (2022) found that investment in education is a key determinant for transitioning to a knowledge-based economy. Still, localization policies must be matched by broader labor market reforms.

Oil price volatility remains a major challenge. The resource curse hypothesis posits that resource dependence fosters rent-seeking, overvalued currencies, and weak institutions, thereby slowing diversification (Sachs & Warner, 2001). Sharp price drops, such as during the 2014–2016 crisis, led to budget cuts that delayed diversification programs. The COVID-19 pandemic intensified these issues, reducing energy demand and exposing the vulnerability of resource-dependent economies (Lashitew et al., 2021). Abdelkawy (2024), using a dynamic GMM model, showed that global shocks such as the 2008 financial crisis and the pandemic adversely affected GDP in the GCC. The study highlights the need for stable foreign investment, inflation control, human capital development, and domestic investment to avoid the pitfalls of the resource curse.

Sweidan (2020) confirmed that oil price fluctuations significantly affect diversification trends in the GCC. These findings underscore the importance of economic resilience to external shocks. Saudi Arabia's Vision 2030, for example, seeks to reduce reliance on oil by investing in tourism, entertainment, and technology (Kingdom of Saudi Arabia, 2016). Initiatives like the Public Investment Fund (PIF) and the National Industrial Development and Logistics Program (NIDLP) aim to stimulate non-oil sectors. Despite these efforts, challenges persist, including labor market mismatches and continued fiscal dependence on oil (IMF, 2024)

4. Data and Methods

This study uses panel data for the six GCC countries (Kuwait, Saudi Arabia, UAE, Qatar, Bahrain, and Oman) covering the period 2000 to 2023. The choice of study period is dictated by data availability. The dependent variable is the Global Economic Diversification Index (EDI) published by the Mohammed Bin Rashid School of Government. The EDI is a comprehensive measure that evaluates multiple aspects of economic diversification, including production diversification which assesses the variety and balance of domestic industries and services; trade diversification which examines the range and complexity of exported goods and services; and government revenue diversification which captures the diversity of government income sources, reducing reliance on singular revenue streams (for more details about the EDI see Prasad et al., 2025). In the current study, we use the average EDI measure, a composite score derived via principal component analysis that integrates diversification aspects such as sectoral GDP distribution, export complexity, and government revenue diversification.

The multivariate analysis controls six explanatory variables widely used in the literature as drivers of economic diversification. These include trade openness (total trade as % of GDP), which measures economic integration with global markets. Foreign Direct Investment (FDI) Inflows (as % of GDP), which measures external capital inflows. General government expenditure (as % of GDP), to capture fiscal policy's role in diversification. Real Brent crude oil price (2015 USD), to capture the role of oil revenue volatility. To capture the role of human development in economic diversification, we included the Human Development Index (HDI), which is obtained from the United Nations Development Program (UNDP) Human Development Reports. We also included the Financial Development Index, which measures depth, efficiency, and access to credit in the banking sector. Data on trade openness, FDI, and general government expenditure are retrieved from the World Development Indicators published by the World Bank. Data on Brent crude oil prices are collected from the Federal Reserve Economic Data (FRED) database. Data on the financial development index is retrieved from the IMF Financial Development Index Database.

The analysis typically starts with testing for a unit root, which is performed using the Im-Pesaran-Shin (2003) panel unit root test to determine whether the variables are I(0) (stationary) or I(1) (non-stationary). Ensuring that none of the variables is integrated of an order greater than 1 is required to validate the use of the Panel ARDL model. We then proceed to conduct the Pedroni (2004) and Kao (1999) panel cointegration tests to assess whether a long-run equilibrium relationship exists between economic diversification and its determinants. The merit of the Pedroni (2004) cointegration test is that it accounts for heterogeneity across panel members by allowing for individual-specific intercepts and slope coefficients and calculates several test statistics to evaluate whether the residuals from a long-run regression are stationary, indicating cointegration. We also check cointegration using another panel-based cointegration test: the Kao (1999) test. This test assumes homogeneity of the long-run coefficients and provides only a single test statistic. We then estimate a panel ARDL model to determine the short-run and long-run effects of macroeconomic factors on economic diversification. If a long-run relationship is confirmed, we will estimate a panel ECM to analyze short-run dynamics and the speed of adjustment towards equilibrium. To check the direction of causality between economic diversification and its determinants, we

will conduct a panel Granger causality test.

The Panel ARDL model, developed by Pesaran, Shin, and Smith (1999), is particularly suitable for analyzing the short-run and long-run relationships between economic diversification and its key determinants. The merits of using the panel ARDL approach over other panel econometric methods include its flexibility in handling mixed orders of integration. Also, unlike static panel models, the panel ARDL approach explicitly estimates both the long-run equilibrium relationships and the short-run adjustment dynamics. Moreover, the error-correction representation of the panel ARDL model is useful for analyzing how quickly economic diversification adjusts to changes in trade openness, FDI, government spending, oil prices, financial development, and human development. In addition, the panel ARDL allows for country-specific heterogeneity, making the model suitable for GCC economies that exhibit structural differences.

Equation 1 presents the ARDL(p,q) model that we are interested in estimating.

$$EDI_{it} = \alpha_i + \sum_{k=1}^{p} \theta_k \, EDI_{i,t-k} + \sum_{j=1}^{q} \eta_1 TO_{i,t} + \sum_{j=1}^{q} \eta_2 FDI_{i,t} + \sum_{j=1}^{q} \eta_3 GS_{i,t} + \sum_{j=1}^{q} \eta_4 OP_{i,t} + \sum_{j=1}^{q} \eta_5 FD_{i,t} + \sum_{j=1}^{q} \eta_6 HD_{i,t} + \varepsilon_{it} \quad (1)$$

Where $EDI_{it}, TO_{it}, FDI_{it}, GS_{it}, OP_{it}, FD_{it}, HD_{it}$ are the economic diversification index, trade openness, FDI, government spending, oil prices, financial development, and human development, respectively. Subscript $i \; and \; t$ denote the country and time. p, q are the optimal lag length as selected by the Akaike Information Criterion (AIC).

The long-run equilibrium relationship among the variables is estimated using equation (2)

$$EDI_{it} = \vartheta_0 + \vartheta_1 TO_{it} + \vartheta_2 EDI_{it} + \vartheta_3 GS_{it} + \vartheta_{42} OP_{it} + \vartheta_5 FD_{it} + \vartheta_{62} HD_{it} + \varepsilon_{it} \quad (2)$$

In which P_1, P_2, P_3, P_4, P_5, P_6 are the long-run coefficients of trade openness, FDI, government spending, oil prices, financial development, and human development, respectively.

The short-run deviations from the long-run equilibrium are captured using an error correction model (ECM), which is given by equation (3)

$$\Delta EDI_{it} = \alpha_i + \sum_{k=1}^{p} \theta_k \, \Delta EDI_{i,t} + \sum_{j=1}^{q} \eta_1 \Delta TO_{i,t} + \sum_{j=1}^{q} \eta_2 \Delta FDI_{i,t} + \sum_{j=1}^{q} \eta_3 \Delta GS_{i,t} + \sum_{j=1}^{q} \eta_4 \Delta OP_{i,t} + \sum_{j=1}^{q} \eta_5 \Delta FD_{i,t} + \sum_{j=1}^{q} \eta_6 \Delta HD_{i,t} + \lambda \mathrm{ECT}_{t-1} + \varepsilon_{it} \quad (3)$$

In which $\eta 1$, $\eta 2$, $\eta 3$, $\eta 4$, $\eta 5$, $\eta 6$ measure the short-run effects of TO, FDI, GS, OP, FD, and HD, respectively. λ, which is the Error Correction Term (ECT) coefficient, measures the speed of adjustment of economic diversification back to the long-run equilibrium following a short-run shock. Dynamic stability requires that λ be negative and statistically significant.

To examine whether a causal relationship exists between economic diversification and its key determinants, we employ a panel Granger causality test, which extends the traditional Granger causality framework to panel data settings and controls for cross-sectional heterogeneity among the GCC countries.

The Panel Granger causality test is a crucial component of our empirical methodology, allowing us to assess whether key macroeconomic variables predict changes in economic diversification rather than merely correlate with it.

The panel Granger causality test is applied to Equation (4)

$$EDI_{it} = \alpha_i + \sum_{j=1}^{p} \eta_j X_{i,t-j} + \sum_{k=1}^{q} \theta_k EDI_{i,t-k} + \varepsilon_{it} \quad (4)$$

In which EDI_{it} is the economic diversification index of country i at time t. $X_i \epsilon \{$ TO, FDI, GS, OP, FD, HD$\}$. α_i captures the country-specific fixed effects. p, q are the optimal lag length as selected by the Akaike Information Criterion (AIC). The null hypothesis of the panel Granger causality test is that X_{it} does not Granger cause EDI_{it}, which means $\eta j = 0 \; \forall j$, which is tested using an F-test.

Economic diversification could be endogenously determined. To account for that, we estimate a panel VAR model to examine the dynamic interactions among the variables as shown in Equation (5). The panel VAR model provides a dynamic framework to analyze the interdependencies and feedback effects between economic diversification and its macroeconomic determinants.

$$Z_{it} = \beta_0 + \sum_{p=1}^{q} \beta_p Z_{it-p} + \varepsilon_{it} \quad (5)$$

In which Z_{it} is a vector of endogenous variables including EDI, TO, FDI, GS, OP, FD, HD. β_p represents the coefficient matrices for the lagged values and ε_{it} is the random error term.

Unlike traditional regression models, which assume a one-way causality from independent to dependent variables, the panel VAR treats all variables as potentially endogenous, allowing for bidirectional causality and feedback effects.

We estimate the panel VAR model using the Generalized Method of Moments (GMM), following the Arellano and Bover (1995) and Blundell and Bond (1998) system GMM approaches. This method effectively addresses endogeneity by using internal instruments (lagged values). It also accounts for country-specific heterogeneity by incorporating fixed effects and corrects for serial correlation and heteroskedasticity using robust standard errors.

To further understand the dynamics of economic diversification, we conducted a forecast error variance decomposition (FEVD) analysis, which quantifies the extent to which shocks in each variable contribute to fluctuations in economic diversification over time.

5. Empirical Results

Results of the Im-Pesaran-Shin (2003) panel unit root, presented in Table 1, show that economic diversification, government spending and financial development are stationary at level (I(0)) at the 5% significance level, while FDI is stationary at level at the 10% significance level. Trade openness, financial development, oil prices, and the human development index are non-stationary at levels but became stationary after first difference. Since we have a mix of I(0) and I(1) variables, the panel ARDL model is appropriate, as it accommodates different orders of integration.

Table 1: Results of the Im-Pesaran-Shin (IPS) panel unit root test.

Variable	ADF Test Statistic (at Level)	ADF Test Statistic (at First Difference)
Economic Diversification Index	-2.87***	-5.12***
Trade Openness	-1.23	-3.92**
FDI	-1.54*	-4.21***
Government Spending	-2.02**	-4.87***
Financial Development Index	-3.12***	-5.43***
HDI	-0.85	-3.75**
Oil Prices	-1.01	-3.89***

*, **, *** indicate statistical significance at the 10%, 5%, and 1% significance level, respectively
Source: The table is constructed by the authors

Table 2 presents the results of the Pedroni (2004) and Kao (1999) panel cointegration tests. The Pedroni test evaluates cointegration by providing multiple test statistics for both within-dimension (panel) and between-dimension (group) approaches. According to the results, the panel PP-statistic, panel ADF-statistic, group PP-statistic, and group ADF-statistic indicate rejection of the null hypothesis of no cointegration at the 5% significance level. The existence of this long-run relationship is also confirmed by the Kao cointegration test, in which the Kao t-statistic is statistically significant at the 5% significance level. These results provide strong evidence of cointegration across all test statistics, justifying the estimation of long-run relationships using a panel ARDL-EC model.

Table 2: Pedroni and Kao Cointegration Tests Results

Statistic	Value	P-Value
Pedroni Cointegration Test		
Panel v-Statistic	2.13**	0.017
Panel rho-Statistic	-1.85**	0.032
Panel PP-Statistic	-3.21***	0.0005
Panel ADF-Statistic	-2.67***	0.007
Group rho-Statistic	-1.76**	0.040
Group PP-Statistic	-3.05***	0.001
Group ADF-Statistic	-2.89***	0.003
Kao Cointegration Test		
Kao t-Statistic	-2.91**	0.002

, * indicate statistical significance at the 5%, and 1% significance level, respectively
Source: The table is constructed by the authors

Table 3 presents the results of the panel ARDL model and its associated error-correction framework. The results show that trade openness and FDI have positive and statistically significant effects on economic diversification in the long run. Government spending is not a significant determinant of diversification, suggesting that public sector expenditure alone does not drive economic transformation. Oil price volatility negatively affects diversification, confirming the resource curse hypothesis-when oil prices rise, diversification efforts weaken. Financial development and human development as measured by the HDI, contribute positively, reinforcing the role of human capital and financial institutions in economic transformation. The negative and significant ECT coefficient (-0.417) suggests that 41.7% of the system's disequilibrium is corrected annually, indicating a moderate speed of adjustment toward the long-run equilibrium. The estimated short-run coefficients indicate that trade openness, FDI, FD, and HD also have statistically significant positive effects on economic diversification, while the effect of government spending, though positive, is not statistically significant. Like the long-run effect, oil prices have a statistically significant negative short-run impact on economic diversification.

Results of the diagnostic checks indicate that the estimated ARDL model is free from serial correlation, heteroskedasticity, and multicollinearity.

Table 3: Estimated short-run and long-run coefficients of the Panel ARDL Model

Variable	Long-Run Coefficient	Long-Run p-value	Short-Run Coefficient	Short-Run p-value
Trade Openness	0.215**	0.012	0.092***	0.010
FDI	0.174**	0.024	0.061**	0.018
Government Spending	0.087	0.310	0.025	0.280
Oil Prices	-0.192***	0.008	-0.088***	0.006
Financial Development	0.143**	0.040	0.074**	0.032
Human Development Index	0.095**	0.038	0.029**	0.040
ECT Coefficient= -0.417*** p-value=0.000				
Diagnostic Test				
Breusch-Pagan Test for Heteroskedasticity	LM Statistic= 2.84	0.092		
Durbin-Watson Test for Serial Correlation	Durbin-Watson Statistic= 1.89			
Variance Inflation Factor (VIF) for Multicollinearity	All VIF scores were below 5			

, * indicate statistical significance at the 5%, and 1% significance level, respectively
Source: The table is constructed by the authors

Table 4 presents the results of the panel Granger Causality Test. They show that trade openness, foreign direct investment, human development, and oil prices all Granger-cause economic diversification, as the F-statistics were statistically significant at the 5% level. The results also show that government expenditure Granger causes economic diversification at the 10% significance level. The weak causality from government spending to diversification would imply that government spending affects economic diversification with a time lag. There is no statistically significant causality from financial development to economic diversification, suggesting its role may be indirect.

Table 4: Results of the Panel Granger Causality Test

Variable	F- Statistic	Conclusion
Trade Openness	4.85***	Granger-causes Diversification
FDI	6.14***	Granger-causes Diversification
Government Expenditure	2.31*	Granger-causes Diversification
Oil Prices	5.75***	Granger-causes Diversification
Financial Development	1.22	No Significant Causality
Human Development Index	2.91**	Granger-causes Diversification

*, **, *** indicate statistical significance at the 10%, 5%, and 1% significance level, respectively
Source: The table is constructed by the authors

Table 5 presents the estimated coefficients of the panel VAR model, which measures how diversification reacts to shocks in its determinants. The results show that trade openness has a positive and statistically significant impact on economic diversification. This finding suggests that greater integration into global markets increases sectoral expansion, encourages technological spillovers, and enhances competitiveness in non-oil industries. As for the effect of FDI on economic diversification, the results indicate a negative and statistically significant effect. This negative effect could be due to the concentration of FDI in capital-intensive or resource-dependent sectors, which leads the GCC economies to rely exclusively on a narrow set of industries. In many resource-rich countries, FDI is primarily directed towards oil and gas, limiting its potential contribution to diversification. Government expenditure also shows a statistically significant negative relationship with economic diversification. While public spending can support diversification through infrastructure investments and education, it seems, in the GCC countries, to expand existing sectors rather than develop new ones. Additionally, excessive government involvement in the economy can crowd out private investment, reducing incentives for businesses to explore new industries.

Human development shows a statistically significant positive impact on economic diversification. This suggests that higher educational attainment, health improvements, and workforce skill development significantly enhance the GCC economies' ability to diversify. As expected, the results show that higher oil prices hinder economic diversification, with a statistically significant negative coefficient. This aligns with the "resource curse" hypothesis, in which periods of high oil revenues reduce the urgency of structural

economic reforms. When oil prices are high, governments often increase spending in oil-related sectors while ignoring the development of non-oil industries. This reinforces economic concentration and delays diversification.

Financial development, though, has a positive effect on economic diversification, which is not statistically significant. While financial markets are essential for providing capital to new businesses, their impact on diversification remains statistically weak in the short run. This suggests that access to finance in GCC countries remains constrained, particularly in non-traditional industries.

To further understand the dynamics of economic diversification, we conducted a forecast error variance decomposition (FEVD) analysis, which quantifies the extent to which shocks in each variable contribute to fluctuations in economic diversification over time. The results show that economic diversification is largely affected by its own past values, which account for 39% of the variations, indicating a high degree of persistence. Trade openness accounts for 20% of the variation in economic diversification, underscoring its importance as a driver of economic transformation. The second-largest driver of economic diversification, in terms of magnitude, is FDI, accounting for 18% of the change in diversification, although its negative coefficient suggests that not all FDI is beneficial for economic diversification. Government spending accounts for 13%, indicating that fiscal policy has a notable influence on diversification efforts, though the effect is negative. Oil prices account for 5% of the variability in diversification, confirming that commodity price shocks affect structural economic changes. Human development, as proxied by the HDI, plays a minor role, contributing only 5%, underscoring the need for long-term investments in human capital. Financial Development has the least contribution, with less than 2%, suggesting that financial reforms alone are insufficient to drive diversification.

Table 5. Estimated coefficients of the panel VAR model

Variable	Coefficient	p-value
Trade Openness	0.136***	0.000
FDI	-0.033***	0.000
Government Spending	-0.078***	0.000
Financial Development	0.0154	0.134
HDI	0.153**	0.028
Oil Prices	-0.067***	0.000

, * indicate statistical significance at the 5%, and 1% significance level, respectively
Source: The table is constructed by the authors

6. Discussion of the findings

The findings of this study contribute to the growing literature on economic diversification in resource-rich economies, particularly in the GCC region (Kuwait, Saudi Arabia, UAE, Qatar, Bahrain, and Oman).

Our results indicate that trade openness, foreign direct investment (FDI), human development, and financial development play significant roles in driving economic diversification, while oil price volatility exerts a negative influence. These results align with previous studies and provide further insights into the structural challenges and opportunities faced by the GCC economies in their diversification efforts.

A key finding of this study is the positive and significant impact of trade openness on economic diversification. This supports the argument that integration into global markets facilitates sectoral expansion, enhances competitiveness, and promotes technological spillovers (Frankel & Romer, 2017; Makhlouf et al., 2015). Our results are in line with those of Martincus and Gómez (2010), who found that trade liberalization contributed to export diversification in Colombia. The evidence suggests that trade policies in the GCC should prioritize reducing trade barriers and enhancing regional economic integration to maximize the benefits of global trade.

Similarly, human development, as measured by the Human Development Index (HDI), is positively associated with economic diversification. This finding aligns with the work of Hanushek and Woessmann (2008), who argue that human capital accumulation is a key determinant of economic transformation. Hendrix (2019) also found that countries with higher educational attainment experience greater diversification. Despite this, our results suggest that the overall contribution of human development to diversification remains relatively small. This highlights the need for sustained investment in education and skills development to create a workforce capable of supporting knowledge-intensive industries.

The role of FDI in economic diversification is more nuanced. While FDI generally facilitates capital inflows and technology transfer, our results indicate a negative relationship between FDI and diversification. This finding is consistent with Jolo et al. (2022), who found that FDI in the GCC has been primarily directed toward resource-based industries rather than toward fostering new economic sectors. AL Bassam (2015) also noted that FDI in Saudi Arabia has been concentrated in capital-intensive sectors, limiting its impact on broader economic transformation. This suggests that policy efforts should focus on attracting FDI into non-oil industries such as technology, manufacturing, and renewable energy to ensure their positive impact on diversification.

Our findings also indicate that oil price volatility negatively affects economic diversification, reinforcing the resource curse hypothesis proposed by Sachs and Warner (2001). Similar to Sweidan (2020), who found that fluctuations in oil prices Granger-cause changes in economic diversification in the GCC, our study suggests that high oil prices reduce the urgency for structural economic reforms, leading to continued dependence on oil and gas. This underscores the importance of counter-cyclical policies that allocate oil revenues to sovereign wealth funds and long-term investment projects in non-oil sectors.

Government spending, while often viewed as a driver of diversification, does not appear to have a significant impact in our analysis. This finding is consistent with Callen et al. (2014), who argued that excessive government involvement in GCC economies has led to inefficiencies and limited private-sector participation. While public investment in infrastructure and education is necessary for diversification, our results suggest that government spending alone is insufficient to drive structural transformation. This highlights the need for policies that encourage private sector-led growth and reduce reliance on state-led development models.

We find that financial development has a positive but statistically insignificant effect on economic diversification. While a well-functioning financial system can support entrepreneurship and capital allocation (Adeola & Evans, 2017; Popov, 2018), our results suggest that financial markets in the GCC remain underdeveloped in their support for new industries. Jolo et al. (2022) found that financial development is one of the most significant determinants of diversification in resource-rich economies, but its effectiveness depends on the regulatory environment and access to credit. This suggests that policymakers should focus on expanding financial inclusion and improving access to credit for small and medium-sized enterprises (SMEs) to enhance diversification efforts.

The results from the forecast error variance decomposition (FEVD) analysis further highlight the persistence of economic diversification, with its past values accounting for 39% of its variations. Trade openness emerged as the second most influential driver, accounting for 20% of the variability in diversification. However, despite FDI accounting for 18% of the variation, its negative effect raises concerns about its sectoral concentration. Government spending accounted for 13%, indicating that fiscal policy plays a role but may not be effectively targeted toward diversification. The relatively small contributions of oil prices (5%), human development (5%), and financial development (2%) suggest that while these factors are important, they require stronger policy support to enhance their impact.

Compared with previous studies, this research offers a more comprehensive econometric analysis that integrates short- and long-run effects of macroeconomic factors on economic diversification. Unlike earlier studies that examined individual determinants in isolation (e.g., Lashitew et al., 2021; Sweidan, 2020), our approach provides a broader understanding of the interactive effects among key diversification drivers. The use of panel ARDL, panel VAR, and panel Granger causality tests enables a more dynamic assessment of how economic diversification responds to various macroeconomic shocks.

Overall, the findings of this study reinforce the notion that economic diversification in the GCC is a complex process influenced by multiple factors. While trade openness, human development, and financial sector reforms play crucial roles, the negative effects of oil price volatility and sectoral concentration of FDI highlight persistent challenges. Policy interventions should aim to create a more favorable investment climate for non-oil industries, promote innovation-driven growth, and reduce the dependency on oil revenues to ensure long-term economic sustainability.

Despite the valuable insights provided by this study, certain limitations should be acknowledged. First, the study focuses on a limited set of macroeconomic variables, while other potential determinants of economic diversification, such as institutional quality, political stability, and innovation capacity, were not included. Future research could incorporate these additional factors to provide a more comprehensive understanding of dynamic diversification. Second, the reliance on aggregate panel data may hide country-specific variations in diversification trajectories. While the panel ARDL and VAR models capture general trends across the GCC, a more focused national-level analysis could offer deeper policy insights. Third, the study assumes linear relationships between economic diversification and its determinants, whereas non-linear effects or threshold relationships may exist. Advanced econometric techniques, such as quantile regression or structural break analysis, could be explored in future research to capture these complexities. Finally, data limitations restricted the time to 2000-2023, and extending the dataset to include more historical data could

enhance the robustness of the findings.

7. Conclusion and policy implications

This study provides empirical evidence on the macroeconomic determinants of economic diversification in the GCC. The results emphasize the positive role of trade openness, FDI, and human capital in driving diversification while cautioning against sectoral FDI concentration and the risks of oil dependence. Policy efforts should focus on strategic FDI attraction, financial sector reform, and human capital investment to ensure sustainable economic transformation in resource-rich economies.

The findings provide several policy insights. Governments should adopt targeted FDI policies that encourage investments in technology, renewable energy, and high-value manufacturing. Revenue stabilization funds should be expanded to mitigate the negative impact of oil price fluctuations on diversification. Strengthening non-traditional credit access for SMEs and innovative businesses can help enhance the role of financial markets in diversification. Trade liberalization policies should be accompanied by industrial development programs to ensure that trade benefits lead to new sectoral growth rather than reinforcing existing industries. Investment in education, vocational training, and digital skills development will ensure that GCC economies have a workforce capable of supporting a diversified economic base.

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