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Article

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Article

Effect of per Capita Income, GDP Growth, FDI, Sectoral Composition, and Domestic Credit on Employment Patterns in GCC Countries: GMM and OLS Approaches

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Abstract: This paper examines the impact of per capita income, gross domestic product (GDP) growth, foreign direct investment (FDI), sectoral composition, and domestic credit on employment patterns in the Gulf Cooperation Council (GCC) countries from 2013 to 2023, based on “Okun’s law”. The dynamic data panel was analyzed using the generalized method of moments (GMM) and the ordinary least square (OLS) method. The research findings reveal that the agricultural sector’s contributions have significantly influenced the employment patterns in GCC countries, emphasizing the traditional role of agriculture in creating job opportunities. However, the contribution of the services and industrial sectors has no significant impact on employment patterns. Domestic credit and FDI inflows have significantly influenced employment patterns in GCC countries, underscoring their vital role in sustaining long-term economic stability. Per capita income and GDP growth did not significantly impact the employment pattern in the GCC countries during the study period. This research provides valuable insights to policymakers, highlighting the need to focus on the services and industrial sectors to promote their contribution to employment in GCC countries. The research findings also augment the literature by identifying the key economic indicators contributing to GCC countries’ employment creation.



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1. Introduction

The six Gulf Cooperation Council (GCC) countries—located in the Middle East and comprising Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates—have undergone significant economic transformations over the past few decades. According to the World Bank Group, these countries have achieved steady economic growth that is expected to reach 4.7% by the end of 2025 ([World Bank 2024a](#)). The GCC countries previously relied heavily on oil and gas production; since the beginning of the 2000s, they have adopted varied strategies and economic and transformation programs aimed at diversifying to avoid the challenges of oil price instability for sustainable economic development ([Sarwar 2022](#)). To achieve these goals, the countries have implemented several economic strategies with varying time frames: the Bahrain Economic Vision 2030 started in 2008, Qatar National Vision 2030 began in 2008, the UAE Vision 2021 started in 2010, Saudi Arabia’s Vision 2030 started in 2016, Kuwait Vision 2035 (New Kuwait) started in 2017, and Oman Vision 2040 started in 2019. These economic strategies were based on diversification efforts, investment in human capital, foreign direct investment (FDI) attraction, infrastructure development, and sustainability initiatives as the main pillars of economic growth.

In response to economic and social changes, the GCC countries have adopted several policies to influence the labor market, aiming to ensure employment for residents

and reduce reliance on expatriate labor by prioritizing education and vocational training. The GCC countries have developed various job localization programs, such as Saudi Arabia's "Nitaqat" program, implemented in 2011, which aims to reduce unemployment by increasing the percentage of Saudi citizens in the private sector (Envoy Global 2023). Similarly, other GCC countries have implemented job localization programs: Oman in 1988 (Sovereign Pro Partner Group 2024), the UAE in 1990 (Javed 2024), Bahrain in the 1980s, Qatar in 2000, and Kuwait in 2017 (Williams et al. 2011). Despite these efforts, some initiatives have achieved limited success (Tlaiss and Al Waqfi 2022).

Researchers expect that economic growth will lead to a reduction in unemployment and create more jobs (Sassanpour 1997). Despite rapid economic development, employment remains a challenge for the GCC countries. Statistics indicate that the unemployment rate among the population in the GCC countries at the end of 2020 was higher than the global rate of 5.4% (GCC Statistical Center 2021). According to Al Flaiti (2023), the population increased by 19% during the 11-year period (2010–2021), with more than half of the GCC countries' population being young people under 25 years. A large percentage of the population (about 90%) works in the government sector due to its attractive salaries, benefits, and job security (Hertog 2012). With the government sector's role in job creation decreasing due to privatization, the percentage of local citizens employed in the private sector is expected to increase. Therefore, these economies' abilities to create jobs for citizens and reduce the unemployment rate are vital for policymakers and researchers.

The GCC countries have adopted economic diversification as a critical tool for achieving the desired macroeconomic policy for economic growth. They have attained remarkable progress in achieving targeted economic diversification. The Economic Diversity Index (EDI) score for GCC countries for 2022 ranged between 86.2% (Kuwait) and 95.7% (UAE), based on the three dimensions of output, trade, and government revenue (Prasad et al. 2024). As part of economic diversification endeavors, GCC countries tend to attract foreign capital through encouraging foreign investment (Alharthi et al. 2024). Foreign direct investment plays a significant role in achieving sustainable economic development since it contributes to job creation, technology and innovation transfer, infrastructure development, increased capital flows, enhanced global competitiveness, improved business environment, skills development, and economic stability (Alfaró et al. 2004, 2010). Economic growth is represented by the increase in a country's gross domestic product (GDP), and GDP growth is an official indicator of a country's economic development (Hu and Yao 2022). It is the total monetary or market value of all the finished goods and services produced within a country's borders in a specific period of time. The GDP growth and GDP per capita are the basic components of real economic growth in any economy" (Kitov 2008). The GDP per capita of a country is the average economic output per person in that country (Fariss et al. 2017).

As a part of their economic strategy, GCC countries adopted policies to improve the efficiency of local institutions and develop the financial, industrial, and service sectors (Callen et al. 2014). Although the oil and gas sectors dominate the GCC countries, other primary sectors, such as the services, industrial, and agricultural sectors, contribute to economic diversification. The agricultural sector contributes to food security and creates jobs for rural populations. However, unsuitable environmental conditions and a rapidly growing population—expected to reach 62.5 million in 2025 from 10 million in 1975 and 30 million in 2000—pose challenges to agriculture. The industrial sector in the Gulf countries is characterized by steady growth and contributes more to the national GDP than the agricultural sector. In 2022, it achieved a growth rate of 30%, contributing 12% to the gross national product and employing more than 2 million people (Gulf Cooperation Council 2024). The GCC countries focused on industrial innovations and supported expanding local industries to achieve economic development and create knowledge-based economies (Raffoul and Hewaidi 2021). For example, Saudi Arabia has developed a plan to double the industrial sector's contribution to the gross national product over the next decade; Saudi Arabia has launched the "Made in Saudi Arabia" program under Saudi Arabia's

Vision 2030 initiative, which aims to support local industries, encourage the consumption of domestic goods, and increase exports (Raffoul and Hewaidi 2021). The services sector employs more than 50% of the workforce in the Gulf countries (Albassam 2015). Numerous industries comprise this sector, including finance, warehousing, transportation, healthcare, tourism, information services, and education. The tourism sector in the UAE and Saudi Arabia is growing rapidly, with millions of tourists visiting these two countries annually (International Monetary Fund. Middle East and Central Asia Department 2022). According to a report, the tourism sector is expected to contribute approximately 10% to GCC countries' GDP by the year 2030. The growth of the tourism sector is accompanied by large investments in infrastructure and entertainment facilities (Fitch Ratings 2023). A key driver of economic growth is domestic credit, which enhances enterprise productivity and increases capital per worker. Domestic credit capital for investment boosts infrastructure development, consumer spending, small and medium enterprises' (SME) growth, skills development, innovation and entrepreneurship, and creates new jobs, sectors, and industries (Mazhar et al. 2022; Srikanth et al. 2020). Based on the Gulf Cooperation Council central banks (2024) data, domestic credit in the Gulf countries is characterized by continuous growth due to the banking system's stability (Junaid Ansar 2024). For example, Saudi Arabia achieved a growth of 10.7% in domestic credit during the first quarter of 2024, and Bahrain and Qatar secured growth in credit facilities, each exceeding 4% (Junaid Ansar 2024). Domestic credit activities focus mainly on real estate, construction, and trade.

Previous studies have focused on the economic diversification resulting from the GCC countries' strategic planning (Al Naimi 2022; Bacha 2024; Kasem and Alawin 2023). Additionally, available studies on the GCC have concentrated on unemployment, specifically among youth (Gouider 2022; Mina 2021; Poplavskaya et al. 2023; Scharfenort 2020). One exception is the study by Ben-Salha and Zmami (2021), which addressed the relationship between employment and economic growth in GCC countries from 1970 to 2017. The existing literature has independently examined the relationship between per capita income, GDP growth, and FDI on employment (Haider et al. 2023; Mina 2023). Other studies have also explored the association between sectoral composition and employment (Loizou et al. 2019; Osabohien et al. 2019) and between DomC and employment separately (Gutierrez et al. 2023; Macaluso 2023; Suyunov 2022). Therefore, there is a notable gap in the literature addressing multiple economic indicators of employment in GCC countries, particularly for recent periods.

This paper aims to achieve several goals. First, it intends to assess the effects of per capita income, GDP growth, and FDI on employment patterns in GCC countries. Second, the study will analyze the impact of economic diversification (sectoral composition) on employment patterns in GCC countries. Third, it will examine the effect of domestic credit on employment patterns in GCC countries. The study will cover the period from 2013 to 2023. The selected macroeconomic indicators reflect the overall health of a country's economy (Acquah and Ibrahim 2020; Emako et al. 2022; Prochniak 2011). They constitute dynamic economic elements that have direct and indirect relationships with employment, as indicated by theoretical frameworks (Okun 1962) and previous studies (Mura et al. 2020; Sanchez and Liborio 2012; Ssebulime and Joseph 2019). The significance of these relationships is evident as GCC countries seek economic development, diversification, and localization of employment. By examining the impact of these indicators on employment patterns, this study provides valuable insights for policymakers and stakeholders interested in economic growth within GCC countries. The research model is based on Okun's law (Okun 1962), which posits a relationship between a country's aggregate economic outputs and unemployment rates across various economic sectors. According to Okun (1962), as economic growth factors increase, the unemployment rate decreases. Building on Okun's framework, this study examines how employment patterns shift in response to changes in macroeconomic indicators, including per capita income, GDP growth, FDI, sectoral composition, and DomC.

2. Literature Review

Employment is an essential economic variable and a primary component of countries' economic policies. It is a multifaceted economic concept that measures the economy's ability to generate sufficient employment opportunities for its population (Kapsos 2005). Employment includes factors such as unemployment rates, employment-to-population ratios, and labor force participation rates. Employment is one of the most significant economic performance measures of a country. Increased employment means more production, which contributes to raising the gross national product and improving individual income and standards of living (Stewart 1999).

The association between employment and economic indicators such as growth in GDP, FDI, per capita income, sectoral composition, and domestic credit has been studied extensively in various economies over different time periods. Haider et al. (2023) asserted the significant and positive elasticity of employment with economic growth in both developing and developed countries using the Cobb–Douglas production function. Furthermore, using the pooled mean group estimator, Ben-Salha and Zmami (2021) confirmed the positive association between employment and GDP in the GCC region. Mina (2023) concluded that the positive relationship between economic growth reduced unemployment in the GCC countries using country and time fixed effects estimation methodology. This study examines the relationship between employment rates and GDP growth in the GCC countries using the GMM and OLS approaches. Per capita GDP, which equals the total GDP of a country divided by its population, is closely related to economic growth and GDP and is a measure of a country's economic status (Hall 2024). Rahman (2013) confirmed that the per capita GDP is negatively associated with unemployment. According to Maitah et al. (2015), employment increases at a rate equal to half the increase in GDP per capita.

An extensive body of literature addresses the association between different economic sectors' growth and employment. Research findings demonstrate the positive impact of the agricultural sector's contribution to GDP and growth on employment (Loizou et al. 2019; Osabohien et al. 2019). Similarly, researchers have confirmed the positive impact of the industrial sector's growth on employment (Charles et al. 2019; Rijwani et al. 2024). In addition, the results of some studies indicate a positive correlation between growth in the services sector and job creation (Butkus et al. 2023; Dawid and Mitkova 2020). According to Padhi et al. (2023), sectoral composition impacts employment patterns differently across sectors and economies. For example, Dildar (2021) found that the capital-intensive industrial sector in MENA countries negatively affected employment patterns. In Saudi Arabia, Hasanov et al. (2021) observed that sectoral composition effects on employment patterns vary over time—positive in the long term but negative in the short term. It is notable that most previous studies on economic sectors and employment focused on one sector. The current research addresses the relationship between sectoral contribution and employment patterns in GCC countries.

FDI is a driver of economic growth, a catalyst for economic development, and a source of economic diversification resulting from the increasing business internationalization processes (Chang et al. 2019; Taiwo et al. 2018). FDI brings advanced technology, stimulates investment, enriches competition, increases finances, and enhances expertise (Ibrahim and Acquah 2021). Alharthi et al. (2024) asserted that the country's economic growth in the GCC region positively and significantly affects FDI. A substantial number of empirical studies indicate the significant and positive impact of inward FDI on employment creation in various countries and regions (Khan et al. 2023; Nazzal et al. 2023; Saurav and Sinha 2020). Previous studies that addressed the relationship between FDI and employment have reached varied conclusions depending on the country and the time period of the study (Mamoon and Rahman 2016). For instance, Ullah et al. (2023) concluded that FDI positively affects the economic growth of countries in an intermediate stage of economic development. There is a scarcity of studies focusing on the impact of FDI on employment in the GCC countries.

Domestic credit is the value of credit available to the private sector in a particular country; it is a measure of its financial development (Bui et al. 2020), expands the investments in the country (Botev et al. 2019), and enhances the country's economic growth (Almajali 2023; Jammeh 2022). The banking system is the main source of domestic credit (Bui 2020). Numerous studies have confirmed the positive association between domestic credit and employment (Gutierrez et al. 2023; Macaluso 2023; Suyunov 2022). Most previous studies have examined the relationship between domestic credit and employment in late historical periods. There is a scarcity of studies analyzing the relationship between these two variables in the GCC countries. The current study addresses the relationship between domestic credit and employment patterns in the GCC countries in the years 2013–2023.

This research hypothesizes that the employment pattern of a particular GCC country is affected by its macroeconomic indicators, such as sectoral contribution, GDP per capita income, FDI, GDP growth rate, and DomC, based on the framework of Okun's law (Okun 1962), which is widely used in economic research (Al-kasasbeh 2022; Kamal 2022; Louail and Benarous 2021) and provides a strong foundation for understanding the dynamic relationship between economic growth and employment. It provides a strong foundation for understanding the dynamic relationship between economic growth and employment. Okun's law predicts a decrease in unemployment of 0.3% with a 1% increase in GDP (Okun 1962). Numerous empirical studies have confirmed the validity of Okun's law (Nadeshan and Gnanachandran 2021; Obodoechi and Onuoha 2019; Oruç 2019) across various contexts. According to Tumanoska (2020), the strength of the relationship between GDP growth and unemployment varies by country and region depending on economic conditions, labor market structures, and policy contexts.

3. Methodology

This research explores the associative relationship between employment patterns and per capita income, GDP growth, FDI, sectoral composition, and domestic credit in the GCC countries. A quantitative approach was adopted to achieve this objective.

3.1. The Data

For systematic modeling of the impact of GDP per capita income, sectoral composition, FDI, GDP growth, and domestic credit growth on GCC countries' employment patterns, we used the panel data related to the six GCC countries over the period 2013–2023. Data for the study was extracted from the websites of the World Bank database (World Bank 2024b) and the International Labour Organization (ILO) database (International Labour Organization n.d.). The GCC countries have received the attention of many researchers because they represent global economic powers and include the world's largest oil-producing (Saudi Arabia) and gas-producing (Qatar) countries. Therefore, the region is characterized by a high per capita income and represents an essential axis of international trade. In addition, the GCC countries are characterized by an accelerated economic change aimed at creating economic diversification. Detailed data on the variables is presented in Table 1.

The summary of descriptive statistics for all research variables is presented in Table 2. The table lists the mean, median, standard deviation, minimum, maximum, skewness, and kurtosis values for the variables EmP, AgS, InS, SerS, PInc, FDI, GDPG, and DomC. The mean of the standardized composite variable "EmP" was zero (Tabachnick et al. 2013). The results demonstrate that the yearly skewness values of the research variables ranged between -1.12 and 2.00 , which indicates a slight variation in the values of the variables (Hair et al. 2021). The largest kurtosis value was 9.174 , which denotes variability in the distribution of variable values.

The box plot in Figure 1 illustrates the distribution of employment rates and male and female percentages in GCC countries over the study period from 2013 to 2023. The value for the employment rate in GCC countries is about 70.559 , while the rate for

males (79.75) is higher than that for females (34.8), indicating that more than 50% of the population is employed.

Table 1. Description and definition of the variables.

| Variable name | Variable Code | Definition | Measures | Source |
|------------------------------------|---------------|---|---------------|------------------|
| Employment pattern | EmP | A composite index, including employment ratio (the number of employed people divided by the total working-age population), female percentage, male percentage | % | World Bank + ILO |
| GDP per capita income | PInc | The total economic output of a country (GDP) divided by its population | (current USD) | World Bank |
| Foreign direct investment | FDI | The amount of net foreign direct investment that flows into GCC countries | (current USD) | World Bank |
| Gross domestic product growth rate | GDP | Annual % change in a country's gross domestic product (GDP) | % | World Bank |
| Sectoral composition | SC | | | |
| Agriculture | AgS | The value added by each sector (agriculture, industry, and services) as a percentage of GDP | % of GDP | World Bank |
| Industry | InS | | | |
| Services | SerS | | | |
| Domestic credit | DomC | Domestic credit to the private sector | % of GDP | World Bank |

Table 2. Summary of statistics.

| | Mean | Median | SD | Min | Max | Skewness | Kurtosis |
|------|------------|------------|------------|-----------|------------|----------|----------|
| EmP | 0 | -0.946 | 2.616 | -3.296 | 4.578 | 0.465 | 1.728 |
| AgS | 1.153 | 0.631 | 1.141 | 0.007 | 5 | 1.408 | 4.795 |
| InS | 12.989 | 8.563 | 16.345 | 0.256 | 66 | 2.00 | 7.14 |
| SerS | 49.703 | 50.809 | 10.652 | 0.398 | 79.8 | -1.12 | 9.174 |
| PInc | 33,062.427 | 25,829.922 | 21,003.269 | 44.994 | 97,630.826 | 1.011 | 4.236 |
| FDI | 3919.998 | 1476.122 | 5808.66 | -2812.637 | 22,736.555 | 1.672 | 5.278 |
| GDPG | 2.134 | 2.458 | 3.066 | -5.274 | 7.85 | -0.673 | 3.076 |
| DomC | 55.093 | 64.099 | 34.539 | 0.022 | 138.858 | -0.214 | 2.388 |

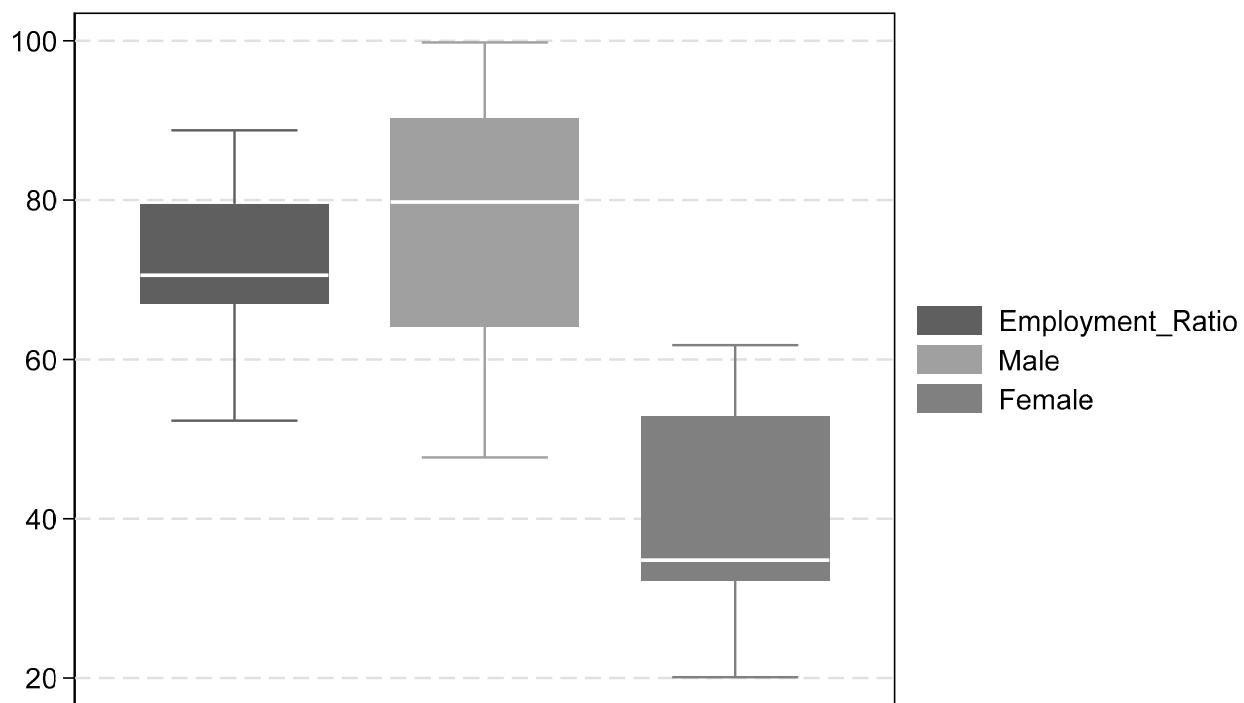


Figure 1. Employment pattern in GCC countries from 2013 to 2023.

The line chart in Figure 2 compares the employment ratios of the GCC countries from 2013 to 2023—United Arab Emirates (UAE), Bahrain (BHR), Kuwait (KWT), Oman (OMN), Kingdom of Saudi Arabia (KSA), and Qatar (QAT)—over the period 2013–2023. The results demonstrate that all countries indicated an overall upward trend, with Qatar and the UAE having the highest employment rates among the GCC countries.

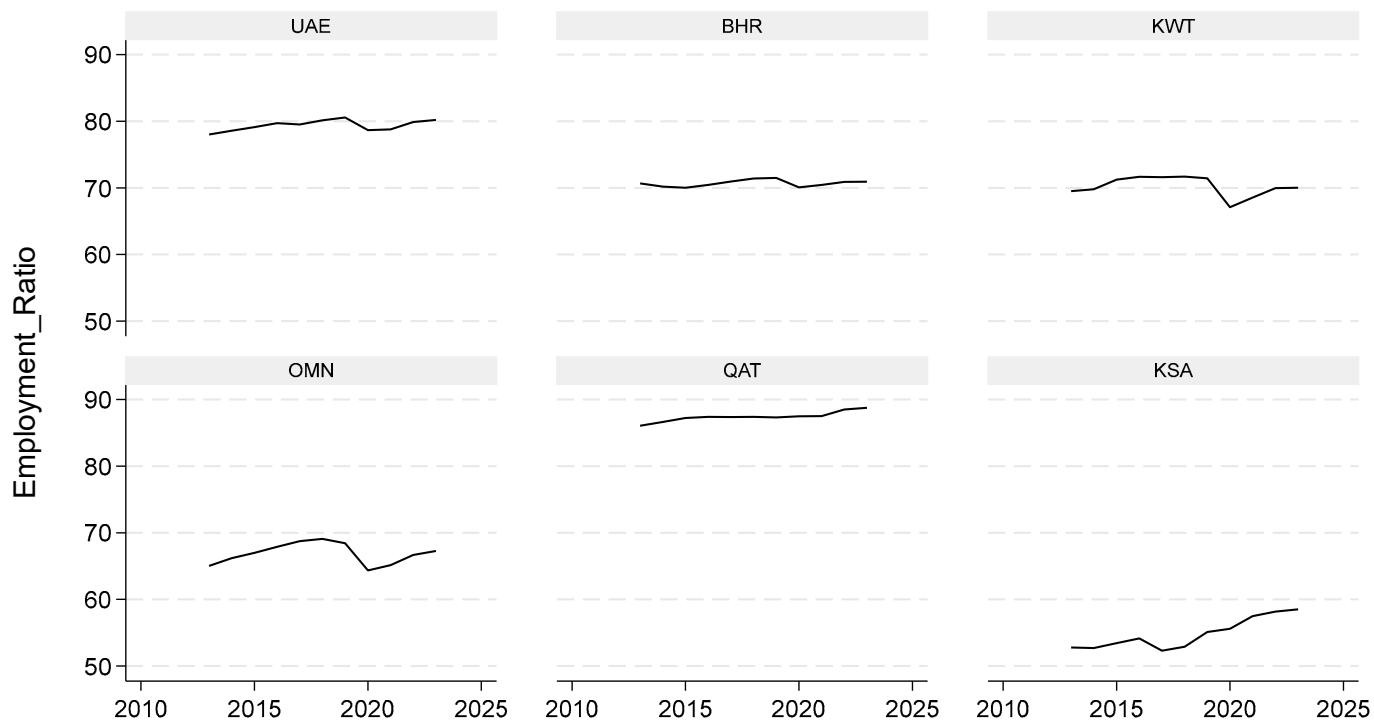


Figure 2. Employment rate trends for GCC countries from 2012 to 2023.

3.2. Specifications of the Model

We utilized the ordinary least squares (OLS) and the generalized method of moments (GMM) approaches to examine the impact of AgS, InS, SerS, PInc, FDI, GDPG, and DomC on EmP in the GCC countries. OLS is a linear regression method used for estimating coefficients of linear regression equations ($\beta_0, \beta_1, \beta_2, \beta_3, \dots, \beta_k$) (Burton 2021). The method is first used as a fundamental starting point to provide a more comprehensive and robust analytical framework for the study. It is a straightforward technique for estimating the associations among variables and establishing baseline results that can be compared against the more complex GMM model (Maggin et al. 2011). The GMM model is a widely used, powerful econometrics technique that provides consistent and efficient parameter estimates (Wooldridge 2001). It is useful in addressing potential endogeneity issues, ensuring that the estimated effects of GDP growth, FDI, and sectoral composition on employment patterns are robust and reliable. The method builds on the concepts of expected values and sample averages, where moment conditions specify the model parameters in terms of the true moments, and the sample moment conditions are their equivalents. The method finds parameter values that best satisfy these conditions. Given the potential endogeneity of some research-independent variables, we adopted GMM for estimation (Arellano and Bond 1991). The generalized method of moments is a widely used parameter estimation strategy that nests the classic method of moments, linear regression, and maximum likelihood (Lee 2013). It allows us to obtain consistent and efficient parameter estimates. The method is characterized by allowing the use of internal instrumental variables to address the internal endogeneity problems in independent variables, which helps in obtaining efficient and consistent parameter estimates. It allows for the control of unobserved country-specific effects and the inclusion of lagged dependent variables, providing a dynamic perspective

on the relationship between the independent variables (AgS, InS, SerS, PInc, FDI, GDPG, and DomC) and the dependent variable EmP.

The general research is specified as shown in Equation (1):

$$EmP_{it} = \alpha + \beta_1 PInc_{it} + \beta_2 FDI_{it} + \beta_3 GDPG_{it} + \beta_4 DomC_{it} + \beta_5 AgS_{it} + \beta_6 InS_{it} + \beta_7 SerS_{it} + \epsilon_{it} \quad (1)$$

EmP_{it} : the dependent variable, depicting the employment pattern for a particular GCC country i and year t ;

α : the intercept term;

$\beta_1 PInc_{it}$: the coefficient for GDP per capita income;

$\beta_2 FDI_{it}$: the coefficient for foreign direct investment;

$\beta_3 GDPG_{it}$: the coefficient for GDP growth;

$\beta_4 DomC_{it}$: the coefficient for domestic credit;

$\beta_5 AgS_{it}$: the coefficient for the contribution of the agricultural sector;

$\beta_6 InS_{it}$: the coefficient for the industrial sector;

$\beta_7 SerS_{it}$: the coefficient for the contribution of the services sector;

ϵ_{it} : the error term capturing unobserved factors.

The study was based on the central hypothesis that the dependent variables (AgS, InS, SerS, PInc, FDI, GDPG, and DomC) positively influence EmP, based on Okun's framework (Okun 1962).

H0: $\beta_i = 0$.

H1: $\beta_i \neq 0$.

Despite its interpretability, the OLS model may be biased due to potential endogeneity and autocorrelation issues inherent in panel data. To address these concerns, we utilized the GMM approach, specifically the Arellano–Bond model, designed for dynamic panel data models. The GMM model is demonstrated in Equation (2):

$$Y_{it} = \alpha + \beta X_{it} + \gamma Y_{i,t-1} + \epsilon_{it} \quad (2)$$

Y_{it} : the dependent variable for unit i at time t ;

X_{it} : the vector of independent variables;

$Y_{i,t-1}$: the lagged dependent variable, which captures the dynamic nature of the model;

α : the intercept term;

β and γ : the coefficients to be estimated;

ϵ_{it} : the error term.

4. Results and Discussion

This section includes the analysis of the relationship between AgS, InS, SerS, PInc, FDI, GDPG, and DomC and EmP in GCC countries during 2013–2023, using OLS and GMM approaches. First, the correlation analysis was conducted to examine the relationship between the independent variables and to ensure the nonexistence of multicollinearity among them. The correlation analysis results in Table 3 reveal a negative correlation between the sectors' (AgS, InS, and SerS) contribution and EmP, with AgS having the lowest negative correlation coefficient (-0.02458). DomC had the highest correlation with EmP ($r = 0.5521$). It is noted that each independent variable showed a correlation that was less than its correlation with itself (less than 1), reducing potential multicollinearity. To confirm the nonexistence of multicollinearity issues, the variance inflation factor (VIF) for independent variables has been calculated in Table 4. The VIF values for all independent variables were less than the threshold, 5, indicating the nonexistence of multicollinearity issues (James et al. 2022).

Table 3. Correlation analysis results.

| Variable | EmP | AgS | InS | SerS | PInc | FDI | GDPG | DomC |
|----------|-----------|-----------|-----------|---------|----------|--------|---------|------|
| EmP | 1 | | | | | | | |
| AgS | −0.4949 * | 1 | | | | | | |
| InS | −0.1825 | 0.3562 * | 1 | | | | | |
| SerS | −0.2458 | 0.2539 | 0.2384 | 1 | | | | |
| PInc | 0.6160 * | −0.3263 * | −0.3557 * | −0.1392 | 1 | | | |
| FDI | 0.0936 | 0.1697 | −0.2576 | 0.0466 | 0.0493 | 1 | | |
| GDPG | 0.0406 | 0.0435 | 0.0154 | −0.2668 | 0.2147 | 0.1965 | 1 | |
| DomC | 0.5521 * | −0.3922 * | −0.3239 * | 0.0409 | 0.4033 * | −0.013 | −0.0537 | 1 |

* $p < 0.05$.**Table 4.** VIF values.

| Variable | VIF | 1/VIF |
|----------|------|----------|
| AgS | 1.47 | 0.68154 |
| InS | 1.52 | 0.656645 |
| SerS | 1.27 | 0.785646 |
| PInc | 1.41 | 0.707186 |
| FDI | 1.25 | 0.803112 |
| GDPG | 1.25 | 0.802752 |
| DomC | 1.41 | 0.709343 |
| Mean VIF | 1.37 | |

4.1. OLS Regression Analysis Results

We started the analysis of the pooled time series panel data by performing the OLS regression analysis. Because of its simplicity, flexibility, and high efficiency, OLS is a widely used method in regression analysis (Wu and Yu 2018). The linear regression analysis results in Table 5 reveal that all independent variables (AgS, InS, AerS, Pinc, FDI, GDPG, and DomC) have a significant influence on the dependent variable (EmP) ($p < 0.05$). The results indicate that as the contribution of AgS, SerS, and GDPG increases, EmP in GCC countries decreases. Moreover, the results also suggest that an increase in the contribution of InS and DomC is associated with increased EmP. The analysis results showed that the regression coefficients for FDI and PInc are equal to zero ($r = 0$), which indicates the nonexistence of their influence on EmP in the GCC countries. However, the results demonstrate that the F statistic corresponding to probability is less than 0.05, indicating that the model is fit. The R-squared values imply that the independent variables (AgS, InS, AerS, Pinc, FDI, GDPG, and DomC) explain 65.6% of the variation in the dependent variable (EmP).

Table 5. Linear regression results.

| EmP | Coef. | St. Err. | t-Value | p-Value | [95% Conf. | Interval] | Sig. |
|--------------------|---------|----------|---------|---------|----------------------|-----------|------|
| AgS | −0.661 | 0.214 | −3.09 | 0.003 | −1.09 | −0.233 | *** |
| InS | 0.054 | 0.015 | 3.53 | 0.001 | 0.023 | 0.084 | *** |
| SerS | −0.062 | 0.021 | −2.91 | 0.005 | −0.105 | −0.019 | *** |
| PInc | 000 | 000 | 5.26 | 000 | 000 | 000 | *** |
| FDI | 000 | 000 | 2.93 | 0.005 | 000 | 000 | *** |
| GDPG | −0.131 | 0.073 | −1.78 | 0.008 | −0.277 | 0.016 | *** |
| DomC | 0.027 | 0.007 | 3.92 | 000 | 0.013 | 0.041 | *** |
| Constant | −0.497 | 1.128 | −0.44 | 0.661 | −2.755 | 1.762 | |
| Mean dependent var | 0.000 | | | | SD dependent var | 2.616 | |
| R-squared | 0.656 | | | | Number of obs | 66 | |
| F-test | 15.788 | | | | Prob > F | 0.000 | |
| Akaike crit. (AIC) | 258.849 | | | | Bayesian crit. (BIC) | 276.366 | |

*** $p < 0.01$.

4.2. The GMM Estimation

The GMM approach was adopted to examine the impact of AgS, InS, AerS, PInc, FDI, GDPG, and DomC on EmP in GCC countries during the period 2013–2023, using a strongly balanced panel. We had to choose between fixed effects (FE) and random effects (RE) models (Kuehl 2000). A Hausman test (Hausman 1978) was conducted to decide on the appropriateness of FE or RE. Since the FE model failed to meet the Hausman test criterion (Chi prob < 0.05), we accepted the alternative hypotheses (H1), and the RE estimates were used to estimate the model. The random effects (RE) regression results in Table 6 showed that $R^2 = 0.029$ ($p < 0.01$), and Chi-square = 110.513, $p = p < 0.01$.

Table 6. Regression results.

| EmP | Coef. | St. Err. | t-Value | p-Value | (95% Conf. | Interval) | Sig. |
|--------------------|---------|----------|---------|-------------------|------------|-----------|------|
| AgS | −0.661 | 0.214 | −3.09 | 0.002 | −1.081 | −.242 | *** |
| InS | 0.054 | 0.015 | 3.53 | 0 | 0.024 | 0.083 | *** |
| SerS | −0.062 | 0.021 | −2.91 | 0.004 | −0.104 | −0.02 | *** |
| PInc | 0 | 0 | 5.26 | 0 | 0 | 0 | *** |
| FDI | 0 | 0 | 2.93 | 0.003 | 0 | 0 | *** |
| GDPG | −0.131 | 0.073 | −1.78 | 0.075 | −0.274 | 0.013 | * |
| DomC | 0.027 | 0.007 | 3.92 | 0 | 0.014 | 0.041 | *** |
| Constant | −0.497 | 1.128 | −0.44 | 0.66 | −2.708 | 1.715 | |
| Mean dependent var | 0.000 | | | SD dependent var | | 2.616 | |
| Overall r-squared | 0.656 | | | Number of obs | | 66 | |
| Chi-square | 110.513 | | | Prob > chi2 | | 0.000 | |
| R-squared within | 0.029 | | | R-squared between | | 0.955 | |

*** $p < 0.01$, * $p < 0.1$.

Linear dynamic panel-data models contain several lags of the dependent variable as covariates and unobserved panel-level effects, fixed or random. To address the issues of endogeneity, unobserved heterogeneity, and dynamic relationships resulting from dynamic panel data models, the Arellano–Bover/Blundell–Bond two-step system GMM was used.

The research model includes the lagged dependent variable ($Y_{i,t-1}$) in Equation (3); we account for potential autocorrelation in the panel data:

$$y_{it} = \delta y_{i,t-1} + \beta_1 (X1)_{it} + \beta_2 (X2)_{it} + \beta_3 (X3)_{it} + \beta_4 (X4)_{it} + \beta_5 (X5)_{it} + \beta_6 (X7)_{it} + \beta_7 (X8)_{it} + \epsilon_{it} \quad (3)$$

$\delta y_{i,t-1}$: the lagged value of the dependent variable due to the dynamic nature of the model;
 δ : the coefficient measuring the persistence of the dependent variable over time.

$X1_{it}, X2_{it}, \dots, X8_{it}$: Independent variables

To solve the problem of potential endogeneity, the lag of the dependent variable ($y_{i,t-1}$) was used as an instrument. To test the validity of the instruments, we used the Hansen test (Hansen 1982) and Sargan test of over-identifying restrictions (Sargan and Butterworth 1985). The modified Wald test for groupwise heteroskedasticity in fixed effect regression model results showed that the heteroskedasticity assumption was met ($\text{chi2}(6) = 261.27$, $\text{Prob} > \text{chi2} = 0.0000$). Also, the Wooldridge test for autocorrelation confirmed the existence of serial correlations in our data ($\text{Prob} > F < 0.05$). The error term correlation results showed that only the dependent variable (EmP) was correlated with “e,” indicating the nonexistence of the endogeneity issue. Therefore, the first lag (EmP_{t-1}) and the second lag (EmP_{t-2}) of the dependent variable (EmP) were the endogenous variables (l.EmP). Meanwhile, endogeneity arose due to the significant correlation between the error term “e” and l.EmP. Therefore, l2.EmP (EmP_{t-2}) was considered as an instrument variable.

The GMM estimation results in Table 7 demonstrate that the lag of the dependent variable, EmP lag1 (EmP_{t-1}), had a persistent and significant impact on EmP (coefficient = 0.456158, $p < 0.01$). This indicates that past employment patterns in GCC countries influence current employment levels. In other words, past employment levels in GCC countries are a predictor of current employment levels. The independent variable AgS is significant at lag1 (EmP_{t-1}) ($p < 0.05$), suggesting that the agricultural sector’s contribution is also a significant

predictor of employment for previous periods. These results indicate a substantial impact of the agricultural sector on employment patterns, likely due to variations in GCC countries' reliance on agriculture. Additionally, the agriculture sector is inherently labor-intensive (Shakulikova et al. 2016). These findings align with those of Padhi et al. (2023), who identified agriculture as a primary influence on employment in emerging economies. These results confirm the conclusions of previous studies (Dildar 2021; Hasanov et al. 2021) and are consistent with Okun's law (Okun 1962). The results showed that InS and SerS are not significant for both lag1 (EmP_{t-1}) and lag2 (EmP_{t-2}) ($p > 0.05$). This may indicate a weak relationship between the contributions of the industrial and service sectors and employment patterns during the current and previous periods in GCC countries. These results contradict previous studies on the association between industrial sector contribution and employment rate (Charles et al. 2019; Rijwani et al. 2024). Similarly, this study's findings are inconsistent with previous studies' conclusions regarding the relationship between the contribution of the service sector and job creation (Butkus et al. 2023; Dawid and Mitkova 2020). This discrepancy may be due to the strong influence of other factors outside the scope of this study.

Table 7. GMM estimation results.

| EmP | Coefficient | Std. Err. | z | Robust $p > z$ | (95% Conf.) | Interval) | t-Statistic |
|------------|-------------|-----------|-------|-------------------|-------------|-------------|-------------|
| L1. AgS | 0.456158 | 0.077448 | 5.89 | 0000 | 0.304363 | 0.607954 | 5.89 |
| - | 0.054224 | 0.607596 | 0.09 | 0.929 | -1.13664 | 1.245091 | 0.09 |
| L1. | 1.432671 | 0.619982 | 2.31 | 0.021 | 0.217529 | 2.647814 | 2.31 |
| L2. | 0.511845 | 1.045968 | 0.49 | 0.625 | -1.53822 | 2.561904 | 0.49 |
| InS | | | | | | | |
| - | -0.00193 | 0.022799 | -0.08 | 0.932 | -0.04662 | 0.042754 | -0.08 |
| L1. | -0.03023 | 0.044547 | -0.68 | 0.497 | -0.11754 | 0.057076 | -0.68 |
| L2. | -0.03242 | 0.054487 | -0.6 | 0.552 | -0.13921 | 0.07437 | -0.60 |
| SerS | | | | | | | |
| - | -0.01334 | 0.021538 | -0.62 | 0.536 | -0.05556 | 0.028868 | -0.62 |
| L1. | -0.12382 | 0.087076 | -1.42 | 0.155 | -0.29448 | 0.046851 | -1.42 |
| L2. | -0.08701 | 0.11265 | -0.77 | 0.44 | -0.3078 | 0.133778 | 0.40 |
| PInc | | | | | | | |
| - | 0.00000852 | 0.000021 | 0.4 | 0.686 | -0.000033 | 0.0000498 | 0.40 |
| L1. | -0.000072 | 0.0000436 | -1.66 | 0.097 | -0.00016 | 0.0000132 | -1.66 |
| L2. | 0.0000109 | 0.000034 | 0.32 | 0.749 | -0.000056 | 0.0000774 | 0.32 |
| FDI | | | | | | | |
| - | 0.0000404 | 0.0000321 | 1.26 | 0.209 | -0.000023 | 0.000103 | 1.26 |
| L1. | -0.000037 | 0.00004 | -0.93 | 0.354 | -0.00012 | 0.0000414 | -0.93 |
| L2. | -0.000049 | 0.0000234 | -2.10 | 0.036 | -0.000095 | -0.00000334 | -2.10 |
| GDPG | | | | | | | |
| - | -0.02133 | 0.027249 | -0.78 | 0.434 | -0.07473 | 0.032083 | -0.78 |
| L1. | 0.015207 | 0.117257 | 0.13 | 0.897 | -0.21461 | 0.245026 | 0.13 |
| L2. | 0.047729 | 0.030345 | 1.57 | 0.116 | -0.01175 | 0.107205 | 1.57 |
| DomC | | | | | | | |
| - | 0.003426 | 0.001923 | 1.78 | 0.075 | -0.00034 | 0.007195 | 1.78 |
| L1. | -0.01351 | 0.005414 | -2.5 | 0.013 | -0.02412 | -0.0029 | -2.50 |
| L2. | 0.014505 | 0.006368 | 2.28 | 0.023 | 0.002024 | 0.026985 | 2.28 |

Number of instruments = 48

Number of obs = 48

Arellano–Bond test for AR (1) in first differences: $z = -1.78$ $Pr > z = 0.005$

Arellano–Bond test for AR (2) in first differences: $z = -0.96$ $Pr > z = 0.337$

Sargan test of overid. restrictions: $\chi^2(26) = 57.72$ $Prob > \chi^2 = 0.00$

(Not robust, but not weakened by many instruments.)

Hansen test of overid. restrictions: $\chi^2(26) = 0.00$ $Prob > \chi^2 = 0.680$

(Robust, but weakened by many instruments.)

The independent variable GDP per capita income (Pinc) is not significant at both lag1 (EmP_{t-1}) and lag2 (EmP_{t-2}). These results suggest that the increase in per capita income may not increase the employment rate in GCC countries. In other words, the consumption rate of individuals may exceed the savings rate, which is expected to be converted into investment and employment opportunities. These findings contradict those of previous studies (Maitah et al. 2015; Rahman 2013).

Similarly, we found that GDPG is not a significant predictor for either lag1 or lag2. These results suggest that GDP growth in GCC countries might not translate into more job opportunities. This outcome does not support Okun's law and contradicts some previous studies (Loizou et al. 2019; Osabohien et al. 2019). Other factors may have a greater impact on employment rates in GCC countries.

Foreign direct investment (FDI) has significantly influenced EmP at lag2 (EmP_{t-2}). The results indicate that FDI has had a substantial impact on employment patterns in GCC countries over the two previous periods. Therefore, we can argue that FDI in GCC countries is associated with job creation. These results are consistent with previous empirical studies that confirmed a positive association between FDI and employment (Khan et al. 2023; Nazzal et al. 2023; Saurav and Sinha 2020). These findings confirm that foreign investment, in addition to attracting foreign capital and modern technology (Ibrahim and Acquah 2021), creates job opportunities for citizens.

DomC has shown a significant influence on both lag1 and lag2 ($p < 0.05$). This result indicates that the amount of domestic investment positively influenced employment in GCC countries for the two previous periods. These results suggest that the availability of DomC contributes to business creation or expansion, leading to more job opportunities. These findings support the existing literature (Gutierrez et al. 2023; Macaluso 2023; Suyunov 2022) and highlight the importance of DomC in enhancing employment opportunities.

The Hansen J-test of overidentifying restrictions was conducted to confirm the validity of the instrumental variables. The value of χ^2 statistic was equal to 0 ($p > 0.05$), indicating that the instruments were not correlated with any error term in the model. We accept the null hypothesis, indicating that the instruments were valid. The Arellano–Bond test results indicated no autocorrelation between the variables. The first-order AR (1) is significant ($p < 0.05$). Therefore, we reject the null hypothesis regarding the existence of first-order autocorrelation. Meanwhile, the second-order AR (2) is insignificant ($p > 0.05$), indicating the acceptance of the null hypothesis in relation to the existence of an autocorrelation. These results indicate the instrument's validity, and the GMM model is valid.

5. Conclusions and Policy Implications

This research aimed to investigate the impact of sectoral composition, FDI, per capita income, DomC, and growth in GDP on employment patterns in GCC countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates) over the period 2013–2023 using the GMM and OLS approaches. The study provided substantial insights into the role of these key economic indicators in creating jobs and enhancing economic growth in GCC countries.

The research results underscore the agricultural sector's contribution to increasing employment at the beginning of the 20th century. The agricultural sector has previously contributed to creating more jobs for the local population than the industrial and service sectors. To boost employment in the agricultural sector, suggested policies include establishing training centers for farmers, encouraging sustainable farming practices, creating microfinance programs for farmers, and developing incentives or subsidies for innovative solutions in agriculture. These policies will make the agricultural sector more attractive and enhance its contribution to the country's GDP and food security.

Despite the service sector's substantial size and its role in the economic transformation of the GCC countries, its contribution to job creation is insignificant. The weak and insignificant role of the industrial sector may create challenges and opportunities for policymakers in the GCC countries to expand the sector and enhance its productivity. The

research findings indicate that the economic expansion of the service and industrial sectors in the GCC countries has not been reflected in employment opportunities. This may be attributed to their capital intensity, use of advanced technology, or employment of skilled labor that may not be available locally. Additionally, developing programs for workers to train them and enhance their skills and capabilities to match those required by institutions in the service and industrial sectors would lead to more job opportunities for citizens. Encouraging diversity in economic sectors by developing policies that help create a balance between different economic sectors (agricultural, industrial, and service) is also important. Therefore, there is an urgent need to develop intervention policies that enhance both the industrial and service sectors' contributions to job creation, leading to sustainable economic growth in GCC countries.

Per capita income and GDP growth did not significantly impact employment patterns in the GCC countries during 2013–2023. This indicates that relying on GDP and per capita income growth alone is inadequate to increase the employment rate in GCC countries. Governments should develop more employment-centric policies, such as SMEs, that stimulate specific economic sectors expected to increase employment. In addition, policymakers should develop academic programs and training programs compatible with labor market needs, helping individuals obtain jobs with rewarding wages. Also, encouraging and supporting entrepreneurship by fostering innovation, incubating projects, and providing funding. Encouraging diversity in economic sectors, especially in fields like technology, would also increase citizens' job opportunities.

The research results demonstrate the significant and vital role of FDI in increasing the employment rate across the GCC countries, contributing to the economic empowerment of individuals, and enhancing economic growth. Policymakers in these countries must strive to encourage FDI and attract more foreign capital by providing additional facilities. Policymakers should encourage investment, especially in high-value industrial projects, which will lead to greater economic diversification and job creation. Developing policies that attract foreign investment by streamlining procedures and facilitating the registration of foreign businesses is essential.

The results also indicate the pivotal role of DomC in promoting employment rates in GCC countries. These results highlight the importance of strengthening credit systems to encourage domestic investment and attract FDI. This can be achieved by adopting policies that stimulate domestic investment, creating more employment opportunities, and enhancing the country's economic growth and sustainability. Recommended guidelines include facilitating enterprises' access to finance by simplifying credit procedures, providing guarantees, and developing microfinance programs to encourage entrepreneurship and create jobs. In addition, developing financial literacy programs that educate individuals about financial decisions and avoiding debt risks can lead to expanded local credit and institutional growth, potentially resulting in more jobs.

The current study adds valuable insights to the economics literature. The findings contribute to a deeper understanding of the dynamic relationship between macroeconomic indicators (sectoral composition, FDI, per capita income, and GDP growth) and employment patterns. This study highlights the importance of sectoral composition, FDI, per capita income, DomC, and GDP growth in enhancing employment patterns in GCC countries. Additionally, the study may contribute to Okun's law by expanding its application to examine sector-specific contributions to employment. Our study extends Okun's law by emphasizing the importance of developing policies to develop labor-intensive sectors to enhance economic growth and increase the employment rate.

The main limitation of this study is that the data set was not comprehensive and did not cover all economic indicators, such as labor market conditions, that may affect employment in GCC countries. Additionally, the period covered by the study did not account for economic changes and global conditions, such as the COVID-19 pandemic, which affected many institutions worldwide. Future studies can address these limitations by focusing on additional economic factors that may impact employment rates in GCC

countries. Additionally, future research could examine successful employment practices of foreign companies, promoting these practices and maximizing their benefits.

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