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Cogent Economics & Finance

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Suggested Citation: Bannaga, Alamedin A.; Lezar, Mohammed (2024) : Total factor productivity and economic efficiency in the Gulf cooperation council (GCC) countries, Cogent Economics & Finance, ISSN 2332-2039, Taylor & Francis, Abingdon, Vol. 12, Iss. 1, pp. 1-19, https://doi.org/10.1080/23322039.2024.2426529

This Version is available at:
https://hdl.handle.net/10419/321660

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Cogent Economics & Finance

ISSN: 2332-2039 (Online) Journal homepage: www.tandfonline.com/journals/oaef20

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To cite this article: Alamedin A. Bannaga & Mohammed Lezar (2024) Total factor productivity and economic efficiency in the Gulf cooperation council (GCC) countries, Cogent Economics & Finance, 12:1, 2426529, DOI: 10.1080/23322039.2024.2426529

To link to this article: https://doi.org/10.1080/23322039.2024.2426529

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Published online: 29 Nov 2024.

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COGENT ECONOMICS & FINANCE
2024, VOL. 12, NO. 1, 2426529
https://doi.org/10.1080/23322039.2024.2426529

DEVELOPMENT ECONOMICS | RESEARCH ARTICLE

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Total factor productivity and economic efficiency in the Gulf cooperation council (GCC) countries

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ABSTRACT

This study focuses on identifying the level and evolution of total factor productivity (TFP) and determining its role as a qualitative source of economic growth in the Gulf Cooperation Council (GCC) countries. This is an issue of particular importance because of the recent increases in external global crises, such as the Covid-19 pandemic, and large fluctuations in oil prices. In addition, there are existing internal challenges in the GCC countries, such as high rates of population growth, labor market pressures, a large-sized public sector, and an inefficient private sector. These challenges require achieving a qualitative improvement in the sources of economic growth by raising the efficiency of the use of available productive resources through relying on the growth of TFP as a primary driver of sustainable economic growth. The results of the study showed that the growth rates in TFP were generally negative and below the average international levels. This can be attributed to several reasons such as weak innovation and the adoption of a stagnant development model. The study presents some recommendations to address these challenges.

IMPACT STATEMENT

Productivity plays a crucial role in the economic and social progress of nations. Economic growth in the GCC countries faces numerous challenges, including fluctuating oil prices, the rapid growth of the working-age population, stagnant productivity in the public sector, and geopolitical risks in the region. These challenges have made it increasingly difficult for these countries to rely heavily on oil revenues, highlighting the importance of transitioning to an economic model that emphasizes sustainable sources of growth. This shift involves raising productivity to create new economic dynamism, diversify income sources, and respond effectively to current and future market changes. In this study, we focus on Total Factor Productivity (TFP) analysis for several reasons: TFP is often interpreted as a measure of technological progress or innovation; it reflects better management practices; it can be used to assess the impact of various policies on economic efficiency; changes in TFP can help in understanding the sources of economic fluctuations and resilience; and it indicates the quality of policies and institutions that are fundamental to economic growth. By emphasizing TFP, the GCC countries can align their strategies with long-term visions such as Saudi Arabia's Vision 2030 and the UAE's Centennial 2071.

ARTICLE HISTORY
Received 1 March 2024
Revised 9 September 2024
Accepted 3 November 2024

KEYWORDS
Total factor productivity; sources of economic growth; GCC countries; empirical evidence

SUBJECTS
Development Studies; Development Policy; Economics and Development; Sustainable Development; Economics

1. Introduction

The development of a country's economy relies on a set of production factors: human resources, capital, and technology. Regardless of the availability of these factors, efficiently managing them to achieve the highest possible level of productivity contributes to the advancement of the country's economy and the sustainability of its economic growth. Productivity plays an important role in the economic and social progress of nations, whether they are developing or developed, and in improving the long-term living standards of their individuals. Given this importance, productivity has become one of the most

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important indicators on which decision-makers rely to take the necessary measures to achieve sustainable economic and social development.

In conjunction with the economic transformations that the world has witnessed in recent years and the increasing intensity of competition among most countries, the issue of factor productivity has gained great importance and has become the subject of important discussions in many international forums and conferences. Most strategic plans and economic policies in many Arab countries, especially the GCC countries, place special focus on productivity and how to improve it with the aim of raising the level of economic growth.

In the aftermath of the 2008 global financial crisis, the global economy has been facing a significant slowdown in economic growth despite many economic stimulus packages pursued by governments in response to these challenges. The decline in economic growth was largely due to TFP growth dynamics. It accounted for more than half of the growth decline during that period. Changes in TFP growth have significantly shifted overall economic growth, accounting for more than half of the decline in advanced and emerging market economies and nearly all of the decline in low-income countries (International Monetary Fund [IMF], 2024). This situation casts significant doubt about the feasibility of sustainable global economic growth and calls for an urgent need for policies and structural reforms that enhance TFP growth performance.

Most of the GCC countries have already witnessed remarkable economic growth after the rise in oil prices during the period 2003–2014. This oil boom enabled them to enhance their exports, financial revenues, and foreign exchange reserves, and increase the pace of investment in several sectors, such as health and infrastructure. But at the same time, it led to increased employment in the public sector with high salaries, raised support levels in several sectors such as energy and food, and encouraged the attraction of a large number of foreign workers. On the other hand, this economic model led to a large number of citizens refraining from working in the private sector and preferring the public sector, which led to an inflation in the cost of government sector wages and a decrease in worker productivity.

The significant decline in oil prices that occurred between late 2014 and 2016, as well as during the Covid-19 pandemic period, led to a noticeable decline in financial resources in the Gulf countries. Economic growth in the GCC countries faces many challenges, such as increased competition in the oil markets due to the emergence of new producers, continued rapid growth of the working-age population, stagnant productivity in the public sector, and the possibility of continued geopolitical instability in the region. These challenges have made it difficult for these countries to continue relying heavily on oil revenues and elucidate the importance of shifting towards an economic model that relies on sustainable sources of growth by raising productivity in order to create new economic dynamism, diversify sources of income, and respond to current and future market changes. TFP measures the total efficiency in an economy's use of labor and capital, and its importance is highlighted by the fact that it is considered one of the basic elements for increasing competitiveness.

In this study we focus on TFP analysis for several reasons: TFP is often interpreted as a measure of technological progress or innovation, as it captures improvements in the ability to produce output without increasing input quantities. This improvement is of particular importance to resource-driven GCC countries. It also reflects better management practices, innovations, and improvements in production processes, which can enhance the competitive position of a country or firm. Policymakers in the GCC countries can use TFP to assess the impact of various policies on economic efficiency. For example, investments in education and health, development in scientific research, and improvement in infrastructure can boost TFP by enhancing human capital and facilitating innovation. TFP allows for more accurate cross-country comparisons of productivity and economic performance which is the main research objective pursued by this study. Changes in TFP can help researchers understand the sources of economic fluctuations and resilience. For instance, a decline in TFP might indicate structural problems or adverse shocks to technology or efficiency. It also reflects the quality of policies and institutions that play a fundamental role in economic growth.

In this context, this study aims to explain the level and development of TFP and the productivity of other factors in the GCC countries, and their role in economic growth. The study explains and analyzes the total factor productivity in these countries and compares it with leading highly efficient countries. It

also attempts to determine the contribution of the factors of production to economic growth and identify the most influential factor.

Focusing on the period 1990–2017 will allow us to understand the drivers of economic growth in the medium and long term in these countries and their role in determining its future pathway. This analysis will help explain fluctuations in economic growth during the pandemic period and the speed of recovery from repercussions. In addition to understanding the pattern of growth and its challenges in the medium and long term, this study proposes a set of solutions and recommendations based on this data and on international best practices, taking into account some of the most prominent challenges facing these countries.

The problem of the study is to identify the sources of economic growth in the GCC countries, analyze the pace of development and dynamics of TFP, and calculate its contribution in the GCC countries during the period 1990–2017. The study attempts to answer the following main question:

- What is the role of TFP in driving economic growth in the GCC countries during the period 1990–2017?

and then answer the following sub-questions:

- What are the most important sources of economic growth in the GCC countries during the period 1990–2017?
- To what extent do the GCC countries differ among themselves in terms of the performance of TFP?
- To what extent are the performance trends of TFP in the GCC countries consistent with those of leading developing countries in East Asian region?
- How can the performance of TFP of the GCC countries be explained during the period of the study?

To achieve its objectives, this study relies on an analytical methodology that combines quantitative and qualitative analysis to determine the actual contribution of production factors in driving economic growth in the GCC countries. It also uses a comparative study method to assess and analyze the performance of these countries in this field compared to a group of other countries.

Two types of production functions were used to calculate TFP values in the GCC countries: the Cobb-Douglas production function and the Constant Elasticity of Substitution production function (CES). Constant Return to Scale was also assumed based on what is familiar in the literature. Data for the study were collected from the World Bank and University of Pennsylvania databases (Penn World Tables) and the United Nations Human Development Indicators.

This study contains five sections as follows: the first section is an literature review of TFP, followed by a second section on the performance of TFP in some selected regions in the world. The third section explains the model used to calculate the sources of economic growth, reviews the results, and analyzes the factors and causes that led to the obtained results. It also presents some conclusions and recommendations to policymakers in the GCC countries. This section also compares the most prominent indicators of productivity development in the GCC with other countries and analyzes the extent of their contribution to economic growth. The fourth section sheds light on the most important challenges facing the GCC countries at present and in the future and ways to improve productivity within them. The final section concludes the study and offers some policy recommendations.

2. Literature review: drivers of TFP

TFP is a key determinant of economic growth. It measures how efficiently labor and capital are used in the production process. Higher TFP leads to more efficient production, reduced costs and enhanced competitiveness. TFP plays a crucial role in economic growth, driving structural changes by shifting resources from low to high-productivity sectors. Various theories and models explain TFP's role in economic growth, highlighting drivers such as institutional quality, human capital, technological innovation, infrastructure and market structure. This review synthesizes the main theories related to TFP and productivity and their role in economic growth.

Endogenous growth theory, developed in the 1980s and 1990s by economists like Paul Romer (1990) and Robert Lucas (1988), challenges the Solow model's exogenous view of technological progress.[1] It posits that economic growth is driven by factors within the economy, such as innovation, knowledge and human capital. TFP is influenced by actions like R&D, education and policies that encourage innovation. Romer emphasizes technological change driven by R&D and knowledge spillovers, arguing that investments in innovation sustain economic growth by continually improving productivity (Romer, 2020).

Schumpeterian Growth Theory[2] focuses on entrepreneurial activities and technological change through creative destruction. Economic growth is driven by waves of innovation where new technologies replace old ones, leading to productivity gains. TFP growth results from innovative activities and R&D investments that advance technology and productivity (Aghion et al., 2015). Recent studies emphasize the importance of innovation. Bloom et al. (2012) show that management practices significantly influence productivity, with well-managed firms adopting new technologies more effectively. Another study highlights the impact of ICT (Information and Communication Technology) on productivity, demonstrating that ICT adoption is a significant driver of TFP growth in advanced economies (Bergeaud et al., 2016).

Institutional quality significantly impacts productivity and economic growth. Strong institutions, including legal frameworks, property rights and governance structures, foster an environment that supports innovation, reduces transaction costs and improves resource allocation, all contributing to higher TFP. Inclusive institutions promote economic activities that enhance productivity, while extractive institutions hinder it (Acemoglu & Robinson, 2019). Rodrik et al. (2004) argue that institutions are more critical than geography and integration in determining economic outcomes placing institutions at the core of productivity analysis.

Human capital, particularly education and skills, is another key driver of productivity. Investments in education and training enhance human capital, making workers more productive and adaptable to new technologies. Cognitive skills, measured through international assessments, strongly correlate with productivity and economic growth (Hanushek & Woessmann, 2015). Goldin and Katz (2008) illustrate how technological advancements and educational attainment have historically shaped productivity trends in the United States.

Infrastructure, including transportation, communication and utilities, affects productivity by reducing costs and facilitating efficient resource allocation. Aschauer (1989) provides early empirical evidence of public infrastructure's positive impact on U.S. productivity. Calderón and Servén (2014) show that infrastructure development is closely linked to productivity growth especially in developing countries.

Market structure and competition also influence productivity by incentivizing firms to innovate and improve efficiency. In 'The Competitive Advantage of Nations', Porter (1990) argues that competitive pressures drive firms to innovate and enhance productivity. Syverson (2017) reviews productivity determinants, finding that competition is crucial as it forces less productive firms to exit the market, reallocating resources to more efficient producers.

With respect to the GCC region, dominated by oil wealth, the productivity drivers are diverse, involving technology, human capital development, and infrastructure improvements. Recent studies in the region show that technological innovation is crucial for productivity, with investments aimed at economic diversification and reducing oil dependence. Hvidt (2013) examines GCC countries efforts in economic diversification through technology and innovation investments, highlighting government policies fostering innovation, especially in the UAE and Qatar. Sbia et al. (2014) explore how foreign direct investment (FDI) and clean energy technologies contribute to productivity growth in the UAE, suggesting that technology transfer through FDI is a significant driver.

Regarding institutional quality, Hertog (2010) shows how some GCC countries have established highly productive state-owned enterprises, identifying effective governance and institutional reforms as key productivity determinants. Looney (2013) emphasizes the need for transparent and efficient institutions to support economic activities, advocating for institutional reforms to boost productivity in the GCC. Human capital development is critical in improving productivity and boosting competitiveness. A study by the World Bank shows that the GCC countries score relatively lower in the Human Capital Index than countries with similar income levels. Other studies emphasize the importance of investing in human capital, particularly education and training, to enhance workforce productivity in the GCC. Kabbani (2019) analyzes education and skills development initiatives in the GCC aiming to improve education quality

and align it with market needs. Harry (2015) focuses on higher education reforms in the GCC and their impact on productivity, stressing the need for GCC economies to upgrade education systems to produce a more skilled and adaptable workforce.

Infrastructure development is another productivity driver in the GCC. A report by PwC Middle East (2020) provides an overview of infrastructure projects in the GCC and their expected productivity impacts, highlighting key sectors such as transportation, energy and telecommunications. Exploring the relationship between market diversification and productivity in the GCC, Alsharif et al. (2017) argue that reducing hydrocarbon dependence and promoting competitive markets are essential for sustainable productivity growth.

3. The performance of total factor productivity in some selected countries during the period (1990–2021)

TFP measures the efficiency of resources used in production processes. It reflects the overall efficiency in an economy's use of labor, capital, and various other factors. These factors relate to the technology used, institutions, quality of education, regulatory laws, etc. Moreover, TFP has been the most important source of economic growth in the world during the past few decades (Babiker, 2007). International evidence suggests that high and sustainable growth comes mainly from improvements in TFP, which can support capital accumulation (IMF, 2024). In this section, for comparative reasons, we review the performance of TFP in some selected regions of the world during the period (1990–2017). The performance of these regions will be compared with the GCC countries.

In his famous study in 1957, Solow estimated that the growth of TFP contributed to 87.5% of the growth rate of productivity per worker in the United States during the period 1909–1949. This study was one of Solow's important studies for which he won the Nobel Prize in Economics in 1987. The US Bureau of Labor Statistics (BLS) conducts many periodic studies to estimate the TFP in America. These studies have shown that the average growth rate of TFP in America (or what is known as Multi-Factor Productivity (MFP) in the private non-farm sector) reached 2.0% during the period 1987–2018, distributed over the factors of production at a rate of 0.8% for capital deepening, a rate of 0.4% for the change in the composition of the labor components, and a rate of 0.8% for the TFP (Whelan, 2020).

TFP and its growth have received great attention from economists and policymakers, especially in developing countries. For example, the issue of TFP and its role in economic growth took on particular importance in Asia during the 1990s. This is due to the work of Young (1992) and Krugman (1994), who pointed out that the economic growth experienced by several Asian countries was due to the accumulation of inputs in the production process rather than increased TFP (Owyong, 2000). In other words, many scholars, particularly Krugman, believe that the Asian economic miracle during this period was largely attributable to the increase in the quantity of factors of production rather than the quality of the use of these factors.

Young (1992) compared the growth experiences of two small Asian economies, namely Hong Kong and Singapore, from the early 1970s to 1990. He was interested in exploring the extent to which TFP contributed to growth in these two economies. He found that Singapore's approach did not produce any TFP growth, while Hong Kong's more free market approach led to strong TFP growth, with this element accounting for almost half of the growth in output per worker. It is argued that Hong Kong has a better development outcome because it achieved the growth without having to divert a huge part of national income towards investment rather than consumption. TFP-based growth has an advantage over-growth based on capital accumulation because it is more sustainable (Whelan, 2020).

Table (1) shows the growth of TFP in the GCC compared to selected leading Asian countries, namely China, Hong Kong, South Korea, and Taiwan, during the period 1990–2021 (in average values). The table indicates that the East Asians have been outperforming the GCC countries in terms of TFP growth. They have shown consistent growth performance throughout the period 1990–2021, compared to negative growth in the GCC countries. The TFP growth performance in the Asian countries can be attributed to unique economic strategies, policies, and investments in human capital and technology.

China has experienced rapid industrialization and urbanization, market-oriented reforms, substantial investments in technology and innovation, and human capital, which have significantly contributed to TFP growth. Hong Kong's economy is highly developed and service-oriented, consistently ranking high in terms of ease

Table 1. Growth of Total Factor Productivity in the GCC compared to selected leading Asian countries for the period 1990–2021 (Average values).

	avg 1990–1994	avg 1995–1999	avg 2000–2004	avg 2005–2009	avg 2010–2014	avg 2015–2019	avg 2020–2021	Overall period avg
CHN	6.72	4.20	3.68	6.59	3.38	3.31	2.47	4.51
HKG	0.92	−3.40	1.06	1.18	0.32	0.43	1.39	0.17
KOR	2.67	2.77	1.63	1.72	0.94	0.76	0.18	1.65
TWN	2.54	1.40	0.94	0.61	1.76	0.69	2.47	1.40
BHR	−0.59	0.37	−0.56	−3.56	−1.30	−2.06	−5.34	−1.54
KWT	6.67	−0.09	4.56	−3.14	−1.55	−5.12	−4.96	−1.07
OMN	0.66	0.85	−2.05	−3.46	−4.06	−3.26	−4.62	−2.06
QAT	1.31	4.93	1.10	−1.64	−1.61	−5.62	−4.83	−0.54
SAU	3.12	−2.02	−0.76	−5.74	−3.21	−3.19	−3.93	−2.09
ARE	1.13	1.72	2.41	−4.82	0.36	0.29	−3.06	−0.02

Source of data: calculated from the Databases of the Conference Board.

of doing business. It has a favorable regulatory environment and a continued emphasis on innovation, technology, education, and infrastructure development, all of which support TFP growth. South Korea is known for its rapid technological advancements and high levels of R&D investment, particularly in industries like electronics, automobiles, and telecommunications. It has a highly educated workforce and proactive government policies supporting industrialization. Large conglomerates like Samsung and Hyundai have played a crucial role in driving productivity growth through economies of scale and scope, as well as continuous innovation. All of these factors have significantly contributed to TFP growth. Taiwan is a global leader in semiconductor manufacturing and high-tech industries. It has a highly skilled and educated workforce, and government policies have supported industrial development, innovation, and a strong emphasis on research and development. All of these elements have contributed significantly to TFP growth.

4. Model, data analyses, results

4.1. The model

The following paragraphs describe the model used to calculate the contribution of TFP in driving economic growth in the GCC countries. Generally, studies on the sources of economic growth in the long term emphasize the significance of determining the role of TFP. Increasing gains in it are a clear indication of the efficient use of production inputs, which in turn raises the standard of living and well-being in the country. In this study, we assume that the total production in the country can be expressed by two types of production functions: Cobb-Douglas and the Constant Elasticity of Substitution (CES). The Cobb-Douglas production function is given by the following mathematical formula:

$$\boldsymbol{Y_t} = \left(\boldsymbol{A_t K_t^{\alpha} H_t^{1-\alpha}}\right)^{\gamma} \tag{1}$$

Where Y_t is the real GDP in period (t).

A_t is TFP in period (t).

K_t is the index of Real Capital Stock in period (t).

H_t is an indicator of the labor component input adjusted by the human capital index or by the quality of human resources available in the country.

γ is a parameter that explains the return to scale hypothesis (Return to Scale). If $(1 = \gamma)$, it means that returns to scale are constant. If $(\gamma < 1)$ it means returns to scale are decreasing, and if $(\gamma > 1)$ it means returns to scale are increasing.

α is a parameter that shows the importance or contribution of real capital stock to aggregate production.

$1-\alpha$ is the contribution of the human element to production.

α and $(1-\alpha)$ can be interpreted as the output elasticities of capital and labor, respectively. α is the elasticity of output relative to capital, since a 1% rise in capital causes a α% rise in output. Similarly, $(1-\alpha)$ is the elasticity of output with respect to labor. Both α and $(1-\alpha)$ represent the proportion of income paid to each factor. Any other unspecified factor is taken care of by the TFP factor. Moreover, in the case of competitive markets where factors are paid their marginal products, α also represents the

share of total income (output) that is paid to capital. For example, if $\alpha = 0.3$, then 30% of the total output is attributed to capital.

Likewise, the aggregate production in the country can be expressed by the production function with Constant Elasticity of Substitution (CES) through the following Equation (2):

$$\boldsymbol{Y_t} = \boldsymbol{A_t}\left(\boldsymbol{\alpha K_t^{\rho}} + (1-\boldsymbol{\alpha})\boldsymbol{H_t^{\rho}}\right)^{1/\rho} \tag{2}$$

$$\boldsymbol{\rho} = \frac{\boldsymbol{\sigma} - 1}{\boldsymbol{\sigma}}$$

The value of the parameter α lies between zero and one and represents the intensity of the use of capital stock in production, while the parameter σ represents the elasticity of substitution between the capital and labor components. When the value of $\sigma = 1$, the function in Equation No. (2) converges to a Cobb-Douglas function with constant returns to scale. Usually, the values of σ range between (0.8 and 1.2), and in this study we assumed that its value is 0.9999.

When we take the natural logarithm of the Cobb-Douglas production function in Equation No. (1) and assume constant returns to scale ($1 = \gamma$), we obtain the third equation:

$$\boldsymbol{lnY_t} = \boldsymbol{lnA_t} + \boldsymbol{\alpha}\ \boldsymbol{lnK_t} + (1-\boldsymbol{\alpha})\boldsymbol{lnH_t} \tag{3}$$

Differentiating Equation No. (3) with respect to time period (t), we obtain the growth equations for the factors of aggregate production in the country as follows:

$$\boldsymbol{g_{y,t}} = \boldsymbol{g_{A,t}} + \boldsymbol{\alpha}\ \boldsymbol{g_{k,t}} + (1-\boldsymbol{\alpha})\boldsymbol{g_{H,t}} \tag{4}$$

Furthermore, Equation No. (4) shows that growth in GDP ($g_{y,t}$) is composed of growth in TFP ($g_{A,t}$), growth in Real Capital Stock ($g_{K,t}$), and growth in human capital ($g_{H,t}$). This equation confirms that TFP ($g_{A,t}$) is the greatest contributor to driving economic growth because the value of the parameter (α) is less than 1. From this equation, it is possible to find the contribution of the growth rate of TFP to economic growth as follows:

$$\boldsymbol{g_{A,t}} = \boldsymbol{g_{y,t}} - \left(\boldsymbol{\alpha g_{k,t}} + (1-\boldsymbol{\alpha})\boldsymbol{g_{H,t}}\right) \tag{5}$$

If ($1 \neq \gamma$), the contribution to the growth rate of TFP is given by the following equation:

$$\boldsymbol{g_{A,t}} = \boldsymbol{g_{y,t}} - \gamma\ \left(\boldsymbol{\alpha g_{k,t}} + (1-\boldsymbol{\alpha})\boldsymbol{g_{H,t}}\right) \tag{6}$$

Therefore, TFP is what is not explained by the labor and capital components. The growth of human capital productivity from Equation (5) is:

$$\boldsymbol{g_{y,t}} - \boldsymbol{g_{H,t}} = \boldsymbol{g_{A,t}} + \boldsymbol{\alpha}(\boldsymbol{g_{k,t}} - \boldsymbol{g_{H,t}}) \tag{7}$$

We will use the previous Equations (1–7) to calculate the contribution of TFP to economic growth in the GCC countries during the period 1990–2017, and to determine the contribution of other factors of production in driving economic growth. The performance of TFP in the United States and the European Union during the period (1970–2018) was analyzed in the previous section in preparation for comparing it with productivity in the GCC countries later.

4.2. Evaluating the performance of TFP in the GCC countries during the period 1990–2017: description for variables and data

Data for the variables used in the study in Equations (1–7) were collected from international databases such as the World Bank (WB), the International Labor Organization (ILO), and the University of Pennsylvania (PWT.9.1). The main variables in the model and their data sources are explained as follows:

Y: Real GDP at constant national prices for 2011 in millions of US dollars, obtained from PWT tables.9.1.

K: Capital Stock: is real capital stock at constant national prices for the year 2011 in millions of US dollars and obtained from the same source.

H: Human capital is the component of human capital adjusted by the quality of human capital available in the specific country. It was calculated using the equation: $H = L.D.P.e^{\pi s}$, where:

L represents the population size, D represents demography, which is proxied by the proportion of the population ages 15–64. It indicates the effect of demographic factors on the population structure and determines the level of dependency, which in turn affects productivity in the country. *P* represents the labor force participation rate, S represents the number of years of schooling, and *p* is a parameter that shows the rate of return to education. Its value ranges between 0 and 1.0, indicating an increase in worker's productivity due to an increase in education by one year. In this study, we assumed its value to be 10% (or 0.1), based on common findings in the literature. A gradual return to education can be assumed, starting from 13.4% for the first 4 years, then decreasing to 10.1% for the following years (4–8), and then decreasing to 6.8% for the years following the second period (Feenstra et al., 2013).

Data for the aforementioned variables were obtained from the World Bank and the International Labor Organization. The number of years of schooling (S) was obtained from the United Nations Human Development Index databases. For Oman's missing data during the period 1990–1998, it was supplemented using the average growth rates of the GCC countries in this variable.

4.3. Analysis and results

TFP was calculated assuming two types of production functions: Cobb-Douglas and Constant Elasticity of Substitution (CES), and we assumed constant returns to scale ($1 = \gamma$). Most applied studies on the sources of economic growth indicated that the value of α ranges between (0.3–0.5), and when there is no valid evaluation for this parameter, the value (0.3) is used. In the case of oil-exporting countries, some studies have indicated high values for α, reaching 0.7 in Algeria, 0.64 in Venezuela, and relatively low in other countries to less than 0.4, such as Iran, Nigeria, and Ecuador (Espinoza, 2012; Senhadji, 2000). Based on these studies, we assume that the value of ($\alpha = 0.5$) in the GCC countries.

The results of calculating TFP in the GCC countries during the period (1990–2017) are shown in Figures 1 and 2. These figures show a pattern of continuous decline in productivity over time during that period, a pattern that is visible in the GCC countries, which indicates a decline in the efficiency of resource use in these countries during the period before the Covid-19 pandemic in 2020. The deterioration of the TFP in the GCC countries is due to several reasons, including institutional, demographic, economic, and global exogenous factors reasons. The institutional reasons include low level of government effectiveness, demographic factors such high dependency rates, and the economic reasons such as deterioration in terms of trade, large inefficient government sector, weak performance of the government spending and revenue systems, and high fluctuations in the global economic environment. Figure 2 shows the performance of TFP in the GCC countries during the period 1990–2017, assuming the Cobb-Douglas production function. Figure 3 gives the same analysis using the Constant Elasticity of Substitution production function (CEs) during the same period of time.

In addition, Table No. (2) shows the average growth rate of total productivity in the GCC countries during the period 1990–2017. From the table, all of these countries have witnessed a decline in this TFP

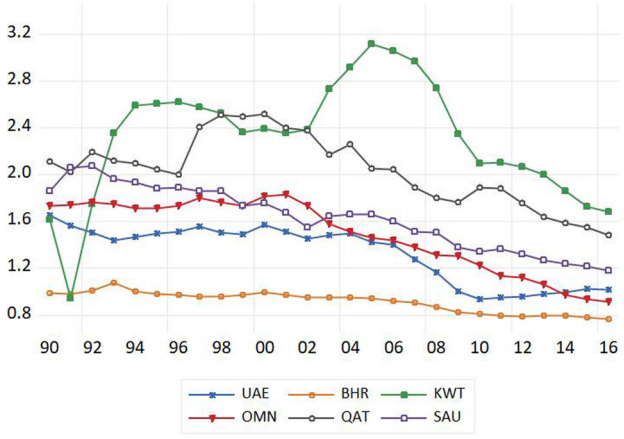

Figure 1. TFP index in the GCC countries during the period 1990-2017 (Assuming Cob Douglas function). *Source*: Authors' calculations using EViews 10.

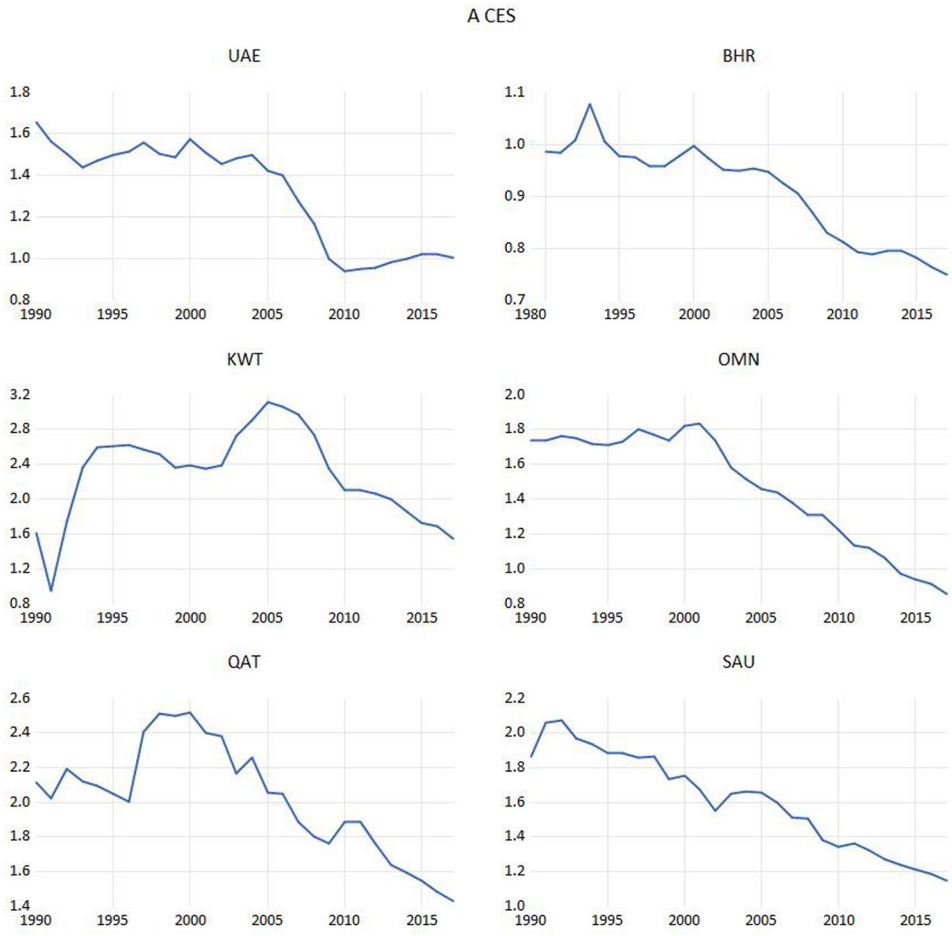

Figure 2. TFP index in the GCC countries during the period 1990-2017 (assuming CES production function). *Source*: Authors' calculations using EViews 10.

ranging from (−1.02%) in Bahrain to (−2.63%) in Oman during that period. When we sub-divide the period (1990–2017) into three periods (1990–1999), (2000–2007), and (2008–2017), we find that the period (2008–2017) witnessed the highest level of losses in TFP, ranging from (−6.5%) in Kuwait to (−1.88%) in the UAE. This is due to the major economic shocks hitting the GCC in that period that led to high economic growth fluctuations, such as the rapid decline in global oil prices. High values of the standard deviation in Table No. (2), in the whole period from 1990 to 2017, indicate high fluctuations in the growth of TFP in the GCC countries during that period, which reached a rate of (18.15%) in Kuwait as the highest level of fluctuations, and a rate of (2.58%) in Bahrain as its lowest level, which indicates relatively low rates of fluctuations in the latter.

The previous results of TFP performance in the GCC countries indicate similar patterns to those of Europe and the USA that were explained previously during the period 1990–2017, but with a difference in the causes for the weak performance in these three regions, even though the performance in America is the best one, as its economy has benefited from the economies of scale of the digital economy in recent decades. These results call for a package of policies and measures to be taken in the GCC countries to halt the deterioration of the TFP and raise production efficiency. The most important recommendations in this regard will be explained later.

4.3.1. Sources of economic growth in the GCC countries 2010–2017

Table 2 shows the sources of economic growth in the GCC countries on a case-by-case basis, according to the results of the study. The table demonstrates the high fluctuations in economic growth rates in most of the GCC countries during that period. The peak was reached in Qatar in 2010 at 15.5%.

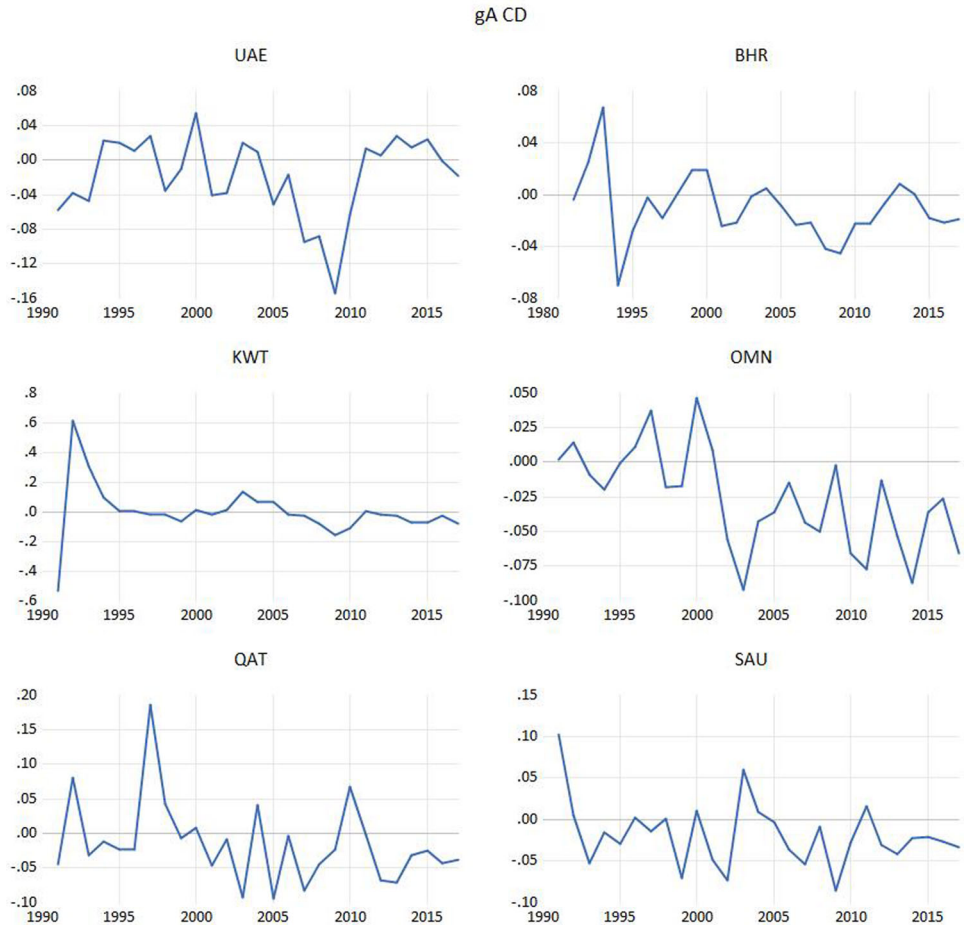

Figure 3. Growth rates of TFP (1990–2017)—according to the Cobb-Douglas production function. *Source*: Authors' calculations using EViews 10.

Table 2. Average growth rates of TFP in the GCC countries (1991–2017).

Average growth rate of total factor productivity using the Cobb-Douglas function (GA_CD)						
	UAE GA_CD_UAE	KSA GA_CD_SAU	QATAR GA_CD_QAT	OMAN GA_CD_OMN	KUWAIT GA_CD_KWT	BAHRAIN GA_CD_BHR
1991–1999	−1.18	−0.77	1.85	0.00	4.21	−0.11
2000–2007	−1.96	−1.71	−3.51	−2.89	2.88	−0.96
2008–2017	−2.39	−2.81	−2.79	−4.78	−6.51	−1.88
1991–2017	−1.86	−1.80	−1.45	−2.63	−0.15	−1.02
	The standard deviation of the growth rates of total factor productivity					
1991–1999	3.32	4.88	7.40	1.88	30.61	3.80
2000–2007	4.67	4.38	5.15	4.21	5.59	1.59
2008–2017	5.94	2.55	3.92	2.79	4.73	1.67
1991–2017	4.66	3.94	5.92	3.57	18.15	2.58

Source: Authors' calculations.

The results of the analysis of Table 3 reveal that economic growth was primarily driven by the growth of real capital stock in most GCC countries, followed by the contribution of human capital growth. The contribution to the growth of TFP, on the other hand, was negative throughout the period 2010–2017 in all GCC countries except for the UAE in 2015 and Qatar in 2010. This can be attributed to the exceptionally high rate of economic growth in these countries during those two years. It is also worth noting the similar contributions of human and real capital stock in driving economic growth in Bahrain over the last decade. In Saudi Arabia, the contribution of real capital stock and human capital has converged in recent years, thanks to the Kingdom's significant investments in the non-oil sector, particularly in infrastructure and education.

Table 4 presents the average growth rates of real capital stock and human capital during the period 1992–2017. The high growth rates in the table can be explained by the increase in the number of

Table 3. Sources of economic growth in the GCC countries during the period (1995–2017).

UAE	2017	2016	2015	2010	2005	2000	1995
GDP growth gY	0.8	2.9	4.9	1.6	4.7	11.5	7.9
Contribution of total factor productivity growth gA CD	−1.9	−0.1	2.4	−6.3	−5.1	5.5	1.9
Contribution of physical capital growth	1.7	1.9	1.6	2.2	1.7	1.3	1.1
Contribution of human capital growth	1.0	1.2	0.9	5.7	8.1	4.7	4.8
BAHRAIN	2017	2016	2015	2010	2005	2000	1995
GDP growth gY	3.7	3.4	2.8	4.2	6.5	6.8	1.9
Contribution of total factor productivity growth gA CD	−1.9	−2.2	−1.8	−2.2	−0.9	1.9	−2.8
Contribution of physical capital growth	2.6	2.6	2.3	3.2	2.8	1.5	1.2
Contribution of human capital growth	3.0	3.0	2.3	3.3	4.6	3.4	3.4
KUWAIT	2017	2016	2015	2010	2005	2000	1995
GDP growth gY	−3.5	2.9	0.6	−2.4	10.1	4.6	1.4
Contribution of total factor productivity growth gA CD	−8.3	−2.8	−7.1	−11.2	6.6	1.5	0.5
Contribution of physical capital growth	3.0	3.7	4.1	3.6	3.0	−0.1	0.9
Contribution of human capital growth	1.7	2.0	3.6	5.2	0.4	3.2	0.0
OMAN	2017	2016	2015	2010	2005	2000	1995
GDP growth gY	−0.9	4.9	4.6	1.9	2.5	6.3	4.7
Contribution of total factor productivity growth gA CD	−6.6	−2.6	−3.6	−6.6	−3.7	4.6	−0.1
Contribution of physical capital growth	3.0	3.6	2.9	2.8	2.8	0.9	1.5
Contribution of human capital growth	2.6	4.0	5.3	5.8	3.4	0.8	3.3
QATAR	2017	2016	2015	2010	2005	2000	1995
GDP growth gY	1.6	2.2	3.5	15.5	7.2	7.7	2.4
Contribution of total factor productivity growth gA CD	−3.9	−4.3	−2.5	6.8	−9.5	0.8	−2.3
Contribution of physical capital growth	4.4	5.2	4.0	5.8	6.8	3.1	3.4
Contribution to human capital growth	1.0	1.3	2.0	2.9	9.9	3.8	1.3
KSA	2017	2016	2015	2010	2005	2000	1995
GDP growth gY	−0.7	1.7	4.0	4.9	5.4	5.5	0.2
Contribution of total factor productivity growth gA CD	−3.3	−2.6	−2.2	−2.7	−0.3	1.1	−2.9
Contribution of physical capital growth	1.7	2.2	3.3	3.3	2.7	1.5	1.4
Contribution of human capital growth	0.9	2.1	2.9	4.3	3.0	2.9	1.7

Source: Authors' calculations.

Table 4. Average growth rates of human and physical capital in the GCC countries during the period (1992–2017).

Average human capital growth rates (1992–2017)						
	UAE	KSA	QATAR	OMAN	KUWIAT	BAHRAIN
Average	9.2	5.3	9.1	7.7	4.6	6.4
Median	9.5	5.8	6.9	8.1	5.2	6.1
standard deviation	5.1	2.3	6.9	4.6	4.5	2.2
Average growth rates of physical capital (1992–2017)						
	UAE	KSA	QATAR	OMAN	KUWIAT	BAHRAIN
Average	3.4	4.7	10.5	5.0	4.9	4.8
Median	3.0	4.2	9.8	5.1	5.1	4.7
standard deviation	1.4	2.0	5.9	2.0	3.3	2.1

Source: Authors' calculations.

immigrant workers and population size, as well as the surge in infrastructure investment and expansion in development expenditure across all the GCC countries.

The results of the previous analysis confirm the decline in the contribution of TFP as a source of economic growth in the GCC countries over time during the period (1990–2017). The previous tables and figures show that the values of the total factor production growth rates fluctuate around an average less than or close to zero. Both the Cobb-Douglas and the Constant Elasticity of Substitution (CES) production functions confirm these results during the period of the study.

Figures 4 and 5 show the growth rates of TFP using Cobb-Douglas production functions and CEs. Figure No. (6) shows the growth rates of real capital stock (gK) and human capital (gH). The Figures 4–6 show an increase in the growth rates of these variables after 1995 and a decline during the period 2010–2015.

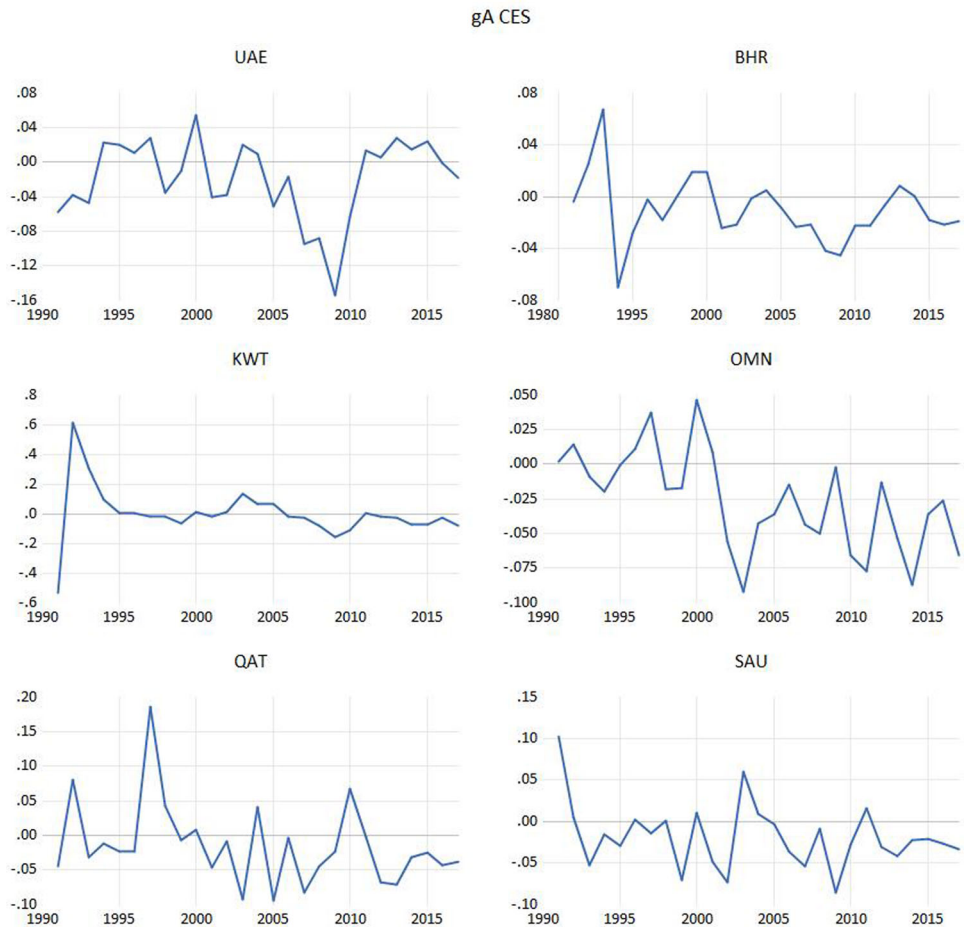

Figure 4. Growth rates of TFP (1990–2017)—according to the constant elasticity of substitution production function (CES). *Source*: Authors' calculations using EViews 10.

4.3.2. Analysis of the effects of the COVID-19 pandemic on economic growth and recovery in the GCC countries

Table 5 shows the effects of the pandemic on economic growth in the GCC countries and recovery from it. The table shows the significant contraction that occurred in all GCC countries in 2020. The level of contraction was generally higher in the countries that are mostly dependent on oil and the countries most strict in implementing precautionary measures and lockdowns. In this respect, the contraction in economic growth in Kuwait reached (8.9%) due to a decline in global oil prices and the stringency of precautionary measures undertaken to confront the outbreak of the virus. In 2021, a gradual recovery from the repercussions of the pandemic began, and economic growth rates began to increase above the rates of the previous year. All the GCC countries recorded a positive increase in the rates of economic growth. The improvement in global oil prices between 2020 and 2021 boosted economic growth performance. The previous analysis shows that economic growth in the GCC countries still depends heavily on fluctuations in high oil prices.

Figure 6 shows the growth rates of TFP in the GCC countries in 2020. The figure indicates that the rates were negative during the pandemic period in 2020. It should be noted that positive values of TFP indicate a qualitative improvement in economic growth and an increase in the efficiency of use of available productive resources, and vice versa for negative values. Previous data show that this improvement in TFP did not occur in the GCC countries in the period before the pandemic, and they were not qualitatively prepared to absorb the repercussions of the pandemic on economic growth, which reflected negatively on the level of their performance during the pandemic period. Figure 7 confirms the continued weak contribution of TFP growth rates in the GCC countries to economic growth.

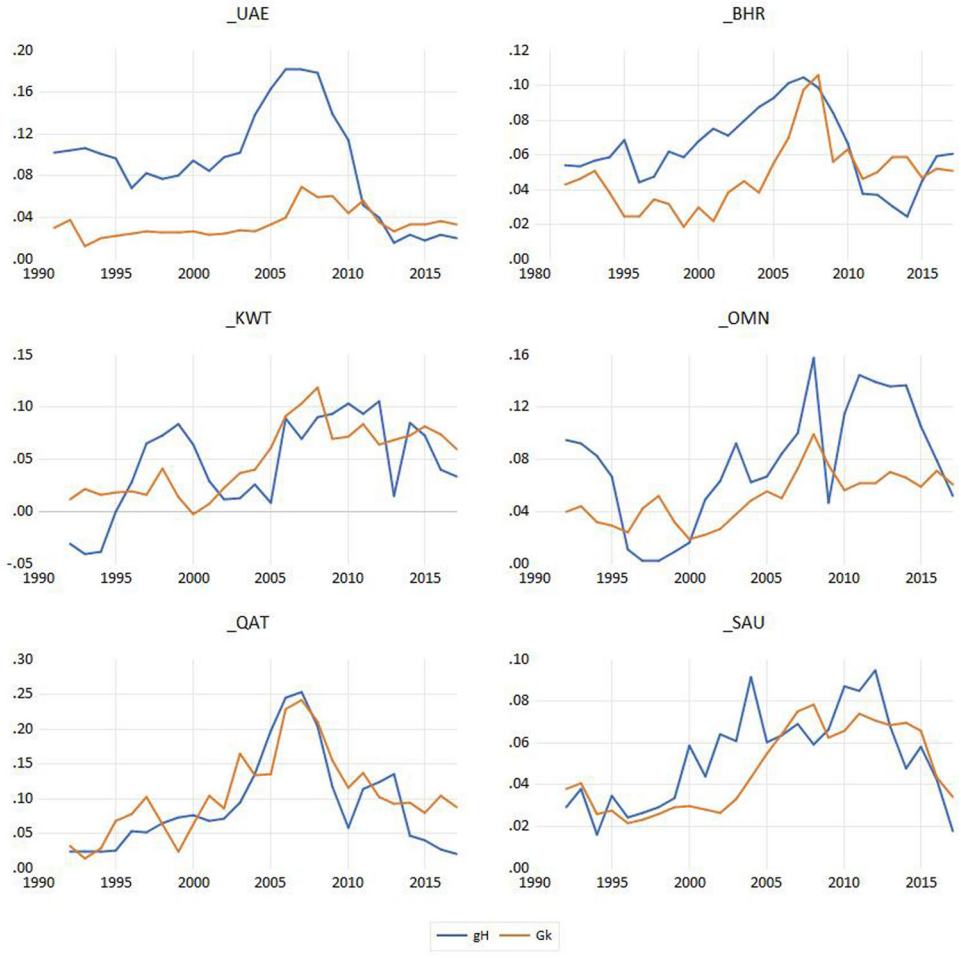

Figure 5. Growth rates of human (g_H) and physical (g_K) capital. *Source*: Authors' calculations using EViews 10.

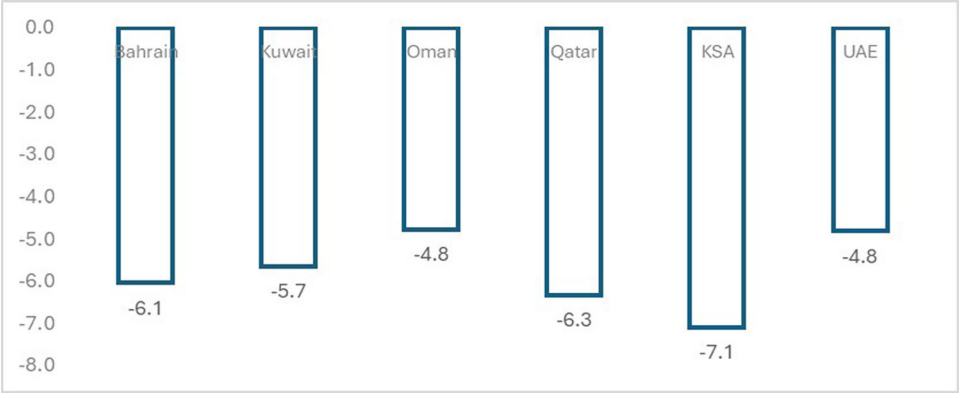

Figure 6. Growth rates of total factor productivity in the GCC countries in 2020. *Source*: Databases of the Conference Board 2021.

4.4. Interpretation and comparison of results

Several factors contribute to variations in TFP performance in the GCC countries, including technological adoption, institutional frameworks, and policy environments. This section elaborates on these aspects, drawing from the previous results and recent empirical studies in this area of investigation, including the work of Acemoglu and Robinson (2019), Bloom et al. (2012), Calderón and Servén (2014), Dabla-Norris et al. (2016), Owyong (2000), Harry (2015), Hvidt (2013), Kabbani (2019), etc.

Table 5. The effects of the pandemic on economic growth in the GCC countries and recovery from it.

Country	Pre-pandemic period			Pandemic period		Decrease in growth rates and the beginning of recovery	
	2018	2019	Average growth rate for the years 2018–2019	2020	2021	Decline in growth rates between 2020 and the average value of 2018–2019	Increase in growth rates between 2020 and 2021
Bahrain	2.1	2.2	2.1	−4.9	2.2	−7.1	9.3
Kuwait	2.4	−0.6	0.9	−8.9	1.3	−9.8	11.1
Oman	0.9	−0.8	0.0	−2.8	2.0	−2.9	4.9
Qatar	1.2	0.7	1.0	−3.6	1.5	−4.5	6.0
KSA	2.5	0.3	1.4	−4.1	3.2	−5.6	8.8
UAE	1.2	3.4	2.3	−6.1	2.3	−8.4	10.7

Source: Authors' calculations using the IMF databases—April 2022.

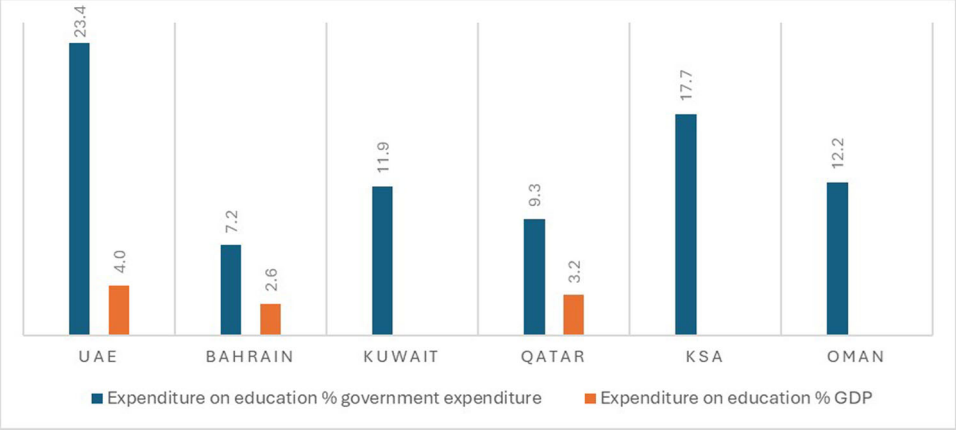

Figure 7. Public spending on education in the GCC countries (2020). *Source*: Arab Monetary Fund, 2020 and the World Bank databases.

The results of the analysis of the growth of TFP in the GCC countries during the period 1990–2017 and during the pandemic show that it was generally unsatisfactory and did not reach the required level. Even the gains achieved by the development performance in recent years have been disappointing in terms of TFP. The high economic growth achieved in the GCC is historically due to the accumulation of production factors rather than productivity improvement. Most of these countries witnessed negative rates of growth in TFP, especially if compared with some oil-producing countries in the world during the two periods (2000–2007) and (2010–2017), such as Mexico, Kazakhstan, or Malaysia, which reached an average percentage of (.03, 7.7, 1.0) respectively in these countries during the first period and averages of (0.0, 2.4, −0.1) respectively during the last period. When the GCC is generally compared with the global average during the two periods, which reached positive percentages of (1.0, 0.1) respectively (The Conference Board Databases, 2020).

The negative growth in TFP in the results of the current study can be explained in terms of restrictions on absorptive capacity and weakness in the quality of public spending, which limits the impact of investment on growth. Moreover, the high expansion of the public sector, which, thanks to the rise in oil revenues during that period, paved the way for disguised unemployment for national employees.

In this context, this study concluded that the role of TFP in the GCC countries in achieving growth is weak compared to other countries, while labor contributes to a greater extent due to the availability of cheap foreign workers. This result reflects preferential policies for employing low-wage foreign workers in the private sector (in exchange for high wages for citizens working in the public sector). When analyzing the contribution of the various components of productivity to economic growth, it becomes clear that there is a negative contribution to TFP in most GCC countries, and even the positive growth in this variable that appeared in some countries such as Bahrain and the United Arab Emirates in the last decade of the last century has declined and become negative in recent times. On the other hand, the

contribution of capital investments increased in most of these countries during the period 2010–2017 compared to the period 1995–2005. Similarly, the contribution of labor increased in most GCC countries, especially in Oman and Bahrain, during the study period 1990–2017.

Although the rise/fall in economic growth rates in the GCC countries coincided with the rise/fall in global oil prices, it is clear that capital and labor have, on average, been the main drivers of economic growth in the region since 1990, regardless of whether oil prices were high or low. In contrast, in non-Gulf oil exporting countries, TFP is considered one of the most important factors driving economic growth, and employment is one of the weakest. However, the performance of growth and its drivers was better in most GCC countries when oil prices rose because this rise led to a favorable environment that encourages public and private investments as well as raises the employment rate, which improves the contribution of capital and labor to growth. The large contribution of labor, especially during periods of high growth, reflects the rapid increase in foreign labor in the private sector.

5. Challenges and means for TFP growth in the GCC countries

5.1. Most prominent challenges

It is likely that the TFP will continue to decline shortly, and thus its contribution to economic growth will decrease if the GCC countries continue to rely on the current economic model or pattern of development which demonstrated its limitations, as well as several internal and external economic and social factors that these countries may face. The most important challenges and risks facing these countries are manifested in the following:

- Instability of oil prices
- Geopolitical instability
- High population growth rates and increased pressure on the labor market

5.2. Ways to develop productivity in the GCC countries

Considering these risks and challenges, as well as structural imbalances and bottlenecks in the economies of the GCC states, at the level of economic structure, public finances, population, and foreign labor, enhancement of TFP is of great importance for their economic growth, and improving it represents one of the most important challenges facing sustainable economic and social development. Achieving this goal requires an accurate diagnosis of the obstacles to productivity development and identifying the necessary policies to improve its performance. It requires developing efficient allocation of production factors, adopting technology and innovation, improving the quality of infrastructure, investing in human capital, and developing the institutional framework. In addition to accelerating the transition towards an economic model that works to limit excessive growth of the public sector and stimulate the private sector, review employment policies, encourage economic diversification, direct investment towards productive sectors with high added value, and become more open to competition and foreign direct investment.

In general, raising the level of productivity in the GCC countries requires a set of reforms, the most important of which include:

5.2.1. Review the role of the state in economic activities

The importance of reducing the dominance of the public sector and granting the private sector a greater role and broader scope in managing the economy is evident, in order to enable it to play the role assigned to it in the best way.

5.2.2. Improving labor market conditions and employment policies in the private sector

Regulatory laws are still very restrictive, which negatively affects the flexibility of these markets. In this context, an executive opinion survey of businessmen, conducted by the World Economic Forum, ranked

these laws first among the other factors most hindering investment in most Gulf countries (World Economic Forum, 2017a, b). In addition, the mismatch between available skills and labor market requirements and the possibility of obtaining cheap foreign labor, on the one hand, and the 'culture of shame' and the attractiveness of employment in the high-wage public sector for GCC nationals, on the other hand, led to the reluctance of most citizens of Gulf countries to work in the private sector, especially in some low-skilled professions.

5.2.3. Raising the level of education, training, and scientific research

Despite the availability of financial resources, public spending on education in general is still low in some GCC countries, as it does not exceed 9% of total public expenditure, as shown in Figure 7.

As for scientific research and development, despite the efforts made, it is generally noted that there is weakness and absence of real supportive policies in this field.

5.2.4. Streamlining laws and legislation related to the business environment and foreign investment

Improving the investment environment requires governments to develop and enforce laws that work to overcome these obstacles facing the private sector, and aim to amend existing legislation, improve the legal and regulatory environment, and make the necessary institutional reforms to encourage investment, especially for the benefit of small and medium enterprises, and improving the services provided. The most prominent of these procedures are:

- Reducing trade barriers
- Lifting restrictions to attract foreign direct investment

5.2.5. Encouraging economic diversification and directing investment towards productive sectors with high added value

Given the significant decline in oil prices in recent years and the various other challenges previously mentioned, it has become necessary, and even urgent, to accelerate the diversification of the economy in various productive sectors, especially in the manufacturing industry. In addition to reform policies related to strengthening the institutional framework, stimulating the private sector, and providing a sound macroeconomic foundation.

6. Conclusion

The present study focuses on TFP performance in the GCC countries for several reasons: the TFP captures improvements in the ability to produce output without increasing input quantities. It also reflects better management practices, innovations, quality of policies and institutions, and improvements in production processes. It can be used to assess the impact of various policies on economic efficiency and to allow for more accurate cross-country comparisons of productivity and economic performance. Changes in TFP can help researchers understand the sources of economic fluctuations and resilience. For instance, a decline in TFP might indicate structural problems or adverse shocks to technology or efficiency.

The analysis of TFP growth in the GCC countries indicates that it has not reached the desired levels, in addition to the presence of significant lags compared to some other developing countries. The results of the analysis of TFP growth in the GCC countries during the period 1990–2017 and during the pandemic show that it was generally unsatisfactory and did not reach the required level. The high economic growth achieved in the GCC is historically due to the accumulation of production factors rather than TFP improvement.

Decline in TFP in the GCC countries can be attributed to several specific government policies and regulations that hinder TFP growth, including the following: Oil dependency has led to a lack of diversification in the economies of the GCC countries and limited investment in other sectors that could have

driven TFP improvements. Inflexible labor market policies that favor the employment of nationals over expatriates have also played a role. These policies, often implemented through nationalization programs (e.g. Saudization in Saudi Arabia), have led to inefficiencies as the local workforce may lack the necessary skills and experience compared to expatriates. The dominance of the public sector reduces the incentive for nationals to work in the private sector, where productivity might be higher. Bureaucratic inefficiencies and regulatory constraints in the GCC countries can stifle business operations and innovation, and hinder productivity growth. Education and training systems have not always aligned well with the needs of the labor market, resulting in a lack of the skills required to improve productivity. Low investment in research and development in the GCC prevents crucial TFP growth. Government subsidies, particularly in the energy and utility sectors, can lead to inefficiencies by distorting market prices and restricting the adoption of new technologies that could improve productivity. The business environment is hampered with challenges such as access to finance, legal hurdles, and the protection of intellectual property rights, which can affect the overall productivity of the private sector.

Therefore, promoting the TFP of the GCC countries requires concerted efforts of all stakeholders, government, and private sector, to contribute to providing an appropriate environment and carrying out several consistent, integrated, and continuous reforms. The goal is to shift from a development model whose main driving force is oil resources to a productive economy based on technology and innovation, in which the market economy is one of its pillars and economic diversification is one of its priorities, which enables us to confront potential negative effects of oil price fluctuations and respond to the projected high demand for jobs due to demographic growth.

Achieving these economic objectives requires the provision of a good business environment, enhancing local competition, greater openness to foreign investment, and developing human capital by obtaining high-level education and training. It also requires enhancing the dynamism of the private sector, which must exist side by side with the public sector to create a more diversified economy with the participation of a large number of sectors.

More importantly, it is essential to have a strong political will and a good institutional framework that works to reduce the role of public administration in the economy and employment, building an economy based on knowledge and innovation, and working to fight corruption and pursue transparency. The success of these also depends on educating society about the importance of detachment from the culture of shame and creating a spirit of citizenship, which will inevitably lead to increased productivity and contribution to sustainable economic and social development.

Notes

1. Developed by Robert Solow in the 1950s, the Solow Growth Model is one of the foundational frameworks for understanding economic growth. Economic growth is driven by capital accumulation, labor force growth, and technological progress (Solow, 1956, 1957). TFP represents technological progress. It introduces the concept of TFP as the residual factor of growth that cannot be explained by increases in labor and capital inputs alone. Solow emphasized that long-term economic growth depends more on technological progress (TFP) than on capital accumulation.
2. Initiated by Joseph Schumpeter and later formalized by Philippe Aghion and Peter Howitt in the 1990s.

Authors contributions

We hereby confirm that both authors, Dr. Alamedin Bannaga and Dr. Mohammed Lezar, contributed to the following aspects of the paper: conception and design of the work; acquisition, analysis, and interpretation of data; and drafting the work and reviewing it critically for intellectual content, with a split of 60% and 40% respectively.

The authors will be responsible for the final approval of the version to be published and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

We hereby confirm that both authors (Dr Alamedin Bannaga and Dr Mohammed Lezar) have not received any funding for this research article.

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Data availability statement

We (Dr. Alamedin Bannaga and Dr. Mohammed Lezar) hereby confirm that the data supporting the findings of this research paper are derived from public domain resources. We agree to make the data and materials supporting the results and analyses presented in our paper available upon reasonable request.

References

Acemoglu, D., & Robinson, J. A. (2019). *The narrow corridor: States, societies and the fate of liberty*. Penguin Press.

Aghion, P., Akcigit, U., & Howitt, P. (2015). The Schumpeterian growth paradigm. *Annual Review of Economics*, *7*(1), 557–575. https://doi.org/10.1146/annurev-economics-080614-115412

Alsharif, N., Bhattacharyya, S., & Intartaglia, M. (2017). Economic diversification in resource rich countries: History, state of knowledge and research agenda. *Resources Policy*, *52*, 154–164. https://doi.org/10.1016/j.resourpol.2017.02.007

Arab Monetary Fund. (2020). *Unified economic report*. Arab Monetary Fund.

Aschauer, D. A. (1989). Is public expenditure productive*? Journal of Monetary Economics*, *23*(2), 177–200. https://doi.org/10.1016/0304-3932(89)90047-0

Babiker, M. (2007). Productivity and its measurement. *Journal of Arab Planning Institute*, *61*, 51. (in Arabic)

Bergeaud, A., Cette, G., & Lecat, R. (2016). Productivity trends in advanced countries between 1890 and 2012. *Review of Income and Wealth*, *62*(3), 420–444. volume https://doi.org/10.1111/roiw.12185

Bloom, N., Sadun, R., & Van Reenen, J. (2012). *Management as a technology? Harvard Business School, Working Paper 16-133*. Harvard Business School. https://www.hbs.edu/ris/Publication%20Files/16-133_64fd57c1-5f76-415a-9567-f1c0d310aff3.pdf

Calderón, C., & Servén, L. (2014). Infrastructure, growth, and inequality: An overview. Policy research working paper. *Worldbank*. https://elibrary.worldbank.org/doi/pdf/10.1596/1813-9450-7034

Dabla-Norris, E., Ho, G., & Kyobe, A. (2016). Structural reforms and productivity growth in emerging market and developing. *IMF Working Papers*, *16*(15), 1. https://doi.org/10.5089/9781498306560.001

Espinoza, R. (2012). *Factor accumulation and the determinants of TFP in the GCC. OxCarre Working Papers 094.* Oxford Centre for the Analysis of Resource Rich Economies, University of Oxford.

Feenstra, R. C., Inklaar, R., & Timmer, M. P. (2013)."PWT8.0: A user's guide. *mimeo*. www.ggdc.net/pwt

Goldin, C., & Katz, L. F. (2008). *The race between education and technology*. Harvard University Press.

Hanushek, E. A., & Woessmann, L. (2015). *The knowledge capital of nations: Education and the economics of growth*. MIT Press.
Harry, G. (2015). *Higher education in the GCC states: Responding to the challenges of globalization*. Gulf Research Center Cambridge.
Hertog, S. (2010). State-owned enterprises and the economic development of the Gulf monarchies: A comparative analysis. In R. G. Harris & M. G. Berryman (Eds.), *The political economy of the Gulf States* (pp. 91–128). Palgrave Macmillan.
Hvidt, M. (2013). *Economic diversification in GCC countries: Past record and future trends. Research paper No. 27*. Kuwait Programme on Development, Governance and Globalisation in the Gulf States.
International Monetary Fund (IMF). (2014). https://www.imf.org/external/np/pp/eng/2014/102514a.pdf
International Monetary Fund (IMF). (2022). *World economic outlook databases*. https://www.imf.org/en/Publications/WEO/weo-database/2022/April
International Monetary Fund (IMF). (2024). *World economic outlook: April 2024*. International Monetary Fund.
Kabbani, N. (2019). *Youth employment in the Middle East and North Africa: Revisiting and reframing the challenge*. Brookings Institution.
Krugman, P. (1994). The myth of Asia's miracle. *Foreign Affairs*, *73*(6), 62–78. https://doi.org/10.2307/20046929
Looney, R. (2013). The Omani and Bahraini paths to development: rare and contrasting oil based economic success stories. In A. Fosu (Ed.), *Achieving development success: Strategies and lessons from the developing world*. Oxford University Press.
Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, *22*(1), 3–42. https://doi.org/10.1016/0304-3932(88)90168-7
Owyong, D. T. (2000). Productivity growth: Theory and measurement. *Asian Productivity Organization, Productivity Journal, 2000*, 19–29.
Porter, M. (1990). The competitive advantage of nations. March–April 1990. *Haravard Business Review*. https://hbr.org/1990/03/the-competitive-advantage-of-nations
PwC Middle East. (2020). Capital Projects and Infrastructure Survey 2020: Challenges and opportunities in the region's infrastructure sector. *PwC Middle East*.
Rodrik, D., Subramanian, A., & Trebbi, F. (2004). *Institutions rule: The primacy of institutions over geography and integration in economic development. NBER. Working Paper 9305*. https://www.nber.org/papers/w9305
Romer, P. M. (1990). Endogenous technological change. *Journal of Political Economy*, *98*(5, Part 2), S71–S102. https://doi.org/10.1086/261725
Romer, P. M. (2020). Human capital and growth: Theory and evidence. In *NBER macroeconomics annual 2019* (Vol. *34*, pp. 1–45). University of Chicago Press.
Sbia, R., Shahbaz, M., & Hamdi, H. (2014). A contribution of foreign direct investment, clean energy, trade openness, carbon emissions, and economic growth to energy demand in UAE. *Economic Modelling*, *36*, 191–197. https://doi.org/10.1016/j.econmod.2013.09.047
Senhadji, A. (2000). Sources of economic growth: An extensive growth accounting exercise. *IMF Staff Papers*, *47*(1), 129–157. https://doi.org/10.2307/3867628
Solow, R. M. (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics*, *70*(1), 65–94. https://doi.org/10.2307/1884513
Solow, R. (1957). Technical change and the aggregate production function. *The Review of Economics and Statistics*, *39*(3), 312–320. https://doi.org/10.2307/1926047
Syverson, C. (2017). Challenges to mismeasurement explanations for the US productivity slowdown. *Journal of Economic Perspectives*, *31*(2), 165–186. https://doi.org/10.1257/jep.31.2.165
The Conference Board Databases. (2020). https://data-central.conference-board.org/#
Whelan, K. (2020). 2023). *Lecture notes on macroeconomics*. University College Dublin.
World Economic Forum (WEF). (2017a). *Executive opinion survey*. WEF.
World Economic Forum (WEF). (2017b). *The global human capital report 2017*. WEF.
Young, A. (1992). Tales of two cities: Factor accumulation and technical change in Hong Kong and Singapore. *NBER Macroeconomics Annual*, *7*, 13–54. https://doi.org/10.1086/654183