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FINANCIAL DEVELOPMENT, INFORMATION AND COMMUNICATION TECHNOLOGY, AND ECONOMIC GROWTH: EVIDENCE FROM GCC COUNTRIES

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ABSTRACT

This paper studies the link between information and communication technology (ICT) diffusion, financial development and economic growth in the panel of 3 Gulf Cooperation Council (GCC) countries, namely, Oman, Qatar and United Arab Emirates from 2008 to 2021. Using the system GMM in a panel data analysis, we showed evidence of a positive association between financial development and economic growth. We also showed that ICT acted as a complement in the finance-growth relationship. The study recommends harmonizing public and private sector investments for a synergistic impact on ICT infrastructure and investing adequately in the financial system to promote economic growth in GCC countries. Economic policies would be approved to provide incentives and subsidies to guarantee affordable ICT services to disadvantaged peoples. In addition, training programs focused on improving digital literacy to enable all population groups to use digital platforms for financial services are recommended.

Keywords: Financial development, ICT diffusion, Economic growth, Panel data

1. INTRODUCTION

In fact, information and communication technology (ICT) have totally changed the way we work, learn, communicate and live. ICT are an umbrella term for a wide range of technologies that facilitate the sharing and transmission of information via the Internet, wireless networks, telephones and other digital channels. Practically every aspect of our civilisation has been deeply affected by these technologies. The ability of ICT to improve communication is one of their greatest benefits. The development of social media, e-mail, instant messaging and video conferencing has enabled people to communicate in real time with others anywhere in the world. These technologies have completely changed the way organizations operate by enabling effective cooperation and communication across regional borders. They have also improved the accessibility of information, allowing individuals to have a wealth of resources and knowledge at their fingertips. In addition, they have changed the way we work. With the rising popularity of remote working and telecommuting, employees can now work from anywhere with an internet connection. For many people, this has promoted work-life balance and amplified productivity. In addition, automation,

data analytics, and other digital tools that enhance performance and simplify operations have amplified efficiency across a range of sectors thanks to ICT (Nakatani, 2021).

ICT has totally transformed the way teachers and students learn in the field of education. Education is now more available and engaging through virtual classrooms, educational apps, and online learning platforms. With the accessibility of online courses, assignments, and materials, students can now involve in self-directed and personalized learning. In this context, ICT is important to improve innovation, economic growth, and societal progress. With the way technology is developing, ICT can change the world in limitless ways. In order to shape the future of our universally interconnected world, it will be imperative that we fully use information and communication technologies (Pradhan et al. 2018).

ICT are indispensable for financial development because they make financial services more available, rise the efficiency of transactions and promote economic growth. ICTs enable mobile payment networks, online financial tools and digital banking services to develop, thereby promoting financial inclusion and availability for individuals and businesses. Financial markets are becoming more efficient, secure and transparent thanks to ICT advances such as internet trading platforms and blockchain technology. Developed financial inclusion, economic empowerment and the overall progress of the global economy are made possible by the synergy between ICT and financial development (Cheng et al. 2021).

ICT enable the efficient flow of information and increased productivity in the financial services sector, which drive economic growth. Particularly in underdeveloped regions, the integration of ICT improves admission to financial services, reduces costs and streamlines transactions. Developed communication technologies aid financial markets make decisions, manage risks and innovate more quickly, which in turn improves economic growth. Digital financial services also promote financial inclusion, which enables individuals and businesses to contribute in the formal economy. By enhancing productivity, reducing barriers to entry and creating a more dynamic and inclusive financial ecosystem, the interaction among ICT and financial development enhances economic growth and ultimately propels overall economic expansion (Jouini, 2021).

Financial development and ICT are crucial drivers of real GDP growth in the GCC countries. ICT adoption rises productivity, accelerates e-commerce, fosters creativity, and moves the economy away from its dependence on oil. Financial development inspires entrepreneurship and effectively channels investment through developed capital markets and banking institutions. According to Alshubiri et al. (2019), fintech and digital banking also promote financial inclusion by allowing individuals and small and medium-sized enterprises to access finance and participate in the formal economy. In the GCC countries, ICT and financial development accelerate economic growth, and facilitate the transition to knowledge-based countries.

Through the above, we asked the following questions: What are the dynamics and interrelationships among financial development and the diffusion of ICT in their relationship with each other and with the economic growth of the GCC countries?

This study will be of great assistance to the region's investment plans and policy choices. Promotion sustainable economic development, diversification, and global competitiveness in the GCC countries needs understanding the complex interlinkages between these elements. This paper can help create more resilient economies, Improvement in living standards, and more opportunities for residents by identifying how best to leverage financial infrastructure and advances in ICT. In addition, it can support regional cooperation and integration, developing innovation and economic stability across the GCC countries.

This paper is ordered as follows. Section 2 covers the existing literature review. Section 3 presents the data and methodology employed. The empirical results are presented in Section 4. Finally, Section 5 draws conclusions and the main contributions of the study.

2. LITERATURE REVIEW

2.1. ICT diffusion and economic growth

In theory, ICT diffusion and economic growth seem to be closely related. ICT is an external and uncontrollable force that advances from government action or business initiatives and manifests itself in productivity gains in real economic activity. Economic growth is a widely debated and constantly developing topic for economists.

In his revolutionary theory of economic development, Smith (1776) documented that increases in labour productivity is a direct result of technological progress in the economy. Although classical theory (Smith, 1776) highlighted specialization to rise productivity, neoclassical theories (Solow, 1956) postulated economic growth through increases in labour and productivity through technological advance. Therefore, by investing in human capital through nutrition, health care and education programs, productivity increases. Romer (1986), unlike the then prevailing neoclassical growth theories, proposed a growth model, which incorporated technological knowledge as an endogenous factor of development.

Four hypotheses define the causal association among economic growth and ICT diffusion. First, the ICT diffusion-led economic growth theory, frequently referred to as the supply-side hypothesis, suggests that ICT diffusion impacts economic growth in a unidirectional manner (Pradhan et al. 2018; Sawng et al. 2021). This argument consists that improved investment in ICT infrastructure and the resulting better use of ICT improve employment opportunities and firm productivity, which contributes positively to economic growth. The development of ICT infrastructure generates new digital business, which stimulates economic growth.

The second school of thought, the demand hypothesis, suggests that economic growth drives the diffusion of ICTs. This theory accepts that as a country develops economically, it can invest more in ICT infrastructure, enabling it to serve a wider range of businesses. In general, advanced countries have increasingly relied on the digital economy to preserve their global market leadership. As a result, they have accelerated the development of more advanced ICT infrastructures. Studies exploring these relations contain Beil et al. (2005) and Salahuddin and Gow (2016).

2.2. Financial development and economic growth

Recent empirical studies show that financial market development is relevant (see, for example, Hermes and Lensink 2003; Alfaro et al. 2004; among others). Conventional wisdom argues that financial development is an important factor of economic growth for several reasons.

First, a well-functioning financial system offers fertile ground for resource allocation, better monitoring, less information asymmetries, and real GDP growth (Shen and Lee, 2006). The financial system can enhance economic growth through two channels. On the one hand, it mobilizes savings, which rises the volume of resources offered to finance investment. On the other hand, it selects and monitors investment projects (i.e. by reducing the costs of acquiring information), which helps to increase the efficiency of the projects implemented (Greenwood and Jovanovic, 1990). This argument was confirmed by Levine et al. (2000) who argued that financial development is a key determinant of economic growth, increasing savings and facilitating capital accumulation, thus stimulating investment and economic growth.

Second, the financial system effects the level of credit rationing in financial markets and limits potential entrepreneurs, which in turn impacts economic growth. This is particularly true when the arrival of an entirely new technology offers the possibility of exploiting not only domestic but also export markets (Alfaro et al. 2004).

Third, the financial system can also determine the extent to which foreign firms will be able to borrow to expand their innovation activities in the host country, which would further growth the opportunities for technology spillovers for domestic firms. Therefore, the diffusion process may be more efficient when host country financial markets are well-developed, as this allows a subsidiary of a multinational enterprise to expand the investment once it has arrived the host country (Hermes and Lensink 2003).

Finally, the efficiency of financial markets is important for economic growth. In fact, some studies have suggested that countries with efficient financial systems are less exposed to the risk of a financial crisis following real economic disruptions and more resilient to crises that do occur. Certainly, countries with more developed financial systems - that is, financial markets and institutions that more efficiently channel society's savings to their most productive uses - experience faster economic growth (Ranciere et al. 2006).

2.3. ICT diffusion and financial development

Another strand of literature studies the association among ICT diffusion and financial system development. Two schools of thought explicate the causal link among ICT diffusion and financial development. The first school, the ICT-led financial development hypothesis, argues that ICT infrastructure is the only cause of financial development (Abor et al., 2018; Marszk and Lechman, 2019). According to this theory, new financial products and services will result directly from the growth of ICT. Two important benefits are the increased availability and potential for individualized service delivery through digital financial services. By seeking economies of scale and scope through digital architecture, financial institutions can offer lower-cost services. These projects help promote access to these essential financial services for excluded people. Consequently, ICT development is important for the success of financial development initiatives in different countries.

The second school of thought confirms that financial development leads to the diffusion of ICT (Das et al., 2018; Lenka and Barik, 2018). Through augmented use of financial products and services, marginalized and vulnerable groups have access to the tools and knowledge they need to promote their economic situation. Increased purchasing power has led to augmented spending on ICT such as mobile phones and the internet. Additional line of thought supporting this direction of causality argues that increased infrastructure spending in disadvantaged communities is a direct result of augmented access to innovative financial tools and skills for these groups. Such infrastructure investments are vital steps towards creating a technologically advanced and cutting-edge monetary system (Shamim, 2007).

2.4. ICT diffusion, financial development and economic growth

The literature on the link between ICT diffusion and financial development is abundant. But limited studies have investigated the trivariate association among ICT diffusion, financial development and economic growth. The growth of ICT and the financial system, mainly in developing countries, has encouraged researchers to study the combined impact of ICT diffusion and financial development on economic growth.

Shamim (2007) earlier showed that financial development, accompanied by better telecommunication infrastructure, is positively related with economic growth. Using dynamic

panel GMM in 61 countries from 1990 to 2002, she found that an increase in mobile phone subscribers and Internet users positively affects financial deepening and that this interaction positively impacts economic growth.

For their part, Andrianaivo and Kpodar (2011) analysed finance as a channel through which ICT diffusion effects economic growth. Using the GMM in 44 African countries from 1898 to 2007, they confirmed a positive effect of ICT on economic growth and showed that the impact of mobile diffusion on economic growth is greater for countries with a high level of financial inclusion. Furthermore, they concluded that economically well-developed countries tend to grow faster when the mobile penetration rate is high.

For their part, Sassi and Goaied (2013) showed that economic growth strategy integrating ICT and financial development has a positive effect on Middle East and North Africa (MENA) countries from 1960 to 2009. They revealed that the interaction term between financial development and ICT diffusion is significantly positive which shows that MENA countries can only benefit from financial development once a certain threshold of ICT development is reached. The interaction impact is also considered by Das et al. (2018) by constructing an economic growth framework. According to this study conducted from 2000 to 2014 in 43 developing countries, ICT diffusion and financial system development can contribute to improving economic growth in low-income countries but not in lower-middle-income countries.

As for Sepehrdoust and Ghorbanseresht (2019), they studied the effect of ICT diffusion and financial development on the developing countries of the petroleum exporting countries from 2002 to 2015. They used a composite index of ICT as a proxy of ICT development and found that ICT had a crucial role in enhancing the economic growth. For their part, Abeka et al. (2021) examined the role played by telecommunication infrastructure in the association among financial development and economic growth of 44 Sub-Saharan African (SSA) countries from 1996 to 2017. They pointed out that telecommunication infrastructure could strengthen the capacity of the financial system in terms of promoting economic growth. Furthermore, they argued that building a robust telecommunications infrastructure will also have a direct impact on economic growth.

As for Gheraia et al. (2022), they examined the role of moderation of ICT diffusion among financial development and economic growth in Saudi Arabia over the period 1990-2019. Using the bootstrap ARDL model, they found that he financial development interaction term with ICT diffusion has a positive and statistically significant effect on economic growth. They suggested that financial development can only improve the Saudi economy when ICT are well developed. For their part, Ofori et al. (2022) examined the direct and indirect impacts of ICT diffusion on inclusive growth in 42 SSA countries from 1980 to 2019. They offered evidence robust to several specifications from the dynamic system GMM to confirm that: (i) ICT skills are more effective in driving inclusive growth in SSA, and (ii) the impacts of ICT skills are promoted in the presence of financial development.

On the other hand, Verma et al. (2023) studied the relationship between ICT diffusion, financial development and real GDP growth in 88 developing countries from 2005 to 2019. They confirmed that ICT diffusion could improve the effectiveness of the financial system as well as contribute to economic growth. On the other hand, Aziz et al. (2023) studied the impact of ICT diffusion and financial development on economic growth in 10 Asian countries from 2001 to 2017. They showed a direct relation among financial development and economic growth. Nevertheless, they found that ICT in isolation has a negative effect on economic growth, but it has a more pronounced beneficial impact when combined with financial development. This highlights the fact that the combination of ICT and financial development creates a synergistic influence on real GDP growth. More

recently, Behera et al. (2024) studied the effect of ICT on economic growth by considering its interaction with financial development, R&D expenditures, and foreign direct investment from 2000 to 2020 in 13 newly emerging countries. They found that the usage of ICT has a beneficial effect on economic growth. Moreover, they recognized that ICT improves economic growth when it interacts with financial development and research and development expenditure.

Based on current empirical studies, telecommunication strategies could be pertinent in explaining the influence of financial development to economic growth. This offers a solid basis on which to assume a more focused study on how several telecommunication infrastructures can be deployed as effective instruments in financial policies and programs to attain economic growth in GCC countries.

3. DATA AND EMPIRICAL METHODOLOGY

3.1. Data

This paper examines a sample of 3 GCC countries, namely, Oman, Qatar, and the United Arab Emirates. The choice of countries selected for this study is mainly dictated by the availability of reliable data over the sample period. The panel covers the period 2008-2021.

The key variable of interest (ICT diffusion) and other control variables are obtained from the World Development Indicators (2024) published by the World Bank. In this study, we employ individuals using the Internet (% of population) to measure ICT diffusion. Internet users are individuals who have used the Internet (from any location) in the last 3 months. The Internet can be used via a computer, mobile phone, personal digital assistant, game console, digital television, etc. Due to the importance of the Internet in today's society, we include a variable that measures this development in finance.

We include the level of financial development of a country as another explanatory variable, because it helps in making savings and investment decisions. Financial markets also allow to diversify risks through the trading of financial instruments that facilitate the identification of profitable investment projects and the mobilization of savings on them. Financial development (FD) is measured by domestic credit to private sector by banks (% of GDP), which allows to measure the degree of intermediation carried out by the banking sector, including credit to private sector. We use this proxy because the private sector is considered the engine of economic growth in many developing countries like those in GCC (Obeng-Amponsah et al., 2019).

The dependent variable is economic growth, proxied by the growth rate of real GDP per capita at 2015 prices in US dollars. Our base model contains the explanatory variables common to most growth regressions showed in the literature:

- Initial GDP per capita (log): log of real GDP per capita. A negative coefficient is expected, signifying the existence of conditional convergence between countries (La Porta et al. 1998).
- Inflation rate: The growth of the consumer price index measures the annual percentage change in the consumer price index that determines the inflation rate. This rate reflects the change in prices paid by the average consumer during a given period when purchasing goods and services. A negative coefficient is expected because high inflation can deteriorate price competitiveness, leading to negative effects on foreign trade and economic growth (Elder, 2004).
- Total natural resources rents (% of GDP): Total natural resources rents are the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents. Natural

resources rents measure the extent to which the economy relies on natural resources to create income. The contribution of natural resources to economic output has important implications for economic development. Revenues from natural resources such as fossil fuels and minerals account for a significant share of GDP in different countries. Natural resources give rise to economic rents because they are not produced; since their supply is relatively fixed, they generally generate returns that exceed their cost of production (Koirala and Pradhan, 2019).

3.2. Empirical methodology

Therefore, the purpose of our empirical study is to examine if ICT diffusion (ICT) plays a significant role in influencing the impacts of financial development (FD) on economic growth in the GCC countries. To this end, we employ a specification that is broadly similar to Abeka et al. (2021). We consider the following model:

$$y_{i,t} = \alpha y_{i,t-1} + \beta_1 FD_{i,t} + \beta_2 ICT_{i,t} + \beta_3 X_{i,t} + \mu_t + \eta_i + \varepsilon_{i,t} \quad (1)$$

Eq. (1) can also be alternatively written with the growth rate as a dependent variable as:

$$Growth_{i,t} = y_{i,t} - y_{i,t-1} = (\alpha - 1) y_{i,t-1} + \beta_1 FD_{i,t} + \beta_2 ICT_{i,t} + \beta_3 X_{i,t} + \mu_t + \eta_i + \varepsilon_{i,t} \quad (2)$$

The subscript "t" represents the period, whereas i represents the country, y is the logarithm of the real GDP per capita, FD is the financial development variable, ICT is the ICT diffusion variable and X is the matrix of the control variables described in the previous section, μ_t is a time specific effect, η_i is an unobserved country-specific fixed effect and $\varepsilon_{i,t}$ is the error term. Eq. (2) forms the basis for our estimation where $(\alpha - 1)$ is the convergence coefficient.

Furthermore, to test whether ICT plays a catalytic role in the relationship between financial development and economic growth, we present into the model an interactive term between ICT and financial development. This allows us to see to what extent the diffusion of ICT affects the impact of financial development on growth. To this end, we add an interaction term constructed as the product of FD and the ICT (i.e., FD*ICT) to Eq. (2) as an additional explanatory variable, apart from the standard variables used in the economic growth equation. If the coefficient on the interaction term is positive and significant, it implies that ICT diffusion can improve the capacity of the financial system to generate high levels of economic growth.

The empirical model used can be presented as follows:

$$Growth_{i,t} = (\alpha - 1) y_{i,t-1} + \beta_1 FD_{i,t} + \beta_2 ICT_{i,t} + \beta_3 (FD_{i,t} . ICT_{i,t}) + \beta_4 X_{i,t} + \mu_t + \eta_i + \varepsilon_{i,t} \quad (3)$$

The subject model, knows both a problem of endogeneity of the variables, and a correlation among the delayed endogenous variable and the residuals. Indeed, any convergence model is dynamic and, as a result, it introduces an additional endogeneity within the explanatory variables.

In general, dynamic models are examined in first differences by the method generalized moments (GMM). In this context, Anderson and Hsiao (1982) suggested to use the lagged first differences of the endogenous variable as instruments. Arellano and Bond (1991) added to this list of instruments the lags of the endogenous variable by showing their orthogonality to the residuals.

It must be said that there are two kinds of GMM estimators, which are applicable to dynamic panels. These are the first difference GMM estimator (Arellano and Bond, 1991) and the system GMM

estimator (Blundell and Bond, 1998), which is only an improved version of the first. As its name indicates, the first difference GMM estimator consists of estimating the equation of the model in first difference, in order to control the effect specific to the statistical unit or individual. This latter method is the one used in the most recent applied works on the association between financial development and economic growth, notably those of Levine et al. (2000); it is on the results of this second method that we principally base our conclusions.

System GMM estimations allows not only to take into account the heterogeneity of countries but likewise to address the problem of the endogeneity of variables, which essentially arises when examining the association among financial development and economic growth. The first authors who were interested in this relationship highlighted the two-way causality (Patrick, 1966) between the two forms of development, if only because the increase in income is accompanied by a growth in savings and therefore acquisitions of financial assets. Work on the theory of endogenous growth has further reinforced the idea of double causality. The sharing of risks that financial intermediation allows and which promotes investment in new technologies involves costs and itself implies a certain level of product per capita (Greenwood and Jovanovic, 1990).

The technique of Arellano and Bond (1991) involves of rewriting the original equation in first differences, which eliminates individual fixed effects, and then using their own lagged levels as instruments for the differenced series. This method improves on the instrumental variable estimation of Anderson and Hsiao (1982) by mentioning to a set of orthogonality conditions defining optimal GMM estimators. It also resolves the difficult choice regarding the list of instruments. However, it has been revealed that this first version omits a set of orthogonality conditions that can be showed by considering a system consisting of two equations. Arellano and Bover (1995) and Blundell and Bond (1998) proposed the GMM method in system. This method consists of combining for each period the equation in first difference with that in level. In the equation in first difference, the predetermined variables are instrumented by their values in level lagged by at least one period. On the other hand, in the equation in level, the predetermined variables are instrumented by their first differences. The system of equations thus obtained is estimated simultaneously, using the GMM. Blundell and Bond (1998) verified this method using Monte Carlo simulations. They showed that the system GMM estimator is more efficient than the difference GMM estimator (Arellano and Bond, 1991) which only uses the moment conditions of the first difference equation with lagged variables as instruments.

Furthermore, two main tests are related with the GMM system method:

- The model over-identification test (Hansen-test), through which the validity of the instruments used is verified, in the sense that they must be correlated with the instrumented variables and not with the error term (Hansen and Singleton, 1982).
- The Arellano and Bond (1991) error autocorrelation test (AR2), which tests the first-order serial correlation of the residuals in level, by testing the second-order serial correlation of the errors in difference, given that the error terms expressed in first difference are correlated in first order, by the construction of the GMM system estimator.

Our findings confirm that there is no serial correlation, and the instruments employed are also valid. The findings of the estimation are exposed in Table (1).

4. EMPIRICAL RESULTS

At the level of table (1), the results clearly show that the coefficient of the financial development variable is positive and statistically significant at the 1% threshold, which advocates that the financial development, proxied by domestic credit to private sector by banks (% of GDP), play a

vital role in economic growth in the GCC countries. The result means that, a 5% increase in financial development will lead to 0.558% increase in real GDP growth. Economic theory argues that financial development contributes to better information about potential investment opportunities and capital allocation, which helps to stimulate economic growth. Our findings corroborate the predictions of the supply-side hypothesis, endogenous growth models, and the findings of some empirical studies such as those of Al-Jarallah (2022) and Riache et al. (2024).

Table 1. Financial development, ICT and economic growth (2008-2021)

Variable	
Initial GDP per capita	-0.648*** (-3.245)
Financial development	0.558** (2.446)
ICT	0.421** (2.459)
Financial development*ICT	0.161* (2.07)
Inflation	-0.771*** (-5.932)
Total natural resources rents	0.937*** (2.524)
Constant	15.208** (2.189)
R-squared AR(2) test (p-value) Sargan test (p-value)	0.87 0.471 0.492

Note: AR(2) is a test of second order residual serial correlation while the J-test is the Sargan over-identification test. T-statistics are in parentheses. *, ** and *** indicate a statistical significance at 10%, 5% and 1% levels, respectively.

In Table (1), ICT diffusion is proxied by the individuals using the Internet (% of population). The estimated coefficient of the ICT variable is statistically significant at the 5% threshold, which advocates that the ICT diffusion plays a positive role in economic growth in the GCC countries. More precisely, the results show that if the ICT increases by 1%, the economic growth will be increased by 0.421%. Thus, this result is consistent with those obtained by Sepehrdoust and Ghorbanseresht (2019) and Gheraia et al. (2022). Overall, these results show the essential nature of ICT in the economic development of a country. Indeed, ICT provides many positive externalities for the entire productive system and constitutes real opportunities in terms of openness and access to the international market, thus allowing GCC countries better integration into the global economy and the information society.

The result also shows the regression findings based on interaction specification using an interaction term among financial development and ICT diffusion (FD*ICT). In this specification, we relied on the interaction term to found the contingency. If the term is positive and significant, this suggests that the effect of financial development on economic growth increases with ICT diffusion. The first thing to note is that the interaction term turns out to be positively signed and statistically significant at 10 percent level. This result suggests that a better contribution of financial development to economic growth requires taking into account the interrelationship and the complementarity between financial development and the ICT diffusion. Furthermore, as financial development and information technology sectors move linked, financial goods and services will become more sophisticated, user-friendly and value-creating through this integration. Thus, a larger portion of

the population will be able to benefit from new financial services, leading to greater economic growth. Therefore, ICT diffusion can improve the capacity of the financial system in terms of improving economic growth. This result is consistent with that of Verma et al. (2023) who confirmed that ICT diffusion complement financial development to enhance economic growth in the panel of developing countries from 2005 to 2019.

Then, the coefficient of initial per capita GDP is negative and statistically significant at 1 percent level, which means that the conditional income convergence across countries hypothesis is verified: holding constant the additional factors of growth, countries with lower GDP per capita tend to grow more quickly. The initial position of the economy is therefore a central factor in economic growth, as documented by neoclassical theory. This finding is reliable with preceding studies (see, for example, Barro and Sala-i-Martin, 1995).

Moreover, we noted that the coefficient of the inflation rate has a negative sign and is then statistically significant at 1 percent level, suggesting that a high inflation rate will have an adverse impact on economic growth. The result shows that a 1% increase in inflation would decrease real GDP growth by 0.771%. This finding suggests that inflation harms the economic growth. Consequently, the adverse effect of inflation on economic growth can be explicated by the general increase in prices, which can rise production costs within firms, creating production-related difficulties. This clearly supports the works of Sadeghi et al. (2023) who affirmed that high inflation decreases economic growth in Middle Eastern countries over the period 2000-2021.

On the other hand, total natural resources rents, which is measured as a percentage of GDP, is also significant, at 1 percent level, in explaining the economic growth in GCC countries. The positive sign on this variable suggests that the higher the natural resources rent, the higher economic growth. The results show that for every 1% change in the natural resources rent, the economic growth will increase by 0.937% suggesting total natural resources rents also have an important effect on economic growth. These results are consistent with the natural resource blessing hypothesis that the abundance of natural resources aids economies overcome obstacles to economic growth. In a similar study, Ben-Salha et al. (2021) confirmed that total natural resources rents exert a positive impact on economic growth in a sample of top resource-abundant countries during the period 1970-2013.

5. CONCLUSIONS AND POLICY IMPLICATIONS

The relationship between financial development and economic growth has received much attention in the theoretical and empirical literature over the years. Consequently, this study examined the role of ICT diffusion in mediating the positive association among financial development and real GDP growth. The results confirmed that the marginal effect of financial development on economic growth depends on ICT diffusion. Then, to test our hypothesis, this study employs the GMM system and data from 3 GCC countries, namely, Oman, Qatar and United Arab Emirates over the period 2008-2021. Theoretically, the study considers the function of ICT in supporting financial policies to achieve the objective of promoting economic growth. From the empirical analysis, we drew three significant conclusions. First, the coefficient measuring the effect of financial development on economic growth is positive and significant, signifying that financial development positively impacts real GDP growth. Second, ICT diffusion is showed to be a crucial factor in economic growth in the selected countries. Finally, the effects of financial development on economic growth are conditioned by the diffusion level of ICT in particular. This confirms preceding empirical studies that have emphasised the complementary role of financial development and ICT diffusion on economic growth (Aziz et al. 2023; Behera et al. 2024).

In light of these results, it is clear that ICT, in addition to being an opportunity for technological catch-up, will significantly impact the level of development of our selected countries in the coming decades also via the financial channel. This is why, in terms of economic policy implications, the study suggests the implementation of incentive policies and regulatory measures favourable to the development of the digital finance sector (e-banking, mobile money, blockchain, etc.) in order to fully exploit the potential of ICT for the development of finance.

Secondly, it is essential to strengthen the ICT infrastructure in order to promote the quality of the telephone network and connectivity in the different countries of the space: this can be done through an attractive policy towards the private sector including foreign direct investments but also through major projects at the community level (optical fibre, satellite, etc.) undertaken by the GCC States. But this will especially encourage the development of value-added services and also the rapid penetration of emerging technologies such as the "Blockchain".

Finally, it is necessary to develop human capital and encourage entrepreneurship in the ICT sector applied to the development of financial services on mobile phones or via the Internet, all of which will have a positive impact on financial development and financial inclusion.

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