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# Dynamics of capital structure determinants: empirical evidence from GCC countries

Shoab Khan<sup>1</sup>, Tahir Akhtar<sup>1</sup> and Ameen Qasem<sup>2,3\*</sup>

## Abstract

The study empirically examines the factors affecting the financing decisions of non-financial listed companies in Gulf Cooperation Council (GCC) countries. Using static and dynamic two-step generalized method of moments techniques, it analyzes unbalanced panel data from 364 non-financial companies across six GCC countries from 2011 to 2021. The findings partially support optimal capital structure theories, highlighting significant internal factors such as profitability, market-to-book ratio, firm size, earnings volatility, and growth opportunities that influence financing decisions. While no single theory fully explains the financing choices, the association of internal factors with book and market leverage is consistent. The study provides robust and generalizable results, aiding financial institutions and policymakers in formulating pro-development policies and regulations. This research facilitates better coordination between corporate managers and financial institutions, supporting the region's economic transition. It is the first study to use extensive data from GCC non-financial firms to investigate financing decisions, offering valuable insights for investors and a basis for further analysis of capital structure choices in the region and beyond.

**Keywords** Capital structure, Non-financial firms, GCC countries, Economic growth, Diversification

## Introduction

Contemporary businesses face various internal and external challenges due to changes in the economic environment, significantly impacting their operations. These changes are crucial in shaping the firms' financing landscape, including past and future investment decisions and the associated financing choices. Such decisions have significantly influenced firms' value, making Capital Structure (CS) considerations of primary concern [12]. To maximize value, businesses aim for optimal financing to minimize the cost of capital by securing stable financial sources to acquire assets, thus creating a CS puzzle. An

incorrect financing choice could threaten the company's existence [20]. Similarly, an appropriate CS ensures the business's stability, sustainability, and growth [85]. Therefore, finance managers focus on achieving an optimal financing structure to enhance the company's value and ensure sustainability amid evolving economic conditions.

Berle and Means [21] emphasized the significance of capital in the separation of ownership and control, where ownership is based solely on providing capital to the corporation. Since then, firms have relied on various sources of capital and financing to support their operations. This mix of financing sources is known as the capital or financial structure. Modigliani and Miller's [66] debt irrelevance theorem posited that a corporation's financing structure is immaterial to the firm's value. Subsequently, the debate on financing choices shifted from the notion of irrelevance to the consideration of the costs and benefits associated with each type of financing. Modigliani and Miller [67] later argued that using debt can enhance firm value due to tax benefits. However, this does not

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necessarily imply that companies should always pursue higher debt levels in their financing decisions.

Later, the trade-off theory was promulgated based on the costs and benefits of debt relative to other financing sources. The pecking order theory is founded on information asymmetry among various financing options. Agency theory highlights the agency costs associated with debt and equity financing. Market timing theory posits that the current market conditions influence financing choices. Despite various conditional theories of CS, there is disagreement among these theories regarding their relative emphasis. Similarly, empirical evidence reports mixed findings concerning optimal financing choices and the factors affecting CS choices across different industries and economies.

The theories on CS have significantly progressed over the years, emphasizing various aspects. Empirical literature also provides substantial evidence suggesting the importance of financing mix for a firm's value. Despite some contradictions, theoretical and empirical evidence generally agree that firms' CS has shifted away from Modigliani and Miller's [66] debt irrelevance theorem. The meta-analysis of the literature review conducted by Kumar et al. [63] concludes that optimal CS remains a puzzle. There is an extensive body of empirical literature on the determining factors of CS for non-financial companies, with notable studies including Sheikh and Wang [80], Frank and Goyal [40], Huang [53], Chen and Strange [31], Chen [30], Rajan and Zingales [77], Harris and Raviv [50], and Titman and Wessels [83]. For financial firms, key studies include Khan et al. [58], Khan et al. [61], Gornall and Strebulaev [45], Gropp and Heider [47], and Amidu [11]. Despite this, the literature regarding CS issues in modern corporate finance remains ambiguous. However, empirical studies have identified the stylized effects of certain corporate internal attributes that can influence optimal financing decisions in developing and developed economies. While these stylized effects do not support a universal CS in similar economic environments, they support conditional optimal capital structures.

Despite the prevalent empirical evidence on CS determinants, there is a notable gap in the literature concerning non-financial companies operating within the Gulf Cooperation Council (GCC) economies. Previous studies have largely overlooked this specific context, leading to an insufficient understanding of the financing choices of these firms. Additionally, while the existing literature extensively supports the use of leverage in financing choices and investment decisions due to tax benefits (tax shield), the unique characteristics of GCC economies, such as relatively low corporate tax rates and distinct legal and cultural environments remain understudied.

Consequently, the main objective of this study is to identify the factors that determine CS choices for firms in the GCC with these unique features. The study also aims to explore how these firms navigate the trade-off between tax benefits and debt costs in such distinct economic and financial environments. By addressing this gap, the study seeks to enhance our understanding of the dynamics in CS determinants, providing valuable insights for both academic research and practical decision-making by corporate managers and policymakers. Hence, the study will explore the following research questions.

1. Do the factors affecting the financing structure decisions of non-financial companies in other countries have the same effect on GCC-listed firms?
2. Do financing decisions in the region's emerging economies differ from those in regions where capital markets are relatively more developed and the tax shield on debt is higher than in the GCC region?

The study's results will be valuable for corporate managers, investors, and policymakers in GCC economies. These economies rely heavily on the energy sector's revenue, particularly from oil and gas exports, as four of the six countries, Kuwait, Saudi Arabia, Qatar, and the UAE, are members of OPEC (Organization of Petroleum Exporting Countries). The depletion of natural resources and the volatility of energy prices have encouraged these economies to diversify. Various policy initiatives are being undertaken to achieve economic diversification, such as increasing private sector participation and privatizing government entities. The financing of these entities will increasingly rely on market channels from domestic and foreign investors through financial markets. Therefore, the study's findings will assist stakeholders in developing efficient financing mechanisms on both the supply and demand sides. This, in turn, will contribute to financial markets and regulatory reforms to enhance business practices, corporate governance, and financing options.

The lack of theoretical consensus and inconclusive empirical evidence on CS, along with the limited research on the dynamics of CS in GCC economies characterized by unique economic and cultural environments motivates this study. Examining the financing patterns of GCC firms is particularly relevant, as it can support the economic diversification visions of member countries by providing insights into the financing needs of growth and capital-intensive industries. Additionally, it will aid foreign investors in making informed investment decisions as GCC markets increasingly attract foreign capital.

The following section reviews the theories and empirical evidence on CS determinants, followed by a description of the data, variables, and methods utilized in the

study. The subsequent section presents the estimation results and discusses these findings. The final section concludes the study by offering recommendations and acknowledging the limitations based on the data employed.

### Overview of GCC economies

The GCC, which consists of six countries, i.e., Bahrain, KSA, Kuwait, Qatar, Oman, and the UAE, was established in 1981 in response to the need for united economic integration and to work towards the establishment of a common market and currency [15]. These countries share many similarities, including geographical proximity, a common religion, language, and culture, as well as similarities in their legal systems, economies, societies, and challenges. These similarities outweigh differences and unite them under a common framework [8, 9, 65]. Consequently, previous research has often treated the GCC countries as a single unit or as similar to a single country (see, e.g., [13, 27, 48, 65]).

The GCC countries' economic frameworks also share common aspects. With the increasing socioeconomic prominence of these countries [65], which have a population of 56.4 million and a Gross Domestic Product (GDP) at current prices of US\$ 1.7 trillion in 2021 [42], these countries account for more than 0.22 percent of global GDP [90] and 61.4 percent of the Middle East Region's GDP in 2017 [72]. Additionally, all GCC countries have access to substantial oil and gas reserves, with a significant portion of their GDP relying on the ability to export oil to various countries at favorable prices [28]. Controlling around 21% of the world's natural gas reserves and 34% of the world's oil reserves, they play a crucial role in oil market stability [10, 28]. Furthermore, the general economic activities of the GCC countries are significantly influenced by the level of oil prices, as oil revenue accounts for more than half of their GDP and about 80% of their total revenue [36]. According to Ulussever et al. [86], GCC countries depend heavily on fossil energy to sustain their economies. Consequently, variations in oil prices are expected to impact GCC countries' spending, budgeting, profitability, and firms' financing decisions.

The swift economic progress in these economies, along with increasing regulatory demands and the presence of foreign institutional investors seeking greater transparency and accountability, has prompted significant changes across the GCC countries, aiding in the development of their stock markets (Eulaiwi et al., [37]; [65]) and boosting foreign direct investment [73]. Regarding informal institutional settings, the GCC countries are recognized as tribal, family-oriented, and collectivist cultures, with ruling families often connected to local and regional

business families [7]. These cultural factors may influence companies' financing needs.

According to the International Monetary Fund (IMF) 2018 report, banks dominate the financial sector of the GCC region compared to non-bank financial institutions and debt markets, with limited access to the equity market. The report further highlights the region's diversity, noting that Saudi Arabia (KSA) is the largest economy, Bahrain has the highest banking depth, and the UAE has the largest banking sector. Al-Hassan et al. [6] state that domestic banks dominate the GCC financial sector with high capital and profit buffers that protect them from financial vulnerabilities. Similarly, Khan [59, 60] argues that GCC banks' strong capital base and profitability can meet the growing capital requirements for the region's rapid economic diversification.

Figure 1 below shows the mean and maximum values of the proxies for CS, i.e., market and book leverage, in all six GCC economies for the data sample used in the study.

The mean values of market leverage (MLEV) and book leverage (BLEV) for the entire sample are 40% and 36%, respectively. The mean BLEV for all countries, except Bahrain, is higher than the mean for the entire sample. Meanwhile, the mean MLEV for Bahrain, KSA, and Qatar is less than the mean MLEV for the entire sample. The leverage ratios indicate firms' use of borrowed money for financing purposes. For GCC firms, both ratios have mean values below 50%, indicating that these firms are comparatively less exposed to financial risk.

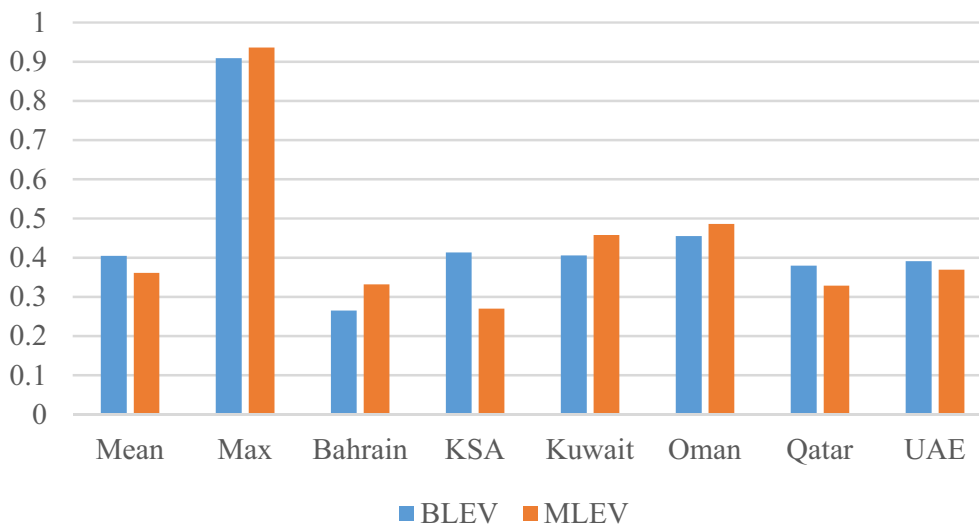
## Literature review and hypothesis development

### Theoretical literature

Since the departure from Modigliani and Miller's [66] irrelevance hypothesis, the primary theories that have emerged in the corporate finance literature to describe the optimal CS are the trade-off theory, agency theory, pecking order theory, and market timing theory. Table 1 summarizes the major conditional theories of optimal CS, their assumptions, and the researchers who proposed them.

Departing from the perfect market assumption of Modigliani and Miller's [66] debt irrelevance theorem, Kraus and Litzenberger [62] formally supported the tax advantage of interest payments and the disadvantages of bankruptcy due to the failure of debt payments as market imperfections. These factors in CS can affect the valuation of firms. According to Bradley et al. [25], the optimal financing structure of a company results from balancing the tax benefits of debt against the associated costs. Drawing on Akerlof's [5] work on the quality of information to mitigate uncertainty, Myers and Majluf [68] introduced the concept of information asymmetry related to various sources of financing. They argued that

### Graphical representation of CS in GCC



**Fig. 1** Graphical representation of CS proxies in GCC. *Source* Authors' calculation

**Table 1** Evolution of capital structure theories. *Source* Authors' compilation based on existing literature

Name of theory	Theoretical assumption	Proposed by
Debt irrelevance theory	The choice between debt or equity does not affect firm value	Modigliani and Miller [66]
Debt relevance	Debt, due to tax advantage, can be value-contributing	Modigliani and Miller [67]
Trade-off theory	Trade of between optimal level of debt and tax advantage is desired; a higher debt level could result in financial distress	Kraus and Litzenberger [62]
Agency theory	Conflict of interest among principal-principal (shareholders and creditors) and principal-agent (shareholders, creditors with managers) affect the capital structure	Jensen and Meckling [55]
Signalling theory	Each source of external financing sends different signals to the investors (debt sends more positive signals to investors than equity)	Ross [76]
Pecking-order theory	To avoid adverse selection information asymmetry, managers should use internal fund sources (retained earnings) followed by debt and equity	Myers and Majluf [68]
Free cash flow theory	Debt related obligations result into lower free cash available with managers' this could prevent managerial opportunism and various agency costs	Jensen [56]
Market timing theory	The choice between debt and equity depends on the market situation/sentiments	Baker and Wurgler [18]

information asymmetry arises from the separation of ownership and professional management. Based on the hierarchy of information costs, they introduced the pecking order theory, which advocates using the most liquid internal funds first.

The concept of information asymmetry and related agency costs was first introduced by Donaldson (1961) and further developed by Jensen and Meckling [55]. Proponents of agency theory propose that higher leverage can reduce agency costs arising from debt obligations, as it encourages managers to act in the best interests of the principals to avoid the threat of job loss or salary reduction. Grossman and Hart [46] stated that the principal-agent conflict is an incentive problem and suggested that

managers' pursuit of profit can mitigate it. The threat of bankruptcy, an agency cost, motivates managers to increase profitability to retain their benefits. Thus, the efficacy of bankruptcy as a disciplinary mechanism for managers depends on a firm's financial structure [46], p. 108).

Traditional theories of CS focus on achieving financial objectives through a targeted level of debt, as seen in static models of CS. However, the literature also highlights dynamic models of CS. For instance, even small recapitalization costs can lead to significant fluctuations in a firm's debt ratio over time [39]. Similarly, studies by Titman and Tsyplakov [84], DeAngelo et al. [33], and Flannery and Hankins [41] support the notion that firms

may deviate from their targeted leverage ratios. Despite this, majority of the literature supports the targeted than changing debt level. However, the debate on the optimal level of leverage and the variation in leverage ratios remains inconclusive.

### Empirical literature

Empirical studies, such as those by Titman and Wessels [83] and Frank and Goyal [40] on U.S. data, Rajan and Zingales [77] on international data, Chen [30] and Huang [53] on China, Sheikh and Wang [80] and Jahanzeb et al. [54] on Pakistan, M'ng et al. [69] on Malaysia, Singapore, and Thailand, and Booth et al. [24] on developing countries, have explored various significant factors that affect firms' financing choices. Thi Viet Nguyen et al. [82] reported that CS enhances firms' effectiveness. Harris and Raviv [50] explicitly reviewed theories of CS, while Parsons and Titman [71] provided a comprehensive review of empirical research on capital/financial structure, concluding the effectiveness of a conditional optimal financing mix for firms. These studies highlighted profitability, market-to-book ratio, firm size, non-debt tax shield, tangible assets, earnings volatility, asset growth, and other factors as significant determinants of financing structure. The current study adopts these factors for empirical investigation of non-financial firms in the GCC. The predictions of the present theories of optimal CS and empirical findings on these factors are summarized in Table 2. Although many studies have highlighted these factors and supported the assumptions of various conditional CS theories, they have not agreed on a single universal relationship between these determinants and firms' leverage.

In addition to the firms' internal factors used as explanatory variables, various studies have employed external macroeconomic indicators. GDP growth is used as a proxy for economic growth, and the inflation rate is used to control for macroeconomic factors that significantly impact financing choices (see [19, 57, 58, 61]).

Based on theoretical predictions and empirical evidence, this study formulates the following hypotheses regarding the factors influencing the financing decisions of non-financial listed firms in the GCC.

*H1* There is a negative association between profitability and leverage.

*H2* There is a positive association between market-to-book ratio and leverage.

*H3* There is a positive association between size and leverage.

*H4* There is a negative association between non-debt tax shield and leverage.

*H5* There is a positive association between asset structure (tangibility) and leverage.

*H6* There is a positive association between volatile earnings and leverage.

*H7* There is a positive relationship between asset growth (growth opportunities) and leverage.

## Data and research methods

### Data and sample

This study investigates the financing choices and their determinants for non-financial companies listed in the capital markets of GCC countries. The data to compute the variables used in the study were obtained from Thomson One DataStream. The primary sample consists of non-financial publicly listed companies in Bahrain, KSA, Kuwait, Qatar, Oman, and the UAE, with data available from 2011 to 2021. Companies with insufficient information were excluded from the sample. All continuous variables were winsorized at the 1st and 99th percentiles to mitigate the impact of extreme values on the regression analysis. This resulted in a final sample of 3682 company-year observations from 364 companies, covering ten sectors according to Industry Classification Benchmark (ICB) classifications. The ten sectors included in the study are Industrials (1111 observations, 30.17%), Real Estate (611 observations, 16.59%), Consumer Discretionary (491 observations, 13.34%), Consumer Staples (396 observations, 10.76%), Basic Materials (321 observations, 8.72%), Telecommunications (223 observations, 6.06%), Energy (198 observations, 5.38%), Utilities (153 observations, 4.16%), Health Care (132 observations, 3.59%), and Technology (46 observations, 1.25%). The sampling procedure is summarized in Table 3.

Table 4 demonstrates the study's final sample distribution based on GCC countries (Panel A), years (Panel B), and industry (Panel C). The results in Table 4, Panel A, show that KSA has the most observations at 1,428 (38.78%), followed by Kuwait at 938 (25.48%), the UAE at 526 (14.29%), Oman at 387 (10.51%), Qatar at 281 (7.63%), and Bahrain at 122 (3.31%). The results in Panel B of Table 4 display the study sample distribution by years, whereas Panel C shows the distribution of the observations by industry based on ICB classifications.

### Variables description

For meaningful comparison with prior research, the present study defines the variables based on existing



**Table 2** Theoretical prediction and summary of empirical evidence. Source Authors' compilation from the literature

Factor	Empirical evidence	Theoretical prediction	Concept
Profitability	Titman and Wessels [83], Booth et al. [24], Chen [30], De Jong et al. [35], Frank and Goyal [40], Sheikh and Wang [80] Abor [2], Nguyen et al. [70]	Pecking order theory (-) Trade-off theory (+)	Profitable firms will use internal funds (retained earnings) Profitable firms will have sufficient funds to meet the debt-related obligations and borrow more to save tax on debt otherwise, debt
Market-to-book ratio	Rajan and Zingales [77], Frank and Goyal [40], Gropp and Heider [47]	Market timing theory (-)	When firms have higher market value, they issue equity, otherwise, debt
Size of the firm	Rajan and Zingales [77], Wald [87], Zou and Xiao [91], Frank and Goyal [40], Sheikh and Wang [80] Titman and Wessels [83], Chen [30]	Trade-off theory (+) Pecking order theory (-)	Larger firms with more assets are highly geared and, due to diversified assets, less prone to bankruptcy For larger firms, information asymmetry is less severe compared to small firms
Non-debt tax shield	Chen [30], Sheikh and Wang [80], González and González [44]	Trade-off theory (+)	Firms with other tax shield expenses like depreciation are not using debt for tax savings
Tangibility (Structure of assets)	Rajan and Zingales [77], Chen [30], Wald [87], Huang [53], Zou and Xiao [91], Frank and Goyal [40], González and González [44]	Trade-off; Pecking order & Agency theory (+)	Tangible assets could be used as collateral to increase borrowing, reducing information asymmetry and agency costs and increasing the tax advantage on debt
Earnings volatility	Bradely et al. (1984); Booth et al. [24], Chen [30], Sheikh and Wang [80]	Trade-off theory (-)	Firms with volatile earnings may fail to meet the debt-related obligations
Asset growth	Zou and Xiao [91] and Eriotis et al. [38] Wald [87], Chen [30], González and González [44]	Trade-off and Agency theory (-) Pecking order (+)	Growth opportunities (asset structure) are intangible assets that cannot be used as collateral, and more growth reduces the leverage. More opportunities can entrench managers to invest in multiple opportunities Potential growth opportunities increase the financing demand and are more likely to increase debt

**Table 3** Sample selection. *Source* Authors' compilation

Description	No. of company-years
Companies listed in GCC markets with available data on DataStream from 2011 to 2021	9168
Less: Financial services companies	2460
Less: Companies with incomplete data in DataStream	3026
Final Sample	3682

literature. Following [4], this study utilizes book leverage (a managerial-based measurement) and market leverage (a market-based measurement) as dependent variables, which serve as proxies for a company's CS. The independent variables include profitability, market-to-book ratio, company size, non-debt tax shield, asset structure (tangibility), earnings volatility, and asset growth (growth opportunities). Macroeconomic factors, specifically economic growth (annual GDP growth rate) and inflation rate are used as control variables. The descriptions of all variables are presented in Table 5.

**Model specification**

The study employs static and dynamic panel estimation methods to assess the determinants of CS among companies listed in GCC countries. The static techniques utilized in this study are pooled ordinary least squares (OLS), the random-effects (REs) model, the fixed-effects (FEs) model, the feasible generalized least squares (FGLS) model, and panel-corrected standard error (PCSE). The dynamic technique utilized is the two-step generalized method of moments (GMM) model. The regression models were first examined using static panel estimation techniques to test the study hypotheses. The Breusch-Pagan Lagrange Multiplier (BPLM) test evaluates the null hypothesis that no REs exist, allowing for a choice between pooled OLS and RE regression models. If the null hypothesis is rejected, it suggests that the pooled OLS technique is unsuitable.

The Hausman [51] specification test indicates acceptance of the null hypothesis, suggesting that the REs model is consistent and efficient for choosing between REs and FEs models. The FGLS regression model is robust in the presence of first-order autoregressive disturbances within unbalanced panels and accounts for

**Table 4** Number of firm-year observations in the sample. *Source* Authors' compilation based on existing literature

Panel A: by GCC countries	Freq	Percent	Cum
KSA	1428	38.78	38.78
Kuwait	938	25.48	64.26
UAE	526	14.29	78.55
Oman	387	10.51	89.06
Qatar	281	7.63	96.69
Bahrain	122	3.31	100
Total	3682	100	
Panel B: by Year	Freq	Percent	Cum
2011	294	7.98	7.98
2012	303	8.23	16.21
2013	312	8.47	24.69
2014	319	8.66	33.35
2015	327	8.88	42.23
2016	333	9.04	51.28
2017	346	9.40	60.67
2018	364	9.89	70.56
2019	364	9.89	80.45
2020	364	9.89	90.33
2021	356	9.67	100.00
Total	3682	100	
Panel C: by Industry	Freq	Percent	Cum
Industrials	1111	30.17	30.17
Real Estate	611	16.59	46.76
Consumer Discretionary	491	13.34	60.1
Consumer Staples	396	10.76	70.86
Basic Materials	321	8.72	79.58
Telecommunications	223	6.06	85.64
Energy	198	5.38	91.02
Utilities	153	4.16	95.18
Health Care	132	3.59	98.77
Technology	46	1.25	100
Total	3682	100	

cross-sectional correlation and heteroscedasticity across panels (Wooldridge [89]). Furthermore, the FGLS model appropriately addresses issues such as normality and homoscedasticity in the data. Hoechle [52] highlights that, except for PCSE, most panel data estimators cannot simultaneously handle serial correlation and cross-sectional dependency. PCSE, a two-step modified version of the 'inefficient' OLS, outperforms pooled OLS, REs, FEs, and FGLS estimators in the presence of serial correlation and cross-sectional dependency in panel data [16, 52].

$$BLV_{it} = \beta_0 + \beta_1 PROF_{it} + \beta_2 MBR_{it} + \beta_3 SZ_{it} + \beta_4 NDTS_{it} + \beta_5 TANG_{it} + \beta_6 EVOL_{it} + \beta_7 ASTGRW_{it} + \beta_8 EG_t + \beta_9 IN_t + Fixedeffects + \epsilon_{it} \tag{1}$$

**Table 5** Variable definitions. *Source* Authors' compilation

Variable name	Acronym	Description
<i>Dependent variables</i>		
Book leverage	BLEV	Total liabilities / Total assets
Market leverage	MLEV	1 – (Market capitalization / Market value of company)
<i>Independent variables</i>		
Profitability	PROF	Operating income / Total assets
Market-to-book ratio	MBR	Market equity plus total debt scaled by the book value of total assets
Size	SZ	Natural log of total assets
Non debt tax Shield	NDTS	Depreciation expense / Total assets
Tangibility	TANG	Fixed assets / Total assets
Earnings volatility	EVOL	(Operating income <sub>t</sub> —Operating income <sub>t-1</sub> ) / Operating income <sub>t-1</sub>
Assets growth	ASTGRW	(Total assets <sub>t</sub> —Total assets <sub>t-1</sub> ) / Total assets <sub>t-1</sub> -
<i>Control variables</i>		
Economic growth	EG	Annual GDP growth rate
Inflation rate	IN	Annual inflation rate

$$MLV_{it} = \beta_0 + \beta_1 PROF_{it} + \beta_2 MBR_{it} + \beta_3 SZ_{it} + \beta_4 NDTS_{it} + \beta_5 TANG_{it} + \beta_6 EVOL_{it} + \beta_7 ASTGRW_{it} + \beta_8 EG_t + \beta_9 IN_t + Fixedeffects + \varepsilon_{it} \tag{2}$$

Baltagi [17] emphasizes that in a dynamic model with panel data, REs and FE models are biased. Additionally, he claims that pooled OLS is inconsistent and biased, even when error terms are not serially correlated. GMM is more effective than static models because it accounts for endogeneity and heteroscedasticity [49, 64]. Therefore, the current study utilizes the dynamic GMM

estimator, as the determinants of CS may suffer from omitted variable bias and endogeneity. The GMM estimator is also employed in this study for its robustness in reducing bias in finite samples and increasing efficiency. Furthermore, the GMM model addresses the unit-root property issue, yielding more precise results [1, 22, 23, 78, 79]). The dynamic models for Eqs. (1) and (2) can be formulated as follows:

$$BLV_{it} = \beta_0 + \beta_1 BLV_{it-1} + \beta_2 PROF_{it} + \beta_3 MBR_{it} + \beta_4 SZ_{it} + \beta_5 NDTS_{it} + \beta_6 TANG_{it} + \beta_7 EVOL_{it} + \beta_8 ASTGRW_{it} + \beta_9 EG_t + \beta_{10} IN_t + Fixedeffects + \varepsilon_{it} \tag{3}$$

**Table 6** Descriptive statistics. *Source* Authors' calculation

Descriptive statistics of the whole sample (N = 3682)					Descriptive statistics (means) by country (N = 3682)					
Variable	Mean	Median	Min	Max	Bahrain	KSA	Kuwait	Oman	Qatar	UAE
BLEV	0.405	0.396	0.004	0.909	0.265	0.413	0.406	0.455	0.380	0.391
MLEV	0.361	0.311	0.002	0.936	0.332	0.270	0.458	0.486	0.329	0.369
PROF	0.041	0.037	-0.770	0.598	-0.002	0.060	0.018	0.065	0.015	0.033
MBR	1.540	1.001	0.113	28.552	0.706	2.161	0.926	0.842	1.251	1.810
SIZE	13.458	13.556	7.665	21.488	11.567	14.675	11.454	11.139	15.392	14.840
NDTS	0.030	0.027	0.000	0.287	0.043	0.036	0.022	0.038	0.020	0.026
TANG	0.422	0.418	0.000	0.995	0.442	0.484	0.359	0.467	0.375	0.354
EVOI	-0.007	-0.033	-26.814	39.616	-0.053	-0.100	0.022	0.258	-0.060	0.041
ASTGRW	0.045	0.019	-0.946	2.701	0.042	0.065	0.021	0.047	0.040	0.035
EG	2.148	2.514	-8.855	13.375	2.399	2.325	0.911	2.639	3.149	2.921
INF	1.881	2.236	-2.540	5.826	1.259	2.055	2.656	1.118	1.276	1.054

All variables are defined in Table 5



$$MLV_{it} = \beta_0 + \beta_1 MLV_{it-1} + \beta_2 PROF_{it} + \beta_3 MBR_{it} + \beta_4 SZ_{it} + \beta_5 NDTs_{it} + \beta_6 TANG_{it} + \beta_7 EVOL_{it} + \beta_8 ASTGRW_{it} + \beta_9 EG_t + \beta_{10} IN_t + Fixedeffects + \epsilon_{it} \tag{4}$$

**Empirical results**

**Descriptive summary/statistics**

Table 6 provides a descriptive summary of the regression variables across all GCC countries, including the mean value of each variable for each country. The results indicate that the mean (median) value of book leverage (BLEV) is 0.405 (0.396), while the market leverage (MLEV) has a mean (median) value of 0.361 (0.311). The data show that Oman’s companies have the highest average values for BLEV and MLEV, at 0.455 and 0.486, respectively. In contrast, Bahrain has the lowest average BLEV at 0.265, and KSA has the lowest MLEV at 0.270. The profitability (PROF) and market-to-book ratio (MBR) have mean (median) values of 0.405 (0.396) and 1.540 (1.001), respectively. The mean (median) values for company size (SZ) and non-debt tax shield (NDTS) are 13.458 (13.556) and 0.030 (0.027), respectively. Tangibility (TANG) and earnings volatility (EVOL) have average (median) values of 0.422 (0.418) and -0.007 (-0.033), respectively. The sample companies exhibit a mean (median) asset growth (ASTGRW) of 0.045 (0.019). For the control variables, the mean (median) value of economic growth (EG) is 2.148 (2.514), and the inflation rate (IN) is 1.881 (2.236).

**Correlation analysis**

Pearson’s correlation is applied to check for multicollinearity among variables. The outcomes are shown in Table 7. The results demonstrate a low correlation between the variables, indicating the absence of multicollinearity. The maximum correlation is between BLEV

and MLEV, as both measurements use almost similar definitions.

**Regression results**

Regression results are given in Table 8 for all models applied in this study. As explained above in Sect. 3.3, this study first estimates the models using pooled OLS. The Table 8 results specify that the coefficients of most independent variables are statistically significant for both BLEV and MLEV. Likewise, the results of RE’s regression models indicate that the coefficients of most independent variables are statistically and significantly associated with both BLEV and MLEV. However, the BPLM test results overruled the null hypothesis, implying that the REs model is more suitable than pooled OLS [26, 43, 74]. Next, the Hausman test indicates that the FEs model is more suitable. Unfortunately, the diagnostic tests have shown that the chosen FEs model is flawed. In particular, the residuals are serially correlated, and the error variance created by the chosen FEs model is heteroscedastic. This study re-investigates the chosen FEs model using the FGLS and PCSE regression models to address these issues. Table 8 shows the findings, demonstrating that most independent variables’ coefficients are statistically significant with both BLEV and MLEV.

Although the results from static models show that the coefficients of most independent variables are statistically and significantly associated with both BLEV and MLEV, which are following several earlier studies, such as Booth et al. [24], Chen [30], Zou and Xiao [91], Frank and Goyal [40], Sheikh and Wang [80], González and González [44], Khan et al. [61] and Akbar et al. [4]. The results are

**Table 7** Correlation matrix. Source Authors’ calculation

Variables	BLEV	MLEV	PROF	MBR	SZ	NDTS	TANG	EVOI	ASTGRW	EG	INF
BLEV	1.000										
MLEV	0.702***	1.000									
PROF	-0.114***	-0.317***	1.000								
MBR	-0.065***	-0.516***	0.305***	1.000							
SZ	0.229***	-0.016	0.173***	0.116***	1.000						
NDTS	0.165***	-0.055***	0.127***	0.138***	0.067***	1.000					
TANG	0.132***	0.047***	0.078***	0.087***	0.163***	0.324***	1.000				
EVOI	0.016	-0.022	0.080***	0.021	0.012	0.006	0.027*	1.000			
ASTGRW	0.085***	-0.063***	0.243***	0.129***	0.098***	-0.026	0.043***	0.073***	1.000		
EG	-0.050***	-0.055***	0.135***	0.051***	0.090***	-0.029*	0.010	0.017	0.088***	1.000	
INF	-0.035**	-0.016	0.050***	0.018	-0.091***	-0.066***	-0.021	-0.009	0.014	0.374***	1.000

\*\*\*, \*\* and \* significance, at  $p < 0.01$ ;  $< 0.05$  and  $p < 0.1$

**Table 8** Regression results of determinants of capital structure in GCC countries over the period 2011–2021. Source Authors' calculation

	OLS		Random Effect		Fixed Effect		FGLS		PCSE		GMM		MLEV		MLEV		MLEV	
	BLEV	MLEV	BLEV	MLEV	BLEV	MLEV	BLEV	MLEV	BLEV	MLEV	BLEV	MLEV	BLEV	MLEV	BLEV	MLEV	BLEV	MLEV
LBLEV																		
LMLEV																		
PROF	-0.679*** (0.045)	-0.843*** (0.041)	-0.389*** (0.073)	-0.208*** (0.039)	-0.299*** (0.079)	-0.112*** (0.038)	-0.407*** (0.023)	-0.286*** (0.017)	-0.413*** (0.035)	-0.352*** (0.029)	-1.691*** (0.162)	0.252*** (0.031)	0.195*** (0.039)	-0.746*** (0.177)				
MBR	0.000 (0.002)	-0.059*** (0.002)	0.023*** (0.006)	0.030*** (0.004)	0.048*** (0.009)	0.058*** (0.005)	0.012*** (0.003)	-0.024*** (0.002)	0.017*** (0.004)	-0.026*** (0.003)	0.092*** (0.019)			0.053*** (0.015)				
SZ	0.053*** (0.002)	0.038*** (0.003)	0.094*** (0.010)	0.220*** (0.011)	0.168*** (0.018)	0.304*** (0.011)	0.076*** (0.003)	0.066*** (0.002)	0.068*** (0.004)	0.061*** (0.004)	0.183*** (0.036)			0.255*** (0.032)				
NDTS	1.480*** (0.167)	0.489*** (0.170)	0.490 (0.328)	0.105 (0.194)	0.506 (0.347)	0.241 (0.180)	0.364*** (0.100)	-0.048 (0.078)	0.561*** (0.146)	-0.047 (0.124)	0.944 (0.801)			-0.124 (0.604)				
TANG	0.012 (0.014)	0.044*** (0.015)	0.162*** (0.036)	0.098*** (0.024)	0.184*** (0.038)	0.093*** (0.022)	0.094*** (0.011)	0.056*** (0.009)	0.091*** (0.016)	0.058*** (0.013)	0.034 (0.079)			-0.003 (0.051)				
EVOI	0.002 (0.002)	-0.001 (0.002)	0.001 (0.001)	0.000 (0.001)	0.002 (0.001)	0.000 (0.001)	-0.000 (0.000)	-0.000 (0.000)	0.001 (0.001)	-0.000 (0.000)	0.016*** (0.002)			0.005** (0.002)				
ASTGRW	0.129*** (0.022)	0.051** (0.021)	0.044*** (0.014)	0.032*** (0.008)	0.027* (0.014)	0.017** (0.008)	0.076*** (0.006)	0.068*** (0.005)	0.064*** (0.009)	0.074*** (0.007)	0.114*** (0.021)			0.074*** (0.018)				
EG	-0.000 (0.002)	0.001 (0.002)	-0.000 (0.001)	-0.000 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.001)	0.000 (0.001)	0.002 (0.002)			-0.001 (0.001)				
INF	-0.002 (0.003)	-0.001 (0.003)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	0.000 (0.000)	0.000 (0.000)	-0.001 (0.001)	-0.000 (0.001)	-0.002 (0.003)			0.000 (0.002)				
_cons	-0.471*** (0.038)	-0.148*** (0.043)	-1.027*** (0.131)	-2.459*** (0.178)	-1.996*** (0.250)	-3.841*** (0.151)	-0.767*** (0.041)	-0.535*** (0.033)	-0.671*** (0.060)	-0.457*** (0.055)	0.989 (2.162)			-2.898 (2.160)				
Observations	3682	3682	3682	3682	3682	3682	3682	3682	3682	3682	3682			3682				
R <sup>2</sup>	0.2830	0.4477	0.2173	0.1104	0.0549	0.0056								3318				
Chi2							2445.63	5652.94	843.75	1997.95	1174.19			740.54				
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes				
Country Dummies	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes			Yes				
Sector Dummies	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes			Yes				
Breusch-Pagan LM test for random effect	9994.84***	12434.73***												Yes				
Hausman test			474.06***	12132.43***										Yes				
Heteroskedasticity test					0.4988	79.46***								Yes				
Wooldridge test for AR (1)					302.028***	138.628***								Yes				

**Table 8** (continued)

	OLS		Random Effect		Fixed Effect		FGLS		PCSE		GMM		MLEV		MLEV		MLEV			
	BLEV	MLEV	BLEV	MLEV	BLEV	MLEV	BLEV	MLEV	BLEV	MLEV	BLEV	MLEV	BLEV	MLEV	BLEV	MLEV	BLEV	MLEV		
<i>AR (2) p-value</i>																			0.274	0.236
<i>Hansen p-value</i>																			0.425	1.000

\*\*\*, \*\* and \* significance, at  $p < 0.01$ ,  $< 0.05$  and  $p < 0.1$

likely to be affected by other sources of endogeneity, such as simultaneity and dynamic endogeneity, which static models do not consider. As a result, the two-step system GMM technique was used in this study, allowing us to control for the various causes of endogeneity [88].

The last two columns of Table 8 present the GMM estimation results. In order to make sure that our GMM estimation models are unbiased and valid, some diagnostic tests should be fulfilled. For example, the lagged dependent variable's coefficient and the other explanatory factors may be biased if the models show second-order serial correlation and the instrumental variables positively correlate with the error term [4]. First, second-order serial correlation should not exist, which means that AR (2) should be insignificant. Second, the number of instruments should be less than the number of groups. Third, it is necessary to accept the null hypothesis, i.e., no relationship exists between the instruments and the error term. Hence, the Hansen test should have an insignificant value [14]. The results in Table 8 indicate that all three diagnostic criteria are fulfilled.

The empirical outcomes indicate that profitability is negatively and significantly related to BLEV and MLEV. Market-to-book ratio and firm size show a positive and significant association with both the leverage proxies. The association of NDTs with leverage is negative and insignificant. Asset structure (tangibility) has positive and negative but insignificant relations with BLEV and MLEV, respectively. Earnings volatility is positively and significantly related to both proxies of leverage. Asset growth represents growth opportunities and is positively associated with leverage measures. The macroeconomic indicators of economic growth have a statistically insignificant positive relation with BLEV and a negative one with MLEV. Inflation is negatively and positively but insignificantly related to BLEV and MLEV, respectively. Finally, it is observed that even though BLEV and MLEV are two different measures used for leverage, the estimation results are similar for both measures. The study outcomes are consistent with prior research findings, such as Bradley et al. [25], Titman and Wessels [83], Rajan and Zingales [77], Wald [87], Booth et al. [24], Chen [30], Zou and Xiao [91], Frank and Goyal [40], Sheikh and Wang [80], González and González [44], Khan et al. [61] and Akbar et al. [4].

#### Further investigation, excluding the Covid-19 period

The study further examines the association between leverage and explanatory variables for the period before COVID-19 by excluding the sample of the pandemic, specifically the years 2020–2021. This exclusion was necessary because pandemics or natural disasters can disrupt long-term patterns or trends, compelling economic

players to make extraordinary or abnormal decisions, unlike those made under normal conditions. To avoid any impact of the COVID-19 pandemic on the reliability of the study's findings, the duration of the pandemic was excluded and analysed separately. Consistent with the complete sample, profitability has a negative and highly significant relationship with both BLEV and MLEV. The market-to-book ratio and firm size show a significant positive relationship with the proxies of leverage for the full study period, excluding the COVID-19 timeframe. NDTs is positively associated with leverage proxies but is only significant with BLEV. Asset structure (tangibility) has a negative and insignificant relationship with BLEV and MLEV. Earnings volatility has an insignificant positive relationship with both leverage proxies. Asset growth is positively associated with BLEV and MLEV but is significant with BLEV only. Economic growth has a positive and significant relationship with both BLEV and MLEV. Inflation has a negatively significant relationship with BLEV and a positive but insignificant relationship with MLEV. The outcomes are consistent with the complete sample, with some variations. For instance, NDTs shows a negative and insignificant association with leverage for the full sample, but before COVID-19, it showed a positive significant relationship with BLEV. Earnings volatility has a significant relationship with leverage for the complete sample but shows an insignificant positive relationship before the pandemic. GDP growth was positive, and inflation had a strong negative association with BLEV before the pandemic (Table 9).

#### Discussion on results

The relationship between profitability and BLEV and MLEV is significantly negative, supporting the pecking order theory's assumption that profitable firms prefer using internal funds to avoid information asymmetry. The results suggest that profitable firms in the GCC region tend to rely on internal funds, such as retained earnings, when financing is needed. These findings are consistent with empirical studies across various economies, including those by Titman and Wessels [83], Booth et al. [24], Chen [30], De Jong et al. [35], Frank and Goyal [40], Sheikh and Wang [80], Chipeta and Deressa [32], Sheikh and Qureshi [81], Khan et al. [61], Ratih [75], and Akbar et al. [4].

The positive and significant association of the market-to-book ratio with both BLEV and MLEV suggests that growing firms utilize a combination of debt and equity to meet their increasing capital needs rather than relying solely on equity. This finding contradicts the market timing theory, which posits a negative relationship between the market-to-book ratio and leverage. Furthermore, our results differ from those of Rajan and Zingales

**Table 9** Regression results of determinants of capital structure in GCC countries (excluding Covid-19 period 2020–2021). Source Authors' calculation

	OLS		Random Effect		Fixed Effect		FGLS		PCSE		GMM		MLEV	BLEV	MLEV	BLEV	MLEV
	BLEV	MLEV	BLEV	MLEV	BLEV	MLEV	BLEV	MLEV	BLEV	MLEV	BLEV	MLEV					
LBLEV													0.140*** (0.043)				
LMLEV																	0.075* (0.043)
PROF	-0.639*** (0.050)	-0.827*** (0.046)	-0.329*** (0.071)	-0.186*** (0.041)	-0.227*** (0.076)	-0.073* (0.038)	-0.378*** (0.028)	-0.295*** (0.020)	-0.440*** (0.041)	-0.379*** (0.035)	-0.886*** (0.223)	-0.629*** (0.151)					
MBR	-0.000 (0.061)	-0.058*** (0.007)	0.018*** (0.007)	0.027*** (0.004)	0.047*** (0.010)	0.084** (0.005)	0.039** (0.003)	0.020 (0.003)	0.065*** (0.005)	0.057*** (0.004)	0.065*** (0.061)	0.267*** (0.029)					
SZ	0.055*** (0.003)	0.038*** (0.003)	0.095*** (0.010)	0.214*** (0.012)	0.188*** (0.020)	0.316*** (0.012)	0.074*** (0.003)	0.065*** (0.003)	0.065*** (0.005)	0.065*** (0.004)	0.065*** (0.061)	0.267*** (0.029)					
NIDTS	1.178*** (0.186)	0.435** (0.198)	0.392 (0.315)	-0.026 (0.183)	0.527 (0.332)	0.203 (0.155)	0.300*** (0.103)	-0.032 (0.084)	0.426*** (0.159)	-0.133 (0.140)	1.721** (0.877)	0.138 (0.652)					
TANG	0.015 (0.016)	0.039** (0.017)	0.144*** (0.037)	0.088*** (0.024)	0.162*** (0.040)	0.078*** (0.021)	0.075*** (0.012)	0.051*** (0.010)	0.071*** (0.017)	0.053*** (0.015)	-0.036 (0.139)	-0.008 (0.059)					
EVOI	0.003 (0.002)	-0.000 (0.002)	0.001 (0.001)	-0.000 (0.001)	0.002* (0.001)	0.000 (0.001)	-0.000 (0.000)	-0.000 (0.000)	0.001 (0.001)	-0.000 (0.001)	0.006 (0.004)	0.002 (0.002)					
ASTGRW	0.139*** (0.025)	0.055** (0.024)	0.044*** (0.015)	0.028*** (0.010)	0.022 (0.015)	0.010 (0.009)	0.081*** (0.006)	0.069*** (0.005)	0.067*** (0.010)	0.068*** (0.008)	0.058** (0.025)	0.015 (0.020)					
EG	0.000 (0.002)	0.000 (0.002)	0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.001)	0.000 (0.001)	0.006* (0.004)	0.003* (0.002)					
INF	-0.006** (0.003)	-0.001 (0.003)	-0.006*** (0.002)	-0.002** (0.001)	-0.006*** (0.002)	-0.003*** (0.001)	-0.001 (0.001)	0.000 (0.001)	-0.002* (0.001)	-0.000 (0.001)	-0.011** (0.005)	0.000 (0.002)					
_cons	-0.464*** (0.043)	-0.140*** (0.050)	-1.006*** (0.135)	-2.362*** (0.188)	-2.239*** (0.281)	-3.989*** (0.160)	-0.728*** (0.041)	-0.535*** (0.038)	-0.625*** (0.061)	-0.398*** (0.062)	-2.169 (2.929)	3.673 (10.308)					
Observations	2962	2962	2962	2962	2962	2962	2962	2962	2962	2962	2962	2962	2962	2962	2962	2962	2962
R <sup>2</sup>	0.2835	0.4423	0.2245	0.1074	0.0553	0.0061	2547.34	4827.58	775.56	1529.91	318.56	517.44					
Chi2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes					
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes					
Country Dummies	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes					
Sector Dummies	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes					
AR(2) p-value													0.375				
Hansen p-value													0.537				

\*\*\*, \*\* and \* significance, at  $p < 0.01$ ;  $< 0.05$  and  $p < 0.1$



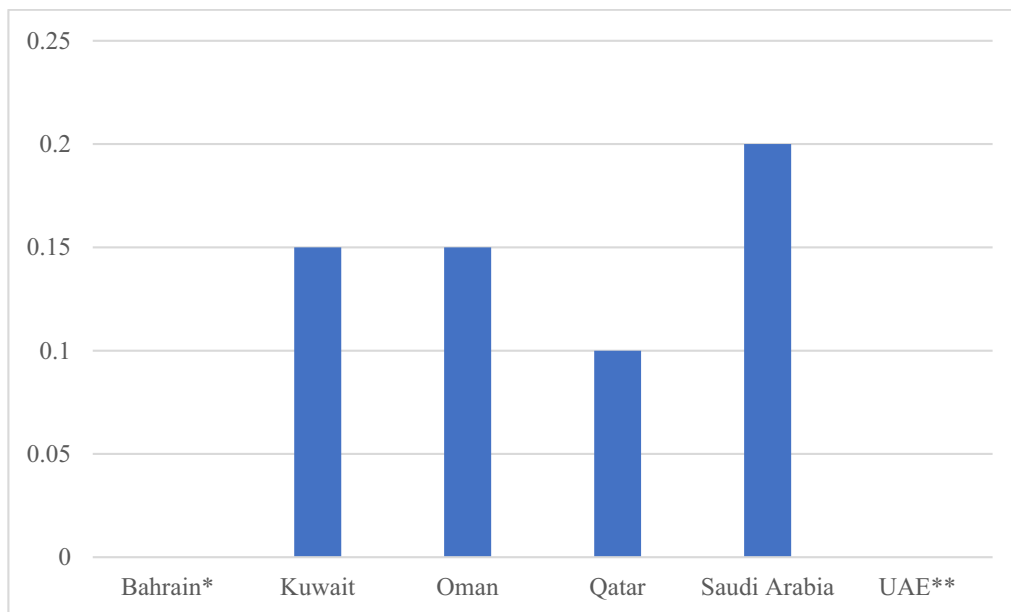
[77], Frank and Goyal [40], Gropp and Heider [47], and Ratih [75]. Chen and Zhao [29] argue that the negative relationship is not robust, reporting a positive relationship between the market-to-book ratio and leverage. They suggest that companies with higher market-to-book ratios are more likely to be profitable and can secure debt at a lower cost, making borrowing more advantageous than issuing equity. Table 6 summarizes the market-to-book ratio, with a mean value of 1.54, indicating that firms in the GCC region have high market-to-book ratios and are profitable, thereby showing a preference for debt over equity. Consequently, the proposed hypothesis is accepted.

Both empirical and theoretical literature suggest an equivocal relationship between firm size and leverage. This study found a positive and significant association between firm size, BLEV, and MLEV. This finding aligns with the assumptions of the trade-off and pecking order theories. Larger firms are presumed to be more diversified, resulting in lower bankruptcy costs and encouraging more borrowing. The results are consistent with those of Rajan and Zingales [77], Wald [87], Frank and Goyal [40], Sheikh and Wang [80], M'ng et al. [69], Ahmed and McMillan [3], and Ratih [75]. Therefore, the hypothesis of a positive association between leverage and firm size is accepted.

The general assumption that tax benefits from debt-related payments are beneficial does not hold for firms with low or negative income. As an alternative, DeAngelo

[34] highlighted depreciation deductions and investment tax credits as tax-deductible expenses other than debt, suggesting they can serve as a tax shield substitute for debt. In the case of GCC firms, NDTs aligns with this argument, as it shows a negative association with leverage, although the relationship is insignificant. This phenomenon is unique to GCC economies compared to other economies, particularly developed ones, as reported by Rajan and Zingales [77], who noted that a higher corporate tax rate in developed economies incentivizes managers to use debt. Hence, tax incentives on various instruments, such as debt and NDTs, have no significant impact on firms operating in the GCC region. Figure 2 shows the corporate tax rate in all GCC economies, which is relatively lower than several economies.

Asset structure (tangibility) demonstrates a strong positive relationship with BLEV but a negative and insignificant relationship with MLEV. This suggests that tangible assets significantly influence firms' financing decisions. The collateralization of physical assets can minimize the transaction costs associated with various financing sources. Secured debt issuance reduces information asymmetry and related transaction costs, supporting the rationale of the pecking order theory. Additionally, creditor monitoring can minimize managerial opportunism and reduce agency costs, as proposed by agency theory. Endorsing the assumptions of trade-off, pecking order, and agency theory, the results are consistent with those of Titman and Wessels [83], Rajan and Zingales [77],



**Fig. 2** Corporate tax rate in GCC economies. \*46% tax rate for oil exploration companies; \*\* 55% & 20% tax rate for firms exploring oil and banks respectively, other sectors 0%. (Data taken from KPMG and World Bank report for the year 2020)

Wald [87], Chen [30], Huang [53], Frank and Goyal [40], González and González [44], Chipeta and Deressa [32], and Ratih [75]. The findings support the hypothesis of a positive association between leverage and asset structure (tangibility).

The association between earnings volatility and both BLEV and MLEV is significantly positive, suggesting that volatile earnings do not deter firms from borrowing in the GCC region. This finding is contrary to mainstream literature. However, Parsons and Titman [71] have argued that a non-monotonic relationship exists between cash flow volatility and debt. Volatile earnings can adversely affect a firm's position, as unstable earnings may signal an inability to meet contractual obligations. In the case of GCC firms, investment in long-term projects might affect earnings, but future growth potential does not seem to discourage further borrowing. De Jong et al. [35] reported both negative and positive, as well as insignificant, associations between leverage and earnings volatility in their cross-country study.

Asset growth (growth opportunities) is positively and significantly associated with both BLEV and MLEV. This finding contradicts the argument that growth, as an intangible asset, cannot be used as collateral. The results are consistent with those of Chen [30] and González and González [44]. Asset growth or growth opportunities encourage managers to pursue risky projects and invest sub-optimally, increasing the firm's demand for financing and, consequently, its cost of debt. Furthermore, if capital markets recognize these opportunities, banks may also acknowledge them and extend credit for investment in these growth opportunities. In line with this argument, our results for the emerging economies of the GCC region support the hypothesis of a positive relationship between leverage and growth opportunities.

The results before the COVID-19 pandemic show similar financing patterns, suggesting that similar internal factors affect firms' financing choices, with some exceptions. Specifically, NDTs and BLEV have a strong positive association, while earnings volatility has no relationship

with leverage. Regarding macroeconomic indicators, GDP growth positively affects leverage, while inflation negatively affects firms' financing choices. Consequently, no significant variation or theoretical contradiction has been found between the complete sample and the sample before COVID-19.

In summary, most of the firms' internal factors influence the financing choices of GCC firms in a manner consistent with earlier studies, based on the assumptions of various CS theories, with some exceptions. The statistical association of earnings volatility and growth opportunities contradicts several empirical findings and theoretical expectations. This discrepancy may be due to the unique institutional environment and specific government policies in the GCC region, which distinguish it from other emerging economies. The empirical evidence supports the core theories of optimal CS, such as the trade-off, pecking order, agency, signaling, and market timing theories. The results align more closely with the pecking order and agency theories and less with the tax-centered trade-off theory. Furthermore, Table 10 summarizes the study's hypotheses based on the existing literature, showing that the statistical results support all the hypotheses.

## Conclusion

This study investigates the factors significantly influencing the financing choices of non-financial firms in GCC countries. The available empirical and theoretical evidence on the relationship between firms' internal factors and financing choices is mixed. A unique aspect of GCC firms, compared to those in other countries, is the distinct behavior of two internal factors—earnings volatility and growth opportunities.

The contemporary provisional theories of optimal CS can partially help understand the financing behavior of GCC firms, even when operating in distinct environments with different tax regimes. The results partially support the assumptions of trade-off, pecking order, agency, signaling, and market-timing theories. Firms'

**Table 10** Summary table of hypotheses outcome

Hypothesis	Outcome
H1: There is a negative association between profitability and leverage	Accepted
H2: There is a positive association between market-to-book ratio and leverage	Accepted
H3: There is a positive association between size and leverage	Accepted
H4: There is a negative association between non-debt tax shield and leverage	Accepted
H5: There is a positive association between asset structure (tangibility) and leverage	Accepted
H6: There is a positive association between volatile earnings and leverage	Accepted
H7: There is a positive relationship between asset growth (growth opportunities) and leverage	Accepted

internal factors statistically behave similarly to those in other developed and emerging economies despite different institutional and economic environments. The results show that profitability, market-to-book ratio, firm size, earnings volatility, and growth opportunities are significant factors influencing the CS of GCC firms. Non-debt tax shields (NDTS) and tangibility are not significant factors in the financing decision. Furthermore, no single conditional theory has robust explanatory power to explain the financing choices fully; each theory only provides partial explanations. It is also observed that the association of internal factors is consistent across both leverage proxies.

The findings reflect the transition of GCC economies from highly centralized, state-controlled systems to more diversified market economies. For example, firms are attracting more debt despite volatile earnings and growth opportunities, often disregarding the risk of financial distress. In contrast, government or state-owned banks extend credit even to underperforming firms to support economic diversification and encourage private sector development. This phenomenon is common in highly centralized economies, as Chen [30] noted. Additionally, Khan [59, 60] and Khan et al. [61] reported that banks in the GCC region are more profitable, which may lead them to overlook firms' internal factors in favor of tapping into available investment opportunities.

Given the similar economic, cultural, and social backgrounds of the six economies in the GCC bloc and their shared aspirations for economic diversification under various economic visions, there is a need to address certain common areas. The study's findings will benefit policymakers and financial institutions in enhancing capital market efficiency. They must accelerate market and regulatory reforms by advancing Fintech, digital finance, and sustainable finance activities. This will help them sustainably achieve the objectives of economic growth and diversification. Additionally, it will assist firm managers and banks in aligning the financial objectives of firms with the broader economic goals of the economy. The study's findings could serve as a foundation for a more comprehensive investigation of factors influencing firms' financing choices. A more detailed study is recommended, incorporating a comprehensive database and including other regional economies, such as those in the MENA region. Analyzing each country individually and comparing the results with those of other regional and emerging economies is also suggested.

#### Abbreviations

CS	Capital Structure
GCC	Gulf cooperation council
GMM	Generalized method of moments
GDP	Gross domestic product
OLS	Ordinary least squares

Res	Random-effects model
Fes	Fixed-effects model
FGLS	Feasible generalised least squares model
PCSE	Panel-corrected standard error model
BLEV	Book leverage
MLEV	Market leverage
PROF	Profitability
MBR	Market-to-book ratio
SZ	Company size
NDTS	Non-debt tax shield
TANG	Tangibility
EVOL	Earnings volatility
ASTGRW	Assets growth
EG	Economic growth
IN	Inflation rate

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SK and TA: conceptualization and major contributors in writing the manuscript—review and editing. AQ: data collection, formal analysis and estimation, and interpretation of results. All authors read and approved the final manuscript.

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The datasets generated and/or analyzed during the current study are available upon request from the corresponding author.

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