



## Research article

# Capital structure and public corruption among non-financial firms in the MENA region: The impact of the Arab spring

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## ABSTRACT

This study investigated the determinants of financing decisions of firms from the Middle East and North Africa (MENA) region, particularly the effect of public corruption on financing decisions and the effect of disorder following the Arab Spring on public corruption-financing structure relationship. The study encompasses a total of 800 business entities from 14 different countries, spanning the time frame of 2005–2018. Data is analyzed through the application of static fixed effects and dynamic GMM-System models. Results indicate that large, tangible companies prefer debt, whereas profitable companies with more room for growth choose equity. Less corruption is associated with increased corporate debt. The use of debt decreased because of the Arab Spring, and corruption's effect on leverage became weaker. The speed of adjustment to the target leverage is comparatively slow for book leverage, while it is significantly greater for market leverage. These outcomes are consistent with the pecking order behavior resulted from increasing information asymmetry, but the tradeoff theory has some support as well. The implications of this study entail the need for enhancing investor protection, strengthening control measures, increasing transparency, and fostering the overall growth of the financial system to facilitate enterprises' use of debt financing, particularly in the post-Arab Spring era. This paper provides fresh empirical evidence demonstrating the effect of the Arab Spring on capital structure and on the relationship between country corruption and capital structure in the MENA region. The paper also expands the body of research on capital structure and corruption across countries by providing empirical findings from a region that has been relatively overlooked in previous scholarly works.

## 1. Introduction

Lack of a perfect capital market necessitates the need for capital structure (CS) policy [1–5]. The choice of debt and equity is important not only for stable corporate financial health but also for the role it plays in economic growth [6,7]. Since Modigliani and Miller's [8] slice-of-the-cake argument, the literature has identified many firm-specific CS determinants [6,9] as well as macroeconomic factors [7,10–12]. Country corruption facets, such as weak regulations and inconsistent policies at the macro level, may affect financing decisions as they influence agency conflicts of interest, the risk of financial fraud, and resource waste at the business level

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[10,13]. Such consequences are exacerbated if accompanied by weak disclosure policies that enhance the information asymmetry problem and increase the cost of capital [14]. Consequently, financial market activity reduces as a result of investors' low confidence.

Public corruption is a potential determinant of CS that is largely ignored. A common link is through asymmetric information as a result of ineffective management transparency, monitoring, and law enforcement [15]. This information gap is also caused by manager-shareholder agency conflicts [16]. Because of poor ruling systems and regulations, emerging countries are deemed more corrupt than developed countries [17]. Non-financial enterprises are less regulated compared with financial firms, and thus they are more exposed to corruption [18].

The Middle East and North Africa (MENA) region may provide new insight into the public corruption-CS relation and dynamics for several reasons. First, it includes a mix of developing and developed countries with diverse governance and disclosures [19]. Second, variations in the country's corruption level make this region an optimal choice to investigate corruption's effect on financial decisions. Third, as market flaws may alter firms and agents' behaviors and intentions, political changes and the Arab Spring in many MENA countries and the resultant uncertainty in the legal environment and the decrease in the law execution quality [20] are expected to affect firms' financing choices. The Arab Spring aggravated political instability and obliged MENA firms to remain conservative. Meanwhile, firms exploit their internal resources and resort rarely to alternative sources [21]. Fourth, bank financing dominates MENA markets, while stocks and bonds are still growing, which entails low-market development [22]. The median firm in this region is smaller and financed largely internally or by private financing (i.e., banks, friends, and family). Because of the amount of finance needed, there are no economies of scale in less developed financial markets with respect to flotation costs. Fifth, the MENA region has one of the largest Islamic firm collections. Islamic enterprises can use only 33 % of debt financing, which increases their reliance on internal and external equity [7]. With the increased need for Shariah-compliant finance, CS choices in the MENA area are expected to differ from those in other regions.

This paper identifies firm and country determinants of corporate financing behavior in the MENA region. Particularly, it investigates corruption's influence on non-financial enterprises' financing decisions using both static and dynamic models, and the way that this relation changed after the Arab Spring. In the dynamic setting, companies were investigated to determine whether they had an optimal CS and how quickly they adjusted their debt level to the target debt ratio.

We add to the limited literature on non-financial firms' CS in MENA, with an emphasis on host country corruption. The sample includes 800 enterprises from 14 countries from 2005 to 2018. Together with established firm- and country-specific determinants of leverage, we examined two proxies for country-level corruption. The results indicated that corruption drives corporations into lower debt. Moreover, we provide fresh evidence about the influence of the Arab Spring, a period of political instability, on firms' CS decisions. The Arab Spring reduced firms' dependence on debt, and corruption's effect is weakened during the period following it. Consistent with previous literature, large, tangible companies prefer debt, while profitable companies with more opportunity for growth choose equity. The speed of adjustment (SOA) to the target leverage is relatively slow for book leverage, while it is considerably greater for market leverage. Our recommendations entail enhancing investor protection, strengthening control measures, increasing transparency, and fostering the financial system's growth overall to facilitate the use of debt financing.

This paper has five sections. Section 2 reviews past research, and Section 3 presents the methodology. Section 4 examines and discusses the results. Finally, Section 5 summarizes the findings and discusses the study's implications, limitations, and suggestions for future research.

## 2. Theoretical background and literature review

### 2.1. Theories of capital structure

Several theories have attempted to explain CS. Trade-off theory focuses on balancing debt's advantages (tax savings) and disadvantages (bankruptcy expenses) to achieve a target debt-equity ratio [1]. The agency theory posits an expected trade-off between agents' and principals' interests [2]. Inefficiency, personal gain, opportunism, and resource waste reflect the agency cost of equity, which an optimal CS may reduce [23]. Considering pecking order theory, managers have more information than shareholders, which prompts new investors to demand an adverse selection premium. Consequently, corporations cover financial needs in a hierarchical manner, preferring retained earnings, then debt, followed by external equity [4]. This is not a target debt-to-equity ratio [21]. Finally, with lower external equity costs, corporations may not support the pecking order hypothesis, because prioritizing internal capital would be costlier, as timing theory suggests [5]. In reality, assessing CS using a single theory is difficult because of the business strategy, market structure, and country differences [24].

The cost and speed of adjusting to target leverage in dynamic modeling are essential insights for optimum CS study [9]. The pecking order hypothesis assumes no target; hence, the SOA is "0". An adjustment of "1" indicates a complete adjustment to the target CS following tradeoff and agency theories. However, the reality is neither of the extremes. A high SOA reflects a target leverage ratio and a dynamic tradeoff model [25], while a low SOA supports the pecking order and the timing theories.

### 2.2. Corruption and CS

Corruption is a widespread phenomenon that all nations experience asymmetrically, usually defined in terms of its actions, characteristics, and effects. Corruption encompasses money fraud, authority abuse, and resource waste [13]. Problems with legal issues, contractual duties, property rights, accountability, the rule of law, and commercial practices are common indicators of a corrupt system [10]. It generates resource misallocation, productivity loss, economic instability, and distortions [26]. While corruption is an

important challenge that threatens a country's legal system, it may also result from weak laws and regulations used to govern investor, company, and individual conduct [15]. Corruption may have a mixed influence on a society [27], including on companies', people's, and nation's wealth. Two hypotheses explain these effects:

### 2.2.1. "Sand the wheel" hypothesis

This hypothesis was proposed to represent corruption's harmful effects on enterprises, investments, economies, and societies. In the absence of sufficient rules and laws, corruption erodes institutional quality through bribery, financial exploitation, and the absence of adequate policies and laws [28]. Cooray and Schneider [29] suggested a negative association between the corruption level and financial sector development. In countries with inefficient institutional settings, banks may not play an effective role in the financial sector. The level of secrecy and the culture of withholding crucial information exacerbate information asymmetry, harming the economy and markets by creating business barriers and misallocating resources. Incorrect private information, including pricing and managers' capacity to handle investments, prevents investors from gauging their potential return [30].

Investors (lenders) lose trust in countries with significant corruption, inadequate law enforcement, and a weak legal framework, which results in poor lending practices [31]. Great corruption harms long-term debt [32], and thus firms prioritize using internal equity. According to Fan et al. [15], such corruption leads to shorter loan maturities when lenders avoid corrupt economies. Moreover, firms become more vulnerable to corruption's effects given the high concentration of power and some of their controllers' misuse. According to Baxamusa and Jalal [14], the cost of capital should incorporate corruption costs (e.g., asymmetric information, weak law enforcement) as the cost of external funding increases as a country's corruption rises.

### 2.2.2. "Grease the wheel" hypothesis

Leff [27] coined the phrase "greasing of wheels" to describe corruption's advantages when considered in isolation from its moral foundation. Under circumstances of inefficient government policies, weak institutions, and weak governance structures, corruption and bribery increase economic growth as an "escape hatch" and advance the financial sector accordingly [29]. According to Méon and Weill [33], corruption decreases "the time cost of queues". Persson et al. [16] claimed that the costs of eliminating or decreasing corruption outweigh the benefits to businesses and society. Therefore, corruption's effect on corporate debt, mediated by financial development, is positive [22]. Consistently, Belkhir et al. [34] found that corruption increases leverage in the MENA area.

We stand by the sand-the-wheel hypothesis and argue that there is a negative association between corruption and debt in MENA countries. Thus, the following hypothesis is posited:

**Hypothesis 1.** The greater a country's corruption, the lower the level of firms' debt.

## 2.3. Arab spring

The Arab Spring has affected the financial system in the MENA countries that experienced political turbulence significantly and the effect spilled over to the majority of countries within the region. Although the effect on CS has not been examined yet, there is a plethora of evidence pertaining to stock markets and the banking industry. According to Mousavi and Ouenniche [35], the MENA markets and many other regions experienced a significant increase in risks and returns' volatility subsequent to the Arab Spring. Diab et al. [36] revealed that banks' financial stability is influenced positively by political stability and corporate governance practices. The Arab Spring had an adverse effect on banks' profitability, both conventional and Islamic, and increased their risk levels [37]. Aliyu et al. [38] found that crisis periods had a negative effect on banks' stability in the MENA region. Hearn [20] claimed that the Arab Spring's effect was less significant in regions with stricter regulatory measures. Arayssi et al. [39] found a negative correlation between the Arab Spring and countries in the MENA region's economic growth, and Matta et al. [40] found a similar effect on Tunisia's economic growth via the investment channel. Elsayed and Yarovaya's [41] findings indicated spillovers between the various MENA markets, suggesting that they exhibit a slow response to incoming information in the short term. However, market participants would be able to modify their knowledge and anticipations, thereby affecting market actions over an extended period. Abdelbaki's [42] findings supported the evidence in favor of the notion that political instability exerts a significant effect on stock markets' functioning.

Del Giudice and Paltrinieri [43] claimed that media coverage of the Arab Spring had a significant effect on the flow of funds. Thereby, investors' erratic conduct diminished the infusion of equity capital into African stock markets. Ahmed [44] examined political uncertainty's influence during the revolution on stock market in Egypt. His findings indicated that the Arab Spring has had an adverse effect on stock market activity. According to ElBannan [45], the country's corruption level and the financial markets' growth influenced the incidence of financial distress in the MENA region during the Arab Spring significantly.

Previous evidence showed that the Arab Spring affected political stability, the rule of law, and investor protection adversely. It also increased information asymmetry and the risk of distress. Issuance of new equity was less likely, and banks were reluctant to extend debt financing on the same basis to firms in these circumstances. Therefore, it was difficult for firms to use external funds, both equity and debt, as the cost of capital should incorporate corruption costs and thus firms resort to internal sources [14]. However, Baxamusa and Jalal [14] found that these costs' sensitivity to changes in corruption increased as the country's level of corruption decreased. Thus, we posit the following:

**Hypothesis 2.** Leverage is lower in the post-Arab Spring era than in the period before.

**Hypothesis 3.** Corruption's effect on leverage was lower in the Arab Spring era than in the period before.

## 2.4. Other CS determinants

Previous literature has found that the following factors are determinants of CS.

### 2.4.1. Firm size

Abdeljawad and Nor [9] showed a positive association between firm size and debt use. Larger companies are financially strong, have better negotiating power, and have access to more funds. A large pool of internal and external sources of funds allows them to attain economies of scale; hence, they may not always rely on internal funds if external funds are less costly. Because of their larger issue sizes, large companies have access to a wider pool of low-cost global equity funds. Therefore, they prefer overvalued stock over debt [9]. Further, they prefer to rely on borrowing to exploit tax benefits, as they are taxed heavily. In contrast, smaller companies use internal funds [46].

Opposing evidence also exists. Large companies may prefer internal financing over external financing. This choice is prioritized if non-debt tax shields (e.g., depreciation charges) are large enough to lower the tax burden [47]. The MENA financial markets are still undeveloped, and smaller companies have greater costs of external capital than larger companies, as they are subject to additional information asymmetry problems [46]; in addition, the unpredictable investment climate encourages large corporations to use retained earnings [48]. Supporting the view of the most studies, we anticipate bigger enterprises to be more indebted.

### 2.4.2. Profitability

Studies show a negative correlation between profitability and leverage [49], which supports Myers and Majluf's [4] pecking order. On the other hand, in a trade-off situation, profitable enterprises that depend heavily upon internal finances may fail to reduce their tax burden [6]; hence, profitable companies prefer to use debt to operate. This research hypothesized that profitable firms use lower debt.

### 2.4.3. Tangibility

Companies with higher tangible assets are financially less risky because the assets are collateral against financial risk [9], and consequently, they may issue more debt. Companies use tangible assets as security to reduce lending costs. Increased tangibility is a favorable indicator during liquidation. Most research has shown a positive relation between tangibility and debt use [50]. We hypothesize that tangibility and financial leverage are positively correlated.

### 2.4.4. Growth opportunities

High-growth enterprises require long-term investment in R&D and marketing, ideally from equity sources, as the return to debt-holders may be lower, and the risk of financing growth is higher. Thus, growth opportunities and debt are projected to be correlated negatively [51]. Growth options create intangible assets that are favored less as loan collateral. When a corporation is close to bankruptcy, these assets lose value quickly. The costs of bankruptcy, agency between bondholders and stockholders, and information asymmetry increase with growth expectations. This link causes corporations to prefer internal funding sources over external sources in a pecking order hierarchy. However, Touil and Mamoghli [10] disagree; in the case of agency cost of equity, high-growth firms may prefer to increase their debt to reduce the amount of cash flow under managers' control and prevent managers from misallocating resources. We anticipate financial leverage to decrease growth potential.

### 2.4.5. Macro determinants of CS

Several macroeconomic variables are used frequently in CS research to address country-level heterogeneity [10]. Two prevalent variables are GDP growth and inflation. Higher GDP growth countries provide more production and long-term investment options, signaling the demand for long-term finances. The trade-off framework implies that higher GDP may lead to lower bankruptcy rates, and firms may prefer to assume debt, demonstrating a positive association [11,12]. Hence, we anticipate GDP growth to boost leverage. On the one hand, high inflation raises interest rates and makes new loans more expensive. In general, corporations prefer to use internal money if the cost of external funding is higher than planned [52]. On the other, corporations in high-inflation areas may choose to borrow to decrease their tax burden, demonstrating a positive correlation between inflation and corporate leverage [11,12]. We hypothesize that inflation will boost leverage.

## 3. Methodology

### 3.1. Data

A panel of non-financial enterprises from MENA countries retrieved from the Refinitiv DataStream database, is used. Financial firms were excluded given their extensive regulation [53]. Generally, non-financial firms have not been subjected to the same degree of strictness in laws, regulations, and investor protection requirements, and consequently, they are more vulnerable to corruption [18]. They also have limited funding sources because of the lack of sophisticated financial markets compared to financial firms [24]. We include only countries that have had at least five firms per year. We also exclude firms with fewer than three consecutive observations. In all, 800 non-financial enterprises from 14 countries in MENA for the period 2005–2018 were included in the unbalanced panel data. The macroeconomic variables data were obtained from the Transparency International Association and the World Bank. The total firm-year observations used were 9729, which is appropriate to assess long-term equilibrium connections and dynamic changes in a firm's financial decisions in this region. Table 1 details the sample.

**Table 1**  
Sample of the study.

Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Bahrain	9	14	16	15	16	17	17	17	17	16	16	16	18	18	222
Egypt	68	73	88	89	90	88	91	102	100	101	97	90	87	84	1248
Iraq						5	6	7	13	29	30	29	24	8	151
Israel	160	176	191	186	189	197	202	209	206	213	212	201	206	205	2753
Jordan	53	61	61	62	62	61	64	64	62	63	60	56	57	56	842
Kuwait	35	42	44	46	48	48	50	50	51	53	49	49	48	45	658
Malta	9	8	9	7	9	9	9	9	8	9	8	10	10	10	124
Morocco	30	35	35	35	37	39	39	40	41	42	41	42	40	42	538
Oman	53	56	59	58	58	60	59	65	65	63	63	57	52	51	819
Palestine	13	15	16	16	17	17	18	18	17	17	15	13	16	17	225
Qatar	12	14	15	15	15	16	16	16	17	18	18	18	18	18	226
Saudi Arabia	42	63	64	71	73	78	79	83	85	89	90	90	90	90	1087
Tunisia	21	23	22	22	25	29	34	34	37	36	35	37	36	27	418
UAE	22	28	30	31	31	31	31	32	31	31	31	30	30	29	418
<b>Grand Total</b>	<b>527</b>	<b>608</b>	<b>650</b>	<b>653</b>	<b>670</b>	<b>695</b>	<b>715</b>	<b>746</b>	<b>750</b>	<b>780</b>	<b>765</b>	<b>738</b>	<b>732</b>	<b>700</b>	<b>9729</b>

### 3.2. Variables' measurement

There is no consensus on whether to assess leverage (the dependent variable) by book or market value. Öztekin and Flannery [54] used both proxies to describe company leverage. Abdeljawad and Nor [9] found that both correspond to each other. However, steady book leverage is preferred given its high accuracy in cases of high fluctuations in stock prices [21]. Fama and French [55] contend that a firm's previous financial actions may be comprehended better using book leverage. Most predictions of trade-off and pecking order models apply directly to book leverage, and some carry over to market leverage. Therefore, this study uses book value as the main proxy and market leverage as a corroborative proxy for robustness purposes given its "forward-looking" feature [56]. Several micro and macro factors other than corruption were considered control variables, including company size, asset tangibility, profitability, and the market-to-book ratio as a proxy for growth options. Inflation and GDP growth were employed as country-level control variables.

For independent variables, as there is no defined criterion to measure corruption at the firm level, macro data are employed [45]. The literature has used several metrics of country corruption; the most prominent are the World Bank's Corruption Index and Transparency International's Corruption Perception Index (CPI). Belkhir et al. [34] used the former, while Hakkala et al. [57] employed the latter. Fan et al. [15] recommend the CPI for research that uses and analyzes panel data. Based upon yearly surveys, the CPI captures perceptions of how much public power is abused for private benefit (corruption), which encompasses petty and grand corruption as well as elite and private interests' "capture" of the state. The CPI scale ranged from 0 (highly corrupt) to 100 (very clean), while the Corruption Index ranges from -2.5 to 2.5, with 2.5 denoting very clean countries. Because high levels of both metrics suggest less corruption, they actually measure the country's cleanliness. Finally, to capture the effect of the Arab Spring that began in 2011, we added a dummy variable equal to 0 for years before 2011 and 1 for 2011 and years after. As the uncertainty that followed the Arab Spring spread throughout the region, we chose to investigate this disorder in all countries in 2011 and after [36]. Table 2 lists all variables, their measures, and references for them.

### 3.3. Models and estimation methods

The determinants of the leverage level are modeled first in the static long-run equilibrium framework. The static modeling generates a picture of the mean response during the analysis period, regardless of the process in the short term. In this study, the static panel data models were estimated with fixed effects based upon the Hausman test (not reported). The mathematical representation of Model 1 is as follows:

$$Lev_{i,t} = \beta_1 + \beta_2 Growth_{i,t} + \beta_3 Profit_{i,t} + \beta_4 Tang_{i,t} + \beta_5 Size_{i,t} + \beta_6 Corrup_{i,t} + \beta_7 Inflation_{i,t} + \beta_8 GDP\ Growth_{i,t} + \eta_i + \gamma_t + \pi_{n,t} + \varepsilon_{i,t} \quad (1)$$

in which  $\beta_i$  is a constant term that varies across firms,  $\eta_i$  is firm fixed effect,  $\gamma_t$  is time dummy,  $\pi_{n,t}$  is country dummy equal 1 for country  $n$  and zero otherwise, and  $\varepsilon_{i,t}$  is the disturbance term of firm  $i$  at time  $t$ . As panel data were used, each observation was indexed by  $i$ , representing the firm in a time period  $t$  (the time dimension). Other variables were defined in Table 2. To investigate the Arab Spring's effect, we added the spring dummy and the interaction between the spring dummy and the corruption variable to the model in a subsequent analysis.

Many previous studies revealed the CS's dynamic nature, which includes the gradual adjustment toward the target debt ratio. Byoun [60] stated that the presence of a target capital and adjustments toward that target require dynamic modeling. Therefore, this dynamism is modeled using a partial adjustment framework. The adjustment process takes time, and its speed varies with the factors that affect the process. The partial adjustment model was used because of imperfections in the market, including the transaction and adjustment costs, which prevent the perfect return to optimal leverage [9,61]. This model represents the firm's willingness to eliminate part of the deviation from the target leverage. Following the previous literature [53,56] and controlling for the firm fixed effects, the

**Table 2**  
Summary of variables measurement.

Variable	Measurement	References
Book leverage	Total debt (short-term debt + long-term debt) divided by the book value of total assets.	[54,56,58]
Market leverage	Total debt (short-term debt + long-term debt) divided by the total assets minus book equity plus market equity, where the market equity is equal to common shares outstanding times the year end market price per share.	[54,56,58]
Cleanliness <sup>a</sup>	The World Bank's Corruption Index.	[34]
Cleanliness Transp. <sup>a</sup>	Transparency International's Corruption Perception Index (CPI).	[57]
Spring	Is a dummy variable that equals 0 for years before 2011 and 1 for years from 2011 and after	
Size	The natural logarithm of sales.	[50,58]
Profitability	Earnings before interest and taxes and depreciation (EBITDA) divided by the total assets (TA).	[9,58]
Tangibility	Net property plant and equipment (total tangible fixed assets) divided by the total assets	[50,58]
Growth options (Market to book ratio)	Total assets minus the book value of equity plus the market value of equity, divided by the total assets.	[58,59]
Inflation	Percentage change in Consumer Price Index according to the World Bank.	[11,12,56]
GDP growth	Percentage change in GDP according to the World Bank.	[11,12]

<sup>a</sup> Both corruption proxies indicate the cleanliness of the country with high levels of the index, and the converse; hence, the variables are termed "cleanliness" rather than "corruption" to help interpret the results.

testable form of the partial adjustment model can be written as:

$$Lev_{i,t} = \beta_1^* + \beta_2^* Growth_{i,t} + \beta_3^* Profit_{i,t} + \beta_4^* Tang_{i,t} + \beta_5^* Size_{i,t} + \beta_6^* Corrupt_{i,t} + \beta_7^* Inflation_{i,t} + \beta_8^* GDP\ Growth_{i,t} + \lambda Lev_{i,t-1} + \gamma_t + \varepsilon_{i,t}^* \quad (2)$$

in which  $\lambda$  is the coefficient of the lagged leverage and the speed of adjustment ( $\delta$ ) equals  $1 - \lambda$ . Other variables are as defined previously. While OLS can be used to estimate the fixed effect model (1), the partial adjustment model (2) is likely to include an endogenous variable that is the lagged leverage ( $Lev_{i,t-1}$ ). OLS is inconsistent in this case [62]. Arellano and Bover [63] and Blundell and Bond [64] introduced System GMM to address the estimation issues in such circumstances. They used the endogenous variable's lagged level to instrument the first difference and the lagged first difference to instrument the level. The system-GMM estimator is found to be efficient and has a low finite sample bias because of the exploitation of more moment conditions, particularly when the instruments are weak. Researchers suggest that two-step GMM has better properties in the context of persistent series [22,65]. Belkhir et al. [34] used this estimation method and it is used in this research. The spring dummy and its interaction with the corruption variable are added to the model in the subsequent investigation.

## 4. Empirical results

### 4.1. Descriptive indicators and correlation analysis

The descriptive analysis offers essential information about the data in the sample. Table 3 shows the variables' pooled number of observations, mean, standard deviation, minimum, and maximum.

The results are comparable to those in previous studies of the MENA region [34,66]. However, what can be seen is the significant difference in the average cleanliness of 0.25 compared to 0.075 in Belkhir et al.'s [34] study of 10 countries in the MENA region over the period 2003–2011. This may refer to an enhancement in anti-corruption efforts, but it may also result from including more stable and transparent countries in our sample.

Secondly, a matrix of correlation coefficients between each pair of variables is reported in Table 4 to explain the direction and degree of their univariate relations. Notably, it was found that book leverage and market leverage were correlated highly, as were the "cleanliness" and "cleanliness trans" variables. This high correlation between measures of the same constructs adds to the validity of the measures in this research. The correlations between other independent variables were low, indicating insignificant multicollinearity problems in all subsequent specifications.

### 4.2. Estimation results: static models

The static models in Table 5 describe long-term equilibrium. Models 1–4 employed book leverage, while Models 5–8 used market leverage. Models 1, 2, 5, and 6 included all firm-specific variables in addition to a proxy for cleanliness. In models 3, 4, 7, and 8, two country-wide variables, inflation and GDP growth, were introduced to compensate for country-wide variations. The two cleanliness proxies were employed in the eight models alternatively.

The results for the cleanliness proxies show positive effects on book leverage. Therefore, a negative relation exists between company leverage and country corruption. Firms in less corrupt countries tend to borrow more, supporting the "sand the wheels" hypothesis. Higher corruption levels are associated with lower property rights, weak law enforcement, and ineffective policies, and thereby increase monitoring costs. These consequences increase the costs of debt financing, making it less attractive. Lower creditor rights protection is one of the reasons for the increased lending risk and was thus a major obstacle to the companies' reliance on debt financing. Guetat [67] explained that the MENA region suffers from a poor regulatory environment, which leads to widespread corruption, and has a negative effect on investments and the capital of the state and individuals, resulting in lower economic growth. Similarly, Baxamusa and Jalal [14] indicated that countries with higher corruption levels suffer from an increase in the cost of capital, whether debt or equity. However, our result contrasts with Belkhir et al.'s [34] findings, who noticed that MENA region firms take

**Table 3**  
Descriptive statistics.

Variable	Obs.	Mean	Std. Dev.	Min	Max
Book Leverage	9729	0.219	0.205	0	0.995
Market Leverage	8135	0.245	0.203	0	0.969
Growth options	9729	1.425	1.029	0	9.819
Tangibility	9608	0.337	0.256	-0.055	1.153
Profitability	8488	0.074	0.406	-26.941	4.487
Size (Ln Sales)	9199	12.624	3.346	-0.263	26.312
Cleanliness <sup>a</sup>	196	0.25	0.599	-1.399	1.567
Cleanliness Transp. <sup>a</sup>	196	49.076	11.99	15	77
Inflation <sup>a</sup>	196	0.037	0.044	-0.049	0.295
GDP growth <sup>a</sup>	196	0.039	0.03	-0.071	0.262
Spring	9729	0.609	0.488	0	1

<sup>a</sup> Macro variables are 196 observations for 14 years and 14 countries. Each firm-year observation corresponds to appropriate macro variables.



**Table 4**  
Pairwise correlations.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Book Leverage	1									
(2) Market Leverage	0.836	1								
(3) Growth options	-0.132	-0.383	1							
(4) Tangibility	0.249	0.188	-0.036	1						
(5) Profitability	0.002	-0.027	-0.16	0.102	1					
(6) Size (Ln Sales)	0.173	0.012	0.094	-0.052	0.116	1				
(7) Cleanliness	0.162	0.123	-0.015	-0.142	-0.103	0.026	1			
(8) Cleanliness Transp.	0.152	0.121	-0.039	-0.127	-0.099	-0.016	0.954	1		
(9) Inflation	-0.053	-0.065	-0.014	0.075	0.049	0.09	-0.447	-0.473	1	
(10) GDP Growth	-0.017	-0.017	0.046	0.01	0.012	0.008	0.014	0.054	0.158	1

**Table 5**  
Determinants of leverage ratio in static models.

VARIABLES	Book Leverage				Market Leverage			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Growth options	-0.00858 <sup>a</sup> (0.00327)	-0.00846 <sup>a</sup> (0.00326)	-0.00782 <sup>b</sup> (0.00324)	-0.00763 <sup>b</sup> (0.00322)	-0.0926 <sup>a</sup> (0.00582)	-0.0921 <sup>a</sup> (0.00584)	-0.0915 <sup>a</sup> (0.00587)	-0.0911 <sup>a</sup> (0.00590)
Tangibility	0.196 <sup>a</sup> (0.0282)	0.196 <sup>a</sup> (0.0285)	0.193 <sup>a</sup> (0.0290)	0.193 <sup>a</sup> (0.0293)	0.0997 <sup>a</sup> (0.0287)	0.0967 <sup>a</sup> (0.0290)	0.0974 <sup>a</sup> (0.0293)	0.0942 <sup>a</sup> (0.0296)
Profitability	-0.103 <sup>a</sup> (0.0380)	-0.102 <sup>a</sup> (0.0377)	-0.0997 <sup>a</sup> (0.0380)	-0.0979 <sup>a</sup> (0.0376)	-0.154 <sup>a</sup> (0.0394)	-0.153 <sup>a</sup> (0.0390)	-0.152 <sup>a</sup> (0.0398)	-0.150 <sup>a</sup> (0.0394)
Size (Ln Sales)	0.0163 <sup>a</sup> (0.00606)	0.0159 <sup>a</sup> (0.00610)	0.0150 <sup>b</sup> (0.00647)	0.0142 <sup>b</sup> (0.00653)	0.00163 (0.00668)	0.00121 (0.00669)	0.000236 (0.00718)	-0.000292 (0.00721)
Cleanliness	0.0279 <sup>b</sup> (0.0142)		0.0277 <sup>b</sup> (0.0137)		-0.0161 (0.0175)		-0.0161 (0.0171)	
Cleanliness Transp.		0.00177 <sup>b</sup> (0.0007)		0.00207 <sup>a</sup> (0.00074)		-0.000670 (0.0008)		-0.000593 (0.0009)
Inflation			0.124 (0.0810)	0.155 <sup>c</sup> (0.0849)			0.0589 (0.0900)	0.0645 (0.0924)
GDP Growth			0.132 <sup>b</sup> (0.0652)	0.198 <sup>a</sup> (0.0746)			0.102 (0.0810)	0.0999 (0.0891)
Constant	0.00653 (0.0755)	-0.0716 (0.0819)	0.0276 (0.0802)	-0.0610 (0.0863)	0.398 <sup>a</sup> (0.0857)	0.433 <sup>a</sup> (0.0929)	0.420 <sup>a</sup> (0.0919)	0.453 <sup>a</sup> (0.0986)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8121	7949	7942	7770	6966	6846	6811	6691
Within R-squared	0.065	0.066	0.064	0.066	0.214	0.213	0.212	0.211
Number of firm	800	779	799	778	740	724	739	723

Robust standard errors in parentheses.

<sup>a</sup>  $p < 0.01$ .

<sup>b</sup>  $p < 0.05$ .

<sup>c</sup>  $p < 0.1$ .

advantage of corruption to avoid legal bureaucracy (red tape and stringent rules) and hence borrow more when the corruption level is higher.

Consistent with the pecking order hypothesis, profitability has a strong negative influence on leverage, implying that profitable organizations favor internal funding [49] to decrease external finance costs (e.g., adverse selection, bankruptcy, and agency charges). MENA companies are considered cautious, as they rely on retained earnings rather than shares issued or debt. Risks in the investment environment affect debt financing negatively; therefore, corporations turn to more secure internal sources, particularly when external sources of financing cannot be obtained easily. Therefore, this negative association is reinforced when the financial markets are underdeveloped [59]. This result corresponds to Belkhir et al. [34], who showed that leverage was related inversely to profitability.

Growth opportunities lead corporations to cut debt and use internal resources for finance, similar to Titman and Wessels [50] and Rajan and Zingales [58]. Chen and Zhao [51] concluded that the problem of information asymmetry explains this negative association; however, investor protection can help reduce this asymmetry's effect.

Size is significantly positive in all specifications with book leverage, while it is insignificant with market leverage. Rajan and Zingales's [58] result indicated that larger enterprises have better access to loans and lower bankruptcy and transaction costs, which encourages borrowing. Abdeljawad and Nor [9] showed that size affects CS positively because of diversification, access to credit, economies of scale, and reduced financing costs. Similarly, larger companies are more accountable, subject to high-quality auditing, and followed by specialized financial analysts, and thus, have easier access to credit [18].

A positive effect of tangibility is noticed in all specifications. Pecking order, agency, and trade-off theories assume that tangibility



affects firm leverage positively. Tangibility allows for higher debt, as corporations decrease information asymmetry by employing physical assets as collateral in bankruptcy [50,58]. Fan et al. [15] and Touil and Mamoghli [10] found similar results, arguing that collateral decreases risks and information asymmetry caused by regulatory failure to protect creditors. Tangibility allows enterprises to absorb unexpected losses and minimize information asymmetry and agency costs. GDP growth has a positive influence on leverage in models 3 and 4. Higher GDP growth rates encourage companies to increase their debt ratio because of the increased volume of investments [11,12]. However, inflation has a positive influence only in Model 4. Inflation's positive effect suggests that firms take advantage of tax shields when the cost of short-term borrowing increases. Moreover, considering money's time value, firms in the MENA region take advantage by using money with a higher value and returning it to the lender at a lower value during times of inflation, which lowers the real cost of financing for long-term loans [11,12], implying inflation's positive effect on leverage.

#### 4.3. Estimation results: dynamic models

Table 6 shows the results of regression with system-GMM using book and market leverage. First- and second-order serial correlations in the first-differenced residuals were tested using AR1 and AR2 statistics [62]. The presence of second-order serial correlation implies that some lags are invalid instruments and should be removed from the instrument set. The results indicate that a serial correlation problem is insignificant compared to the 5 % threshold. The Hansen test for the instruments' validity is also reported. Because the null here is that all instruments are valid, the null should not be rejected to proceed with GMM modeling. The results also satisfy this condition.

The results are consistent with the static models. Cleanliness proxies have a positive effect on market leverage in models 5 and 6; larger and more tangible firms use more debt for financing, while profitability and growth options reduce leverage. Adding country-level factors results in statistically insignificant GDP growth, while inflation has a negative influence on leverage. High inflation raises interest rates, making new loans more expensive; hence, corporations prefer to use internal money if the cost of external funding is higher than planned, consistent with Akinsola and Odhiambo [52].

As seen in Table 6, lagged dependent book and market leverage have a significant influence on a firm's CS in MENA. Supported by Belkhir et al. [34], this finding is evidence that MENA firms have an optimal capital structure toward which they adjust. However, the SOA between book and market leverage differs significantly. Firms close the gap between observed and target book leverage at a slow

**Table 6**  
Determinants of leverage ratio in dynamic models.

VARIABLES	Book Leverage				Market Leverage			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
L. Book Leverage	0.889 <sup>a</sup> (0.032)	0.890 <sup>a</sup> (0.032)	0.892 <sup>a</sup> (0.034)	0.897 <sup>a</sup> (0.034)				
L. Market Leverage					0.646 <sup>a</sup> (0.033)	0.645 <sup>a</sup> (0.034)	0.625 <sup>a</sup> (0.035)	0.626 <sup>a</sup> (0.035)
Growth options	-0.006 <sup>a</sup> (0.002)	-0.006 <sup>a</sup> (0.002)	-0.006 <sup>a</sup> (0.002)	-0.006 <sup>a</sup> (0.002)	-0.063 <sup>a</sup> (0.006)	-0.063 <sup>a</sup> (0.006)	-0.066 <sup>a</sup> (0.006)	-0.065 <sup>a</sup> (0.006)
Tangibility	0.030 <sup>a</sup> (0.009)	0.031 <sup>a</sup> (0.009)	0.030 <sup>a</sup> (0.009)	0.029 <sup>a</sup> (0.009)	0.062 <sup>a</sup> (0.011)	0.063 <sup>a</sup> (0.011)	0.068 <sup>a</sup> (0.011)	0.069 <sup>a</sup> (0.011)
Profitability	-0.123 <sup>a</sup> (0.028)	-0.123 <sup>a</sup> (0.027)	-0.121 <sup>a</sup> (0.028)	-0.120 <sup>a</sup> (0.028)	-0.165 <sup>a</sup> (0.019)	-0.164 <sup>a</sup> (0.019)	-0.173 <sup>a</sup> (0.020)	-0.172 <sup>a</sup> (0.019)
Size (Ln Sales)	0.003 <sup>a</sup> (0.001)	0.003 <sup>a</sup> (0.001)	0.003 <sup>a</sup> (0.001)	0.003 <sup>a</sup> (0.001)	0.004 <sup>a</sup> (0.001)	0.004 <sup>a</sup> (0.001)	0.005 <sup>a</sup> (0.001)	0.005 <sup>a</sup> (0.001)
Cleanliness	0.001 (0.003)		0.001 (0.013)		0.009** (0.004)		-0.016 (0.015)	
Cleanliness Transp.		-3.98e-06 (0.000)		0.00016 (0.001)		0.00045 <sup>b</sup> (0.000)		-0.00076 (0.001)
Inflation			0.017 (0.339)	0.102 (0.315)			-0.663 <sup>c</sup> (0.364)	-0.609 <sup>c</sup> (0.343)
GDP Growth			0.040 (0.060)	0.022 (0.077)			0.064 (0.078)	0.097 (0.096)
Constant	-0.007 (0.006)	-0.007 (0.008)	-0.008 (0.006)	-0.016 (0.032)	0.105 <sup>a</sup> (0.015)	0.088 <sup>a</sup> (0.017)	0.120 <sup>a</sup> (0.019)	0.154 <sup>a</sup> (0.041)
SOA	11.1 %	11 %	10.8 %	10.3 %	35.4 %	35.5 %	37.5 %	37.4 %
Observations	7400	7245	7246	7091	6222	6115	6094	5987
Number of firms (groups)	789	768	788	767	717	702	715	700
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Instruments	31	31	32	32	31	31	32	32
AR1 p	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AR2 p	0.0548	0.0544	0.0551	0.0550	0.428	0.360	0.360	0.267
Hansen p	0.462	0.359	0.503	0.432	0.662	0.686	0.768	0.751

Robust standard errors in parentheses.

<sup>a</sup> p < 0.01.

<sup>b</sup> p < 0.05.

<sup>c</sup> p < 0.1.

annual SOA rate that ranges from 10.3 % to 11.1 %. The SOA using market leverage (35.4–37.5 %) is faster, as market changes affect market leverage more than book values.

The SOA is an important issue in contemporary CS research, where high SOA is consistent with trade-off theory and adjusting actively toward the target leverage. Our results indicate that firms return to optimal book leverage slowly, which does not eliminate the presence of target capital, but allows for the presence of pecking order or timing behaviors. The SOA is higher for market leverage due to the inherent stability of book leverage. Touil and Mamoghli [10] claimed that adjustment's higher cost is the primary reason that it is slow. Overall, the results provide evidence that non-financial firms in MENA countries' target leverage and financial decisions are dynamic, but the slow SOA supports the effects of information asymmetry and timing as well.

#### 4.4. Arab spring effect on corruption-CS relationship

In 2011, citizens of numerous MENA countries staged anti-government demonstrations, known as the Arab Spring, that led to political instability in the region. Consequently, substantial social and economic effects were identified. We investigated this political instability's effect on the corruption-financing relation in the MENA region. We added two variables to the previous specifications to capture this effect: one is a spring dummy equal to 1 for years 2011 and after, and the other is an interaction term for this dummy variable with the cleanliness proxies. The results are presented in Tables 7 and 8 for static and dynamic models, respectively. While other variables' results are similar to the previous results, we will discuss the new variables in the following. The results showed that the spring variable is negative, reflecting the lower level of borrowing for firms after 2011. This is consistent with our assumption that the Arab Spring reduced the political stability, the rule of law, and investor protection and increased information asymmetry and the risk of distress. As a result, the issuance of new securities was less likely and banks were unwilling to extend debt financing, so firms relied more on internal sources. The interaction term is negative in model 3 in Table 7 and model 7 in Table 8, indicating that the cleanliness-leverage relation was weaker in the Arab Spring era. This result is consistent with Baxamusa and Jalal [14], who found that the sensitivity of costs of capital to changes in corruption decreases as the country's level of corruption increases. Finally, the SOA is not affected greatly, except for models 5 and 6, where it appears to be lower after the effect of the Arab Spring is controlled. The cost of adjusting and the information asymmetry intensified after 2011, and increased the cost of external issues. This may have resulted in firms' reluctance to borrow after 2011 and led them to depend more upon internal sources. Overall, the justification for these results is

**Table 7**  
Arab Spring effect, static models.

VARIABLES	Book Leverage				Market Leverage			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Growth options	-0.00836 <sup>b</sup> (0.00326)	-0.00824 <sup>b</sup> (0.00326)	-0.00753 <sup>b</sup> (0.00322)	-0.00740 <sup>b</sup> (0.00321)	-0.0925 <sup>a</sup> (0.00582)	-0.0920 <sup>a</sup> (0.00585)	-0.0914 <sup>a</sup> (0.00588)	-0.0909 <sup>a</sup> (0.00591)
Tangibility	0.196 <sup>a</sup> (0.0283)	0.195 <sup>a</sup> (0.0285)	0.192 <sup>a</sup> (0.0290)	0.192 <sup>a</sup> (0.0293)	0.0995 <sup>a</sup> (0.0288)	0.0965 <sup>a</sup> (0.0290)	0.0969 <sup>a</sup> (0.0294)	0.0936 <sup>a</sup> (0.0296)
Profitability	-0.101 <sup>a</sup> (0.0377)	-0.100 <sup>a</sup> (0.0375)	-0.0978 <sup>a</sup> (0.0378)	-0.0969 <sup>a</sup> (0.0374)	-0.154 <sup>a</sup> (0.0393)	-0.152 <sup>a</sup> (0.0389)	-0.151 <sup>a</sup> (0.0398)	-0.149 <sup>a</sup> (0.0393)
Size (Ln Sales)	0.0152 <sup>b</sup> (0.00598)	0.0152 <sup>b</sup> (0.00604)	0.0142 <sup>b</sup> (0.00642)	0.0138 <sup>b</sup> (0.00649)	0.00118 (0.00667)	0.000824 (0.00667)	-9.12e-05 (0.00719)	-0.000555 (0.00720)
Cleanliness	0.0393 <sup>b</sup> (0.0165)		0.0387 <sup>b</sup> (0.0158)		-0.0121 (0.0194)		-0.0125 (0.0190)	
Spring <sup>c</sup> Cleanliness	-0.0160 (0.00977)		-0.0163 <sup>*</sup> (0.00938)		-0.00564 (0.0106)		-0.00534 (0.0103)	
Cleanliness Transp.		0.00195 <sup>a</sup> (0.000713)		0.00219 <sup>a</sup> (0.000749)		-0.000581 (0.000838)		-0.000540 (0.000884)
Spring <sup>c</sup> Cleanliness Transp.		-0.000570 (0.000464)		-0.000523 (0.000447)		-0.000285 (0.000508)		-0.000273 (0.000493)
Spring	-0.0268 <sup>b</sup> (0.0135)	-0.00103 (0.0274)	-0.0291 <sup>b</sup> (0.0133)	-0.00658 (0.0258)	-0.0642 <sup>a</sup> (0.0152)	-0.0501 (0.0311)	-0.0695 <sup>a</sup> (0.0149)	-0.0558 <sup>c</sup> (0.0299)
Inflation			0.0984 (0.0768)	0.138 <sup>c</sup> (0.0817)			0.0510 (0.0858)	0.0555 (0.0886)
GDP Growth			0.121 <sup>c</sup> (0.0659)	0.187 <sup>b</sup> (0.0751)			0.0985 (0.0809)	0.0942 (0.0890)
Constant	0.0161 (0.0747)	-0.0734 (0.0819)	0.0349 (0.0797)	-0.0616 (0.0863)	0.402 <sup>a</sup> (0.0853)	0.433 <sup>a</sup> (0.0928)	0.423 <sup>a</sup> (0.0917)	0.453 <sup>a</sup> (0.0984)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8121	7949	7942	7770	6966	6846	6811	6691
Within R-squared	0.067	0.067	0.066	0.066	0.214	0.213	0.212	0.211
Number of firm	800	779	799	778	740	724	739	723

Robust standard errors in parentheses.

<sup>a</sup> p < 0.01.

<sup>b</sup> p < 0.05.

<sup>c</sup> p < 0.1.

**Table 8**  
Arab Spring effect, dynamic models.

VARIABLES	Book Leverage				Market Leverage			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
L. Book Leverage	0.887 <sup>a</sup> (0.032)	0.888 <sup>a</sup> (0.033)	0.891 <sup>a</sup> (0.034)	0.896 <sup>a</sup> (0.035)				
L. Market Leverage					0.644 <sup>a</sup> (0.033)	0.644 <sup>a</sup> (0.034)	0.622 <sup>a</sup> (0.035)	0.624 <sup>a</sup> (0.035)
Growth options	-0.006 <sup>a</sup> (0.002)	-0.006 <sup>a</sup> (0.002)	-0.006 <sup>a</sup> (0.002)	-0.006 <sup>a</sup> (0.002)	-0.063 <sup>a</sup> (0.006)	-0.063 <sup>a</sup> (0.006)	-0.066 <sup>a</sup> (0.006)	-0.065 <sup>a</sup> (0.006)
Tangibility	0.031 <sup>a</sup> (0.009)	0.031 <sup>a</sup> (0.009)	0.030 <sup>a</sup> (0.009)	0.029 <sup>a</sup> (0.010)	0.062 <sup>a</sup> (0.011)	0.063 <sup>a</sup> (0.011)	0.068 <sup>a</sup> (0.011)	0.069 <sup>a</sup> (0.011)
Profitability	-0.123 <sup>a</sup> (0.027)	-0.123 <sup>a</sup> (0.027)	-0.121 <sup>a</sup> (0.028)	-0.121 <sup>a</sup> (0.028)	-0.164 <sup>a</sup> (0.019)	-0.164 <sup>a</sup> (0.019)	-0.173 <sup>a</sup> (0.019)	-0.172 <sup>a</sup> (0.019)
Size (Ln Sales)	0.003 <sup>a</sup> (0.001)	0.003 <sup>a</sup> (0.001)	0.003 <sup>a</sup> (0.001)	0.003 <sup>a</sup> (0.001)	0.004 <sup>a</sup> (0.001)	0.004 <sup>a</sup> (0.001)	0.005 <sup>a</sup> (0.001)	0.005 <sup>a</sup> (0.001)
Cleanliness	0.004 (0.004)		0.004 (0.013)		0.013 <sup>a</sup> (0.005)		-0.010 (0.014)	
Spring <sup>b</sup> Cleanliness	-0.004 (0.004)		-0.004 (0.004)		-0.006 (0.005)		-0.010* (0.005)	
Cleanliness Transp		0.00012 (0.000)		0.00024 (0.001)		0.0006** (0.000)		-0.0005 (0.001)
Spring <sup>b</sup> Cleanliness Transp.		-0.00019 (0.000)		-0.00013 (0.000)		-0.00014 (0.000)		-0.0004 (0.000)
Inflation			0.007 (0.342)	0.096 (0.317)			-0.683 <sup>b</sup> (0.366)	-0.615 <sup>b</sup> (0.345)
GDP Growth			0.041 (0.061)	0.023 (0.078)			0.069 (0.079)	0.098 (0.097)
Constant	-0.007 (0.006)	-0.004 (0.009)	-0.007 (0.006)	-0.013 (0.034)	0.106 <sup>a</sup> (0.015)	0.090 <sup>a</sup> (0.018)	0.122 <sup>a</sup> (0.019)	0.161 <sup>a</sup> (0.043)
SOA	11.3 %	11.2 %	10.9 %	10.4 %	33.6 %	33.6 %	37.8 %	37.6 %
Observations	7400	7245	7246	7091	6222	6115	6094	5987
Number of firms (groups)	789	768	788	767	717	702	715	700
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Instruments	32	32	33	33	32	32	33	33
AR1 p	0	0	0	0	0	0	0	0
AR2 p	0.0566	0.0562	0.0567	0.0561	0.449	0.371	0.393	0.295
Hansen p	0.468	0.365	0.502	0.433	0.650	0.678	0.756	0.731

Spring variable dropped due to collinearity with year dummies. Robust standard errors in parentheses.

\*\*p < 0.05.

<sup>a</sup> p < 0.01.

<sup>b</sup> p < 0.1.

that laws became less strict after protests and political changes in this region.

## 5. Conclusions

This study investigates the CS practices of non-financial companies operating in the MENA region. Country-level corruption and the Arab Spring's effect on CS is analyzed through the application of static and dynamic models. Country corruption has an effect on CS because of the significant agency problems and information asymmetry that are associated with corrupt practices. The developing countries in the MENA region are more susceptible to corruption because of inadequate governance systems and regulations, which make them a suitable choice for this study.

Our contribution to the literature on capital structure is threefold. The study expands the research on CS across countries in a geographic area that has been relatively overlooked in previous scholarly works. Our second contribution is emphasizing the significance of enhancing institutional environments in developing countries to facilitate firms' access to external finance, particularly when the level of corruption in a country is found to have a significant effect on the decisions that corporations make about their CS. Finally, addressing the effect of the Arab Spring, a period of political instability, on the CS decisions is the first instance in which such an analysis has been conducted. The findings of this research are likely to be significant to other developing countries and regions and carry major implications for emerging economies that share similar attributes.

The results indicate that large, tangible companies prefer debt, while profitable companies with more growth opportunities choose equity. Less corruption is associated with increased corporate debt. The use of debt decreased because of the Arab Spring, and corruption's effect on the CS became weaker. The SOA to the target leverage is comparatively slow for book leverage, while it is significantly greater for market leverage. These outcomes are consistent with the pecking order theory, but the tradeoff theory has some support as well.

Our findings suggest that market imperfections, including information asymmetry and the cost of distress, played a crucial role in determining CS in the MENA region. The aforementioned have important implications for investors, managers, and policymakers. The

presence of information asymmetry leads to a tendency among novice and less sophisticated investors to opt for alternative investment vehicles. An analogous line of reasoning applies to the bond market and seasonal equity issues. The reallocation of investors' preferences is expected to reduce the significance of financial markets in securing new financing for companies. Consequently, this will have an adverse effect on new investments throughout the economy. Increasing the information provided by firms and the investors' protection are imperative to prevent such an outcome.

Managers, in these circumstances, should rationally adopt strategies intended to enhance retained earnings, including reduced dividends, and adjusting the capital structure toward lower debt, as effective restructuring strategies to mitigate distress risk and accommodate information asymmetry, particularly during the post-Arab Spring period. Another source of funding, in the absence of access to debt or equity from stock markets or lending institutions, could be joint ventures, especially important for startups, or later stage of growth funding.

The findings have implications for regulators and policymakers in the MENA region who wish to assess transparency and significant political events' effects on the financial system and investors. The potential decline in the stock market's role should be a matter of concern for policymakers. We recommend implementing remedial policies to ensure common stocks' equitable pricing. The policies encompass various measures, such as information dissemination to help in valuation, the timely and accurate disclosure of information, and the promotion of affordable financial consultation services for investors. Moreover, the adoption of high-quality accounting standards has the potential to decrease corruption. In summary, the implications entail enhancing investor protection, strengthening control measures, increasing transparency, and fostering the financial system's growth overall to facilitate enterprises' use of debt financing.

The findings on adjustment behavior indicate that the adjustment rate is slow. This outcome suggests that either the target is unimportant or that the costs of adjustments to achieve the target are prohibitively high. Adjustments' cost is one of many obstacles that prevents the financial system from being more effective. It is recommended that policymakers enhance the financial system's efficiency by lowering transaction costs, thereby stimulating local and global investment.

The study is subject to certain limitations, primarily that the dataset is limited to the period from 2005 to 2018. However, this approach was taken to mitigate the COVID-19 pandemic's influence, which emerged near the end of 2019. Future research may consider the pandemic and political instability's compound effect. Further, considering the varying duration of the Arab Spring across the affected countries, it remains debatable to what extent this may have influenced CS. The investigation of these questions encompasses components that warrant further academic exploration.

## Data availability

The data that supports the findings of this study is available on request from the corresponding author. The data is not publicly available due to privacy restrictions associated with the providing database.

## CRedit authorship contribution statement

**Islam Abdeljawad:** Writing – original draft, Methodology, Formal analysis, Conceptualization. **Ayat A. Hakawati:** Writing – original draft, Investigation, Data curation. **Muiz Abu Alia:** Validation, Investigation, Conceptualization. **Mamunur Rashid:** Writing – review & editing, Visualization, Validation.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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