



# Impact of the Global Financial Crisis and the Tunisia's Jasmine Revolution on the Corporate Capital Structure: Evidence from Four Arab Countries

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## ABSTRACT

This paper provides new evidence on capital structure determinants in the Arab world with special focus on the impact of the 2008 global financial crisis and the Jasmine Revolution on four different corporate leverage ratios. The sample consists of 440 non-financial listed companies from four Arab-Mediterranean countries (Egypt, Jordan Morocco and Tunisia) and the panel data are analyzed from the period 2003–2019. Statistical analysis of results are carried out by using the ordinary least squares; three dummy variables are included (time, country and industry). The results indicate cross-country variations in four different leverage ratios. Moroccan firms, contrary to those in Tunisia and Jordan, show lower leverage ratios. By contrast, they report higher levels of “size”, “profitability” and “growth opportunities”. The results also show that the Jasmine Revolution as well as the 2008 global financial crisis affects the impact of firm-specific determinants: After crisis and Jasmine Revolution, the positive and the negative effects of “size” and “profitability”, respectively, become more important. Profitability is the most significant explanatory factor of corporate capital structure in Arab countries. During the two sub-periods, the growth opportunities and their negative impact on the corporate financial decisions depend on the choice of the leverage ratio (total debt versus long term debt – book values versus market values). Asset tangibility is the most critical factor: its positive effect on capital structure is more important before the Jasmine revolution and/or the global financial crisis. The effect is initially positive but becomes negative when leverage ratio is calculated using total values of debt (book and market values of debt). Results on capital structure determinants in the Arabic context not depend only on the choice of the leverage ratio, but also on the period considered.

**Keywords:** Leverage Ratio, Pecking Order Theory, Trade-off Theory, Panel Data

**JEL Classifications:** G01, G10, G30, G32, G38

## 1. INTRODUCTION

A vast and rich literature compares developed countries with other countries around the world not only in terms of their economic and financial development but also in terms of their legal, regulatory and institutional framework (Demirgüç-Kunt and Levine, 2001; Beck and Levine, 2005; Chinn and Ito, 2006; Svirydzhenka, 2016; Asante et al., 2023). In their study opposing developing countries to emerging markets over the period 2002 to 2017, Khan et al. (2023) examine the relationship between

institutional quality and financial development. Abaidoo and Agyapong (2023) show how institutional quality influences variability in financial development; the sample consists of sub-Saharan Africa countries. Ayadi et al. (2018) pay particular attention to arabic countries mainly Egypt, Jordan, Morocco and Tunisia. They examine the relationship between the financial system development, the regulatory framework and the financial inclusion. Abida et al. (2015) are limited to 3 countries of the North Africa (Egypt, Morocco and Tunisia). They discuss the relationship between economic growth and financial development.

The institutional, economic, financial and other country-specific factors are regarded as important determinants of capital structure (Rajan and Zingales, 1995; Demirgüç-Kunt and Maksimovic, 1999; Booth et al., 2001; Bancel and Mittoo, 2004; Gajurel, 2006; Jöeveer, 2013; Lemma and Negash, 2013; Mokhova and Zinecker, 2014; Öztekin, 2015). Nevertheless, prior research on capital structure determinants shows the importance of firm-specific factors (size, asset tangibility, growth opportunities, profitability...) and the vast majority of the very first studies are focusing on developed countries. In their international study including 42 countries, De Jong et al. (2008) show that country-specific factors can influence the roles of firm-specific determinants of leverage. The effects are both direct and indirect.

More recently, other factors, such as the corporate social responsibility (CSR), ethics, and sustainability are also worth considering as potential determinants of the capital structure. Krištofik et al. (2022) examine the mediating role of CSR in the relations between capital structure and its determinants (effective corporate tax rate, depreciation and amortization, asset tangibility and available cash). The sample consists of European CSR companies and non-CSR companies. Quite on the contrary, Abdul Rahman and Alsayegh (2021) consider the CSR as the dependent variable and the leverage ratio as an independent variable. The objectives of the study are to identify and describe the determinants of Corporate Environment, Social and Governance (ESG) reporting among Asian firms. Lu et al. (2021) focus on the impacts of CSR on company values whereas Yang et al. (2016) raise the question of its effects on capital structure.

This paper contributes to the existing literature by investigating the determinants of capital structure in four Arab countries - Egypt, Jordan, Morocco and Tunisia - over the period 2003–2017. Among the notable events that took place during that period of time is the international financial crisis which started in 2008. Started on 17 December 2010 in Tunisia, the “Jasmine Revolution” is the second important event.

To date, studies on the impact of such events on capital structure determinants are scarce, especially in Arab countries and more generally in emerging and developing countries. Iqbal and Kume (2014) examine the impact of the financial 2008 crisis on the capital structure decision of UK, French and German firms. A year later, Demirgüç-Kunt et al. (2015) use data on a wider sample of countries, a sample of 79 countries. Using a sample of six Gulf Cooperation Council “GCC” countries, Zeitun et al. (2017) show that the impact of the 2008 global financial crisis on the capital structure differs from country to country and between industries. As regards the Jasmine revolution effect on the capital structure determinants, the studies are also scarce. Hamouda et al. (2023) investigate the effects of the Arab “Spring” or Arab Revolutions of 2011 on the determinants of corporate capital structure in 11 countries from the Middle East and North Africa (MENA) region. To our knowledge, this is the first study evaluated the impacts of Jasmine Revolution on the corporate capital structure in this region.

First, this paper assesses and analyses recent trends in four different leverage ratios in four Arab countries; leverage ratios

are considered proxies for capital structure of firms. Second, it tests the validity of capital structure theories, mainly the pecking order theory and the hierarchical theory. Moreover, it investigates the most important factors that could explain the corporate capital structure decisions across Arab countries. The paper finally discusses the effects of the crisis and the Tunisia's Jasmine Revolution on four different capital structure determinants: firm size, asset tangibility, growth opportunities and profitability.

The rest of the paper is organized as follows: Section 2 begins with a brief introduction to the major theories of capital structure that have been used to explain and justify the debt/equity choice of firms in Arab countries. In the same section, four hypotheses are developed referring to the two major theories of capital structure: the trade-off and the pecking order theories. In that same section is presented the research methodology. Section 3 reports and discusses the estimation results. Section 5 concludes the paper.

## 2. HYPOTHESIS AND RESEARCH METHODOLOGY

According to authors such as Ahmadimousaab et al. (2013) and Sahar et al. (2015), the most common theories in the corporate finance literature are the pecking-order theory “POT”, the trade-off theory “TOT” and the market timing theory. Other theories are also emerging and the objective is always the same: To identify the factors which can help explain the choice between debt financing and equity financing.

There is a broad consensus, however, that the two most common theories used are the pecking-order and the trade-off theories (Serrasqueiro and Caetano, 2015; Adair and Adaskou, 2015; Simatupang et al., 2019; Agyei et al., 2020). The trade-off theory stipulates that firms trade-off between benefits and costs of debt (Campbell and Kelly, 1994; Hackbarth et al., 2007; Ghazouani, 2013; Abdeljawad et al., 2013). In the

pecking order theory, it is understood that firms prefer internal to external financing (Frank and Goyal, 2003; Chen and Chen, 2011; Chaklader and Padmapriya, 2021).

### 2.1. Hypothesis Development

A review of the literature, both theoretical and empirical, shows that there are no consistent predictions on the effects of size, tangibility, profitability and growth opportunities on capital structure. In fact and regardless of the context, the trade-off and the pecking order theories give distinctively different predictions.

In the Arab world and especially in four countries suffered more from Jasmine Revolution of 2010-2011, we propose the following hypothesis regarding four firm-specific determinants of capital structure: size, tangibility, profitability and growth opportunities.

- Hypothesis 1: Confirming the propositions of the trade-off theory, we suppose a positive size - leverage relationship

Prior studies on capital structure determinants confirm that there is a mixed relationship between the size of a firm and the

leverage ratio (Bevan and Danbolt, 2004; Hall et al., 2004). Firm size is, therefore, critical (Frank and Goyal, 2003). However according to the pecking order theory "POT", larger firms are more likely to have more cash flows and more accumulated cash reserves. That means that they have less recourse to leverage. The relation is so negative between firm size and the capital structure (Titman and Wessels, 1998; Antoniou et al., 2002; Huang and Song, 2005).

In the opposite, the trade-off theory "TOT" suggests a positive relationship between size and leverage ratio: enjoying economies of scales, larger firms can raise more external finance at lower costs (Warner, 1977; Ang et al., 1982; Titman and Wessels, 1988). Larger firms have better reputation. They can obtain external financial resources more easy. They are more diversified and less likely to go bankrupt; the agency costs are lower (Zeitun et al., 2017; Antoniou et al., 2008; Mitton, 2007).

- Hypothesis 2: Confirming the propositions of the trade-off theory, the tangibility has a positive relationship with leverage.

The trade-off theory predicts a positive relation between leverage and tangibility. According this theory, tangible assets are considered as a collateral of borrowed fund (Belkhir et al., 2016; Frank and Goyal, 2009; Rajan and Zingales, 1995). According to pecking order theory, firms with more tangible assets have preference to equity; they have less information asymmetry problems. Thus, they have lower dependance on debt (Leary and Roberts, 2005; Hovakimian et al., 2004).

- Hypothesis 3: We suppose, confirming the propositions of the pecking order theory, the negative profitability-leverage relationship.

According to the pecking order theory, profitability is negatively related with capital structure. Profitable firms have, in fact, more internal funds and demand less external financing (Friend and Lang, 1988; Jensen et al., 1992; Booth et al., 2001; Aggarwal and Jamdee, 2003 Cheng and Shiu, 2007). However and according to the trade-off theory, it is argued that more profitable firms have more income to shield from taxes. The relationship is therefore positive between profitability and leverage (Jensen, 1986; Fama and French, 2002; Xu, 2012). Oktavina et al. (2018) show that profitability does no impact on the capital structure of Indonesian firms

- Hypothesis 4: Confirming the propositions of the trade-off theory, the growth opportunities have a negative relationship with leverage.

The pecking order theory suggests that firms with higher growth opportunities have generally higher information asymmetries. In their capital structure, they have less of equity and more of debt (Frank and Goyal, 2003; Daskalakis and Psillaki, 2008). In this paper, we suppose a negative relationship between growth opportunities and leverage (Rajan and Zingales, 1995). We suppose, in other words, that that the trade off theory better describes the capital structure in the Arabic context.

In total and as shown in the Table 1, we suppose that the firm size and the asset tangibility are positively related to leverage ratios, whereas the profitability and the growth opportunities have the opposite effects on capital structure.

## 2.2. Research Methodology

### 2.2.1. Sample

The present study focuses on non-financial listed firms of four Arabic countries: Egypt, Morocco and Tunisia from North Africa and Jordan from the Middle-East. Obviously, each firm must be listed in the stock exchange of its country (Fan et al., 2012; Mateus and Terra, 2013; Antoniou et al., 2008).

The initial sample used consists of 445 listed firms. All regulated firms are excluded: financial (SIC codes 6000 to 6999) and utility firms (SIC codes 4900 and 4999). Firms with negative book to market ratios are also eliminated. The final sample consists of 440 non-financial companies listed on the Arab stock markets in the 2003 – 2019 period.

Table 2 presents the representativeness of the final sample.

As shown in the Table 2 and contrary to Morocco, Egypt is the country the most representative of the sample (36, 86%).

The choice of this sample is justified by the fact that these four countries share similar experiences. They were profoundly affected by the Jasmine revolution. They differ, however, in terms of their economic growth and financial, social and political development. Every country has its own particularities. In the 1990s, the four Arab countries became IMF "Success Stories" (Pfeifer, 1999); they have received special attention: Shabsigh and Domaç (1999) investigate the impact of the exchange rate policies of these four countries on their collective economic growth. Harrigan and El-Said (2010) describe the economic impact of the IMF and World Bank programs on these four countries over the period 1983-2004. Ayadi et al. (2018) investigate the relationship between financial inclusion, financial development and sustainable economic growth in these the four Mediterranean countries. El-Behairy et al. (2022) study the impact of Covid-19 on the labor markets (gender analysis). El-Said and Harrigan (2014) explain the link

**Table 1: The signs of the coefficients for each independent variable**

Variable	Pecking order theory	Trade-off theory	Expected sign
Size	-	+	+
Tangibility	-	+	+
Profitability	-	+	-
Growth opportunities	+	-	-

**Table 2: Representativeness of the selected sample**

Country	Number of firms	Observations	Percentage of sample
Egypt	170	1 935	36.86
Morocco	64	754	14.36
Tunisia	73	1 054	20.08
Jordan	133	1 507	28.70
Total	440	5 250	100

between economic reforms, level of social welfare provision political stability.

### 2.2.2. Model specification and estimation method

According to the literature review on capital structure determinants, various firm-specific factors can explain the choice between debt financing and equity financing. In this paper four factors are selected: size firm, asset tangibility, firm profitability and growth opportunities. They are found to be the key determinants of capital structure.

To examine the impact of these four different factors on capital structure of firms in the Arab countries, we use the following regression model:

$$\text{Lev}_{i,j,t} = \alpha_0 + \alpha_k X_{i,j,t} + \varepsilon_{i,t}$$

Where “ $\text{Lev}_{i,j,t}$ ” is the firm  $i$ 's leverage ratio at time  $t$  in country  $j$ . In this paper and following Hamouda et al. (2023), four leverage ratios are used to measure the notion of capital structure: “LevBv”, “LevMv”, “LTLevBv” and “LTLevMv”.

“ $X_{i,j,t}$ ” is a vector of firm-level factors: firm size, asset tangibility, firm profitability and growth opportunity. “ $\alpha_0$ ” and “ $\alpha_k$ ” are the constant and the specific coefficients, respectively. “ $\varepsilon_{i,t}$ ” is the error-term of firm  $i$  in time  $t$ .

The Table 3 lists the variables included in the estimation model.

Two ratios are so expressed in book values “LevBv” and “LTLevBv”, two others in market values “LevMv” and “LTLevMv”. Similarly, two ratios are based on the total debt

values “LevBv” and “LevMv”, the two others are based on the long-term debt “LTLevBv” and “LTLevMv”.

In addition, dummy variables are added to illustrate the existence of the Jasmine revolution. All firm data required for this study are collected from the Thomson Reuters Datastream database. Using the four-digit SIC industry classification, the final sample of firms is grouped into different sectors.: industry dummy variables are included in the econometric model. We employ other control variables including country and dummy variables.

Once all the variables are defined, we use the ordinary least squares (OLS) method to estimate the regression coefficients (Lakshmi et al., 2021). The review of empirical literature shows that this method is used by almost all studies focusing in the capital structure determinants. In fact, the linear functional equations and the Ordinary Least Square procedure are the most commonly applied (Viviani, 2008; Gharaibeh, 2015; Dalwai and Sewpersadh, 2023; Sadaa et al., 2023).

## 3. RESULTS

As noted above, this paper attempts to contribute to the debates on capital structure determinants. Inconclusive results in previous empirical studies present, in fact, opportunities for further relevant research, particularly in the Arabic world.

### 3.1. Descriptive Statistics

As most previous studies, we use the leverage ratio (debt to total assets) as a proxy for capital structure of a firm. We emphasize

**Table 3: Variable definitions**<sup>12345</sup>

Book Leverage ratio “LevBv”	$\frac{\text{Total bookdebt}(\text{WorldscopeItem, WC03255})}{\text{Total assets}(\text{WorldscopeItem, WC02999})}$
Market Leverage ratio “LevMv”	$\frac{\text{Total book debt}}{\text{Total assets} - \text{Common equity}^1 + \text{Market equity}^2}$
LT book leverage ratio “LTLevBv”	$\frac{\text{Long term debt}(\text{Worldscope Item, WC03251})}{\text{Total assets}}$
LT Market-leverage “LTLevMv”	$\frac{\text{Long term debt}}{\text{Total assets} - \text{Common equity} + \text{Market equity}}$
Size “Size”	$\ln(\text{Total assets})^3$
Tangibility “Tang”	$\frac{\text{Property, plant and equipment PPE}^4}{\text{Total assets}}$
Profitability “Prof”	$\frac{\text{Earnings before interest, taxes, depreciation, and amortization EBITDA}^5}{\text{Total assets}}$
Growth opportunity “MTB”	$\frac{\text{Total assets} - \text{Common equity} + \text{Market capitalization}}{\text{Total assets}}$

1 Worldscope Item WC (03501).

2 Worldscope Item WC(C08001).

3 Natural log of total assets (Worldscope Item, WC [07230]).

4 Natural log of total assets (Worldscope Item, WC [07230]).

5 Worldscope Item WC (18198).

**Table 4: Descriptive statistics of leverage ratios (2003–2019)**

Variable	Observations	Mean	Standard deviation	Min	Max
LevBv	3 449	0.2598236	0.1854616	3.44e-06	0.8921912
LevMv	3 158	0.2248406	0.1843889	2.38e-06	0.9015303
LTLevBv	3 264	0.129395	0.1428843	0.0000186	0.8525789
LTLevMv	2 984	0.1094487	0.1348634	0.0000103	0.8161056

that leverage ratio can be measured with total debt or long-term debt. It may be expressed in book value or market value.

Table 4 below present descriptive statistics of four leverage ratios and their evolution over the sample period 2003–2019. The sample consists of 440 non-financial listed companies from four Arab-Mediterranean countries.

The Table 4 shows that, on average and over the sample period 2003–2019, the total leverage ratios expressed on accounting and market values, are around 25% and 22%, respectively; those calculated using long-term debt are around 13% and 11%, respectively. They represent almost half of the total leverage ratios.

We note, moreover, that leverage ratios measured at market value are different from those measured at book value. Fama and French (2002) show that research results differ due to differences in how the leverage ratios are calculated (market or book values). Venanzi (2017) argues the opposite. Bowman (1980) shows a very high correlation between the book and market values of debt. Gurcharan (2010), among others, notes that using the book value or market value is “crucial”.

There are also some notable differences between countries. Leverage ratios differ, in fact, from country to country. Cross-country comparison is presented in the table below; mean values are retained. All variables are averaged over the period 2003–2019.

The data provided in the Table 5 indicate that the level of leverage of Tunisian firms is high compared to other Arabic countries. As can be seen in Figure 1, the peak levels are attained in 2006, 2011, 2015 and 2018. Figure 2 shows that Tunisia reported the highest level of leverage in 2005 and 2006 and during the period 2012–2019. Generally the lowest values are in Morocco. It should be noted, however, that the differences between arabic countries are more pronounced, namely when the leverage ratios are calculated on the basis of the total debt.

Based on theoretical and/or empirical theory, these variations in leverage ratios can be explain by a set of specific-firm factors. In the Table 6 below, we present the mean values of the most commonly used explanatory variables: firm size, asset tangibility, profitability and growth opportunities. Table 6 shows that the Moroccan firms have the highest values of “size”, “profitability” and “growth opportunities”. However, Egyptian firms have the highest percentage of tangible assets. Jordan firms are smaller and less profitable on average.

It should be reminded that these four specific-firm factors represent the independent variables of the econometric model. The Table 7

**Table 5: Cross-country statistics of leverage ratios**

Country	LevBv	LevMv	LTLevBv	LTLevMv
Egypt	0,259	0,220	0,125	0,100
Morocco	0,211	0,157	0,100	0,075
Tunisia	0,320	0,278	0,177	0,158
Jordan	0,244	0,235	0,113	0,107

**Table 6: Firm-specific variables**

Country	Size	Tang	Prof	MTB
Egypt	11,937	0,43	0.087918	1,374
Morocco	12,597	0,322	0.1034414	1,82
Tunisia	11,186	0,297	0.0878768	1,555
Jordan	10,563	0,425	0.0217348	1,201
Total	11.51484	0.3846349	0.0722935	1.433294

presents the correlation result of eight variables, of which half are explanatory variables.

Table 7 shows that the correlation between the two total leverage ratios “LevBv” and “LevMv” is important (0.887); more important is the correlation between the two other long-term leverage ratios “LTLevBv” and “LTLevMv” (0.935). It is still important, however, to point out that each econometric model retains only one leverage ratio. Thus, there is no problem about correlations between the four different leverage ratios. Table 7 also shows that the correlation between profitability and growth opportunities is high relative to other correlations (0.476). However, none of the variable has value above than the 0.5% amongst independent variables. The multicollinearity problem does not exist (Yakubu and Oumarou, 2023; Morrissey and Ruxton, 2018; Chakraborty, 2010).

Correlation analysis reveals also that different leverage ratios are positively correlated with size and tangibility. They are negatively correlated with profitability and growth opportunities. The notable exception is the negative correlation between total leverage ratio expressed in market values “LevMv” and tangibility “Tang”: the correlation is negative and significant (−0.036).

### 3.2. Regression Results

Using four different leverage ratios, four independent variables and traditional regression modeling OLS, we obtain the following results in Table 8.

Using simple OLS method, results show that, during the whole period 2003–2019, firm size has positive impacts on different leverage ratios. The first hypothesis H1 is therefore confirmed: in Arab countries, larger firms, more diversified and less prone to bankruptcy, find it easier to access debt. This result agrees with the assumptions of the trade-off theory (Warner, 1977; Ang et al., 1982). The second hypothesis on tangibility H2 is also confirmed not only by the trade-off theory, but also by the pecking order

Figure 1: Trends in leverage ratios in the Arab countries

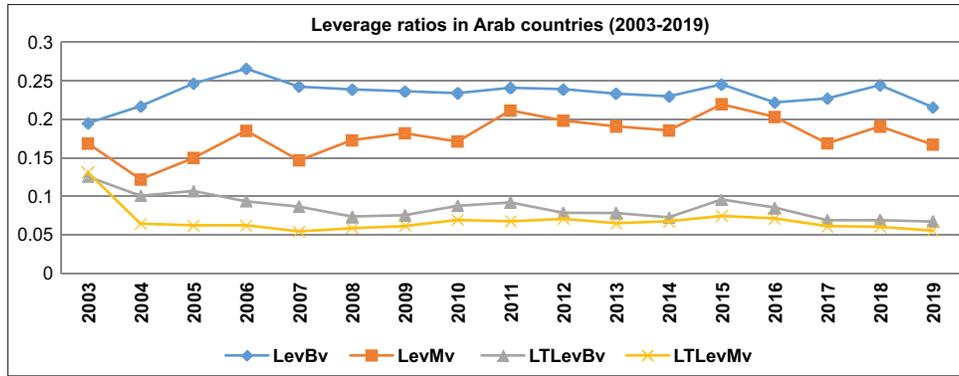


Figure 2: Leverage ratios: A cross-country analysis

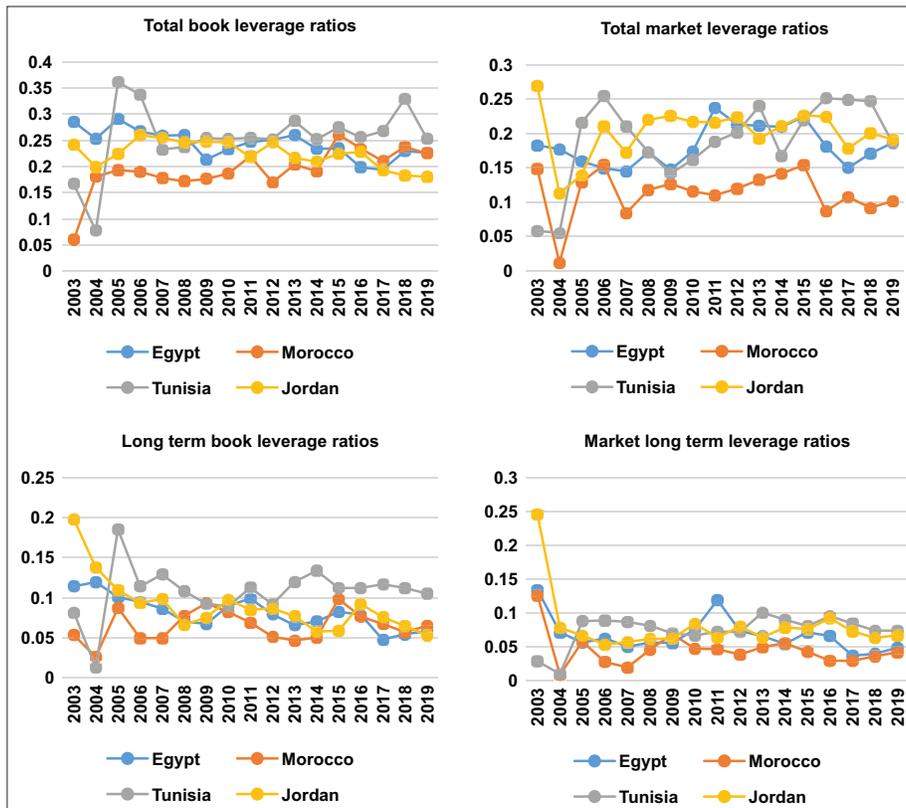


Table 7: Correlation matrix

	LevBv	LevMv	LTLevBv	LTLevMv	Size	Tang	Prof	MTB
LevBv	1.000							
LevMv	0.887*** (0.000)	1.000						
LTLevBv	0.759*** (0.000)	0.662*** (0.000)	1.000					
LTLevMv	0.708*** (0.000)	0.763*** (0.000)	0.935*** (0.000)	1.000				
Size	0.082*** (0.000)	0.021 (0.228)	0.122*** (0.000)	0.075*** (0.000)	1.000			
Tang	0.031 (0.069)	-0.036* (0.043)	0.112*** (0.000)	0.029 (0.120)	0.096*** (0.000)	1.000		
Prof	-0.217*** (0.000)	-0.323*** (0.000)	-0.144*** (0.000)	-0.223*** (0.000)	0.285*** (0.000)	-0.086*** (0.000)	1.000	
MTB	-0.104*** (0.000)	-0.303*** (0.000)	-0.082*** (0.000)	-0.204*** (0.000)	0.117*** (0.000)	0.038* (0.029)	0.476*** (0.000)	1.000
N	3569							

P-values in parentheses. \*P<0.05, \*\*P<0.01, \*\*\*P<0.001

theory. Its impact is positive, as in the case of long term leverage ratios, and negative, as in the case of total leverage ratios. Thus, we can confirm that, in arabic countries, the impact of asset tangibility on capital structure is depending on how we define the leverage ratio. Profitability and growth opportunities, the two other firm-specific determinants of capital structure, give negative and significant effects on the different leverage ratios. The two hypothesis H3 and H4 are validated. Profitability is certainly the most important factor explaining the capital structure of non-financial listed firms in arab countries.

Moreover, we can also confirm that the results are slightly better when the dependant variable - capital structure - is the total

leverage ratio expressed on market value (Helland, 1987; Rao, 1973). The coefficient of determination is  $R^2 = 0.284$ .

Another question arises as to who do political events and crisis situations affect corporate capital structure in the Arab world ? These include the Global financial crisis, as well as the Jasmine Revolution. Two dummy variables are therefore introduced: "FinCrisis"<sup>6</sup> and "JasmineRev"<sup>7</sup>.

Table 9 contains the results of the regressions. In Panel A, proxies for capital structure are the leverage ratios (book and market values). In Panel B, proxies are long term leverage ratios.

We note, once again, that the results are better when the proxy of capital structure is total leverage ratios expressed in market values. In either case, before or after the turbulent times periods of revolution and crisis, market leverage ratios (total or long-term debt) give better results than book leverage ratios, in the Arabic countries. Some of authors prefer use market values of leverage (Gurcharan, 2010; Wiwattanakantang, 1999; Suto, 2003; Deesomsak et al., 2004; Welch, 2004; Elsas and Florysiak, 2008), while others prefer the book values, for practical reasons and in view of the availability of data (Titman and Wessels, 1988; Graham and Harvey, 2001; Mateus and Terra, 2013).

**Table 8: Regression results**

	LevBv	LevMv	LTLevBv	LTLevMv
Size	0.018*** (8.057)	0.016*** (7.947)	0.016*** (9.037)	0.014*** (8.555)
Tang	-0.010 (-0.553)	-0.038* (-2.264)	0.066*** (4.245)	0.031* (2.196)
Prof	-0.437*** (-8.181)	-0.334*** (-7.123)	-0.249*** (-7.143)	-0.206*** (-6.946)
MTB	-0.012** (-2.865)	-0.082*** (-15.710)	-0.012*** (-3.715)	-0.041*** (-12.599)
_cons	0.052 (1.209)	0.149*** (3.569)	-0.050 (-1.420)	0.014 (0.409)
N	2787	2787	2651	2651
R <sup>2</sup>	0.148	0.284	0.201	0.257

\*P<0.05, \*\*P<0.01, \*\*\*P<0.001

6 FinCrisis = 0 if year ≤2007 and FinCrisis = 1 if year ≥2008

7 JasinRev = 0 if year ≤2010 and JasinRev= 1 if year ≥2011

**Table 9: Effects of Global Financial Crisis and Jasmine Revolution on capital structure**

Panel A: Total leverage ratios								
	LevBv				LevMv			
	FinCrisis		JasmineRev		FinCrisis		JasmineRev	
	Before	After	Before	After	Before	After	Before	After
Size	0.005 (0.805)	0.020*** (8.265)	0.003 (0.771)	0.024*** (8.759)	-0.002 (-0.363)	0.019*** (8.282)	0.002 (0.562)	0.022*** (8.427)
Tang	0.158*** (4.000)	-0.038* (-2.274)	0.088*** (3.469)	-0.057** (-2.997)	0.134*** (3.935)	-0.064*** (-4.152)	0.061** (2.784)	-0.081*** (-4.474)
Prof	-0.378*** (-3.372)	-0.460*** (-11.097)	-0.412*** (-6.003)	-0.460*** (-9.719)	-0.244* (-2.529)	-0.352*** (-9.070)	-0.295*** (-4.918)	-0.367*** (-8.157)
MTB	-0.023* (-2.505)	-0.009 (-1.642)	-0.017* (-2.368)	-0.008 (-1.252)	-0.066*** (-8.211)	-0.089*** (-16.832)	-0.071*** (-11.568)	-0.092*** (-14.689)
Constant	0.125 (1.248)	0.047 (1.279)	0.179** (2.850)	-0.002 (-0.042)	0.270** (3.143)	0.139*** (4.044)	0.272*** (4.974)	0.097* (2.454)
Observations	422	2365	943	1844	422	2365	943	1844
R <sup>2</sup>	0.247	0.147	0.163	0.165	0.374	0.282	0.316	0.286

Panel B: Long-term leverage ratios								
	LTLevBV				LTLevMv			
	FinCrisis		JasmineRev		FinCrisis		JasmineRev	
	Before	After	Before	After	Before	After	Before	After
Size	0.008 (1.664)	0.017*** (9.374)	0.008** (2.675)	0.020*** (9.088)	0.002 (0.606)	0.016*** (9.109)	0.006* (2.296)	0.018*** (8.618)
Tang	0.188*** (6.253)	0.050*** (4.007)	0.143*** (7.754)	0.035* (2.388)	0.143*** (5.709)	0.017 (1.439)	0.110*** (7.080)	0.001 (0.047)
Prof	-0.146 (-1.714)	-0.282*** (-8.675)	-0.225*** (-4.491)	-0.280*** (-7.328)	-0.140* (-1.969)	-0.229*** (-7.547)	-0.201*** (-4.742)	-0.230*** (-6.340)
MTB	-0.026*** (-3.659)	-0.009* (-2.046)	-0.014** (-2.824)	-0.011* (-2.188)	-0.040*** (-6.743)	-0.041*** (-10.557)	-0.037*** (-8.608)	-0.043*** (-9.122)
Constant	-0.033 (-0.432)	-0.142*** (-4.635)	0.036 (0.792)	-0.172*** (-4.625)	0.073 (1.147)	-0.069* (-2.436)	0.096* (2.497)	-0.099** (-2.817)
Observations	422	2229	943	1708	422	2229	943	1708
R <sup>2</sup>	0.274	0.209	0.210	0.228	0.346	0.262	0.289	0.273

\*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001

Besides, Table 9 shows a significant “positive effect” of the **size** firm on the different leverage ratios, namely after the global financial crisis and especially after the Jasmine Revolution. Before crisis and revolution, firm size is not significant, except for long-term market leverage ratio. The first hypothesis H1 is confirmed. With long-term debt, we also find positive relationships between leverage and tangibility, confirming thus the predictions of the trade-off theory. The hypothesis H2 is also confirmed. However and after crisis and/or revolution, the positive effect of tangibility on total leverage ratios becomes negative but, still also significant. It can thus be argued that, in arabic countries, the impact of asset tangibility on corporate capital structure depend not only on the choice of the leverage ratio, but on the period considered.

As for the impact of profitatbility on capital structure in Arabic countries, all results show negative and significant impact. The hypothesis H3 is so confirmed There is, however, a notable exception: Long-term leverage ratio calculated with book values, and particularly before the crisis period. After the 2008 global financial crisis and the Tunisia's jasmine Revolution, we can confirm that the negative effect is more important and more significant. The significant negative impact of profitability on capital structure is one of the most consistent results.

Less well researched, but potentially significant, is the negative impact of growth opportunities on corporate capital structure The hypothesis H4 is so confirmed. The importance of this factor after the global financial crisis and the Tunisia's jasmine Revolution, depends, however, on the choice of the leverage ratios: book value or market value. When the proxy of capital structure is book leverage ratio (total debt or long term debt), the negative impact of growth opportunities becomes less important and less significant. Growth opportunities have larger effects on the financial decisions of firms (debt versus equity) when the leverage ratios are calculated using market values.

We can conclude, in summary, that the results of this paper agree with the assumptions of the the two most fundamental theories of capital structure: the trade off theory and the pecking order theory. We can confirm, moreover, that results on capital structure determinants in the Arabic countries are sensitive to the choice of the leverage ratios. They also depend on the time period and the time horizon examined: before or after Crisis and Jasmine Ravolution

#### 4. CONCLUSION

One of the most contentious issues on corporate finance is how do firms choose their capital structure (Myers, 1984; Barton and Gordon, 1987; Brusov and Filatova, 2023; Tekin and Polat, 2023). In a context of an increasingly turbulent environment characterized by multiple and complex crises and wars, the issue turns out to be quite complicated (El-Bannan, 2017; Talbi et al., 2022). This paper extends previous litterature on capital structure determinants by considering the specific context of the Arab countries, particularly the countries that are the most strongly affected by the Arab Spring. These countries are Egypt, Jordan, Morocco and Tunisia. All the sample countries, with the exception of Jordan, are countries of

North Africa (Fargues and Fandrich, 2012; Teti et al., 2017; Prince et al., 2018; El-Bannan, 2021).

In this study, the analysis is from 2003 to 2019, a time period sufficiently long to show how firms in Arab countries choose their capital structure. Two major events have marked this time period: the 2008 global financial crisis and the Jasmine Revolution in late 2010 and early 2011. During this period, we observe differences in the evolution of four proxies of capital structure employed in the present study: the leverage ratios. Leverage ratios can be calculated using the total debt or the long term debt. They can be expressed either on book values or on market values (Bowman, 1980).

The two most recognized theories related to firms' capital structure, the trade-off and the pecking order theories, consistently show the importance of firm-specific factors in explaining the leverage ratios and their evolution: size, tangibility, profitability and growth opportunities. Referring to these theories, all the proxies of capital structure are supposed to be positively and significantly correlated with size and tangibility and negatively correlated with profitability and growth opportunities.

In this paper, the asset tangibility is the factor the more sensitive to the choice of leverage debt. Its impact - at times positive, at others negative - on leverage ratios depends also on the period considered: After or before crisis and/or revolution. At the opposite, we find strong inverse relationship between profitability and leverage, which is consistent with the assumptions of the pecking order theory. This is certainly the most important factor of capital structure in the Arabic countries.

After global financial crisis and Jasmine revolution, results show, moreover, that the firm size, a proxy for the probability of default, plays a larger role in determining the corporate capital structure in the Arabic world. Empirically, after crisis and revolution, firm size is strongly positively related to capital structure. Finally, the results show that the negative impact of growth opportunities on capital structure depends on the choice of leverage ratios (long term debt or total debt). To sum up, we can confirm that the regression results are sensitive to whether market value or book value of debt is used. They are also sensitive to whether total or long term of debt is used.

Firm-specific variables have significant impacts on firms' capital structure in the Arab world. This research is, however, limited to four Arab countries. Further research could include other countries. Besides, this study focused only on firm-specific determinants of capital structure, future studies may center on both firm and country-specific determinants. The country-specific factors include factors such as tax policy, capital market development, shareholder and creditor protection.

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