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On the prediction of financial distress in emerging markets: What matters more? Empirical evidence from Arab spring countries

Mona A. ElBannan *

Faculty of Management Technology, German University in Cairo, Cairo, Egypt

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ABSTRACT

This study explores the main determinants of financial distress in 11 emerging countries. Using two-way cluster-robust standard errors, evidence shows that matured, profitable, liquid, small firms with high market-to-book ratio and low growth in assets are less prone to financial distress. Moreover, well-developed financial markets in countries with low levels of corruption reduce financial distress. Furthermore, it uses tests for equality between coefficients and moderates multiple regressions to capture the effect of firm life cycle on financial distress, over three Arab Spring sub-periods. The results imply adopting strategies to increase earned capital and cash holdings, avoid over-investment, and facilitate risk diversification strategies.

1. Introduction

Recently, the Middle East and North Africa (MENA) region has been facing several challenges, such as civil wars, political instability, high unemployment rate, low oil prices, and economic fragility. Governments across the region are undertaking various economic reform plans and development strategies to foster economic growth, and the World Bank expects regional growth to improve in coming years. These events may increase the probability of firm financial distress in the region. Therefore, these events also motivate this study to examine empirically the effect of the Arab Spring on firm distress to develop policies and restructuring strategies that help firms recover. Most studies on financial distress in developing countries examine the reasons behind distress and bankruptcy (e.g. Salloum and Azoury, 2012; and Zaki et al., 2011). However, this study examines the determinants of firm financial distress, while controlling for the Arab Spring, institutional variables, and fixed effects.

Therefore, the purpose of this study is to shed new light on the main factors influencing the probability of financial distress in a cross-country analysis of financial distress, and examine the effect of firm maturity as a proxy for firm life on financial distress, in the context of emerging markets. This study adopts a cross-country analysis approach, using a sample of 11 countries in the MENA region. The unique characteristics of the MENA countries and the distinct economic and political conditions affecting their corporate decision-taking are important motivations for this study. While most studies on financial distress focus on U.S. firms and the financial distress in the banking sector (e.g., Distinguin et al., 2010; Sahut and Mili, 2011), few studies examine the MENA countries, mixed results.

Particularly, a cross-country approach allows researchers to conduct more in-depth analyses of countries sharing the same characteristics of the region in question. Further, it enables examining the influence of several financial variables on the region. It is very interesting to examine these relationships for MENA region firms and provide empirical evidence from the perspective of emerging

* Corresponding author at: Department of Accounting and Finance, Faculty of Management Technology, German University in Cairo (GUC), New Cairo City, Postal code 11835 Cairo, Egypt.
E-mail address: mona.elbannan@guc.edu.eg.

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financial markets, because of the distinct economic and political conditions in these markets. The empirical findings of this study reveal the following: (1) Consistent with studies on the U.S. and other developed countries, for example, Hasan and Habib (2017), firm life cycle stage has a significant effect on financial distress in the MENA countries. This gives support to the life cycle theory, and implies that firm managers in the growth and decline stages of their life cycle should consider uncertainty and information asymmetry that increase the possibility of firm failure and distress. Furthermore, investors should link the firm life cycle to firm-specific risk and idiosyncratic risk when determining expected returns. (2) Evidence shows that firm life cycle, liquid cash holdings, profitability, market-to-book ratio, growth in book assets, market capitalization, and institutional factors, are highly significant determinants of financial distress in the emerging region, similar to studies on developed economies (e.g., Campbell et al., 2008; Charalambakis and Garrett, 2016). (4) Regressions testing the effect of the Global Financial Crisis (2007–2008) on financial distress show no significant evidence of a relationship between the crisis and financial distress. This may be due to the lack of financial integration between MENA countries and international stock markets. (4) Controlling for the effect of the Arab Spring, the effect of firm life cycle on financial distress is negative and highly significant across all Arab Spring periods, indicating that firms in growth and decline stages are more prone to financial distress due to lower earned capital ratios, while matured firms are less likely to be financially distressed. (5) Institutional factors that may differ across countries have significant effect on financial distress; specifically, the development of financial markets and the country level of corruption appear to be significant determinants of financial distress in the MENA region across the three Arab Spring periods.

This study makes the following contributions to bridge the gap in the existing literature on financial distress. First, few studies examine the life cycle-distress link, except for those on corporate turnaround strategies for distressed firms (Sudarsanam and Lai, 2001; Koh et al., 2015), and studies examining corporate risk, cost of equity, and financial distress (e.g. Hasan and Habib, 2017; Hasan et al., 2015; Habib and Hasan, 2017). Second, most studies on predicting financial distress in MENA countries focus on banking distress, because of the significant role of banks in emerging countries (e.g. Distinguin et al., 2010; Sahut and Mili, 2011). To the best of my knowledge, this is the first study to examine the determinants of financial distress in a sample of non-financial firms in the MENA region, using three proxies for financial distress, while controlling for the effect of the life cycle theory, Global Financial Crisis, and institutional factors, which may differ across countries. Thus, this study contributes to the literature on financial distress in the context of the MENA region. Examining these relationships is crucial because of the unique characteristics of this region and recent events; however, no studies do so. Third, the relationships and hypotheses in this study are re-examined while controlling for the influence of political transition and the Arab Spring period. Dividing the sample into before, during, and after the Arab Spring period, offers important insights into the main determinants of financial distress. Fourth, it was imperative to adopt reliable econometric methods to ensure the validity of the results. This study employs panel logistic regression using robust standard errors with clustering across two dimensions as follows: firms and years. Further, this study uses the tests for equality between coefficients with bootstrapped standard error of difference, and moderated multiple regression analysis with different interaction terms to capture the effect of firm life cycle on financial distress over three Arab Spring sub-periods. All study results remain qualitatively the same and reliable to using other robustness tests. Fifth, to predict financial distress in MENA emerging countries that share common characteristics, this study employs an econometric model comprising different aspects, to expand the group of financial distress indicators. To provide robust empirical evidence across countries, the study includes a large set of possible indicators, such as firm-specific variables, macroeconomic environment, and institutional factors in the estimated models, while controlling for the year, country, and industry fixed effects. This study explores—for the first time—the effect of financial market developments, level of corruption in the country, Global Financial Crisis, and political instability caused by the Arab Spring. Therefore, this study has implications for financial regulators and corporate policy makers, as the Arab Spring in one Arab country can spillover to other Arab and emerging countries through different channels due to common characteristics. Finally, the predication of financial distress during economic and political instability helps understand the effect of financial shocks on corporations across countries and offers invaluable insights for policymakers and portfolio managers when diversifying their portfolios.

Therefore, the findings of this study should be of interest to firm shareholders, prospective investors, and financial managers in emerging markets. The results should have practical implications for financial managers, policymakers taking financing and investing decisions, analysts considering firm life cycle stages when valuating firms, and finally, investors seeking stable income. Indeed, understanding the factors affecting the financial distress protects the firm against the risk of distress.

This paper proceeds as follows. Section 2 reviews the relevant literature leading to the hypothesis development. Section 3 describes the empirical methodology, including the sample, data, univariate analysis, logistic regression, and the robustness tests. Finally, Section 4 concludes this paper.

2. Review of related literature and research hypothesis

Financial distress has attracted considerable research attention in recent decades (e.g. Altman, 1968; Taffler, 1983), to develop more accurate measures and models to predict distressed firms with potential bankruptcy and insolvency issues. Distress forecasts include the assessment of loan security, reviews and evaluations of auditors, determination of portfolio risk, monitoring of financial institutions, and pricing all securities exposed to credit risk, such as bonds and credit derivatives (Scott, 1981). A firm is considered financially distressed if it lacks liquidity to meet financial obligations and interest payments on debt (Gilson et al., 1990). Therefore, distress is a situation when the current value of the firm is less than the claims of its creditors (Chen et al., 1995). It is a firm's inability to meet the contractual debt obligations, as its cash flows are less than its financial obligations (Baldwin and Scott, 1983).

Many definitions are used in the literature to define distress based on financial ratio analysis to compute the change in accounting ratios, changes in stock returns, or depending on *Z*-score models for predicting corporate bankruptcy developed by Altman (1968) and

Taffler (1983, 1984), where firms with negative Z-scores may be considered potentially bankrupt. Corporate financial distress includes four terms with distinct definitions: failure, default, insolvency, and bankruptcy. Failure means that the revenues of the firm are less than its costs or its realized rate of return on an investment is less than comparable investment returns. A technical default occurs when the firm violates a debt covenant, while a legal default occurs when it fails to meet periodic repayments of loan obligations. Insolvency refers to the inability to meet current obligations due to liquidity constraints. Bankruptcy indicates that the firm is in financial distress and requires legal declaration, involving the courts (Habib et al., 2020). In other words, bankruptcy is the final stage of financial distress, when the firm has no way out of its financial problems (Volkov et al., 2017).

As proxies for corporate distress, empirical studies use negative earnings for one year in large firms (John et al., 1992), interest coverage ratio where the earnings before interest, taxes, depreciation, and amortization less than interest expense for two consecutive years (Asquith et al., 1994), poor common stock returns (Gilson et al., 1990), and distance to default (Koh et al., 2015). Similarly, Tinoco and Wilson (2013) develop a risk model to proxy for credit risk and predict distress. Their model includes accounting ratios, market-based and macroeconomic data. The accounting ratios used in the model includes total funds from operations to total liabilities, total liabilities to total assets, the no-credit interval, and interest coverage ratio. Stock market information is embedded in equity prices and security residual return, while macroeconomic variables include proxies for inflation, interest rates, and three-month Treasury bills to capture the conditions in the economic environment that may affect firm financial distress. Furthermore, Geng et al. (2015) use data mining techniques to build models for forecasting the financial distress of 107 Chinese companies based on 31 financial indicators during the period 2001–2008. They argue that return on total assets, net profit margin of total assets, cash flow per share, and earnings per share, have important roles in predicting the deterioration in profitability. Similarly, Ashraf et al. (2019) test the accuracy of the traditional distress models in predicting corporate financial distress in Pakistan before, during, and after the financial crisis, and conclude that the ability of the models to predict financial distress decreases during the financial distress period. This result suggests the need for identifying more determinants of firm financial distress in both developing and developed countries.

There is increasing interest in the literature on the consequences of financial distress. Tax avoidance is one such consequence. Richardson et al. (2015) use a sample of Australian firms and find that distressed firms avoid taxes unlike their healthy peers, to increase the amount of cash needed for survival and recovery from financial distress. In addition, the financial distress of firms may affect the financial health of their suppliers. Lian (2017) posits a significant positive relationship between a customer firm's financial distress and its supplier's probability of financial distress, which may last for up to two years after a major customer becomes financially distressed (Oliveira et al., 2017). Besides the customer-supplier relationship, Garcia-Appendini (2018) examines the competitive industrial relationship and argues that financially distressed firms adversely affect the investment decision of their non-distressed competitors in U.S. firms, as they lead to an increase in the credit costs in this industry. As for market pricing, cash flow is more informative in explaining the stock returns of distressed firms than earnings information. In particular, Lee et al. (2017) find empirical evidence that operating cash flows are significantly related to stock returns in financially distressed firms. Furthermore, financial distress risk could explain market anomalies. Su (2016) examines the association between financial distress risk and investment-growth anomalies, arguing that high (low) capital investment expenditures have lower (higher) expected returns due to lower (higher) exposure to systematic distress risk. Some scholars investigate the consequences of financial distress on the CEO compensation. Chang et al. (2016) argue that newly hired CEOs receive higher compensation in the presence of high distress risk, and this compensation is equity-based rather than cash bonuses.

One strand of the literature on financial distress focuses on corporate turnaround strategies and firm restructuring to recover from financial distress (Sudarsanam and Lai, 2001; Koh et al., 2015; and Smith and Graves, 2005). Many studies examine the responses of firms to poor performance and distress. For instance, Sudarsanam and Lai (2001) classified the turnaround strategies into financial, operational, asset, and managerial restructuring strategies, and examine the effectiveness of these strategies on firm recovery for three years after distress in 166 potentially bankrupt UK firms during the period 1985–1993, using Taffler (1983)*Z*-scores. Financial restructuring involves restructuring the capital of the company to depend more on equity and decrease reliance on debt, to alleviate the burden of paying interest and repayment of principle, and this could be done through dividend cut/omission, equity issues, and debt restructuring. They argue that financial distress causes firms to reduce or omit dividend payments due to liquidity constraints and restrictive provisions in binding debt covenants. They find evidence that non-recovery firms focus on financial and operational restructuring to survive, while recovery firms choose investment and acquisition. In particular, 33% to 64% of non-recovery firms rely on dividend reduction and omission between distress year and distress year +2. Similarly, John et al. (1992) use negative earnings to proxy for distress in a sample of large size firms that have at least one year of negative earnings during the period 1980–1987, followed by three years of positive earnings. They find evidence that firms change their financial policies by reducing debt and cutting dividends. Therefore, some studies do find a link between dividend changes and financial distress, which may be because of belief that managers already adopt prudent and conservative dividend policies, where future reductions in case of distress will not be essential. DeAngelo and DeAngelo (1990) examine dividend adjustments in 80 NYSE financially distressed firms during the period 1980–1985, and find evidence that all firms reduced dividends, and even those with no binding debt covenants tend to cut dividends instead of omitting them, as managers are reluctant to omit dividends, especially in firms with long histories of dividend payments. They concluded that financial distress is a significant determinant of dividend reductions, as firms respond to financial distress with early and aggressive dividend reductions.

Another strand of literature on financial distress examines the main causes behind a firm's distress. Campbell et al. (2008) use a sample of U.S. firms over the period 1963–2003 to explore the main determinants of corporate failure. They find that firms with lower profitability, lower market capitalization, higher leverage, lower past stock returns, lower cash holdings, more volatile past stock returns, higher market-book ratios, and lower prices per share, are more likely to file for bankruptcy. In developed economies, the main determinants of distress may be attributed to reduction in the expected market for the industry's product and technological uncertainty

(Sudarsanam and Lai, 2001). These may trouble a firm with binding debt covenants and force it to lower dividend payments. In addition, poor economic conditions, industry downturn, competition (especially, foreign competition), change in accounting techniques, failed acquisitions, over-expansion, and poor management, are the main reasons for negative earnings and poor operating performance, relative to the industry and high interest expenses (John et al., 1992; Asquith et al., 1994). Using a large sample of U.S. firms during the period 1980–2011, Zhang (2015) find robust empirical evidence that R&D investments increase the likelihood of financial distress, because of the high uncertainty associated with R&D investments. Furthermore, to mitigate the endogeneity arising from the incentives of distressed firms to invest further in risky R&D to recover, Zhang (2015) employs state R&D tax credits as an instrumental variable, with results remaining robust. Using a large sample of U.S. listed firms during the period 1991–2012, Boubaker et al. (2020) argue that firms with higher corporate social responsibility have lower risk of financial distress because of their high creditworthiness and access to cheaper finance. Yazdanfar and Öhman (2020) argue that the Global Financial Crisis and other firm-specific variables (e.g., leverage, performance, and financial distress in previous years) influence financial distress in Swedish SMEs during 2008–2015. Mselmi et al. (2017) compare a sample of distressed SMEs matched with non-distressed SMEs in France. They find that distressed firms tend to have lower liquidity, solvency and profitability, higher financial leverage, and poor repayment ability. In the financial institutions setting, Chiaramonte and Casu (2017) find a negative relationship between the likelihood of bank distress, and failure, and bank liquidity holdings ratio, proxied by the net stable funding ratio. Moreover, Desai et al. (2016) document that bank financial statements can partially show in advance the increase in risk of bank distress.

Nevertheless, studies on the main drivers of corporate distress in emerging MENA countries defined additional causes of distress due to the distinct characteristics of the developing countries. For instance, in a sample of 178 Lebanese family-owned firms, Salloum and Azoury (2012) use the coverage ratio (EBITDA/Interest expenses) to proxy for financial distress, and argue that managerial characteristics in Lebanon such as board size and board independency are significant determinants of distress, that is, good governance reduces the likelihood of failures. In contrast, Shahwan and Habib (2020) argue that the efficiency of corporate governance has no effect on the likelihood of financial distress in Egyptian firms during the period 2014–2016; however, the efficiency of intellectual capital reduces the probability of financial distress. Moreover, Salloum and Azoury (2012) find empirical evidence that financial distress in 276 Lebanese family firms is negatively related to equity ownership of insiders and positively related to CEO-Chairman duality. Zaki et al. (2011) examine the causes of financial distress in commercial and Islamic banks in the UAE during 2000–2008, and argue that bank-specific fundamental factors, that is, cost income ratio, equity to total assets, asset growth, and loan loss reserve to gross loans ratio, affect bank distress, and find no evidence for the effect of macroeconomic factors. More recently, Ninh et al. (2018) examine the main causes of financial distress in Vietnamese firms during 2003–2016, and argue that accounting, market, and macroeconomic variables are significant determinants of the likelihood of financial distress. In particular, financial liquidity, solvency, productivity of assets, profitability, and the market value of equity have negative relationship with financial distress, while inflation and the interest rate for short-term Treasury bills report a positive relationship. Similarly, Khoja et al. (2019) examine the determinants of financial distress in the Gulf Corporation Council (GCC), the United Kingdom, and the United States of America during the period 2004–2012. Their findings reveal that the industrial factors and the macroeconomic developments, including inflation rate, interest rate, and oil prices, play significant roles in explaining financial distress in these different dynamic environments. Koh et al. (2015) investigate the effect of firm life cycle (birth, growth, maturity, and decline phases) on choosing the restructuring strategies in distressed U.S. firms during 1995–2013. They find evidence that financial restructuring by reducing dividends and investment has a positive relationship to financial recovery, and the corporate lifecycle influences these financial choices. Akbar et al. (2019) examine the relationship between bankruptcy risk and firm life cycle in Pakistan using a sample of 301 listed firms over different industries during the period 2005 to 2014. Their results reveal that bankruptcy risk increases during the introduction, growth, and decline stages, while it decreases during the mature stages of a firm's life cycle. Similarly, Zhang and Xu (2020) examine the influence of life cycle on the debt maturity structure in China. They argue that companies have relatively short-term loans in the introduction and recession periods, while growth companies have long-term debt ratios. Moreover, companies in recession have negative growth that decreases the operating cash flow; therefore, the increase in cost of financial distress decreases firm access to long-term loans. Mokhova and Zinecker (2013) argue that firm life cycle influences the probability of bankruptcy in a sample of small and medium sized enterprises in the Czech Republic during the period 2006–2010, including the financial crisis years. In addition, they posit a strong negative relationship between liquidity and financial distress.

With regard to firm life cycle, the explanatory variable of the primary focus in this study, many studies determine the main characteristics of the different stages of firm life cycle, including the introduction, growth, maturity, and shakeout stage (Dickinson, 2011). The introduction stage involves triggering innovation, the number of producers increase in the growth stage, reaching its maximum during the maturity stage, and finally, the decline stage has zero entry (Gort and Klepper, 1982). Furthermore, the literature widely discusses the main characteristics of each stage. For instance, at the introduction stage, firms are small in terms of their assets, and struggle to exist in the market, which entails taking high risk. During this stage, firms need to invest heavily in a positive NPV project; therefore, increasing their debt ratios more than in the growth and mature stages. Asymmetric information increases during the introduction stage and makes it difficult to access funds of finance projects. Firms will then seek external funds and borrow at higher rates. Consequently, small firms with high debt ratios, low profitability margins, and thereby, low earned equity ratios, are more prone to financial distress risk (Boot and Thakor, 1994; Pástor and Pietro, 2003). The second stage is the growth stage, where firms expand and develop rapidly through innovation and diversification. They increase both sales growth and assets. Firms in this stage struggle to gain competitive advantages, improve their internal operations, and increase sales to avoid market exit (Mokhova and Zinecker, 2013). Thus, firms at this stage are relying more on external finance, as their ability to generate internal profits and earned equity is still less than their demand for funds to finance their rapid growth. Thus, firm performance is high, less asymmetric information, lower cost of equity capital, and lower debt ratios than in the introduction stage (Lemmon and Zender, 2010). Therefore, more

assets and sales growth lead to greater accumulation in firm profits than the introduction stage (Hasan and Habib, 2017; Hasan et al., 2015). Growing firm liquidity is negatively related to profitability, as firms use their cash and other liquid holdings to generate profitability (Mokhova and Zinecker, 2013).

The third stage in the firm life cycle is the maturity stage. Firms in this stage maintain slower growth rates, stable sales levels and

Table 1
MENA development indicators.

Panel A: economic development indicators for entire MENA countries

Indicator name	2007	2008	2009	2010	2011	2012	2013	2014	2015
Annual Population growth %	2.16	2.20	2.20	2.15	2.11	2.07	2.02	1.95	1.89
Unemployment %	10.04	9.85	9.57	10.71	10.59	11.11	10.52	10.64	10.31
Annual GNI growth %	6.20	3.97	0.13	4.85	5.62	2.16	3.04	3.55	3.26
GNI (mill US$)	2,145,573	2,662,958	2,366,910	2,750,721	3,262,334	3,514,915	3,511,497	3,553,099	3,154,815
Gross domestic savings (% of GDP)	40.23	42.29	34.55	36.82	39.64	38.51	37.34	34.73	28.20
Gross domestic savings (mill US$)	853,728	1,121,906	806,091	1,013,826	1,289,685	1,348,050	1,286,944	1,191,947	817,622
Annual GDP growth %	5.17	4.51	0.54	5.03	3.61	2.72	3.07	3.25	2.60
GDP (mill US$)	2,123,322	2,647,705	2,368,231	2,767,962	3,282,393	3,529,758	3,524,024	3,563,559	3,147,279
Annual Inflation, consumer prices %	4.57	11.27	3.32	3.95	4.64	4.13	3.19	2.89	1.86
Annual Inflation, GDP deflator %	8.26	16.52	(4.37)	10.64	12.73	4.19	2.00	1.04	0.43
Net inflows of foreign direct investment (% of GDP)	5.97	4.33	3.51	3.18	1.96	1.77	1.68	1.50	1.64
Net inflows of foreign direct investment (mill US$)	126,454	113,755	83,844	87,567	62,347	61,877	58,039	51,747	50,572
Net outflows of foreign direct investment (% of GDP)	2.88	2.61	0.63	1.20	1.08	0.43	1.13	1.06	1.26
Net outflows of foreign direct investment (mill US$)	60,992	67,589	14,683	32,560	34,601	17,316	39,275	36,471	38,787
Imports of goods and services (% of GDP)	37.35	38.16	38.41	36.82	36.17	37.60	37.90	38.58	40.75
Annual Imports of goods and services growth %	21.29	13.97	(8.11)	5.47	6.15	8.52	4.45	4.25	(2.78)
Exports of goods and services (% of GDP)	49.37	51.18	42.97	45.23	49.38	49.43	48.30	45.42	39.25
Annual Exports of goods and services growth %	5.15	4.23	(6.27)	6.54	7.48	6.69	1.01	(1.07)	1.83

Panel B: financial markets performance

Financial indicator	2007	2008	2009	2010	2011	2012	2013	2014	2015
Stocks turnover ratio %	36.51	73.69	45.58	41.33	46.63	67.41	38.97	60.00	47.88
Stocks traded (mill US$)	978,959	903,563	625,748	432,193	470,275	664,371	571,314	877,876	609,004
Total listed companies	2172	2254	2200	2119	2283	2209	2183	1981	1969
Market capitalization (current US$)	–	–	885,966	1,061,817	901,123	912,044	1,554,102	1,422,922	1,307,714
Market capitalization of listed companies (% of GDP)	53.45	58.06	54.04	51.50	36.99	36.24	57.17	50.93	51.34

Panel C: economic growth indicator by country

GDP growth (annual %)	2007	2008	2009	2010	2011	2012	2013	2014	2015
Bahrain	8.29	6.25	2.54	4.33	2.10	3.59	5.41	4.48	2.93
Egypt	7.09	7.15	4.69	5.14	1.82	2.19	2.11	2.23	4.20
Jordon	8.18	7.23	5.48	2.34	2.56	2.65	2.83	3.10	2.38
Morocco	3.53	5.92	4.24	3.82	5.25	3.01	4.73	2.42	4.40
Tunisia	6.71	4.24	3.04	3.51	(2.38)	3.70	2.30	2.30	0.80
Kuwait	5.99	2.48	(7.08)	(2.37)	9.63	6.63	1.15	(1.62)	(0.40)
Saudi Arabia	5.99	8.43	1.83	4.76	9.96	5.38	2.67	3.64	3.49
United Arab Emirates	3.18	3.19	(5.24)	1.64	5.21	6.89	4.32	4.57	3.18
Oman	4.45	8.20	6.11	4.80	(1.09)	7.08	3.91	2.89	3.50
Qatar	17.99	17.66	11.96	19.59	13.38	4.88	4.58	4.18	3.58

The macro-economic indicators for MENA countries over sample period 2007–2015. Economic development and economic growth measures are compiled in Panel A. Financial markets indicators in the MENA in Panel B. In Panel A, Gross domestic savings are calculated as GDP less consumption expenditure. In Panel B, Stocks turnover ratio is the value of domestic shares traded divided by market capitalization. Stocks traded represent the total number of shares traded multiplied by prices. Listed companies are companies which have shares listed on an exchange at the end of the year. Market capitalizations is share price times the number of shares outstanding for listed companies. Panel D shows the GDP of MENA countries on an individual basis. Data on MENA economic indicators are obtained from *the World Bank's World development indicators database*, while the data on stock market indicators are collected from the *Arab monetary fund* (regional Arab organization).

product prices, less innovation, and changes (Tian et al., 2015). Therefore, managers prefer to be more conservative to protect their achievements, as they have limited positive NPV projects to implement (Jensen, 1993), and accordingly, there will be higher levels of retained earnings, liquidity, less demand for external finance, less growth opportunities (DeAngelo et al., 2006). Thus, during this stage, firms will maintain high earned equity capital, more stability, and are less likely to be financially distressed and go bankrupt.

The final stage in the firm life cycle is the shake out and decline stage. During this stage, the firm size increases more than their competitors, number of products decrease, and prices fall, with poor management strategies, and a lack of new business ideas to implement. An even more dramatic effect is that managers may participate in poor and risky negative NPV investments to give signals to stakeholders that they still have investment opportunities (Koh et al., 2015).

The financial systems and stock markets in the MENA countries are undeveloped, and firms rely more on debt finance to reduce the high agency costs (Giannetti, 2003). Moreover, the inefficient financial markets of MENA countries are slow to receive market information. Elsayed and Yarovaya (2019) use a sample of eight MENA countries to examine the instability caused by the Arab Spring, and argue that the Global Financial Crisis and the political turmoil of the Arab Spring cause financial instability, and generate stronger spillover effects between MENA markets. High leverage means that firms have high debt obligations in the form of cash flows to meet interest expenses and repay the principle of debt, which will reduce firm liquidity and may raise exposure to financial risk. In contrast, economic and political instability in the region increase the probability of financial distress and bankruptcy.

Following these arguments, and based on the above literature, this study predicts that during the introduction stages, when earned equity capital is low, or the balance of retained earnings is zero, the probability of firm financial distress is high. As the literature on financial distress and life cycle shows, growth firms, and matured firms with higher retained earnings to total assets ratio are less prone to financially distress. Relying on the main characteristics for firms that are more likely to be financially distressed, this study develops the following hypotheses:

H1. : Firm life cycle is negatively associated with corporate financial distress.

H2. : Firm liquidity is negatively associated with corporate financial distress.

H3. : Firm growth opportunities negatively associated with corporate financial distress.

H4. : Firm profitability is negatively associated with corporate financial distress.

H5. : Firm size has a negative influence on corporate financial distress.

2.1. MENA economic and political environment

From the above discussion on financial distress, it is important to review the MENA economic and political environment for further insight into the developments in the region. The MENA economy is classified as a bank-based economy, where banks represent the main source for finance and investments (Kar et al., 2011) and family ownership dominates the business sector (Salloum and Azoury, 2012). The Arab Spring caused the recent turmoil in the region, hindering the attraction and retention of capital and access to finance (Neaime, 2016). In its global economic prospects, the World Bank (2018) reports that the MENA region faces the following main risks: political and economic turmoil, weak oil prices, and obstacles in their reform progress. This region has distinct characteristics that differentiate it from other regions and the developed countries. The political uncertainty and turmoil in certain Arab countries started in Tunisia in 2010, and its effect has spread quickly to other Arab countries. This effect has also spread to the GCC, which was less affected by the Arab Spring. The recent political and military turmoil in the region, in addition to the financial crises, make the MENA economies vulnerable, leading to financial instability and a fragile financial sector. The World Bank expects that political uncertainty will take many years to resolve, and adversely affects the economic activities and growth of those countries, as direct foreign investments and tourists in the region decrease (World Bank 2011b).

In the aftermath of the 2010–2012 turmoil in the MENA countries, most of the economic variables of the region have been slowing down during 2007–2015, as Table 1 shows. The World Bank (2011a) reports in its World Development Report (2011a) that the MENA region is in turmoil, where Syria, Iraq, Libya, and Yemen are embroiled in civil war, which is causing great damage to both life and infrastructure. The civil war in Syria led to the Syrian refugee crisis. Tensions, protests and the need for change induced the political transitions, in the expectation that this Arab Spring would herald a transition to democracy and pluralism. Tunisia triggered this transition in 2010, which spread to other countries in the region, such as Jordan, Egypt, and Morocco. However, these countries faced instability and political unrest that lead to security concerns, which decelerate growth rates, increase unemployment rates, and hurt tourism, especially in Egypt and Tunisia. Along with these consequences, Arab oil exporters, namely, the GCC countries are experiencing low oil prices that adversely hurt their economies. For all the above challenges, the MENA governments are undergoing several reform plans in an attempt to ensure economic stability, enhance developments, and accelerate economic growth.

Many empirical studies examine the effect of the political uncertainty caused by the Arab Spring on the economies of these countries. For instance, Chau et al. (2014) find significant links between political uncertainty and financial market volatility, and little evidence that MENA markets have greater integration with international markets after the political revolution. Similarly, use price data for six Arab stock markets during the period 2010–2015 and test the impact of the Arab Spring on stock market performance. Their results reveal high risk and the persistence of volatility.

Table 1 (Panel A) shows that most of the economic indicators are adversely affected during and after the transition period started by the revolutions in 2010–2011. The gross net income (GNI) growth rate and the gross savings of the region are decreasing, which reflects more consumption than investment. The GDP growth rate decreased from 5.17 in 2007 to reach 2.60 in 2015. In particular, it

started to decelerate in 2011 from 5.03 to 2.60 in 2015, reflecting a decrease of 48% in GDP growth. Breaking down the MENA GDP in Panel D, Morocco and Egypt show the highest GDP growth rates of 4.4 and 4.2 in 2015, respectively. Kuwait experienced the highest deterioration of 100% in GDP growth from 10.08 in 2005 to −0.4 in 2015. This might be attributable to the decrease in oil prices, as Kuwait is a major oil exporting country in the GCC. Foreign direct investments (FDI) in Panel A show that the inflow of FDI to the region decreased 48% from 2010 to 2015. This indicates that the region became less attractive for foreign investments, and shows low regional integration with world economies and markets. Similarly, the import (export) growth rates are high, at 21.29% (5.15%) in 2007, while they show sharp decrease of −2.78% (1.83%) in 2015. For the capital markets performance in Panel B of Table 1, the indicators show that the capital markets in the MENA region remain underdeveloped, with few listed firms on the stock exchanges, and low trading activity on stocks. Thin trading on stock is apparent across years, with sharp a decrease of 31% between 2014 and 2015. Table 1 (Panel B) reports the changes in these indicators over 2007–2015 in the MENA markets.

3. Empirical methodology

3.1. Sample

The dataset of this study includes 11 MENA countries, namely, United Arab Emirates, Bahrain, Egypt, Jordan, Kuwait, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, and Tunisia. The data source for the analysis is retrieved from the Thomson Reuters Datastream database, which provides both the prices and accounting data on firms.

The sample covers an 11-year period beginning in 2005 and concluding in 2015. The financial variables used in the empirical analyses and regression models are lagged one year, that is, all explanatory financial variables are lagged for one period to explain the main determinants of financial distress during the 10-year period of 2006–2015. This period comprises two considerable financial challenges as follows: the Global Financial Crisis and the changes in the political regimes of many Arab countries, the so-called Arab Spring period. Therefore, the study period will control for these two challenges, and examine their effects on corporate financial distress. The sample excludes Syria, Yemen, Libya, and Iraq, as the severe civil wars in these countries has destroyed their economies. However, Tunisia and Egypt passed through periods of social unrest and political tensions, ending with regime change and effective economic reform plans. Following Fama and French (2001), I exclude utilities and financial firms operating in the regulated industries and firms with negative total equity. For inclusion in the sample, a firm should be a non-financial firm with available financial data on Thomson Reuters Datastream Database over the sample period. Moreover, the shares on which the dividends are paid are ordinary common shares. The resulting sample consists of 1534 firms in 11 MENA countries for 16,874 firm-year observations in total. The number of observations might decrease in some of the study analyses and repressions due to missing data in any of the study variables. Table 2 shows the breakdown of the number of firms in each country and its percentage to the total number of firms.

3.2. Data and summary statistics

To explore the main determinants of corporate financial distress, this study examines the association between financial distress and firm life cycle, which is the main explanatory variable of interest for this study, in addition to other firm-specific variables used as control variables. To recall, all the financial variables included in the empirical regression analyses are based on the fiscal year immediately prior to the year of the financial distress or non-distress. The empirical analyses focus on financial distress over the 10-year period from 2006 to 2015.

The dependent variable in this study is financial distress (DeAngelo and DeAngelo, 1990). Studies have argued that growth firms and matured firms with higher retained earnings to total assets ratio are less prone to financial distress. This study argues that the firm life cycle is relevant to a firm's investment decision and reliance on internal funds to finance its projects. Thus, managers of firms in the maturity stage will prefer accumulating their retained earnings, instead of wasting them on unprofitable projects, as they have limited positive NPV projects to implement (Jensen, 1993). Therefore, the higher earned equity or retained earnings to total assets ratio indicates that the firm is stable and less likely to be financially distressed. To control for the potential impact of financial distress on

Table 2
Number of firms by country.

Serial	Country	Number of firms	Percentage to total firms
1	Emirates	134	8.7
2	Bahrain	54	3.5
3	Egypt	305	19.9
4	Jordan	221	14.4
5	Kuwait	203	13.2
6	Lebanon	41	2.7
7	Morocco	83	5.4
8	Oman	135	8.8
9	Qatar	51	3.3
10	Saudi Arabia	179	11.7
11	Tunisia	128	8.3
	Total	1534	100.0

matured firms, this study uses the Altman (1968)*Z*-score measure of a firm's bankruptcy likelihood, as the main measure of distress. The discriminant function takes the following form:

$$Z = 0.012\ X1 + 0.014\ X2 + 0.033\ X3 + 0.006\ X4 + 0.999\ X5 \quad (1)$$

where Z is the Altman overall *Z*-score index, X1 is the ratio of Working capital/Total assets, X2 is Retained Earnings/Total assets, X3 is Earnings before interest and taxes/Total assets, X4 is the market value of Equity/Book value of total debt, and X5 is Net sales/Total assets. Therefore, this index combines measures for liquidity, performance, and solvency. To indicate whether the firm is financially distressed a dummy variable, *Distress*, is constructed to take the value of one when Altman's *Z*-score < 1.81 and zero otherwise, where Altman (1968) defined distressed firms to have an overall Z-score below 1.81. Because financial distress is central to my study, and to ensure the validity of my results, I used two additional measures of financial distress: Asquith et al.'s (1994) interest coverage ratio and Taffler's Z-score (Taffler, 1983, 1984). (1) The interest coverage ratio, *IntCoverage*, is measured as firm earnings before interest, taxes, depreciation, and amortization (EBITDA) to interest expenses (Asquith et al., 1994). A firm is in distress if its EBIDTA is less than its interest expense in any year, that is, interest coverage ratio is less than 1 (i.e. IntCoverage <1). (2) Regarding Taffler's Z-score, Taffler (1983) developed a linear discriminant model taking the following form:

$$Z = C_0 + C_1\ Profit\ before\ taxes/current\ liabilities + C2\ Current\ assets/total\ liabilities + C_3\ Current\ liabilities/total\ assets + C_4\ No - credit\ interval \quad (2)$$

where C_0 is the constant and $C_1 - C_4$ denote the coefficients (Mosteller-Wallace percentage contribution measures) of the four ratios of profitability (53%), working capital (13%), financial risk (18%) and liquidity (16%), respectively. No-credit interval variable is a proxy for liquidity and Graham (2000) defines it as the time needed by a firm to finance its expenses. Following Tinoco and Wilson (2013), this study calculates the no-credit interval variable using the following formula:

$$No - credit = (Current\ assets – Inventories) – current\ liabilities/(Sales – EBIT – Depreciation)/365 \quad (3)$$

This study employs the Taffler Z-score to classify a firm as a distressed firm if it has a negative Z-score in one year after positive Z-scores in two consecutive years. Thus, this study classifies firms with negative Z-scores as distressed firms and the potential of bankruptcy risk, as their financial profiles, are the same as those of previously bankrupt firms. A dummy variable, *Z-score*, takes the value of one if the firm is classified as a distressed firm and zero otherwise.

Firm life cycle is the main predictor of interest in this study, in addition to other firm-specific variables, institutional variables that may differ across countries, and fixed effects. Firm maturity is a proxy for the effect of the firm life cycle on financial distress. The life cycle theory argues that there are four stages of a firm life cycle: birth, growth, maturity, and decline. Each stage has different restructuring strategies and decisions that will be appropriate for the stage characteristics (Koh et al., 2015). Therefore, one could expect that the life cycle stage will affect whether a firm is financially distressed (DeAngelo and DeAngelo, 2006). Specifically, firms in the maturity stage are less likely to be distressed than are those in other life cycle stages. Firm maturity, *MatAsset,* is measured by the earned equity proxied by the ratio of firm retained earnings to book value of total assets (RE/TA), and *MatEQ* is the ratio of firm retained earnings to book value of total Equity (RE/EQ). Firms with higher RE/TA and RE/EQ are more mature and well established, while firms with lower RE/TA and RE/EQ ratios are younger firms that tend to be more vulnerable to financial distress (DeAngelo et al., 2006; Hasan and Habib, 2017). Therefore, this study uses the earned equity ratio to proxy for firm life cycle stage, where firms in the maturity stage tend to have high earned capital ratios, and firms in the growth and decline stages hold lower earned capital ratios.

This study includes other determinants of financial distress as independent control variables in this study. Specifically, I control for the effect of firm cash ratio, as a proxy for liquidity, profitability, growth opportunities, size on firm financial distress (e.g., Chen and Merville, 1999; Pranowo et al., 2010; Sayari and Mugan, 2013; Al-Hadi et al., 2019). Several empirical studies link financial distress with firm size to control for differences in firms' investment opportunities, ability to access funding sources, availability of resources and capabilities to cope with competition. Prior studies argue that larger firms can avoid financial distress because of their high performance, earnings power, and large economic resources, to cope with any unexpected financial shocks (Al-Hadi et al., 2019). The firm cash holdings, as a proxy for firm liquidity, and firm financial profitability, are included to control for firm solvency, ability to meet obligation, and recover during periods of financial constraints (Al-Hadi et al., 2019). Corporate financial distress, which is the likelihood that a firm goes bankrupt, is influenced by the availability of liquidity and credit (Hendel, 1996). To control for firm liquidity, I measure ***CASH***, by the cash holdings and marketable securities to the total assets ratio (John, 1993).

I measure profitability (*E/TA*) using the ratio of earnings before interest but after taxes to book value of total assets, and the return on equity ratio (*ROE*) measured by the common stock after-tax earnings over book value of the total equity ratio (Fama and French, 2001; Denis and Osobov, 2008). An alternative measure for profitability (*Operating E/TA*) is the operating income scaled by the book value of total assets used to confirm the results (Ferris et al., 2009). This study uses two measures to proxy for firm investment and growth opportunities. The market-to-book ratio, *MB*, measured by the book value of total assets minus the book value of total equity plus market equity, all divided by the book value of total assets. The market value of equity is the stock closing price at the end of the year multiplied times the number of shares outstanding. The other proxy for growth opportunities is the percentage change in firm book total assets, *ChgTA*, using the formula $TA_t - TA_{t-1} / TA_{t-1}$%. The size of the firm, ***Size,*** is proxied by market capitalization identified by the stock closing price at the end of the fiscal year multiplied times the number of outstanding shares at the end of the year, in million US dollars, where all different local currencies are expressed in dollars. Moreover, a dummy variable, *Crisis*, which takes the value of one for crisis years (2008 and 2009), and zero otherwise, is included to capture the effect of the financial crisis triggered in late 2007 and extended until 2009 on the dividend decision.

Table 3
Summary statistics.

Panel A: entire sample

Variables	Obs.	Mean	Median	Std. Dev.	Minimum	Maximum
Altman *Z*-score	3160	7.241	3.32	8.565	0.97	28.21
IntCoverage	3160	23.086	8.59	31.848	−0.91	103.14
Taffler Z-score	3160	6.704	0.52	40.951	−51.6	124.17
MatAsset	3160	0.134	0.13	0.173	−0.37	0.49
MatEQ %	3160	26.34	27.96	32.86	−85.5	84.46
CASH	3160	0.050	0.030	0.065	0	0.52
MB	3160	1.450	1.25	0.727	0.56	5.29
ROE	3160	0.099	0.10	0.132	−0.33	0.39
E/TA	3160	0.066	0.06	0.068	−0.14	0.23
ChgTA %	3160	8.2	4.0	0.186	−22	1.01
SIZE mill $	3160	752,821	206,089	1,276,078	5450	7,094,173
CRISIS	3160	0.193	0	0.395	0	1

Panel B: sample characteristics by distressed and non-distressed firms

Variables	Non-distressed firms (Obs. = 2364) (0)					Distressed firms (Obs. = 796) (1)					Diff. (0)–(1)	t-statistic
	Mean	Median	Std. Dev.	Min	Max	Mean	Median	Std. Dev.	Min	Max		
MatAsset	0.1745	0 0.16	0.159	−0.37	0.49	0.0165	0.04	0.154	−0.37	0.44	0.158	(24.33)***
MatEQ %	31.495	31.245	28.01	−85.5	84.46	11.016	15.275	40.55	−85.5	84.46	20.48	(15.79***
Altman *Z*-score	9.262	4.74	9.046	1.81	28.21	1.239	1.14	0.285	0.97	1.81	8.023	(25.01)***
IntCoverage	29.39	12.61	34.28	−−0.91	103.14	4.777	2.69	9.792	-0.91	103.14	23.08	(19.83)****
Taffler *Z*-score	10.56	3.27	38.14	−51.6	124.17	−4.705	−13.44	46.52	−51.6	124.17	15.26	(8.869)***
CASH	0.0548	0.03	0.0688	0	0.52	0.037	0.02	0.534	0	0.52	0.017	(6.59)***
MB	1.550	1.34	0.783	0.56	5.29	1.154	1.08	0.395	0.56	4.45	0.396	(13.68)***
ROE	0.124	0.12	0.117	−0.33	0.39	0.026	0.04	0.145	−0.33	0.39	0.097	(19.02)***
E/TA	0.0815	0 0.08	0.0657	−0.14	0.23	0.023	0.03	0.054	−0.14	0.22	0.058	(22.08)***
ChgTA %	0.0862	0.05	0.1839	−0.22	1.01	0.067	0.02	0.191	−0.22	1.01	0.018	(2.43)**
SIZE mill $	757,740	221,438	1,256,508	5450	7,094,173	738,212	160,668	1,333,211	5450	7,094,173	19,527	(0.373)*
CRISIS	0.198	0	0.399	0	1	0.178	0	0.383	0	1	0.020	(1.26)*

The table presents the descriptive statistics for various firm characteristics variables included in the study analyses, in addition to other essential variables to describe the sample. All reported values in the table represent the mean values of variable measures. *Altman Z-score* is a proxy of the likelihood of bankruptcy, where distressed firms are defined to have Z–score below 1.81. *IntCoverage* is measured as firm earnings before interest, taxes, depreciation and amortization to interest expenses. *Taffler Z-score* is a measure of bankruptcy, where firm is considered to be distressed if it has a negative Z-score in one year after positive Z-scores in two consecutive years. *MatAsset* & *MatEQ* are measures of earned equity. Profitability *(ROE)* is measured by after-tax earnings to total equity ratio, and *(E/TA)* is the ratio of earnings before interest but after taxes to book value of total assets. Firm liquidity (*CASH)* is the cash and marketable securities to total assets ratio. Growth opportunities is measured by firm Market-to-Book ratio *(MB)* calculated as book value of assets minus book value of equity plus market value of equity all divided by book value of assets, and growth in assets (*ChgTA)* defined as the firm percentage change in book assets. Firm size *(SIZE)* is proxied by market capitalization calculated as stock closing price at end of fiscal year multiplied times number of outstanding shares at end of year. In panel B, *t*-tests are employed to test for differences in mean values between the distressed and Non-distressed subsamples; the t-statistic is included with the significance level. *, **, and *** indicate two-tailed significance at the 1%, 5%, and 10% levels, respectively.

Table 3 presents the summary statistics for the sample characteristics, whereas it also records the mean values for the measures of the variables. Panel A describes the characteristics of the entire sample, including 1534 firms in 11 MENA countries over the period 2005–2015. Panel B presents the statistics are separately for the characteristics of distressed and non-distressed firms, while Panel C shows the distressed and non-distressed firms.

In Panel A in Table 3, the mean (median) for the Altman *Z*-score is 7.241 (3.32) for the entire sample. The mean of the Altman Z-score for the whole sample is positive and higher than 1.81, the cut-off point defined by Altman (1968). The means (medians) for MatAsset and MatEQ are 13.4% (13%) and 26.3% (27.96), respectively. The mean reported for MatAsset in this study is higher than that reported by Akbar et al. (2019) of 0.0127, for a sample of 301 non-financial listed firms in Pakistan during 2005–2014; however, it is less than the mean for the RE/TA ratio of 42%, reported by Hasan and Habib (2017), using a large panel of US firms. Table 3, Panel B compares the firm-specific characteristics between the distressed and non-distressed groups, and *t*-tests determine whether the difference is significant. As the literature suggests, the findings show that non-distressed firms are large, matured, profitable, and liquid firms with high growth opportunities (e.g., Chen and Merville, 1999; Pranowo et al., 2010; Sayari and Mugan, 2013; Mokhova and Zinecker, 2013; Al-Hadi et al., 2019; Akbar et al., 2019).

In Table 3 Panel B, the means and medians of all financial distress measures, including Altman Z-score, Interest coverage ratio, Taffler Z-score, and firm-specific variables for the non-distressed firms are much higher than that of the non-distressed firms. The t-tests show positive differences between the means of all variables for non-distressed and distressed groups, and the differences are statistically significant, as Table 3 shows. The findings show that distressed firms are less matured by 16.4 times, as shown by the lower mean (median) earned equity ratio, MatAsset, of 17.4% (16%) versus 1.65% (4%) for non-distressed firms, and this difference is significant at the 1% level. Non-distressed firms are more profitable and liquid than distressed firms as the ROE, E/TA, and CASH ratios show, where the statistically significant differences recorded by the *t*-test are 2%, 10%, and 6%, respectively. Similarly, the M/B, ChgTA, and firm size are higher for non-distressed firms with (t-statistic) of 0.39, 0.018, and $19,527 mill (13.68, 2.43, and 0.373), respectively, and these differences are statistically significant.

To examine the characteristics of the individual countries further, Table 4 compiles the descriptive statistics for financial distress and firm life cycle on an individual country basis. The analyses support the positive Altman Z-score, MatAsset, and MatEQ recorded for the entire sample, where the mean of these variables are positive for all the countries over the sample period. In particular, Bahrain has the lowest mean Altman *Z*-score at 5.087, while Morocco recorded the highest positive mean (median) Altman *Z*-score at 9.323 (4.50). Turning to firm life cycle, mean (median) MatAsset appears to be positive for all countries. For instance, Bahrain has the highest MatAsset mean (median) of 25.5% (27%), while Jordon recorded the lowest mean (median) MatAsset of 5% (6%).

For further analysis of sample characteristic, Table 5 presents the descriptive analysis for the entire sample across sub-periods to study the effect of the Arab Spring. The sample period has three sub-periods to capture the effect of the economic and political changes due to waves of revolutions in some Arab countries. These revolutions started in late 2010–2012, first in Tunisia, and spread to five other MENA countries: Egypt, Libya, Yemen, Syria, and Bahrain, in addition to several demonstrations across the MENA region. The period from 2010–2012 shows protest and insurrection called the Arab Spring.

Some implications are apparent when dividing the descriptive statistics for the financial variables of the sample into the pre-Arab Spring period (2007–2009), during the Arab Spring period (2010–2012), and the post-Arab Spring period (2013–2015) to capture the differences between the three periods. In Table 5, the means for all financial distress measures are positive across the three periods; however, they decrease during the Arab Spring and post-Arab Spring periods from the pre-Arab Spring period, implying that the Arab Spring period is associated with risk (Sottilotta, 2015). For instance, the mean of the Altman *Z*-score decreases by 23% from the pre-to the during Arab Spring period and continues to decrease in the post-Arab Spring period.

With regard to firm maturity, Table 5 shows that means MatAset and MatEQ decrease by 8% from the pre-to the during-Arab Spring periods, but increase again by 36% and 43%, respectively, in the post-Arab Spring period. This may indicate that firms were not able to

Table 4
Sample characteristics of Altman Z-Score by country.

		Financial distress					Firm life cycle				
Ser.	Country	Mean	Median	Std dev.	Min	Max	Mean	Median	Std dev.	Min	Max
1	Emirates	6.378	2.835	8.19	0.97	28.21	0.162	0.15	0.155	−0.35	0.49
2	Bahrain	5.087	3.730	4.37	0.97	19.74	0.255	0.27	0.125	−0.04	0.49
3	Egypt	8.523	3.505	9.607	0.97	28.21	0.152	0.14	0.149	−0.37	0.49
4	Jordan	7.470	3.275	8.957	0.97	28.21	0.057	0.06	0.197	−0.37	0.49
5	Kuwait	4.924	2.655	6.532	0.97	28.21	0.103	0.10	0.171	−0.37	0.49
6	Lebanon	5.736	2.60	9.085	2.13	28.21	0.143	0.15	0.542	0.07	0.22
7	Morocco	9.323	4.50	9.493	0.97	28.21	0.172	0.17	0.157	−0.37	0.49
8	Oman	6.954	3.375	7.953	0.97	28.21	0.165	0.18	0.198	−0.37	0.49
9	Qatar	6.131	2.81	7.575	0.97	28.21	0.148	0.10	0.160	−0.33	0.49
10	Saudi Arabia	7.602	3.81	8.406	0.97	28.21	0.126	0.12	0.142	−0.37	0.48
11	Tunisia	7.301	3.06	9.048	0.97	28.21	0.164	0.17	0.194	−0.37	0.49

This table presents the descriptive statistics of financial distress for each MENA country in the sample over the period 2005–2015. Financial distress is measured by *Altman Z-score* index explained in details in Section 3.2, where Altman (1968) defined distressed firms to have an overall Z–score below 1.81. Firm Life cycle is proxy for firm maturity, *MatAsset,* is measured by the earned equity proxied by the ratio of firm retained earnings to book value of total assets.

Table 5
Descriptive statistics by Arab Spring Sub periods

Variables	Pre-Arab spring (2007–2009)	During-Arab spring (2010–2012)	Post-Arab spring (2013–2015)
Altman Z-score	8.858	6.785	6.656
IntCov	25.802	22.86	21.76
Taffler Z-score	9.872	6.367	5.130
MatAsset	0.126	0.113	0.154
MatEQ	24.30	21.52	30.89
CASH	0.055	0.047	0.049
MB	1.897	1.353	1.267
ROE	0.143	0.091	0.079
E/TA	0.092	0.063	0.055
ChgTA %	20.48	5.23	3.31
Size mill $	993,248	727,827	635,457
Obs.	782	986	1392

The evolution of sample characteristics over three sub periods; before (2007–2009), during (2010−2012), and after the Arab Spring period (2013–2015). The values reported in this table are the mean values for firm financial distress measured by Altman *Z*-score, firm interest coverage ratio (*IntCov*), and Taffler Z-score measure. Firm maturity is measured by *MatAsset & MatEQ,* Liquidity as measured by Cash holdings to total Assets *(CASH),* profitability measures proxied by ROE and E/TA, growth opportunities measures presented by market-to-book ratio and growth of book assets, and firm size as measured by market capitalization.

achieve high profits to accumulate as retained earnings during the Arab Spring period, while earned capital increases when economic conditions begin to improve again.

Expectedly, a decrease in the profitability measures during the Arab Spring period, followed by a slight increase after the Arab Spring. In sum, the Arab Spring period (2010–2012) shows deterioration in firm-specific variables, while the post-Arab Spring period presents slight recoveries, reflecting poor growth and productivity. The results show poor developments in most countries during the Arab Spring transitions, followed by relative recovery due to attempts to implement reform plans.

3.3. Univariate analysis

Before commencing on the regression analyses, I will summarize the association between financial distress and other financial variables to detect the sample characteristics on country basis, using univariate analysis. Analyses by country offer some important insights into the financial characteristics and properties of the individual countries in the region. To assess the relative importance on corporate financial distress, Table 6 displays the univariate results of various firm-specific variables classified by financial distress (distressed and non-distressed) for each MENA country in the sample.

In Table 6, the analysis shows that the mean Altman *Z*-score for all countries is higher for non-distressed firms than distressed firms. The highest (lowest) Altman Z-score mean recorded in Table 6 is 10.84 (1.055), for non-distressed (distressed) firms in Morocco (Bahrain). The mean Interest coverage ratio, IntCoverage, is positive for all countries with the highest (lowest) mean value of 38.73 (2.24) recorded for non-distressed (distressed) firms in Saudi Arabia (Tunisia). The mean value of the Taffler *Z*-score is negative for distressed firms for all countries, except for Qatar and Saudi Arabia. The highest (lowest) number of distressed firms in the sample is 153 (16) in Kuwait (Bahrain), while the highest (lowest) number of non-distressed firms is 380 (101), in Egypt (Qatar). Both **Maturity measures** are higher for non-distressed firms than for distressed firms. In particular, the mean of MatAsset is less than 10% for distressed firms in all countries, except for Jordon, Morocco, Oman, and Tunisia, where the mean (MatAsset) is negative. As Table 6 shows, the highest (lowest) mean of MatAsset is 30% (−8%), recorded in Bahrain (Jordon) for non-distressed (distressed) firms. Both profitability measures show that distressed firms are less profitable than are non-distressed firms. For instance, the ROE ratio for non-distressed firms is higher than it is for distressed firms. The highest (lowest) mean value of ROE is 16.2% (−0.04%) for non-distressed (distressed) firms in Morocco (Jordan). Furthermore, the univariate results of other firm-specific variables suggest that liquidity, profitability, growth opportunities measures, and firm size are indeed higher for non-distressed firms than they are for distressed firms in all countries. Specifically, non-distressed firms in all countries are more profitable, larger in size, and with higher earned equity and growth opportunities than are distressed firms. Notably, profitability measures and financial distress proxies show similar results, which ensures that distressed firms have smaller size, earned capital, liquidity ratio, profitability ratios, and growth opportunities than do non-distressed firms.

I conduct further univariate analysis to consider the effect of the Arab Spring period on the financial variables in each country. Table 7 exhibits this analysis for the three sub-periods by country.

As Table 7 shows, the means of all the financial distress proxies show evident decrease for all countries during the Arab Spring period (2010–2012), except for Kuwait, and even decreases more in the period after the Arab Spring in most of the countries. This result indicates that this transition period has high influence on the economic conditions of Arab countries and affected their economies adversely, which reflects in poor firm performance. Table 7 presents the maturity ratios that support this notion, where mean MatAssets and MatEQ increase in the post-Arab Spring period after a notable decrease during the Arab Spring period for most of the countries. This implies that after the transition period, managers prefer to keep higher amounts of retained earnings and increase their earned equity.

With regard to profitability measures, the mean values of profitability decrease during the Arab Spring period followed with slight

Table 6
Country characteristics for distressed and non-distressed firms

Country	Financial distress	Number	Altman_*Z*-score	IntCov.	Taffler Z-score	MatAsset	MatEQ	CASH	M/B	ROE	E/TA	ChgTA	SIZE $
Emirates	Distressed	88	1.26	6.29	−7.54	0.095	19.37	0.030	0996	0.055	0.036	0.089	915,729
	Non-distressed	236	8.28	30.88	20.86	0.186	29.46	0.049	1.21	0.094	0.065	0.081	922,831
Bahrain	Distressed	16	1.055	3.65	−35.22	0.048	12.20	0.036	0.74	0.011	0.030	0.068	202,619
	Non-distressed	78	5.952	32.67	10.73	0.299	52.33	0.096	1.18	0.140	0.088	0.10	797,433
Egypt	Distressed	90	1.304	5.26	−22.15	0.053	23.09	0.058	1.247	0.025	0.027	0.014	673,121
	Non-distressed	380	10.23	26.96	6.70	0.175	34.18	0.061	1.40	0.149	0.093	0.081	616,219
Jordan	Distressed	101	1.200	1.266	−8.12	−0.083	−13.68	0.028	1.040	−0.038	−0.002	0.037	37,968
	Non-distressed	275	9.61	22.308	14.22	0.105	16.64	0.056	1.394	0.058	0.0484	0.057	260,930
Kuwait	Distressed	153	1.150	3.615	−5.59	0.018	3.557	0.031	1.088	0.001	0.020	0.066	567,978
	Non-distressed	243	7.300	19.385	9.54	0.156	27.44	0.049	1.284	0.087	0.063	0.075	863,406
Lebanon	Distressed	17	1.62	5.20	−5.26	0.091	2.030	0.015	1.06	−0.023	−0.012	0.035	78,305
	Non-distressed	108	5.736	8.347	3.067	0.143	25.16	0.042	1.07	0.042	0.041	0.042	1,565,207
Morocco	Distressed	49	1.307	4.216	−16.61	−0.010	4.797	0.019	1.182	0.008	0.012	0.072	288,977
	Non-distressed	259	10.84	34.58	0.408	0.206	42.04	0.043	1.804	0.162	0.094	0.084	859,009
Oman	Distressed	80	1.25	5.176	−5.174	−0.002	20.281	0.033	1.248	0.088	0.035	0.061	120,553
	Non-distressed	246	8.810	34.51	10.71	0.219	39.84	0.055	1.449	0.147	0.092	0.094	256,245
Qatar	Distressed	47	1.236	8.598	8.358	0.095	34.63	0.067	1.130	0.122	0.055	0.149	2,471,882
	Non-distressed	101	8.410	33.84	24.88	0.172	28.48	0.075	1.550	0.136	0.094	0.146	1,388,193
Saudi Arabia	Distressed	100	1.306	7.725	5.161	0.031	7.292	0.037	1.311	0.015	0.025	0.087	1,795,504
	Non-distressed	298	9.453	38.73	8.581	0.154	26.99	0.053	2.099	0.152	0.099	0.109	1,419,615
Tunisia	Distressed	55	1.23	2.242	16.37	−0.024	28.15	0.040	1.234	0.047	0.013	0.079	73,899
	Non-distressed	140	9.68	20.33	5.504	0.238	46.11	0.052	1.577	0.116	0.077	0.071	136,794

The table presents the descriptive statistics for the baseline sample characteristics variables included in the study analyses during the period from 2005–2015. The statistics in the table are classified by distressed and non-distressed firms for each country, where *Number* represents the number of distressed and non-distressed in each country over the sample period, whereas financial distress is calculated by a dummy variable that takes a value of one if the firm $_i$ in country $_j$ is financially distressed in year $_t$, and zero otherwise. The values reported in this table are the mean values for firm financial distress measured by Altman *Z*-score, firm interest coverage ratio, and Taffler Z-score measure. Life cycle is proxied by maturity ratio and measured by *MatAsset & MatEQ,* Liquidity as measured by Cash holdings to total Assets *(CASH),* profitability measures proxied by ROE and E/TA, growth opportunities measures presented by market-to-book ratio and growth of book assets, and firm size as measured by market capitalization.

Table 7
Country characteristics for Arab Spring Sub-periods

Country	periods	Altman_Z-score	IntCov.	Taffler Z-score	MatAsset	MatEQ	CASH	M/B	ROE	E/TA	ChgTA	SIZE $
Emirates	Pre	9.799	33.17	17.20	0.132	20.95	0.045	1.637	0.134	0.089	0.205	1,093,803
	During	4.812	21.19	2.83	0.1132	19.27	0.035	1.068	0.082	0.051	0.050	870,659
	Post	5.646	21.57	17.93	0.209	34.71	0.049	0.959	0.059	0.045	0.042	864,556
Bahrain	Pre	8.651	46.59	12.17	0.242	42.95	0.127	1.722	0.218	0.122	0.263	1,215,242
	During	6.083	41.33	5.32	0.29	51.847	0.074	1.074	0.147	0.095	0.040	647,660
	Post	2.884	14.45	−5.238	0.242	42.84	0.071	0.827	0.054	0.053	0.043	470,174
Egypt	Pre	9.773	23.81	6.314	0.143	30.88	0.068	1.790	0.194	0.114	0.183	926,093
	During	8.339	24.43	1.59	0.157	29.19	0.054	1.276	0.122	0.082	0.051	629,810
	Post	7.748	20.33	−3.213	0.154	35.26	0.060	1.149	0.077	0.054	−0.001	403,935
Jordan	Pre	8.612	16.84	19.45	0.097	15.19	0.069	1.633	0.076	0.062	0.169	235,045
	During	7.227	17.42	12.62	0.040	5.902	0.051	1.277	0.017	0.023	0.004	263,894
	Post	6.980	16.64	0.036	0.045	7.268	0.037	1.138	0.020	0.026	0.0164	150,974
Kuwait	Pre	4.287	9.95	3.85	0.1188	22.21	0.033	1.556	0.104	0.075	0.269	1,240,966
	During	4.705	12.51	−6.191	0.059	8.470	0.036	1.197	0.019	0.033	0.006	715,205
	Post	5.401	15.45	10.40	0.1244	22.65	0.052	1.036	0.050	0.039	0.013	516,674
Lebanon	Pre	4.023	10.25	3.55	0.156	26.36	0.050	2.15	0.060	0.061	0.06	53,999
	During	3.455	9.32	−2.56	0.133	24.89	0.034	1.15	0.053	0.052	0.049	24,306
	Post	5.736	8.34	3.067	0.143	25.16	0.042	1.07	0.042	0.041	0.042	1,565,207
Morocco	Pre	13.34	45.46	−0.625	0.151	30.02	0.045	2.11	0.178	0.103	0.19	1,015,378
	During	8.389	23.64	0.478	0.146	30.95	0.035	1.66	0.135	0.081	0.057	698,737
	Post	7.545	24.29	−5.05	0.204	43.86	0.039	1.48	0.114	0.069	0.033	668,512
Oman	Pre	8.298	29.19	8.94	0.136	28.14	0.055	1.59	0.169	0.099	0.189	273,354
	During	7.008	30.77	10.56	0.167	30.00	0.059	1.42	0.121	0.082	0.080	258,321
	Post	6.355	24.78	4.33	0.176	40.517	0.043	1.301	0.123	0.068	0.045	183,679
Qatar	Pre	6.103	25.81	11.41	0.070	12.38	0.087	1.78	0.126	0.0867	0.296	1,830,498
	During	5.427	25.94	21.13	0.116	24.57	0.060	1.29	0.148	0.086	0.149	1,583,951
	Post	6.855	25.01	23.69	0.230	47.90	0.075	1.31	0.119	0.075	0.049	1,817,621
Saudi Arabia	Pre	10.37	33.71	10.53	0.121	20.33	0.044	3.00	0.159	0.108	0.220	2,032,715
	During	6.677	30.41	9.81	0.088	15.17	0.045	1.51	0.106	0.075	0.072	1,286,884
	Post	6.827	31.26	4.74	0.159	29.47	0.055	1.65	0.112	0.074	0.067	1,390,213
Tunisia	Pre	5.891	12.64	8.477	0.134	37.08	0.049	1.34	0.111	0.064	0.147	66,280
	During	7.965	16.89	14.49	0.159	43.60	0.050	1.47	0.109	0.062	0.055	121,911
	Post	7.549	15.96	1.589	0.187	41.11	0.047	1.56	0.077	0.054	0.045	148,633

The table presents sample characteristics for three sub periods; pre-, during, and post-Arab spring periods for each country in the sample. The values reported in this table are the mean values for firm financial distress measured by Altman *Z*-score, firm interest coverage ratio (*IntCov*), and Taffler Z-score measure. Life cycle is proxied by maturity ratio and measured by *MatAsset & MatEQ,* Liquidity as measured by Cash holdings to total Assets *(CASH),* profitability measures proxied by ROE and E/TA, growth opportunities measures presented by market-to-book ratio and growth of book assets, and firm size as measured by market capitalization.

increases due to attempts of recovery in the post-Arab Spring period. Table 7 shows mostly a monotonic relation between means ROE and E/TA on one hand, and the three sub-periods for each country on the other. Similarly, the mean cash ratio as a proxy for liquidity shows evident decrease during the Arab Spring period for most of the countries, followed with slight increase in the post-Arab Spring period. This may also indicate that poor economic and political conditions during the transition period have unfavorable influence on firm cash holdings and solvency, which may lead to financial distress. Finally, the mean values of the growth opportunities and firm size show decrease during the Arab Spring period for all countries.

3.4. Econometric model

The univariate analysis suggests that the mean values of financial distress measures for distressed firms are than non-distressed firms. Moreover, it provides evidence that non-distressed firms in all countries are more profitable, liquid, larger in size, and with higher earned equity than are distressed firms. The regression analysis helps examine these relationships while controlling for other factors that may affect and explain the determinants of financial distress. Including controls reduces the effect of the firm maturity on financial distress, which is due to other factors, and provides additional explanations for the magnitude and significance of these relations.

To examine the empirical association between firm financial distress (distressed versus non-distressed) on one hand and firm life cycle, financial profitability, and other explanatory variables on the other, this study uses pooled logistic regressions with standard errors that are robust to clustering. For panel data set, Petersen (2009) argues for the grouping of observations into clusters to control for heteroscedasticity and the serial correlation among observations. It is also possible to compute robust standard errors that will account for clustering in multiple dimensions. Specifically, clustering will be employed when there is correlation in the errors and regressors within the panel data dimensions; therefore, controlling for clustering is essential to avoid under-estimated standard errors (Cameron et al., 2011). In this context, Gow et al. (2010) argue that two-way cluster-robust standard errors are required to provide valid results and inferences, especially when using variables that exhibit higher dependence, both over time and cross-section.

To examine the main relationships of this study and test the study hypotheses empirically (H_1–H_2) developed from the literature discussion in Section 2, I formulate the following equation to illustrate the relationships:

$$\begin{aligned}\text{Distress}_{i,t} = {} & \alpha + \beta_1\,\text{MatAsset}_{i,t-1} + \beta_2\,\text{CASH}_{i,t-1} + \beta_3\,\text{PROF}_{i,t-1} + \beta_4\,\text{GROW}_{i,t-1} + \beta_5\,\text{M/B}_{i,t-1} + \beta_6\,\text{SIZE}_{i,t-1} + \beta_7\,\text{CRISIS}_{i,t-1} \\ & + \beta_8\,\text{Instit}_{i,t-1} + \beta_9\,\text{FE} + \mu_{i,t} \end{aligned} \quad (4)$$

where subscripts i denotes individual firms, t is time period, β are the parameters to be estimated, and μ_{it} is the error term. The dummy variable, Distress $_{i,t}$ is firm financial distress, the dependent variable equals one when Altman's *Z*-score < 1.81 and zero otherwise. Distress $_{i,t}$ is measured by two alternative measures: IntCoverage, and the Taffler Z-score to ensure the validity of results.

The main independent explanatory variables of interest in this study, MatAsset, is firm maturity, used as a proxy for firm life cycle, and measured by RE/TA (MatAsset) and RE/EQ (MatEQ) as an alternative measure for earned capital. I add several firm-specific control variables as follows: CASH, SIZE, PROF, GROW, and M/B. The first two variables are included to control for firm liquidity and size. CASH is measured by the ratio of cash holdings and marketable securities to total assets ratio, and SIZE is measured by firm market capitalization. Sayari and Mugan (2013) find a negative relationship between cash flow, company size, and financial distress score of 124 companies in Turkey. PROF is firm profitability measured by ROE and E/TA ratio, for instance, Routledge and Gadenne (2000) link the financial distress and the financial characteristics of the firm. Two growth opportunities measures are included; M/B is market-to-book ratio and GROW is the change in book assets. To control for the effect of the Global Financial Crisis in 2008–2009, the dummy variable CRISIS is included and takes the value of one for the crisis years 2008 and 2009, and zero otherwise.

In a cross-countries sample, there may be institutional differences that affect the probability of firms being distressed. Therefore, this study uses the legal frameworks, quality of regulations, and protecting minority rights, development of capital market, and level of corruption, as institutional variables to control for these institutional differences across the MENA countries (e.g., Bancel et al., 2005; Mollah, 2011; Faccio and Xu, 2015). The quality of legal framework (LEGAL), protection of minority investors and extent of disclosure (MINRTY), and control of corruption (CORRUP) are institutional indicators obtained from the World Bank database (Worldwide Governance Indicators (WGI)) and Thomson Reuters Datastream database. Financial development (FMarket) is the financial market development index constructed by Svirydzenka (2016) and obtained from the International Monetary Fund (IMF) database. The index combines the depth of financial markets and efficiency of financial services across countries. Notably, all independent explanatory variables are lagged for one period to explain current corporate dividend decision.

Furthermore, in Eq. (4), fixed effects are included (FE) to control for year, industry, and country-fixed effects, where each industry is based on two-digit SIC codes. For a further robustness check, I controlled for two sets of fixed effects for country–industry and industry–year combinations. For the sake of brevity and because of space constraints, I have not tabulated the results of these two sets.

3.5. Logistic regressions

Eq. (4) is estimated using logit regression with one year lagged explanatory variables (all regressors including the main explanatory variable, firm maturity, and control measures) to mitigate the potential endogeneity problem. Following econometric literature, I consider the two-way cluster-robust standard errors (CL-2) approach, because it is robust to both time-series and cross-sectional correlation (Petersen, 2009; Gow et al., 2010; Cameron et al., 2011). In particular, two-way clustering by firm and year allows for within firm dependence (time-series) and within-year dependence (cross-sectional), that is, the observation for firm j in year t can be

Table 8
Logit regressions

Panel A: Logit regression												
		Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Sign	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat
Intercept		1.475	8.91***	0.936	6.68***	1.472	8.88***	1.4356	8.85***	−0.236	−3.10***	1.540	9.25***
Life cycle proxies													
MatAsset	−	−6.086	−15.13***			−6.082	−15.13***	−5.959	−15.20***	−5.083	−13.84***	−6.882	−18.30***
MatEQ	−			−0.0115	−6.68***								
Other firm-specific control variables													
CASH	−	−3.231	−3.34***	−3.439	−3.42***	−3.246	−3.36***	−3.086	−3.28***	−4.183	−4.75***	−3.385	−3.40***
E/TA	−	−2.439	−5.35***	−4.044	−8.14***	−2.430	−5.33***	−2.207	−5.22***	−3.416	−7.96***		
M/B	−	−1.511	−12.38***	−1.222	−11.53***	−1.519	−12.49***	−1.475	−12.28***			−1.613	−13.18***
ChgTA	−	0.994	3.67***	0.952	3.49***	0.982	3.63***			0.697	2.89***	0.657	2.54***
SIZE	−	0.000	8.41***	0.000	7.44***	0.000	8.39***	0.000	8.74***	0.000	4.29***	0.000	8.02***
CRISIS	+	−0.071	−0.58	−0.035	−0.31			−0.011	−0.09	−0.285	−2.38*	−0.045	−0.38
R-squared		0.243		0.164		0.243		0.236		0.180		0.235	
Obs.		3160		3160		3160		3304		3160		3160	
Mean VIF		1.70		1.77		1.71		1.74		1.46		1.51	
Panel B: Logit regression with institutional variables and fixed effects													
Intercept		1.194	3.63***	2.447	7.30***	1.904	5.64***	1.940	5.82***	1.814	5.34***	2.303	6.71***
Firm-specific variables													
MatAsset	−	−6.341	−15.04***	−6.126	−15.38***	−6.060	−15.24***	−6.117	−15.21***	−6.131	−15.33***	−6.222	−15.50***
CASH	−	−3.727	−3.63***	−3.281	−3.42***	−3.343	−3.46***	−3.395	−3.51***	−3.422	−3.55***	−3.381	−3.52***
E/TA	−	−2.629	−5.50***	−2.463	−5.44***	−2.501	−5.45***	−2.593	−5.66***	−2.532	−5.53***	−2.501	−5.52***
M/B	−	−1.513	−10.96***	−1.445	−11.96***	−1.509	−11.65***	−1.501	−11.60***	−1.509	−11.58***	−1.464	−11.94***
ChgTA	−	1.261	4.15***	1.079	3.96***	1.057	3.76***	1.123	3.96***	1.146	4.02***	1.176	4.24***
SIZE	−	0.000	5.46***	0.000	8.47***	0.000	7.77***	0.000	7.88***	0.000	7.44***	0.000	8.02***
CRISIS	+	0.086	0.31	0.055	0.43	0.047	0.37	0 0.094	0.70	0.108	0.80	0.137	1.01
Institutional variables													
FMARKET	−			−2.699	−3.43***	−2.265	−3.04***	−2.937	−3.68***	−2.780	−3.44***	−3.355	−4.05***
LEGAL	−			−0.077	−0.28	−0.350	−1.23			−0.537	−1.85*	−0.343	−1.19
MINRTY	−							0 0.046	1.59	0.063	2.06**	0.083	2.76***
CORRUP	+			0.387	2.22**	0.561	3.07***	0.408	3.63***	0.711	3.63***	0.600	3.16***
Fixed effects													
Year-FE		Yes		No		Yes		Yes		Yes		No	
Industry-FE		Yes		No		Yes		Yes		Yes		No	
Country-FE		Yes		No		Yes		Yes		Yes		No	
R-squared		0.270		0.248		0.255		0.255		0.256		0.250	
Obs.		3160		3160		3160		3147		3147		3147	
Mean VIF		1.98		3.06		3.43		4.55		4.80		4.70	

Logit regressions with robust standard errors and clustered firms and years. The coefficients of all variables and the intercept (constant term) for each model are reported. Z-statistics are computed based on robust standard errors clustered by firm and time CL-2. Mean values of variance inflation factor (VIF) are used to test for multicollinearity in the regression. As the rule of thumb, if VIF exceeds 10 and tolerance is less than 0.1, multicollinearity will not be of concern. The dependent variable, *Distress*, is a dummy binary variable that takes the value of one for distressed firms when Altman's Z-score < 1.81 and zero otherwise. The main explanatory independent variable is the earned equity, *MatAsset,* measured by RE/TA. Liquidity is measured by cash holdings to total book Assets *(CASH)*. Profitability is measured by *(E/TA)*, the ratio of earnings before interest but after taxes to book value of total assets. Growth opportunities is measured by market-to-book ratio, (M/B) and growth of assets (*ChgTA)* defined as the firm percentage change in book assets. Firm size *(SIZE)* is proxied by market capitalization. *Crisis* is dummy variable that takes the value of one for crisis years (2008 and 2009) and zero otherwise. Panel B reports the logit regressions with fixed effects and institutional variables. All models include country, industry, and year fixed effects (FE), (except models 2 & 6) where each industry is based on two-digit SIC codes while excluding the utilities and financial industries. Sign is the predicted sign for each variable in the regression. *, **, *** two-tailed Significant at 1, 5 and 10% levels, respectively.

correlated with observation for firm j in year t + 1 and that for firm k in year t (Gow et al., 2010).

I followed the CL-2 approach to deal with correlation in two dimensions, that is, across firms and across time. I estimated logit panel regression models (1–6) with robust standard errors clustered by firm and year and compiled them in Table 8.

In addition to these models in Table 8 to estimate logit regressions with CL-2 across firms and years, I re-estimate Eq. (4), and run several regressions using different clustering approaches, as means for robustness check. **First,** I used the one-way cluster-robust standard errors approach, as Gow et al. (2010) mention that it is used frequently in accounting research. While dummy variables for each year are included in all specifications to absorb the time effect, robust standard errors clustered by firm are used to control for heteroscedasticity and serial correlation among observations of the same firm in different years. **Second**, I employ a two-way cluster-robust standard errors (CL-2) approach, while clustering across countries as a cross-sectional dimension and across years as a time-series dimension. **Third**, I re-estimate Eq. (4) for all logit models (1–6) using robust standard errors without clustering. All specifications used as robustness tests show the same results and significance levels, which ensures the validity of the results and inferences used in this study.

Table 8 presents logistic Models (1–6) to estimate Eq. (4) and empirically examine the hypotheses of this study. On one hand, these models examine the relationship between the financial distress and firm life cycle. Thus, I examine the first hypothesis ***(H_1)***, and in the MENA country, using a sample of 11 countries in the MENA region, during the period 2005–2015. On the other hand, these models examine the hypotheses ***(H_2– H_5)***, and test the relationship between financial distress and corporate-specific characteristics. The dependent variable used in the six specifications is the dummy (binary) variable, *Distress,* while the main explanatory variables are *MatAsset, MatEQ*. I also use two alternative measures for *Distress*: *IntCovarge* and *Taffler Z-Score*, to check the validity of the results. Using cross-country analyses, I examine these relationships while controlling for the effect of other firm-specific factors, namely, profitability, growth opportunities, size, liquidity, and the financial crisis of 2007–2008.

I used the main models in Table 8-Panel A to estimate logit regressions with CL-2 across firms and years. Panel B of the same table reports re-estimations of the logit multivariate regressions while controlling for different institutional factors, and year-, industry-, and country-fixed effects, in addition to two sets of fixed effects for country–industry and industry–year combinations used as robustness check on the main results. I have not tabulated the results of these two sets for the sake of brevity.

As predicted, the coefficients of *MatAsset* are negative and highly significant at the 1% level in all regression models (1–6) in Table 8-Panel A. I obtained the same result for the alternative measure, MatEQ, in Model 2. This result implies a negative relationship between firm life cycle and financial distress, which supports the notion that firms in the maturity stage of their life cycles are less prone to financial distress. This finding supports Hasan and Habib (2017), in that idiosyncratic volatility is significantly lower in the mature stage of the life cycle in a large sample of U.S. firms. However, it goes against the findings of Koh et al. (2015), who fail to find evidence of the association between firm life cycle and the likelihood of recovery from financial distress, using a sample of U.S. firms between 1995 and 2013. As hypothesized, the coefficient on *CASH* is negative and statistically highly significant ($p < 0.001$). This illustrates that firm liquidity is a significant determinant of firm financial distress and supports the findings of John (1993) that financial distress is a consequence of the severe shortage of liquidity.

With regard to other control variables, consistent with the predicted sign, the coefficients on ***E/TA* and *M/B,*** are significantly negative at the 1% level of significance in all specifications. Charalambakis and Garrett (2016) find that profitability is negatively related to the probability of financial distress when using the *Z*-score in a sample of Indian firms. Against the predicted sign, the ***ChgTA* and *SIZE*** enters the regressions significantly positive ($p < 0.001$) across all specifications. Although large firms tend to have well diversified portfolios and vary their business investments, thereby, being less prone to financial distress and bankruptcy (Titman and Wessels, 1988), the results of this study suggest that large firms may have complicated structures and high access to finance, which encourage managers to undertake risky sophisticated investments that expose firms to distress. The empirical evidence shows that firm growth in assets, *GhgTA*, is significantly positive in all specifications. Although this finding is against this study's hypothesis, it is consistent with the empirical results of Cao et al. (2008) and Rajgopal and Venkatachalam (2011) that firms with more growth opportunities are more likely to experience higher firm idiosyncratic risk of equity, and are likely to experience greater stock return volatility.

The literature in finance uses many proxies for growth opportunities to capture the effect of growth opportunities and investments. Kallapur and Trombley (1999) classified growth opportunities into three types, as follows: price-based proxies, investment-based proxies, and variance measures. The market-to-book value of equity (M/B) is a price-based proxy, where growth firms will have higher market values, as growth opportunities should reflect in stock prices. On the other hand, asset book value growth, as a proxy for firm growth opportunities, relies on the level of investment activity, and thus, the increase in the assets of the firm. These classifications for growth opportunities measures may explain the negative and significant relationship between M/B and financial distress, where a decrease in the value of equity will increase the probability of a firm being distressed. Meanwhile, the significant positive relationship between growth in book assets and distress suggests that an increase in the value of investments may expose firms to high risk of failure and financial distress. Finally, CRISIS fail to enter all regression models (1–6) significantly, which suggests an insignificant relationship between CRISIS and the dummy variable, Distress. This result may be explained by the findings of Neaime (2016) that the oil rich MENA GCC countries are relatively less affected by the Global Financial Crisis than the remaining MENA stock markets of Morocco, Egypt, and Tunisia, which are more financially and economically integrated with world stock markets. Therefore, Arab countries in general are less integrated and are not affected by international financial crisis, such as other countries that are more open economies, and cooperate and integrate with international financial markets.

The literature using cross-country analysis includes institutional variables to capture the institutional differences between countries. For instance, Bhattacharjee and Han (2014) explore financial distress under the institutional setting of stock exchanges in China and the legal infrastructure, and emphasize the importance of institutional influences on financial distress. Therefore, panel B of

Table 8 presents the results of re-estimating the effect of life cycle and other control variables on financial distress in models (2–6), while using institutional factors including the legal settings, minority protection and disclosure, financial markets and institutions development, and country level of corruption. Models 2 and 3 exclude minority protection, MINRTY, while Model 4 excludes legal protection. Furthermore, year-, industry-, and country-fixed effects are included in models (1, 3, 4, 5), in addition to two sets of fixed effects for country–industry and industry–year combinations, not tabulated, and used to ensure the validity of the main results. The empirical results reported in Table 8-Panel B provide evidence that financial markets development and level of corruption are significant institutional determinates of financial distress. In particular, underdeveloped financial markets and high levels of corruption lead to financial distress. Legal protection, LEGAL, is an insignificant predictor of financial distress in all models, while, MINRTY shows mixed results in models 4, 5, and 6.

I used the variance inflation factor (VIF) in all regression models (1–6) to test for the multicollinearity problem in the explanatory (predictor) variables of the data. As mean VIF ranges from 1.46 to 4.80 for all specifications in Table 8 – Panels A and B, it indicates no multicollinearity concerns. Notably, the main results reported in Model 1 are found to be unaffected by the exclusion of any variables (i.e., *MatAsset, Crisis, ChgTA, M/B, and E/TA* from Models 2, 3, 4, 5, and 6, respectively). Furthermore, the results remain robust to using *IntCoverage* and *Taffler Z-score* as alternative measures of financial distress, and using *ROE* and *Operating E/TA* as alternative measures of profitability. Despite these changes, the results of all specifications are unaffected and they remain qualitatively similar and unchanged, ensuring the robustness of the regression results. Finally, the main results of models (1–6) reported in Table 8 Panel A remains the same, regarding the coefficients sign and significance level across all models, and after including the institutional variables and fixed effects.

3.6. Robustness tests

To examine the empirical validity and robustness of results obtained from the univariate and regression analysis discussed above, I

Table 9
Logit regressions for Arab Spring subsamples and tests for equality of coefficients

Panel A: Logistic regressions

Subsamples	Pre-Arab Spring (1)		During Arab Spring (2)		Post-Arab Spring (3)	
	2007–2009		2010–2012		2013–2015	
Variables	**Coef.**	**z-stat**	**Coef.**	**z-stat**	**Coef.**	**z-stat**
Intercept	0.709	2.14**	1.711	5.44***	1.677	7.02***
MatAsset	**−7.214**	**−4.61*** **	**−6.431**	**−7.10*** **	**−6.034**	−12.22***
CASH	−3.122	−1.93**	−7.435	−3.41***	**−1.390**	**−1.00**
E/TA	−2.239	−1.97**	−2.708	−3.08***	−1.842	−2.76***
M/B	−1.089	−5.74***	−1.645	−7.15***	−1.686	−8.95***
ChgTA	1.024	2.59***	2.104	3.56***	**0.963**	**1.59**
SIZE	0.000	4.99***	0.000	4.73***	0.000	4.55***
R-squared	0.213		0.254		0.245	
Obs.	782		986		1392	

Panel B: Tests of equality of the dividend premium coefficient over the three Arab Spring sub-periods

Variables	Sub-samples	Difference in Coefficients	Bootstrapped Standard Error of Difference	*Z*-stat
MatAsset	During-period (2) Vs. Pre-period (1)	0.783	0.0421	2.92***
	Post-period (3) Vs. During-period (2)	0.397	0.1254	1.46
	Post-period (3) Vs. Pre-period (1)	1.18	0.04551	3.34***
CASH	During-period (2) Vs. Pre-period (1)	−4.313	0.1315	0.99
	Post-period (3) Vs. During-period (2)	6.045	0.1342	1.26
	Post-period (3) Vs. Pre-period (1)	1.732	0.1134	3.41***
E/TA	During-period (2) Vs. Pre-period (1)	−0.469	0.1411	0.84
	Post-period (3) Vs. During-period (2)	0.866	0.0925	2.32**
	Post-period (3) Vs. Pre-period (1)	0.397	0.1335	2.93***
M/B	During-period (2) Vs. Pre-period (1)	−0.556	0.0340	3.99***
	Post-period (3) Vs. During-period (2)	−0.041	0.0764	0.81
	Post-period (3) Vs. Pre-period (1)	−0.597	0.0387	4.31***
ChgTA	During-period (2) Vs. Pre-period (1)	1.08	0.1189	0.68
	Post-period (3) Vs. During-period (2)	−1.141	0.0377	1.76*
	Post-period (3) Vs. Pre-period (1)	−0.061	0.0431	1.87*
SIZE	During-period (2) Vs. Pre-period (1)	0.000	0.0164	−2.22**
	Post-period (3) Vs. During-period (2)	0.000	0.0363	1.54
	Post-period (3) Vs. Pre-period (1)	0.000	0.0176	−1.56

Logit regressions with robust standard errors and clustered firms and years for three subsamples. Panel A presents the coefficients of all variables, and the intercept (constant term) for each model is reported. *Z*-statistics are computed based on robust standard errors clustered by firm and time CL-2. Definitions of all variables are the same as those shown in Table 8. *, **, and *** indicate two-tailed significance at the 1%, 5%, and 10% levels, respectively. Panel B displays the difference in all variables coefficients in the three periods, the bootstrapped standard error of difference, and Z-stat.

perform several tests. To this extent, the results suggest that the main predictors of financial distress are firm-specific determinants, including life cycle, liquidity, profitability, growth opportunities, and firm size, in addition to institutional factors, including financial markets development, and level of country corruption. All the variables in all models enter the logit regression with the expected sign and are highly statistically significant, except for the positive signs on the coefficients of growth in assets and firm size. Against the background of many empirical studies (e.g. Campbell et al., 2008), this study does not find support for the "too big to fail" view, where large stocks outperform small stocks, and argues that large size firms are more susceptible to firm distress. The size of firm asset portfolio increases with firm size (Opler et al., 1999; Bates et al., 2009), This finding is supported by the findings that risky financial investments are concentrated in large, low cash flow volatility firms, while smaller firms will avoid investing in risky financial assets (Duchin et al., 2017). Accordingly, this study argues that larger firms with high asset growth hold larger asset portfolios than do smaller firms, and tend to invest in riskier investments that may increase financial risk and distress. Furthermore, the positive relationship between firm size and assets growth on one hand and firm financial distress on the other is indeed affected by the characteristics of the emerging economies. Therefore, the argument of this study on the MENA countries is different from others on developed countries because of the distinct characteristics of emerging countries. The undeveloped financial markets and the availability of few investments and financial resources will indeed affect the prediction of the financial distress in emerging countries.

Further, I perform additional analyses to obtain valid results. **First**, I use three alternative measures of financial distress, namely, *Altman Z-score*, *IntCoverage*, and *Taffler Z-score* in all logistic regression models to re-estimate Eq. (4). For the purpose of brevity, I reported the results for the *Altman Z-score* measure only in different specifications displayed in Table 8 and regressions of subsamples in Table 9. **Second**, firm profitability is proxied by three alternative measures used in all logistic regressions (*E/TA*, *ROE*, and *Operating E/TA*) to ensure the validity of the results. For simplicity, I report the regression results for one measure only (*E/TA)* in Tables 8 and 9. **Third**, as explained in Section 3.4, I used different clustering approaches to re-estimate Eq. (5) and perform different specifications to validate regressions results, as follows: (1) one-way cluster-robust approach, where the standard errors are clustered by firm. (2) two-way cluster-robust standard errors (CL-2), where standard errors are clustered by country and time. (3) robust standard errors without clustering. **Fourth**, to control for the effect of outliers, I winsorized all financial variables to ensure the robustness of the results, using two winsorizing approaches as follows: (1) The outlying values are winsorized at the 1% and 99% tails, that is, all financial variables are winsorized at the 1st and 99th percentiles of their distributions. (2) All panel logistic regressions are re-estimated by winsorizing all financial variables at the top and bottom 5% of the distribution (5% and 95% tails), that is, all outliers below the fifth percentile and above the 95th percentile are replaced with their values at the 5th and 95th percentile, respectively. When I run all logistic regressions with the winsorized variables using both winsorizing approaches, the results of this study remain qualitatively unchanged under all specifications. This ensures the reliability and validity of the study findings. **Fifth**, in Table 8, I use all the regression Models (1–6) to estimate Eq. (4) to examine the relationship between firm financial distress on one hand, and firm life cycle and other firm-specific variables on the other. The main results reported in Model 1 are unaffected by the inclusion of MatEQ in Model 2, exclusion of *CRISIS* from Model 3, and ChgTA from Model 4, and by dropping *M/B, E/TA* from Models 5 and 6, respectively. In addition to the above robustness checks, I conduct the test of equality and the Moderated Multiple regression (MMR), using interaction terms with firm life cycle to provide more insights into the predictors of financial distress in the MENA region.

3.6.1. Tests of equality with bootstrapped standard error of difference

An additional analysis can be performed to check the robustness of the main results by dividing the study sample into three subsamples, as follows: pre-Arab Spring (2007–2009), during the Arab Spring (2010–2012), and post-Arab Spring (2013–2015). Splitting the sample into pre-, during and post-Arab Spring helps examine the effect of the Arab Spring period and the transition to democracy on corporate financial distress. I re-estimated Eq. (4) for the three subsamples to provide some insights on the main determinants of financial distress in each sub-period. Table 9 estimates the logit models separately for the three periods to test the empirical relationship between financial distress and many firm-specific factors, while excluding CRISIS. Similar to the main analysis, these additional logit regression models are estimated with robust standard errors and clustering along time and firm dimensions.

Table 9 Panel A presents the results of the three specifications for the regression of the Arab Spring sub-periods. The estimates of the regression coefficients in all three models show similar results and significance levels as the main results obtained from Table 8. This indicates that splitting the study sample into three sub-periods to test the effect of the Arab Spring does not change the empirical results, except for CASH and ChgTA, which turn to be insignificant in the post-Arab Spring period. Indeed, this ensures the validity of the results. For further analysis on the statistical differences between the three sub-periods, I performed tests of equality between coefficients with bootstrapped standard error of difference.

To test the statistical significance of the difference between the coefficients of all explanatory variables across the three sub-periods, I employ the bootstrapping method to test for the equality of coefficients of each variable over the three Arab Spring periods (Ferris et al., 2009). The standard errors of the difference in the coefficients are bootstrapped and reported along with the Z-statistics in Panel B of Table 9. Using the bootstrap analysis, Panel B in Table 9 shows that the difference in *MatAsset* coefficients are statistically significant between the pre-Arab Spring period (2) and the during-Arab Spring period (1) at the 1% level. There is also significant difference in the coefficients between the post-period (3) and the pre-period (1) at the 1% level of significance. However, there are insignificant differences in the "2013 to 2015" and the "2010 to 2012" periods. These findings denote that the effect of the firm life cycle increases significantly in the during-Arab Spring period, in comparison to the pre-Arab Spring period, and in the post-period in comparison to the pre-period. The negative effect of matured firms on financial distress significantly increases during the Arab Spring and after it, suggesting that matured firms are less prone to financial distress during and post the period compared to the pre-Arab Spring period. Therefore, the maturity effect is significantly greater because of the economic instability, and consequently, increases firm financial risk.

Table 10
Logit regressions with life cycle interaction terms

Dependent variable: Distress												
	(1)		(2)		(3)		(4)		(5)		(6)	
	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat
Intercept	2.476	0.344***	2.450	7.26***	2.210	6.28***	1.540	9.22***	1.471	8.54***	1.327	7.50***
Interaction terms and Arab Spring dummies												
MatAsset*g1	−1.965	−3.20***					−1.961	−3.15***				
MatAsset*g2			−1.389	−3.02***					−1.304	−3.03***		
MatAsset*g3					−1.105	−3.84***					−1.143	−3.99***
g1	−0.150	−1.03					−0.223	−1.55				
g2			0.050	0.42					0.049	0.42		
g3					0.271	2.34**					0.304	2.67***
Firm-specific controls												
MatAsset	−5.989	−14.96***	−5.765	−14.01***	−5.203	−10.91***	−5.954	−14.73***	−5.74	−13.83***	−5.132	−10.67***
CASH	−3.689	−3.65***	−3.221	−3.35***	−3.987	−4.47***	−3.652	−3.58***	−3.17	−3.27***	−3.963	−4.45***
E/TA	−2.302	−5.07***	−2.342	−5.07***	−2.661	−5.63***	−2.268	−4.97***	−2.34	−5.05***	−2.637	−5.53***
M/B	−1.500	−12.21***	−1.458	−11.89***	−1.483	−12.03	−1.552	−12.52***	−1.53	−12.32***	−1.54	−12.41***
ChgTA	1.304	4.38***	1.062	3.86***	1.251	4.54***	1.282	4.31***	0.98	3.59***	1.203	4.39***
SIZE	0.000	8.66***	0.000	8.60***	0.000	8.75***	0.000	8.65***	0.000	8.55***	0.000	8.73***
CRISIS	0.088	0.65	0.0581	0.43	0.1627	1.16	−0.022	−0.18	−0.07	−0.55	0.068	0.51
Institutional variables												
FMARKET	−2.586	−3.19***	−2.721	−3.44***	−2.418	−3.04***						
LEGAL	−0.067	−0.24	−0.134	−0.49	−0.006	−0.02						
CORRUP	0.359	2.03**	0.425	2.43**	0.341	1.95**						
R-squared	0.2565		0.251		0.252		0.253		0.246		0.249	
Obs.	3160		3160		3160		3160		3160		3160	
Mean VIF	2.90		2.86		3.20		1.77		1.64		1.90	

Logit regressions with robust standard errors and clustered firms and years for five specifications. Coefficients of all variables, and the intercept (constant term) for each model is reported. *Z*-statistics are computed based on robust standard errors clustered by firm and time CL-2. Definitions of all variables are the same as those shown in Table 8. Three interaction terms are used; MatAsset*g1, MatAsset*g2 & MatAsset*g3 are the maturity ratios as measured by retained earnings / total assets in the pre-Arab, during- & post-Spring periods respectively. The dummy variables; g1, g2, g3 are the Pre-, during-, and Post-Arab Spring period respectively. Definitions of all variables are the same as those shown in Table 8. The *, **, and *** indicate two-tailed significance at the 1%, 5%, and 10% levels, respectively.

With regard to other explanatory variables, the differences in CASH coefficients are significantly greater in the post-period (3) than the pre-Arab Spring period (1) at the 1% level of significance. This result suggests that liquidity has greater effect on financial distress because of the Arab Spring. Furthermore, the differences between the coefficients of profitability, E/TA, between the sub-periods are significantly positive in the post-Arab Spring period versus during- and pre-periods. The market-to-book ratio, M/B, coefficients show significant decrease in the during- Arab Spring period in comparison to the pre-Arab Spring period at the 1% level of significance, and a significant decrease in the post-Arab Spring period in comparison to the pre-Arab Spring period. Regarding the growth in assets, ChgTA coefficients show very little evidence for differences between the sub-periods. Finally, firm size coefficients are significantly higher in the during-Arab Spring period (2) than in the pre-Arab Spring period (1).

In summary, firm maturity, liquidity, profitability and market-to-book effects on financial distress is significantly different in the post-Arab Spring period than the pre-Arab Spring period, which supports the main argument of this study. These findings indicate that the transition period known as the Arab Spring influenced firm financial distress. The coefficients on *MatAsset, CASH, E/TA, M/B* remain as hypothesized and reported in the main regressions of Table 8. Against predictions, the coefficients on ChgTA and Size remain positive, as reported by the regressions of the main models presented in Table 8. The coefficient on MatAsset is negative and highly significant at the 1% level of significance, across the three Arab Spring periods, suggesting that the firm life cycle effect is persistent and supports the study hypothesis.

3.6.2. Moderated multiple regression analysis

This study uses the MMR analysis to examine the effect of a moderator variable on the relationship between a dependent and an independent variable using interaction terms (Bedeian and Mossholder, 1994).

Hypothesis 1 (H1) in this study proposes that firm life cycle is associated with lower financial distress. To enhance confidence in the study findings, the MMR analysis includes interaction terms in the regression models to predict financial distress in matured firms across Arab Spring periods. Therefore, this study uses MMR analyses to test this hypothesis. To accommodate the possibility that effects of firm life cycle on financial distress may differ due to the effect of the Arab Spring, this study employs three interaction terms as follows: MatAsset × g1, MatAsset × g2, and MatAsset × g3. Here, the effect of high RE/TA measured by MatAsset, as a proxy of firm maturity and life cycle, on financial distress across the three sub-periods of the Arab Spring. The interaction terms use the product of the maturity measure and the dummy variables of pre-Arab Spring (g1), during-Arab Spring (g2), and the pre-Arab Spring (g3) periods. These interaction terms provide ample room to capture the effect of firm maturity and financial distress over the three dummy periods. Table 10 presents the estimates of the regression coefficients on the moderating effect of Arab Spring periods on the relationship between firm maturity and financial distress.

Interestingly, Table 10 shows that the coefficients on the interaction terms MatAsset × g1, MatAsset × g2, and MatAsset × g3 are negative and significant across all specifications (1–6). This indicates that firm maturity predicts financial distress during the three sub-periods of pre-, during-, and post-Arab Spring, which ensures the validity of the study main results. In particular, this study argues that matured firms with high RE/TA ratios were less likely to be financially distressed. This relation is persistent across all Arab Spring periods, and when using both firm-specific variables and institutional variables. Moreover, three dummies of g1, g2, and g3 are used to capture the effect of the pre-, during-, and post-Arab Spring periods, respectively. The empirical results show that coefficients on g3 in Models 3 and 6 are positive and highly significant at the 1% level of significance, suggesting that the post-Arab Spring period (2013–2015) has an adverse effect on firms' financial distress. The insignificant coefficients on g1 and g2 suggest that the pre- and during-Arab Spring periods do not impact firms' financial distress in the MENA region.

Notably, all the results obtained from the MMR models discussed above remain qualitatively the same as the main findings of this study, using the logistic regression with two ways clustering (CL-2) in Table 8 and Table 9. The results obtained from Table 10 support the findings of all empirical tests conducted in this study, and argue that the main predictors of financial distress in the MENA countries includes a set of firm-specific determinants in addition to institutional variables. This indicates the validity and robustness of the findings of this study. To recap, the main findings of this study support the validity of life cycle theory in MENA countries. The maturity stage of firms' life cycle, proxied by the high earned capital and measured by the retained earnings to total assets, suggest that firms are less likely to follow risky strategies, and risky decisions. Matured firms have internal flows of funds that grow more than the availability of profitable investments; thus, the cost of capital decreases, and financial risk and distress reduce (Mueller, 1972).

4. Conclusion and implications

This study explores the main predictors of financial distress in the MENA countries during the period 2006–2015, and examines the validity of the life cycle theory, while controlling for the Arab Spring period, and using many robustness tests to ensure the validity of the results. Literature on the life cycle theory suggests that selecting strategies, decision making process, access to finance, and the structure of capital differs from one stage to another over the firm life cycle stages (koh et al., 2015). Accordingly, firm risk-taking will be affected by firm life cycle, where Habib and Hasan (2017) suggest that firm life cycle has explanatory power for firm risk-taking behavior in a large sample of US firms, and argue that risk-taking behavior increases in the growth stage and affects firm performance positively (Habib and Hasan, 2017). Furthermore, mature firms maintain high levels of cash flows to keep them safe and isolated from the risk of capital market (Mueller, 1972). Consistent with these arguments and the study expectations, the empirical evidence provides strong support for the life cycle theory effect on corporate financial distress. Furthermore, this study argues that the main predictors of financial distress are firm maturity, liquidity, profitability, market-to-book, growth of assets, firm size, and institutional variables, including developments of financial markets and the level of corruption in the country. In particular, matured, profitable, liquid, small-sized firms with high market-to-book ratios and low growth in assets are less likely to be in financial distress.

Moreover, well-developed financial markets in countries with low levels of corruption are significant institutional characteristics that reduce firm financial distress.

This study employs the panel data methodology and uses robust standard errors with clustering in two dimensions (CL-2) to control for heteroscedasticity and the serial correlation among observations, and explores the determinants of financial distress in 11 emerging countries. To control for the effect of Arab Spring, it splits the study sample into sub-samples to examine if the study hypotheses persist across samples. Moreover, it creates three interaction terms to gain more insight on these relations. To check the validity of the main finding, this study conducts tests of equality with bootstrapped standard error of difference, and the MMR analysis. All study findings appear to be reliable and robust to estimating the coefficients using different specifications, using robustness tests, and employing alternative measures for firm maturity, profitability, and financial distress.

To conclude, this study examines significant predictors of financial distress in the MENA countries over the period 2006–2015. Moreover, splitting the study sample into three Arab Spring sub-periods to test for the effect of the Arab Spring on the determinants of financial distress is a major contribution of this study. It provides some insights into how the relationship between financial distress and firm-specific indicators will vary across Arab Spring periods. Exploring what drives financial distress in the emerging countries is interesting because of the special economic and political characteristics of these countries that differentiate them from developed countries. As predicted by studies on US firms and other developed countries, this study finds that firm life cycle, profitability, growth opportunities, liquidity, size, and institutional characteristics are the main determinants of financial distress in MENA countries. Particularly, similar to studies on developed countries, the empirical evidence of this study suggests that financial distress has a negative association with earned equity ratio, liquidity, profitability, and M/B ratio. However, against the results of studies on developed countries (e.g. Campbell et al., 2008; Al-Hadi et al., 2019), it finds a positive relation between growth of assets, firm size, and financial distress. This finding implies that high capitalization and greater investments in assets increase the risk of default for firms in underdeveloped financial markets in MENA countries. The increased risk caused by economic and political instability causes financial volatility in capital markets in comparison to the advanced economic process in developed countries, which facilitates risk diversification.

The results of this research are in line with the firm life cycle. The results suggest that firm maturity persists as a significant determinant of financial distress, even after controlling for other firm-specific factors, the Arab Spring effect, institutional variables, and fixed effects. This finding implies that managers of firms in the growth and decline stages should plan to maintain a certain ratio of earned capital to serve as a cushion against the risk of financial distress. Managers in distressed firms facing bankruptcy should follow strategies that increase their retained earnings to total assets ratio and cash holdings, such as omitting or reducing dividends and changing capital structure, as effective restructuring strategies to recover from distress (DeAngelo and DeAngelo, 1990; Koh et al., 2015). For investors, the results imply that they should consider the firm life cycle stage when calculating firm-specific risk and idiosyncratic risk, to determine the expected returns from firm equity. With regard to firm liquidity, this study finds that financial distress is negatively related to holding cash liquid assets. This finding implies that the benefits of maintaining higher levels of liquid assets offset their opportunity cost. Moreover, the economic instability due to the Arab Spring emphasizes maintaining high liquid assets to absorb insolvency risk and financial distress.

As a price-based proxy for growth opportunities, the market-to-book ratio is a significant negative predictor of financial distress, as an increase in value of equity will decrease the likelihood of firm being distressed. However, the investment-based measure for growth opportunities indicates that increasing the level of investments and the book value of assets will exacerbate firm financial distress because of the increase in firm risk failure. The positive relationship between firm investment policy and financial distress shows that managers face over-investment problems. Financial managers should be prudent while selecting their investment portfolio mix and yield, as long-term investments involve high uncertainty of future cash flows and expose firms to financial distress. This argument holds true during the Arab Spring period. The increase in value of assets and investments, with high uncertainty of cash flows in periods of economic turbulence, will cause financial distress. Indeed, financial regulators should develop the financial capital market and reduce corruption to avoid the risk of failure and distress.

These empirical results have further important implications for emerging countries with the same characteristics. The study results predict that maintaining high levels of liquid assets and earned equity ratio, by omitting or reducing dividends and increasing equity capital, may reduce the possibility of financial distress. Therefore, financial analysts and investors should consider them when forecasting firm future cash flows (i.e. dividends) in valuation models. This study predicts corporate financial distress while controlling for the Global Financial Crisis and the Arab Spring, which provides important implications for portfolio managers when diversifying their portfolios by investing in MENA countries. Elsayed and Yarovaya (2019) argue that these economic and political crises have strong spillover effect in the MENA economies. Furthermore, low levels of country corruption and developed financial markets are important factors to maintain corporate financial stability; therefore, these results have useful implications for financial regulators and investors with long-term investment horizons.

In fact, emerging markets share common characteristics. The MENA region comprises developing countries that have characteristics common with developing countries in other regions. Therefore, the results of this study should be of interest to other developing regions and countries, and have important implications for emerging markets sharing common characteristics, despite some economic, cultural, and geographical discrepancies.

Declaration of Competing Interest

None.

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