

# STABILITY IN ISLAMIC, CONVENTIONAL, AND SOCIALLY RESPONSIBLE BANKS: EVIDENCE FROM MENA COUNTRIES

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## Abstract

This study empirically estimates financial stability and its determinants in 40 Islamic banks, 168 conventional banks, and 8 socially responsible banks (SRBs) in MENA region during the period 2005-2012. The dependent variables in this study are capital ratio (equity to total assets) and z-score. The statistical approaches to find the relationship between financial stability indicators and their determinants are ordinary least square (OLS) and fixed effects model FEM). The results suggest that the SRBs are the most stable banks while, Islamic banks are highly risky. Moreover, conventional banks score the minimum capitalisation. The stability in Islamic banks is positively affected by ROA and age. Furthermore, the main determinants of capitalisation in Islamic banks are operating leverage, GDP, and market capitalisation. In conventional banking, size and profitability are important to stability. The capitals have effective associations with lending, ROA, and market development. In SRBs, banks achieve better stability in countries with higher inflation. This study could help bankers, policy makers and economists who focus on MENA region. The coverage of period 2005-2012 could be a limitation and the availability of data for the Islamic and socially responsible banks in MENA area could be another limitation as well.

**Keywords:** Islamic Banks, Conventional Banks, Socially Responsible Banks, Z-Score, Capital Ratio

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## 1. INTRODUCTION

After the global financial crisis (GFC) in 2007, focusing on insolvency risk analysis became more important as the majority of banks achieved a huge amount of loss or bankruptcy. The stability indicators are z-score, as employed by Ghosh (2014), and capital (equity to total assets) ratio (Horvath et al., 2014). In this study, both measures are used: z-score and capital ratio during the period 2005-2012. The z-score was developed by Boyd et al. (1993) and statistically concerns the probability of bankruptcy. A higher z-score means the bank is more stable and less likely to go bankrupt. Regarding the capitalisation ratio, better values indicate that the firm is well capitalised and stable. After measuring the stability and comparing values between Islamic, commercial, and socially responsible banks (SRB), finding the determinants of stability is the main topic. Financial stability can be affected by many factors, for example internal variables such as size of bank (log of total assets) and external factors like inflation. However, these variables can affect the stability positively or negatively. In fact, the relationship between stability and its determinants can help with the decision about which variable to use more or less - or even neglect altogether - in order to avoid insolvency risks and to raise financial stability in the banking sector. In accordance with macroeconomics, identifying the factors that affect

banks leads to allocating more recovery plans by the banks' policy makers. However, this study identifies the stability (z-score and capitalisation which can be the explained variable) and its determinants (explanatory variables).

To understand more about the characteristics of socially responsible banks, we have to consider the main aims of this type of bank to be as follows (Kansal et al., 2014):

1. SRBs are concerned more with social issues (e.g. sponsoring community events, local scholarships, training courses, summer training for students) rather than achieving profits.

2. SRBs care about environmental issues, such as energy saving, green funds, and organic agriculture (Kansal et al., 2014).

The most recent study on SRB was made by Gutiérrez-Nieto et al. (2016). This study has focused on the credit score system for socially responsible lending. This study concludes that SRB is a financial institution that only fund target groups or causes, generally social and/or environmentally orientated.

When considering Islamic and conventional banks, the main difference between them is that conventional banks deal with interest (Riba), whereas Islamic banks operate interest-free.

During the time of the global crisis, the banking sector in the Middle East and North Africa faced many hurdles due to a reduction in deposits and loans as internal factors. In addition, the external

factor of economic recession allowed an increment in cash flows and GDPs. Most MENA countries' incomes depend on the export of oil. As a result, oil prices have affected MENA's economies as well as their banking sector. So, this study aims to compare the financial stability in MENA region between Islamic, conventional, and socially responsible banks. Further, this study investigates the reasons behind the instability.

This study aims to answer several questions:

Q1: Are Islamic, conventional, and socially responsible banks financially stable over the period of the study? Which type of bank is the most stable?

Q2: What are the determinants of financial stability in Islamic, conventional, and socially responsible banks? Are the determinants different for these bank types?

Q3: How do the internal and external factors affect stability? Are the influences positive or negative?

In fact, this study makes several contributions to the current literature. Firstly, it is the first study that concerns the financial stability of the socially responsible banking system. Secondly, comparing the financial stability of Islamic, conventional, and socially responsible banks is a contribution to the literature. Thirdly, discovering what impact the financial crisis had on SRBs will add to financial knowledge.

The study is organised as follows. Section 2 reviews the previous literature. Section 3 presents the data and methodology. Section 4 shows and discusses the empirical results. Finally, Section 5 concludes the study.

## 2. LITERATURE REVIEW AND HYPOTHESES

### 2.1. Literature Review

As previously mentioned, stability studies have become more important since the global financial crisis in 2007. Many studies concentrate on conventional banks (Cubillas & González, 2014; Fu et al., 2014; William, 2014), but there is a limited number of studies analysing Islamic banks or comparing Islamic and commercial banking stability (Beck et al., 2013; Ghosh, 2014). In terms of cooperative banks, only one study was conducted by Mirzaei et al. (2013) that compared Islamic, real estate, savings and cooperative banks in the Middle East and Eastern Europe using z-score as a stability indicator (dependent variable). However, stability indicators can be non-performing loans, credit risk, net interest margin and z-score. Most studies focusing on z-score indicate the percentage of bankruptcy. Many studies found the determinants of stability through statistical regressions such as OLS, which is the most common model (Chalermchatvichien et al., 2014; Jeon & Lim, 2013; Lee & Chih, 2013; Srairi, 2013).

Rajhi and Hassairi (2013) discuss the Islamic banking stability for MENA and Southeast Asian regions for the period 2000-2008. This study explains the causes of stability as size of banks, loans services, liquidity and GDP. In contrast, efficiency ratio and inflation led to instability. These results allow managers to attract more clients to

borrow; one way could be by minimising the lending interest. Additionally, bankers could consider reducing their costs, as efficiency ratio has a negative and significant sign.

With regards to the MENA region, Srairi (2013) compared the determinants of risk using 10 countries over the period 2005-2009. This study evaluated 175 Islamic and conventional banks in MENA. There are three types of explanatory variables, namely ownership, bank-specific variables and financial indicators. Srairi (2013) adopted OLS regression as a statistical approach to examine the determinants of z-score. This study yielded three main results: family banks tend to be more stable than company and state-owned banks; concentration (equity % participation by the largest shareholder of the bank), size, loan growth, operating leverage, diversification, banking sector development, and shareholders' rights and bank concentration (assets of 3 largest banks to total assets of all banks in the country) were found to have a significant and positive z-score which leads to making the banks less risky; and efficiency ratio (cost to income) was found to be decreasing the z-score which raises the insolvency risk. Overall, during the period, conventional banks have more mean z-score (21.7) than Islamic banks (20.8) which makes the conventional banks more stable and resistant against crises in MENA countries.

A significant comparison has been conducted between Middle Eastern banks and Eastern European banks over the period 1999-2008, examining 1929 banks by Mirzaei et al. (2013). The empirical results explain that for banks in the Middle East, market share, interest rate, capital ratio and overheads to total assets ratio have a significant and negative relationship with z-score, while inflation and bank size were found to be decreasing the z-score (increasing the risk). Regarding the Eastern European banks, the findings indicate that z-score (stability) was influenced significantly and positively by market share, interest rate spread, capital ratio, off-balance sheet to total assets, bank age, inflation, and GDP. In contrast, overheads to total assets ratio is negative and significant with z-score at the 5% level. Overall, the most stable banks were found to be the foreign banks (Middle Eastern and Eastern European) through the period.

Concerning the GCC banking market, Ghosh (2014) tested the relation between risk and capital for 57 conventional banks and 46 Islamic banks in the GCC region for the period 1996-2011. The main finding (after employing the 2SLS model) shows that banks generally increase capital in response to an increase in risk. However, the determinants of risk identified by Ghosh (2014) such as funding (short-term funding over total assets) and listed banks explain the z-score significantly and positively. In contrast, income diversification was found to have a significant and negative relationship with z-score (the risk indicator) which made banks more risky through the period. Regarding to capitalisation, the relationship between the capital ratio and size was found to be significant and negative, while ROA were improving the capital significantly over the period. In general, Ghosh (2014) proposed that the GFC does not impact the stability of banks in GCC.

## 2.2. Hypotheses' formulations

Based on the literature review on stability, this study examines the determinants of stability in MENA region using the most effective internal variables, namely z-score, capital ratio, bank size, loan intensity, credit risk, ROA, operating leverage, age of bank, and foreign, domestic and public ownerships. On the other side, GDP, inflation, market capitalisation and global financial crisis can be examined as external variables.

### 2.2.1. Internal variables

1. Z-score: Horv ath et al. (2014) consider the commercial banking sector in their study examining the determinants of capitalisation including z-score in the Czech Republic for the period 2000-2010. The association between capitalisation and z-score was positive and significant. This demonstrates that more capitalisations led to financial stability and less default risk.

*H1.* There is a significant relationship between z-score and stability.

2. Capital ratio: Capitalisation is one of the most important bank-specific variables to describe stability in the banking sector. There are many examples showing the importance of capitalisation such as the studies of Ghosh (2015), K ohler (2015) and Tabak et al. (2015), who claim that higher equity leads to raising constancy in the banking industry. Consequently, more capitalisation lets banks face any threat of failure. On the contrary, Tabak et al. (2013) argue that capitalisation decreased the stability in the Latin American banking sector for the period 2001-2008. In order to avoid any bankruptcy risks, banks need to reduce their capitalisation (which enhances the stability).

*H2.* There is a significant relationship between capital ratio and stability.

3. Bank size: The size of banks (total assets) plays a very important role on stability in the recent studies. There are various points of view considered regarding banking size. Some studies confirm that size keeps banks stable with less default risk and others go against this orientation. An example of a study that considered the relationship between stability and bank size as positive is the most recent study of Tabak et al. (2015), who examined the stability (z-score) determinants of 76 Brazilian commercial banks for the period 2001-2011. The result of this study supports having more total assets in the Brazilian banking industry. The same result was found by Cubillas and Gonz alez (2014) and Agoraki et al. (2011). Conversely, K ohler (2015) proves a negative and significant correlation between size and stability (z-score).

*H3.* There is a significant relationship between bank size and stability.

4. Loan intensity: K ohler (2015) found that banks with a larger loan portfolio have significantly higher z-scores. This encourages banks to raise their lending activities due to being further from insolvency risk, as noted for European commercial

banks in the period 2002-2011. This contradicts the results of Rumler and Waschiczek (2014). Berger et al. (2009) analysed both stability indicators (z-score and capital ratio) for 23 countries for the period 1999-2005. This study discouraged banks from giving more loans as lending reduced the capital and increased the default (bankruptcy) risk which logically made banks unstable.

*H4.* There is a significant relationship between loan intensity and stability.

5. Credit risk: Soedarmono et al. (2011) conducted a study which concentrated on examining the financial stability using a sample of commercial banks from 12 Asian countries between 2001 and 2007. They document that the relationship between liquidity and stability ratios (z-score and capitalisation) are positive and significant (the same conclusion as Nguyen & Nghiem, 2015; Dima et al., 2014; Jeon & Lim, 2013). This means that banks could enhance their stability through providing fewer loans to cover the withdrawals of clients. On the other hand, Lee and Chih (2013) find a negative and significant correlation between z-score and loans to deposits ratio. As a result, increasing the loans to deposits ratio let banks take less risk over the period 2004-2011. The results of Dong et al. (2014) revealed that a loan to deposits ratio was irrelevant to stability in the Chinese commercial banking sector through the period 2003-2011.

*H5.* There is a significant relationship between credit risk and stability.

6. Return on assets (ROA): The statistical results of Anginer et al. (2014) claim that the profitability ratio (ROA) improved the steadiness of banks over the period 2004-2009. This result also concludes that earnings of banks are very important in terms of profits and can save banks from default risk. This is consistent with Ghosh (2014) in terms of capital ratio. The rest of the studies in the literature could not provide any further evidence that profits influence stability and risk in banking systems (Ghosh, 2014; Srairi, 2013; Tabak et al., 2015; Tan & Floros, 2013; Zhang et al., 2015).

*H6.* There is a significant relationship between profitability and stability.

7. Operating leverage: A few studies have examined the determination of fixed assets intensity on stability. Srairi (2013) concentrated on the stability indicators of 10 MENA countries including 175 Islamic and conventional banks for the period 2005-2009. Based on the results, the Islamic and conventional banks in MENA countries were recommended to purchase more fixed assets as the z-score and operating leverage were found to be significant and positive, which is consistent with Williams's (2014) findings. Berger et al. (2009) had an opposite result which suggested that fixed assets (negative correlation with z-score) made the financial stability worse and raised the risk of failure over the period 1999-2005 in their sample of 23 countries (1091 Asian commercial banks). This result allows policy makers to sell more fixed assets; depreciation could be due to the high cost of the fixed assets. In contrast, this study approved that

fixed assets intensity increased the capitalisation significantly over the period.

*H7.* There is a significant relationship between operating leverage and stability.

8. Age: Lee and Chih (2013) compared the stability (z-score) of small (185) and large (57) banks in China for the period 2004-2011. Lee and Chih (2013) argue that the experience in the Chinese banking sector affected the stability of large banks. Higher experience time leads to steadier banks with fewer insolvency risks. In this study, age is unimportant for small banks (similar to Dedu & Chitan, 2013). Schaeck and Cihak (2014) included z-score and capital ratio as dependent variables to find if the age impact the stability or not examining ten European Countries for the period 1995-2005. As a result of this study, time trend was found to be highly important to both z-score and capitalisation. Another study also focused on age; Mirzaei et al. (2013) compared the stability (z-score) between emerging economies and advanced economies in the Middle East and Eastern Europe through the period 1999-2008. This study concludes that older banks in advanced economies were financially more settled and less risky. On the other side, age was found to be an insignificant variable to stability (z-score).

*H8.* There is a significant relationship between age and stability.

9. Foreign ownership: Berger et al. (2009) argue that increment in levels of foreign banks increased the probabilities of failure for 23 countries over the period 1999-2005, as the relationship between z-score and foreign ownership was significant and negative (similar to Kasman & Kasman, 2015). This finding contradicts the conclusion of Mirzaei et al. (2013) who approve that foreign banks allow the banking sector to be more stable and less risky. On the other side, Berger et al. (2009) claim that foreign banks enhance capital ratios significantly.

*H9.* There is a significant relationship between foreign ownership and stability.

10. Domestic ownership: Tabak et al. (2013) examined the determinants of z-score inefficiency for 17 Latin American countries through the period 2001-2008. The results suggest that private banks significantly increased financial instability. García-Kuhnert et al. (2015) found an insignificant correlation between z-score (financial stability) and private banks.

*H10.* There is a significant relationship between domestic ownership and stability.

11. Public ownership: Finally, Rumler and Waschiczek (2014) examined the impact of public banking roles on financial stability for commercial Austrian banks during the period 1995-2010. Their findings conclude that government involvement in the banking sector was important to improve their financial effectiveness. This result is consistent with the study of Agoraki et al. (2011) but contradicts to the result of ElBannan (2015) and Barakat and Hussainey (2013).

*H11.* There is a significant relationship between public ownership and stability.

## 2.2.2. External variables

1. Gross Domestic Product (GDP): The GDP growth is a macroeconomic indicator that has been examined by most studies in stability of the banking industry. The majority of studies prove that there is a positive relationship between GDP development and stability (z-score) in the banking industry (e.g. Köhler, 2015 and Anginer et al., 2014). In contrast, a minority of studies proposed that GDP decreases stability and increases the probability of bankruptcy. Examples for this case can be seen in the studies of Cubillas and González (2014) and Dong et al. (2014), who confirm that banks in better GDP growth found hurdles in growing (investing) their capital (negative association between capital ratio and GDP growth). According to capitalisation, Nguyen and Nghiem (2015) also confirmed that GDP affected the stability negatively. However, Chalermchatvichien et al. (2014) could not estimate any correlation between GDP and z-score (stability).

*H12.* There is a significant relationship between GDP and stability.

2. Inflation: Rumler and Waschiczek (2014) investigated the factors that determine the bank-taking risk, focusing on the Austrian banking industry for the period 1995-2010. In fact, they found that inflation reduced the bank risk-taking. As a result, the constancy of Austrian commercial banks was enhanced. Many studies support Rumler and Waschiczek's (2014) result (for example, Barakat & Hussainey, 2013; Bertay et al., 2013; Bourkhis & Nabi, 2013; Tan & Floros, 2013). In the private banking sector, Nguyen and Nghiem (2015) and Horváth et al. (2014) found the same result in terms of capitalisation. This result encourages banks to expand their activities in high inflation rates but some studies discourage banks from operating more due to a negative and significant relationship between z-score and inflation rates (see Cubillas & González, 2014; Delis et al., 2012; Houston et al., 2010; Köhler, 2015; Mirzaei et al., 2013). Nguyen and Nghiem (2015) arrived at the same conclusion in accordance with the public banking sector. In fact, the inflation rates are not always an influential variable to stability (Delis et al., 2012; Srairi, 2013).

*H13.* There is a significant relationship between inflation and stability.

3. Market capitalisation: Nguyen et al. (2012) indicate that financial development in the Asian economies such as in the stock market is very important to the banking industry, as they investigated the financial stability (z-score) determinants of 151 Asian commercial banks including Bangladesh, India, Pakistan and Sri Lanka over the period 1998-2008. Results from Dima et al. (2014) show the same association between stock market growth and stability (z-score) using a sample of commercial banks in 63 developed and developing countries through the period 1997-2010. In addition, Lee and Hsieh (2014) also found a positive and significant relationship between capital ratio and stock market earnings. Anginer et al. (2014) and Tan and Floros (2013) argue that stock

market development did not influence stability in the banking industry.

H13. There is a significant relationship between market capitalisation and stability.

4. Global financial crisis (GFC): For GFC, there is no study finding a positive relationship with stability. Williams's (2014) findings suggest that Asian commercial banks faced a risk of bankruptcy over the GFC period. In addition, Anginer et al. (2014) conclude that bank stability was affected by GFC. Some studies found no influence of GFC in banks, such as Ghosh (2014), Bourkhis and Nabi (2013) and Nguyen et al. (2012).

H14. There is a significant relationship between market capitalisation and stability.

### 3. METHODOLOGY

#### 3.1. Data of the study

The data in this study was extracted from two main sources: Bankscope (Bankscope, 2016) and World Bank databases (World Bank, 2016). For Bankscope, the data was extracted from balance sheets and income statements of 216 banks, and of those being 40 Islamic banks, 168 conventional banks, and 8 socially responsible banks (more details in Table 1 below) during the period 2005-2012. The data has been gathered from Middle Eastern and North African (MENA) regions including Islamic, conventional and socially responsible banks. Regarding the banks, data was collected from 20 countries, namely Algeria, Egypt, Iran, Iraq, Lebanon, Libya, Malta, Morocco, Israel, Jordan, Palestine, Syria, Tunisia and Yemen, as well as the Gulf Cooperation Council (GCC) countries, which are considered to be oil exporter countries in the Middle Eastern region, namely Bahrain, Kuwait, Oman, Qatar, the Kingdom of Saudi Arabia, and United Arab Emirates (Bankscope, 2016).

The main purposes of choosing MENA countries are:

1. Most MENA countries have the same culture and language (Arabic).
2. MENA countries contain Islamic, conventional, and socially responsible banks (globally, the highest number of Islamic banks can be found in MENA region).
3. Availability of data for MENA region.
4. The first international Islamic bank was located in the Middle East in 1975 in Jeddah, Saudi Arabia, known as Islamic Development Bank (Islamic Development Bank, 2016); whereas, the first

domestic Islamic bank was established in Dubai, UAE in 1975, known as Dubai Islamic Bank (Dubai Islamic Bank, 2016).

5. Some MENA countries lead in the global export of oil, especially GCC countries whose GDP is based on the oil sector. However, only 8 MENA countries out of 12 members are in the Organisation of Petroleum Exporting Countries (OPEC Organisation, 2016).

6. MENA countries considered to have emerging economies. So, studying their stability would enhance their economics.

#### 3.2. Independent variables

The bank-specific variables in this study are z-score, capital ratio, size of banks, loan intensity, credit risk, ROA, operating leverage, age of banks, z-score, and domestic, foreign and public ownerships. On the other side, four main country indicators are examined as GDP, inflation, market capitalisation and global financial crisis. In Table 2, we conclude the descriptive statistics for the independent variables for Islamic, conventional and socially responsible banks for the period 2005-2012.

#### 3.3. Dependent variables

Based on the literature, the dependent variables would be the natural logarithm of z-score (e.g. Chalermchatvichien et al., 2014) and capital ratio (Nguyen & Nghiem, 2015). Table 2 illustrates the data description of z-score and capital ratio for MENA countries over the period 2005-2012. Table 2 explains that based on both stability's indicators (z-score and capital ratio), the socially responsible banks were found to be the most financially settled type of banking by far (scoring averages 4.877 and 0.696 for z-score and capital ratio, respectively). This occurred due to SRBs having high capitals over the period 2005-2012, which allowed them to face insolvency risks. These results encourage all banks in MENA region to provide more social services to be more fixed and less risky. In contrast, Islamic banks were unstable and highly risky (average z-score = 2.715). Finally, conventional banks scored the least capitalisation (0.15). The reasons behind the stability's indicators can be revealed in results sections through finding the determinants of financial stability.

This study employs z-score as an explained variable to describe stability. Boyd et al. (1993) proposed the z-score formula:

$$Z\text{-score} = (ROA+E/TA)/(S.D.ROA) \quad (1)$$

where,

ROA: return on assets

E/TA: equity to total assets (or capital) ratio

S.D. ROA: standard deviation of return on assets

According to capitalisation ratio, Horváth et al. (2014) employed the capital ratio as follows:

$$Capital\ ratio = Equity / Total\ Assets \quad (2)$$

Table 1. Number of banks in each country

N	Countries	GDP (million US\$) in 2015	World	Islamic	Conventional	SRBs	Total
			Rank	Banks	Bank		
1	Saudi Arabia	777,870	20	3	9	0	12
2	UAE	402,340	28	6	17	0	23
3	Iran	367,098	31	7	0	1	8
4	Israel	290,643	36	0	8	0	8
5	Egypt	271,427	39	2	21	0	23
6	Iraq	229,327	45	0	2	0	2
7	Algeria	212,453	48	1	9	3	13
8	Qatar	202,450	49	3	6	0	9
9	Kuwait	175,787	55	2	6	0	8
10	Morocco	103,824	60	0	8	1	9
11	Oman	77,116	63	0	7	0	7
12	Syria	71,998	65	0	5	0	5
13	Libya	65,516	69	0	5	0	5
14	Tunisia	46,995	82	1	8	2	11
15	Lebanon	45,019	85	0	28	0	28
16	Yemen	40,415	89	4	1	0	5
17	Jordan	33,858	90	1	7	0	8
18	Bahrain	32,791	92	9	15	0	24
19	Malta	9,545	135	0	4	1	5
20	Palestine (Gaza)	6,641	148	1	2	0	3
Total				40	168	8	216

Source: International Monetary Fund (2016)

Table 2. Variable definitions and summary statistics

Variables	Definition	Islamic Banks			Conventional Banks			Socially Responsible Banks			All Banks		
		Obs	Mean	S.D.	Obs	Mean	S.D.	Obs	Mean	S.D.	Obs	Mean	S.D.
<b>Dependent variables</b>													
Z-score	log(Z-score), where Z-score = (ROA + capital ratio)/S.D. (ROA)	291	2.715	0.883	1277	3.079	1.050	64	4.877	0.949	1653	3.073	1.103
Capital ratio	Capital/total assets	291	0.226	0.215	1277	0.150	0.202	64	0.696	0.255	1653	0.191	0.253
<b>Independent variables</b>													
<b>Bank-specific variables</b>													
Size	Log (total assets)	291	2.715	0.883	1277	8.052	1.754	64	4.877	0.949	1653	8.032	1.759
Loan intensity	Loans/total assets	291	0.226	0.215	1277	0.470	0.388	64	0.696	0.255	1653	0.458	0.366
Credit risk	Loans/deposits	291	7.907	1.755	1277	1.104	14.677	64	8.406	0.963	1653	1.372	16.534
ROA	Return on assets = net income/total assets	291	0.485	0.222	1277	0.015	0.039	64	0.134	0.132	1653	0.012	0.050
Operating leverage	Fixed assets/total assets	291	2.722	24.643	1277	0.016	0.016	64	0.809	0.221	1653	0.017	0.019
Age	Log (years since establishment)	291	0.007	0.068	1277	3.665	0.593	64	0.005	0.013	1653	3.552	0.644
Foreign ownership	Dummy = 1 if a bank owned by foreign, else zero	291	0.022	0.019	1277	0.434	0.496	64	0.019	0.014	1653	0.415	0.493
Domestic ownership	Dummy = 1 if a bank owned by local, else zero	291	3.109	0.612	1277	0.379	0.485	64	3.460	0.595	1653	0.378	0.485
Government ownership	Dummy = 1 if a bank owned by government, else zero	291	0.285	0.452	1277	0.193	0.395	64	0.500	0.504	1653	0.226	0.419
<b>Country-specific variables</b>													
GDP	Log ( GDP)	291	25.202	1.218	1277	25.053	1.079	64	25.014	1.056	1653	25.113	1.145
Inflation	Inflation rates	291	0.104	0.100	1277	0.065	0.072	64	0.055	0.053	1653	0.071	0.079
Market capitalisation	Market capitalisation to GDP	291	0.568	0.501	1277	0.567	0.492	64	0.228	0.243	1653	0.558	0.492
Global Financial Crisis	Dummy = 1 for the period 2007-2009, otherwise zero	291	0.395	0.490	1277	0.388	0.488	64	0.375	0.488	1653	0.390	0.488

### 3.4. Main models

The main models of the study that obtained from OLS and fixed effects models (through STATA 14) can be as follows:

$$Z\text{-}sco_{it} = \alpha + \beta_1 EQTA_{it} + \beta_2 LTA_{it} + \beta_3 LOANSTA_{it} + \beta_4 LOANSDEPO_{it} + \beta_5 ROA_{it} + \beta_6 FATA_{it} + \beta_7 LAGE_{it} + \beta_8 FORE_{it} + \beta_9 DOM_{it} + \beta_{10} GOV_{it} + \beta_{11} LGDP_{it} + \beta_{12} INFLATION_{it} + \beta_{13} MCAP_{it} + \beta_{14} GFC_{it} + \varepsilon_{it} \quad (3)$$

$$i = 1 \dots n; t = 1 \dots n$$

$$Cap_{it} = \alpha + \beta_1 LOGZ_{it} + \beta_2 LTA_{it} + \beta_3 LOANSTA_{it} + \beta_4 LOANSDEPO_{it} + \beta_5 ROA_{it} + \beta_6 FATA_{it} + \beta_7 LAGE_{it} + \beta_8 FORE_{it} + \beta_9 DOM_{it} + \beta_{10} GOV_{it} + \beta_{11} LGDP_{it} + \beta_{12} INFLATION_{it} + \beta_{13} MCAP_{it} + \beta_{14} GFC_{it} + \varepsilon_{it} \quad (4)$$

$$i = 1 \dots n; t = 1 \dots n$$

As mentioned,  $Z\text{-}sco_{it}$  denotes the dependent variable which is the z-score and  $Cap_{it}$  represents capital ratio,  $i$  is the observations,  $t$  is time,  $\alpha$  is the constant,  $\beta$  denotes the coefficient of variables and  $\varepsilon_{it}$  is the error term. On the other side, the independent variables are size ( $LTA$ ), loans intensity ( $LOANSTA$ ), credit risk ( $LOANSDEPO$ ), return on assets ( $ROA$ ), operating leverage ( $FATA$ ), age ( $LAGE$ ), foreign ownership ( $FORE$ ), domestic ownership ( $DOM$ ), public ownership ( $GOV$ ), gross domestic production ( $GDP$ ), inflation rates ( $INFLATION$ ), market capitalisation ( $MCAP$ ), and global financial crisis ( $GFC$ ). However, before examining the relationship between the dependent and independent variables, we need to conduct a correlation matrix to insure that there is no multicollinearity. As a result, Table 3 indicates that the maximum amount is 36.16% (the correlation between size and age) which is less than 80% (Studenmund, 2005). This means that no potential multicollinearity problem exists.

## 4. DATA ANALYSIS AND RESULTS

The determinants of financial stability of Islamic, conventional and socially responsible banks using OLS regression are displayed in Table 4. The findings suggest that the hypotheses which support z-score in Islamic banks are  $H4$ ,  $H6$ ,  $H8$  and  $H14$ , while the determinants of capital ratio are  $H3$ ,  $H4$ ,  $H7$ ,  $H10$ ,  $H11$ ,  $H12$  and  $H14$ . According to conventional banks,  $H3$ - $H12$  and  $H14$  affected z-score significantly, whereas  $H3$ - $H6$ ,  $H8$  and  $H14$  were found to be significant with capitalisation. Regarding the socially responsible banks,  $H3$ ,  $H7$ ,  $H8$  and  $H12$  confirmed a significant relationship with z-score and  $H5$ - $H7$ ,  $H10$  and  $H12$  impacted capital ratio effectively.

$H3$ . Bank size: OLS findings suggest that larger conventional and socially responsible banks were more stable and less risky than smaller banks. Many studies confirm that higher total assets enhance stability, such as the studies of Tabak et al. (2015) and Cubillas and González (2014). The reason for this result could be due to the fact that larger banks are more likely to gain profits from economies of scale than smaller banks, which may have a higher degree of production differentiation and loan diversification. In Islamic and conventional banks, the relationship between capital ratio and size of banks is strongly negative at the 0.1% level. This indicates that smaller sized banks are better

capitalised than larger sized banks (consistent with Ghosh, 2014).

$H4$ . Loan intensity: The results confirm that Islamic banks that provide more loans tend to be financially constant (in line with Köhler, 2015), but at the same time, lower their capitals significantly (similar to ElBannan, 2015). Regarding the conventional banks, the opposite situation was demonstrated in that loans allowed conventional banks to be riskier (Bourkhis & Nabi, 2013) but supported the capitalisation significantly.

$H5$ . Credit risk: The findings show that conventional banks suffering from increment in credit risk are affected in their financial stability and capitalisation. Consequently, conventional banks could increase deposits and minimise loans. This can be achieved through encouraging clients to make more deposits with higher deposit interests. Furthermore, banks could discourage customers from applying for more loans by raising the lending interest. This finding is in line with Nguyen and Nghiem (2015) concerning Indian commercial banks. On the other side, socially responsible banks' capitalisation decreased the credit risk significantly.

$H6$ . ROA: The profitability was found to be highly important to Islamic and conventional banks' financial stability. However, there is a negative and significant correlation between capitalisation and ROA in socially responsible banks. This relationship shows that the costs of banks was found to be greater than income. Banks could find strategies to cut costs by achieving more stability and avoiding any default risks.

$H7$ . Operating leverage: Concentrating on operating leverage ratio, there is a positive and significant association between operating leverage and stability in conventional and socially responsible banks. In other words, greater concentration of fixed assets against total assets leads to an increase in stability. The assumption is correlated with Wang et al. (2015). This underlines strategies with fixed assets such as purchasing more fixed assets. According to capitalisation, Islamic banks have a strong and significant relationship (at 0.1%) between capital and fixed assets intensity. This contradicts with the correlation between capital ratio and operating leverage in SRBs. This confirms that SRBs could reduce fixed assets (selling or depreciation) in order to enhance their capitals. In this case, the costs of fixed assets significantly increased over the period.

Table 3. Correlation matrix for variables

N	Independent Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Z-score	1														
2	Capital ratio	0.086	1													
3	Size	0.141	-0.201	1												
4	Loan intensity	-0.035	0.237	0.204	1											
5	Credit risk	0.011	0.129	-0.036	-0.011	1										
6	ROA	0.120	0.071	0.058	0.190	-0.034	1									
7	Operating ratio	-0.021	0.350	-0.277	0.235	0.017	-0.136	1								
8	Age	0.242	-0.201	0.362	0.076	-0.065	0.023	-0.121	1							
9	Foreign banks	-0.135	0.099	-0.235	-0.133	-0.003	-0.035	0.069	-0.155	1						
10	Domestic banks	0.072	-0.184	-0.012	0.012	-0.031	-0.010	-0.080	0.081	-0.658	1					
11	Government banks	0.092	0.162	0.308	0.117	0.037	0.043	0.003	0.106	-0.387	-0.395	1				
12	GDP	-0.128	0.045	0.333	0.236	0.000	0.074	0.015	-0.008	-0.136	-0.089	0.263	1			
13	Inflation	-0.133	0.026	-0.092	-0.082	0.077	-0.102	0.079	-0.127	0.017	-0.090	0.066	-0.086	1		
14	Market capitalisation	-0.145	0.084	0.064	0.104	0.029	0.046	-0.093	0.010	0.030	0.089	-0.142	-0.122	0.019	1	
15	Financial crisis	-0.009	0.001	-0.013	-0.015	-0.019	-0.039	0.012	-0.010	0.017	0.001	-0.023	-0.019	0.057	0.051	1

Table 4. OLS results

Stability	Islamic banks		Conventional banks		Socially responsible banks	
	Z-score	Capital Ratio	Z-score	Capital Ratio	Z-score	Capital Ratio
	Bank-specific variables					
(H1) Z-score		-0.00199 (-0.16)		-0.00285 (-0.72)		0.0139 (-0.78)
(H2) Capital ratio	-0.0491 (-0.16)		-0.143 (-0.72)		0.883 (-0.78)	
(H3) Size	-0.0121 (-0.27)	-0.053*** (-6.32)	0.0715*** (-3.51)	-0.0274*** (-9.83)	0.293* (-2.42)	0.0128 (-0.8)
(H4) Loan intensity	0.594 (-2.24)	-0.279*** (-5.47)	-0.289*** (-2.98)	0.131*** (-9.89)	-1.066*** (-1.38)	0.139 (-1.44)
(H5) Credit risk	-0.000051 (-0.03)	0.00106** (-2.97)	0.00523* (-2.74)	0.0017*** (-6.44)	0.194 (-0.52)	-0.166*** (-4.05)
(H6) ROA	3.471*** (-4.93)	0.237 (-1.61)	5.597*** (-5.7)	2.552*** (-21.13)	10.16 (-1.98)	-2.250*** (-3.83)
(H7) Operating leverage	1.652 (-0.65)	2.800*** (-5.79)	4.092*** (-2.03)	0.343 (-1.2)	17.33* (-2.45)	-2.876*** (-3.39)
(H8) Age	0.569*** (-6.38)	-0.0585*** (-3.10)	0.155*** (-3.09)	-0.0142* (-2.00)	-0.569*** (-3.86)	0.0329 (-1.6)
(H9) Foreign ownership			-1.858*** (-5.18)	-0.0187 (-0.37)	-0.567*** (-2.11)	0.0252 (-0.72)
(H10) Domestic ownership		-0.0693** (-3.21)	-1.505*** (-4.26)	-0.0529 (-1.05)	-0.832 (-0.89)	-0.721*** (-12.20)
(H11) Public ownership		-0.00642 (-0.21)	-1.752*** (-5.00)	0.0248 (-0.5)	-0.427 (-1.04)	0.0329 (-0.63)
	Macroeconomic variables					
(H12) GDP	-0.0372 (-0.61)	0.054*** (-4.6)	-0.178*** (-6.12)	-0.00467 (-1.12)	-0.885*** (-6.41)	0.0518* (-2.32)
(H13) Inflation	0.2 (-0.41)	0.0983 (-1.01)	-1.750*** (-4.47)	0.0446 (-0.8)	9.784*** (-8.22)	-0.0872 (-0.38)
(H14) Market capitalisation	-0.331** (-3.16)	0.138*** (-6.99)	-0.212*** (-3.55)	0.0286*** (-3.38)	-0.93 (-1.86)	0.12 (-1.92)
(H15) Global financial crisis	-0.0142 (-0.16)	0.0233 (-1.35)	0.0315 (-0.56)	-0.00241 (-0.30)	-0.0759 (-0.75)	0.0224 (-1.82)
Sigma	1.738	-0.543*	8.328***	0.447***	25.86***	-0.683
_cons	-1.27	(-1.98)	-10.33	-3.79	-8.73	(-1.17)
R <sup>2</sup>	0.3818	0.5775	0.1445	0.5384	0.9011	0.9085
Number of banks	40	40	168	168	8	8
Obs	291	291	1277	1277	64	64

*H8. Age:* According to age of banks, older Islamic and conventional banks scored better z-scores than new banks, which means that older banks are less risky than new banks due to their having more experience in the banking sector and dealing with failure risks. Studies by Lee and Chich (2013) and Mirzaei et al. (2013) demonstrate the same result. This goes against the relationship between age and stability in SRBs as the most recent established banks tend to be steadier than older banks. Depending on capitalisation, the age of bank inversely and significantly influences capitals in conventional banks.

*H9. Foreign ownership:* With regard to ownership, the OLS model confirms that an increment in levels of foreign banks raised the risk of insolvency in conventional and socially responsible banks. Kasman and Kasman (2015) claim the same finding in Turkey. As a result, the international banks are discouraged to invest in the banking sector in MENA region.

*H10. Domestic ownership:* Based on the OLS coefficient, the conventional banks in MENA were threatened with bankruptcy over the period 2005-2012. In addition, the concentration of local Islamic and socially responsible banks decreased the capitalisation negatively and significantly at the level of 0.1%.

*H11. Public ownership:* Based on conventional banks' empirical results, the involvement of government in banking operations results in instability and higher default risks. Barakat and Hussainey (2013) propose the same association. In Islamic banks, public ownership allowed for worse capitalisation.

Based on the results of *H9*, *H10* and *H11* above, the banking sector in MENA region did suffer from the economic recession during the period 2005-2012. This could be due to Arab Spring (republic revelations) that occurred in 2011 in some MENA countries. Ghosh (2015) confirms that Arab Spring badly and negatively affected the banking sector in 12 MENA countries.

*H12. Gross domestic production:* The findings state that GDP (economic) growth significantly decreases the stability of conventional and socially responsible banks. In other words, these banks cannot exploit the growth of the economy. This result is consistent with the findings of Cubillas and González (2014). In contrast, Nguyen et al. (2012) confirm that GDP development leads to more stable banks. Depending on capital ratio, the Islamic and socially responsible banks in countries with higher

GDP were found to be well capitalised compared to countries with low GDP rates.

*H13. Inflation:* the inflation rates strongly impact the stability of conventional banks in MENA region (similar to Köhler, 2015). In contrast, the inflation supported the stability of SRBs and allowed them to be further from bank-risk taking (in line with Nguyen & Nghiem, 2015).

*H14. Market capitalisation:* Finally, market capitalisation was found to have a negative and significant relationship to stability in both the Islamic and conventional banking sectors. This contrasts with Nguyen et al. (2012), who note that development in the stock market makes banks steadier against losses. On the contrary, the capitals of Islamic and conventional banks were strongly and effectively increased in countries with greater stock market indices.

To include a robust test, we can test the data through fixed effects model (FEM) as in Table 5 below. The main differences between the findings of OLS and FEM are:

- The relationship between the financial stability (z-score) and the capitalisation became strongly significant and positive (in line with Tabak et al., 2015) for Islamic, conventional and socially responsible banks compared to OLS coefficients which have insignificant correlation.
- The FEM approved that higher capitalised Islamic, conventional and socially responsible banks are more stable than lower capitalised banks. Horvath et al. (2014) claims the same result in Czech Republic case study.
- For the macroeconomic factors, FEM confirms that during the global financial crisis (2007-2009), Islamic banks could increase their capitals efficiently.

According to Hartmann et al. (2005), central bank tries to prevent systematic risk as higher risk results to have weaker financial products and services which leads to contraction in economy from the macroeconomics point of view. However, concentrating on microeconomics concept, banks strive to be stable through having better capitalisation and having less probability of bankruptcy risk. Well regulations imposed from central banks to banks yield to more stability in banking systems.

Table 5. FEM results

Stability	Islamic banks		Conventional banks		Socially responsible banks	
	Z-score	Capital Ratio	Z-score	Capital Ratio	Z-score	Capital Ratio
<b>Bank-specific variables</b>						
(H1) Z-score		0.163*** (12.82)		0.0839*** (8.21)		0.144*** (4.98)
(H2) Capital ratio	2.492*** (12.82)		0.691*** (8.21)		2.429*** (4.98)	
(H3) Size	-0.0980* (-2.50)	-0.0216* (-2.15)	-0.29*** (-10.02)	-0.048*** (-4.63)	0.0897 (0.85)	0.0217 (0.84)
(H4) Loan intensity	-0.129 (-1.19)	-0.0744* (-2.70)	-0.0828 (-1.53)	0.260*** (15.16)	0.494 (1.39)	0.00705 (0.08)
(H5) Credit risk	0.00012 (0.23)	0.000192 (1.45)	0.00019 (0.32)	-0.00003 (-0.19)	0.292 (1.71)	-0.174*** (-5.04)
(H6) ROA	1.551*** (7.45)	-0.132* (-2.26)	2.258*** (6.72)	1.822*** (17.19)	3.610 (1.65)	-1.913*** (-4.07)
(H7) Operating leverage	0.703 (0.75)	0.0131 (0.05)	3.000** (3.24)	-0.560 (-1.73)	11.99*** (4.04)	-2.648*** (-3.55)
(H8) Age						
(H9) Foreign ownership	0.0996 (0.74)		-0.171 (-1.68)	0.00150 (0.04)		
(H10) Domestic ownership	0.0556 (0.46)	0.0210 (0.95)	-0.109 (-1.43)	-0.00740 (-0.28)		
(H11) Public ownership		0.0488 (1.43)				
<b>Macroeconomic variables</b>						
(H12) GDP	0.128 (1.86)	-0.0180 (-1.02)	0.420*** (8.80)	0.0306 (1.78)	0.137 (0.90)	0.00755 (0.20)
(H13) Inflation	-0.131 (-0.91)	-0.00404 (-0.11)	-0.0436 (-0.33)	-0.0525 (-1.15)	0.182 (0.24)	0.158 (0.85)
(H14) Market capitalisation	0.0570 (1.09)	-0.0284* (-2.14)	0.150*** (3.91)	-0.0332* (-2.48)	0.0377 (0.17)	0.0510 (0.96)
(H15) Global financial crisis	-0.0216 (-0.96)	0.0140* (2.44)	-0.00774 (-0.46)	0.00546 (0.94)	-0.0102 (-0.46)	0.00755 (0.76)
Sigma	-0.329 (-0.20)	0.433 (1.05)	-5.20*** (-4.83)	-0.599 (-1.58)		-0.204 (-0.26)
$R^2$	0.6290	0.5693	0.3665	0.6109	0.6109	0.7633
Number of banks	40	40	168	168	8	8
Obs	291	291	1277	1277	64	64

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ,  $t$  statistics in parentheses.

## 5. CONCLUSION

This study aimed to find the determinants of financial stability in Islamic, conventional, and socially responsible banks in MENA region covering the period 2005-2012, using z-score and capital ratio. The socially responsible banks were found to be the most stable. Furthermore, Islamic banks were more risky and unstable. In addition, conventional banks had the minimum capital ratios. According to the determinants of stability in Islamic banks, the results conclude that z-score was strongly and positively affected by both ROA and age. According to capital ratio, the main determinants of capitalisation are operating leverage, GDP and market capitalisation. These variables highly support capitalisation in Islamic banks. In the conventional banking sector, the size of banks and profitability were found to be very important to their financial stability. Focusing on capitals of conventional banks, capital ratio had effective associations with lending, ROA and financial market development. In SRBs, banks achieved better financial stability in countries with higher inflation rates. However, the global financial crisis had insignificant relationships with z-scores and capitalisation in Islamic, conventional, and socially responsible banks.

The greatest limitation to this study was the availability of data, which forced the researcher to

reduce the sample of banks, particularly in Islamic and socially responsible banks. Furthermore, it is often difficult to contact banks with a view to collecting more data.

An area for future research could be to cover more recent periods, and include the Arab Spring period which could potentially add more to the literature review.

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