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The effect of bank capital structure and financial indicators on CI's financial strength ratings: the case of the Middle East

Abstract

This paper aims to integrate the theory of bank financial performance with the practice of bank ratings. The paper studies the effect of bank capital structure and financial indicators in Middle Eastern commercial banks associated with high and low ratings issued by Capital Intelligence (CI). The authors also investigate how bank capital structure and financial indicators can be differentiated between banks with high and low ratings, using the multinomial logit technique. A sample of 65 rated commercial banks from eleven countries is used. The article focuses on commercial banks in order to avoid comparison problems between various types of banks. The data is taken from the Bankscope database and covers the period of 1994-2007. The results reveal that the financial indicators of the highly-rated banks are associated with decreases in the ratio of impaired loans to gross loans, the ratio of loan loss reserve to gross loans, the ratio of non-interest expenses to total assets, the ratio of net loans to deposits and short-term funding and the ratio of net loans to total assets. In contrast, these financial indicators are allied to an increase in the ratio of non-operating income to net income, the gap ratio, the interbank ratio and the equity ratio. The robustness of the results is quite obvious since the financial indicators associated with highly-rated banks are the opposite of those associated with low-rated banks. In view of the findings, some policy implications can be drawn that may be useful for bank management and policymakers in the Middle East region.

Keywords: Financial Strength Rating, bank capital structure, multinomial logit, Middle East banks, Capital Intelligence.
JEL Classification: G21, G24.

Introduction

The interrelationships between bank credit ratings, capital structures, ratings and financial indicators have created an ongoing and interesting area of research for many years. The rating of banks is always conducted by external rating agencies, which follow a usually unpublished methodology to assign a rating based on a bank's financial indicators. Therefore, the concern for the public and for investors is that the banks' financial indicators that determine their ratings are not accurate. The banking business depends to a large extent on gaining the public confidence that helps the banks to attract financial resources (i.e., deposits) and invest those resources in profitable opportunities. In this case, public confidence could be increased if the financial indicators associated with high ratings were disclosed.

The relevant literature on bank ratings has included intermediary factors, such as a bank's capital structure and credit ratings. The reason for the importance of capital structure is that it affects a bank's Financial Strength Rating (FSR), given that the adjustment of capital structure is largely controlled by universal bank supervisory regulations such as Basel I and II. Therefore, since the sources of bank capital are regulated, FSR is also implicitly regulated. This requires bank managers to design financial strategies that do not deviate from the regulations and which help the bank to achieve a high rating. For this main reason, among others, this paper treats bank capital structure as one of the determinants of FSR assigned by Capital Intelligence (CI)[1]. The role of credit ratings is covered separately in the literature (Horrigan, 1966; Ederington, 1985; Ederington and Goh, 1998; Gray, Mirkovic et al., 2006). The connection between credit ratings and FSRs is obvious. Banks that do not base their lending decisions on sound credit ratings end up with a cumulative bad debt that negatively affects their credit risk, and in turn a weakened FSR. In addition, a logical and strong relationship exists between credit ratings and bank capital structure. For example, high credit ratings motivate banks to extend credit lines, which may require them to secure financing sources, such as accepting more deposits, borrowing from other banks and/or issuing equity. It is clear that any change in these financing sources is likely to alter the bank's capital structure. This paper examines this relationship by addressing the effect of credit risk, measured by financial indicators, on FSR, in an independent model.

The next question that occurs is why we need to know about FSR in the Middle East region. The literature on the determinants of bank ratings is extensive and well-established for the developed economies (Poon, Firth et al., 1999; Poon and Firth,

[1] CI has provided ratings' services since 1985. Strong professionalism in providing valuable information to banks' creditors on their financial strength distinguishes CI from other rating agencies. CI has developed two ratings for financial institutions: the FSR rating (assessing the bank's intrinsic financial strength, soundness and risk profile, controlling for many factors related to the bank's operating environment) and support ratings for banks (emphasizing the probability that banks would receive support from third parties in the case of difficulties).

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2005; Pasiouras, Gaganis et al., 2006)[1]. In terms of bank ratings, the Middle East region is not as well-recognized in the literature as developed countries. This is due to four main problems that have evolved over time. Firstly, Middle Eastern banks' equity financing has mainly been obtained from the government. Secondly, since most of the Middle Eastern banks were typically government banks, there was less need to assess their creditworthiness (Harington, 1997). Consequently, a disconnection was created between credit ratings and banks' capital structures. Thirdly, the market forces that monitor capital risk were absent, since the stock markets were underdeveloped or even non-existent in many countries, and this led to less interest in bank ratings (32.5% of commercial banks – 65 out of 200 – are rated)[2]. Finally, the opening and development of various stock markets in the region has encouraged many foreign banks to establish businesses there, driving the mostly unrated Middle Eastern banks to performance comparable to that of the rated foreign banks.

It should be emphasized that the main objectives of this paper are to examine the relationship between FSR and bank performance in terms of financial indicators, and to investigate how bank capital structure and financial indicators can distinguish highly-rated bank from low-rated ones. In this paper, we discuss the significance of bank capital structure decisions on FSR in the Middle East. To the best of the authors' knowledge, limited previous research has addressed the relationship between credit rating and capital structure in developed economies, for example, the US market (Graham and Harvey, 2001; Shivdasani and Zenner, 2005; Kisgen, 2006). We are not aware of any other studies that investigate the significance of bank capital structure on FSR in the Middle East. In view of the findings, some policy implications can be drawn that may be useful for bank management and policymakers in the Middle East region.

The methodology adopted by rating agencies to produce bank ratings does not reveal how financial indicators are used[3]. Consequently, our methodology provides a systematic and practical approach for using bank financial indicators to distinguish between highly and low-rated banks. This perspective is quite different from the other relevant studies in the literature, since it provides an answer to the following question: why does a bank's rating matter? Additionally, of course, this approach should add value to the bank ratings and assist practitioners (bank managers) to formulate banking strategies that promote high ratings. The rest of this paper is organized as follows. Section 1 reviews the relevant literature. Section 2 discusses the research methodology and data collection. Section 3 explains the empirical results. The final section offers conclusions and areas for future research.

1. Review of the relevant literature

The authors divide the literature review into three main parts. The first discusses the financial determinants of bank capital structure; the second discusses the financial sector in the Middle East region and the third presents empirical findings on the determinants of bank ratings.

1.1. Determinants of bank capital structure. Bank capital requirements are included in numerous legal frameworks with the aim of guaranteeing banks' financial stability (Weber and Darbellay, 2008). The specific characteristics of banks explain why the theory of optimal capital structure is somewhat different for them than for non-financial firms. But simply, governments interfere in banks' capital structures in two ways: firstly, by providing an underpriced guarantee, such as explicit deposit insurance or implicit guarantees of deposits and other liabilities, and secondly, through the regulators, by increasing the costs associated with capital levels that are considered insufficient. Naceur and Omran (2011) showed that bank capitalization has a positively significant impact on the net interest margin, cost efficiency and profits. They demonstrate this by explaining that excess capital allows banks to invest in more risky assets, in the form of loans or securities, and thus to generate a higher interest margin, which results in higher profits.

Capital adequacy, as a buffer against losses and failure, is one of the main tools used to monitor banks. Many studies have shown that stiffer capital regulations, including the risk-based capital standard, are the key component of declines in loan growth which in turn eventually result in credit crunches (Wall, Larry et al., 1987; Furlong, 1992;

[1] It should be stressed that this study differs from others in various aspects. Firstly, we examine the FSRs assigned by CI, in contrast to others who have investigated bank's individual ratings and FSRs assigned by Fitch and Moody's, respectively. CI is considered to be more specialized in rating banks in the Middle East region than the other two information providers. This is due to the fact that CI provides ratings for 65 banks in the Middle East, while Fitch, for example, provides them for only fifty banks. Secondly, we are using a sample which is considerably more comprehensive in terms of period, number of banks and current ratings rather than previous ratings. Thirdly, to the best of our knowledge, there are no other studies that have investigated which financial indicators are associated with highly-rated banks. Finally, we focus on the rating of Middle Eastern banks.

[2] According to the statistics of the CI, from which the authors obtained all of the data used in this paper.

[3] This was confirmed by contacting Capital Intelligence, which stated that the basis for giving a certain rating to a bank is not revealed either to the client bank or to the public.

Haubrich and Wachtel, 1993; Berger and Udell, 1994; Brinkmann and Horvitz, 1995; Lown and Peristiani, 1996; Jacques and Nigro, 1997; Wagster, 1999; Furfine, 2000; Rime, 2001; Naceur and Kandil, 2007). The banking industry in the Middle East has different features to that in the G10 countries meaning that both the Internal Ratings-Based (IRB) approaches and the standardized approach would result in higher capital requirements in the former region. This is due to the fact that the credit quality and credit ratings assigned to corporate borrowers in Middle Eastern markets are considerably lower than those in G10 countries. Besides this, banks in Middle Eastern countries face difficulties in implementing the IRB approaches because they have not been adapted for the environment in such countries.

1.2. Financial sector in Middle East region. In the last few decades, repressive policies have been adopted by various countries in the Middle East region (excluding the Gulf states) in order to stay in control of the money supply, as well as to serve some social goals, such as protecting financial institutions against usury practice by keeping the interest rates lower than the market rates in order to support the government debt at a lower cost. Such policies forced the banks to increase their reserve requirements, raise their credit ceilings and use selective credit allocation. Consequently, a non-competitive and segmented financial sector was created. This forced Middle Eastern countries to adopt a financial reform agenda, aiming to select better investment opportunities to improve productivity, mobilize savings, improve corporate governance, and allow the trading, hedging, and diversification of risk (Naceur and Omran, 2011). Nowadays, some countries in the region, especially the Gulf Cooperation Council (GCC) countries, have begun to concentrate their efforts, using privatization, enhancing bank regulation and market orientation, with the aim of producing a well-developed, profitable and efficient banking sector.

In the late 1990s, the Middle East region was considered a bank-based economy, with banks controlling most financial activities. This forced many countries to adopt comprehensive banking sector reforms. Before this, most of the banking sectors in the Middle East were highly regulated and controlled mainly by governments. The prudential rules and regulations imposed by the governments were initiated mainly to mitigate the economic downturns associated with financial crises, as well as to reduce adverse budgetary consequences for governments. In other words, the main purpose of such severe rules was to enhance the ability of the banks' management to make wise investment opportunities (Murinde and Yaseen, 2004).

In line with the recommendations of the Basel Committee on Banking Supervision, the central banks recommended that banks raised their minimum capital requirement to eight percent. In the same context, many countries in the region formulated bank laws focusing mainly on the transparency and disclosure of their central banks' activities. Central banks' most important activities can be summarized as follows: (1) issuing banknotes; (2) maintaining price stability; (3) managing gold and foreign exchange reserves; (4) preparing monetary, credit and banking policies; (5) supervising policy implementation; (6) supervising the national payment system; (7) recording and following up external debt (public and private); and (8) making recommendations to the government regarding loans and credit facilities.

For non-oil countries in the Middle East region, the structure of the banking sector can be illustrated as follows: the Egyptian government owns around 67% of the country's total banking assets, meaning that Egypt has the highest percentage owned by the state (Naceur and Omran, 2011). Jordan and Lebanon, meanwhile, have no banks owned by the government. Regarding the oil-producing countries, most of the banks in the GCC countries have a significant amount of financial strength and are well-capitalized (Jbili, Galbis et al., 1996). GCC banks tend to be family-owned with a moderate amount of state-ownership and participation. Accordingly, prudential guidelines were set out by the GCC to regulate the launch of new banks in these countries and to reduce the probability of the failure of the banking sector. The guidelines cover such aspects as capital, capital reserves, a minimum age of ten years for a bank, licensing, monitoring licensed foreign banks, bank closures, and a minimum capital retention requirement, among others (Jabsheh, 2002).

The Middle East is described in the literature as having bureaucratic and political problems, underdeveloped financial markets, accrued opacity within the banking industry, a massive volume of non-performing loans, and an inadequate regulatory, institutional and legal environment (Godlewski, 2005). In addition, Rojas-Suarez (2001) identifies the main problems with Middle Eastern markets as capital regulation inefficiency due to a lack of data, accounting standards and rules, a poor reporting system and inefficient financial markets. Consequently, Basel II is likely to increase the capital charges for Middle Eastern banks. Therefore, it can be concluded that the rating of banks is a significant issue in the region. FSR assigned by CI rating agency is used as an indicator of banks' performance and strength. Thus, it would be of great benefit to economists and policy makers to determine the

main quantitative factors (financial indicators) that affect the rating assignment process, and in particular the main financial indicators that produce high bank ratings and thus a better and more developed banking system in general. It has already been noted that rating agencies do not publish their methodologies, and thus it is unclear to the public why some banks are assigned a AAA rating and other a CCC. In this study, we are trying to remove this gap between practitioners and the public.

1.3. Empirical findings on the determinants of bank ratings. The relevant literature including few studies on bank ratings and bank financial characteristics. Poon et al. (1999) used data from the year 1997 for a sample of 130 banks from different countries. The main objective of their work is to identify the determinants of Bank Financial Strength Ratings (BFSRs) assigned by Moody's within different financial, economic and political environments. They also examine whether the information provided by the BFSR is the same as that contained in traditional debt ratings. Their empirical results reveal that the BFSR provides similar but not identical information to that contained in traditional debt ratings (both long- and short-debt ratings). Their results also show that the effect of country risk on BFSRs is insignificant. This can be explained by the large similarity in banks' financial disclosures across countries and the maintenance of minimum capital adequacy ratios required by the BIS. In addition, the study finds that profitability is positively related to higher ratings and that loan provision, risk and profitability are important determinants of ratings.

Poon and Firth (2005) conducted a study based on ratings assigned by Fitch in 2002 for a sample of 1,060 banks in 82 countries. The study reveals that Fitch's Bank Individual Rating (FBR) has significant positive relationships with the sovereign rating, the size of the bank and profitability factors. Banks with solicited ratings tend to be larger and in a stronger financial position than those with unsolicited ratings and banks operating in countries with high sovereign ratings are also more likely to have non-shadow ratings (solicited ratings). Meanwhile, unsolicited bank ratings were found to be lower than the ratings of other banks. Also, asset quality ratio and liquidity ratio were found to negatively affect FBR. Pasiouras, Gaganis et al. (2006) provide additional evidence of such relationships using 2004 data for a sample of 857 banks from 71 countries. Their paper examines the impact of bank regulations, supervision, market structure and bank characteristics on bank ratings. The findings, controlling for market structure, reveal that the impacts of banks' capital strength, profitability, liquidity, size and diversification of business and franchise power (expense management) on FBRs are positive (negative) and statistically significant. In addition, banks that are relatively more strictly controlled by institutional shareholders were found to obtain higher ratings.

Pasiouras, Gaganis et al. (2007), using 2004 data for a sample of 215 Asian commercial banks, examine the possibility of replicating Fitch credit ratings by employing a multi-criteria decision aid model. Their empirical results reveal the significant positive impacts of capital strength and liquidity on banks' credit ratings. On the other hand, regulatory restrictions on bank activity were found to have a negative and significant effect. The results also show that a bank's credit rating is significantly and positively affected by the number of institutional shareholders and the number of institution subsidiaries. The relevant literature discussed above demonstrates a significant association between bank ratings and financial characteristics. These two dimensions have not been studied extensively for the Middle East region, however, and the relationships between bank credit ratings, bank capital structures and bank ratings have not been examined at all for the Middle East. This emphasizes the importance of the current study in addressing this research gap.

2. Research methodology and data collection

Based on our review of the relevant literature, the following alternative research hypotheses were developed in order to investigate whether a bank's capital structure and financial indicators affect its ratings, namely its FSR:

H_{A1}: There is a positive relationship between a bank's equity ratio and its FSR[1].
H_{A2}: There is a negative relationship between a bank's asset quality and its FSR.
H_{A3}: There is a positive relationship between a bank's capital ratio and its FSR.
H_{A4}: There is a positive relationship between a bank's profitability and its FSR.
H_{A5}: There is a negative relationship between a bank's credit risk and its FSR.
H_{A6}: There is a positive relationship between a bank's liquidity and its FSR.
H_{A7}: There is a positive relationship between a bank's interest rate risk and its FSR.

[1] Clearly, the corresponding null hypothesis (H_{01}) is that there is a negative relationship between a bank's equity ratio and its FSR, and null hypotheses corresponding to the subsequent hypotheses can be derived similarly.

Dependent variable. The dependent variable is the FSR that indicates the CI's "opinion of the bank's inherent financial strength, soundness and risk profile". The rating scale is coded by assigning numerical values to each CI bank rating score. This method is common among other relevant studies (Poon, Firth et al., 1999; Poon and Firth, 2005; Pasiouras, Gaganis et al., 2006; Poon, Lee et al., 2009). The coding system used in this paper is as follows:

AAA = 19, AA+ = 18, AA = 17, AA- = 16, A+ = 15, A = 14, A = 13, BBB+ = 12, BBB = 11,BBB = 10, BB+ = 9, BB = 8, BB = 7, B+ = 6, B = 5, B = 4, C+ = 3 C = 2, C = 1, D = 0.

Independent variables. The study aims to examine the relationships between FSR and both the capital structure and financial indicators of a bank. The equity ratio is a well-known proxy for a bank's capital structure. The literature provides evidence that this ratio avoids distortions in the measurement of capital structure (Poon and Firth, 2005). The effects of capital structure on FSR are also influenced by other aspects or categories of bank performance. It is believed that a bank's asset quality, liquidity, profitability, credit risk, interest rate risk and capital adequacy, as determined by CI[1], all have an effect on FSR, since these are the major variables used by ratings agencies. The main independent variables are thus the banks' capital structure and various bank financial indicators of each of the above six categories of performance. Each of the six categories includes various measures that are used as predictors for FSR. A description of each variable is given in Appendix.

Control variables. The methodology examines the other factors that may have an effect on FSR. Bank financial performance measures are controlled for the following three variables:

1. Country-specific factors (dummy).
2. The size effect as a dummy variable (Ln Assets) that we classify into three size levels: large, medium and small-sized banks[2].
3. The time effect.

2.1. Estimation method. The nature of the dependent variable mainly necessitates the use of the multinomial logit (ML) technique. A similar, related technique (an order logistic regression 'logit') has been used in a number of empirical studies (Eisenbeis, 1978; Zmijewski, 1983; Ederington, 1985; Poon, Firth et al. 1999). In this case, the data are called 'individual specific'. The estimation description of these models is as follows (Greene, 2000, p. 859):

$$\text{Prob}(Y = j) = \frac{e^{\beta_j' X_i}}{1 + \sum_{k=1}^{J} e^{\beta_k' X_i}} \text{ for } j = 1,2,..., J,$$

$$\text{Prob}(Y = 0) = \frac{1}{1 + \sum_{k=1}^{J} e^{\beta_k' \ i}}.$$

The estimated equations provide a set of probabilities for the $J + 1$ choices for a decision maker with characteristics X_i. The estimation of the ML model is straightforward. Newton's method provides a readily solution. The log-likelihood can be derived by defining, for each individual (or each subject), $d_{ij} = 1$ if alternative j is chosen by individual I, and 0 if not, for the $J + 1$ possible outcomes. Then for each i, one and only one of the d_{ij}'s is 1. It is worth noting that if the data are in the form of ratios, then the appropriate log-likelihood and derivatives are obtained just by making $d_{ij} = n_i p_{ij}$.

The log-likelihood is a generalization of that for the binomial or logit model:

$$ln\, L = \sum_{i=1}^{n} \sum_{j=0}^{J} d_{ij}\, ln\, Pr\,\text{ob}(Y_i = j).$$

The derivatives have the characteristically simple form:

$$\frac{\partial ln\, L}{\partial \acute{r}\acute{A}} = \sum_i \left[d_{ij} - P_{ij}\right] x_i \quad \text{for } j = 1, ..., J.$$

The regressors are bank's equity ratio (proxy for bank's capital structure) in addition to the financial indicators of bank performance that include asset quality, capital adequacy, credit risk, interest rate risk, liquidity and profitability. Dummy variables are assigned to assess the country, bank's size and the time effects respectively. These are used as the factors in the estimation procedures.

2.2. Data collection. Our overall sample consists of 200 commercial banks. We focus only on commercial banks to avoid comparison problems between various types of bank and to provide homogeneity in the comparison between countries. The banks are from eleven countries in the Middle

[1] This is based on the CI classification.
[2] Size reflects qualitative factors, such as geographic and product diversification.

East[1], as shown in Table 1, and the data covers the period from 1994 to 2007. The data are obtained from the Bankscope database of Bureau van Dijk. Bankscope contains the financial statements and data of over 11,000 public and private banks worldwide. The rationale behind using the Bankscope database is that it presents the banks' financial information using a separate data template for each country, thus allowing for differences in reporting and accounting conventions, but also converts the data into a global format, resulting in standard financial ratios that can be compared across banks and countries, as explained by (Pasiouras, Gaganis et al., 2006). Out of the 200 banks in our sample, 65 are rated by CI, and the remaining 135 non-CI rated banks were excluded from this study. The data were classified into four quartiles, using a simple weighted average, in order to determine the financial indicators associated with high versus low FSRs[2]. The first quartile corresponds to low-rated banks and the fourth corresponds to highly-rated banks[3].

Table 1. Descriptive statistics for banks, by country and whether rated by CI, based on size (ln total assets)

Country	No. of commercial banks	No. of banks with CI bank rating	Mean size (total assets)	Standard evaluation of size
Bahrain	18	5	8.460	1.576
Egypt	33	5	8.627	1.103
Jordan	11	8	6.627	1.047
Kuwait	9	6	9.073	0.754
Lebanon	64	6	8.001	0.858
Oman	11	5	7.274	0.762
Qatar	7	4	7.628	1.129
Saudi Arabia	12	9	9.195	0.897
United Arab Emirates	20	14	7.720	1.327
Yemen	6	2	5.460	0.683
Iran	9	1	8.728	1.980
Total	200	65	7.990	1.445

Table 1 provides descriptive statistics for each country based on bank size, namely the natural log of total assets (in US dollars). It is clear that banks in both Saudi Arabia and Kuwait are larger in size than those in other countries. Meanwhile, Yemen's banks are smaller than those of the other countries. Furthermore, banks in Iran, Lebanon, Egypt and Bahrain have a similar average size, as do banks in the UAE, Qatar and Oman.

3. Results and discussion

Each ML run addresses one of the six categories of bank financial performance. The results of the six models are reported in Table 2[4].

3.1. Proposed models. *3.1.1. Model 1: Asset quality.* The final model for asset quality includes three significant predictors at the 99% confidence level, namely, ILGL, CS and LLRIL (see Appendix for details of the variables these abbreviations denote). The model is significant at the 1% level, which indicates that the alternative hypothesis (H_{A2}) is accepted. The asset quality model correctly classifies 47.9% of the predicted FSR. Furthermore, the cross-classification shows that the asset quality category is relatively powerful in predicting a BBB- rating, with a 76.4% likelihood of correctly predicting the rating. Also, the parameter estimates show that the banks with BB-, BB, BB+, BBB- and A ratings are the most representative to the model and to the available data.

3.1.2. Model 2: Capital adequacy. The capital adequacy final model includes four significant predictors, at different levels: ENL, EM, CS and CFNL. The final model is significant at the 1% level, which shows that the alternative hypothesis (H_{A3}) outperforms the null hypothesis (H_{03}). This model correctly classifies 66% of the predicted FSR. The cross-classification shows that the capital adequacy category is powerful in predicting both A and BB+ ratings, with 95.8% and 88.9% of ratings correctly predicted, respectively. The parameter estimates show that BB+ and BBB- are the ratings best represented by this model.

3.1.3 Model 3: Credit risk. The credit risk model has five significant predictors, at different levels of significance: CS, PLLE, LLRGL, RLLE and PPLTL. This model is significant at the 99% confidence level, which indicates that the null hypothesis (H_{05}) is rejected in favor of the alternative hypothesis (H_{A5}). The credit risk model correctly classifies 46.6% of the FSRs. The cross-classification shows that the credit risk category is relatively powerful in predicting A ratings, with 90.8% correctly predicted. In addition, the credit risk model successfully predicts 50% of the BB- ratings.

[1] Israel, the Palestinian Territory, Iraq and the Syrian Arab Republic were excluded from the sample because they do not have commercial banks rated by CI.

[2] It should be emphasized that 'A+ and A' are taken to be high ratings, whilst 'BBB-, BB+, BB and BB-' are considered low ratings.

[3] All four quartiles were used in the robustness test.

[4] Detailed results of the analysis are available from the authors upon request.

Table 2. The financial indicators associated with FSR

Variables (financial indicators)	Model 1: Asset	Model 2: Capital	Model 3: Credit	Model 4: Interest	Model 5: Liquidity	Model 6: Profitability
Wald Chi-square						
CS	33.905***	9.877**	49.08***	48.72***	22.12***	13.86**
LLRIL	18.966***					
ILGL	71.314***					
ENL		70.63***				
CFL		8.1*				
EM		17.91***				
PLLTL			11.4*			
PLLE			24.18***			
LLRGL			77.76***			
RLLE			27.58***			
GR				61.41***		
IBR					36.37***	
LR					40.95***	
NLDSTF					31.95***	
LADSTF					60.65***	
NIM						19.4***
NIEAA						22.26***
ROAE						17.05***
NOINI						18.48***
TME						44.35***
OER						13.41**
No. of observations[1]	167	103	365	600	356	126
Significance of the Model						
Chi-square	122.49***	93.02***	6.76	116.19***	239.52***	180.69***
Log Likelihood	471.03***	171.35***	952.29	2122.06***	1018.46**	274.94***
R^2 (Pseudo)[2]	53.5%	64.4%	58.9%	18%	48.2%	78.3%
Overall classification accuracy	47.9%	66%	46.6%	25.8%	42.3%	52.4%

Notes: The multicollinearity is addressed by examining the VIF scores. The predictors associated with VIF > 5 are excluded. Outliers are also excluded. *, **, and ***denotes a statistically significant difference at 10, 5 and 1 per cent level, respectively. [1]The number of observations various across models due to missing data in Bankscope. This is mainly because Bankscope does not provide full bank reports for all sample banks with FSR. [2]We report the value of Nagelkerke which is an adjustment to Cox and Snell measure.

3.1.4. Model 4: Interest rate risk. The results for this model indicate two significant predictors: CS and GR. The final model is significant at the 1% level, showing that the alternative hypothesis (H_{A7}) can be accepted. It correctly predicts 25.8% of FSRs. Like the capital adequacy model, the cross-classification shows that the interest rate risk model is also powerful in predicting A and BB+ ratings, with 52.8% and 37.5% correctly classified, respectively. The parameter estimates show that B-, BB-, BBB- and A are best represented by this model.

3.1.5. Model 5: Liquidity. Five significant predictors at the 1% level, namely CS, IBR, LR, NLDSTF and LADSTF, are identified in this model. The model is significant at the 1% level and so the alternative hypothesis (H_{A6}) is accepted. The model correctly classifies 42.3% of the FSRs. Furthermore, the cross-classification shows that liquidity is relatively powerful in predicting A and BB+ ratings, with 82.9% and 50.9% correctly predicted, respectively. The parameters estimates show that BB-, BB, BB+, BBB-, A and A+ are best represented by the model. The parameters of the final predictors vary in their significance across different ratings, except for IBR, which is statistically significant across all ratings.

3.1.6. Model 6: Profitability. The final profitability model includes seven significant predictors, at different significant levels: NIM, NIEAA, ROAE, NOINI, TME, CS and OER. The final model is significant at the 1% level which shows that the alternative hypothesis (H_{A4}) outperforms the null hypothesis (H_{04}). The model correctly classifies 52.4% of FSRs. Furthermore, the cross-classification shows that profitability is relatively powerful in predicting BB-, A+, BB and A ratings, with 85.7%, 60%, 58.3% and 57.1% correctly predicted, respectively. The parameters estimates show that BB–, BB, BB+, BBB-, A and A+ are the ratings that are best represented by this model.

Finally, it should be emphasized that bank capital structure (measured by the ratio of equity to total assets) was significant across all six categories (models). This leads to the acceptance of the alternative hypothesis (H_{A1}).

3.2. Testing for the Robustness of the methodology. Our methodology is aimed at examining the contribution of each of the six performance measure to FSR. In order to test the robustness of the results, a further ML is performed on all of the performance measures at once. The objective is to detect the stability of the estimates of the predictors, in terms of the significance and trends (changes in signs) of the estimated coefficients, as shown in Table 3.

These results can be interpreted as follows.

3.2.1. Asset quality. ILGL is only robust and consistent with the bank rating theory for low-rated banks (that is, BB- , BB, BB+ and BBB-). The positive sign of its estimate shows that highly-impaired loans are associated with low bank ratings.

Table 3. Robust and significant financial indicators of FSR in the Middle East

Ratings	Determinants	Expected	Observed	Consistency
7= BB-	ILGL	Positive	Positive	Consistent
	NIM	Negative	Negative	Consistent
	NIEAA	Positive	Positive	Consistent
8= BB	ILGL	Positive	Positive	Consistent
	LLRGL	Positive	Positive	Consistent
	IBR	Negative	Positive	Inconsistent
	CS	Negative	Positive	Inconsistent
	NIM	Negative	Negative	Consistent
	NIEAA	Positive	Positive	Consistent
	NOINI	Negative	Negative	Consistent
	OER	Positive	Negative	Inconsistent
	GR	Negative	Negative	Consistent
9= BB+	CS	Negative	Positive	Inconsistent
	ILGL	Positive	Positive	Consistent
	LLRGL	Positive	Positive	Consistent
	IBR	Negative	Positive	Inconsistent
	LR	Positive	Negative	Inconsistent
	NLDSTF	Positive	Positive	Consistent
	NIEAA	Positive	Positive	Consistent
10= BBB-	CS	Negative	Positive	Inconsistent
	ILGL	Positive	Positive	Consistent
	LLRGL	Positive	Positive	Consistent
	IBR	Negative	Positive	Inconsistent
	LR	Positive	Negative	Inconsistent
	NLDSTF	Positive	Positive	Consistent
	NIEAA	Positive	Positive	Consistent
14= A	CS (credit risk category)	Positive	Positive	Consistent
	GR	Positive	Positive	Consistent
	CS (Liquidity category)	Positive	Negative	Inconsistent
	IBR	Negative	Positive	Inconsistent
	LR	Negative	Negative	Consistent
	NLDSTF	Negative	Positive	Inconsistent
	LADSTF	Positive	Negative	Inconsistent
15= A+	CS	Positive	Negative	Inconsistent
	IBR	Positive	Positive	Consistent
	LR	Negative	Negative	Consistent
	NLDSTF	Negative	Positive	Inconsistent
	LADSTF	Positive	Negative	Inconsistent

3.2.2. Credit risk. Of the five ratios in this category, only LLRGL is robust and consistent with the bank ratings theory, and only across some low-rated banks (namely, BB, BB+ and BBB-). The positive sign associated with this predictor estimate implies that a poor quality loan portfolio results in a low rating.

3.2.3. Profitability. In this category, three financial indicators are robust and consistent. Firstly, NIM is robust and consistent with the bank rating theory for some low-rated banks (BB- and BB). The negative sign associated with this predictor can be explained by the fact that low-rated banks are not operating efficiently, and are thus generating low net interest margins. Consequently, this is arguably consistent with the results reported by Poon et al. (1999), who find profitability to be positively related to high Moody's ratings. Secondly, NIEAA is robust and consistent across all low-rated banks (BB-, BB, BB+ and BBB-). The positive sign of its estimation indicates that low-rated banks are inefficient in managing the cost side of their performance relative to asset investment. Finally, NOINI is also robust and consistent with the bank rating theory but only for BB-rated banks. The negative sign associated with this predictor implies that low-rated banks are not capable of generating income, even from unusual banking activities such as investment in securities. In addition, low-rated banks are not able to provide loans as efficiently as highly-rated ones.

3.2.4. Interest rate risk. The robustness and consistency of GR is identified and reliable for two ratings (namely, BB and A). The negative sign associated with this predictor for low-rated banks (BB) shows that a lower interest sensitive gap ratio results in a low bank rating. On the other hand, the positive sign associated with this predictor estimate for highly-rated banks (A) shows that a high interest sensitive gap ratio leads to high bank ratings. This is due to the fact that most of the interest sensitive assets of low-rated Middle Eastern banks are concentrated in low-quality loans while those of highly-rated banks are concentrated in high-quality loans. This argument is supported by the fact that the average provision of loan losses/total loans for low-rated banks (2.45%) is higher than that for highly-rated banks (0.6373%).

3.2.5. Liquidity. Three financial indicators are identified as being robust in this category. Firstly, NLDSTF is robust and consistent with the bank rating theory for some low-rated banks (BB+ and BBB-). The positive sign associated with this predictor explains the relatively illiquid position of low-rated Middle Eastern banks. This is supported by the fact that highly-rated banks are characterized

by a portfolio of high-quality loans (i.e. the average growth rate of the ILGL for highly-rated banks is -5.27%). This can encourage highly-rated banks to sell more loans, disregarding the relative liquidity perspective. The descriptive statistics show that the ratio of net loans/deposits and short-term funding is higher for the highly-rated banks (62.77%) than for the low-rated ones (50.65%). Secondly, IBR is robust and consistent with the bank rating theory for highly-rated banks (namely, A and A+). The positive sign of its estimates shows that highly-rated banks are characterized by high liquidity, which complies with the theoretical assumption of the theory. Finally, LR is also robust and consistent with the theory for A and A+ banks. The negative sign of the estimates for this predictor shows that a bank with low net loans to total assets ratio (i.e., a more liquid bank) will be assigned a higher rating.

3.2.6. Capital adequacy. The robustness and consistency of CS can be seen for A-rated banks. The positive sign of its predictor estimation implies that increasing a bank's equity ratio is likely to increase its rating.

Table 4. Sensitivity analysis of the consistent financial indicators of bank FSR in Middle East

Predictor	Lowly rated	Highly rated
Asset quality		
ILGL	Positive	Negative
Credit risk		
LLRGL	Positive	Negative
CS	Negative	Positive
Profitability		
NIEAA	Positive	Negative
NOINI	Negative	Positive
Interest rate risk		
GR	Negative	Positive
Liquidity		
NLDSTF	Positive	Negative
IBR	Negative	Positive
LR	Positive	Negative

It can be concluded that our results would be quite beneficial for investors and bank managers, enabling the latter to form their strategies. Table 4 summarizes the results of the sensitivity analysis on the financial indicators of FSR for high- and low-rated banks. Five of the six categories of bank financial indicators are represented, showing the relationship between each variable and the FSR.

Conclusion remarks and areas for future research

This paper has revealed the most consistent and significant financial indicators that are associated with the ratings assigned by CI to Middle Eastern banks. In practice, bank managers as well as investors in these banks' stocks need to focus upon the banking activities that help banks achieve high ratings. Each rating agency has its own customized rating system, the details of which are not published. Practitioners as well as researchers can benefit from this paper as it will assist them in designing and adjusting bank financial strategies to enable Middle Eastern banks to achieve high ratings. Banks seeking high ratings should aim to improve their asset quality, profitability, liquidity and capital adequacy, while reducing both their credit and interest rate risk. In particular, Middle Eastern banks should focus on reducing ILGL, LLRGL, NIEAA, NLDSTF and LR, while increasing CS, NOINI, GR and IBR.

Future research could extend this study in various directions. Firstly, sovereign and country risk ratings could be used to capture important macroeconomic and institutional characteristics of the Middle Eastern countries in this study. Secondly, financial indicators could be used to distinguish between rated and non-rated Middle Eastern banks, and to predict the FSRs assigned by CI using more advanced statistical techniques, such as neural networks and genetic programming. Finally, a comparison between CI's FSR and Fitch's individual bank rating could be carried out.

References

1. Berger, A.N. and Udell, G.F. (1994). "Did Risk-Based Capital Allocate Bank Credit and Cause a "Credit Crunch" in the United States?", *Journal of Money, Credit, and Banking*, Vol. 26, pp. 585-628.
2. Brinkmann, E. and Horvitz, P. (1995). "Risk-Based Capital Standards and the Credit Crunch", *Journal of Money, Credit, and Banking*, Vol. 27, pp. 848-863.
3. Ederington, L.H. (1985). "Classification Models and Bond Ratings", *Financial Review*, Vol. 20, pp. 237-262.
4. Ederington, L.H. and Goh, J.C. (1998). "Bond Rating Agencies and Stock Analysts: Who Knows What When?", *Journal of Financial and Quantitative Analysis*, Vol. 33 No.4, pp. 569-584.
5. Eisenbeis, R. (1978). "A Comment on a Multivariate Analysis of Industrial Bond Ratings and The Role of Subordination", *Journal of Finance*, Vol 33, pp. 325-335.
6. Furfine, C. (2000). "Evidence on the Response of US Banks to Changes in Capital Requirements", Working Paper, Bank of International Settlements, Monetary and Economic Department, Basel, Switzerland, June 2000.
7. Furlong, F.T. (1992). "Capital Regulation and Bank Lending", *Economic Review*, Federal Reserve Bank of San Francisco, pp. 23-33.
8. Godlewski, C.J. (2005). "Bank Capital and Credit Risk Taking in Emerging Market Economies", *Journal of Banking Regulation*, Vol. 6, No. 2, pp.128-145.

9. Graham, J.R. and Harvey, C.R. (2001). "The Theory and Practice of Corporate Finance: Evidence from the Field", *Journal of Financial Economics*, Vol. 60, pp.187-243.
10. Gray et al. (2006). "The Determinants of Credit Ratings: Australian Evidence", *Australian Journal of Management*, Vol. 31, No. 2, pp.333-354.
11. Greene, W.H. (2000). *Econometric Analysis*, Prentice Hall.
12. Harington, H. (1997). "Not Moody-Just Angry", *The Banker*, Vol. 147.
13. Haubrich, J.G. and Wachtel, P. (1993). "Capital Requirements and shifts in Commercial Bank Portfolios", *Economic Review*, Federal Reserve Bank of Cleveland, Vol. 29, pp. 2-15.
14. Horrigan, J. (1966). "The Determination of Long-term Credit Standing with Financial Ratios", *Journal of Accounting Research*, Vol. 4, pp. 44-62.
15. Jabsheh, F.Y. (2002). "The GATS Agreement and Liberalizing The Kuwaiti Banking Sector", *ERF 8th Annual Conference: Building for Future Economic Development*, Cairo, Egypt.
16. Jacques, K. and Nigro, P. (1997). "Risk-Based Capital, Portfolio Risk, and Bank Capital: A Simultaneous Equations Approach", *Journal of Economics and Business*, Vol. 49, No. 6, pp. 533-547.
17. Jbili et al. (1996). "Financial Systems and Reform in the Gulf Cooperation Council Countries", *Financial Market Development, Arab Monetary Fund and the Economic Research Forum for the Arab Countries, Iran and Turkey*, Abu Dhabi, UAE.
18. Kisgen, D.J. (2006). "Credit Ratings and Capital Structure", *The Journal of Finance*, Vol. 61, No. 3, pp. 1035-1072.
19. Lown, C. and Peristiani, S. (1996). "The Behaviour of Consumer Loan Rates during the 1990 Credit Slowdown", *Journal of Banking and Finance*, Vol. 20, pp. 1673-1694.
20. Murinde, V. and Yaseen, H. (2004). "The Impact of Basel Accord Regulations on Bank Capital and Risk Behaviour: 3D Evidence from the Middle East and North Africa (MENA) Region", *Third International Conference of the Centre for Regulation and Competition (CRC), on "Pro-Poor Regulation & Competition: Issues, Policies and Practices*", CapeTown, South Africa, 2004
21. Naceur, S.B. and Kandil, M. (2007). "Basel Accord and Lending Behavior: Evidence from Mena Region", Working Paper, Economic Research Forum.
22. Naceur, S.B. and Omran, M. (2011). "The Effects of Bank Regulations, Competition, and Financial Reforms on Banks' Performance", *Emerging Markets Review*, Vol. 12, No.1, pp. 1-20.
23. Pasiouras et al. (2007). "A Multicriteria Discrimination Approach For the Credit Rating of Asian Banks", *Annals of Finance*, Vol. 3, pp. 351-367.
24. Pasiouras et al. (2006). "The Impact of Bank Regulations, Supervision, Market Structure, and Bank Characteristics on Individual Bank Ratings: A Cross-Country Analysis", *Review of Quantitative Finance and Accounting*, Vol. 27, pp. 403-438.
25. Poon, W.P.H. and Firth, M. (2005). "Are Unsolicited Credit Ratings Lower? International Evidence from Bank Ratings", *Journal of Business Finance and Accounting*, Vol. 32, pp. 1741-1771.
26. Poon et al. (1999). "A multivariate analysis of the determinants of Moody's bank financial strength ratings", *Journal of International Financial Markets, Institutions and Money*, Vol. 9, pp. 267-283.
27. Poon et al. (2009). "Do Solicitations Matter in Bank Credit Ratings? Results from a Study of 72 Countries", *Journal of Money, Credit and Banking*, Vol 41, No. 2, pp. 285-314.
28. Rime, B. (2001). "Capital Requirements and Bank Behavior: Empirical Evidence for Switzerland", *Journal of Banking and Finance*, Vol. 25, pp. 789-805.
29. Rojas-Suarez, L. (2001). "Rating Banks in Emerging Markets: What Credit Rating Agencies Should Learn from Financial Indicators", Working Paper, Institute for International Economics.
30. Shivdasani, A. and Zenner, M. (2005). "How To Choose a Capital Structure: Navigating the Debt-Equity Decision", *Journal of Applied Corporate Finance*, Vol.17, No.1, pp. 26-35.
31. Wagster, J. (1999). "The Basel Accord of 1988 and the International Credit Crunch of 1989-1992", *Journal of Financial Services Research*, Vol. 15, pp. 123-143.
32. Wall et al. (1987). "The Effect of Capital Adequacy Guidelines on Large Bank Holding Companies", *Journal of Banking and Finance*, Vol. 11, pp. 581-600.
33. Weber, R.H. and Darbellay, A. (2008). "The Regulatory Use of Credit Ratings in Bank Capital Requirement Regulations", *Journal of Banking Regulation*, Vol. 10, No. 1, pp. 1-16.
34. Zmijewski, M.E. (1983). "Predicting Corporate Bankruptcy: An Empirical Comparison of the Extant Financial Distress Models", Working Paper, State University of New York, NY.

Appendix

Table 1A. List of the bank financial indicators examined in the study

Factors	Variables
Asset quality	Loan Loss Provision / Net Interest Revenue (LLPNIR)
	Loan Loss Reserves / Impaired Loans (LLRIL)
	Impaired Loans / Gross Loans (ILGL)
	Net Charge Off / Net Income Before Loan Loss Provision (NCONIBLLP)
	Impaired Loans / Equity (ILE)
	Unreserved Impaired Loans / Equity (UILE)
Capital adequacy	Tier 1 Ratio (TR)
	Total Capital Ratio (TCR)
	Equity / Total Assets (CS)
	Equity / Net Loans (ENL)
	Equity / Liabilities (EL)
	Equity / Deposit & Short-Term Funding (EDSF)
	Capital Funds / Total Assets (CFTA)
	Capital Funds / Net Loans (CFNL)
	Capital Funds / Deposit & Short Term Funding (CFDSF)
	Capital Funds / Liabilities (CFL)
	Subordinated Debt / Capital Funds (SDCF)
	Equity Multiplier (EM)
Profitability	Net Interest Margin (NIM)
	Net Interest Income / Average Assets (NIRAA)
	Other Operating Income / Average Assets (OIAA)
	Non Interest Expense / Average Assets (NIEAA)
	Pre-Tax Operating Income / Average Assets (PTOIAA)
	Non Operating Items & Taxes / Average Assets (NOITAA)
	Return On Average Assets (ROAA)
	Return On Average Equity (ROAE)
	Dividend Pay-Out (DPO)
	Income Net Of Distribution / Average Equity (INODAE)
	Non-Operating Income / Net Income (NOINI)
	Cost To Income Ratio (CIR)
	Recurring Earning Power (REP)
	Net Profit Margin (NPM)
	Asset Utilization (AU)
	Tax Management Efficiency (TME)
	Expense Control Efficiency (ECE)
	Operating Efficiency Ratio (OER)
Credit risk	Net Charge Off / Average Gross Loans (NCOAGL)
	Provision for Loan Losses/ Total Loans (PLLTL)
	Provisions for Loan Losses / Equity (PLLE)
	Loan Loss Reserve / Gross Loans (LLRGL)
	Reserve for Loan Losses / Total Equity (RLLE)
Liquidity	Interbank Ratio (IBR)
	Net Loans / Total Assets (LR)
	Net Loans / Deposit & Short-Term Funding (NLDSTF)
	Net Loans / Total Deposit & Borrowing (NLTDB)
	Liquid Assets / Deposit & Short-Term Funding (LADSTF)
	Liquid Assets / Total Deposit & Borrowing (LATDB)
Interest rate risk	Interest Sensitive Gap Ratio (GR)