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The American University in Cairo

School of Business

The effects of firm performance and governance indicators on firm's credit rating in the
MENA Region

A Thesis Submitted to

The Department of Management

in partial fulfillment of the requirements for
the degree of Master of Science in Finance

by Marwa Mohamed Elteir

(under the supervision of Dr. Islam Azzam)*

May/2015

The American University in Cairo

School of Business

**The effects of firm performance and governance indicators on firm's credit rating in the MENA
Region**

A Thesis Submitted by

Marwa Mohamed Elteir

Submitted to the Department of Management

May 2011

In partial fulfillment of the requirements for
The degree of Master of Science in Finance

has been approved by

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ACKNOWLEDGEMENTS (Optional)

ABSTRACT

This paper attempts to identify the effects of firm performance and governance indicators on the credit rating of firms in the MENA region. We used ordered probit model considering a panel structure with a dependent variable (credit rating) and six independent variables that include financial ratios and governance indicators. This sample include 2463 firms during eight years (2006-2013). The results of the initial model show that debt ratio, payout ratio, return on assets, rule of law and market to book ratio are significant.

TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION.....	1
II. LITERATURE REVIEW.....	4
Definition of credit Rating.....	4
Rating Changes.....	4
Determinants of credit rating.....	5
Quality of Credit Rating.....	10
Hypotheses Development.....	11
III. METHODOLOGY.....	15
Data Description.....	15
Methodology.....	18
IV. FINDINGS.....	20
Descriptive statistics for credit rating.....	20
Empirical Results.....	23
Additional Tests.....	24
V. CONCLUSION.....	27
REFERENCES.....	28
APPENDICES.....	32

LIST OF TABLES

Table 1: Implied Credit Rating and its conversion to credit rating number.....	18
Table 2: Descriptive statistics of credit rating for the sample countries.....	20
Table 3: Descriptive statistics of credit rating of the sample period.....	21
Table 4: Descriptive statistics of credit rating of the industry sectors.....	22
Table 5: Descriptive statistics of the Financial Ratios and Governance Indicators.....	22
Table 6: Test of Equality for high credit rating group and lower credit rating group.....	23
Table 7: Correlation Matrix.....	23
Table 8: Results of the order probit model.....	24
Table 9: Results of the effect of the effect of financial crises.....	25
Table 10: Effect of revolution on the determinants of credit rating on Egypt and Tunisia	26
Table 11: List of ratios used in the SmartRatios model. Industry specific metrics are highlighted.....	32

LIST OF FIGURES

Figure 1: Construction of StarMine CCR.....	17
Figure 2: Construction of Starmine TMCR.....	33

CHAPTER I

INTRODUCTION

In the financial market the word risk is often related to the possibility of an investment loss. According to (Markowitz, 1952), risk was related to uncertainty, represented by the variability of the expected return of a given asset. This leads to an increase in the demand for information related to credit risk analysis and accordingly, several analysis techniques have been developed. This have appeared significantly since the 1980's according to Callado, et al. (2008).

The first publicly available bond ratings was available in 1909 by John Moody. He created an industry designed to foster the availability of information to financial markets. A credit rating is an “opinion” offered by a Credit rating agency (CRA) about the relative creditworthiness of a bond issuer, which include corporations, state and local governments, and sovereign governments.

A firm's credit rating reflects a rating agency's opinion of an entity's overall creditworthiness and its capacity to satisfy its financial obligations (Standard and Poor's (2002)). A credit rating may be assigned to a particular debt issue, or it may indicate the general ability of the firm to meet its obligations. The credit rating agencies determine their ratings based on both public and private information, as well as their subjective view of a company. Because investors cannot get a complete overview of the company's financial situation, many investors rely on rating agencies to get an accurate representation of the debtor's ability to repay the obligation and its overall financial performance. This means that a favorable credit rating is very important to get beneficial terms and conditions when firms issue debt on financial markets

The Financial Crisis of 2008 have revealed the over-reliance of the financial system on the ratings of the credit rating agencies, particularly on those ones as the big three of Standard and Poor's, Moody's, and Fitch. Moody's and S&P account for 80% of the market, while Fitch's share is only 15% (Duff and Einig, 2007). They take most of the blame for their overly optimistic ratings of the mortgage subprime credit (Capitalized Debt Obligations) which leads to the creation of the credit bubble of 2003-2007 and the

system's near-collapse in 2008. During this period, 60% of all global structured products were AAA-rated, while less than 1% of corporate issues were deserving this rate. This is why it is believed that the expansion of mortgage would have been difficult without the optimism and the approval of the credit rating agencies Coval, et al. (2009).

According to Han, et al. (2009) credit ratings, especially those issued by Standard & Poor's and Moody's are critical to international investors who wish to invest in corporate debt from emerging markets because:

- (a) Financial information in emerging markets are much less transparent than in developed markets.
- (b) There are no reliable financial institutions in emerging markets that can certify the eligibility of a debt to international investors.
- (c) Many foreign institutional investors are not allowed to invest in speculative grade bonds in emerging markets.
- (d) Bank regulators use ratings for financial regulation, financial supervision and capital adequacy rules.

Following the widespread problems with mortgage-backed structured finance product ratings, the Securities and Exchange Commission (SEC) amended rules governing the conduct of Nationally Recognized Statistical Rating Organizations (NRSROs). In late 2008, and again in late 2009, the SEC placed restrictions on conflicts of interest arising from the issuer-pays business model (White 2010). Specifically, NRSROs were requested to:

- (1) Disclose historical ratings actions;
- (2) Not allow to structure and then rate an issue; and
- (3) Disclose payment amounts and any potential conflicts of interest.

The Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 further directed federal agencies to remove any reference to or requirement of reliance on credit ratings.

This is the first study that provides insights about the dynamics of the MENA stock markets. It covers 10 stock markets in the MENA region. The test period of this study is from 2006 to 2013 to reflect most of the political and other significant events the MENA region passed by. This study focuses on examining the determinants of credit ratings in the MENA region,

The rest of the thesis is organized as follows. Section II presents the literature review of the main studies of these areas. Section III presents the data, and methodology used in this thesis. Section IV provides the results of this empirical study and section V concludes with areas for future research.

CHAPTER II

Literature Review

2.1 Definition of credit rating

Almost all the ratings are defined by symbols. These rating symbols are intended to reflect the same general level of creditworthiness for issuers and issues regardless of different sectors, industries, and at different times. Standard & Poor's (2011) believed that credit ratings express the agency's opinion about the ability and willingness of an issuer to meet its financial obligations in full and on time. In addition, the CRAs are expected to provide information to debt market participants beyond those publicly available sources (e.g: Reiter and Zeibart, 1991; Ederington et al., 1987). Credit rating is an indicator of a firm's default risk and express a relative measure of credit risk, based on the analysis of quantitative and qualitative variables.

2.2 Rating changes

Credit rating should change over time according to firm performance. Altman and Kao (1992) find that rating changes tend to exhibit serial correlation. This means a downgrade is more likely to be followed by a subsequent downgrade than by an upgrade. Also, Lucas and Lonski (1992) studied Moody's ratings and showed that the number of firms downgraded has increasingly exceeded the number of firms upgraded over time. This can be explained either by the quality of firms has declined through time or rating standards have become stricter. Löffler (2002) explained this by observing that the agencies appear to have an additional objective of avoiding near-term reversals in their rating assignments. This was confirmed by Lando and Skødeberg (2002) who developed a model that states that the rating changes are not independent.

In addition credit ratings are expected to vary according to the state of the business cycle. For instance, bank loan standards tend to be most lax during economic booms (Lown et al., 2000) and banking supervisors have historically been most vigilant

during downturns (Syron, 1991). In addition, Bangia et al. (2002) documented an empirical significance of the pro-cyclical of credit quality changes by showing that estimated credit losses are much higher in a contraction relative to an expansion.

Amato and Furfine (2004) did a very important study. They examined the influence of the state of the business cycle on credit ratings using the annual data on all US firms rated by Standard & Poors. They developed a model of rating determination that takes into account factors that measure the business and financial risks of firms, in addition to indicators of macroeconomic conditions. Their results show that ratings do not generally exhibit excess sensitivity to the business cycle.

On the other hand, Fons (2002) points out that markets prefer stability in ratings due to a desire for “ratings to be a view of an issuer’s relative fundamental credit risk, which they perceive to be a stable measure of intrinsic financial strength.” Also, Moody’s states that ratings are meant to be representative of long-term horizon and thus only adjust ratings when they are confident a company’s risk profile is permanently adjusted.

2.3 Determinants of credit rating

2.3.1 Effect of firm performance on firm’s credit rating

One of the early studies on determinants and characteristics of the bonds issuing firms was conducted by Horrigan (1966). He used two-step analytical approach in order to predict the bond rating based on financial ratios and characteristics of ratings. He has explained 65 percent of variation in the bond rating and also found that total assets have the most significant impact on bond ratings. Altman (1968) used five financial ratios such as working capital to total assets, retained earnings to total assets, earnings before interest and taxes total assets, market value of equity to book value of total assets, and sales to total asset to predict the bankruptcy. The study concluded that these variables have statistically significant effects in a default prediction exercise and the model is found to be highly accurate for predicting bankruptcy.

Pinches and Mingo (1973) used financial ratios to predict the industrial bond ratings. They have used six financial ratios such as earnings ratios, debt ratios, total

assets, working capital ratios, net income sales worth, debt and debt coverage ratios and means for percentage changes in sales. Their model is unable to correctly predict 69.70 per cent of the actual ratings in the original sample, and predicted approximately 60 per cent of the ratings for a holdout sample and another sample of newly rated bonds. In addition, Ederington (1985) has used interest coverage, the long term debt to capital ratio, and total assets in his research for comparison of bond rating models and statistical methods. The financial ratios used in this study have statistically significant impact on credit ratings.

In 1998, Blume, et al. did a study on the declining quality of U.S corporate governance debt. They used a panel regression from 1978 to 1995 using the following financial ratios: pre-tax interest coverage, operating income to sales, long term debt to assets, total debt to assets, and total assets. They concluded that the long term ratio is significantly related to credit ratings although the total debt ratio is insignificant. This can be explained by high correlation between these two variables or due to multicollinearity as mentioned by Amato and Furne (2004). Kamstra, et al. (2001) employed net income plus interest expenses divided by interest expenses to represent interest coverage, a debt ratio measured by total debt divided by total assets, profitability captured by the net income total assets ratio, and firm size measured as book value of firm assets. They find that the debt ratio is negatively related to credit ratings whereas return on asset is positively related to credit ratings. The firm's size significantly affects ratings and leads to higher credit ratings. On the contrary interest coverage has no significant impact on ratings thus they suggested that interest coverage did not determine the credit ratings.

Adams and Hardwick (2003) examined the determinants of external credit ratings attained by insurance firms in the United Kingdom (UK) and of the likelihood that insurers will have such an assessment. Using panel data relating to A.M. Best-rated and Standard and Poor's (S&P)-rated insurers over the period 1993–1997, a trichotomous logit model and an ordered probit model with sample selection are employed to show that the factors which influence the likelihood of having external credit assessments not only vary between the two agencies but also differ from those which determine the ratings themselves. The findings proposed that higher ratings can achieved through higher levels

of profitability and liquidity. Furthermore, there is inverse relationship between ratings and leverage because lower financial leverage leads to higher credit ratings.

In addition, Gray, et al. (2006) worked on determinants of Australian credit ratings by testing the association between financial ratios and industry variables. They have taken profitability, leverage, cash flow ratios and interest coverage ratios. They used ordered probit model approach and their results revealed that leverage ratios and interest coverage have significant effect on credit ratings. It was also observed that industry variables and profitability ratios have very important impact on credit ratings in evaluating determinants of Australian credit ratings. In addition, the results reflected that Financial variables are helpful in discriminating between A- and BBB-rated firms, but are less precise in separating AA- and A-rated firms.

Tanthanongsakkunm and Treepongkaruna (2008) used both the market based model and accounting based model and examined if they can explain the credit ratings. They take market to book ratios and firm size proxy for market based model and debt leverage ratios and interest coverage ratio for accounting based model. They employed ordered probit model methodology on Australian companies that are rated by Standard and Poor's during 1992–2003. The results showed the likely relationships between the credit ratings and all independent variables and that the market-based model is more informative in explaining credit ratings than the accounting-based model.

Rashid and Abbas (2011) conducted study to detect the financial ratios that are most significant in bankruptcy prediction for the non-financial sector of Pakistan based on a sample of companies which became bankrupt over the time period 1996-2006. They used twenty four financial ratios to measure financial characteristics of companies (e.g.: profitability, liquidity, leverage, and turnover ratios). These ratios were examined for a five-year period before bankruptcy. The discriminant analysis produced a parsimonious model of three variables sales to total assets, EBIT to current liabilities, and cash flow ratio. Their results provided evidence that the firms having Z-value below zero fall into the “bankrupt” whereas the firms with Z-value above zero fall into the “non-bankrupt” category. The model used in this study achieved 76.9% prediction accuracy when it is applied to forecast bankruptcies on their sample.

Al-Khawaldeh (2012) has conducted study on determinants of credit ratings. Firm specific variables used in the study are profitability, leverage, capital intensity, growth opportunity and firm size while audit quality is used as corporate governance proxy. The results confirmed that firm characteristics variables have significant impact on firm's credit ratings. Profitability has positive impact on credit rating for all models, while leverage and loss propensity are negatively associated with credit ratings for all models. Capital intensity results are insignificant. The growth potential which is measured by Tobin's Q and firm size are highly positively associated with credit ratings. On the other hand, type of sector and audit are not related to credit rating.

Gonis, Paul, and Tucker (2012) examined the main determinants of the rating likelihood of UK companies. They used a binary probit specification to model the main drivers of a firm's propensity to be rated. The sample used covers 245 non-financial UK companies over the period 1995–2006, representing up to 2872 firms over the years. In addition, this study has established important differences in the financial profiles of rated and non-rated firms and paid specific attention to the time dimension for the factors that drive the rating decision. The results of this study reflect five key findings; a- the likelihood of obtaining a rating is negatively related to a company's leverage and positively related to its financial flexibility. b- Outstanding debt, the choice of bonds as a financing method, and past/future issuance of public debt, are all positively related to soliciting credit ratings. c- Default risk, represented by the book to market ratio, is significant across the specifications and different models. d- In terms of model specification, this study finds that the contemporaneous and predictive specifications provide similar results and are equally efficient in classifying accurately the propensity to get rated within-sample. e- This study addresses a notable omission in the credit rating literature by providing a testable conceptual framework for the modelling of rating likelihood.

2.3.2 Effect of governance indicators on firm's credit rating

It is commonly accepted that the business environment that includes legal, regulatory, financial, and institutional system of a country has an impact on the

performance of firms. Because the barriers of doing business varied across regions and countries; this for sure will affect the aggregate performance of the business environment at both firm and country level.

One of these factors is the political stability. This is an important factor in explaining variation in financial development around the world. Goldsmith (1994) mentioned, the democratization efforts were thought by many to promote greater political freedom and stability and, in turn, enhanced attractiveness for lending and investment purposes. In addition, Roe and Siegel (2011) reported that that variation in political stability has a significant, consistent, and substantial impact over many decades on debt and stock market development. In addition,

Block and Vaaler (2004) find that average agency ratings for developing countries decline during election years. They find an additional decline of approximately one level during election years, holding constant a set of macroeconomic control variables thought to explain sovereign ratings. In addition, their results show that bond spreads are greater in the pre-election than in the postelection periods, and that they decline as elections approach.

Another variable of the governance indicators is the rule of law. This measures the confidence the agents and firms have in abiding the rules of the society. According to the United Nations; Rule of law means “a principle of governance in which all persons, institutions and entities, public and private, including the State itself, are accountable to laws that are publicly promulgated, equally enforced and independently adjudicated, and which are consistent with international human rights norms and standards. It requires, as well, measures to ensure adherence to the principles of supremacy of law, equality before the law, accountability to the law, fairness in the application of the law, separation of powers, participation in decision-making, legal certainty, avoidance of arbitrariness and procedural and legal transparency”.

La Porta, et al. (2000) explain the large difference in ownership public traded firms among countries by how well investors including shareholders and creditors, are protected by law from expropriation by the managers and controlling shareholders of firms.

Bushman, et al. (2004) reported that governance transparency is primarily related to the legal/judicial regime, whereas financial transparency is primarily related to the political regime. Their results show that governance transparency is higher in countries with a legal/judicial regime characterized by a common law legal origin and high judicial efficiency. On the other hand, financial transparency is higher in countries with low state ownership of enterprises, low state ownership of banks, and low risk of state expropriation of firms' wealth.

Qian and Strahan (2007) reported that legal differences shape the ownership and terms of bank loans across the world. Their multidimensional empirical model results show that loans have longer maturities, and lower interest rates under strong creditor protection. Their results confirmed the findings of Demirgüç-Kunt and Maksimovic (1998) who investigated how differences in legal and financial systems affect firms' use of external financing to fund growth. Their findings show that in countries whose legal systems score high on an efficiency index, a greater proportion of firms' use long-term external financing. In addition, Kisgen and Strahan (2010) reported that that bond regulations affect yields which in turn affect credit rating.

Also, Domadenik, et al. (2014) used a game theoretic model and find that underdeveloped democratic institutions do not punish political corruption which comes from political connectedness of firms which leads to a negative effect on performance.

2.4 Quality of credit rating

Rating agencies are supposed to provide an independent opinion on the credit quality of issuers. However, if market participants rely on credit ratings for investment decisions, then credit ratings themselves affect the credit quality of issuers. This increased the criticism about the performance of the credit rating agencies. Also, previous work on rating agencies have also focused on how the conflicts of interest between investors and information intermediaries affect the quality of the information disclosed to the market. Credit ratings can affect strongly the relationships with third parties, including the employees of the firm, suppliers to the firm, financial counterparties, or customers of the firm. The common criticism of credit rating agencies include flawed

methodologies (IOSCO, 2008); a lack of transparency Parker et al. (2008); inherent conflicts of interest within the Credit Rating Agencies business model (US Senate Committee, 2008); poor communication (FSA, 2008); Credit Rating Agencies staff resourcing (CESR, 2008); and extreme product complexity resulting in a lack of understanding among users (Chung and van Duyn, 2008).

Questioning the credibility of the credit rating agencies increased after the failure of those rating agencies to predict insolvency accurately was discussed by Klein (1992); Ambrose and Seward (1988); Ambrose and Carroll (1994); and Carson and Scott (1997). Cantor and Packer (1995) mentioned that Credit rating agencies deal closely with issuers of corporate securities and often use both quantitative and qualitative information when formulating their rating of a company's financial condition. Usually, this information come from public and private sources. Lizzeri (1999) considers the optimal disclosure policy of an information intermediary who can perfectly observe the type of the seller at zero cost, and finds that in equilibrium the information intermediary does not disclose any information. In addition, Doherty, Kartasheva, and Phillips (2009) and Camanho, Deb, and Liu (2010) examined how competition between rating agencies affects information disclosed to investors. Opp, Opp, and Harris (2013) studied rating inflation due to preferential-regulatory treatment of highly rated securities.

Skreta and Veldkamp (2009), Bolton, Freixas, and Shapiro (2012) developed models that showed that investors behavioral biases cause rating inflation. Fulghieri, Strobl, and Xia (2010) study the welfare effects of unsolicited credit ratings. On the other hand, Boot, Milbourn, and Schmeits (2006) developed a model in which credit rating shave a real impact on the firm's choice between a risky and a safe project. In their model, if some investors base their decisions on the announcements of rating agencies, then rating agencies can discipline the firm, inducing first-best project choice.

2.5 Hypotheses Development

Description of this study's methodological aspects is divided into three parts. First, we describe the hypotheses and the variables and proxies we will use, together with

its theoretical justifications. Second, the model statistical technique are discussed. Finally, data collection steps and the study's sample are presented.

Financial ratios were collected from the Thomson Reuters- Eikon for deriving their financial ratios. Four firm specific financial variables were used in this study. Previous bond-rating prediction studies. Financial leverage, and profitability were selected as potential determinants of bond ratings of firms. In addition, I used market to book ratio & Payout ratio to examine if the performance of the stock in the stock market and dividend policy have any relation to credit rating. In addition, we used two country governance indicators including political stability and the rule of law. To identify the determinants of credit ratings, six hypotheses were formulated, which are Presented below.

2.5.1 Profitability

ROA, which is net income divided by total assets, is a measure of a firm's profitability relevant to total investment in this study. Logue and Merville (1972) proposed that high profitability lowers the probability of business failure, thus lowering a firm's overall risk. Scherrer and Mathison (1996) argued that high profitability helps stabilize operating cash flow, thus reducing the risk of the firm. Because a firm with high profitability has greater ability to pay off its borrowed funds, profitability is expected to correlate with bond ratings in a positive fashion.

H1: Firms that are more profitable should have better credit ratings.

2.5.2 Leverage:

Debt ratio, which is a ratio of long-term debt to total assets, was used as a proxy of a firm's financial leverage in this study. High financial leverage means that the company has high financial burden to pay debt holders. Van Horne (1998) argued that as the financial leverage increases, investors' exposure to financial risk increase and the volatility of earnings increase. Firms with high financial leverage have high percentage of cash outflow going to fixed coverage, they have higher financial risk, and thus lower bond ratings. Therefore, financial leverage is expected to be inversely related to bond ratings.

H3: Firms that are less leveraged have better credit ratings.

2.5.3 Performance in the financial market

Market to Book (M/B) is the market value of common equity divided by the book of common equity at the end of year t . Firms with higher M/B represent high-growth firms that could be associated with greater risk. This suggests that M/B will be positively associated with bond yields and negatively associated with credit ratings. Fama and French (1998) found that value stocks outperform growth stocks in twelve of thirteen major markets during the 1975-1995 period. In addition, Abhyankar, et al. (2009) investigated value vs growth investment strategy in the G7 country. Their results show that value stocks dominate growth stocks in US, Canada, and Japan; while there are no significant dominance relations between value and growth portfolios in the remaining countries.

H4: Firms that have a lower M/B firms in the financial market should have a better credit ratings

2.5.4 Payout ratio

Payout ratio (POUT) is calculated as dividend per share divided by earning per share. A firm that has relatively stable earnings is often able to predict approximately what its future earnings will be. Such a firm is therefore more likely to pay out a higher percentage of its earnings than a firm with fluctuating earnings. In other studies, Rozeff (1982), Lloyd et al. (1985), and Collins et al. (1996) used beta value of a firm as an indicator of its market risk. They found statistically significant and negative relationship between beta and the dividend payout. Their findings suggest that firms having a higher level of market risk will pay out dividends at lower rate. D'Souza (1999) also finds statistically significant and negative relationship between beta and dividend payout. This leads us to believe that firms with higher payout ratio have higher credit rating. It is worth mentioning that the inclusion of this variable is unprecedented in determinant rating studies and has not been tested previously by other authors.

H5: Firms with higher payout ratio should have a better credit rating

2.5.5 Political stability

Political stability (PS) reflects perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism (World Bank, 2014). It is measured by Worldwide Governance Indicators (WGI). Political stability number reflects the percentile rank among all countries (ranges from 0 (lowest) to 100 (highest) rank). Strong political institutions or political stability protect bondholders from uninformed government actions that would negatively affect bondholders' return on investment which in turn will negatively affect the credit rating. Qi. Et al. (2010) find that higher political rights are associated with significantly higher ratings for corporate bonds issued in both the Eurobond and the Yankee bond markets. In addition, Roe (2006) find that political stability are important in shaping a country's financial development.

H5: Firms in countries that have higher political stability should have a better credit rating

2.5.6 Rule of law

Rule of Law (ROL) “reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence” (World Bank, 2014).

It is measured by Worldwide Governance Indicators (WGI). Rule Of Law number reflects the percentile rank among all countries (ranges from 0 (lowest) to 100 (highest) rank). Mansi, et al. (2009) stated that firms incorporated in states with more restrictive payout statutes have better credit ratings than do firms incorporated in less restrictive states. There results suggest that the explanation is the more restrictive state provides a credible commitment mechanism for avoiding some of the moral hazard problems associated with long-term debt. In addition, A number of authors (Fuerst (1998); Stulz

(1999); Coffee, (1999)) hypothesize that firm value is increased by bonding to a stricter set of laws and standards.

H7: Firms in countries that have a higher rule of law should have a better credit rating

CHAPTER III

Data and Methodology

3.1 Data Description

The initial sample of this study consist of all stocks listed in the MENA region stock markets that have been rated by StarMine CCR between 2006 & 2013. The MENA Region includes 10 countries: Abu Dhabi, Dubai, Egypt, Israel, Jordan, Kuwait, Morocco, Qatar, Saudi Arabia, and Tunisia. The issuer credit ratings are obtained primarily through Thomson Reuters Eikon database. The Worldwide Governance Indicators (WGI) variables comes from World Bank database. Also, years for which complete financial information was unavailable are excluded from the sample. In addition, financial sector firms are not included in the sample due to significant differences in the accounting standards and the interpretation of several financial ratios (leverage in particular). Finally, we cleaned the data from outliers and convert credit rating symbol to a number to be able to use it in our model. The total number of ratings observations that meet the above criteria, and therefore form our initial sample, 2463 firms over the eight years

3.1.1 StarMine Credit Rating

The StarMine Combined Credit Risk Model (StarMine CCR) is used to evaluate corporate credit risk. It provide its daily scores via Thomson Reuters Eikon, Datastream Professional, and as a daily data feed. It combines the power of StarMine's three credit risk models; the StarMine Text Mining Credit Risk Model, the StarMine SmartRatios Credit Risk Model and the StarMine Structural Credit Risk Model to generate a single, final estimate of public company credit risk. StarMine was able to predict accurately 90.4% of default events within a 12-month horizon in its bottom quintile of scored companies.

StarMine developed a corporate credit risk model that assess a company's default risk through both the accounting ratio analysis and the contingent claims analysis. In addition, StarMine's credit risk model includes a novel third approach that applies cutting-edge machine learning algorithms to mining textual data for information regarding a company's financial health. Each of these three powerful models provides unique insights into a company's credit default risk:

1- The StarMine Structural Credit Risk Model (StarMine SCR): the evaluation of the credit risk from the equity market's view via StarMine's proprietary extension of the Merton structural default prediction framework that models a company's equity as a call option on its assets. It is broken down into three primary components: leverage, asset drift, and volatility.

2- The StarMine SmartRatios Credit Risk Model (StarMine SRCR): It assess credit risk using financial ratios and incorporates both reported information and forward-looking estimates via the StarMine SmartEstimate. The ratios used to assess the firms are shown in the appendix Table (1).

3- The StarMine Text Mining Credit Risk Model (StarMine TMCR): it mines the language in textual data from different sources including Reuters News, StreetEvents conference call transcripts, corporate filings, and select broker research reports to assess companies' potential financial distress. The construction of this model is shown in the appendix Figure (2).

StarMine CCR combines the outputs from StarMine SCR, StarMine SRCR, and StarMine TMCR in a logistic regression framework, in which the probability of default, P , is modeled by

$$P = \frac{1}{1 + \exp(-(\alpha + X\beta))}$$

where α is the intercept term, β is a vector of the coefficients in need of calibration, and X is a matrix containing the explanatory variables. In this case α incorporates the effect of the company's region on the credit risk, and X includes the outputs from the three StarMine credit risk models. A measure of past changes in StarMine SCR is also included in X , as the research revealed that momentum exists in credit risk, particularly with

StarMine SCR and particularly when credit risk is deteriorating. A rapidly deteriorating SCR score indicates a greater probability of further deterioration in the future.

From this formula the probability that a company will default within 12 months can be obtained using the linear combination of the explanatory variables. The parameters are calibrated through maximum likelihood estimation.

Figure 1: construction of StarMine CCR

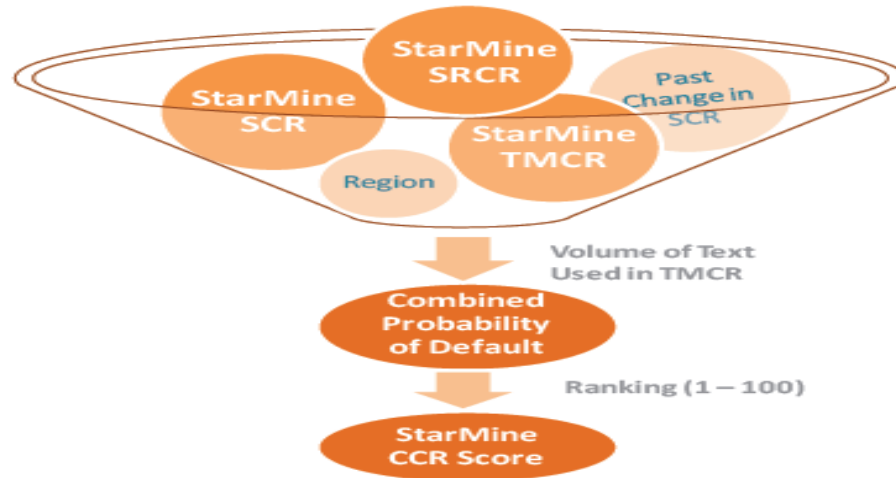


Figure 1. Construction of StarMine CCR. Conditioned on the volume of text used in StarMine TMCR, the three input StarMine credit risk models are combined with additional information on region and past SCR score changes into a raw probability of default, which is then ranked into a 1-100 score.

Source: Thomason Reuters

The volume of text on a given company determine the weights allotted to StarMine TMCR and the other two models. The weight on StarMine TMCR increases with higher text volume.

The results show that StarMine TMCR generates more predictive scores when it has sufficient textual data to analyze which comes from higher text volume. StarMine CCR achieves its strong predictive power through the additive strength of its three distinct component models, and by incorporating information not utilized by any other commercial credit risk model.

It is worth mentioning that Starmine CCR outperformed Starmine SCR & Altman Z-score in their credit rating performance around the world and in all years (1999-2010)

To be able to use this credit rating index we have to convert its rating into numbers to be able to use it in the model. 20 is the best credit rating & 1 is the worst credit rating for any firm.

Table 1: Implied Credit Rating and its conversion to credit rating number

Implied Letter Rating	Credit rating number
AAA	20
AA+	19
AA	18
AA-	17
A+	16
A	15
A-	14
BBB+	13
BBB	12
BBB-	11
BB+	10
BB	9
BB-	8
B+	7
B	6
B-	5
CCC+	4
CCC	3
CCC-	2
CC	1

3.2 Methodology

The model used in this study is the ordered probit model which is intended to solve problems with the ordinal nature. This model was developed by McKelvey and Zavoina (1975) and used by Blume, Lim and Mackinlay (1998) and Pottier, and Sommer (1999). This statistical technique is designed for empirical studies in which the

dependent variable is discrete and takes on a finite number of values that possess a natural ordering.

In this paper the ordered probit model have a dependent variable that are ordered categories which is the credit rating.

$$CR = \beta_0 + \beta_1 ROA_{t-1} + \beta_2 DR_{t-1} + \beta_3 M/B_{t-1} + \beta_4 POUT_{t-1} + \beta_5 PS_{t-1} + \beta_6 ROL_{t-1} + \varepsilon_{it}$$

Where (CR) is the credit rating number, (ROA) is the return on assets, (DR) is the Debt Ratio, (M/B) is the Market to Book ratio, (POUT) is the Payout Ratio, (PS) is the political stability, (ROL) is the rule of law, and (ε_{it}) are normal random errors.

CHAPTER IV

Results

4.1 Descriptive statistics for credit rating

Table 2 show the descriptive statistics of credit rating in each country. It shows mean, median, standard deviation of each country. In addition, it shows the minimum and maximum credit rating and the number of observations in each country. The results show that the Saudi Arabia has the biggest proportion of our sample followed by Egypt. On the other hand the lowest proportion comes from Dubai. This can be explained by absence of credit rating for companies in Dubai Stock market before year 2012. We find that Tunisia has the highest mean and median which means that the firms in Tunisia have the best credit rating. Surprisingly, the lowest average credit rating was in Israel although it is considered one of the most important markets in the MENA country.

Table 2: Descriptive statistics of credit rating for the sample countries

Country	Mean	Median	Standard Deviation	Minimum	Maximum	No. of Observations
Abu Dhabi	14.253	15	2.960	6	19	99
Dubai	14.053	15	4.236	7	20	19
Egypt	14.165	14	3.013	5	20	484
Israel	12.532	13	3.407	3	20	370
Jordan	15.350	16	3.099	6	20	329
Kuwait	13.754	14	3.203	6	20	191
Morocco	15.415	16	2.760	7	20	289
Qatar	15.385	16	3.176	5	20	122
Saudi Arabia	14.066	14	3.428	3	20	519
Tunisia	16.756	17	2.896	11	20	41

Table 3 show average credit rating in each year. We choose this period because it takes into consideration the effects of the financial crises and Political or revolutionary events that take place in the MENA region on the credit rating. Although financial systems in MENA countries have not been highly exposed to the crisis due to their limited integration with global financial institutions, the impact of the global recession on the real

economy can be significant in many MENA countries. The start of the Arab spring in 2011 was a turning point event. In addition to its economic, financial and social effects, it leads to downgrade the credit rating of these countries many times and have a significant effect on the stock markets. The lowest mean was in year 2007 which can be explained as the effect of the global financial crises that appeared in September 2007 and decrease the credit rating of most of the firms around the world. The largest number of observations is year 2013 followed by 2012 because of the addition of the firms listed in Dubai stock market

Table 3: Descriptive statistics of credit rating of the sample period

Year	Mean	Median	Standard Deviation	Minimum	Maximum	No. of Observations
2006	14.740	15	2.899	4	20	208
2007	13.961	14	3.234	5	20	254
2008	15.010	15	2.839	7	20	291
2009	12.099	12	3.672	3	20	304
2010	14.117	14	2.987	5	20	325
2011	14.865	15	3.051	6	20	341
2012	14.592	15	3.499	5	20	363
2013	14.735	15	3.239	3	20	377

Ratings agencies suggest that credit ratings should also depend partly on the firm's business environment. Many industry characteristics can have a significant influence on the level of business risk a firm faces like competitiveness, exposure to technological change, barriers to entry, and vulnerability to economic cycles This is why the inclusion of industry types into a model of credit ratings as a measure of industry effects may improve the explanatory power. According to Hawawini, and Subramanian (2001) Industry factors may have a large impact on firm performance.

Table 4 show that the best rating sector is the medical sector. It outperformed the technology & petroleum Sector. Also, it worth mentioning that Real estate sector has the lowest mean. This can be explained by the financial crises in 2007 which was its main reason the real estate sector.

Table 4: Descriptive statistics of the credit rating of the industry sectors

Sector	Mean	Median	Standard Deviation	Minimum	Maximum	No.Of Observations
Agriculture	14.155	15	3.402	6	20	58
Heavy industries	14.634	15	3.398	3	20	593
Industrial	14.490	15	3.154	3	20	725
Leisure	14.473	14	3.058	6	20	74
Medical	16.044	16	2.512	8	20	90
Other services	14.758	16	3.037	6	20	128
Petroleum	13.514	14	3.354	4	20	111
Real estate	13.183	14	3.353	3	20	436
Retail	14.243	14	3.185	6	20	103
Technology	14.164	15	3.515	5	20	128

Table 5 presents the descriptive statistics of the independent variables used in this study. An important finding is the large variation in the political stability variable where the minimum is 6.604 and the maximum is 91.943. The minimum is in Egypt in year 2011. this is explained by the revolution; while the maximum number is for Qatar in year 2013. The average profitability is 5.7% which means that the firms in the sample are profitable and can face the risk of default. The average M/B is 2.139 which means that these firms are performing good in the financial market.

Table 5: Descriptive statistics of the Financial Ratios and Governance Indicators

Variables	Mean	Median	Standard Deviation	Minimum	Maximum	Count
DR	0.243	0.211	0.192	0	1.156	2463
M/B	2.139	1.57	6.12	-166.92	72.09	2463
POUT	0.372	0.389	0.335	0	1	2463
ROA	0.057	0.05	0.086	-1.31	0.44	2463
PS	32.466	29.717	20.484	6.604	91.943	2462
ROL	60.357	60.664	11.499	34.123	83.412	2463

We divided our sample into high credit rating group and low credit rating group.

High credit rating group: The firms which have a credit rating number from (11 to 20).

Low credit rating group: The firms which have a credit rating number from (1 to 10).

Table 6 shows that debt ratio of low credit rating group is double the debt ratio of the high credit rating group. In addition, it shows that return on assets of high credit rating

group is very high comparing to low credit rating group (6.5% comparing to 0.8%). The market to book and payout policy come as we expected in literature. We find that high credit rating firms have higher market to book ratio and higher payout policy.

Table 6: Test of Equality for high credit rating group and lower credit rating group

Variables	High credit rating group				Low credit rating group			
	DR	M/B	POUT	ROA	DR	M/B	POUT	ROA
Mean	0.215	2.296	0.409	0.065	0.410	1.223	0.159	0.008
Median	0.179	1.650	0.441	0.056	0.409	1.120	0.000	0.012
Standard Deviation	0.175	5.331	0.332	0.087	0.206	9.447	0.266	0.066

4.2 Empirical Results

As our data presented a panel structure, we have conducted an unbalanced panel data analysis to assure the validity of the statistical tests. The correlation matrix for the study's independent variables is presented in Table 7. This Table shows that there is no high correlation between the variables used to measure the determinants of credit rating. In other words the data used don't have a multicollinearity problem.

Table 7: Correlation Matrix

Variables	DR	M/B	POUT	ROA	PS	ROL
DR	1					
M/B	0.036	1				
POUT	-0.234	0.087	1			
ROA	-0.287	0.06	0.421	1		
PS	-0.12	-0.041	0.019	-0.005	1	
ROL	0.332	-0.028	-0.12	-0.091	0.324	1

Using the ordered probit model, the results in table 8 show that return on assets, leverage, payout ratio, and rule of law were significant at 1%. In addition to Market to book which is significant at 10%. The results go with what we expected and what we found in other literature. The profitability have a positive effect on credit rating especially return on assets who have a significant positive effect on determining credit rating. Leverage measured by debt ratio has a negative significant effect. Also, the payout ratio show that it has significant positive effect on credit rating. The surprise in the POUT is its high positive coefficient (0.839). The M/B is the only significant variable at 10%. It shows

that M/B almost have no effect on credit rating because of its very low coefficient. Finally the results show that Rule of law has a small positive effect on credit rating. The Pseudo R-squared of this model is 12.4%.

Table 8: Results of the ordered probit model

This table presents results for the ordered probit model that incorporates financial and governance variables. The sample period is from 2006 to 2013 adjusted to be from 2007 to 2013. Coefficients with 1% significance are followed by ***, coefficient with 5% by **, and coefficients with 10% by *.

Variables	Credit Rating Coefficient
DR	-3.539*** (-24.234)
M/B	-0.008* (-1.861)
POUT	0.839*** (11.031)
ROA	4.064*** (13.648)
PS	0.002 (5.141)
ROL	0.012*** (5.141)
Pseudo R-squared	0.124 (1.354)
No Of Observations	2024

4.3 Additional Tests

We measure the effect of global financial crises on the credit rating during the period (2008-2010). This period stopped at 2010 to exclude the effect of revolutionary and political events in MENA region

The results of the after financial crises Period in table 9 show that all financial ratios are significant. All the variables are significant at 1% and none of the governance indicators were significant. This can be explained by that the rating agencies learned from the financial crisis and improved their performance in evaluating the firms.

Table 9: Results of the effects of financial crises on the determinants of credit rating

This table presents results for the ordered probit model that incorporates financial and governance variables. The sample period is from 2007 to 2010 adjusted to be from 2008 to 2010. The Coefficients with 1% significance are followed by ***, coefficient with 5% by **, and coefficients with 10% by *.

Variable	Credit Rating Coefficient
	-3.521*** (-15.227)
DR	-0.069*** (-4.623)
M/B	0.609*** (5.071)
POUT	4.193*** (8.902)
ROA	0.001 (0.325)
PS	0.004 (0.784)
Pseudo R-squared	0.119
No. of Observations	808

The last test was on the effect of revolution on credit rating in Egypt and Tunisia. Tunisia had a revolution on December 2010 and Egypt's revolution is on January 2011. Table 10 show the difference in the determinants of credit rating before and after the revolution. The results show that all the variables were significant at 1% before the revolution and after the revolution except for M/B which is significant only before the revolution. The results agree with the previous literature, but it shows that ROA have less effect & and DR have a stronger effect after the revolution. Also, surprisingly the Political stability (significant variables in both periods) increased in a very small rate from 9.5 % to 9.8%. The results show that this model is explaining better after the crises than before the crises with Pseudo R-squared 18.2% comparing to 13.9%.

Table 10: Effect of revolution on the determinants of credit rating on Egypt and Tunisia

This table presents results for the ordered probit model that incorporates financial and governance variables. The sample of before the revolution period for is from 2006 to 2010 adjusted to be from 2007 to 2010. The sample of after the revolution period is from 2011 to 2013. Coefficients with 1% significance are followed by ***, coefficient with 5% by **, and coefficients with 10% by *.

Variable	Before Revolution	After Revolution
DR	-2.639*** (-5.734)	-3.543*** (-7.865)
M/B	-0.094*** (-4.079)	-0.065 (-1.567)
POUT	0.723*** (-3.208)	1.122*** -5.286
ROA	8.156*** (-7.313)	7.036*** -6.848
PS	0.095*** (-4.882)	0.098*** -6.848
RL	-0.173*** (-3.597)	-0.143*** (-4.949)
Pseudo R-squared	0.139	0.182
No of Observations	218	275

CHAPTER V

Conclusion

This study aimed to identify the effect of the financial ratios and governance indicators of credit ratings in MENA region. We built an Ordered Probit Model using a panel structure data. The sample comprised a total of 2463 credit rating observations issued to companies excluding financial sector operating in the stock market of MENA region during the period 2006-2013 by StarMine CCR agency. The debt ratio, market to book, payout ratio, return on assets, and rule of law were significant.

We did additional test on the effect of financial crises on the determinants of credit rating. The results show that debt ratio, market to book, payout ratio, and return on assets are the significant variables. The last test was on the effect of revolution on determinants of credit rating on Egypt and Tunisia. We find all the variables are significant except market to book ratio.

The limitation of this paper is not using Standards and Poor or Moody's credit rating as they are the most popular. For the future research, we suggest analysis the effect of macroeconomic and corporate governance factors on the firm's credit rating. In addition, we would like to extend this analysis to private firms in the MENA region as it is still unclear.

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APPENDICES

Table 11: List of ratios used in the SmartRatios model. Industry specific metrics are highlighted								
Components	Ratios	Banks	Insurance	Retail	Airlines	Utilities	Oil & Gas	All Others
Profitability	Return on capital	√	√	√	√	√	√	√
	Profit Margin	√	√	√	√	√	√	√
	Unrealized Losses	√	√	√	√	√	√	√
	Change in LIFO Reserve	√	√	√	√	√	√	√
	Operating Leverage	√						
	Combined ratio		√					
	Break-even Load				√			
	Passenger Load				√			
	Generation Cost					√		
Leverage	Assets/ Equity	√	√	√	√	√	√	√
	Unfunded Pension Liab		√	√	√	√	√	√
	net Debt/ Equity		√	√	√	√	√	√
	Tier 1 capital Ratio	√						
	Loans/ Deposits	√						
Coverage	EBITDA/ Interest		√	√	√	√	√	√
	Free Cash flow/Debt		√	√	√	√	√	√
	EBIT/ Interest		√	√	√	√	√	√
	Non-performing Loans	√						
	Loan-loss provision	√						
	Other Real-Estate Owned	√						
Liquidity	Cash/Debt	√	√	√	√	√	√	√
	short-term Debt/ Total Debt	√	√	√	√	√	√	√
	Quick Ratio			√	√	√	√	√
	Change in Quick Ratio			√	√	√	√	√
	Change in Reserve			√		√		
	Fuel Reserve						√	
	Proven reserves							
Growth & Stability	Normalized ROE Growth	√	√	√	√	√	√	√
	Standard Deviation of EPS Growth	√	√	√	√	√	√	√
	Standard Deviation of Revenue Growth	√	√	√	√	√	√	√
	Same-Store Sales Growth			√				

Source: StarMine SRCR

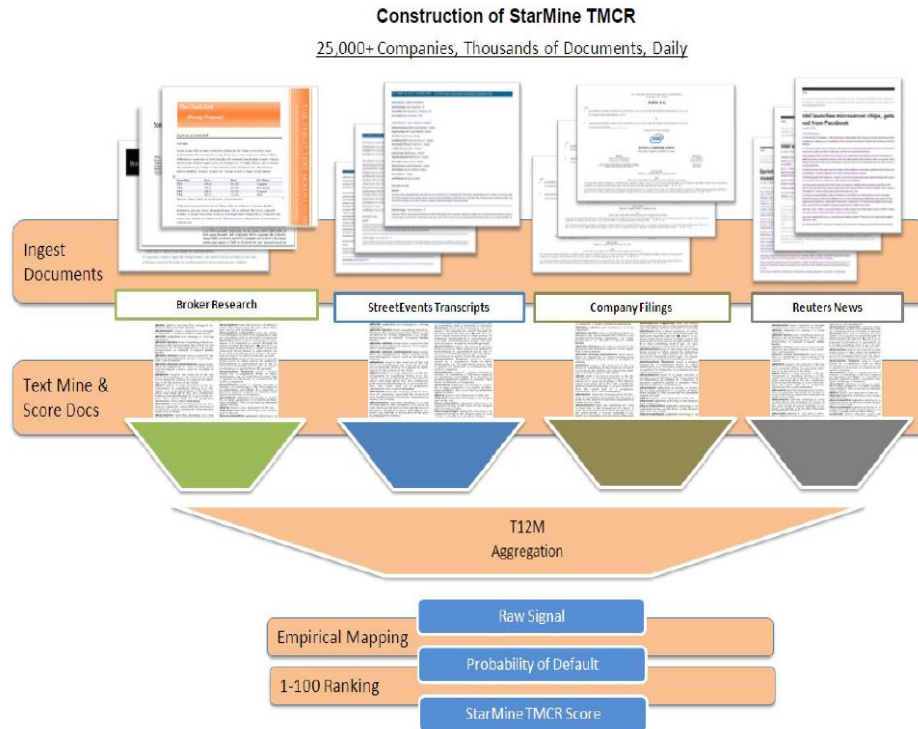


Figure 1. Construction of StarMine TMCR. We use text mining to score the documents, and then aggregate the trailing twelve months of scores by document source to create our four main components. These are combined into a raw signal which is then mapped to a 1-year probability of default using historical default data. The probability of default is ranked to form a 1-100 score.

Figure 2: Construction of Starmine TMCR

Source: StarMine TMCR

VITA

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