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Suggested Proposed Model for Predicting Companies Financial Distress by Using Financial Performance and Earnings Quality Measures: Evidence from Egypt

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Abstract:

This study aims at proposing a suggested model to predict companies financial distress by using financial performance and earnings quality measures in the Egyptian companies. To achieve this aim, It is necessary to examine the role of accounting, market, earnings quality measures in predicting companies financial distress, In total, 44 accounting, market ratios, earnings management, earnings persistence, earnings predictability, and earnings smoothing were identified from previous studies as potentially significant in predicting companies distress through a sample of 66 listed companies in Egypt for the period from 2009 to 2015. A stepwise logistic regression technique was used to develop a model to identify factors associated with financial distress. The results demonstrate that many of the variables were significantly related to improving prediction models which are, net income/total assets, current assets/ current liabilities, cash flow from operation /sales, cash flow from operation /total assets, cash flow from operation/ total liabilities, market value of equity/ total debt, price/earnings are accurate in classifying the total sample with accuracy of 93.4%, while the prediction model without market value of equity/total debt, price/earnings is accurate in classifying the total sample with accuracy of 91.8%. Additionally, the findings indicate that, the final model that includes the accounting, the market and earnings persistence is accurate in classifying the total sample with accuracy of 94.3% ,This results indicate that incorporating the impact of earnings quality improves prediction models .

Keywords: financial distress, financial ratios, earnings quality, earnings management, earnings persistence, earnings predictability

1. Introduction

Recently, due to the financial collapses of the most famous firms in the world such as WorldCom, Global Grossing, Enron, and Lehman Brothers, as well as the economic crisis situation that causes increasing trend to financial distressed companies that may enter in the bankruptcy procedures and go to liquidation. The latter situation provokes huge economic, labor and social losses. Indeed the distress of a company has implications on many of its stakeholders such as employees who lose their jobs ,suppliers who might be significantly affected in the event of the bankrupt firm being one of their main customers, creditors and lenders who could not receive their money, government which has to bear some of the social and welfare costs in addition to losses in terms of a decrease in taxation incomes due to the

higher unemployment rate. In such a context of financial distress, manager may feel under pressure and have incentives to make decisions aiming at avoiding or postponing firms bankruptcy, additionally, rating agencies, and even distressed firms themselves. (Campa,D., Camacho-Minano,M.D.M.,2014) (Altman, E.I.,et. al., 2016) (Kamal, A .M., 2017)

Although there is no unified definition of financial reporting quality Paragraphs OB2-OB3 of CON 8, (FASB, 2010) stated that the objective of financial reporting is to provide information to help present and potential investors and creditors and other users in assessing the amounts, timing, and uncertainty of the prospective net cash inflows to the related entity.

Since Beaver (1966) a large literature on bankruptcy prediction has emerged, and its influence has spilled into the commercial world, where it has been used in the development of several commercially bankruptcy prediction models with alternative explanatory variables and alternative statistical methodologies for model estimation (Wu,Y., et. al., 2010)

The early distress prediction models are based on accounting variables. Examples include Beaver (1966, 1968); Altman (1968) ; Altman et. al. (1977) ; Ohlson (1980) ; and Zmijewski (1984).The Variable used to give early warnings of distress are mostly traditional ratios from financial statement.

The Merton (1974) distance -to-default (DD) models which is price- based ; and Shumway (2001), however, finds that half of the accounting variables used by Altman (1968) ; Altman (1980) and Zmijewski (1984) are statistically unrelated to distress probability, he argues some market variables such as firm size, past stock returns, and idiosyncratic return variability are all strongly related to distress risk when market variables included in the distress model. (Xu,M., Zhang,C., 2009)

As a response to the need for financial distress model improvement Dechow, P., et. al., (2010) have attempted to define earnings quality as follows: higher quality earnings provide more information about the features of a firm's financial performance that are relevant to a specific decision made by a specific decision- maker.

Accordinary, this paper analyses a matched sample of distressed and non-distressed listed companies from Egypt and suggests proposed model for predicting companies distress, and examines the possibility of predicting by using combined model which collect accounting, market, and earnings quality measures that will be explained later in the next sections of this paper. The remainder of this paper proceeds as follows : section 2 (research method), section 3 (conceptual framework) which includes the role of financial performance measures in distress Prediction, The role of earnings quality measures in distress prediction, and the proposed three models, section 4 (conclusion)

2. Method

The researcher depended on previous studies in order to identify different both financial performance, and earnings quality measures that can be used in predicting companies distress. These studies are:

2.1 Studies that used the financial performance measures

Altman (1968) uses multiple discriminant analysis to develop the Z-Score model to predict the financial bankruptcies of U.S. manufacturing firms. The Z-Score model is the best - known and most widely used financial distress test , The Z-Score measures how closely a firm resembles other firms that have filed for bankruptcy, Altman considers 22 financial ratios, of which five are found to be useful for predicting bankruptcy, which are working capital/ total assets, retained earnings/ total assets, earnings before interest and taxes/ total assets, market value of equity/ total liabilities, sales/total assets. This model was over of 90% accurate in classifying bankrupt firms correctly. The Z-Score model has drawn several statistical objections over the years because of its use of unadjusted accounting data from relatively small firms and old data. There is evidence that the Z-Score coefficients should be re-estimated for the prediction of corporate distress involving different time periods or different industries.

(Li, J., 2012) (Grice, J.S., Ingram, R.W., 2001)

Ohlson (1980) uses conditional logit model to predict bankruptcy. This model identifies four basic factors that affect the probability of bankruptcy: company size, financial structure, performance, and current liquidity.These four factors are represented by nine accounting variables are found to be useful for predicting bankruptcy, which are, log (total assets / GNP price – level index), total liabilities /total assets, working capital /total assets, current liabilities/ current assets, one if total Liabilities exceeds total assets, zero otherwise, net income/total assets, funds from operation/ total libilities, one if net income was negative for the last 2 years, zero otherwise,(net income $_t$- net income $_{t-1}$) (|net income $_t$|- |net income$_{t-1}$|), this model was of 83.99% accurate in classifying bankrupt firms correctly.

Moreover, Abo Elsaod (2007) is directed to adapt a corporate distress prediction model applied to a sample of Egyptian companies listed in the Egyptian stock market. by using a model that combines accounting, economic, and corporate governance measures, the results of using other variables than accounting variables to the sample are superior to a model using only accounting variables reaching 84.8% for the classification sample and 78.2% for the validation sample.

Additionally, Cultrera,L., Bredart X . ,(2014) aims at developing a bankruptcy prediction model for Belgian small- and medium – sized enterprises SMEs through the building of a logit model that includes five selected financial ratios which are, current ratio, earnings before interest and taxes/ total assets, equity/ total assets, fiscal charges/added value, cash flow/ total debt, the results demonstrated the probability of bankruptcy was higher for firms with lower liquidity, profitability, debt structure and added value ratio, the accurate in classifying the total sample with accuracy of 79.23%.

In addition, Hu,H., Sathye,M.,(2015) establishes three financial distress prediction models for a unique set of enterprises, which listed on the specialized Hong Kong growth enterprise market, the logistic regression and

jackknife method are used to test the predictability of various models. The study finds that the model that includes firm-specific financial variables, firm – specific non- financial variables and a macro- economic variables, is a better predictor of financial distress than is a model that includes only the first set of variables or a model that includes the latter two sets, with accuracy of 86.00% .

Finally, Xu,M.,Zhang ,C., (2009) aims at developing a bankruptcy prediction model for Japanese listed companies, through the building of a logit model that includes the traditional measures, such as Altman's Z score, Ohlson's O- score and the option pricing theory - based distance - to- default, the results indicate that the predictive power substantially enhanced when these market measures are combined between 59.2% to 72.4% .

2.2 Studies that used the earnings quality measures

Gaio, C., Raposo, C.,(2010) finds out positive and significant relation between firm valuation and earnings quality measures based on seven earnings quality attributes: accruals Quality, persistence, predictability, smoothness, value relevance, timeliness, conservatism.

Kamarudin, K.A., Ismail, W.A.W., (2014) finds out the quality of earnings is very important as the earnings figure is widely in many contractual agreements and investing decision based on six earnings quality attributes: earnings management, accrual quality, earnings persistence, earnings predictability,value relevance, timeliness.

Dechow,P.,et.,al.,(2010) earnings quality attributes: earnings persistence, earnings smoothness, abnormal accruals and modeling the accruals process- asymmetric timeliness and timely loss recognition - target beating.

Givoly, D., et . al., (2010) accruals persistence, estimation error in the accruals process, absence of earnings management, conservatism.

From the previous discussion of literature, the researcher concludes that:

- First, that some of the accounting variables such as used by (Altman, 1968) and (Ohlson, 1980) are statistically unrelated to distress probability accounting variables and add little predictive power.
- Second, the market variable complement accounting variables and that the use of market variables cause increasing the predictive power of the accounting variables in certain models.
- Third, the measures of earnings quality could be used in this study classified as the follow: earnings management, Earnings persistence and Earnings predictability
- Fourth, the distress phase is an important phase that comes before bankruptcy phase to take the precaution to avoid falling in bankruptcy phase.

What has been discussed above highlights the importance of this study in suggesting proposed model for predicting companies financial distress by using combined model, which collects accounting, market and earnings quality measures.

3. Conceptual framework

As for proposing distress prediction model this section is divided into two groups: the financial performance measures and the earnings quality measures, The researcher would discuss the measures of each group that would be used in building distress prediction model.

3.1 The role of financial performance measures in distress prediction

This paper focuses on the using of financial performance measures in building distress prediction model as follows:

3.1.1 Determining the concept of financial distress

There is no general agreement on the definition of financial distress, some studies define financial distress as bankruptcies (Altman, 1968), (Zmijewski,1984), others define distress as the defaults. (Bharath,S.T., Shumway,T., 2008)

While Pindado J., et.al., (2008) demonstrated that the company is thereby classified as financially distressed not only when it falles for bankruptcy, but also whenever both of the following conditions are met 1- its EBITDA is lower than its financial expenses for two consecutive years leading the firm into a situation in which it cannot generate enough funds from its operational activities comply with its financial obligation, 2- A fall in its market value takes place between these two periods **.**

Then, Campbell, et al., (2008) demonstrated two alternative ways in which a firm may fail to meet its obligation, falling under chapter 7 or chapter 11 of the bankruptcy code, delisting, or D (default) rating issued by a leading credit rating agency.

Moreover, Beaver, W.H ., et.al., (2011) indicated that the first concept of financial distress refers to inability to pay obligations when due, and the second concept of solvency occurring when the assets of the company exceed its liabilities.

Consistent with the previous literature in the present study financial distress occurs as those companies meeting one of the three of the following criteria through the year:

1. The net working capital ratio is negative (Balance sheet statement) .
2. The operating cash flow is negative (cash flow statement).
3. Occurrence losses through two successive years (Income statement).

3.1.2 Determining the financial performance measures

Statement of financial accounting concepts No. (SFAC No.1) states that financial reporting should provide information about an enterprise financial performance during a period.

Moreover, Liou , F . M., Yang , C. H.,(2008) clarified that the selection of financial ratios that best predict financial distress has two approaches: inductive and deductive. Inductive approach starts by forming a very wide range of possible variables and reduces them to a limited number of variables using statistical techniques. On the other hand, deductive approach provides theoretical explanations to the process for selecting model predictors.

Then Liou ,F.M.,(2008) uses 52 variables of liquidity, leverage, profitability, operations, variable to explore the differences and similarities between fraudulent financial reporting detection and business failure prediction in Taiwan.

Additionally, Diamond,H.S., (1976) uses 23 variables of liquidity, leverage, profitability, activity, cash flow variables for detection of manufacturing corporate failure in the United States of America.

3.2 The role of earnings quality measures in distress prediction

This paper focuses on the earnings quality as measures used in building distress prediction model namely, earnings management, earning persistence, earnings predictability as follow:

3.2.1 Earnings quality measures:

The analyses of this study requires measures of the four earnings attributes on a firm –and year- specific basis using the relevant accounting information for consequent seven -year windows as follow:

3.2.1.1 Earnings management

This study employs the measure in (Miller, J.E.,2009) estimated discretionary accruals, through a relationship between the change in working capital and cash flow from operation would be an indicator of earnings management that appear with the following equation:

EDAC= $(\Delta$ wc/cfo$)_{t0}$-$(\Delta$ wc/cfo$)_{t0-1}$

Where:

EDAC = estimated discretionary accruals for firm i in year t

(Δ wc/cfo) = changing in working capital divided by cash flow from operations.

The measure of earnings management points out that the change in working capital and cash flow from operation with slope not equal to zero, therefore that would indicate possible earnings management activity, these results show that there is no significant relation between earnings management measure and financial distress.

3.2.1.2 Earnings persistence

This study employs the measure in (Li, F., Abeysekera,I., Ma,S., 2011) regress current earnings on the last year's earnings to estimate the slope-coefficient estimates of earnings persistence , with the following equation:

$$\frac{Earn_{jt}}{TotalAssets_{jt-1}} = \propto + \delta_t * \frac{Earn_{jt-1}}{TotalAssets_{jt-1}} + V_{jt}$$

where

$Earn_{jt}$ = firm's j net income before extraordinary items in year t.

$Earn_{jt-1}$ = firm's j net income before extraordinary items in year t-1.

δ_1: Value of δ_1 close to one(β_i 0.736) that indicates highly persistent earnings, that viewed as a higher quality, The results show positive and significant relation between earnings persistence measure and financial distress.

3.2.1.3 Earnings predictability

In this study earnings predictability is calculated using the (Francis et.al, 2004) measures earnings predictability that using the square root of the estimated error -variance from the earnings persistence equation, as follows :

Predjs= $\sqrt{\sigma^2(v_{js})}$

where

$\sigma^2(v_{js})$ = estimated error -variance from the earnings persistence equation

The measure of earnings predictability indicates that small values of predictability (from 0.01 to 0.05) imply more predictable earnings. More predictable earnings are viewed as higher quality, these results show that there is no significant relation between earnings predictability measure and financial distress.

3.2.2 Estimating and expanding distress prediction models

This section demonstrates the research gap concerning using earnings quality in predicting financial distress. The researcher addresses the literature regarding as:

Li, F., et.al., (2011) indicated that the distressed firms prefer opportunistic earnings management, the non distressed firms are more likely to choose more efficiently than distressed firms, and the earnings management performs better than earnings quality in predicting future profitability, and the number of distressed firms increased and the number of non distressed firms decreased.

Bisogno, M., Deluca,R.,(2015) found that firms going bankrupt are more likely to report fraudulent financial statements than their financially sounder counterparts and an important reason for earnings management at unlisted firms is securing outside financing, which for Italian firms most commonly represents bank loans.

Chen , Y., et.al., (2010) pointed out that the desire to avoid continued special treatment status and the risk of being de-listed leads firms to adopt different earnings management behaviors before and after being designated as special treatment firms in listed companies in China for the period 2002-2006.

Howe, J .S., (2016) illustrated that the distressed firms manage earnings upward and downward more than other firms, distressed firms manage earnings upward significantly more than non - distressed firms after negative earnings surprises, the change in bankruptcy probability after a negative earnings surprise is greater for distressed firms. Distressed firms have less post –announcement earnings drift, earnings management by distressed firms lower earnings quality and weakens investor's response.

3.2.3 The proposed three models

According to the previous studies, this study represents variables selected from previous studies; these financial ratios are related to variables of liquidity, leverage, profitability, operation, cash flow, and market ratios. Finally, The Proposed combined model for Egyptian companies distress predicting using accounting, market, and earnings quality variables. The estimated models take the forms as shown in tables: 1, 2, and 3

Table 1: The proposed model for Predicting Egyptian companies distress using accounting variables only

$$\text{logit}(p_i) = \ln\left(\frac{p_i}{1-p_i}\right) = \beta_0 + \beta_1 x_{1,i} + \cdots + \beta_k x_{k,i}.$$

$$y = 0.686 - 37.011x_2 - 1.349x6 - 5.503x28 - 13.354x32 + 0.237x36$$

y = is one if the company goes distress and zero otherwise

$x2$ = Earnings / Total Assets

$x6$ = Current Assets/ Current Liabilities

$x28$ = Cash Flow From Operation /Sales

$x32$ = Cash Flow From Operation /Total Assets

$x36$ = Cash Flow From Operation /Total Liabilities

Table 2: The proposed model for predicting Egyptian companies distress using accounting, market variables

$$\text{logit}(p_i) = \ln\left(\frac{p_i}{1-p_i}\right) = \beta_0 + \beta_1 x_{1,i} + \cdots + \beta_k x_{k,i}.$$

$$y = 2.312 - 27.023x_2 - 1.573x6 - 4.134x28 - 15.354x32 + 0.237x36 - 0.104x42 - 15.347x43$$

Where,

y = is one if the company goes distress and zero otherwise

x2 = Net income / Total Assets

x6 = Current Assets/ Current Liabilities

x28 = Cash Flow From Operation /Sales

x32 = Cash Flow From Operation /Total Assets

x36 = Cash Flow From Operation /Total Liabilities

x42 = Market Value of Equity / Total Liabilities

x43 = Price/Earnings

Table 3: The proposed model for predicting Egyptian companies distress using accounting, market, and earnings quality variables

$$\text{logit}(p_i) = \ln\left(\frac{p_i}{1-p_i}\right) = \beta_0 + \beta_1 x_{1,i} + \cdots + \beta_k x_{k,i}.$$

$$y = 2.312 - 27.023x_2 - 1.573x6 - 4.134x28 - 15.354x32 + 0.237x36 - 0.104x42 - 15.347x43$$

Where,

y = is one if the company goes distress and zero otherwise

x2 = Net income / Total Assets

x6 = Current Assets/ Current Liabilities

x28 = Cash Flow From Operation /Sales

x32 = Cash Flow From Operation /Total Assets

x36 = Cash Flow From Operation /Total Liabilities

x42 = Market Value of Equity / Total Liabilities

x43 = Price/Earnings

X46 = Earnings persistence

Regarding tables 1,2, and 3 the following pointes should be discussed :

The model that includes firms -specific accounting, market, earnings persistence variables, is a better predictor of financial distress than is a model that includes only the first set of market variables or a model that includes the two sets of accounting and market variables with total accuracy of 94.3%.

4. Conclusion

The research examines the possibility of predicting the financial distress of Egyptian distress listed companies in Egypt for the period 2009-2015,The researcher examines the accuracy of three models in the financial distress prediction, A stepwise logistic regression technique was used to develop a model to identify factors associated with financial distress, the first model which combined accounting and market variables appears to have higher distress predicting power than the second model based on the accounting variables only, the accuracy in classifying the total sample with accuracy of 93.4%, while the prediction model without market variables of equity/ total debt, price/earnings is accurate in classifying the total sample with accuracy of 91.8% .

Additionally, this study provides direct evidence that includes earnings persistence as one of the earnings quality measures to the model consists of market – driven variables and accounting – driven variables of profitability, liquidity and leverage seems more consistent and more reliable indications of companies distressed, this is reflected in highest predictive power compared to the previous models. The average block-holding in distressed companies is of 97.7%, whereas in non-distressed companies is of 69.2%, with total accuracy of 94.3%, The contribution of this study is that future studies might use the combined proposed model as a model to predict financial distress instead of focusing only on financial performance measures, and use other earnings quality measures such as conservatism and earnings smoothing.

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