Contents lists available at ScienceDirect

ScienceDirect

journal homepage: www.elsevier.com/locate/aebj

Conference Title

# Financial performance evaluation and bankruptcy prediction (failure)(*)

*Dr. Talal A. Al- Kassar*[a] *, Dr. Jared S. Soileau*[b]

[a] *Associate Professor, Accounting Department, Faculty of Economics and Administrative Sciences, Zarqa University, P.O. Box 132222, Zarqa 13110, JORDAN.*

[b]*Assistant Professor, Department of Accounting, Center for Internal Auditing, Louisiana State University., LA 70803. USA.*

ARTICLE INFO

*Article history:*
Received 04 October 13
Received in revised form 15 March 14
Accepted 9 May 14

Keywords:
Financial Performance
Solvency
Bankruptcy
Criteria
Testing
Ranking

ABSTRACT

Despite the copious number of statistical failure prediction models described in the literature, testing of whether such methodologies work in practice is lacking. This paper examines the performance of the same companies with solvency for predicting bankruptcy and comparison in both models. This model is suggested for measuring the values of financial performance (Al-Kassar and Soileau; 2012), and applying the financial failure model (Z-score) used by Taffler (1983). The data of six companies were examined for the period 1998-2011.

The methodology which used at empirical study includes measuring financial performance according to both models. Then both results have been shown in table (8). The correlations between their results for both models are shown highly relationship. They were tested by T-test. Therefore, they were classified and ranked the companies according to these values.

The research also demonstrates the need to include measures of both financial and non-financial performance in the evaluation as they complement each other. Without both financial and non-financial, the evaluation process is incomplete and does not provide desired results or the correct image of the process. The research suggests including comprehensive measures of performance evaluation of projects by using indicators of adopted criteria. Thus, the application of both models leads to better results and assists users in maintaining greater objectivity while obtaining more accurate results than from analysis based on personal evaluation alone.



**(*)"This research is funded by the Deanship of Research and Graduate Studies in Zarqa University /Jordan"**

* *Corresponding author.* Tel.: +962795432337; fax: +0-000-000-0000.
E-mail address: talal_kassar@yahoo.com

Peer review under responsibility of Holy Spirit University of Kaslik.

Hosting by Elsevier

2214-4625/$ – see front matter © 2014 Holy Spirit University of Kaslik. Hosting by Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.aebj.2014.05.010

## 1. Introduction

Since the development of the Z-Score, financial innovation has paved the way for further development of corporate bankruptcy prediction models. The option pricing model developed by Black and Scholes in 1973 and Merton in 1974 provided the foundation upon which structural credit models were built. KMV (Kealhofer, McQuown and Vasicek), Now Part of Moody's Analytics Enterprise Risk Solutions, was the first to commercialize the structural bankruptcy prediction model in the late 1980s. Miller (2009) noted that "the Distance to Default is not an empirically created model, but rather a mathematical conclusion based on the assumption that a company will default on its financial obligations when its assets are worth less than its liabilities. It is also based on all of the assumptions of the Black-Scholes option pricing model, including for example, that asset returns are log-normally distributed".

There are many dimensions upon which to measure the performance of a credit scoring system, but the most relevant way to compare models with different sample sets is by measuring the models' ordinal ability to differentiate between companies that are most likely to go bankrupt from those that are least likely to go bankrupt (Bemmann, 2005).

Many governments are interested in establishing investment projects because of the importance of the role government play in the efforts to build a stable economic base. This is reflected in many developing countries which are looking for opportunities to improve their political, economical, social and cultural aspects. Generally, projects need a lot of money and resources to finance them. Therefore, finding and using the best method to control these investments and resources to achieve development objectives in different fields and avoid insolvency is of great importance. Gerdin (2005), states that Management Accounting Systems (MAS) can be considered as "those parts of the formalized information system used by organizations to influence the behavior of their managers that leads to the attainment of organizational objectives". Managers in some organizational contexts are likely to benefit from accounting information that is detailed and issued frequently, whereas MAS information in other contexts tends to be general rather than detailed, and issued less frequently (Gerdin, 2005).

The empirical literature reviewed by Chenhall (2006), for example, indicates that non-financial performance measures are more widely adopted in just in time (JIT) and total quality management (TQM) settings. Other studies like Abdel-Kader and Luther (2008), have highlighted the need for additional research to increase our understanding of organizational and environmental factors that explain the development of management accounting systems, including the use of non-financial measures. Accounting information plays an important role in individual and corporate decision making. In particular, a fundamental use of accounting information is to help different parties make an effective decision concerning their investment portfolios. Much of the accounting literature assumes that accounting and financial reporting in a country is a function of its environment (Belkaoui and AlNajjar, 2006). The management accounting literature reveals that changes in the environment and the technology of a company can lead to new decision making and control problems (Abdel-Maksoud et al., 2010).

### *1.1. Research objectives*

1. To apply a model created by Al-Kassar and Soileau (2012), this can measure the financial performance of the companies mathematically.
2. To apply Taffler's model (1983) namely Z-score to measure financial failure(solvency) of the same companies, and,
3. To see whether there is correlation between the above results for each company, through testing the values by t-test, and classify and rank them accordingly.

### *1.2. Research problems*

The research problem focuses on the following:

1. To investigate the correlation between values of financial performance and failure from each model.
2. In order to avoid personal intervention during the evaluation process and to use objectively steps to evaluate all companies by carrying on the comprehensive performance evaluation to companies by using indicators and criteria adopted.

### *1.3. Research scope and methodology*

The research paper will cover both theoretical and empirical materials. The theoretical side includes defining of financial performance, criteria, factor analysis and Taffler's model. While, the empirical side includes the studying of financial performance values, financial failure values (company solvency), testing and correlation, and rank and classify the companies. Different materials, articles, reports, and sites have been used to assist the research paper. Thus the proposed paper attempts:

1. To measure of financial performance values according to suggest model.
2. To measure financial failure values according to Taffler's model.
3. To test the above values.
4. To classify and rank the companies.

### *1.4. Population of the study*

The data for six companies have been used in both models. These companies 1, 2, and 3, related to a Mill, Transportation, and Heritage and Museums company respectively. The remaining three, companies 4, 5, and 6 are for commercial oil companies (petrol stations). The period of the study is between the years 1998-2011.

The paper is organized as follows: the next section provides a review of literature and previous studies. Section three begins with the types of performance evaluation indicators and criteria in both financial and non-financial groups as internal and external indicators. Section four presents financial performance formula, computation of financial performance, the mathematical model and empirical study of six companies. Section five presents the measuring of financial failure (solvency). Section six presents the testing of the values of the models. Finally, section seven provides findings.

## 2. Literature Review Previous studies

Many studies have been carried out in measuring company performance and the likelihood of business failure according to various factors.

These studies attempt to avoid the use of potentially biased personal intervention during the evaluation process by following objective steps to evaluate companies on a single base measure (see for instance Altman (1968), Taffler (1977, 1983 and 2005), De Toni and Tonchia (2001), Bernard et al. (2007), and Al-Kassar and Soileau (2012)). Concerned with measurement of performance models, De Toni and Tonchia (2001) used principle components analysis to describe and evaluate the dimensions and actual state of performance measurement models in an operations management setting.

Considering social, financial and operational factors, Bernard et al. (2007) use surface measurements to classify organizations and establish an overall performance evaluation model for local development companies.

Altman (1968) developed a measure to predict the likelihood of corporate bankruptcy based on a set of financial ratios using a multiple discriminant analysis approach. The Altman model is as follow:

Altman-Z=0.0012(WC) +0.014(RE) +0.033(EBIT) +0.006(MVE) +0.00999(NCI)

Where:

Altman-Z is the Z-score or predictive measure of corporate bankruptcy,

WC is the ratio of working capital scaled by total assets,

RE is the ratio of retained earnings scaled by total assets,

EBIT is the ratio of earnings before interest and taxes scaled by total assets,

MVE is the ratio of market value of equity scaled by the book value of total debt, and

NCI is the ratio of sales scaled by total assets.

According to Altman (1968), a minimum Altman-Z score of 1.8 is necessary to avoid failure, but only with a z-score of 3.0 or more is the company fairly safe. Using the following modified Z-Score model, Taffler (1983) studied solvency among UK companies:

$Z\text{-}Scr=C_0+ 0.053*(PBT/CL) + 0.13*(CA/TL) + 0.18*(CL/TA) + 0.16*(NCI)$

Where:

Z-Scr: Taffler's solvency z-score for UK companies,

$C_0$: constant,

PBT/CL is the ratio of profit before taxes scaled by current liabilities,

CA/TL is the ratio of current assets scaled by total liabilities,

CL/TA is the ratio of current liabilities scaled by total assets,

NCI ('no credit' interval) is calculated as the difference between the quick assets and current liabilities scaled by the daily operating expenses [(quick assets –current liabilities)/daily operating expenses] as a measure of short term liquidity. More specifically, the ratio indicates the number of days which a company can continue to finance operations from its existing quick assets if revenues are cut-off.

Based on the Taffler (1983) model, the coefficient percentages C1 to C4 contribute 0.53, 0.13, 0.18, and 0.16 respectively, to the models operation. Companies with a ZT-Score above a certain threshold (i.e. Z-Scr=0) were predicted not fail during the next year.

Al-Kassar and Soileau (2012) present a mathematical financial performance model based on factor scores for three companies in Jordan and test the results by plotting and ranking. The results are then correlated and tested, in order to classify and rank companies by value. In summary, the research presents a linkage between a model suggested by the Al-Kassar and Soileau (2012) and Taffler's Z-score model. Based on a 25 year sample period within their study, Taffler and Agarwal (2005) conclude their Z-score model possesses forecasting ability.

This paper attempts to reconcile and measure the correlation between both models financial performance and bankruptcy prediction (financial failure). Therefore, to evaluate results for the same companies by following objective steps to evaluate them on a single base measure, and in order to avoid personal intervention during the evaluation process.

## 3. Types of Performance evaluation indicators and criteria

Jowett, and Rothwell (1988) noted that financial targets provide readily measurable objectives that are frequently already available. They contends that such financial measures may be achievable by simply exploiting the monopoly power of the industry, through either high prices or lower quality of goods or services and proposed additional performance indicators as one solution to this problem.

In general, the indicators are divided into the following categories based on work by Parks and Glendinning (1981), Jowett and Rothwell (1988), and BSA (1996) as follows:

### *3.1. Internal indicators*

It includes measures of information related to production and service from inside the organization. These measures include:

i. Production indicators.
ii. Productivity indicators.
iii. Financial Indicators.
iv. Marketing indicators.
v. Personnel indicators.
vi. Special Indicators, (which related to the nature of the project).

### *3.2. External indicators*

It includes measures that attempt to capture information that the organization does not have control over yet may impact the organizational results. Such factors include:

i. Economic indicators
ii. Social indicators
iii. Political indicators
iv. Environmental Indicators.

## 4. Measuring of Financial Performance

Al-Kassar and Soileau Model:To measure mathematically the financial performance it is necessary to know the components. Courtis (1978) indicates that total performance can be divided into three main groups, namely, profitability, managerial performance and liquidity (or solvency); as shown in Figure (1).

**Table 1- Financial Performance Values.**

| Year/company No. | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1998 | -5.743 | 1.593 | 0.516 | 5.443 | -1.746 | 0.828 |
| 1999 | -3.415 | 2.679 | -0.110 | 5.599 | -1.671 | 1.318 |
| 2000 | -3.585 | 1.755 | -0.455 | 2.857 | -1.472 | 0.628 |
| 2001 | -3.410 | 0.793 | 0.106 | 0.882 | 0.463 | 0.215 |
| 2002 | -3.354 | -1.411 | -0.994 | 0.391 | 0.152 | 0.362 |
| 2003 | -3.887 | -1.986 | -1.458 | 0.327 | 1.666 | 0.613 |
| 2004 | -2.524 | -2.313 | -1.704 | -0.244 | 1.592 | 0.955 |
| 2005 | -4.053 | -1.451 | -1.705 | 0.911 | 2.131 | 0.895 |
| 2006 | -4.945 | -0.892 | -1.199 | 0.659 | 1.139 | 3.659 |
| 2007 | -6.030 | 0.093 | -2.454 | 0.507 | 2.231 | 5.173 |
| 2008 | -3.173 | -1.796 | -2.475 | 0.182 | 0.038 | 5.187 |
| 2009 | -2.957 | -1.091 | -2.280 | 0.226 | 0.238 | 5.266 |
| 2010 | -1.980 | -1.025 | -2.155 | 0.218 | 0.258 | 5.313 |
| 2011 | -1.755 | -1.041 | -2.320 | 0.202 | 0.287 | 4.895 |

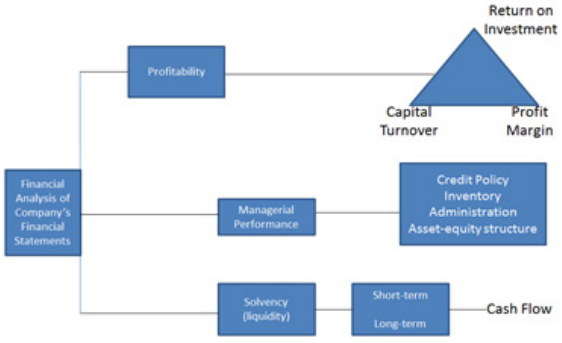


**Fig. 1- Financial Ratios Categoric Framework.**

Therefore, we have the following relation:

$$FP = \sum(P + MP + L)$$

Where: FP = Financial Performance

P = the average of Profitability of relevant ratios.

MP = the average of managerial performance of relevant ratios.

L = the average of liquidity of relevant ratios.

To solve the above relation it is necessarily to use Factor Analysis to analyze the interrelationships of a set of variables using multivariate methods. Al-Kassar and Soileau (2012) have used factor analysis,[†] to identify the interrelationships between the sets of variables; however, their mathematical model for factor analysis might be expressed as:

$$FP(Y) = c_1*r_1 + c_2*r_2 + c_3*r_3 + \ldots + c_n*r_n + C$$

Where: FP = financial performance of a company.

c1 = raw coefficient score for ratio 1.

r1 = ratio 1, n = number of ratios.

C = constant.

Computer programs can be used to obtain the values of standardized scores for each factor and ratio. Therefore, the total value of all the factors represents the value of financial performance. The final stage in calculating the equation can be achieved by running a computer program to obtain a single value for each of the six companies that incorporates all of the financial performance ratios. Table 1 provides these measures of financial performance for six companies. Companies 1, 2, and 3, which exhibit negative results, are for a Mill, Transportation, and Heritage and Museums company respectively. The remaining three, companies 4, 5, and 6 are for commercial oil companies (petrol stations) and have positive results in each year. The period study's is between 1998-2011 as shown below in Table 1 (Financial performance values) and Figure 2.

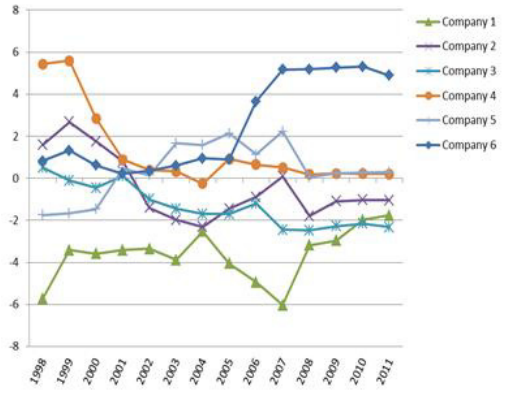


**Fig. 2- Financial Performance Values.**

## 5. Measuring of Financial Failure (Solvency)

Taffler's Model: When applying the above model to the six companies (financial performance) presented in Table 1, the model reflects the likelihood of the observed company's failure according to the summary of the percentages of the four selected ratios as opposed to considering each ratio in isolation. In their 2005 study, Taffler and Agarwal indicate that the four key dimensions of the firm's financial profile measure: profitability, working capital position, financial risk, and liquidity. Through factor analysis and the use of the Mosteller-Wallace criterion, Taffler and Agarwal (2005) it is possible to evaluate the relative contribution of each component ratio to the overall Z-score. This analysis indicates that profitability alone accounts for approximately 53% of the discriminant power, while the other three balance sheet measures together provide the remaining proportion.

The ratios are in factor analysis form, without personal intervention, and the results commensurate with the power of the model. Taffler and Agarwal (2005) indicate that over a 25 year period, the z-score model possesses true forecasting ability. Table 2 provides the ratios definitions as well as the calculated ratio coefficients and ratio coefficient percentages for all six companies previously referenced in Table 1 and Figure 2.

[1]SPSS is Statistical Package for Social Science.

Three of the four ratios presented in Table 2 (PBT/CL, CA/TL, and NCI) are negatively associated with risk of insolvency, therefore the greater the ratio, the lower the risk of insolvency. However, a higher value of CL/TA is indicative of greater risk of insolvency. This study confirms the importance of the relationship between profitability and current liabilities, where the specific weight of this indicator is 53%. The researchers agree on the importance of including a profitability measure to capture significant changes in the likelihood of financial failure without over dependence on the direct relationship between current assets and current liabilities.

**Table 3- Financial Failure Values.**

| | Company Number | | | | | |
|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** |
| 1998 | -4.25 | -3.20 | 0.90 | 6.88 | -1.50 | 1.77 |
| 1999 | -1.54 | 3.00 | 1.20 | 7.01 | -1.30 | 2.35 |
| 2000 | -2.19 | 1.30 | 1.50 | 4.12 | -0.90 | 1.88 |
| 2001 | -2.30 | -0.80 | 2.10 | 2.31 | 0.93 | 1.02 |
| 2002 | -2.22 | -1.10 | 2.40 | 2.10 | 0.68 | 1.08 |
| 2003 | -1.52 | -1.40 | -2.60 | 2.22 | 2.73 | 1.54 |
| 2004 | -1.91 | -4.50 | -2.70 | 1.98 | 2.91 | 1.83 |
| 2005 | -2.41 | -4.60 | -2.90 | 3.62 | 3.85 | 1.91 |
| 2006 | -2.62 | -4.20 | -2.40 | 3.75 | 2.74 | 2.19 |
| 2007 | -3.80 | 5.20 | -2.80 | 4.97 | 3.92 | 3.22 |
| 2008 | -1.20 | -3.10 | -2.10 | 2.06 | 1.02 | 3.56 |
| 2009 | -2.90 | -3.40 | -2.30 | 2.01 | 1.11 | 4.28 |
| 2010 | -2.75 | -3.60 | -2.50 | 1.32 | 1.42 | 4.38 |
| 2011 | -2.62 | -3.20 | -2.80 | 1.10 | 2.69 | 4.24 |

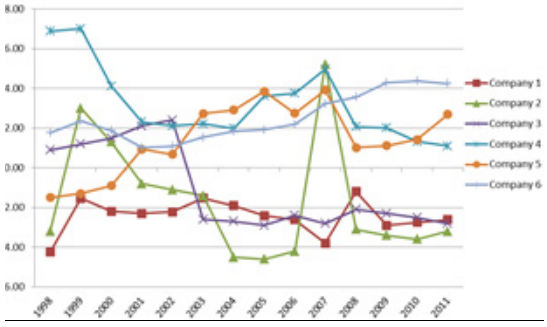


**Fig. 3- Financial Failure Graph.**

When the ratio of Profit before Tax to Current Liabilities is low, the company has a higher risk of being able meet the needs of current payments with operating cash flows. Therefore, the ratio is negatively associated with the risk of insolvency. Table 4, indicates that companies 1, 2, and 3 were in negative position as a result of operating losses, while the others (companies 4, 5, and 6) are in better position. Company 1 from the year 2008 and company 2 from 2009 become positive through 2011.

**Table 2- Financial indicators used to measure the financial failure.**

| Ratios | Ratio Coefficients | Ratio Coefficient percentages | Purpose |
|---|---|---|---|
| PBT/CL | 12.18 | 53% | Lower value indicates that company is approaching the barrier of financial failure |
| CA/TL | 2.50 | 13% | Lower value indicates that company is approaching the barrier of financial failure |
| CL/TA | 10.68 | 18% | Higher value indicates that the company is approaching the barrier of financial failure |
| NCI ('no credit' interval) | 0.029 | 16% | Lower value indicates that the company is approaching the barrier of financial failure . |
| $C_O$ | 3.2 | | Intercept Term |
| Total | | 100% | |

Alternatively, company 3 begins with a positive value from 1998 to 2002 then takes a negative position, indicating increasing risk. Therefore, lower value indicates that company is approaching the barrier of financial failure.

**Table 4- Profit before Tax/Current Liabilities.**

| | Company Number | | | | | |
|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** |
| 1998 | -0.75 | -1.25 | 1.6 | 2.5 | -0.6 | 1.2 |
| 1999 | -0.25 | 1.75 | 1.5 | 2.04 | -0.5 | 1.6 |
| 2000 | -0.15 | 0.9 | 1.9 | 2.1 | -0.2 | 1.3 |
| 2001 | -0.1 | 0.8 | 1.5 | 2.3 | 0.3 | 1.1 |
| 2002 | -0.3 | -0.7 | 1.3 | 2.09 | 0.27 | 1.1 |
| 2003 | -0.16 | -0.8 | -0.9 | 2.1 | 1.24 | 1.2 |
| 2004 | -3.2 | -0.9 | -1 | 1.9 | 1.35 | 1.55 |
| 2005 | -2.3 | 1.1 | 0.8 | 2.8 | 2.68 | 1.65 |
| 2006 | -1.9 | -1.8 | -1.2 | 2.9 | 2.5 | 1.89 |
| 2007 | -1.7 | 1.4 | -1.09 | 3.25 | 2.8 | 2.4 |
| 2008 | 1.5 | -1.2 | -1.01 | 2.1 | 1.1 | 2.45 |
| 2009 | 1.6 | 0.9 | -1.05 | 2.2 | 1.2 | 3.15 |
| 2010 | 1.1 | 0.8 | -1.01 | 1.8 | 1.3 | 3.3 |
| 2011 | 1.3 | 0.5 | -0.85 | 1.5 | 1.9 | 3.25 |

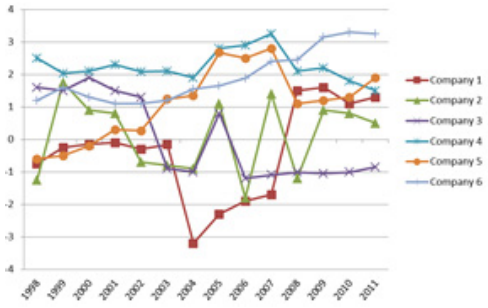


**Fig. 4- Profit Before Tax/ Current Liability.**

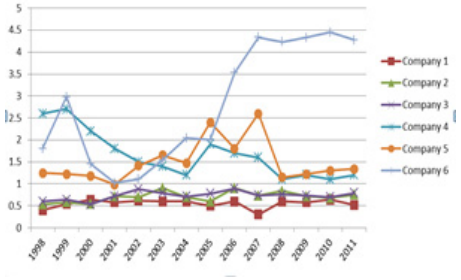


**Fig. 5- Current Assets/ Total Liabilities.**

Similar to the Profit before Taxes to Current Liabilities ratio, Current Assets to Total Liabilities presented in Table 5 and Figure 5 provides an additional measure of financial solvency risk. Therefore, when the ratio is low the company is higher risk. Companies 1-3 have low values while companies 4-6 have high values. Therefore, lower values indicate that, the company is approaching the barrier of financial failure.

The ratio of Current Liabilities to Total Asset has a positive association with insolvency, indicating greater risk of business failure. As can be noted in in Table 6 and Figure 6, companies 1-3 show higher vales than companies 4-6. As higher value indicates that the company is approaching the barrier of financial failure, companies 1-3 are in a more risky position.

**Table 5- Current Assets/Total Liabilities.**

| | Company Number | | | | | |
|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** |
| 1998 | 0.4 | 0.53 | 0.6 | 2.6 | 1.25 | 1.8 |
| 1999 | 0.54 | 0.58 | 0.64 | 2.7 | 1.22 | 2.98 |
| 2000 | 0.64 | 0.54 | 0.53 | 2.2 | 1.18 | 1.45 |
| 2001 | 0.58 | 0.72 | 0.72 | 1.8 | 0.98 | 1.02 |
| 2002 | 0.62 | 0.7 | 0.88 | 1.5 | 1.41 | 1.11 |
| 2003 | 0.6 | 0.9 | 0.79 | 1.4 | 1.65 | 1.54 |
| 2004 | 0.6 | 0.7 | 0.71 | 1.2 | 1.47 | 2.04 |
| 2005 | 0.5 | 0.6 | 0.78 | 1.9 | 2.4 | 2.01 |
| 2006 | 0.6 | 0.9 | 0.89 | 1.7 | 1.8 | 3.53 |
| 2007 | 0.3 | 0.73 | 0.74 | 1.6 | 2.6 | 4.34 |
| 2008 | 0.6 | 0.84 | 0.76 | 1.1 | 1.15 | 4.23 |
| 2009 | 0.58 | 0.72 | 0.73 | 1.2 | 1.22 | 4.33 |
| 2010 | 0.64 | 0.68 | 0.70 | 1.1 | 1.3 | 4.45 |
| 2011 | 0.52 | 0.75 | 0.79 | 1.2 | 1.34 | 4.28 |

**Table 6- Current Liabilities/Total Assets.**

| | Company Number | | | | | |
|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** |
| 1998 | 0.8 | 0.42 | 0.38 | 0.15 | 0.23 | 0.25 |
| 1999 | 0.78 | 0.39 | 0.36 | 0.12 | 0.21 | 0.12 |
| 2000 | 0.69 | 0.41 | 0.41 | 0.035 | 0.15 | 0.35 |
| 2001 | 0.57 | 0.21 | 0.23 | 0.038 | 0.034 | 0.44 |
| 2002 | 0.56 | 0.23 | 0.16 | 0.046 | 0.041 | 0.38 |
| 2003 | 0.88 | 0.24 | 0.11 | 0.053 | 0.043 | 0.28 |
| 2004 | 0.55 | 0.36 | 0.12 | 0.068 | 0.039 | 0.18 |
| 2005 | 0.58 | 0.33 | 0.21 | 0.035 | 0.031 | 0.17 |
| 2006 | 0.75 | 0.38 | 0.14 | 0.047 | 0.040 | 0.022 |
| 2007 | 0.83 | 0.26 | 0.12 | 0.041 | 0.025 | 0.015 |
| 2008 | 0.72 | 0.31 | 0.23 | 0.061 | 0.035 | 0.012 |
| 2009 | 0.61 | 0.29 | 0.18 | 0.057 | 0.029 | 0.010 |
| 2010 | 0.57 | 0.35 | 0.21 | 0.059 | 0.030 | 0.011 |
| 2011 | 0.64 | 0.28 | 0.23 | 0.062 | 0.033 | 0.016 |

The ratio of Sales to Total Assets is negatively associated with the probability of financial failure, similar to ratios associated with tables 4 and 5. The lower values are very risky to the company. Beginning in 2004, the position of company 1 began to improve, but is still in a fairly poor position in 2011. Alternatively, Company 2, 3, and 6 improved whereas 4 and 5 seem to have experienced higher variability.

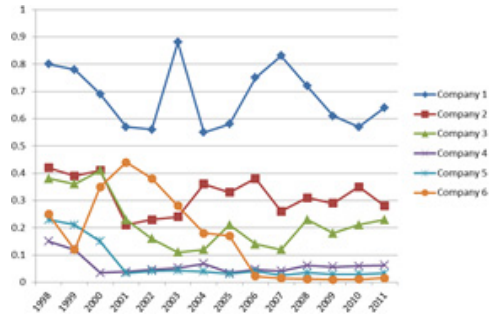


**Fig. 6- Current Liabilities/Total Assets.**

**Table 7- NCI (Sales/Total Assets).**

| | Company Number | | | | | |
|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** |
| **1998** | 0.3 | 2.4 | 1.9 | 3.01 | 0.81 | 1.21 |
| **1999** | 0.41 | 1.16 | 1.94 | 3.02 | 0.76 | 1.89 |
| **2000** | 0.5 | 1.15 | 2.3 | 1.25 | 0.75 | 1.1 |
| **2001** | 0.61 | 2.1 | 2.2 | 2.02 | 2.0 | 0.78 |
| **2002** | 0.8 | 1.8 | 2.8 | 1.9 | 2.1 | 1.05 |
| **2003** | 0.78 | 1.3 | 2.9 | 1.2 | 3.2 | 1.4 |
| **2004** | 1.31 | 1.2 | 3.1 | 1.4 | 3.1 | 1.5 |
| **2005** | 0.85 | 1.1 | 2.8 | 2.0 | 3.4 | 1.45 |
| **2006** | 0.8 | 1.3 | 2.99 | 1.8 | 2.7 | 2.54 |
| **2007** | 0.5 | 2.4 | 3.4 | 1.77 | 3.5 | 4.10 |
| **2008** | 1.4 | 2.6 | 2.6 | 1.1 | 1.1 | 4.15 |
| **2009** | 1.5 | 2.3 | 2.3 | 1.33 | 1.3 | 4.28 |
| **2010** | 1.4 | 2.4 | 2.5 | 1.4 | 1.0 | 4.35 |
| **2011** | 1.4 | 2.5 | 2.6 | 2.1 | 1.4 | 4.01 |

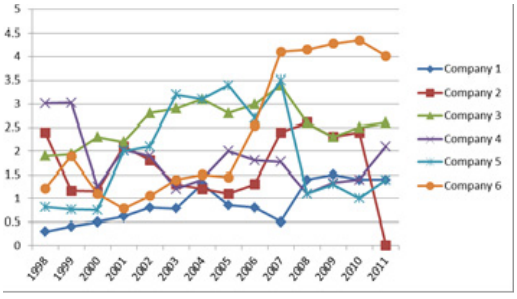


**Fig. 7- NCI.**

Both models (Financial performance model by Al-Kassar and Soileau (2012) and Taffler's (1983) model) were applied for six companies, it should be noted that the mean value of the financial performance (Y) is zero. This means that any Y value of a company above zero is classified as above average and those below zero are classified as below average.

## 6. Study analysis and correlation

The analysis of liquidity via financial indicators helps to provide early warning of increased risk of financial failure. Thus, it is noted that there are two directions in the analysis of liquidity. The first focuses on the direct relationship between current assets and current liabilities which considers the use of current assets as a main source of meeting current liabilities. This trend contrasts with the continuity of an organization and its profits. Since profitability depends on the use of productive assets, including current assets, disposing of current assets to pay current liabilities prevents the continuity of the organization to continue to perform operations.

The second trend based on the main function of financial management of the project which is to estimate the financial needs of the activity, and the provision of necessary sources of funding and investing them to achieve profit and therefore the continuity of the project. To determine the imbalance between these elements leads to financial failure. It should consider the narrow concept of liquidity, which links the direct relationship between current assets and current liabilities.

This means that the analysis of financial performance assists financial management and top management of the companies to give greater attention to important ratios. From the plotting of the 25 ratios, there are seven ratios that show they have a direct impact and the most powerful in the calculation of the values of financial performance, namely: (Al-Kassar and Soileau, 2012):

1. Sales/ Working Capital.
2. Sales/Accounts Receivable.
3. Current Assets/Total Liabilities.
4. Current Assets/Current Liabilities.
5. Current Liabilities/Total Assets.
6. Cash/Current Liabilities.
7. Profit before Tax/Current Liabilities.

Consistent with the 1983 Taffler model, some ratios have an impact in determining the values and the power of the overall model as well. It is also helpful to improve their policies by adopting the standard levels such as current assets to current liabilities to be (2:1), decreasing current liabilities, changing policy regarding customers by reducing credit policy and collecting debt from customers within shorter periods. This might lead the companies to safeguard their financial performance and move to be an improved position far away from increased likelihood of financial failure.

It is important to measure the profit impact to the future payment of current liabilities. Thus, contribution of current assets to cover operating expenses without depending on external sources of funding should be shown. Furthermore, it is essential to analyze the contribution of current assets to cover the total liabilities, and the specific weight of the current liabilities to total assets. Therefore, results from the four ratios of the Taffler model (1983) show maximum value of the first, second and fourth, and the low value for the third one, give the best indicator to move away from the likelihood of bankruptcy in the near future for an organization.

Thus, the correlation between the values of financial performance (FP) and the values of financial failure (X) for the companies 1, 2 and 3 which have poor results are tested by (t-test) and results reveal the following:

**Table 8- Correlation Values.**

| Company | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| **Correlation Coefficient (r)** | 0.539 | 0.601 | 0.821 | 0.880 | 0.966 | 0.929 |
| **P-Value** | 0.047 | 0.023 | 0.000 | 0.000 | 0.000 | 0.000 |
| **T calculated** | 2.217 | 2.604 | 4.981 | 6.418 | 14.418 | 8.695 |
| **T scheduled** | 1.771 | 1.771 | 1.771 | 1.771 | 1.771 | 1.771 |
| **Rank** | 6 | 5 | 4 | 3 | 1 | 2 |

The values indicate a strong correlation lies between (0.7 and 0.9) for companies. Where -values are determined by the value of the correlation coefficient.

Using t-test: then it indicates the following hypothesis,

Ho: $f\bar{I} = 0$ does not exist any relationship.

H1: $f\bar{I}$, 0 there is a relationship.

It appears in the table above, and after testing each of the calculated values of t and t scheduled at a significance level 0.05. As the calculated values of t greater than the scheduled, therefore, will reject Ho in support of H1, there is a relationship. The rank and classification of the companies are shown in Table 8. The negative results should be observed because it is beginning to fail. Also it should deal more accurately with the companies that get negative results because it is possible to fail in the coming year. But normally, they received subsidies from the State to help them for next periods.

## 7. Findings

The constructs and uses a model to mathematically measure organizational financial performance and likelihood of financial failure. Values of both financial performance and financial failure are used to correlated am evaluate through the graph of company ratios selected. Results of the models are tested and demonstrate with acceptable values of significance, 0.05, and the null hypothesis rejected in favour of the alternative that a relationship exists between financial performance and likelihood of organizational failure. The comprehensive performance models used in the evaluation process of these companies requires both financial and non-financial measures to complement each other. Without following such a process, the analysis of these companies is not complete and may yield unreliable results. Therefore, we recommend applying both evaluations and using indicators and criteria adopted to reach a more reliable result. Therefore, it is recommended to follow both models to obtain accurate results and maintain objective from personal intervention.

## REFERENCES


Abdel-Kader, M., & Luther, R., (2008). The impact of firm characteristics on management accounting practice: a UK-based empirical analysis. *The British Accounting Review*, 40(1), 2-27.

Abdel-Maksoud, A., Cerbioni, F., Ricceri, F., & Velayutham, S. (2010). Employee morale, non-financial performance measures deployment of innovative managerial practices and shop-floor involvement in Italian manufacturing firms. *The British Accounting Review*, 42 (1), 36-55.

Agarwal, V., & Taffler, R. J. (2005). Twenty-five years of z-score in the UK: do they really work? *Accounting and Business Research*, 37 (4), 1-36.

Al-Kassar, T., & Soileau, J. (2012). Design and Applied Mathematical Model of Measuring Financial Performance Evaluation: Jordan Results. *Oil, Gas & Energy Quarterly,* 60(3) 621-636.

Aharoni, Y. (1981). Performance Evaluation of state-owned Enterprises: A Process Perspective, (note). *Management and Finance*, 27 (11) 1340-1347.

Altman, E. I. (1968). Financial Ratios Discriminant Analysis and the Prediction of Corporate Bankruptcy. *Journal of Finance*, 23, 4, 589-609.

Belkaoui, A., & AlNajjar, F. (2006). Earnings opacity internationally and elements of social, economic and accounting order. *Review of Accounting and Finance*, 3 (3), 130-144.

Bemmann, Martin, Improving the Comparability of Insolvency Predictions (June 23, 2005).

Dresden Economics Discussion Paper Series No. 08/2005. Available at SSRN: http://ssrn.com/abstract=731644.

Bernard F., Desrochers, J., Martel, D., & Prefontaine, J. (2007). Modeling the Performance Evaluation of Local Investment and Economic Development Corporations. *Journal of Business & Economic Research*, Sept. 5 (9), 55-76.

Chenhall, R. H. (2006). The contingent design of performance measures. In Bhimani (Ed.). *Contemporary issues in management accounting*, 92-116. Oxford: Oxford University Press.

Courtis, J.K. (1978). Modeling a Financial Ratios Categoric Framework. *Journal of Business Finance and Accounting*, 5 (4), 371-386.

De Tone, A., & Tonchia, S. (2001). Performance Measurement Systems-Models, Characteristics and Measures. *International Journal of Operations & Production Management*, 21 (1/2), 46-71.

Gerdin, J. (2005). Managing accounting system design in manufacturing departments: an empirical investigation using a multiple contingencies approach. *Accounting, Organizations and Society*, 30 (1) 99–126.

Glautier, M., & Underdown, B. (1986). Accounting theory and Practice, UK.

Miller, W. (2009). Introducing the Morningstar Solvency Score, A Bankruptcy Prediction Metric. *Morningstar, Inc*. December 2009, Electronic copy available at: http://ssrn.com/abstract=1516762.

Jowett, P., & Rothwell, M. (1988). Performance Indicators in Public Sector. UK, (also White Paper 1987).

Perks, R., & Glendinning, R.. (1981). Little Progress Seen in Published Performance Indicators. *Management Accounting*, Dec 28-30.

Taffler, R., & Tisshaw H. (1977). Going, going, gone – four factors which predict. *Accountancy*, March, 50-54.

Taffler, R. J. (1983). The Z-Score Approach to Measuring Company Solvency. *The Accountant's Magazine*, March, 22-24.

The Board of Supreme Audit (BSA), internal studies, 1986, 1998 unpublished.

## Appendix A:

The following are the ratios referred to in the text as R1-R25:

**Profitability Ratios**

Return on investment ratios:
R1= EBIT/TA = Earnings before Tax scaled by total assets
R2= NP/TA = Net Profit scaled by total assets
R3= NP/NW = Net Profit scaled by net worth

Profit margin ratio:
R4= NP/Sales = Net Profit scaled by sales

Capital turnover ratios:
R5= Sales/TA = Return on Sales computed as Sales scaled by total assets
R6= Sales/NW = Sales scaled by net worth
R7= Sales/WC = Sales scaled by working capital

**Managerial Ratios**

Credit Policy ratio:
R8= Sales/AR = Sales scaled by accounts receivable (AR Turnover)

Inventory ratios:
R9= INV/COGS = Inventory scaled by the cost of goods sold
R10= INV/WC = Inventory scaled by working capital
R11= INV/Sales = Inventory scaled by sales

Administration ratios:
R12= Op. Exp./TA = Operating Expenses scaled by total assets
R13= COGS/Sales = Cost of goods sold scaled by sales

Asset-equity structure ratios:
R14= NW/TA = Net Worth scaled by total assets
R15= Debt/WC = Debt scaled by working capital
R16= LTA/NW = Long-term assets scaled by new worth
R17= LTA/TA = Long-term assets scaled by total assets
R18= WC/SALES = Working capital scaled by sales

**Solvency Ratios**

Short-term liquidity ratios:
R19= CA/CL = Current assets scaled by current liabilities (Current Ratio)
R20= WC/TA = Working capital scaled by total assets
R21= Quick Assets/CL = Quick assets scaled by current liabilities (Quick Ratio)

Long-term solvency ratio:
R22= Debt/NW = Total debt scaled by net worth

Cash flow ratios:
R23= CF/CL = Cash flows from operations scaled by current liabilities
R24= CF/TA = Cash flows from operations scaled by total assets
R25= CF/WC = Cash flows from operations scaled by working capital