

# Using Accounting and Stock Market Price Data to Predict Financial Distress

Essra'a Al Haddidi Rasmiah Ahmad Abu Mousa  
Faculty of Business, Al-Balqa'a Applied University, PO box 19117, Salt, Jordan

## Abstract

This study investigated accounting measures depended on CAMEL ratios to predict services sector distress. The study used five variables representing CAMEL ratio from (2010-2015). Researchers used stepwise method and moving average to predict prices in 2017. Result showed that there is no significant relationship between market stock price and CAMEL ratios. Other factors such as Internal (mismanagement or corruption) or external (political issues) are affecting financial performance. Predicted result showed that there might be (19-26) listed corporations' facing financial distress in 2017. Especially in transportation and tourism filed.

**Keywords:** CAMEL Ratios; Firms' Distress; predicting.

## 1. Introduction

One of the main benefits of the financial analysis is using it to predict failure by building a model that would give an early alert to investigate the causes and treatment of the failure. Ratios analysis is considered to be an important tool in financial analysis, which used to assess firm financial situations and measure management performance. Researchers reached to CAMEL technique to analyze possibility of business failure. CAMEL stands for Capital, Assets quality, Management, Earnings and liquidity.

Distress is not fortuitous, but the result of many internal and external factors which interact through time, such as Intense competition, general economic conditions, government decisions and inflationary trends. The corruption of the administration, increasing bad debts, poor liquidity and imbalance in funding are some internal reasons of failure.

Increasing numbers of business that failed in developed and developing countries, predicting failure have become important as an early warning to take correct actions to avoid failure. The post event of distressed companies usually appears in losses, decreasing in revenues and profits and decreasing in market stock prices than par value.

Over the past 10 years, Jordan has pursued restructured reforms in education, health, as well as privatization. It has also created the conditions for public-private partnerships in infrastructure and carried out tax reforms. Adverse regional developments, particular in Syria and Iraq crises remain the largest recent shock affecting Jordan. This is reflected in an unprecedented refugee influx, in disrupted trade routes, and in lower investments and tourism inflows. The large number of Syrian refugees entering the country is having a strong impact on the country's economy and social fabric. Other major challenges facing Jordan include high unemployment, a dependency on grants and remittances from Gulf economies as well as continued pressure on natural resources. Jordan's economy slowed down in 2015 for the first time since 2010, largely due to the effects of security spillovers from the regional crises. Real GDP growth was at 2.4% in 2015, compared to 3.1% in 2014. Going forward, real GDP growth is forecast to rebound slightly to 3% in 2016, reflecting additional investment projects in the medium term. A deflationary environment persisted in 2015, amidst expansionary monetary policy and tight fiscal policy. Service sector contributes two thirds about (60%) of GDP. The Securities Commission declared (note 1) that there is (30) insolvent company in Jordan in 2016, with (700) million Jordan dinar capitalization, reference reasons stumbling mismanagement or corruption, complicity of the auditors and the non-application of the principles of corporate governance.

Services sector include the following sections according to Amman Stock exchange classifications: Health services, education, hotels and tourism, transportations, media, technology and communications, energy and utilities, and finally commercial services. Services sector contribution in trading value in 2015 is (21.2%). Table (1) shows the trading value for services sector from (2010- 2015):

Table (1)  
 Trading value for service sector  
 Millions Jordan Dinar

Year	Trading Value
2010	1,744,663,490
2011	576,006,319
2012	403,893.684
2013	408,120,453
2014	373,463,671
2015	723,462,452

Sources: Amman Stock Exchange annual report 2015.

The main goal of the study is to predict stock market prices for services sector corporations for two years forward, using CAMEL ratios, to predict financial distress from (2010-2015). This study aimed to answer the following questions:

- 1- Can market stock price and CAMEL ratios predict service sector distress?
- 2- What are the most influential variables for predicting service sector distress?

## 2. Literature Review

The theoretical definition of financial distress occurred when firms doesn't generate enough cash flows to make a contractually required payment (Ross 2001). Practical definition implies when firms doesn't pay totally their obligations to creditors. If this happened firm failure or firm bankrupt occurs. Internal and external reasons lead to failure. internal reasons could be one the following : poor management and lack of administrative specialized technical elements and trends faulty management, it also may be due to financial reasons of increasing numbers of bad debts , imbalance in the financing structure and weak cash flow. External reasons caused by intensive competition, general economic conditions, governmental decisions and inflationary trends at the level of the local and global economy, which lead to an increase in the value of the debts, causing an imbalance in the financing structure.

Financial failure passes through the many phases, evolutionary phase which predict the existence of imbalances by management, increasing indirect costs, growing competition and the lack of credit facilities, the growing burden and weak working capital. Financial insolvency in this stage reflects the lack of ability to obtain the necessary funds to cover the debt owed. Total failure stage when total liabilities become much more than net worth of the firm.

Many studies have addressed the financial failure of several aspects: some studied stock market indicators to predict failure others search to establish models to predict failure, and here some of the studies that searched financial market indicators to predict failure.

Distinguin, et al (2005) investigated whether the market information could add to accounting information in prediction of bank financial distress in Asia. A stepwise logit model is first estimated to isolate the optimal set of accounting indicators and then extended to include market indicators. Their results showed that the market indicators bring additional information in prediction process. They also found that market indicators are significant to predict banks' financial distress whatever asset structure is.

Earl and Frank (2011) tested efficient market hypothesis by analyzing the effect of Federal Deposit Insurance Corporation (FDIC). Bank failure announcement on stock price returns of banks holding company. Their results showed a negative signal which implies that the holding company of the failed bank will have repelled investors and driving down demand for holding company's stock. Study results support the semi-strong form efficient market hypothesis and show mixed evidence of pre- announcement trading on this information.

KENNETH, et al (2014) attempted to predict bank failure using CAMEL and stock market information. The study covered five accounting years between 2006 and 2010. Multiple discriminate models were used to predict bank failure. It was discovered that almost all the banks used for the study had their Z score fall within bankruptcy region. An attempt was further made to thoroughly evaluate managerial quality because experience has shown that bank failure in Nigeria was largely due to managerial inefficiency. Managerial quality were evaluated using variable such as total loan to total deposit, interest expenses to total deposit and operating expenses to total deposit. They concluded that bank failure is as a result of poor CAMEL rating as well as excessive risk taking and the end results are credit crunch, unemployment, illiquidity etc. They suggested that the only way to contain bank failure is by ensuring regular and transparent on site and off site examination by CBN and NDIC.

Studies that search models to predict failure are: Arabi (2013) estimated banks failure by logistic regression and discriminate analysis, both analysis showed that the earning was the most influential measure on bank's failure followed by assets quality and capital adequacy. A new bank is identified as being of a particular

rating depends upon which discriminated function value is higher.

Ruzgar, et al (2008) this paper focused on the Turkish banking sector, they selected to apply the Rough Set Theory (RST) approach to analyze the failures of banks during the 1995-2007 periods. The data for the financial ratio analysis for the 41 banks investigated from the publicly available sources. The results showed that early warning systems based on statistical models can effectively be used to predict bank failures. In this study, low capital ratios were found to be important variables in discriminating between failed and successful banks in Turkey. Also low and medium assets quality and profitability ratios were the leading indicators in predicting potential failures. The overall results showed that RST model is a promising alternative to the conventional methods for failure prediction.

Agrawal and Maheshwari (2016) significance of the Merton distance-to-default (DD) in predicting defaults for a sample of listed Indian firms. They used a matched pair sample of defaulting and non-defaulting listed Indian firms. They found a significantly negative relationship with the probability of default. The DD retains its significance even after the addition of Altman's Z-score.

Polemis and Gounopoulos (2012) identify financial characteristics that assess and predict corporate financial distress in publicly traded firms quoted in the London Stock Exchange. Their model has two stages: the first stage discriminates financially healthy or distressed firms utilizing binary logit regression. The second stage makes use of the univariate analysis. Firms can be further categorized into four possible outcomes: financially healthy, potentially healthy targets and financially distressed and potentially distressed acquisition targets. They found that financial distress could be identified as early as three years prior to the event. Moreover, statistically significant differences were found between the four firm sample groups.

### 3. Methodology

#### 3.1 Data source

This study depended on closing prices for services listed corporations in Amman Stock Exchange form (2010-2015), financial statements (balance sheet and income statements) also used for the same intervals on yearly basis. This study depended on CAMEL ratios that Altman concluded (1968). The following table showed the ratios used in the study:

Table (2)  
CAMEL Ratios used

Ratios	Symbol
Net working capital /Total Assets	X1
Retain Earnings/Total Assets	X2
EBIT / Total Assets	X3
Market value of owners equity/Total liabilities	X4
Sales / Total Assets	X5

#### 3.2 Study Sample

Services sector contained (65) listed companies in different fields. The following table showed the whole number of corporations and their filed in services sector:

Table (3)  
The sample of the study

Services Sector	Number of the listed corporations
Health services	4
Education services	6
Hotel and Tourism	14
Transportation	15
Technology and communication	3
Media	2
Utility and Energy	6
Commercial services	15
Total	65

Source: Amman Stock Exchange yearly bulletins (2010-2015).

Researchers excluded the following corporations from the study because some of them out of the market or lacked of closing price.

Table (4)  
 Excluded corporations from the sample of the study

Corporation Name	Field
IRBID DISTRICT ELECTRICITY	Utilities and Energy
CENTRAL ELECTRICITY GENERATING	Utilities and Energy
ELECTRICITY DISTRIBUTION	Utilities and Energy
NATIONAL PETROULEUM	Utilities and Energy
BATELCO JORDAN	Technology and Communications
ROYAL JORDANIAN AIR ACADEMY	Transportation
JORDAN SILOS AND SUPPLY GENERAL COMPANY	Commercial Services
AL JAMIL FOR INVESTMENTS CO	Commercial Services
JORDAN HIMMEH MINERAL	Hotels and Tourism
AL-TAJAMOUAT FOR TOURISTIC PROJECTS CO PLC	Hotels and Tourism

After excluding the pervious corporations the sample study contained (55) working listed corporations.

### 3.3 Study Hypothesis

Based on the questions of the study, the following hypothesis will be tested:

H<sub>0</sub>: There is no significant relationship between market stock price and CAMEL ratios for listed service corporations in Amman Stock Exchange.

### 3.4 Methodology

CAMEL ratios were calculated for services sector from (2010-2015). Actual prices were collected from Amman Stock Exchange yearly reports .In order to predict stock market prices for 2017, stepwise method used depending on actual closing prices of 2015. Moving average also used to predict stock market prices for 2017 through calculating moving average for both CAMEL ratios and closing prices.

This study initially examined the cause and effect between CAMEL ratios and stock closing price for services sector to predict distress. Based on the research problem and research hypothesis, the research used stepwise method based on actual data to examine the relationship between stock closing prices and CAMEL Ratio. Using the following regression model:

$$P_{2017} = 1.721 + .305X_1 - .638X_2 + 6.551X_3 - 0.001 X_4 - 0.218X_5 \quad (1)$$

Whereas:

P: The predicted closing prices

The Constant: 1.721

X1: Working capital/ Total Assets

X2: Retained earnings / Total Assets

X3: EBIT/ Total assets

X4: Market value of owners' equity /total liabilities

X5: Sales /total assets

Moving Average used to predict stock closing prices for services sector in order to predict prices for 2017 depending CAMEL ratios. The following model used:

$$P_{2017} = 1.248 - 2.877X_1 - .017X_2 + 4.762 X_3 + 0.282X_4 + 0.40X_5 \quad (2)$$

Whereas:

The constant: 1.248

## 4. Results

Testing the predicted stocks closing prices, showed the following descriptive analysis:

Table (5)  
 Descriptive Analysis stock closing prices and CAMEL ratios

	Mean	Std. Deviation	N
Price	2.0194	2.89578	55
X1	.1115	.21968	55
X2	.0930	.41686	55
X3	.0674	.13926	55
X4	17.1498	91.57439	55
X5	.4280	.44619	55

The previous table showed the small value of prices (2.01), and also the small values of financial

performance with higher standard deviations.

Person correlation showed the following relationships:

Table (6)  
 Person correlation between stock closing prices and CAMEL ratios

Variables	Person Correlation	Sig (1-tailed)*
X1	-.043	.377
X2	-.012	.466
X3	.286	.017
X4	-.049	.361
X5	.038	.391

\*significant at 5%

The above table showed that there is a weak correlation between CAMEL ratios and stock closing prices, except there is a strong correlation (28.6%) between market stock prices and EBIT to total assets.

ANOVA analysis showed the following results:

Table (7)  
 ANOVA Analysis using stepwise method

Model	Sum of Squares	Mean Square	F	Sig
Regression	41.286	8.257	.893	.438
Residual	411.533	8.399		
Total	452.819			

Entered removed analysis showed that EBIT to total assets is the only variable that had the powerful in explaining the relationship between stock prices and CAMEL ratios .Table(8) showed the coefficients that showed if the relations between closing prices and CAMEL significant or not:

Table (8)  
 Coefficients Analysis using stepwise method

Variables	T	Sig*
X1	.121	.904
X2	-.556	.581
X3	2.169	.035
X4	-.262	.794
X5	-.232	.817

Significant at 5%.

So predicted stock prices will be as follow:

$$P = 1.618 + 5.951X_3$$

Moving average was calculated in spite of predicting market stock prices in 2016-2017.ANOVAs analysis showed the following results:

Table (9)  
 ANOVAs Analysis Results using moving average

Model	Sum of Squares	Mean Square	F	Sig
Regression	147.579	29.51	0.939	.464
Residual	1570.349	31.40		
Total	1717.928			

The pervious table showed that there is no significant relationship between CAMEL ratios and closing prices for services sector.

Table (10)  
 Coefficients Analysis using moving average

Variables	T	Sig*
X1	-.702	.486
X2	-.008	.994
X3	.818	.417
X4	1.888	.065
X5	.511	.612

Table (10) showed that there is a no significant relationship between CAMEL ratios and market closing price for services sector.

## 5. Discussions

The previous results showed that there is no significant relationship between CAMEL ratios and market stock prices for services sector. It is clear that there are other factors external or internal affecting financial performance. Researchers concluded way to predict financial distress for services sector: using par value as indicator for prediction distress. Corporations with predicted prices less than par value they might face distress. Stepwise depending on closing price of 2015 calculations predicted that there are (19) corporation will face financial distress by 2017. While moving average predicted that there are (26) corporation will face financial distress most of them in transportation and hotel and tourism field.

## 6. Conclusions

The main study hypothesis was can stock market price predict with CAMEL ratios distress of services listed corporations? Two regression methods were used. Stepwise method and moving average used to predict stock market price 2017. Neither method showed a significant relationship between stock market prices and CAMEL ratios. This could be attributable to many reasons:

- 1- Altman model is not suitable for services sectors in Jordan. It recommended doing similar study with different financial ratios in order to determine exactly what factors affecting the financial ratios.
- 2- It could be the political and social factors surrounding Jordan affecting financial performance.
- 3- Stumbling mismanagement or corruption.

Researchers' recommend corporations in services sector to solve the distress through merging with other corporations and reducing capital expending.

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