

A STUDY ON THE PREDICTIONS OF FINANCIAL  
DISTRESS IN MALAYSIA

BY

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DECLARATION

We hereby declare that:

- (1) This undergraduate research project is the end result of our own work and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.
- (2) No portion of this research project has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.
- (3) Equal contribution has been made by each group member in completing the research project.
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DEDICATION

This dissertation is dedicated to:

Our supervisor,

Encik Ahmad Harith Ashroffie Bin Hanafi

For guiding us throughout the way of completing in this research project.

Friends & Families

For giving us their support, encouragement, help, and motivation throughout the way of completion in this research project.

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LIST OF ABBREVIATIONS

AE	Asset Efficiency Ratio
AT	Asset Turnover Ratio,
BLR	Base Lending Rate
CR	Current Ratio
DE	Debt to Equity Ratio
DEBT	Debt Ratio
DV	Dependent Variable
IR	Inventory Turnover Ratio
MDA	Multiple Discrimination Analysis
NPM	Net Profit Margin Ratio
OCF	Operating Cash Flow Ratio
OLS	Ordinary Least Square
PN17	Practice Note 17
QR	Quick Ratio
ROA	Return on Asset
ROE	Return on Equity Ratio

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## PREFACE

Generally, this research study is conducted as part of the requirement to complete the course of Bachelor of Business Administration (HONs) Banking and Finance which is taken by the final year students in Univerisiti Tunku Abdul Rahman (UTAR). UBFZ3026 Research Project, is a compulsory subject for every student to complete before they graduate from the university. This research project took a year to complete, and we are given two long semesters to complete the study. Our topic for this research project is “Prediction of Financial Distress in Malaysia”. The primary aim of this research is to explore into further detail regarding the ability to predict financial distress based on the existing listed distressed companies (PN17). We’ve decided to use financial ratios and macroeconomic variable in the country of Malaysia. The variables involved in this research is to examine whether there is a relationship between predictions of financial distress and financial ratios which are leverage ratio, activity ratio, liquidity ratio, profitability ratio, cash flow and the macroeconomic variable which is base lending rate. We referred to many journals and articles to study the relationship between the dependent variable and independent variable. The results of this research are based on the secondary data collected by World Bank. E-Views played a major role in analyzing and measuring the reliability of the data. Hence, the results generated from the sample were somewhat able to generalize the whole population.

ABSTRACT

Under the provisions of Practice Note 17, issued by the Bursa Malaysia out of 17 companies, only 15 companies fulfilled the criteria of PN17 and were used in this study classified as financially distressed companies. The failure or bankruptcy of financially distressed companies is a serious threat to the many economic agents holding an interest in the distressed companies, namely; shareholders, managers, employees, bankers and client. Business failure involves not only many parties but large cost both direct and indirect. The main purpose of this paper is to use financial ratio analysis variables to predict potential financially distressed firms by using Ordinary Least Square regression model, Logistic Regression Model. However, Stepwise Logit Regression Model was used to run the test again to remain and reassure the significance at 10% significance level. The ability of the model used was analyzed and the findings talks a little deeper as to why we may or may not encourage it according to the period of study. The results demonstrate on the suitable ratio which is significant and is reliable.

## **CHAPTER 1: RESEARCH OVERVIEW**

### **1.0 Introduction**

The primary motive of this research is to explore into further detail regarding the ability to predict financial distress (DV). It is vital that financial distress companies (PN17), current and potential investors, and stock market regulators have mutual understanding on the importance of the particular company's financial distress status. As mentioned above, this particular study is developed with an aim to predict financial distress, which is also known as bankruptcy for the failing corporate sector (PN17). We have decided to use financial ratios and macroeconomic variable in the country of Malaysia. The main purpose of conducting this study is identified in the research background and problem statement. Consequently, we have come up with research objectives and questions to support the study on the factors that causes corporate bankruptcy. This study has developed a brief hypothesis of study to examine whether there is a relationship between predictions of financial distress and financial ratios which are leverage ratio, activity ratio, liquidity ratio, profitability ratio, cash flow and the macroeconomic variable which is base lending rate. This chapter briefly explains on the foundation of the study.

### **1.1 Research Background**

Prediction of financial distress is one the best way in making decision in business firm surroundings. Usually, financial distress prediction models state a mixture of predictive methods and models which includes multivariate logit and probit models, discriminant analysis, neural networks, and survival analysis.



Moreover, certain researchers used market price, financial ratio, and corporate governance as predictors to estimate the distress prior to its situation.

It seems that the quality of direction and knowledge of a company and its management to run the organization efficiently has been established and cited as the leading reasons for failure. Noor, Iskandar, and Omar (2012) have declared that the quality of direction is frequently cited as the starting ground for failure.

Some studies on company operation and company non-accomplishment had cited direction quality as the most essential factor to a long-run success. If the financial distress company manages to survive, they are able to understand and control the amount of increasing risks inherent in current external and financial situation. This shows, that companies must have had efficient control over its operations and productively allocate its resources

Generally in all credit risk prediction models, different model has different variable selection, which is always an important content in the modeling because it has significant impact on the prediction accuracy of models. Financial ratios which are the ratio of two items in financial statements are the most popular ones tried in the past. It proves that a company's financial statement appropriately reports its characteristics, information and financial conditions (Noor, Iskandar, & Omar, 2012)

Furthermore, the source of financial distress and bankruptcy can be divided into 4 major parts, which consist of leverage ratios, activity ratios, liquidity ratios, and profitability ratio. Income Statement and Balance Sheet are often used to obtain financial ratios. In previous study in Malaysia (Mohmad Isa, 2004), four major parts of financial ratios have been used in successfully completing their study.

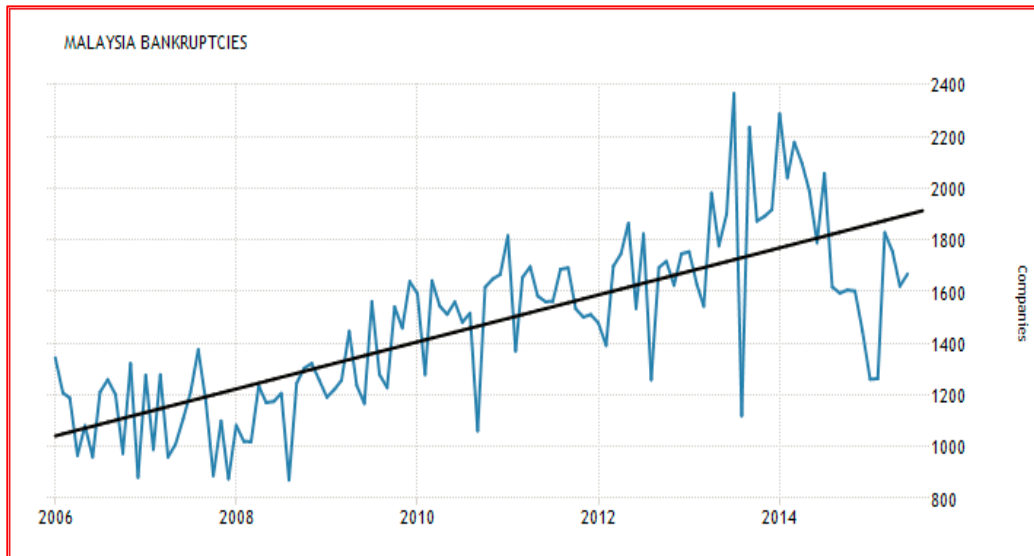
It has been shown by Kane, Richardson, and Meade (1998) that rank transformation of data can be used to guarantee the models are to be less sensitive towards non-normal distribution, although data and financial ratios infrequently have normal distribution. Not only does rank transformation provide financial ratios, but it shows an improvement of the outcome in predicting corporate failure. Moreover, it is useful to ensure that the cash flow data and financial ratios are suitable in comparing with the use of market return (Mossman, Bell, Swartz & Turtle, 1998). It has also proven to have accurate results by using market return data and financial ratios.

Logit analysis is preferred in financial distress and bankruptcy prediction studies where it is rather the probability of presence of failure but it's not only classification that is required (Barnes, 1987). The probability of logit analysis provides us with final result using the coefficients of independent variables. (Zavgren, 1985). It also has the capability to attain the significance of individual variable without requiring it to be multivariate normal, unlike MDA. (Keasey & Watson, 1991).

## **1.2 Problem Statement**

Corporate bankruptcy seems to be an alarming issue in Malaysia lately. Based on the past statistic records, there is an average of 1249.71 companies declared bankrupt from 1998 till 2015. There is an increasing trend of Malaysia bankruptcies rate over the years.

Figure 1.1 Malaysia Bankruptcies



Source: [www.tradingeconomics.com](http://www.tradingeconomics.com)

Companies that have financial problems and fail to resolve their financial issues are categorized under the PN17 (Practice Note 17). Some investors are still uncertain about the list of companies stated under the PN17 category and they are unaware that they are or might be holding the shares of the companies (Hwa, 2010). This is due to lack of analytical studies on the PN17 companies listed (Mohammed, 2012). There are several factors that can affect a company's performance. For instance, real interest rates, cyclical fluctuations, competitiveness and also profit margin. As of April 2016, 15 companies from different sectors are listed under this category.

Investors and shareholders can therefore do their analysis before investing and somehow predict the financial distress using various methods. However, the suitable method used to predict financial distress in Malaysia remains debatable as there are various ratios and variables that can be used. Those ratios and variables vary in accuracy, therefore it would be interesting to do further research on the predictions of financial distress.

## **1.3 Research Objectives**

### **1.3.1 General Objective**

In this research, the main objective is to identify the predictions of financial distress for the corporate sector (PN17) using financial distressed companies as dependent variables as well as financial ratios and macroeconomic variable as the independent variable in Malaysia using Logit model.

### **1.3.2 Specific Objectives**

Following below are the specific objectives:

- a) To examine the most suitable financial ratio under the category of leverage, liquidity, profitability and activity ratios to foresee financial distress.
- b) To examine the efficiency between base lending rate (BLR) and how it predicts financial distress firms in Malaysia
- c) To examine if cash flow ratios are able to rise the predictions of PN17 company failure.
- d) To examine the overall significant relationship between financial ratios and macroeconomic variable in financial distress predictions.
- e) To examine the efficiency and accuracy of Logit model in conducting the analysis and determining the likelihood of companies that will be financially distressed.

## **1.4 Research Questions**

Following are research questions created to meet the objectives of the study. The Research questions include:

- a) Does research identify the most suitable financial ratio under the category of leverage, liquidity, profitability and activity ratio to predict financial distress?
- b) Does base lending rate predict financial distress companies in Malaysia efficiently?
- c) Does cash flow ratios able to rise the predictions of PN17 company failure?
- d) Does financial ratios and macroeconomics have an overall significant relationship?
- e) Does Logit model provide efficiency and accuracy in conducting analysis and determining the likelihood of companies that will be financially distressed?

## **1.5 Hypotheses of the Study**

H1: Liquidity ratios does significantly predict financial distress

H2: Activity ratios does significantly predict financial distress

H3: Leverage ratios does significantly predict financial distress

H4: Profitability ratios does significantly predict financial distress

H5: Cash flow ratios does significantly predict financial distress

H6: Base lending rate does significantly predicts financial distress

## **1.6 Significant of the Study**

Most of the economies around the world had faced a setback and bad financial crisis caused by the outbreak of the global financial crisis which occurred on 2008. This crisis has led to the bankruptcy state of several public listed companies in Asian, Europe, and etc. Consequently, this had lead the economist, financial advisors, and researchers to examine the ability of some companies to survive such crisis, which further leads to the finding of best model and financial indicator that will help the firms to predict the level of financial distress they are undergoing. Since then, this study has been a favorite topic among general scholars as well as those who are into the finance field. Therefore, this paper studies the prediction of financially distressed companies under the corporate sector (P17) Malaysia using both the financial ratios and macroeconomic variable.

In point of fact, firms do not face bankruptcy frequently but however once it takes place it will surely rock the market. For example in Malaysia's case, the most well-known financial scandal took place was the Asian Financial Crisis in 1997. It may have started with the attack of Thai Bhat, but eventually Malaysia also suffered the burn. The consequences of such scandals tend to affect the health of a country's economy, industries, firms and specific individuals as well. An early warning will enable the concerned parties like the government authorities, creditors and managers to take any one of the pre-emptive or corrective actions to evade or alleviate the potential damages which could be experienced (Keasey & Watson, 1991).

Besides the benefit of the firms, this research tends to provide useful information for potential investors who would like to invest in a particular firm. A country's economic condition plays a major role in deciding its rate of bankruptcy. Basically, if a country's economic condition begins to deteriorate, it only indicates to one thing, the increasing rate of bankruptcy in the respective country (Buehler, Kaiser & Jaeger, 2010). Therefore, the venture capitalist are advised to have a look in the financial distress prediction before making their investment decision as it will also secure their return.

A financially distressed firm could face cost connected to the condition, for example like opportunity cost of projects, more exclusive financing or even less dynamic workers. Very often, the borrowing cost will further increase the capital of the firm in such way that it can be costly and challenging as well. Even the employees of such firm will have a very low level of confidence and high level of stress because the increasing chances of bankruptcy which will cost them their job. These kinds of employees ought to be less productive. All of these scenarios can be avoided at once if there is the right model and financial pointer to help determine prediction of financial distress of firms.

## **1.7 Chapter Layout**

This research project consists of five main chapters and they are structured as follow:

### **Chapter 1: Research Overview**

In chapter 1, it provides an overview of this research project by defining research background and further discussion on problem statement.

Besides, this chapter contains objectives, research questions, hypothesis of study, and significance of study to keep up the study of this research.

## **Chapter 2: Literature Review**

In chapter 2, it reviews and elaborates on applicable literatures from multiple journals and articles. Such elaboration includes empirical testing procedures and proposed theoretical framework that is related to our topic.

## **Chapter 3: Methodology**

In chapter 3, it focuses on the various possible methods and how the study is carried out. It demonstrates the ways to conduct research which covers data collection methods and data analysis.

## **Chapter 4: Data Analysis**

In chapter 4, it presents the highlight of the research project which is the test and findings. The research project analyses the data collected on both PN17 companies and non PN17 companies. Along with that, the hypothesis are discussed in a detailed manner.

## **Chapter 5: Discussion, Conclusion and Implications**

In chapter 5, the final chapter of research project where it sums up and concludes on all the major findings and discussions which are related to the hypothesis developed. It comprises the summary of statistical analyses, discussion of major findings, implications and limitations of study as well as recommendations for future research.



## **1.8 Conclusion**

In brief, the first chapter explains the whole concept of the study on the possible ways Malaysia can predict financial distress. As mentioned, the ultimate goal is to discover the factors that predict financial distress for the corporate sector (P17) Malaysia by using macroeconomic variables and several financial ratio. This financial related experiment has developed the hypotheses of study to examine whether there is relationship between Predictions of Financial Distress and financial ratio which are leverage ratios, activity ratios, liquidity ratios, profitability ratios, cash flow and the macroeconomic variable (base lending rate). The previous researchers had found that, there are several other financial ratios which could also predict the financial status of a firm as well. Nevertheless, this study had chosen the ratios mentioned above to conduct the research as they have proved to play a stronger role in predicting firm's financial distress. The respective evidence and reasoning will be further discussed in the following chapter.

## **CHAPTER 2: LITERATURE REVIEW**

### **2.0 Introduction**

The purpose of this study is to analyze the financial ratios (leverage ratio, liquidity ratio, activity ratio, profitability ratio, cash flow ratio and base lending rate) which will be used to predict the financial distress that a firm could endure in near future. The pure reason of this research is to identify whether these financial ratio which are being stated above have any major roles in predicting the financial distress of a firm in our country, this is because most of the financial ratios might reflect the financial condition of a firm. In addition, this study will also identify all the methods and models used by different researchers to carry out their research.

### **2.1 Relevant Theory**

#### **2.1.1 Wreckers' Theory of Financial Distress**

The Wreckers' theory of financial distress explicates the advantages that may outshine of the financial distress especially to stakeholders. It is not an obligatory to regard a distressed firm's negative excess returns to market's inefficiency. Equilibrium phenomenon takes place when a firm overprices the market price to the expected cash flows to its shareholders and this as mentioned earlier need not be referred to capital market ineffectual (von Kalckreuth, 2005).

Participants are able to attain return in the form of non-cash when the firms have possibilities of heading towards bankruptcy.

This is considered the supreme form of disbursement. However once the markets are efficient, it is vital to explore and reveal the returns in the stock valuation (Baimwera & Muriuki, 2014). This is exactly what is meant by Wreckers' theory of financial distress from past researches.

The researchers were basically trying to illustrate a scenario of ship wreckage and profiting from an entirely different outlook. Campbell, Hilscher and Szilagi (2008) portrayed this theory as a phantasm of a company being hit by sequences of negative impacts, therefore causing losses to the company itself and moving closer to a condition whereby the company faces financial distress.

The share prices are volatile with regard to private information especially when leverage is higher. Private information refers to affairs that is undisclosed to the general public and the fate of the firm is said to be relying on it. The presence of asymmetric information causes the investors to leave which in their point of view describes the market for lemons. Akerlof (1970) in his research stated that market for lemons exist due to uncertainty and poor quality goods as well as merchandise hence shrinking the size of market and reduction of good quality goods.

### **2.1.2 Normative Theory of Bankruptcy**

Normative theory is also known as the modern theory of bankruptcy. This theory is closely related to the early stages of the borrowing firm's life with regard to the bankruptcy procedure's results. It is said that higher payoffs are generated to creditors by financially distressed firms than the system that endeavor to liberate economically distressed firms.

Normative theory postulate that the interest rates drop as the creditors payoffs increases due to an efficient bankruptcy system. In addition, the society that desires to make the most of social welfare will want the firms to conduct projects and those that only can raise credit. However, the debt financed firms tend to conduct fewer projects than the expectation of the society because when the firm is doing well, the good state returns be shared with creditors but when the firm isn't doing well, the bad state returns must be handed over to the creditors (Baimwera & Muriuki, 2014). This theory also states that borrower's investment incentives can be improved if the bankruptcy system is efficient. This is due to the drop in interest rate which raises the net expected profits (Alder, 2002).

## **2.2 Review of Literature**

### **2.2.1 Predictions of Financial Distress**

The situation whereby a company is unable to or experiencing difficulties to settle off its liabilities to their creditors is known as financial distress. The possibilities of the company going into financial distress rises especially when the sensitivity of the company's fixed costs and revenue increases towards the economic recessions or assets that are illiquid.

Past researchers mentioned about the main reason of a corporate bankruptcy, which is the company's unhealthy financial position that leads to distress. Therefore it is essential for a company to diagnose the corporate financial distress at the earliest. This is because a company's financial condition is of great interest especially to the auditors, stakeholders, board of directors as well as the investors. Hence, this issue caused a lot of researchers to conduct their research and to study intensively on the corporate bankruptcy or financial distress.

Past researchers did investigate and study on the predictions the financial distress and bankruptcy of firms using financially distressed companies as their dependent variable, while financial ratios and macroeconomic variables as their independent variables. Various methods were used to analyze and to examine the possibilities of a firm being distressed financially such as the Logit Analysis, Z score, Hazard and Multiple Discriminant Analysis.

### **2.2.2 Leverage Ratio**

Leverage ratio, which is one of the financial ratios, is used to measure a company's status in meeting its own financial obligations. A slow geared company is financed by their equity capital whereas a company that is highly geared is usually companies that have prominent borrowing level. Leverage ratio is used to calculate a company's real productivity without taking leverage and tax factors into consideration. If a company is unable to settle payments related to their liabilities besides failing to captivate external finance, they are considered to be highly leveraged and exposed to higher default risk. High leverage ratio indicates that a company is in high financial risk (Khaliq, Altarturi, Thaker, Harun, & Nahar, 2014). Hence, they stress on the importance of this ratio as to predict financial failure of a company.

Leverage ratio was found to be significant in explaining bankruptcy in both Multiple Discrimination Analysis (MDA) and logit analysis according to Mohamed, Ang and Sanda (2001) when they did their research based on a period of 10 years starting from 1987. Past researchers also mentioned that bankers found leverage ratios to be significantly important to both manufacturers and retailers in evaluating and analyzing retail firms.

Debt ratio is the most commonly used leverage ratio in bankruptcy related studies. It is defined by dividing the total debt over total assets and this can be explained as the fraction of a firm's asset that are capitalized by debt. During the early years of research, Beaver (1966) identified that debt ratio is the best discrimination factors that identified 90 percent of firms one year in advance to bankruptcy. Abdullah, Zainudin, Ahmad and Rus (2014) concluded in their research that in order to distinguish distressed and non-distressed firms, debt ratio is always significant regardless the period of which the research is conducted. Alifiah, Salamudin and Ahmad (2013) mentioned in their research that debt ratio is positively related to financial distress.

Besides debt ratio, retained earnings (RA) over total assets (TA) are also used by researchers to measure leverage of a company. A company is considered to have high retained earnings relative to total assets if they have not made use of much debt but capitalized their assets through profit retentions (Altman, 2000).

### **2.2.3 Liquidity Ratio**

Liquidity ratios functions to quantify and scrutinize a company's capability in order to meet their short term liabilities. This ratio mirrors the possibilities of a company whether they are capable of paying back their debts as wells as to reveal the shortage of funds to undergo their daily operations. A company with higher liquidity ratios is definitely better than one that has lower liquidity ratios. Higher liquidity ratios indicates complication in controlling the working capital, however the lower liquidity ratios indicates that the current liabilities exceeded the current asset which possibly causes trouble in resolving their short term obligations. This does not mean that the company will face bankruptcy but it signals that the company is not in competent financial health (Khaliq, Altarturi, Thaker, Harun, & Nahar, 2014).

Liquidity ratio was found to be significant by the past researchers. Both the liquidity ratio, namely the current ratio and the quick acid test ratio has been useful in predicting financial distress.

Yap, Munuswamy and Mohamed (2012) mentioned in their research that liquidity ratios are the most potent ratios in the power discrimination. Low, Nor and Yatim (2001) in their research found that current asset ratio is significant in detecting financial distress but they seem had an afterthought upon the indication of the liquidity ratio. A high liquidity ratio does not manifest that the particular company has plentiful cash to pay back their liabilities. Besides that, some researchers have different ways in interpreting their results. Almansour (2015) found out that current ratio is insignificant and negatively correlated with the bankruptcy possibilities which actually means that the company has lesser chances in entering the bankruptcy zone if they were to have high liquidity.

#### **2.2.4 Activity Ratio**

Activity ratio is used to test the capability of a company to produce sales from the available assets. It also exhibits how a company uses its assets effectively for example selling its stocks in order to generate sales. The lower the activity ratio, the lesser the amount of sales generated by the company and vice versa.

Total assets turnover, stocks turnover, account receivables turnover and account payables turnover ratios are example of activity ratios. Some researchers used inventory turnover, account payable turnover, asset receivable turnover, circulating asset, circulating current asset as well as circulating fixed assets. Shivaswamy, Hoben and Matsumoto (1993) mentioned in their studies that bankers found activity ratios to be remarkably vital for retailer compared to manufacturers.

Based on Mann-Whitney U (MWU) test, activity ratios consisting of total sales over total assets are insignificant in terms of indicator especially when predicting corporate distress (Mbanwie & Edmond, 2009). According to past researcher Almansour (2015), activity ratio is ineffective to predict bankruptcy if it is tested independently. Only with the Z score model it is able to produce an outcome. Therefore, this ratio is considered distinct than the other financial ratios. Total assets turnover ratio that represents asset management has a negative relationship with financial distress (Alifiah, Salamudin & Ahmad, 2013; Almansour, 2015).

### **2.2.5 Profitability Ratio**

Profitability ratio is commonly used not only to determine the company's return investment, but also to specify the ability and health of a company. This will help the company to earn satisfactory profit which will be shown through its return on assets. This ratio generates more towards the earnings rather than the expenses and other relevant cost incurred a certain period of time. Just by observing a company's profitability ratio, it can help investors determine as to how effective a company can manage its assets. Companies with a great profit have lesser tendency to experience bankruptcy. Therefore the probability ratio and financial distress are negatively correlated. According to Sori, Hamid, Nassir and Mohamad (2001) and many other researchers, profitability ratio is one of the important ratios and it is significant to determine bankruptcy.

This ratio is also the best and easiest way of measuring the profit of a company through profit against sales, assets, and equity. Typically when a company continuously faces losses, then it is a known fact that it would sooner or later bring major failure.



Therefore, it is obvious that the larger the losses become the larger possibilities of failure. Nonetheless, if the company has increased in profit it shows growth. According to (Noor & Iskandar, 2012), the return on asset (ROA) ratio turned out to be an important indicator when the researcher analyzed the data using both logit and hazard models. However, the sign of the ROA coefficient were not the same between both the models.

Additionally, most researchers found ROA to be significant as well. However, ROA is idiosyncratic whereby it has the propensity of analyst to cornerstone the performance based on single years. In order to segregate idiosyncratic returns, researcher should analyze these ratios averaging over a number of years as well as to attempt finding patterns in the data.

### **2.2.6 Cash Flow**

Cash to asset and cash to current liabilities represented by the cash flow ratio is an alternative way used to measure the distress and non-distress companies' short term solvency. Sori, Hamid, Nassir and Mohamad (2001) and Low, Nor and Yatim (2001) discovered that cash flow ratios have positive outcomes in their studies. Cash flow and profitability of bankruptcy are expected to have a negative relationship. So, if the level of cash flow rises, the profitability of bankruptcy will decline subsequently. For those stakeholders who might be particularly interested in a firm, could know about the firm's financial position with the aid of cash flow, as it is said to be 'early warning' sign of failure. It is reported by Gombola and Ketz (1983) that there are a certain number of information provided by the cash flow from the operation ratio and is not explained by other accrual ratios. Moreover, Gentry, Newbold, and Whitford (1987), affirmed that cash flow ratios can be ponder, in order to explicate the illness of a company as well as its financial health.

The cash flow ratio has significantly prescient abilities in financial distress related models Gilbert, Menon and Schwartz (1990). Compared to the other ratios, cash flow ratio has always been one of the most popular ratios among the researchers. Cash flow ratio was considered as one of the significant ratio in explaining the bankruptcy which occurred in Malaysia during the era of 1987 to 1997 (Low, Nor & Yatim, 2001). A study was led by Mossman, Bell, Swartz and Turtle in 1998 whereby they contrasted four different types of bankruptcy prediction model that are based on financial statement ratios. Cash flow ratio however turned out to be the most prominent in differentiating the bankrupt and non-bankrupt firms.

Besides that, financial ratios which are obtained from the financial statement, especially the cash flow ratio might be subjected to earning management. A firm's financial result can be manipulated by the management to meet its programmed goals (Lee & Yeh, 2004). Different firm may apply various accounting treatments, thus the firms which are using identical ratios should not be compared when it comes to decision making. Additionally, financial ratios are calculated using the financial data over years due to the ratios themselves representing the incompetence of firms to meet the requirements. Gilbert, Menon and Schwartz (1990) debated that using the financial ratio alone may lead to the insufficiency of information content and model misspecification for prediction purpose.

The prediction tests result showed that cash flow to total debt is one of the ratios that have strong ability to forecast failure. Therefore, it was summarized that the cash flow ratios server as a measure to identify possible downfall of a company.

### **2.2.7 Base Lending Rate**

The recent macroeconomic variable used by a local researcher in his study is the Base Lending Rate (BLR). The services and trading sectors in Malaysia were the dependant variable used by the researcher. The results proved that the base lending rate is significant in detecting financial distress among all the other macroeconomic variables used. Alifiah (2014) mentioned that the higher the base lending rate is, the higher the possibilities that the services and trading sectors companies in Malaysia will be financially distressed. However, there were lack of research and journals regarding how the base lending rate affects the financially distressed companies especially in Malaysia. This is mainly due to data unavailability from the reliable sources.

## **2.3 Empirical Testing Procedures**

### **2.3.1 Logit Regression Analysis**

Logit analysis is an alternative approach to the Multiple Discriminant Analysis (MDA) whereby it is extensively used to predict financial distress. This model is able to conquer the MDA limitations. Logit analysis results are much easier to be interpreted as compared to the Z-score model. The probability values lies between 0 and 1 for all values Z in the P (Z) unlike resulting it in a group as the MDA model does (Alifiah, Salamudin & Ahmad, 2013).

Logit Analysis also provides the presence of probability of an outcome described by a divided dependent variable using coefficients of the independent variables Alifiah (2014). Logit model are being used to predict the financial distress based on weighted majority voting accumulation of multiple classifiers which are widely used to go through classification problems with two classes.

Predictions on corporate bankruptcy and defaults on Malaysian companies in 2001 are correctly classified at 81% and 74% for the analysis and holdout samples respectively using the logit method (Mohamed, Ang & Sanda, 2001).

### **2.3.2 Altman Z-score**

Z-score is ordinarily used model to predict bankruptcy and also to measure financial distress. The Z score model and its warning signs have the capability in identifying corporate problems at an early stage to help avoid any financial difficulties (Ray, 2011). This model is specifically catered to the five similar independent variables, which are financial ratios and rates that are well recognized by the dependent variable. According to The Altman's Z-Score, this substantial method was developed by Dr. Altman in year 1968. It is a standardized formula to estimate the possibilities of the company entering into bankruptcy in the forthcoming two years based on its financial health. In short, Z-score is also known as Z.

This model focuses on the variances between financial ratios specifically; current ratio and debt ratio in order to examine the difference of financial situation between the successful companies and PN17 listed companies. Past studies reveal that there is strong correlation between the current ratio and Z – Score. Muhammad Suleiman in 2001 mentioned in his research that current ratio and debt ratio are positively correlated to with financial distressed.

Following is the formula to detect Z score.

$$Z = (1.2X1) + (1.4X2) + (3.3X3) + (0.6X4) + (1.0X5)$$

Companies that scores 2.99 and higher falls into the non-bankrupt category, while companies that have a score anything below 1.81 are definitely distressed. "Zone of ignorance" or "grey area" is defined as the area between 1.81 and 2.99.

Altman's model proposes that a company has a greater risk of bankruptcy when it has lower observed Z-score. However, financial distress can be easily determined when the result shows a significant relationship between both variables and Z. It is also recommended by Edward and Hotchkiss (2010) that the Z-Score model is an accurate forecaster to predict distress up to two years prior to bankruptcy.

### **2.3.3 Hazard Model**

Discrete hazard model is used to examine and analyze binary data, as well as observations of cross sectional and time series especially bankruptcy related data. Hazard model can be said as something similar to logit model, as both have identical functions and asymptotic variance-covariance matrix. However, hazard model varies in its own way whereby this model uses a company's yearly observations instead of using assorted time covariates. Due to this, hazard model has its own advantages (Shumway, 2001). This model uses company-year observations which enable it to extinguish needless sample selection bias and creates more logical as well as efficient estimation of coefficient. Since all the available data in each year is used in the analysis, it is viable to track any changes in probability of bankruptcy. According to Abdullah (2005), in a sample they used in their studies showed that the hazard model is able accurately classify 100% of insolvent companies as well as 84.7% of the solvent companies.

Similarly, Abdullah, Halim, Ahmad and Rus (2008) found that the accuracy rate of hazard model is way higher than that produced by other methodologies and it also precisely predicted 94.9% of the cases studied. Shumway (2001) also establish that hazard model is superior to the Multiple Discrimination Analysis (MDA) and logit models as he managed to overcome econometric problems by using this model to predict distress or bankruptcy.

It is said that in a hazard model, the dependent variable consists of two separate parts. First is the event indicator and the other is the measure of time, which in this case refers to the amount of time being spent in a non-bankrupt group. It is also proven in previous studies by other researchers that unlike other static models, a company's risk for bankruptcy varies from time to time in a hazard model. Its health functions are based on its age and latest financial data. Shumway (2001) in his studies revealed that the proposed hazard model is unbiased and consistent while the static models tend to produce biased and estimation of inconsistent bankruptcy probabilities.

### **2.3.4 Multiple Discriminant Analysis**

Multiple Discriminant Analysis (MDA) is a multivariate technique that uses numerous variables in chorus to categorize observations into one immense group, as if to reduce the variables and classify them into a broad group. As mentioned above, MDA is a statistical technique which is used to lessen the differences between variable in order to categorize the failing and non- failing companies under the study into a specific set numbers of board groups. In 1970s to 1980s, it was widely used to predict corporate failure. Edward Altman was the first researcher to initiate a multivariate statistical model to distinguish the solvent firms from the non-solvent firms in 1968.

Besides that, he was also the first one who used multivariate in studies to predict financial distress. MDA was used by Altman to develop a model to foresee the bankruptcy; namely the “Z-score” model, which forecast bankruptcy if the company’s score fell within a certain array. The initial sample of the MDA used by Altman consists of 66 firms with 33 firms in each group (solvent and insolvent group). The model was exceptionally precise in categorizing 95 percent of the total sample correctly one year prior to failure (-1 year).

The Multiple Discriminant Analysis (MDA) grows into a domain method for corporate failure prediction in 1980s. Andreev (2006) mentioned that the formula has been extensively used in variety of context as well as countries from 1985 onwards, because it was widely acknowledged by courts, management accountants, auditors, and data base systems in which loans is assessed in. In recent years this technique has turn out to be well known in the practical business world and in academic world as well. Altman (1968) started to use MDA to identify companies into known categories and showed that bankruptcy could be described rather completely by a combination of 5 financial ratios, which built the famous z-score model.

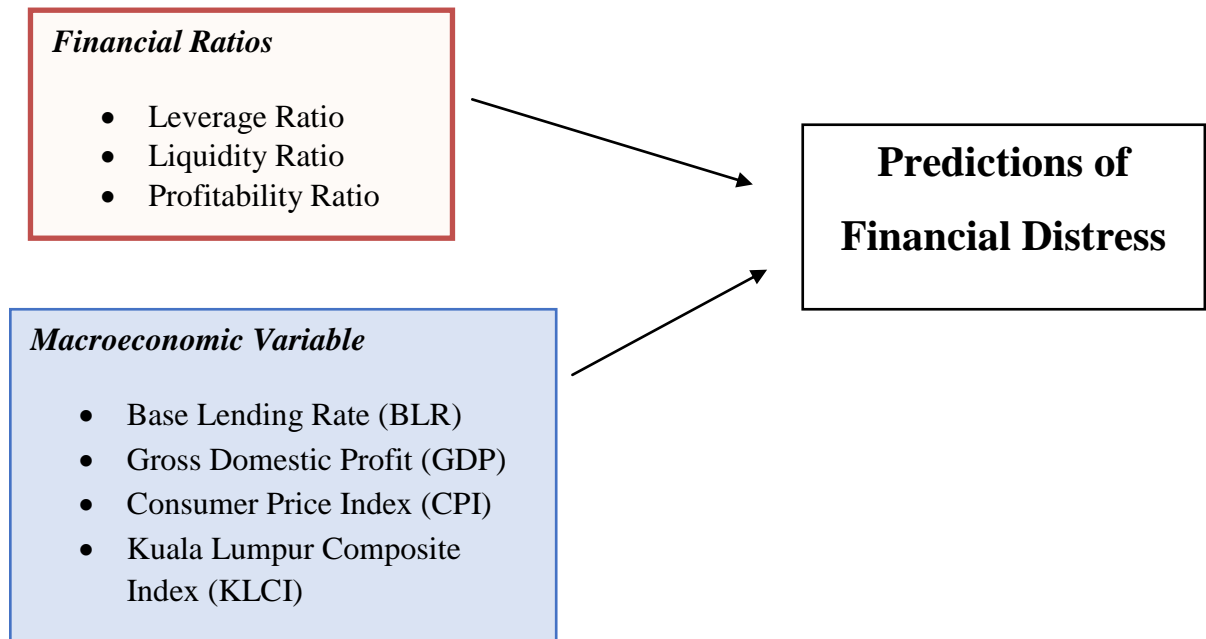
Multiple Discriminant Analysis was used by Sori, Hamid and Nassir (2006) and Yap, Yong and Poon (2010) in their studies. Sori, Hamid and Nassir (2006) showed the model was successful in foreseeing the firm’s health at the rate of 88 % while Yap, Yong and Poon (2010) revealed high accurateness in between 88% to 94 % for five years prior to failure. However, more advanced statistical model was used recently and MDA still remains to be a reliable and potential statistical tool. In recent times, Altman (2002) re-examined Altman (1968) Z-score using three samples. It was concluded that the precision of the discriminant model arrays from 82% to 94% in the first year before financial distress, while in the second year the accuracy of the model falls to an array between 68% and 75%.

Apart from that, MDA has a benefit of possibly yielding a particular model with a comparatively small number of selected measurements which convey an abundant deal of information.



## 2.4 Proposed Theoretical/Conceptual Framework

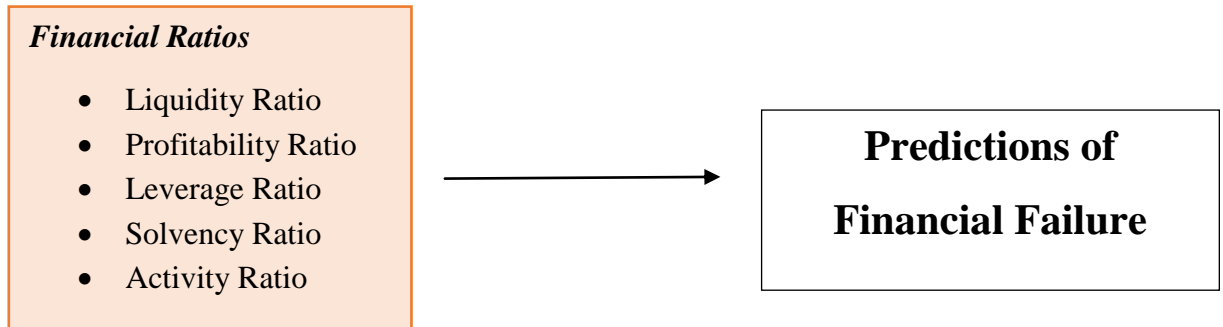
Figure 2.1: Proposed Conceptual Frameworks for Predictions of Financial Distress in Malaysia



Source: Alifiah, M. N. (2014). Prediction of financial distress companies in the trading and services sector in Malaysia using macroeconomic variables. *Procedia-Social and Behavioral Sciences*, 129, 90-98.

Figure 2.1 shows that both the financial ratios and macroeconomic variables are used to predict insolvency of firms. Each component in the financial ratios including leverage, liquidity, and profitability as well as the macroeconomic variables Base Lending Rate (BLR), Gross Domestic Profit (GDP), Consumer Price Index (CPI), and Kuala Lumpur Composite Index (KLCI) are proven to be significant independent variables used by the past researchers to predict financial distress.

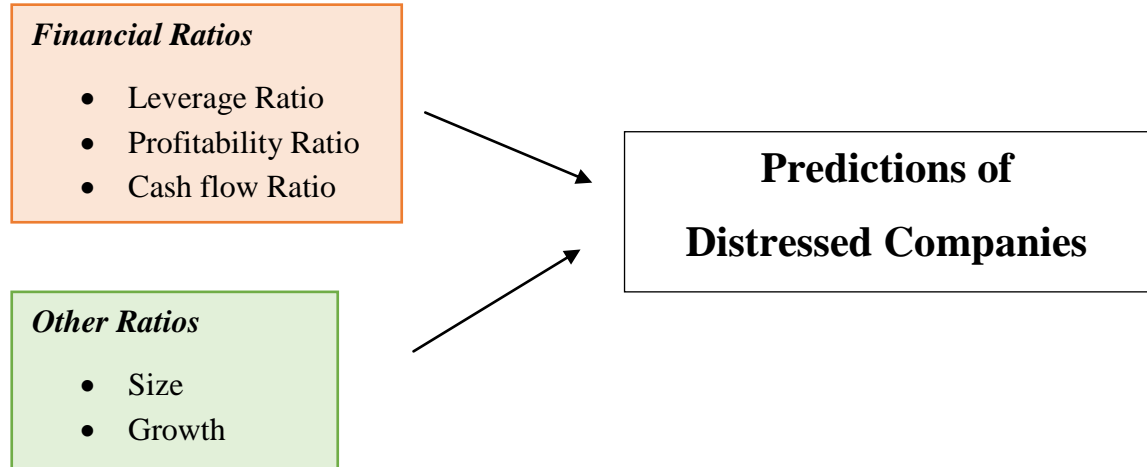
Figure 2.2: Proposed Conceptual Frameworks for Predictions of Financial Failure in Jordan



Source: Almansour, B.Y. (2015). Empirical model for predicting financial failure. *American Journal of Economics, Finance and Management*, 1(3), 113-124.

Figure 2.2 shows that financial ratios used by the past researcher. The research was done based on 22 public listed companies from 2000 till 2003 consisting of both solvent and non-solvent companies in Jordan. The analysis was conducted based on several ratios such as the liquidity, profitability, leverage, solvency and activity ratios.

Figure 2.3: Proposed Conceptual Frameworks for Predictions of distressed companies in Malaysia



Source: Abdullah, N.A.H., Rus, R.M., & Ahmad, A. (2009). Factors contributing to financially distressed companies in Malaysia. *International Journal of Management Studies*, 16(2), 225-242. Retrieved from <http://ijms.uum.edu.my/images/pdf/16no2ijms/ijms16210.pdf>

Figure 2.3 shows the independent variables used by the researchers in identifying factors contributing towards financially distressed companies. The ratios were chosen based on the popularity from previous studies. The additional two other ratios which are the size and growth is proven to have negative relationship with probability of bankruptcy. For instance, the larger the size of a firm and the greater the growth of a firm, the lesser the possibilities of bankruptcy.

## 2.5 Hypotheses Development

### 2.5.1 Leverage Ratios

H1: Leverage ratios does significantly predict financial distress

We have decided to use debt to equity and debt ratio to represent the leverage ratio. This ratio will detect how committed a particular company in repaying its long-term debt. Evaluating a company's health is frequently uses leverage ratio. Not only does it measure the ability to meeting and fulfilling finance obligation, also it observes whether it is heavier on equity investors or debt financing, using the finance structure as a guide. If the ratio were to be at a high percentage, it shows that company is too reliant on creditors rather than the capital given. It also has a great influence to the lenders. Generally, company will be stated as unhealthy, if ever the ratio hits 2. As or debt ratio, we have discovered a good study on why debt ratio will give us an accurate result, below is a situation based on yearly prior to distress. When a company has three-year prior to distress, it is certain that more variables are found significant. However, as the companies face the distress situation nearer, there are important variables being emerged, but less in number. Two-year prior to distress, a few variables remain significant. However, when it came to one-year prior to distress, the only ratio that could foresee financial distress companies is the debt ratio. Therefore, this ratio has found to be steadily significant in all period.

## **2.5.2 Activity Ratios**

H2: Activity ratios does significantly predict financial distress

As for Activity ratio we have included inventory turnover ratio and asset turnover ratio to help investigate the result. This ratio helps assist on how the company manages and utilizes its resources effectively. Studies have shown that activity ratio is rarely used to predict financial distress.

## **2.5.3 Liquidity Ratios**

H3: Liquidity ratios does significantly predict financial distress

We have taken account of current ratio and quick ratio to symbolize Liquidity ratio. It shows how efficient and capable a company is when it comes to handling short-term debt obligation. Distinct quick ratio, current ratio gives us a simple break down by dividing current asset and current liability, hence is easy to monitor the financial soundness. It is proven that a high percentage or ratio shows that a company has more liquidity. In addition, the general rule is to gain a percentage of 2 or more for it be considered healthy and ratio being less than 1 indicates a red light.

### **2.5.4 Profitability Ratio**

H4: Profitability ratios does significantly predict financial distress

We have comprised net profit margin and returns of earning to help with our experiment. It overviews on how wisely used the assets and revenue to control the expenses of the company in order to generate a positive return.

### **2.5.5 Cash Flow**

H5: Cash flow ratios does significantly predict financial distress

We have obtained operating cash flow and asset efficiency to help provide sufficient outcome. This ratio is the most important to investors. This is because, it provides information on the reaction of investors towards owning company share and cost of issuing share. This highly concerns the shareholder regarding their return on investment. Also the relationship between value and return of investors share held in a company. According to (Beaver, 1966), different level of success in predicting bankruptcy is found when there are several ratios involved. Nevertheless, the inflow and outflow have the ability of delivering a clear and valuable information and indication on the financial condition even before it going down the drain. Gilbert, Menon and Schwartz (1990) points that cash flow variables have proven to have significantly predict the model of financial distress.

### **2.5.6 Base Lending Rate**

H6: Base lending rate does significantly predicts financial distress

Just like Alifiah (2014), we too have considered macroeconomic variables to help give a little depth to the study. It is a known fact that, the greater the base lending rate shows, the greater the chances of trading and service sectors of going through financial distress. However, our assumption on base lending rate being active in our study is poor.

## **2.6 Conclusion**

During the course of this research, it was a crystal clear indication that all the financial ratios did play a major role in predicting the financial distress of a firm. Based on the studies which were done by various researchers, it can be confirmed that financial ratios are indeed the outmost important variables in predicting a firm's financial distress. In the subsequent chapters, this study will discuss more about the above matter in detail.

## **CHAPTER 3: METHODOLOGY**

### **3.0 Introduction**

This chapter concentrates on the methodology and the ways on how the research project is being carried out. It focuses in data collection and the different approaches used to obtain the data. Data is extremely important in research studies as it includes most of the information, which are being used in this study. The companies' annual report was collected from Bursa Malaysia as a secondary data, which also belongs to the panel data. Theoretical model is very important to achieve successfulness in research. This chapter will describe in detail about the theoretical models.

### **3.1 Research Design**

A research that is most likely to be done within a conceptual structure is known as research design in general. Research design can be defined in general as a conceptual structure within which a research is most likely to be done. Research design was define by Burns and Grove (2003) as a map that can be used to direct a study while having an outmost control over the factors that have the chances to hamper with the validity of the outcomes. While, research design can also be termed as a blueprint which terms research design as a plan that tells how, when and where all the data are to be gathered and examined (Parahoo,1997). Then again, research design can be categories into quantitative, qualitative and mixed methods. However, in our study we are using quantitative method due to numeric and quantity data to conduct the research.



The quantitative data has been conquering as the research method in western cultures since its emergence around 1250 (A.D.). Leedy and Ormrod (2001) assumed that, all the surveys and experiments are precise in quantitative research, as it builds upon existing theories.

Besides, according to Creswell (2003) which is based from another research, the methodology of a quantitative research conserves the theory of an empirical paradigm. Furthermore, mathematical and statistical are used in qualitative research design to evaluate and analyze data. In quantitative research, the purpose is to determine the relationship between the independent variables, which are the macroeconomic variables, and financial ratios while the dependent variable is financial distress companies.

In this research, we are using secondary data, which is available in Bursa Malaysia. The main reason we are using secondary data because its time saving, easy accessibility to obtain it and it is more reliable compared to the primary data. We will be using three types of panel data, which are OLS Model, Logit Model, and Stepwise Logit Regression to conduct the test in this research paper.

### **3.2 Sampling Design**

Practice Note 17 (PN17) companies consist of companies that have poor financial management and performance throughout the years that caused them to be financially distress. Companies that did not meet the Bursa Malaysia minimum requirements and criteria are to be classified under this category. The regulator of Malaysia's stock market formed PN17 category back in 2005. The data sampling for our research are from 12 consequent years from 2004 until 2015 as 2015 is the most recent year among the available financial statements of the listed companies in the official Bursa Malaysia webpage.

The financial statements can be obtained from the company's annual report. Those figures in the annual report are useful to us to calculate and predict the upcoming financial distress years before and after it has been listed in the PN17 category. The independent variable chosen (the leverage, activity, liquidity, profitability, cash flow ratios and base lending rate) are vital to be calculated in order to forecast the company's performance as well as to match the Bursa Malaysia criteria.

Table 3.1: List of PN17 companies

Companies
Asia Knight Berhad
CN Asia Corporation Berhad
EKA Noodles Berhad
HB Global Limited
Java Berhad
Kinsteel Bhd
Kuantan Flour Mills Berhad
Lion Diversified Holdings Berhad
Maxwell International Holdings Berhad
Nakamichi Corporation
Perwaja Holding Berhad
Perisai Petroleum Teknologi Berhad
Petrol One Resources Berhad
Stone Master Corporation Berhad
YFG Berhad
MAA Group Berhad
Malaysia Pacific Corporation Berhad

Source: <http://www.bursamalaysia.com/market/listed-companies/list-of-companies/pn17-companies/>

Out of 17 companies listed in Bursa Malaysia, only 15 companies were used in this study. The reason was that two companies (MAA Group Berhad and Malaysia Pacific Corporation Berhad) falls under financial and property development firms. These company's assets are different from the other nonfinancial companies. According to past researchers, financial firms are excluded from quantitative studies due to high leverage. The high leverage term may be normal for financial firms but as for the nonfinancial firms as it more likely reflects distress (Fama & French, 2012).

Table 3.2: Description of the independent variables

Independent Variable	Ratios	Descriptions	Formulas
Leverage ratio :	Debt to equity ratio	Debt to equity ratio of the PN 17 companies. This ratio measures the riskiness of a business's capital structure in terms of the relationship concerning the funds, which are supplied by the creditors and investors (Fraser and Ormiston, 2004).	$\frac{\text{Total Debt}}{\text{Total Equity}}$
	Debt ratio	Debt ratio of PN the 17 companies. The proportion of all assets that are financed with debt are considered in this ratio (Fraser and Ormiston, 2004).	$\frac{\text{Total Debt or Total Liabilities}}{\text{Total Assets}}$

Liquidity ratio :	Current ratio	Current ratio of PN the 17 companies. It is used to measure the firm's ability to meet its debt obligation. The source of the available cash to meet this requirement must come mainly from cash or conversion to cash of other current assets (Fraser and Ormiston, 2004).	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$
	Quick or Acid Test ratio	Quick or Acid Test ratio of PN the 17 companies. This ratio basically measures a firm's capability to generate cash to meet its current liabilities, a higher ratio indicates the firm's greater liquidity (Coltman and Jagels, 2001)	$\frac{\text{Current Assets} - \text{Inventories}}{\text{Current Liabilities}}$

Activity ratio :	Inventory Turnover	Inventory Turnover of PN the 17 companies.	$\frac{\text{Cost of Sales}}{\text{Average Inventory}}$
	Total Asset Turnover	Total Asset Turnover of PN the 17 companies. This ratio measures the efficiency off managing a firm's entire assets (Fraser and Ormiston, 2004).	$\frac{\text{Sales}}{\text{Total Assets}}$
Profitability ratio :	Return on Equity (ROE)	Return on Equity (ROE) of PN the 17 companies. It measures a firm's return to its shareholders (Fraser and Ormiston, 2004).	$\frac{\text{Profit After Tax or Net Income}}{\text{Total Equity}}$
	Net Profit Margin	Net Profit Margin of PN the 17 companies. This ratio basically measures a company's profitability after the consideration of its revenues and expenses which includes interest, tax and non-operating items (Fraser and Ormiston, 2004).	$\frac{\text{Profit After Tax or Net Income}}{\text{Sales}}$

Cash Flow Operating Ratio:	Cash Flow ratio	Operating Cash Flow ratio of PN the 17 companies. It measures the firm's ability to generate cash after a period of time. Casey and Bartczak (1985) suggested that 40 percent or more (amount of cash generated) is common for healthy firms.	$\frac{\text{Cash Flows from Operations (CFO)}}{\text{Sales}}$
	Asset Efficiency ratio	Asset Efficiency ratio of PN the 17 companies. It was noted by Gilbert et al. (1990) that the cash flow variable has a significantly foretelling ability in the financial distress models.	$\frac{\text{Cash Flows from Operations (CFO)}}{\text{Total Assets}}$
Base Lending Rate		Base lending rate is found to be significant in predicting financial distress in Malaysia.	(Adapted from <a href="http://www.bnm.gov.my">www.bnm.gov.my</a> )

One of the most widely used ratios in financial sectors is leverage ratio, which measure the amount of capital that a company can generate from its debt. Breuer (2000), thus the leverage ratio can also be thought has stated it as a measure of balance sheet or, precisely to the extent, that it also contains off-balance-sheet revelations of economic leverage. Liquidity ratio also has similar popularity as the leverage ratio. In simple words, it is used to measure a corporation's capability to settle its debts. If you have more liquid assets to cover short-term liabilities, there are higher chances that you will be able to pay debt that you owe and will still be able to run your other ongoing operations without any lack of resources. A company with a high liquidity ratio will not face any problems when it comes to paying their short-term debt. However, businesses with a low liquidity ratio might face difficulties in paying their short-term liabilities.

Activity ratio is also another financial tool used by the researchers. It measures on how excellently a company is using its assets. For example, like selling its stocks in order to generate sales. Profitability ratio is without a doubt is the most widely used as well as the outmost popular ratio among the others. A firm's capability on how much earnings it could produce compare to its expenditures and other related cost which mostly incurred during a certain time

The cash to asset and cash to current liabilities represent the cash flow ratio. It is used as an alternative to measure the short-term solvency for distress and non-distress companies. Base lending rate is a rate decided by the banks in a country depending on the amount it would cost for them to borrow the money and lend it to the borrowers. In simple term, BLR is known as an amount of interest rate that needs to pay by the borrowers to the bank when they acquire the loan.

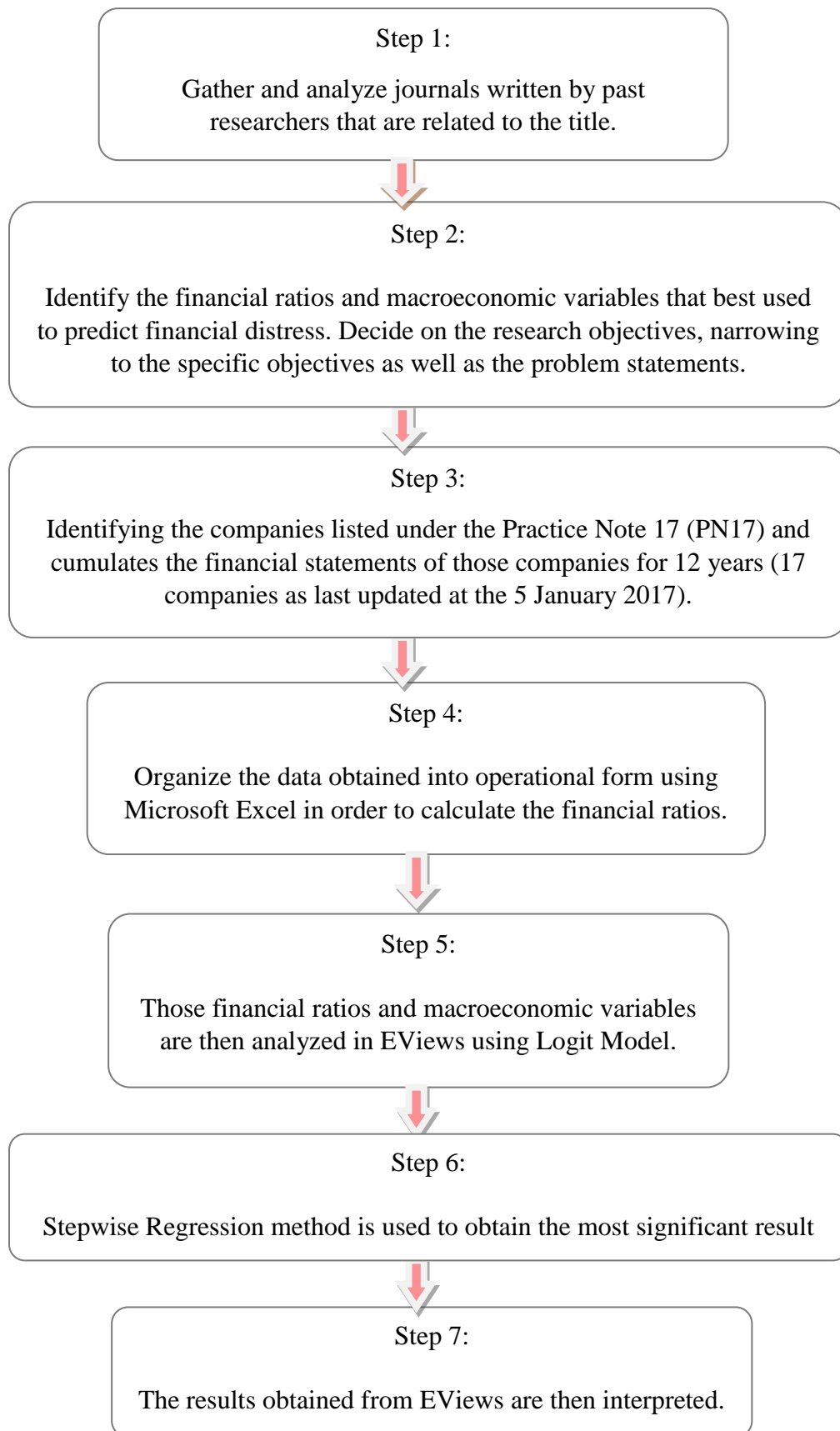


### **3.3 Data Processing**

Throughout the study, we managed to acquire and researched on approximately 90 to 100 journals that relates to our topic, Predictions of Financial Distress either using Logit Model or other significant models to get a better idea as well as an overall understanding on the research. We surfed the Bursa Malaysia official website to check on the companies listed under the PN17 category. Based on our research, there are 17 companies classified under PN17 that had insolvent financial performance. Financial statements of the 15 companies (two excluded due to finance and property firm) from the period of 2004 until 2015 were obtained. The 12 years of financial statement collected were in terms of Ringgit Malaysia (RM).

All the data obtained from the financial statement are then used to calculate the financial ratios. In order to run the hypothesis testing under Logit Model, we used EViews. The results obtained were then interpreted with further explanations to identify the vital factors for predicting and forecasting the company's financial status.

Figure 3.1 Diagram of data processing



### **3.4 Data Collection Method**

As for this research paper, we decided to use five types of financial ratios including the leverage ratio, activity ratio, liquidity ratio, profitability ratio as well as the cash flow. We have also included the base lending rate as the macroeconomic variable. We referred to the Bursa Malaysia webpage for the updated list of Practice Note 17 (PN17) companies. The PN17 companies' we chose for our studies consists of 15 companies and we managed to obtain the annual report as well as the financial statements of all the 15 companies from 2004 until 2015, a period of 12 years. As for the Base Lending Rate (BLR), we manage to obtain the statistics from the Bank Negara Malaysia official webpage ([www.bnm.gov.my](http://www.bnm.gov.my)). We used EViews software to analyze and calculate the logit model.

This research paper requires us to use secondary data. Secondary data are primary data that has been statistically calculated and analyzed by researchers. We managed to acquire the relevant information from Bursa Malaysia ([www.bursamalaysia.com](http://www.bursamalaysia.com)) database.

### **3.5 Data Analysis**

#### **3.5.1 Descriptive Analysis**

According to Glass and Hopkins (1984), it was said that descriptive research consist of collecting data that describes events and later systematizes, tabulates, portrays and illustrate the data collection. Borg, Gall, and Gall (1989), believed that the aim of descriptive studies is to find out about the importance of observations, and the commonly used technique to collect descriptive data is through survey methods. Moreover, the three main reasons in doing a research is to illustrate, clarify and as well as certify the outcomes.

Innovative investigation creates a path, which leads to the emergence of description and assists to arrange the results so that the explanation can be appropriate with the outcomes and then check or certify those explanations (Krathwohl, 1993).

Besides that, multiple variables can be used to conduct an analysis in descriptive research, which makes it to be similar to the other types of analysis, but however unlike other techniques, only a single variable is needed in this analysis (Borg, Gall & Gall, 1989). The number of variables employed is what makes descriptive research to be exclusive. Many well-known researcher such as Appiah and Abor (2009), Altman (1968), Mutchler (1985), Koh, and Killough (1990) commonly used this analysis.

### **3.5.2 Correlation Analysis**

The measure of the relationship between two or more variables is known as correlation. Karl Pearson was the first person who described the coefficient of correlation in 1896 (Hauke & Kossowski, 2011). Pearson correlation can be said as one of the most useful statistics to conduct a research. In addition to that, Pearson Karl also acknowledged Francis Galton's concept of correlation as well as Auguste Bravais's contribution in his own work in developing mathematical theory of correlation (Denis, 2001). The relationship between two continuous variables can be quantified by using this test, in which the continuous variable can be connection between two independent variables or between an independent variable and dependent variable. A clearer picture about the relationship among a firm's practices and their performances can be obtained using correlation analysis (Gavrea, Ilies and Stegorean, 2011).

We extracted the relevant data from the 15 companies' financial statement and balance sheet as stated in the Bursa Malaysia web page. Overall, we are using Microsoft Excel to tabulate and calculate the financial ratios.

The financial ratios that we are using in this study is debt to equity ratio, debt ratio, current ratio, quick or acid test ratio, inventory turnover ratio, asset turnover ratio, return on equity ratio, net profit margin ratio, operating cash flow ratio, and asset efficiency ratio which are 10 in total.

### 3.5.3 Models

#### 3.5.3.1 Ordinary Least Squares (OLS) Model

Past researchers use least squares estimators as a part of their research because it is Best Linear Unbiased Estimator (BLUE). BLUE helps in studies as they are unbiased, have minimum variance, consistent and are efficient estimators. OLS regression has been proven the most precise and unbiased estimates considered the assumptions being fulfilled. The OLS prediction model is extracted from Pohlman and Leitner (2003) and Abdullah and Ahmad (2005).

$$Y_i = \beta'x_i + \mu_i \quad (1)$$

Where,  $Y_i$  = non distressed if  $Y_i > 0$

$Y_i$  = distressed, otherwise

$x_i$  = financial ratios of companies

$\mu_i$  = error term

Equation (1) represents the financial ratios of listed companies that are weighted. As in this research, we are referring to data across 12 years and of 15 PN17 companies. Therefore, pooled least square model best fits this study. Pooled data consists of cross sectional data of company ratios at different times. The pooled analysis in this study is considered a cross sectional dominant because the temporal units are fewer than the cross sectional units.

There are a few reasons why pooled data are used in quantitative studies. The main reason is that pooled analysis allows researchers to vary in both time and space simultaneously instead of just calculating financial ratios of 15 companies at that one point or testing 12 years of data for one company using time series data. Overall, the pooled model is able to test several companies through time (Pennings, Keman & Kleinnijenhuis, 1999).

### 3.5.3.2 Logit Model

Logit model was proven highly accurate in forecasting companies that are financially distressed. The prediction model has been used by Ohlson (1980), Nam and Jinn (2000) and Abdullah and Ahmad (2005) in their studies.  $P_i$  represents the probability of non-distress companies'. The non-distress companies' likelihood function is illustrated below in equation 2.

$$P_i = \frac{1}{1+e^{-y_i}} \quad (2)$$

Where,  $Y_i = \beta'x_i + \mu_i$

As mentioned earlier, if  $P_i$  represents the probability of non-distress companies', then  $(1-P_i)$  is the otherwise whereby it represents the probability of distressed companies. The probability of distressed companies' is expressed in equation 3.

$$1 - P_i = \frac{1}{1+e^{-y_i}} \quad (3)$$

If the calculated logit model has a probability, less than 0.5, then the company is categorized as non-distressed. However, if the company has a probability of more than 0.5, then the company is definitely under financial distress (Abdullah & Ahmad, 2005).

### 3.5.4 Evaluation of Probit and Logit Models

There is no measure of goodness of fit equivalent to  $R^2$  in maximum likelihood estimation.

### 3.5.5 Pseudo R-squared

Compare the value of likelihood of the full model with an empty model:

$$M(\text{full}): P(Y=1 | X) = F(\beta_0 + \beta_1 X_1 + \dots + \beta_p X_p)$$

$$M(\text{empty}): P(Y=1 | X) = F(\beta_0)$$

$$\text{Pseudo R-squared} = 1 - \frac{\log L^{\max}(\text{Full})}{\log L^{\max}(\text{Empty})}$$

(Also known as McFadden R-squared)

### 3.5.6 Likelihood Ratio Test

The likelihood Ratio (LR) statistics for  $H_0 : \beta_1 = \dots = \beta_p = 0$  is

$$LR = 2 \{ \log L^{\max}(\text{Full}) - \log L^{\max}(\text{Empty}) \}$$

We reject  $H_0$  for the large values of LR.

The LR statistics can be used to compare any pair of two-nested model.

Suppose that  $M_1$  is a sub model of  $M_2$ , and we want to test  $H_0 : M_1 = M_2$ .

Then, under  $H_0$  :

$$LR = 2 \{ \log L^{\max}(M_2) - \log L^{\max}(M_1) \} \underset{\sim}{d} \chi_k^2,$$

Where  $k$  is the number of restrictions (i.e. the difference in number of parameters between  $M_2$  and  $M_1$ ).

### 3.5.7 Evaluation in EViews

#### **Hosmer/ Lemeshow and Andrews Tests:**

- The null hypothesis is that the deviations between expectations and actual observations are zero (i.e. the model predicts perfectly).
- Rejection of hypothesis suggests that the model performs poorly.

### 3.5.8 Stepwise Regression

As mentioned earlier, we will be using the OLS and Logit Model to run our test. However, we have also decided upon using the Stepwise Regression for our research. Stepwise regression is a process that methodically adds in and removes out the most and least significant variable. Besides that, this regression is specially used in explanatory research, which is also one of the reasons why we cast the die. Past researchers used stepwise regression in their studies to get a clearer idea on the explanatory variables to foresee a better and accurate result.

Stepwise regression includes two methods, which are the forward method and the backward method. Researchers usually run the forward stepwise regression by adding the most significant variable one at a time from the previous analysis followed by the rest of the variables until there are no longer significant when enumerated to the model. Abdullah, Zainudin, Ahmad, and Rus (2014) in their studies regarding the predictors of financial distressed of small and medium-sized enterprises, used the forward stepwise regression method in selecting their independent variables.

Unlike the forward method, the backward method is slightly different whereby the variable that is not significant and did not help in measuring the dependant variable is removed from the model.



The backward method elimination begins with all independent variables in the regression, the same as in our study.

### **3.6 Conclusion**

This chapter is considered as the core basis of the following chapters as this chapter's focus is in data collection as well as the explanations of the theoretical model. In the next chapter, the data and models, which have been mention earlier in this chapter, will be used to perform data analysis.

## CHAPTER 4: DATA ANALYSIS

### 4.0 Introduction

The chapter emphasizes on identifying whether the financial ratio which is stated in the previous chapters have any major roles in predicting the financial distress. Here, we interpret and generate the collected data from the company's annual report by using the methodology and models which had been stated in the earlier chapters. All the test will be conducted based on OLS Model, Logit Model, and Stepwise Logit Regression. In short, this chapter will illustrate the results as well as explain about it in the form of interpretation.

### 4.1 Descriptive Analysis

Table 4.1: Descriptive Analysis

	CR	QR	IT	AT	DE	DEBT	NPM	ROE	OCF	AE	BLR
Mean	1.389561	0.811196	15.64029	0.641547	1.180981	99.26107	-0.197164	-0.058447	0.044427	0.019475	6.139167
Median	1.377546	0.723144	4.112389	0.541284	0.951196	0.525144	-0.045318	-0.043825	0.034766	0.021812	6.450000
Maximum	7.580805	6.807741	480.2090	2.080552	17.28247	12031.94	1.761393	20.36027	1.006185	0.957983	6.850000
Minimum	-41.44170	8.31E-05	-2.462102	0.000000	-42.44170	0.034061	-4.074560	-13.10280	-1.509238	-0.694998	3.670000
Std.Dev.	3.830853	0.765650	48.66284	0.446418	4.590211	1009.268	0.669009	2.122136	0.262930	0.128328	0.840404

For the accumulated mean leverage ratio has the highest positive value, which is 99.26107 while asset efficiency ratio has the lowest positive value which is 0.019475. These results show that it has the highest leverage value which is more than 1. It means these companies have a weak financial security that may lead to default risk. However, the results show that the asset efficiency ratio is less than 1. Meaning the company is performing well with low usage of liabilities and assets efficiently. Besides that, Return on Equity has the highest negative value -0.058447 and Net Profit Margin has the lowest negative value with -0.197164. ROE with the lowest negative value shows that the company financed a large amount of capital, but expected return was inadequate. Company with the highest negative value of Net Profit Margin indicates a poor financial management and the company might be going through financial distress.

For the median Inventory turnover had the highest positive value 4.112389 and Asset Efficiency has the lowest positive value 0.021812. The difference between asset efficiency and inventory turnover are 4.09577, which indicates the presence of financial distress in the company. However ROA has the lowest negative value -0.043825 and Net Profit Margin has the highest negative value -0.045318. The distance between ROA and NPM is 0.001493, is considered small.

Furthermore leverage has the highest positive value of standard deviation 1009.268 and asset efficiency has the lowest positive value of standard deviation 0.128328. Leverage has the highest value because of its high value in mean which leads to high value in standard deviation. Moreover, Leverage has the highest range 12031.90594 which is between 12031.94 and 0.034061. Next, Inventory Turnover has difference of 482.671102 from 480.2090 to -2.462102. Following, ROE has the difference of 33.46307 which is between 20.36027 to -13.10280. Lastly, Asset Turnover has difference 2.080552 from 2.080552 to 0.000.

## 4.2 Correlation Coefficient Analysis

To examine how strong the relationship of correlation coefficient test analysis varies between (+1) to (-1). When the value of the correlation coefficient lies around  $\pm 1$ , it shows a strong relationship. When the value falls below 0 it proves weak relationship between the variables.

Table 4.2 Correlation Coefficient Analysis

<b>IV</b>	<b>DV</b>
AE	-0.02294789036628091
AT	-0.05227636537731355
CR	-0.04507565851890681
DE	0.03308296261515437
DEBT	0.08283463815638099
IT	-0.01671207421387831
NPM	-0.0389642204410827
OCF	-0.1374994899088289
QR	-0.06460090142024268
ROE	-0.09235905345403167

Note: CR represents Current Ratio; QR represents Quick Acid Test Ratio; IT represents Inventory Turnover Ratio; AT represents Asset Turnover Ratio; DE represents Debt to Equity Ratio; DEBT represents Debt Ratio; NPM represents Net Profit Margin Ratio; ROE represents Return on Equity Ratio; OCF represents Operating Cash Flow Ratio; AE represents Asset Efficiency Ratio; BLR represents Base Lending Rate.

According to the table above results of the most correlation test falls under negative value. The results of correlation coefficient analysis between DV ( dependent value ) and AE , AT , CR, DE, DEBT, IT, NPM, OCF, QR and ROA ( independent values) falls below 0 and has a negative relationship. This indicates that the company is performing badly and might lead to financial distress.

### 4.3 Results (OLS Model, Logit Model, Stepwise Logit Regression)

#### 4.3.1 Panel OLS Model

Table 4.3 Panel OLS Model

Variables	Panel OLS	
	Coefficient	Prob
CR	-0.037360	0.0565*
QR	0.003541	0.9526
IT	0.000238	0.7947
AT	-0.078749	0.4195
DE	-0.016553	0.4615
DEBT	4.13E-05	0.5097
NPM	0.054088	0.4954
ROE	-0.108325	0.0321*
OCF	-0.277432	0.2078
AE	-0.064029	0.9158
BLR	0.041247	0.4533

Note: P-value in parentheses \*, \*\*, and \*\*\* indicates significance level at 10%, 5%, and 1% respectively. CR represents Current Ratio; QR represents Quick Ratio; IT represents Inventory Turnover; AT represents Asset Turnover; DE represents Debt to Equity; DEBT represents Debt Ratio; NPM represents Net Profit Margin; ROE represents Return on Equity; OCF represents Operating Cash Flow; AE represents Asset Efficiency and BLR represents Base Lending Rate.

Following, to gain significance level for each variable we use the research test hypothesis.

#### 4.3.1.1 Interpretation and Hypothesis Testing

##### **Current Ratio (CR)**

When CR increases by 1 percent, the probability of the firm being financially distress will decrease by 0.0373, on average, holding other variables constant.

Decision making: **Reject  $H_0$**  since the p-value, 0.0565 is smaller than significance level, 0.10

Conclusion: There is sufficient evidence to conclude that current ratio **does significantly** predict financial distress.

##### **Quick Acid Test Ratio (QR)**

When QR increases by 1 percent, the probability of the firm being financially distress will increase 0.0035, on average, holding other variables constant.

Decision making: **Do not reject  $H_0$**  since the p-value, 0.9526 is larger than significance level, 0.10

Conclusion: There is sufficient evidence to conclude that Quick Acid Test ratio **does not significantly** predict financial distress.

### **Inventory Turnover Ratio (IT)**

When IT increases by 1 percent, the probability of the firm being financially distress will increase 0.0002, on average, holding other variables constant.

Decision making: **Do not reject  $H_0$**  since the p-value, 0.7947 is larger than significance level, 0.10.

Conclusion: There is sufficient evidence to conclude that Inventory Turnover ratio **does not significantly** predict financial distress

### **Asset Turnover Ratio (AT)**

When AT increases by 1 percent, the probability of the firm being financially distress will decrease 0.0787, on average, holding other variables constant.

Decision making: **Do not reject  $H_0$**  since the p-value, 0.4195 is larger than significance level, 0.10.

Conclusion: There is sufficient evidence to conclude that Asset Turnover ratio **does not significantly** predict financial distress.

### **Debt to Equity Ratio (DE)**

When DE increases by 1 percent, the probability of the firm being financially distress will decrease 0.0165, on average, holding other variables constant.

Decision making: **Do not reject  $H_0$**  since the p-value, 0.4615 is larger than significance level, 0.10.

Conclusion: There is sufficient evidence to conclude that Debt to Equity ratio **does not significantly** predict financial distress.

### **Debt Ratio (DEBT)**

When DEBT increases by 1 percent, the probability of the firm being financially distress will increase 0. 00004, on average, holding other variables constant.

Decision making: **Do not reject  $H_0$**  since the p-value, 0.5097 is larger than significance level, 0.10.

Conclusion: There is sufficient evidence to conclude that Debt ratio **does not significantly** predict financial distress.

### **Net Profit Margin Ratio (NPM)**

When NPM increases by 1 percent, the probability of the firm being financially distress will increase 0. 0540, on average, holding other variables constant.

Decision making: **Do not reject  $H_0$**  since the p-value, 0.4954 is larger than significance level, 0.10.

Conclusion: There is sufficient evidence to conclude that Net Profit Margin ratio **does not significantly** predict financial distress.



### **Return on Equity Ratio (ROE)**

When ROE increases by 1 percent, the probability of the firm being financially distress will decrease 0.1083, on average, holding other variables constant.

Decision making: **Reject  $H_0$**  since the p-value, 0.0321 is smaller than significance level, 0.10.

Conclusion: There is sufficient evidence to conclude that Return on Equity ratio **does significantly** predict financial distress.

### **Operating Cash Flow Ratio (OCF)**

When OCF increases by 1 percent, the probability of the firm being financially distress will decrease 0.2774, on average, holding other variables constant.

Decision making: **Do not reject  $H_0$**  since the p-value, 0.2078 is larger than significance level, and 0.10.

Conclusion: There is sufficient evidence to conclude that Operating Cash Flow ratio **does not significantly** predict financial distress.

### **Asset Efficiency Ratio (AE)**

When AE increases by 1 percent, the probability of the firm being financially distress will decrease 0.0640, on average, holding other variables constant.

Decision making: **Do not reject  $H_0$**  since the p-value, 0.9158 is larger than significance level, 0.1

Conclusion: There is sufficient evidence to conclude that Asset Efficiency ratio **does not significantly** predict financial distress.

### **Base Lending Rate (BLR)**

When BLR increases by 1 percent, the probability of the firm being financially distress will increase 0.0412, on average, holding other variables constant.

Decision making: **Do not reject  $H_0$**  since the p-value, 0.4533 is larger than significance level, 0.10.

Conclusion: There is sufficient evidence to conclude that Base Lending ratio **does not significantly** predict financial distress.

### 4.3.2 Logit Model

Table 4.4 Logit Model

Variables	Logit Model	
	Coefficient	Prob
CR	-0.689055	0.0002*
QR	0.392649	0.1689
IT	0.000539	0.8913
AT	-0.220917	0.6361
DE	-0.313814	0.0137*
DEBT	0.079600	0.6789
NPM	0.886807	0.0415*
ROE	-2.122718	0.0001*
OCF	-1.196933	0.3275
AE	-2.648469	0.3928
BLR	0.067904	0.8037

Note: P-value in parentheses \*, \*\*, and \*\*\* indicates significance level at 10%, 5%, and 1% respectively. CR represents Current Ratio; QR represents Quick Ratio; IT represents Inventory Turnover; AT represents Asset Turnover; DE represents Debt to Equity; DEBT represents Debt Ratio; NPM represents Net Profit Margin; ROE represents Return on Equity; OCF represents Operating Cash Flow; AE represents Asset Efficiency and BLR represents Base Lending Rate.

### 4.3.2.1 Interpretation and Hypothesis Testing

#### Current Ratio (CR)

When CR increases by 1 percent, the probability of the firm being financially distress will decrease by 0.6890, on average, holding other variables constant.

Decision making: **Reject  $H_0$** , since the p-value, 0.0002 is smaller than significance level, 0.10

Conclusion: There is sufficient evidence to conclude that current ratio **does significantly** predict financial distress.

#### Quick Acid Test Ratio (QR)

When QR increases by 1 percent, the probability of the firm being financially distress will increase 0.3926, on average, holding other variables constant.

Decision making: **Do not reject  $H_0$** , since the p-value, 0.1689 is larger than significance level, 0.10.

Conclusion: There is sufficient evidence to conclude that Quick Acid Test ratio **does not significantly** predict financial distress.

#### Inventory Turnover Ratio (IT)

When IT increases by 1 percent, the probability of the firm being financially distress will increase 0.0005, on average, holding other variables constant.

Decision making: **Do not reject  $H_0$**  since the p-value, 0.8913 is larger than significance level, 0.10.

Conclusion: There is sufficient evidence to conclude that Inventory Turnover ratio **does not significantly** predict financial distress.

#### **Asset Turnover Ratio (AT)**

When AT increases by 1 percent, the probability of the firm being financially distress will decrease 0.2209, on average, holding other variables constant.

Decision making: **Do not reject  $H_0$**  since the p-value, 0.6361 is larger than significance level, 0.10.

Conclusion: There is sufficient evidence to conclude that Asset Turnover ratio **does not significantly** predict financial distress.

#### **Debt to Equity Ratio (DE)**

When DE increases by 1 percent, the probability of the firm being financially distress will decrease 0.3138, on average, holding other variables constant.

Decision making: **Reject  $H_0$**  since the p-value, 0.0137 is smaller than significance level, 0.10.

Conclusion: There is sufficient evidence to conclude that Debt to Equity ratio **does significantly** predict financial distress.

### **Debt Ratio (DEBT)**

When DEBT increases by 1 percent, the probability of the firm being financially distress will increase 0.0796, on average, holding other variables constant.

Decision making: **Do not reject  $H_0$**  since the p-value, 0.6789 is larger than significance level, 0.10.

Conclusion: There is sufficient evidence to conclude that Debt ratio **does not significantly** predict financial distress.

### **Net Profit Margin Ratio (NPM)**

When NPM increases by 1 percent, the probability of the firm being financially distress will increase 0.8868, on average, holding other variables constant.

Decision making: **Reject  $H_0$**  since the p-value, 0.0415 is smaller than significance level, 0.10.

Conclusion: There is sufficient evidence to conclude that Net Profit Margin ratio **does significantly** predict financial distress.

### **Return on Equity Ratio (ROE)**

When ROE increases by 1 percent, the probability of the firm being financially distress will decrease 2.1227, on average, holding other variables constant.

Decision making: **Reject  $H_0$**  since the p-value, 0.0001 is smaller than significance level, 0.10.

Conclusion: There is sufficient evidence to conclude that Return on Equity ratio **does significantly** predict financial distress.

\*Note: Based on the results e notice that both Net Profit Margin Ratio and Return on Equity Ratio are significant. Hence, we can positively conclude that Profitability ratio is strongly used to predict financial distress.

### **Operating Cash Flow Ratio (OCF)**

When OCF increases by 1 percent, the probability of the firm being financially distress will decrease 1.1969, on average, holding other variables constant.

Decision making: **Do not reject  $H_0$**  since the p-value, 0.3275 is larger than significance level, and 0.10.

Conclusion: There is sufficient evidence to conclude that Operating Cash Flow ratio **does not significantly** predict financial distress.

### **Asset Efficiency Ratio (AE)**

When AE increases by 1 percent, the probability of the firm being financially distress will decrease 2.6484, on average, holding other variables constant.

Decision making: **Do not reject  $H_0$**  since the p-value, 0.3928 is larger than significance level, 0.1

Conclusion: There is sufficient evidence to conclude that Asset Efficiency ratio **does not significantly** predict financial distress.

### **Base Lending Rate (BLR)**

When BLR increases by 1 percent, the probability of the firm being financially distress will increase 0.0679, on average, holding other variables constant.

Decision making: **Do not reject  $H_0$**  since the p-value 0.8037 is larger than significance level, 0.10.

Conclusion: There is sufficient evidence to conclude that Base Lending ratio **does not significantly** predict financial distress.



### 4.3.3 Stepwise Logit Regression

Table 4.5 Stepwise Logit Regression

Variables	Logit Model	
	Coefficient	Prob
CR	-0.471537	0.0010*
DE	-0.226552	0.0414*
NPM	0.433254	0.2014
ROE	-1.495116	0.0007*

Note: P-value in parentheses \*, \*\*, and \*\*\* indicates significance level at 10%, 5%, and 1% respectively. CR represents Current Ratio; DE represents Debt to Equity; NPM represents Net Profit Margin and ROE represents Return on Equity.

#### 4.3.3.1 Interpretation and Hypothesis Testing

##### Current Ratio (CR)

When CR increases by 1 percent, the probability of the firm being financially distress will decrease by 0.4715, on average, holding other variables constant.

Decision making: **Reject  $H_0$**  since the p-value, 0.0010 is smaller than significance level, 0.10

Conclusion: There is sufficient evidence to conclude that current ratio **does significantly** predict financial distress.

### **Debt Ratio (DE)**

When DE increases by 1 percent, the probability of the firm being financially distress will decrease 0.2266, on average, holding other variables constant.

Decision making: **Reject  $H_0$**  since the p-value, 0.0414 is smaller than significance level, 0.10.

Conclusion: There is sufficient evidence to conclude that Debt ratio **does significantly** predict financial distress.

### **Net Profit Margin Ratio (NPM)**

When NPM increases by 1 percent, the probability of the firm being financially distress will increase 0.4333, on average, holding other variables constant.

Decision making: **Do not reject  $H_0$**  since the p-value, 0.2014 is larger than significance level, 0.10.

Conclusion: There is sufficient evidence to conclude that Net Profit Margin ratio **does not significantly** predict financial distress.

### **Return on Equity Ratio (ROE)**

When ROE increases by 1 percent, the probability of the firm being financially distress will decrease 1.4951, on average, holding other variables constant.

Decision making: **Reject  $H_0$**  since the p-value, 0.0007 is smaller than significance level, 0.10.

Conclusion: There is sufficient evidence to conclude that Return on Equity ratio **does significantly** predict financial distress.

## 4.4 Goodness of Fit

Table 4.6 Goodness of Fit

H-L Statistic	8.8904	Prob. Chi-Sq(8)	<b>0.3516</b>
Andrews Statistic	9.9002	Prob. Chi-Sq(10)	0.4493

$H_0$ : Model prediction is good

$H_1$ : Model prediction is poor

P-value: 0.3516

Decision rule: Reject null hypothesis ( $H_0$ ) if the test statistics is larger than the critical value or the P-value is less than significance level. Otherwise, do not reject  $H_0$ .

Decision making: Reject  $H_0$  since the p-value, 0.3516 is smaller than significance level, 0.10.

Conclusion: There is sufficient evidence to conclude that the model has a poor prediction.

## 4.5 Model Selection

### 4.5.1 Panel OLS vs. Logit Model vs. Stepwise Logit Regression

Table 4.7 Panel OLS vs. Logit Model vs. Stepwise Logit Regression

Variable	OLS		Logit		Stepwise Logit	
	Coefficient	Probability	Coefficient	Probability	Coefficient	Probability
CR	-0.037360	0.0565	-0.689055	0.0002	0.471537	0.0010
QR	0.003541	0.9526	0.392649	0.1689	-	-
IT	0.000238	0.7947	0.000539	0.8913	-	-
AT	-0.078749	0.4195	-0.220917	0.6361	-	-
DE	-0.016553	0.4615	-0.313814	0.0137	0.226552	0.0414
DEBT	4.13E-05	0.5097	0.079600	0.6789	-	-
NPM	0.054088	0.4954	0.886807	0.0415	0.433254	0.2014
ROE	-0.108325	0.0321	-2.122718	0.0001	-1.495116	0.0007
OCF	-0.277432	0.2078	-1.196933	0.3275	-	-
AE	-0.064029	0.9158	-2.648469	0.3928	-	-
BLR	0.041247	0.4533	0.067904	0.8037	-	-
$\beta_0$	0.459302	0.1984	1.296826	0.4707	-	-
$R^2$	0.078627		0.144639			
F (Probability)	0.428914		0.002919			

We decided to use logit model instead of linear probability model. This is because the results that were compared by the marginal effects of logit model to coefficient of variables in the linear probability model were somewhat better. There were 2 additional variables that were significant using logit model. In OLS model, the slope coefficient measures the change in the average value of the regressand for a unit change in the value of regressor, with all other variables held constant. Whereas, in the logit model, the slope coefficient of a variable gives the change in the log of odds associated with a unit change in the variable, holding all variables constant. No doubt that, OLS is easy to estimate, and easy to interpret.

However, OLS is known to have several problems, some are surmountable and can be overcome but some are fundamental. In addition to making our result more accurate, we used Stepwise Logit to re-confirm the results based on logit. However, we manage to discover that Net Profit Margin's result had been adjusted from significant to insignificant. Based on this situation, we decided to use this accurate model. More will be explained in Chapter 5 under major findings.

## **4.6 Conclusion**

During the course of this research, it can be seen clearly that some of the financial ratios did play a major role in predicting the financial distress of a firm. Based on the studies which were done by various researchers, it can be confirmed that financial ratios are indeed important in predicting financial distress. In the subsequent chapters, this study will discuss more about the above matter in detail.

## **CHAPTER 5: DISCUSSION, CONCLUSION AND IMPLICATIONS**

### **5.0 Introduction**

This chapter emphasizes about how financial ratios and macroeconomic variables help in predicting financial distress accurately using the Logit Model. It includes the study of 10 financial ratios and the Base Lending Rate (BLR) of 12 companies across 12 years. This chapter allows us to do further discussion on the results obtained in Chapter 4 as well as the statistical analysis. Here we elaborate deeper on the major findings and the implication of the study. Besides that, we also listed out the limitations we had throughout the research and provided some recommendations and suggestions for future researcher's reference.

### **5.1 Summary of Statistical Analysis**

Table 5.1 Regression Analysis of Panel OLS

Variables	P-value	Results
CR	0.0565	Significant
QR	0.9526	Insignificant
IT	0.7947	Insignificant
AT	0.4195	Insignificant
DE	0.4615	Insignificant
DEBT	0.5097	Insignificant
NPM	0.4954	Insignificant
ROE	0.0321	Significant
OCF	0.2078	Insignificant
AE	0.9158	Insignificant
BLR	0.4533	Insignificant

Table 5.2 Regression Analysis of Logit Model

Variables	P-value	Results
CR	0.0002	Significant
QR	0.1689	Insignificant
IT	0.8913	Insignificant
AT	0.6361	Insignificant
DE	0.0137	Significant
DEBT	0.6789	Insignificant
NPM	0.0415	Significant
ROE	0.0001	Significant
OCF	0.3275	Insignificant
AE	0.3928	Insignificant
BLR	0.8037	Insignificant

Table 5.3 Regression Analysis of Stepwise Logit Regression

Variables	P-value	Results
CR	0.0010	Significant
DE	0.0414	Significant
NPM	0.2014	Insignificant
ROE	0.0007	Significant

The above regression shows the relationship between Credit Ratio (CR), Quick Ratio (QR), Inventory Turnover (IT), Asset Turnover (AT), and Debt to Equity (DE), Debt Ratio (DEBT), Net Profit Margin (NPM), Return-on-Equity (ROE), Operating Cash Flow (OCF), Asset Efficiency (AE) ratios and BLR with different models. The result generated by Panel OLS shows that CR and ROE are the only variables that are significant at 10% significance level. The other independent variables are insignificant due the P-value being larger than 10% significance value.

Additionally, the outcome varied when the Logit Model is used. The results showed that CR, DE, NPM and ROE are significant at 10% significance level as their P-value were lower than 0.10. However, the remaining independent variables still remained insignificant. The test is then conducted using the Stepwise Logit Regression Model. This test was run based on the previous Logit test using variables that were significant. The CR, DE and ROE remained significant at 10% significance level but NPM became insignificant whereby the P-value, 0.2014 is larger than 0.10. The justifications behind the significances are elaborated in the major findings.

## **5.2 Discussion of Major Findings**

### **5.2.1 Panel OLS Model**

Based on our OLS results, we found that out of two ratios from Liquidity, current ratio is significant just as similar to Low, Nor and Yatim (2001), while quick ratio is insignificant towards predicting financial distress. According to (Hendel, 1996), he mentioned that during the time of recession which occurred in year 2007-2009, unnecessary ratios are not needed for instance non-liquid assets. In this case we have found inventory to be non-liquid assets. Since, the demand is relatively low during that period of time to investors held. It is essential that firms deviate their focus from maximizing profit through inventories in order to generate cash, instead they need to emphasis on how to maintain and survive during the time of crisis. Hence, due to the inventory involved, it has resulted a negative relationship. As for activity ratio, we measured by inventory turnover and asset turnover. The outcomes of both ratios are insignificant. We believe that inventory turnover has the same reasoning as the explanation (Hendel, 1996), because it involves inventory. Following variable is Leverage ratio, and we used debt to equity and debt ratio to help with the study. However, the result displayed is insignificant.



Although, Khaliq, Altarturi, Thaker, Harun, and Nahar, (2014) had mentioned that leverage ratio had proven to predict when the company is at unsound state. Another situation of outcome is, in Profitability ratio only return on earning showed and positive response just as Sori, Hamid, Nassir and Mohamad (2001) and net profit margin showed a negative response towards the study. Ohlson (1980), stated that the Logit model will provide a much more accurate result, because it emphasize on probabilistic estimates rather than simple estimates. Besides, we used operating cash flow and asset efficiency to evaluate Cash Flow ratio which found to be insignificant. Based on the study of Liang (1992) and Bhattacharyya & Pendharkar (1998), they mentioned that small sample size could be the consequences of insignificants. It shows that our study lacks of an appropriate sample size to conduct results in becoming significant. Finally, base lending rate found to be insignificant in our results. This could be why not many researches use this variable to conduct their studies.

### **5.2.2 Logit Model**

In the result of using Logit model, we discovered that there is a difference, thus it proves to probabilistically estimate rather than simple estimation Ohlson (1980). Liquidity is found to have the same results by using OLS. The current ratio is significant as to Low, Nor and Yatim (2001), while quick ratio insignificant. This result has proven that the cause this insignificants is due to the irrelevant use of inventory during the time of recession (Hendel, 1996) and not the different method approach. Activity ratios show insignificant result. Since the results shows to be the same as OLS, possibility of the activity ratio not being able to perform could be due to the method used. In this study we have used Logit model. Since, the logit model only allow single period data and has remarkable assumption on the health of a firm over a considerable period of time, it does not necessarily have to work on most cases and study (Hillegeist, 2004).

Problems like this can create results to be bias, inefficient, and become inconsistent coefficient estimate Shumway (2001). Perhaps a different form of model would have changed the perspective of the result. Following is the result of Leverage ratio. Debt to equity ratio proves to be significant just as Mohamed, Ang and Sanda (2001). However, debt ratio is insignificant and does not match the outcome of the previous researches Beaver (1966). Using logit model the profitable ratio turned out to be significant just as Sori, Hamid, Nassir and Mohamad (2001). Although the net profit margin was insignificant in OLS model, we believe that the logit model had proven its ability to having a depth by using its model Ohlson (1980). Operating cash flow and asset efficiency continues to show that it is insignificant. This could be due to the small sample size which was started by Liang (1992) and Bhattacharyya & Pendharkar (1998). In addition to, sample would give a better result if the companies were to be from the same sector and field. If possible researches should increase their size of data into a slight larger amount to help gain positive results. Base lending rate remains to be insignificant towards the prediction of financial distress. Alifah (2014) had mentioned that base lending rate will only provide the possibilities that the services and trading sectors companies in Malaysia will be financially distressed. Since, she emphasized on possibilities, therefore her study is not able to fully support this particular variable.

### **5.2.3 Stepwise Logit Regression**

We conducted the stepwise logit regression by only using 4 significant ratios which are the current ratio, debt to equity ratio, return-on-equity and net profit margin from the results obtained in the logit model. However, the outcome was slightly different as the net profit margin ratio turned out to be insignificant. Past researchers suggest that the popular measures of this ratio can be deceptive as a low ratio does not mean that company has insufficient income to service their liabilities.

Besides that, Abdullah, Halim, Ahmad and Rus (2008) mentioned in their studies that, the use of stepwise regression is to lessen the multicollinearity problem. It is possible that net profit margin has multicollinearity problem. Although net profit margin ratio is found to be positive in the stepwise logit regression test, it is insignificantly associated with the predictions of insolvency of firms. This brings to mean that higher the profitability, the higher the possibilities the companies towards bankruptcy due to multicollinearity (Almansour, 2015). Current ratio remains significant as past researchers concluded that a financial ratio that quantifies liquidity is potent in their discriminating power (Yap, Munuswamy & Mohamed, 2012). The debt to equity ratio remains significant and has been periodically used by researchers as it has performed well in past studies. The return on equity ratio tends to be significantly correlated in predicting distress as well. It is proven in much research that it is able to discriminate solvent and insolvent firms (Flagg, 1991).

### **5.3 Implication of Study**

Market investors, either local or foreign investors will able to obtain knowledge from this research. Company's financial performance are usually measured using financial ratio analysis, which is a form of financial analysis that determines a company's financial position which is of utmost importance in order to ensure equitable distribution of resources. By calculating the financial distress using financial ratio analysis, it would help companies to monitor the correlations between the assets and liabilities. In cases where liabilities are on the higher side than the assets, companies can identify its financial position. This will assist them in cases where they want to set up a plan in order to repay their loans.

Moreover, when there are high liquidity assets, it will affect the cause to invest in companies. Investors will have very high interest to invest in companies with high liquidity assets compared to companies with low liquidity assets.

Besides that, ratio analysis also helps in performance analysis. With the use of financial analysis, companies can study their performance in past years. This can help them to identify their weakest points and improve on them and also gives them an opportunity to estimate early trends. With the use of previous and current year ratios, companies are able to forecast and make estimations for the future. This gives companies the foundation for budget planning in order to avoid from falling into distress again.

## **5.4 Limitations of the Study**

The main limitation in our study is the issue of data availability. There are a total of 17 PN17 companies as updated in the Bursa Malaysia's official webpage dated on the 5th of January 2017. As mentioned earlier in this research, we used 12 years of data from 2004 till 2015. However, we only managed to obtain the financial statements for 12 companies upon 17 companies in total. The remaining 5 companies were lacking a few years of data, hence causing us to exclude those companies from our study due to incomplete data. We tried to obtain data from Bloomberg webpage. However, Bloomberg was a little too complex, so we referred to the listed companies' financial statement under the Bursa Malaysia webpage.

In addition to that, we used macroeconomics variable which is Base Lending Rate (BLR) to predict the financial distress. However, there were very few researchers within Malaysia that used the BLR in their studies.

Although BLR has been proven to be significant in the possibility of predicting financial distress especially in the trading and services sector by our Malaysian researcher, we were still lacking of journals to refer for our study as well as to obtain a clearer picture on the impact of BLR towards the company performances. We only manage to obtain a few BLR related journals from Google Scholar written by researchers from other countries.

## **5.5 Recommendations**

Financial distress is emerging to become one of the major problem faced by firms in financial sectors. There is no hiding that the financial ratios play an important role in predicting the financially distressed companies. Preventive steps must be taken to reduce this arising issue. Even scholars could help and play their part in minimizing this matter by coming out with more researches regarding this issue, which will help the firm as well as the future researcher. As for the recommendation for future researchers, firstly we would like to recommend that they should give outmost priority to different ratios, other than what is being used in this particular study. They are advised to try different ratios to do the comparison in order to understand which financial factors have the best effect to the PN 17 Company's performance. Apart from this, it is also strongly advised to use data from two different companies for comparison. This will provide a more significant result during the analysis.

Secondly, future scholars are recommended to include profitability ratio in their study, as this ratio promises to provide the most significant value (positive) when it comes to the results. Furthermore, researchers are suggested not to use too large data. For example, they are advised to try not to use 20 or 30 years data, as the data might be outdated or most probably missing. It is also possible that they would not get the desired outcome if the outdated data are used. Thus, they are encouraged to use the most recent data to conduct their study.

Last but not the least, future investigators are proposed to conduct more studies regarding this topic, especially the effect of macroeconomic variables in predicting financial distress as this is one of the topic which has a very little amount of research that had been done. This matter can be considered as a very important issue especially to companies as it helps to recognize a firm which is in a financial distress. This type of research does not only benefits a firm but also the investors who wish to invest in a particular firm. Nonetheless, this is a topic that seldom gains attention from researchers; there are a number of scopes that can be covered by future academician. We also suggest future researches to exclude Base Lending Rate, instead explore into other macroeconomics variable. There are plenty of things to be discussed as well as investigate in this topic.

## **5.6 Conclusion**

In short, it is clear that the financial ratios which includes leverage ratio, activity ratio, liquidity ratio, profitability ratio, cash flow and the macroeconomic variable which is base lending rate plays a very important role as well as the key part in predicting the financial distress for the corporate sector (P17) in Malaysia. All the data which was used along in this study was gathered from the annual report of PN 17 companies which was available in Bursa Malaysia. The results Panel OLS shows that CR and ROE are the only variables that are significant at 10% significance level. The other independent variables are insignificant due the P-value being larger than 10% significance value. But the result varied when Logit Model was used. The results showed that CR, DE, NPM and ROE are significant at 10% significance level as their P-value were lower than 0.10. However, the remaining independent variables still remained insignificant.

Nonetheless, Stepwise Logit Regression Model was used to run the test again and the CR, DE and ROE remained significant at 10% significance level but NPM became insignificant whereby the P-value, 0.2014 is larger than 0.10.

Overall, it can be seen that different ratios has different significance in predicting financial distress in PN17 companies. Logit model did provide us efficient analysis and in determining the likelihood of companies that they will be financially distressed. However, it is possible for future researchers to use different treatments for precise and better results.

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APPENDICES

**Appendix A: OLS Model**

Dependent Variable: DV  
 Method: Panel Least Squares  
 Date: 02/06/17 Time: 15:00  
 Sample: 2004 2015  
 Periods included: 12  
 Cross-sections included: 12  
 Total panel (balanced) observations: 144

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CR	-0.037360	0.019418	-1.923950	0.0565
QR	0.003541	0.059483	0.059533	0.9526
IT	0.000238	0.000913	0.260801	0.7947
AT	-0.078749	0.097249	-0.809762	0.4195
DE	-0.016553	0.022412	-0.738571	0.4615
DEBT	4.13E-05	6.25E-05	0.661127	0.5097
NPM	0.054088	0.079111	0.683699	0.4954
ROE	-0.108325	0.050012	-2.165958	0.0321
OCF	-0.277432	0.219156	-1.265911	0.2078
AE	-0.064029	0.604502	-0.105920	0.9158
BLR	0.041247	0.054843	0.752097	0.4533
C	0.459302	0.355342	1.292561	0.1984
R-squared	0.078627	Mean dependent var		0.583333
Adjusted R-squared	0.001846	S.D. dependent var		0.494727
S.E. of regression	0.494270	Akaike info criterion		1.508188
Sum squared resid	32.24804	Schwarz criterion		1.755672
Log likelihood	-96.58951	Hannan-Quinn criter.		1.608751
F-statistic	1.024048	Durbin-Watson stat		0.118273
Prob(F-statistic)	0.428914			



**Appendix B: LOGIT Model**

Dependent Variable: DV  
 Method: ML - Binary Logit (Quadratic hill climbing)  
 Date: 02/06/17 Time: 15:00  
 Sample: 2004 2015  
 Included observations: 144  
 Convergence achieved after 10 iterations  
 Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
CR	-0.689055	0.185359	-3.717417	0.0002
QR	0.392649	0.285403	1.375770	0.1689
IT	0.000539	0.003944	0.136676	0.8913
AT	-0.220917	0.466919	-0.473138	0.6361
DE	-0.313814	0.127337	-2.464438	0.0137
DEBT	0.079600	0.192307	0.413920	0.6789
NPM	0.886807	0.435124	2.038055	0.0415
ROE	-2.122718	0.556635	-3.813480	0.0001
OCF	-1.196933	1.222457	-0.979120	0.3275
AE	-2.648469	3.099508	-0.854480	0.3928
BLR	0.067904	0.273176	0.248572	0.8037
C	1.296826	1.797707	0.721378	0.4707
McFadden R-squared	0.144639	Mean dependent var		0.583333
S.D. dependent var	0.494727	S.E. of regression		0.465127
Akaike info criterion	1.328578	Sum squared resid		28.55727
Schwarz criterion	1.576062	Log likelihood		-83.65758
Hannan-Quinn criter.	1.429141	Restr. log likelihood		-97.80383
LR statistic	28.29250	Avg. log likelihood		-0.580955
Prob(LR statistic)	0.002919			
Obs with Dep=0	60	Total obs		144
Obs with Dep=1	84			

### Appendix C: Stepwise Logit Regression

Dependent Variable: DV  
 Method: ML - Binary Logit (Quadratic hill climbing)  
 Date: 02/17/17 Time: 11:50  
 Sample: 2004 2015  
 Included observations: 144  
 Convergence achieved after 5 iterations  
 Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
CR	-0.471537	0.142876	-3.300319	0.0010
DE	-0.226552	0.111094	-2.039270	0.0414
NPM	0.433254	0.339088	1.277702	0.2014
ROE	-1.495116	0.441201	-3.388740	0.0007
C	1.374863	0.360190	3.817053	0.0001
McFadden R-squared	0.083835	Mean dependent var		0.583333
S.D. dependent var	0.494727	S.E. of regression		0.471850
Akaike info criterion	1.313951	Sum squared resid		30.94723
Schwarz criterion	1.417069	Log likelihood		-89.60446
Hannan-Quinn criter.	1.355852	Restr. log likelihood		-97.80383
LR statistic	16.39875	Avg. log likelihood		-0.622253
Prob(LR statistic)	0.002528			
Obs with Dep=0	60	Total obs		144
Obs with Dep=1	84			

**Appendix D: Goodness Fit Model**

Goodness-of-Fit Evaluation for Binary Specification

Andrews and Hosmer-Lemeshow

Tests

Equation: UNTITLED

Date: 02/06/17 Time: 15:01

Grouping based upon predicted risk (randomize ties)

	Quantile of Risk		Dep=0		Dep=1		Total Obs	H-L Value
	Low	High	Actual	Expect	Actual	Expect		
1	0.0394	0.3022	10	11.3556	4	2.64443	14	0.85670
2	0.3030	0.3999	12	8.87265	2	5.12735	14	3.00977
3	0.4033	0.4740	10	8.52630	5	6.47370	15	0.59020
4	0.4777	0.5537	6	6.86113	8	7.13887	14	0.21195
5	0.5619	0.6144	4	6.14478	11	8.85522	15	1.26809
6	0.6174	0.6494	5	5.16169	9	8.83831	14	0.00802
7	0.6508	0.6937	3	4.61681	11	9.38319	14	0.84480
8	0.6962	0.7448	6	4.15795	9	10.8421	15	1.12903
9	0.7500	0.8323	2	3.05980	12	10.9402	14	0.46974
10	0.8348	1.0000	2	1.24333	13	13.7567	15	0.50212
Total			60	60.0000	84	84.0000	144	8.89043
H-L Statistic			8.8904		Prob. Chi-Sq(8)		0.3516	
Andrews Statistic			9.9002		Prob. Chi-Sq(10)		0.4493	

**Appendix E: Covariance Analysis**

	CR	QR	IT	AT	DE	DEBT	NPM	ROE	OCF	AE	BLR
CR	14.57352	0.684321	-4.581771	0.054413	13.56152	-137.2994	0.300672	-6.231848	-0.029587	-0.026583	-0.206142
QR	0.684321	0.582149	4.016949	0.044363	0.163682	-80.09007	0.104523	-0.035346	0.013053	-0.002751	0.041725
IT	-4.581771	4.016949	2351.627	-0.552898	12.51628	-1542.855	2.905094	0.804632	3.631452	0.280240	0.914602
AT	0.054413	0.044363	-0.552898	0.197905	0.127227	-63.11449	0.031501	-0.030556	-0.018491	-0.006573	0.006658
DE	13.56152	0.163682	12.51628	0.127227	20.92372	-215.3013	0.203687	-8.670870	-0.027540	-0.036623	-0.419788
DEBT	-137.2994	-80.09007	-1542.855	-63.11449	-215.3013	1011548.	19.10414	25.27620	-4.424274	79.40780	-197.6360
NPM	0.300672	0.104523	2.905094	0.031501	0.203687	19.10414	0.444465	0.088500	0.052584	0.034568	0.115786
ROE	-6.231848	-0.035346	0.804632	-0.030556	-8.670870	25.27620	0.088500	4.472188	0.040027	0.022006	0.388367
OCF	-0.029587	0.013053	3.631452	-0.018491	-0.027540	-4.424274	0.052584	0.040027	0.068652	0.016556	0.002198
AE	-0.026583	-0.002751	0.280240	-0.006573	-0.036623	79.40780	0.034568	0.022006	0.016556	0.016354	-0.018081
BLR	-0.206142	0.041725	0.914602	0.006658	-0.419788	-197.6360	0.115786	0.388367	0.002198	-0.018081	0.701374

**Appendix F: Descriptive Analysis**

	CR	QR	IT	AT	DE	DEBT	NPM	ROE	OCF	AE	BLR
Mean	1.389561	0.811196	15.64029	0.641547	1.180981	99.26107	-0.197164	-0.058447	0.044427	0.019475	6.139167
Median	1.377546	0.723144	4.112389	0.541284	0.951196	0.525144	-0.045318	-0.043825	0.034766	0.021812	6.450000
Maximum	7.580805	6.807741	480.2090	2.080552	17.28247	12031.94	1.761393	20.36027	1.006185	0.957983	6.850000
Minimum	-41.44170	8.31E-05	-2.462102	0.000000	-42.44170	0.034061	-4.074560	-13.10280	-1.509238	-0.694998	3.670000
Std. Dev.	3.830853	0.765650	48.66284	0.446418	4.590211	1009.268	0.669009	2.122136	0.262930	0.128328	0.840404
Skewness	-9.694705	4.041861	6.978981	0.878704	-5.648045	11.60948	-3.261738	4.605525	-0.813596	1.404508	-2.008018
Kurtosis	110.1904	29.25125	61.27651	3.445793	60.26076	137.6118	17.02597	70.52186	13.69739	27.71911	6.430864
Jarque-Bera	71194.41	4526.848	21545.86	19.72329	20438.38	111956.7	1435.701	27864.27	702.4912	3713.550	167.3962
Probability	0.000000	0.000000	0.000000	0.000052	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	200.0968	116.8123	2252.201	92.38272	170.0613	14293.59	-28.39165	-8.416312	6.397460	2.804464	884.0400
Sum Sq. Dev.	2098.587	83.82949	338634.2	28.49828	3013.015	1.46E+08	64.00290	643.9951	9.885921	2.354925	100.9979
Observations	144	144	144	144	144	144	144	144	144	144	144