THE DETERMINANTS OF CREDIT RISK

IN AN EMERGING MARKET

By

NG YEN THENG

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ABSTRACT

The aim of this study is to examine the determinants of credit risk management in an emerging market by using Malaysian listed companies. The sample of the study is selected using paired sample method. In order to adjust for earning management portions, the discretionary accrual model is used to calculate the abnormal accruals of firms. Furthermore, logistic regression is applied to determine the accuracy of unadjusted and adjusted model in predicting financial distress.

Based on the empirical result, the liquidity ratio is proof to be significant at 5percent significance level in determining financial distress before and after earnings management is adjusted. Meanwhile, the productivity ratio is only showing its significance before the earnings management is adjusted and the profitability ratio is significant after the earnings management is adjusted. On the other hand, this study indicates that both unadjusted and adjusted models are having the same level of Type I error (23.3%). Out of the total 30 distressed observations, 23 are classified as distressed observations resulting in 76.6 percent of success classification and 7 are classified as non-distressed observations resulting in a 23.3 percent failure. However, for the Type II error, the non-adjusted model is performing better with a 16.7 percent failure compared to a 26.7 percent failure of adjusted model. As a result, by considering the cost for both Type I and Type II errors, the unadjusted model is better and more appropriate in predicting financial distress firms in Malaysian market compared to the adjusted model. This indicates that the unadjusted model helps in improving credit management among market participants in Malaysia.

Keywords: credit risk management, bankruptcy, financial distress determinants, earnings management

ABSTRAK

Kajian ini bertujuan untuk menguji keberkesanan faktor-faktor dalam meramalkan kemuflisan dengan menggunakan syarikat-syarikat yang tersenarai di Bursa Malaysia sebagai sampel. Sampel kajian dipilih dengan menggunakan kaedah sampel berpasangan. Dalam usaha untuk menyelaraskan pengurusan pendapatan, model akruan digunakan dalam kajian ini. Tambahan pula, regresi logistik digunakan untuk menentukan ketepatan model-model dalam meramalkan kemuflisan firma sebelum dan selepas penyelarasan pengurusan pendapatan.

Berdasarkan keputusan, nisbah *liquidity* didapati berkesan dalam meramal kemungkinan kemuflisan firma sama ada sebelum atau selepas penyelarasan pengurusan pendapatan. Pada masa yang sama, nisbah *productivity* didapati hanya berkesan dalam meramal kemungkinan kemuflisan firma sebelum penyelarasan pengurusan pendapatan dan nisbah *profitability* pula berkesan dalam meramal kemuflisan firma selepas penyelarasan pengurusan pendapatan. Di samping itu, keputusan menunjukkan model sebelum penyelarasan pengurusan pendapatan mempunyai Ralat I sebanyak 23.3 peratus pada masa sebelum dan selepas pengurusan pendapatan diselaraskan. Daripada jumlah keseluruhan 30 pemerhatian yang menghadapi masalah kewangan, 23 dikelaskan sebagai firma yang mempunyai masalah kewangan manakala 7 dikelaskan sebagai firma yang tidak menghadapi masalah kewangan. Dari segi Ralat II, model yang sebelum penyelarasan pengurusan pendapatan didapati lebih baik dalam meramal firma yang tidak mempunyai masalah kewangan berbanding dengan model yang telah diselaraskan pengurusan pendapatan. Kesimpulannya, dengan mempertimbangkan kos bagi kedua-dua Ralat I dan Ralat II, model tanpa penyelarasan pegurusan pendapatan adalah lebih baik dan sesuai dalam meramalkan kecenderungan masalah kewangan firma di Malaysia. Ini menunjukkan bahawa model tanpa penyelarasan pengurusan pendapatan dapat membantu dalam meningkatkan pengurusan kredit di kalangan pelabur yang melabur di Malaysia.

Kata kunci: Pengurusan risiko kredit, kemuflisan, pengurusan pendapatan

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LIST OF ABBREVIATIONS

BNM	Bank Negara Malaysia (Central Bank of Malaysia)
Bursa Malaysia	Bursa Malaysia Berhad
DataStreams	Thomson Reuters Datastreams
EM	Emerging market
FRS	Financial Reporting Standards
GAAP	General Accepted Accounting Principles
IFRS	International Financial Reporting Standards
MARC	Malaysian Rating Corporation Berhad
MDA	Multivariate discriminant analysis
MIDA	Malaysian Investment Development Authority
PN 17	Practice Notes 17/2005
SC	Securities Commission

CHAPTER ONE

INTRODUCTION

1.0 Introduction

The contents of this chapter including discussion on the background of the study, highlighting on the problem statement of the study, description about the research objectives and research questions, hypotheses of the study, explanation about the significance of the study, the scope of study and finally, summary of the organization of the study.

1.1 Background of study

Credit risk is the risk if an economic loss from the failure of counterparty to meet its contractual obligations (Jorion, 2003). From bank perspective, credit risk can be defined as the possibility of losses due to diminution in borrower's credit quality or the potential where a bank's borrower or counterparty fails in to meet its obligations (Sinha, 2010). The borrower or lender can be an individual, a corporation or even a government. The default of the repayment may not only bring a huge financial loss, including principle and interest, to the lender but also cost the lender to collect back its principle. Meanwhile, the borrower may suffer in losing its reputation, creditworthiness and moreover its property that pledged as collateral on its borrowing. Based on those circumstance mentioned above, credit risk has became one of financial risk that concerned by not only credit providers but also cautious by investors, corporations and regulators. Therefore, the assessment of credit risk plays a

significant role to help those parties in making their decision whether it is worthwhile to provide or invest their funds in a particular company.

The importance of credit risk can be discovered through the implementation of the Basel Agreement or more significantly known as the Basel Accord. The credit risk has been pinpointed as one of the most important risk to be managed according to the Basel Committee. Started from Basel I in the year of 1988, the credit risk already has been highlighted as one of the key financial risk that must be controlled by the banking sector in maintaining the healthiness of banking institutions. Following by Basel II (in year 2004) and Basel III (in year 2010), each Basel also proposed the importance of measuring the level of credit risk and capital requirement is compulsory to back the portion of risky assets of banks. Besides, credit rating system also plays a crucial role in determine the creditworthiness of a borrower, from an individual to a country, in order to prevent and mitigate the risk of default that may bring huge losses to the lenders. Thus, the credit rating agency, such as Moody's or Fitch, should have a sophisticated model in determine the default tendency of a borrower.

In addition, each single country has its own regulation and regulators that control the credit facility and credit exposure of the country. For instance, one of the functions of the Central Bank of Malaysia (BNM) is to be responsible in promoting the financial system stability in Malaysia by providing a well diversified and comprehensive financial sector that able to meet the increasing needs of credit facility from consumers and businesses. The Banking and Financial Institutions Act 1989 (BAFIA) was introduced to provide a guideline in supervise the Malaysian financial system and

provide the BNM with the power to investigate and prosecute any illegal activities in the financial system.

As an emerging country, Malaysia possesses a strong position in terms of many aspects that attract foreign investors to invest in the country. According to the Malaysia Investment Performance 2012 reported by the Malaysian Investment Development Authority (MIDA), Malaysia has attracted RM162.4 billion of direct investment in 2012 which was the highest amount since ever. Besides, Malaysia was also able to maintain its growth of 5.6 per cent in term of Gross Domestic Product (GDP) in year 2012 where the macroeconomic environment was gloomy. In addition, based on the Malaysian External Trade Statistics 2012 report, the total trade in year 2012 had exceeded the one trillion ringgit mark which hit the figure of RM1.31 trillion and it was the 15^{th} consecutive year of increment in term of trade. Based on those achievements, it is not hard to notice that Malaysia has gained an outstanding reputation in global market and this will lead the country to boost more on its development and global value.

In order to keep Malaysian economy sustain and attract more foreign investors to invest in Malaysia, credit risk management plays a crucial role in determine the confidence of investors to invest in the country. Changes in credit rating significantly affect real macroeconomic outcomes and bring impact to a country's long term development. For instance, the downgraded of sovereign ratings for several Europe countries has brought an impact to the economies of those countries. Besides, Chen, Chen, Chang and Yang (2013) had proven that there is a strong relationship between credit rating changes and private investment growth. As a result, it can be concluded

that credit risk assessment is a crucial step in order to make decisions on an investment.

According to Bank Negara Malaysia (BNM) (2008), a sound measurement of corporate sector soundness may have an impact on the stability of financial system for a country[1]. Therefore, a forward looking model that can predict the level of credit risk that leads to corporate failure can help not only investors to avoid making wrong judgment on their investment decisions but also help the corporation itself to review its business strategy, and in addition, it can help credit providers to mitigate and manage such threats. As a consequence, the credit risk will be maintained at a secure level.

Battiston, Gatti, Gallegati, Greenwald and Stiglitz (2007) studied about the relationship between credit chains and bankruptcy propagation in the production networks. According to their findings, the presence of delayed payments or trade credit is one of the reasons that make the collapse of supply chain. As the supplier fail to collect credit from the customers, the supplier may be unable to repay its debtors and thus causing financial distress within the firm which may lead to bankruptcy. Battiston *et al.* (2007) also found that such case may lead to a domino effect of supply chain failure that caused an avalanche of bankruptcies. According to Sinha (2010), loans are the primary source of credit risk as the major income of banks comes from fund based activities. Thus, banks need to manage the credit risk carefully and able to identify, measure, monitor and control credit risk in order to hold sufficient capital to protect themselves against credit risk.

[1] Financial Stability and Payment Systems Report 2008

1.2 Problem statement

According to BNM, the bankruptcy cases in Malaysia (including bankruptcy cases for public listed companies, private companies and individual) has increased to 2366 cases in July of 2013, which increased by 467 cases compared to 1899 cases in June of the same year[2]. The number of bankruptcy cases is shown in Figure 1.1. The number of 2366 cases was the highest since 1998 and the increasing trend of bankruptcy cases in Malaysia since 1998 until August 2013 is shown in Figure 1.2. In other words, the incremental of bankruptcy cases reflected that more and more companies fail to repay their debt and continue their business. Thus, lenders who have wrongly estimated the repayment ability and financial condition of their clients will be suffering a huge loss.

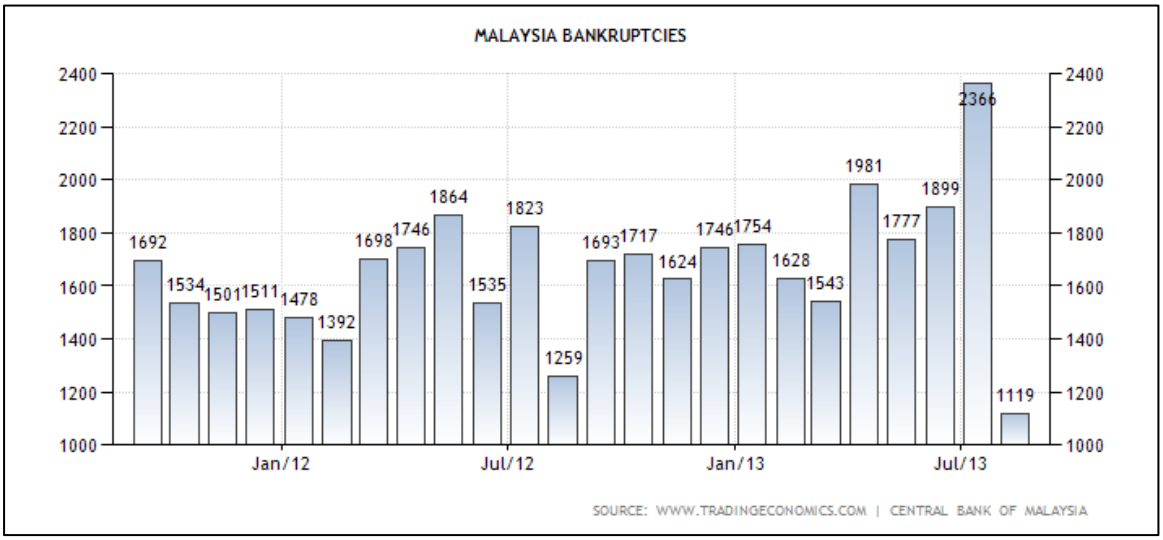

Figure 1.1
Malaysia bankruptcies (monthly data)

[2] www.tradingeconomics.com

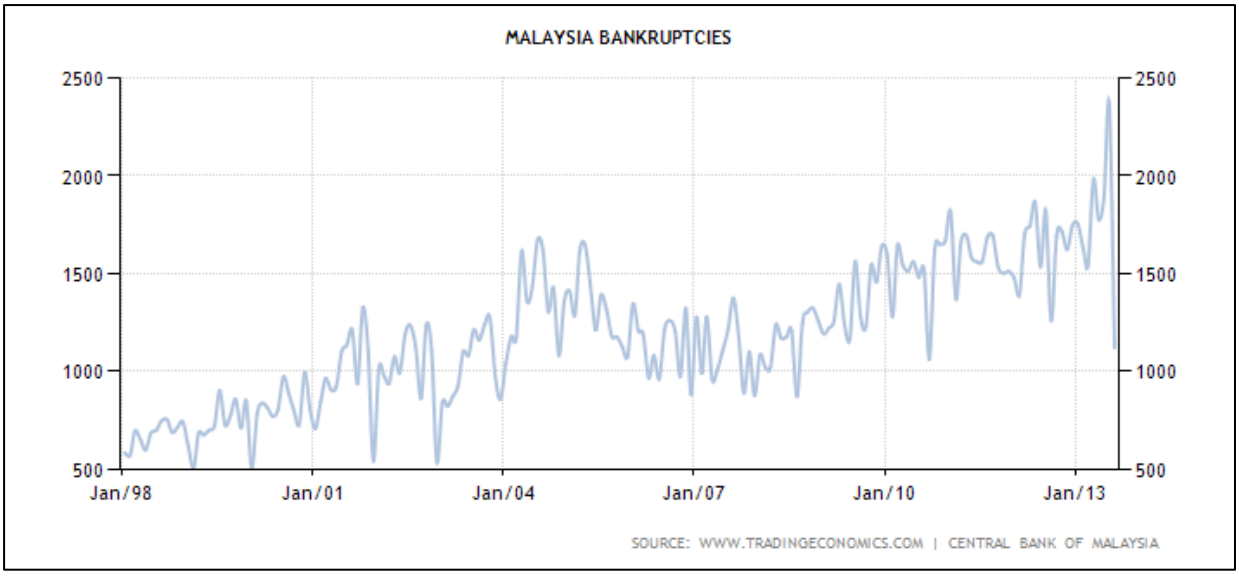

Figure 1.2
Malaysia bankruptcies (January 1998-August 2013)

This phenomenon of increasing of bankruptcy firms should be taken into account by all market players in order to derive a more sophisticated tool to predict the bankruptcy probability. One of the most used and widely accepted methods in managing credit risk is the default prediction model using financial ratios. Over the years, financial ratios have been applied and proven on its accuracy in determine financial status of a firm and also been used to predict financial distress or bankruptcy by market participants. Besides, due to its ease of application and understanding, it is still being used nowadays by investors and analysts.

However, as accounting figures is used in calculating those financial ratios, this characteristic has been facing some issues on its prediction power recently. According to Basu (1997), accounting figures can affect a firm's position due to the asymmetric practice of accounting reporting such as conservatism principles in recording the loss and gain of the firm. Besides, earning management using accounting figures has also been proven by Hoffman and Patton (2002). According to Cho, Fu and Yu (2012), the existence of earning management using accounting figures and the changes of

accounting principles have made one of the prediction model, the conventional Z-score model, fail to consider earning manipulations that may exist among firms. Therefore, based on their study, earnings management adjustment should be made on the financial figures used in calculating bankruptcy tendency.

Based on the research by Leuz, Nanda and Wysocki (2003) that conducted a study on the systematic differences in earnings management using 31 countries, Malaysia, Hong Kong and Singapore have been proven to have the worst earning management compared to other common law countries (law system that formed based on decisions in cases by judges). Furthermore, Malaysia has also undergone the accounting transmission from Financial Reporting Standards (FRS) to International Financial Reporting Standards (IFRS) effective from 1st January 2006 and the fully convergence of IFRS has been started in 2012. As a result, in Malaysia, there may need some adjustment when using financial ratio in predicting financial distress due to the changes of accounting environment and existence of earning management practices. Thus, this study aims to test whether the accuracy rate in predicting financial distress by using financial ratios will be increased after adjustment is being made for the earnings management portions.

1.3 Research objectives

The main objective of this study is to examine the determinants of credit risk management in an emerging market. The specific objectives of this study are as follows:

i. To determine the factors that contribute in predicting financial distress before and after earnings management is adjusted.

ii. To compare the difference in the accuracy rate between two models in predicting financial distress.

1.4 Research questions

i. What factor(s) is/are contributing in financial distress prediction before and after the earnings management is adjusted?

ii. What is the difference in term of accuracy rate for both two models used in predicting financial distress?

1.5 Hypotheses

To answer the first research question, the following hypotheses are presented:

H_1: Liquidity ratio is significant in predicting financial distress before earnings management is adjusted.

H_2: Productivity ratio is significant in predicting financial distress before earnings management is adjusted.

H_3: Profitability ratio is significant in predicting financial distress before earnings management is adjusted.

H_4: Leverage ratio is significant in predicting financial distress before earnings management is adjusted.

H_5: *Liquidity ratio is significant in predicting financial distress after earnings management is adjusted.*

H_6: *Productivity ratio is significant in predicting financial distress after earnings management is adjusted.*

H_7: *Profitability ratio is significant in predicting financial distress after earnings management is adjusted.*

H_8: *Leverage ratio is significant in predicting financial distress after earnings management is adjusted.*

To answer the second research objective, the following hypothesis is proposed:

H_9: *There is no difference in accuracy rate between the two models used.*

1.6 Significance of study

1.6.1 Practical contributions

By adding the abnormal accrual as one of the variable, this study helps in determining potential bias among accounting figures. Through detecting the bias, adjustment can be made and a better prediction of bankruptcy can also been done. Furthermore, the findings is useful as an empirical evidence to pinpoint that the credit providers, investors, corporations and even regulators should take note about the effect of earning management in order to help them to make a better decision or promote a better regulatory environment in financial market.

1.6.2 Theoretical contributions

The theoretical contribution of this study is by adding literature that related with the modification of bankruptcy prediction which takes account of the changing of accounting environment in Malaysia. Although the effects of accounting standard changes have been studied by the western countries, however, this issue is seldom touched by using sample from the emerging market, especially in Malaysia. The findings of this study will identify that whether a more sophisticated prediction model is needed as the country undergoes globalization in term of its accounting standard. Moreover, this study also provides knowledge about the effect of earning management on bankruptcy prediction. It contributes literature on the differences of considering and ignoring the impact of earning management.

1.7 Scope of study

This study is focused on Malaysian public listed companies. Sample is selected using paired sample design. In addition, firms from financial sector are excluded from the sample as their business nature is different than others. The time frame of study covers from year 2006 until year 2013.

1.8 Organization of study

The remainder chapters of this study are organized as follows: In Chapter 2, prior studies are critically reviewed and the background of study will be elaborated in detail. Chapter 3 discusses about credit risk management and accounting environment in Malaysia. Chapter 4 explains the research methodology. In Chapter 5 the empirical findings will be reported and discussed. Chapter 6 includes the summarization of findings, limitation of study and suggestion of future study.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

The organization of this chapter is as follow: Section 2.1explains about the decision making theory. Section 2.2 describes on the background and importance of credit risk. Section 2.3 explains on the implication of financial distress. Section 2.4 discusses about the development and history of credit risk model. Section 2.5 discusses the empirical result on earning management and its impact on financial failure prediction. Section 2.6 is the summary of the chapter.

2.1 Decision making theory

Decision theory deals with methods that are used to determine the optimal course of action in the situation where numbers of alternatives are available and their consequences cannot be forecasted certainly (Tryfos, 2001). In North's (1968) thought, decision theory provides a rational framework to choose between alternative choices when the consequences of the choice are imperfectly unknown. Thus, a formal theory of decision making must take uncertainty into account and regard precise knowledge of outcomes as a limiting special case. The theory of decision making is needed when choice is made under uncertain situation, when the decision will affected the future of a particular person or party, when having competing decision makers or a complex decision is needed.

There are many literatures for decision making theory in finance field. As highlighted by McInnes and Carleton (1982), the decision making in finance field involved setting the broad direction of a firm's financing, rate and mix of investment type and productivity level. All these decision will relate to the tradeoff between profitability and risk exposure of a firm. Hence, financial decision making involves analyzing the financial problems of the company and using analytical techniques to conduct financial analysis so that an optimal decision can be made.

Past studies show that in order to make an optimal decision, the decision analysis process is the key. Treacy and Carey (1998) studied on how internal rating system can have significant effect on bank's decision in managing its credit risk. They concluded that a careful design of control and internal review process is a crucial step in making the credit control decisions that can largely reduce potential incentive conflicts. Besides, according to Sung Park's (2004) study, credit scoring can helps making decision on credit worthiness of clients. The credit score is helpful for users in term to make quick decision in even a few seconds. Thus, it is crucial that organizations must understand and match themselves a suitable credit score model.

In addition, Mavri, Vasilis, Ioannou, Gaki and Koufodontis (2008) stated the benefits of credit scoring model and how it can be used to make future decision in their study. They found that credit scoring model can reduce possible risks, improve cash flows, decrease time taken to make future decision and, lastly, proper credit collections. The prediction of bankruptcy is also considered as one of the most important criteria of business decision making problem by Tam and Kiang (1992).

Another theory that similar with the decision making under uncertainty condition is the theory of irreversible choice under uncertainty. The theory indicates that investment behavior characterized by irreversible nature of investment and waiting for potential value. It is all driven by the sensitivity to various forms of risks. According to Reinhart and Rogoff (2004), they found that capital flows from high risk countries to low risk countries. This proven by when the sovereign credit rating is downgraded; investors tend to shift their investment to less risky country. Besides, based on Chen *et al.* (2013), they found that private investment growth decline due to downgrade of sovereign ratings and the situation goes vice versa. As a result, investors are concerned about the risk exposure and avoid high risk investment. Thus, it can be concluded that investors are making their investment decision based in the level of risk exposure.

As a summary, all decisions are made through the judgment and analysis of current and future situation and condition. Hence, it is important to have a good decision analysis tool to help in making the best decision.

2.2 Credit risk: Background and Significance

Risk is defined as the combination of the probability of an event and its consequences by International Organization for Standardization under ISO Guide 73:2009. By referring to the ISO guide, the sources of risk can be categorized into several categories such as human behavior, management activities and control, economic circumstance, political circumstance, technology issues, natural and unnatural events, and legal relationship. In the process of risk management, it involves four major steps: risk identification, risk evaluation and analysis, risk reporting and monitor, and risk

controlling (ISO Guide 73:2009; Northern Territory Government of Australia, 2013; Health and Safety Executive of United Kingdom, 2013). These four steps can be applied on all fields or industries, as well as for personal purpose.

In finance field, financial risk is one of the important risks to be concern. It may arise through firms' exposure to changes in market prices such as interest rate and exchange rate, firms' transactions with other parties such as customers and vendors, or firm's internal failure such as system or people (Horcher, 2012). The process to cope with the uncertainties resulting from the financial market is defined as financial risk management. Financial risk management does have the process as normal risk management which involved four processes: identification, assessment, monitor and report, and control (Basel Committee, 2001).

According to Christoffersen (2003), there are five main financial risks that mostly faced by corporations including market risk, liquidity risk, operational risk, business risk and credit risk. Among those five, credit risk is probably the oldest form of risk that faced by financial market players from all over the world. Stated by Georgakopoulos (2006), there are written records which indicate that lending activities has been started since 3000 B.C. Thus, this implies that credit risk also exists since long time ago.

Credit is usually referred to borrowing and lending of money. Basically, it refers to a loan that granted to a borrower or a financial instrument (i.e. fixed coupon bond) that involves pre-determined fixed payments and is made over a set time period. According to Anita (2008), credit risk is defined as the potential loss of valuable

assets caused by probable deterioration in the creditworthiness of counterparty or its inability to meet contractual obligations. In short, credit risk refers to the risk that borrower fail to pay back its debt.

Nowadays, credit risk has become pervasive. Refer to Basel Committee (2001), credit risk has been identified as the dominant risk for banking firms as the core business of banks are loan lending and deposit activities. Furthermore, securities firms may face credit risk as well due to their involvement in derivatives market, borrowing or lending securities and making margin loans to customers. Thus, credit risk depends on the ability of borrowers to generate sufficient cash flows through operation, earnings, or asset sales to meet their future interest and principle payment of the outstanding debt. The importance of credit risk has been highlighted by Basel Agreement, credit rating and financial market regulators.

2.2.1 Basel Agreement

'Credit risk' is always a buzzword in the finance world. Firstly, the importance of credit risk can be identified through the financial regulatory environment, particularly the implementation of Basel Agreement. Based on the description from the Hong Kong Institute of Bankers (2012) published in *Credit Risk Management*, the Basel Agreement is formed by the Basel Committee on Banking Supervision, which is part of the Bank for International Settlements (BIS) in Basel, Switzerland. This committee was formed by the central bank governors of G10 countries and today it is now composed of 27 members from both developing and developed countries (as updated at 10nd June 2013). The duty of the committee is act as the primary global standard-setter banks' regulations and provides forum for cooperation on banking supervisory

matters. However, based on the Basel Committee, the Basel Agreement has no legal force which means it is not compulsory to be followed by individual national authorities.

The Basel Accord was introduced in 1988. Initially, the goal for Basel Accord was to provide guideline in maintaining a minimum capital requirement for commercial banks to promote safety and soundness of the global financial system and create a level-playing field for banks that active in the international stage (Jorion, 2003). Thus, the accord only covered credit risk in 1988. The capital charge for market risk, currency and commodity risk was added afterward during the amendment of Basel Accord in 1996.

However, as time over, the regulations show their age. Jorion (2003) listed four major imperfection of Basel I as following: inadequate differentiation between credit risk, securitization, non-recognition of credit risk mitigation techniques and non-recognition of diversification of credit risk. Those flaws lead to regulatory arbitrage where bank activities were aimed at getting around the regulations.

As a result, the Basel Committee came out with the Basel II with three pillars as shown following:

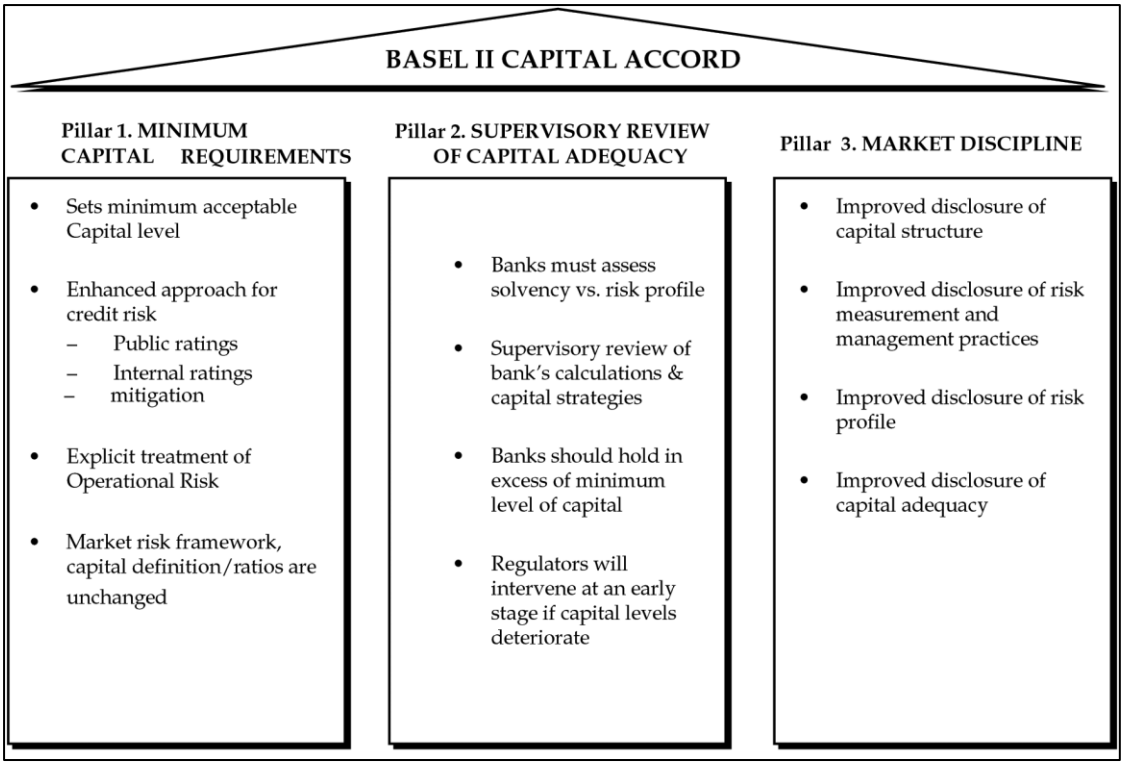

Figure 2.1 *Source: Garside & Bech (2003)*
Basel II capital accord

By referring to Figure 2.1, it was clearly stated that the Basel II had improved in maintaining minimum capital requirement to cover credit, market and operational risk in its Pillar 1. Meanwhile, the supervisory review process and market discipline were also been strengthen.

As a consequence from global financial crisis in 2008 that caused by serious credit default cases, the Basel Committee has noticed the burgeon of credit risk issue and proposed various measures to strengthen the global banking system through the introduction of Basel III in 2010. Figure 2.2 in below show the changes in term of pillars from Basel II to Basel III:

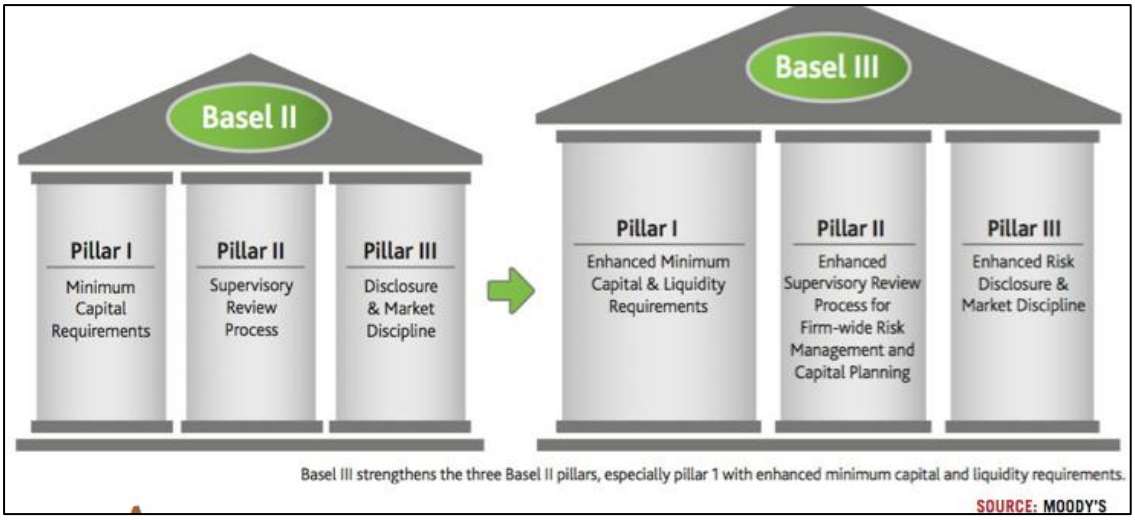

Figure 2.2
Enhancement from Basel II to Basel III

In Malaysia, banking institutions are the dominant financial institution. The banking institution's market share possesses more than 50 percent of the financial system and controls most of the financial flow [3](Muhammad Amar Farid, 2012). As a result, it is important to safeguard the stability of the banking sectors. Furthermore, bank loans are considered as the main source of finance for businesses although there is existence of corporate debt (i.e. bond), especially in emerging market (Sufian Fadzlan, 2009). As a result, for banks to provide funds or loans for those businesses, banks need to assess the default riskiness of the borrowers.

Miller and Noulas (1997) found that the more financial institution exposed to high risk loans, the higher the non-performing loans and, at last, lower the profitability. Thus, the assessment of riskiness has become one of the core activities as the major income of banks is generated from loan provision. The assessment can be done through the internal risk rating system of banks (Jacobson, Lindé and Roszbach, 2006). According to the Basel Committee, banks are allowed to base their capital

[3] Refer to Appendix A

requirement buffer based on their own internal rating systems or external rating systems.

2.2.2 Credit rating

The credit rating also plays an important role in assessing credit risk. Credit rating is, defined by Moody's, an "*opinion of the future ability, legal obligation, and willingness of a bond issuer or other obligor to make full and timely payments on principal and interest due to investors*" (Moody's, 2003; cited by Jorion, Liu and Shi, 2005, p.313). In general, a credit rating is a credit rating agency's assessment in term of the credit quality of a debt issuer (SEC, 2005). The setting of credit rating is made by credit rating agency based on the assessment of default likelihood or long term credit worthiness of a firm (Chou and Cheng, 2012). Some of the most famous and well known credit rating agencies include Standard & Poor's, Moody's and Fitch Ratings. Each of those agencies has their own method to assess the level of creditworthiness. Frost (2007) found that credit ratings has been increased in its usage recently due to the financial globalization, increasing complexity of financial products and increasing usage of ratings in financial regulation and contracting for the credit quality assessment purpose.

According to the report of 2012 Annual Corporate Default and Rating Study published by Malaysian Rating Corporation Berhad (MARC), there were 12 rating migrations cases among corporate issuers during 2012 including 10 rating downgrades, 1 upgrade and 1 default. Compared to 2011, the corporate default rate is lower in 2012; however, the downgrades-to-upgrades ratio in 2012 has increased

(2011: 8 downgrades, 2 upgrades and 2 defaults). Figure 2.3 demonstrates the summary of annual rating from 2001 to 2012.

Year	Issuers as of 1st January	Upgrades	Downgrades	Default	Withdrawn	Migrating	Stable	Downgrade to Upgrade (x)
2001	23	0.0%	0.0%	4.3%	4.3%	4.3%	95.7%	n.a
2002	42	7.1%	7.1%	0.0%	2.4%	14.3%	85.7%	1.0
2003	50	8.0%	4.0%	0.0%	10.0%	12.0%	88.0%	0.5
2004	57	19.3%	0.0%	0.0%	10.5%	19.3%	80.7%	0.0
2005	78	9.0%	2.6%	2.6%	9.0%	14.1%	85.9%	0.3
2006	91	8.8%	11.0%	1.1%	9.9%	20.9%	79.1%	1.3
2007	98	5.1%	11.2%	4.1%	11.2%	20.4%	79.6%	2.2
2008	98	8.2%	7.1%	1.0%	8.2%	16.3%	83.7%	0.9
2009	98	1.0%	5.1%	5.1%	23.5%	11.2%	88.8%	5.0
2010	82	6.1%	12.2%	1.2%	24.4%	19.5%	80.5%	2.0
2011	78	2.6%	10.3%	2.6%	20.5%	15.4%	84.6%	4.0
2012	75	1.3%	13.3%	1.3%	21.3%	16.0%	84.0%	10.0
Arithmetic Mean	n.a	6.4%	7.0%	1.9%	12.9%	15.3%	84.7%	1.2

Source: MARC Fixed Income Research

Figure 2.3
Summary of annual rating actions

MARC stated that this may be a warning for possibility of default rate increment in future. The possibility of changing of credit rating, which referred as credit rating transition risk, may cause direct and indirect cost of losses. For example, the downgrading credit rating of United States (U.S.) federal government on August 8, 2011 has brought down the global stock market while the three main indexes of U.S. declined about five to seven percent in that single day.

Cantor (2004) stated few reasons why credit risk managers are concerned about credit rating transition risk including credit rating transition statistic can be used to predict long term default and, the rating transition data can used for determine the rating process and illustrate how credit rating relate to measurement of credit risk. In addition, the credit rating is also used by banks, supervisors and other financial institutions in order to produce accurate and stable estimation of credit loss for current

and future population of the same credit exposures, and used for portfolio selections (Kiefer and Larson, 2007). Thus, it is needed by market participants to have a sophisticate model in order to predict the default tendency.

2.2.3 Regulators

Each country has its own financial regulator as well as for Malaysia. The Bank Negara Malaysia is the Central Bank for the country and was established on 26th January 1959 under the Central Bank of Malaysia Act 1958 (CBA 2009). The key roles and functions of the BNM are to promote financial system stability, conduct prudent monetary policy, act as banker and adviser to the government, and promote financial inclusion (Bank Negara Malaysia, 2013).

To cope with credit risk, Bank Negara Malaysia has formed a series of guidelines to ensure the credit risk control is sufficient. For instance, the "Best Practice for the Management of Credit Risk" guidelines have been set up in 2001 for the adoption of banking institutions to make sure banks is prudent in their credit granting activities and strengthen their risk management policies (BNM, 2001). Beside, training programs regarding to credit risk control are also provided by the BNM. According to the press released by International Finance Corporation (IFC) on 20th November 2012, the BNM and IFC have held the Fourth Credit Reporting and Risk Management Training in Kuala Lumpur with the aim to strengthen credit reporting techniques and credit risk management.

In order to provide an efficient, secure and active trading market for local and foreign investors, the Bursa Malaysia (formally called as Kuala Lumpur Stock Exchange

(KLSE)) was established (Bursa Malaysia Berhad, 2013). To manage and control the quality of credit in Malaysia, especially for those listed companies that may collect funds from investors or source their capitals from financial institutions, Bursa Malaysia has set a series of requirements and criteria that need to be fulfilled by those firms. In case the stock issuer fails in the requirement compliance, it may face the situation where the company will be filed into the Practice Note 17/2005 (PN17). According to Bursa Malaysia, a PN 17 firm is a company where its financial condition and level of operations does not fulfill the requirement to be continued listing in the Official List. Thus, restructuring plan should be taken by the firm to fix the problem in order to remove the PN 17 title or fail in restructuring will cause the firm to be delisted from the Official List.

In addition, the Credit Bureau Malaysia has been formed as one of the credit information and ratings providers in Malaysia. This bureau is specialized in providing information for small and medium enterprise for credit evaluation purpose (Credit Bureau Malaysia, 2013). The credit report, named as Credit Risk Report, is used to assist financial institutions and credit grantors in reviewing the credit standing and rating of their potential or existing customers in order to minimize the risk exposure and maximize revenue.

Moreover, the Securities Commission (SC) Malaysia also plays an important role in guarding the discipline of the financial market. Since its establishment on 1 March 1993 under the Securities Commission Act 1993, the SC acts as a regulatory body that investigate and safeguard the activities of financial market. The functions of SC including approve authority for corporate bond issue, regulate the operations of unit

trust scheme and ensure proper conduct of market institutions and licensed persons (SC, 2013).

As a conclusion, credit risk plays a crucial position not only in a single country but also been concerned in the international stages. This is due to the potential losses that it may bring to the market players where the details will be discussed in the following section.

2.3 The implication of financial distress

Battiston *et al.* (2007) studied about the relationship between credit chains and bankruptcy propagation in the production networks. According to their findings, the presence of delayed payments or trade credit is one of the reasons that make the collapse of supply chain. As the supplier fail to collect credit from the customers, the supplier may unable to repay its debtors and thus causing financial distress within the firm which may lead to bankruptcy. According to Sinha (2010), loans are the primary source of credit risk as the major income of bank comes from fund based activities. Hence, banks need to manage the credit risk carefully and able to identify, measure, monitor and control credit risk in order to hold sufficient capital to protect themselves against credit risk.

Palubinskas and Stough (1999), using post-communist countries as sample, found that there are several factors that caused banks failures including bad loans, lack of banking skills, lack of regulation, deposit insurance, mismanagement and corruption. Based on Andrade and Kaplan (1997), by using highly leveraged transactions as sample, they found that the primary cause for distress is firm high leverage while the

poor firm performance and poor industry performance contributed not much in explaining about distress. Besides, operating and net cash flow margins have declined significantly after the firms fall in distress and rebound in the year before distress is resolved. The impact of financial distress has also been studied by Andrade and Kaplan (1997). They discovered that when firms are in distress conditions, it will cause costly investment cuts, depressed asset sales and delay. The cost of financial distress was estimated to reach as high as 10-20 percent of the total firm value. Similar to above findings, prior study done by Kaplan and Stein (1993), as cited in Tykvová and Borell (2012), also found that high debt levels lead to higher bankruptcy likelihood.

Besides, Opler and Titman (1994) found that highly leveraged firms are tending to lose substantial market share to their healthy counterparties and experience lower operating profits when the industry is undergoing downturn. They also discovered that the stock returns of highly leveraged firms are lower than their less leveraged competitors when the industry is distressed. Purnanandam (2008) highlighted three major costs that resulted from financial distress. Firstly, financial distressed firm may lose its customers, suppliers and key employees. Secondly, financial distressed firm is having high tendency to violate its debt covenants or fail to meet its obligations. Lastly, financial distressed firm may need to give up those positive net present values (NPV) projects due to high external financing cost.

Referring to Asquith, Gertner and Scharfstein (1994), where they studied about the responses of companies to distress, there are several ways firms react to distress such as bank debt restructurings, public debt restructurings and asset sales. In average,

financial distressed firms would need to sell 12 percent of their in order to implement their restructuring plans such as payoff senior private debt. Based on Honohan (1998), when a bank fail or distressed, losses will be incurred by depositors, government, other creditors of banks and as well as banks' shareholders. Moreover, the distressed condition may leads to a contagious panic which may cause bank runs and causing a domino effect in the banking industry such as the case for Continental Illinois Bank. Beside, deposit freezing due to bank failure may cost the banks more as they need to pay the depositors with interest.

From the above discussion, it is obvious that market participants would need to pay a huge compensation for their mishandling of credit risk. Thus, it is crucial that a more sophisticated model should be developed to measure and control for credit risk.

2.4 Development and history of credit risk model

The assessment of creditworthiness of debtors or borrowers in the form of default tendency, which may lead to bankruptcy, is one of the most significant tasks for credit providers such as banks, financial institutions, and investors as well as rating agencies. When a firm facing financial distress problem, it may bring direct and indirect cost that affect the firm's value (Andrade and Kaplan, 1998). An announcement of bankruptcy certainly follows with negative returns (Altman, 1969). Thus, it is critical to be able to predict bankruptcy events.

Default prediction model has become one of the major tools that been used to predict the probability of default since long time ago. Empirical studies on default prediction have been conducted since long time ago. It was firstly pioneered by Beaver and

Altman (Hol, Westgaard and Van der Wijst, 2002) in 1960's. It started with a univariate discriminant analysis developed by Beaver in 1966 and expanded by Altman towards multivariate discriminant analysis (MDA) which applied through the famous Z-score model that still been using today.

Since then, researchers keep trying to develop other methods in predict the probability of default. Until today, despite of the traditional discriminant analysis, the literature of default prediction has been increased in term of various method of default prediction such as Cox proportional hazards model (Henebry, 1996; Figlewski, Frydman and Liang, 2012), logit analysis (Ohlson, 1980; Cheng, Chen and Fu, 2006; Barros, Ferreira and Williams, 2007), neutral network (Tam and Kiang, 1992) and option-pricing model (Charitou, Dionysiou, Lambertides and Trigeorgis, 2013). Based on Altman and Saunders (1998) opinions, there was significant improvement in term of credit risk measurement literature over the last 20 years start from the 1980's.

2.4.1 Financial ratio in predicting financial distress or bankruptcy

In the past, many researches were done to determine which financial ratios are significant in determine financial distress or bankruptcy. Korol (2013) analyzed the statistical model that used by prior researchers[4]. Based on his analysis, it was found that five of those financial ratios are popular among researchers to predict business bankruptcy. They are earnings before interest and tax to total assets ratio (reflects firms' profitability), net profit to total asset ratio (reflects firms' activity), total liabilities to total assets (reflects firm's debt level), working capital to total assets ratio

[4] Refer to Appendix B

(reflects firms' liquidity) and total revenues from sales to total assets (reflects firms' activity).

Meanwhile, Fons and Viswanathan (2004) using an accounting ratio approach to predict default risk over a one-year horizon for public and non-financial firms. Among a series of accounting ratios, they found that the interest coverage and leverage ratios are important in determine default risk compared to others. Moreover, based on Thai and Abdollahi (2011), liquidity, profitability, leverage and cash flow ratios were significant in identifying corporate financial failure.

Yap, Munuswamy and Zulkifflee (2012) studied about the company failure in Malaysia using financial ratios and logistic regression. Initially, they used 16 financial ratios to predict firm failure[5]. The empirical results show that there are four ratios which have significant power in predicting company failure. They are cash flow to total debts ratio and total debts to total assets ratio that measure firm's liquidity, retained earnings to total assets ratio that measure firm's profitability and finally the cash to current liabilities ratio that measure firm's solvency. According to the methodology used by Tykvová and Borell (2012) in their study, in determine firm's financial distress, ratios measuring liquidity, profitability and solvency are considered as the most significant indicators.

Chi and Tang (2006) also studied about bankruptcy prediction in the perspective of export credit risk. By using a logit model, they found that the significant financial variables that can be used to predict bankruptcy were those from the areas of solvency, operational efficiency and capital structure. Ali and Ng (2012) had compared the

[5] Refer to Appendix C

bankruptcy prediction power using current ratio and Altman model by using Malaysian public listed companies as sample. Their results show that both current ratio and Altman model are useful in predicting potential financial failure of companies.

One of the most popular default predicting models, the Z-score model, is also using financial ratios as predictors for bankruptcy and it was proven quite accurate in predicting bankruptcy (Altman, 1993). The Z-score model used a combination of five ratios to predict the default tendency which including working capital to total assets, retained earnings to total assets, earnings before interest and taxes to total assets, market value of equity to book value of debt and sales to total assets (Altman, 1968). Besides, the Z-score model had also been modified to suit the condition of different market in predicting bankruptcy. According to Altman, Hartzell and Peck (1995), they modified the original Z-score model that suitable to be applied in emerging market, which is called the emerging market (EM) Z-score model, by including four financial ratios as the predictors (liquidity ratio, productivity ratio, profitability ratio and leverage ratio)

In addition, by using Bayesian model averaging (BMA) techniques, González-Aguado and Moral-Benito (2013) found that firm specific variables (or financial ratio) such as working capital to total assets, retained earnings to total assets and total liabilities to total assets are the most robust determinants of corporate default. By using a sample of PN17 companies that listed in Malaysian Stock Exchange, Mohammed (2012) found that financial liquidity ratios and Altman Z-score can be used to identify financial distress companies. In addition, the report from Financial

Department of United States (2000) stated that financial ratios are useful in determine a firm's performance and financial position. Furthermore, it can be used to analyze firm's trend and predict future bankruptcy.

Additionally, Mohammed and Ng (2012) also found that Altman Z-score and current ratio are useful tools in company financial failure prediction. A study by Yap *et al.* (2012) indicated that four ratios have significant discriminating power in predict corporate failure, including two of the liquidity ratio (cash flow to total debts and total debts to total assets), one profitability ratio (retained earnings to total assets) and one solvency ratio (cash to current liabilities). The usefulness of financial ratio one again proven by Ferri and Liu (2004), as stated in Shen, Huang and Iftekhar Hassan (2012), using a sample of 563 non-financial firms from developed and developing countries. They found that financial ratios can comprise almost all of the information that reflects firm's credit rating in developed countries. Meanwhile, in developing countries, financial ratios do play an important role in determine the credit rating and sovereign risks.

Although some researchers critic that accounting based statistical models are lack of theoretical framework in determine the appropriate variables and relationships, however, they do provide an alternative credit view that out from the market opinion and were found out that most of the credit analysts were using the same variables in determine the default probability. According to Fons and Viswanathan (2004), accounting ratio-based analysis does not assess the creditworthiness based on market value, but indeed, the market prices of a company may be judged using the accounting ratio. Moreover, they also mentioned that market information may undergo time-

varying risk and liquidity premiums that may affect the accuracy of information about creditworthiness and thus affect the result of default prediction too. This reflects that accounting ratio approach may not take into account of market value but it is still a useful and applicable method to be used as a default prediction tool.

Table 2.1 summarized the key financial indicators that were proven to be significant in determines financial failure or bankruptcy, which includes profitability ratio, leverage ratio, productivity ratio and liquidity ratio.

Table 2.1
Summary for significance of financial ratio in determine bankruptcy

	Author(s)	**Year**	**Significance of financial ratio(s) in determine financial distress or bankruptcy**
i.	Altman	1968	Profitability, productivity, liquidity, leverage and activity ratios
ii.	Keasey and McGuinness	1990	Profitability and efficiency ratios
iii.	Altman *et al.*	1995	Profitability, productivity, leverage and liquidity ratios
iv.	Fons and Viswanathan	2004	Interest coverage and leverage ratios
v.	Chi and Tang	2006	Solvency, operational efficiency and capital structure ratios.
vi.	Thai and Abdollahi	2011	Liquidity, profitability, leverage and cash flow ratios.
vii.	Ali and Ng	2012	Current ratio (liquidity ratio) and Altman model.
viii.	Tykvová and Borell	2012	Liquidity, profitability and solvency ratios.
ix.	Yap *et al.*	2012	Cash flow to total debts ratio and total debts to total assets (liquidity ratio), retained earnings to total assets (profitability ratio) and cash to current liabilities (solvency ratio).
x.	Korol	2013	Earnings before interest and tax to total assets (profitability ratio), net profit to total asset (activity ratio), total liabilities to total assets (debt ratio), working capital to total assets (liquidity ratio) and total revenues from sales to

			total assets (activity ratio).
xi.	de Claro	2013	Earnings and profitability ratios.
xii.	González-Aguado and Moral-Benito	2013	Total liabilities to total assets (debt ratio), working capital to total assets (liquidity ratio) and earnings before interest and tax to total assets (profitability ratio).

Based on above discussion, the financial ratio is suitable and applicable in determine financial distress. Thus, this study selects four of the most used financial ratios to test on their contribution in predicting financial distress before and after adjusts for earnings management portion including profitability ratio, productivity ratio, liquidity ratio and leverage ratio.

2.4.1.1 Profitability ratio

Profitability reflects a firm's ability to generate earnings. Profitability ratio is mostly used by both management and external users in determine the firm's success in generating profits and how the profits are used to reward investors (Edmonds, Olds and McNair, 2010). According to Thai and Abdollahi (2011), in predicting corporate financial distress, profitability ratio is one of the significant and effective ratios. It was found that profitability ratio was negatively correlated with financial distress. This indicated that distressed firms are suffering from inability to generate sufficient cash. Furthermore, de Claro (2013) indicated that the earnings and profitability ratios are the most effective indicators of bank failure in Philippines among the CAMELS (capital adequacy, asset quality, management quality, earnings and profitability, liquidity and sensitivity to market). By using UK industrial firms as sample, Keasey and McGuinness (1990) discovered that the profitability and efficiency ratios were significant in explaining failure one year prior to it.

2.4.1.2 Leverage ratio

Financial leverage ratio provides information about firm's long term financial obligations and its ability to meet those obligations (Drake, n.d.). In banking field, D'Hulster (2009) stated that leverage can help a financial institution to increase potential gains and losses by involve in an investment. However, the excessive leverage has also leads to global financial crisis (Financial Stability Board, 2009; cited in D'Hulster, 2009). Furthermore, Shahidur, Tan, Hew and Tan (2004) indicated that capital adequacy, loan management and operating efficiency are three common indicators that significant in detecting bank's financial distress. Among corporate, Fons and Viswanathan (2004) found that leverage ratio is significant in predicting firm's default risk. According to Thai and Abdollahi (2011), debt ratio was the most significant variable of distress prediction in their study. The positive relationship between debt and financial distress indicated that higher the debt higher the probability of distress. The similar result also found by Mallick and Yang (2011).

2.4.1.3 Productivity ratio

The activity ratio provides information on company's ability in managing its resources efficiently. Shortly, it reflects how well assets are used. Thus, activity ratio sometimes is also referred as efficiency ratio. By using univariate analysis, Beaver (1966) found that one of the best indicators to determine corporate failure was the net income to total assets ratio, which had 88 percent in term in its accuracy. Furthermore, Bottazzi, Grazzi, Secchi and Tamagni (2011) studied on the significance of financial and economic variables as determinants of corporate failure by using a large sample of medium sized limited liability firms. They discovered that higher level of

productivity leads to lower level of default. Meanwhile, another study, by Becchetti and Sierra (2003) which used manufacturing firms as sample, found that firm's productive inefficiency has significant explanatory power in predicting bankruptcy.

2.4.1.4 Liquidity ratio

According to Pearson (1998), the ability of a firm to pay its creditors on time causes significant impact on the survival of the business. Thus, liquidity ratio can be used to measure the ability of firm to pay its creditors within one year sufficient quickly. As cited in Shahidur *et al.* (2004), Kwok *et al.*(1999) discovered that liquidity was significant in predicting bank failures. Using distressed and non-distressed firms in Malaysia as sample, Thai and Abdollahi (2011) discovered that liquidity, profitability, leverage and cash flow ratios were significant in identifying corporate financial failure. In addition, Back (2001) tested the accuracy of liquidity measure in predicting bankruptcy. In predicting financial distress, as individual variable prediction model, he found that the traditional liquidity measurement such as working capital to total assets and current ratio performed better than cash conversion cycle and comprehensive liquidity index.

2.5 Effect of earnings management

In order to achieve the goals of maximize shareholders' wealth, maintain optimal level of liquidity and solvency, and manage risk wisely, a company must first determine the status and trend of its own and targeted firms' financial position. Thus, financial reporting plays a crucial role in providing information that is useful to present and potential investors and creditors to make decision on investments, credits and trading activities (Spiceland, Sepe and Tomassini, 2007). According the

Statement of Accounting Concepts (SAC) (2001), financial reporting is important in providing information to users that needed to make and evaluate decision on sources allocations.

The users of financial reports include resource providers, recipients of goods and services, parties performing a review or oversight function and, management and governing bodies. Even the employee of the company would need the earnings information to determine the ability of the company to pay their salary or to grant wage increment (Ronen and Yaari, 2008). As a result, the accounting statement users should be aware of the quality of financial reporting before they use the information in making their decisions.

There are many accounting professions that prepare guidelines or known as accounting standard to assure the quality of accounting report. For example, the Malaysian Accounting Standard Board (MASB) was established to develop and issue accounting and reporting standards within the country to develop and promote high quality accounting and reporting standard that consistent with international standards (MASB, 2013). However, even though there are series of guidelines that help in standardize and guiding the practices of accounting reports, the possibility of accounting distortions, especially the earning management behavior, are still exist (Roychowdhury, 2006; Cohen, Dey and Lys, 2007; Jansen, Ramnath, Yohn, 2012; Yang, 2013).

According to Jackson and Pitman (2001) earnings management is defined as the manipulation of accounting numbers within the limit and scope of the Generally

Accepted Accounting Principles (GAAP). Meanwhile, Hashemi and Rabiee (2011) divided earnings management into two category: accounting earnings management (i.e accounting statement choices under GAAP) and real earnings management (i.e changes in the timing of operations). There are three major factors that contribute to the earnings surprises proposed by Mulford and Comsikey (1996) including changing in economic fundamentals, aggressive application of accounting principles and fraudulent in term of financial reporting. Firstly, the changing in economic fundamentals such as weakening in company's credit quality and poor decision making will affect the company performance. Next, different accounting principles have their own guidelines and practices, thus, if each single company use different accounting principles in their financial report preparation process, it may be difficult to compare from firm to firm. Lastly, as mentioned before, earnings expectation is made using the information provided in the financial statement. Therefore, the fraud in financial reporting such as overstated revenue or understated expenses may cause misjudgment and poor decision making for financial statement users. According to Lin and Wu (2014), earnings management is considered as fraudulent activity to the stakeholders due to its materially misleading although the manipulation of counting figures is made within the scope of accounting standards and laws.

Mulford and Comsikey (1996), in their article *Financial Warning*, stated that there are two groups of people that make their decision setting using the financial statement: the lenders and equity investors. Those decision made are based on their earning expectation within a company. They mentioned that an earnings surprise requires an earning expectation. For example, lenders such as bond investors will have earning expectations within a company in deciding their willingness to lend their money to the

company through determine of the bond rates. Loss avoidance and earnings decrease avoidance have been cited as the main type of earnings management by most of the studies (Degeorge, Patel and Zeckhauser, 1999; Burgstahler and Dichev, 1997; Moreira and Pope, 2007).

Studies have been conducted to determine the factors that contribute to corporate failure and accounting fraud was found as one of the factors. According to Yap *et al*. (2012), if a collapse of a firm cannot be detected earlier, this may due to the firm did not disclose true and adequate information about their financial condition. Besides, this also reflects that the accounting standards and other regulations or legal requirement may not be enough to ensure fair and transparent disclosure. Meanwhile, Shen *et al.* (2012) found that the effect of financial ratios on credit ratings is significantly affected by the level of information asymmetries. They also suggested that for banks to improve the credit rating, the information asymmetry in the country should be reduced too.

Thus, corrective actions should be taken to adjust the company information biases in order to prevent poor decision making and improve company performance. As a result, the objective of this study is to determine whether the accuracy of predicting financial distress would be increased if earnings management portions are adjusted.

2.6 Summary

The background and significance of credit risk has been discussed in this chapter. The literature and empirical evidence show that management of credit risk is a crucial task for market participants and the mismanaged may cost huge losses. Besides, in order to

predict financial distress or bankruptcy, the financial ratios is applicable and accurate based on the findings from past studies. However, when the financial information is used as input for the bankruptcy prediction, the quality of financial information should be also take in to consideration, particularly the earnings management portions. Thus, this study aims to figure out whether adjustment for earnings management portions will increased the bankruptcy prediction power for financial ratios.

CHAPTER THREE

CREDIT RISK MANAGEMENT AND ACCOUNTING ENVIRONMENT IN MALAYSIA

3.0 Introduction

In this chapter, Section 3.1 describes about the background of Malaysia as an emerging country from the economic and finance perspective. In addition, the implication of credit risk control in the financial market, especially for public listed companies will be discussed in this chapter too. Section 3.2 discusses about the background of accounting practices and development of accounting standard in Malaysia. The regulatory and authorities that responsible to the implementation and reformation of accounting practices will also be discussed in this chapter. Finally, Section 3.3 is the summary of the chapter.

3.1 Emerging country and its credit management: Malaysia

The definitions for emerging market are different from variety sources. Emerging markets are defined by the World Bank as those with gross national income (GNI) per capita of less than $12,457 (JP Morgan, 2013). In Oglesby (2007) opinion, an emerging market is a country that attempts to transform its economy by improving its operation to the levels of other countries that are more advanced than. Shortly, emerging markets are financial markets of developing nations. In the World Economic Outlook report that released by the International Monetary Fund (IMF) in 16th July 2012, Malaysia has been classified as one of the emerging and developing

economies in the South East Asia (ASEAN) region. Others ASEAN countries that also included in the list are Indonesia, Philippines, Thailand and Vietnam.

As an emerging country, Malaysia possesses a strong position in terms of many aspects that attract foreign investors to invest in the country. Based on the Annual Report 2012 published by Bank Negara Malaysia, the economy performance of Malaysia in 2012 was better that what was expected. In the past year, Malaysia was able to reach a growth record of 5.6 percent. Besides, private investment and public investment have also shown a positive figure of double digit growth of 22 percent and 17.1 percent. Under the weak external environment where the Euro countries were experienced a recession due to the sovereign debt crisis, the slow and fragile economy recovery of United States, and the impact of natural disaster in Japan from the previous year, the Malaysian economy environment is considered well managed and control under such poor and challenging circumstances. This has been proven by the positive figure of economic indicators.

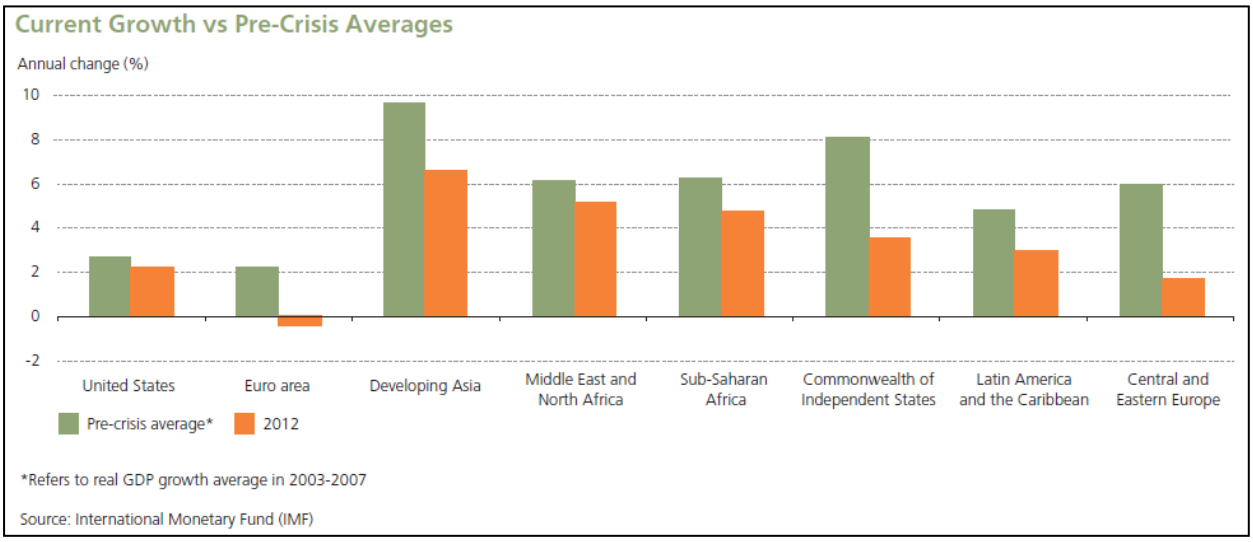

Figure 3.1
Current growth vs pre-crisis averages

Based on Figure 3.1, it shows that the differences of average growth in term of real Gross Domestic Product (GDP) in different areas. It is determined that the average growths of all areas were affected by the negative figure of GDP in the Euro area. It was discovered that the growth of GDP before the Euro crisis, where before the year of 2012, was higher than during the Euro crisis period which is in year 2012. All countries undergo a decrement in GDP during the Euro crisis period due to the instability condition in Euro area that affected the market participants' confidence to take part in the global market. This reflects that all countries were experienced a poor economic condition in 2012. Fortunately, Malaysia can still stand still under such weak environment and stabilize the economy and development of the nation.

As a result of well-managed and organized policy to handle the economic shock event, based on the Malaysian External Trade Statistics 2012 report, the total trade of Malaysia in year 2012 had exceeded the one trillion ringgit mark which hit the figure of RM1.31 trillion and it was the 15^{th} consecutive year of increment in term of trade. Besides, according to the Malaysia Investment Performance 2012 reported by the Malaysian Investment Development Authority (MIDA), Malaysia has also attracted RM162.4 billion of direct investment in 2012 which was the highest amount since ever. Besides, Malaysia was also able to maintain its growth of 5.6 per cent in term of Gross Domestic Product (GDP) in year 2012 under poor economic conditions as the financial failure in the west countries may had spillover effects in the emerging economies. Thus, it is obvious that Malaysia has gained an outstanding reputation in global market and this will lead the country to boost more on its development and global value.

However, in order to keep Malaysian economy sustain and attract more foreign investors to invest in Malaysia, credit risk plays a crucial role in determine the confidence of investors to invest in the country. Changes in credit rating significantly affect real macroeconomic outcomes and bring impact to a country's long term development. Based on Kräussl's (2004) study on the impact of sovereign rating changes in emerging markets, the author found that the changes in country rating have a significant impact on the size and volatility of emerging markets lending activities. Besides, Chen *et al.* (2013) had proven that there is a strong relationship between credit rating changes and private investment growth. They found that increase in private investment growth is affected by the upgrades in sovereign ratings. As a result, it can be concluded that credit risk assessment is a crucial step in order to make decision on an investment.

There are series of guidelines that set by regulators to be followed by corporate in order to manage and control the quality of credit market in Malaysia, especially for those listed companies that may collect funds from investors or source their capitals from financial institutions. In order to maintain a position in the Bursa Malaysia (formally called as Kuala Lumpur Stock Exchange (KLSE)), there are series of requirements and criteria that need to be fulfilled. In case the stock issuer fails in the requirement compliance, it may face the situation where the company will be failed into the Practice Note 17/2005 (PN17).

According to Bursa Malaysia, a PN 17 company is a company that do not fulfill the requirement, in term of financial condition and level of operations on a consolidated basis, to be continued listing on the Official List, either in Main Market or ACE

Market. The Practice Note 17 has stated the criteria that can cause issuer to file into the list. The criteria are as follow (as at March 25, 2013)[6]:

a) The shareholders' equity of the listed issuer on a consolidated basis is 25 percent or less of the issued and paid-up capital (excluding treasure shares) of the listed issuer and such shareholders equity is less than RM 40 millions.
b) Receivers or managers have been appointed over the asset of the listed issuer, its subsidiary or associated company which asset accounts for at least 50 percent of the total assets employed of the listed issuer on a consolidated basis.
c) A winding up of a listed issuer's subsidiary or associated company which accounts for at least 50 percent of the total assets employed by the listed issuer on a consolidated basis.
d) The auditors have expressed a modified opinion with emphasis on the listed issuer's latest audited financial statements.
e) The auditors have expressed a modified opinion with emphasis on the listed issuer's ongoing concern in the listed issuer's latest audited financial statements and the shareholders' equity of the listed issuer's on a consolidated basis is 50 percent or less of the issued and paid-up capital (excluding treasure shares) of the listed issuer.
f) A default in payment by a listed issuer, its major subsidiary or major associated company.
g) The listed issuer has been suspended or ceased:
    i. All of its business or its major business.
    ii. Its entire or major operations.

For any reasons whatsoever including, amongst others, due to or as a result of-

[6] *Practice Note 17*. Retrieved from http://www.bursamalaysia.com/misc/system/assets/4913/regulation_rules_bm_main_pn17.pdf

i. The cancellation, loss or non-renewal of a license, concession or such other rights necessary to conduct its business activities.

ii. The disposal of the listed issuer's business or major businesses.

iii. A court order or judgment obtained against the listed issuer prohibiting the listed issuer from conducting its major operations on grounds of infringement if copyright of products.

h) The listed issuer has an insignificant business or operations.

When a firm falls into the PN17 list, it must construct a regularization plan which stands with three principles quoted under PN17. Firstly, the regularization plan must be sufficient and capable enough to solve all problems that caused the company to be filed into PN17 list. Secondly, the plan should enables the PN17 Company to normalize back its financial condition and level of operations. Finally, the plan should be fair enough and reasonable to the company and its shareholders and, will increase shareholders' value. The regularization plan must be prepared within three months from the announcement of PN17 filling and a monthly reporting basis must be done to report the progress of regularization. However, if the implementation of regularization cannot help in improving the company's condition, the company may be delisted from the Bursa Malaysia. As at 9th September 2013, there are 26 public listed companies that fall in the list of PN 17 under the Bursa Malaysia.

According to Bank Negara Malaysia (BNM), a sound measurement of corporate sector soundness may have an impact on the stability of financial system for a country[7]. Therefore, a forward looking model that can predict the level of credit risk

[7] Financial Stability and Payment Systems Report 2008

that leads to corporate failure can help not only investors to avoid making wrong judgment on their investment decisions but also help the corporation itself to review its business strategy, and in addition, it can help credit providers to mitigate and manage such threats. As a consequence, the credit risk will be maintained at a secure level.

In addition, the increasing in number of issues regarding the credit crisis since from the global financial crisis on 2008, the Europe sovereign crisis and recently the Cyprus financial disaster have made the market participants more sensitive to the default risk. The massive losses the undergone by banks or other market players has reflected the insufficient in determine default probability.

As a consequence, discussion on credit assessment and preclusion of bank and corporate failures has become the one of the main objectives of financial market players and regulators. Meanwhile, bankruptcy prediction has also become one of the most challenging tasks and popular research topic in finance and accounting field (Tsai, 2009).

3.2 The revolution of accounting standards in Malaysia

The financial reporting practice in Malaysia has undergone significant changes in the past two decades. According to Lau (2010), the development of accounting reporting in Malaysia can be divided into three different time horizons, namely: pre-MASB (period before establishment of Malaysia Accounting Standard Board (MASB)), post-MASB (period after the formation of MASB) and International Financial Reporting Standards (IFRS) Convergence.

In the first phase, which is the pre-MASB period, firms were required to follow the reporting guidelines as stated in the Companies Act 1965 as well as those listing requirement of Bursa Malaysia for listed companies. Voluntarily disclosure practice was encouraged during that time but the feedback is low among Malaysian firms. Thus, it was clearly that the financial reporting standards in the early years in Malaysia are not mandatory for firms, diverse and discretional.

The post-MASB period covers from 1999 to 2005. During this period, MASB was established and together with Financial Reporting Foundation, new accounting framework was formed. The MASB was established as an independent authority to develop and issue accounting and financial reporting standards within the country. MASB is responsible in develop the frameworks for financial reporting that comprise an independent standard setting structure with representation from all parties that related in the standard setting process such as the users, regulators, preparers or accountants. Besides, the MASB's mission is to develop and promote high quality accounting and reporting standards that are parallel and consistent with international standards and best practices for the benefits of users, auditors, preparers and the public in Malaysia. With the establishment of MASB, new accounting reporting framework (mandatory reporting standards) has been formed and it involved an independent standard setting structure that jointed all relevant parties such as users, regulators, accountancy professionals and preparers in the process of standards setting.

After the post-MASB period, the accounting reporting in Malaysia has come to the IFRS convergence period. According to the press released by MASB and Financial Reporting Foundation (FRF) on 1st August 2008, Malaysia will be in full convergence

with the International Financial Reporting Standards (IFRS) by 1st January 2012. This means that all reporting entities in Malaysia are required to prepare their financial statements according to the IFRS. Based on MASB's chairman, Dato' Zainal Abidin Putih, the full convergence of IFRS is believed can enhance the Malaysian capital and financial market more. Besides, due to more than hundred countries are using the IFRS, compliance with IFRS will help comparability and increase transparency of the financial reports. Furthermore, the increase in term of cross border trading and globalization has increase the demand for better transparency and comparability in accounting practices.

A diverse accounting standard will make comparison of financial information between companies from different countries become difficult and misleading. Thus, the step forward to IFRS is considered as a good move as a single set of high quality global accounting standard is urgently needed (Tan, Lazar and Radiah Othman, 2007). Despite that changing of accounting standard can ease comparison among firms from different countries, it also aims to reduce the audit risk, which is the risk of inability of auditors to detect material misstatement due to error or fraud.

Based on the literature above, it is found that Malaysia undergoes changing in accounting standards. The changing of accounting standard is considered as a revolution of financial information. According to Mohammed (1997) (cited in Mohammed & Ng, 2012), as a consequence of this revolution, the financial data provided should be analyze in order to produce more useful information to help and increase the quality of decision making.

Besides, the change in accounting environment has also impact the earning management practices. Studies have found that the changing of accounting standard into IFRS has lowered the earnings management (Wan Ismail, Kamarudin, van Zijil and Dunstan 2013; Zéghal *et al.,* 2011; Barth, Landsman and Lang , 2008). Unfortunately, although the level of earning management has been lowered, the existence of earning management is still a factor that should take note when the financial information is used to predict the bankruptcy of a firm.

3.3 Summary

As discussed above, it was found that Malaysia, as an emerging market, is working hard to improve its financial environment so that can compete with others developed countries. Its achievements can be sighted through those economic indicators. Moreover, the regulatory system and accounting standards have also undergone revolution in order to reach the international level. Thus, for the purpose to become more competitive, it is crucial to maintain and control the level of credit risk within the countries as to provide a more stable financial environment for foreign and local investors.

CHAPTER FOUR

METHODOLOGY

4.0 Introduction

This chapter is organized as follow: Section 4.1 describes about the research framework, Section 4.2 explains on the research design used in this study, Section 4.3 expresses the measurement of the instrument used by the study, Section 4.4 describes on the data collection process, Section 4.5 explains about the technique of data analysis and Section 4.6 is the summary of the chapter.

4.1 Research framework

This study intends to distinguish the significance of financial ratio in determine financial distress before and after earnings management adjustment and determine also the effect of earnings management adjustment on the accuracy rate in determine financial distress by using Malaysian public listed companies as sample. Figure 4.1 shows the theoretical framework for the study. The framework illustrates how the research objectives that were developed in Chapter One and decision making theory was brought together and applied in the theoretical framework.

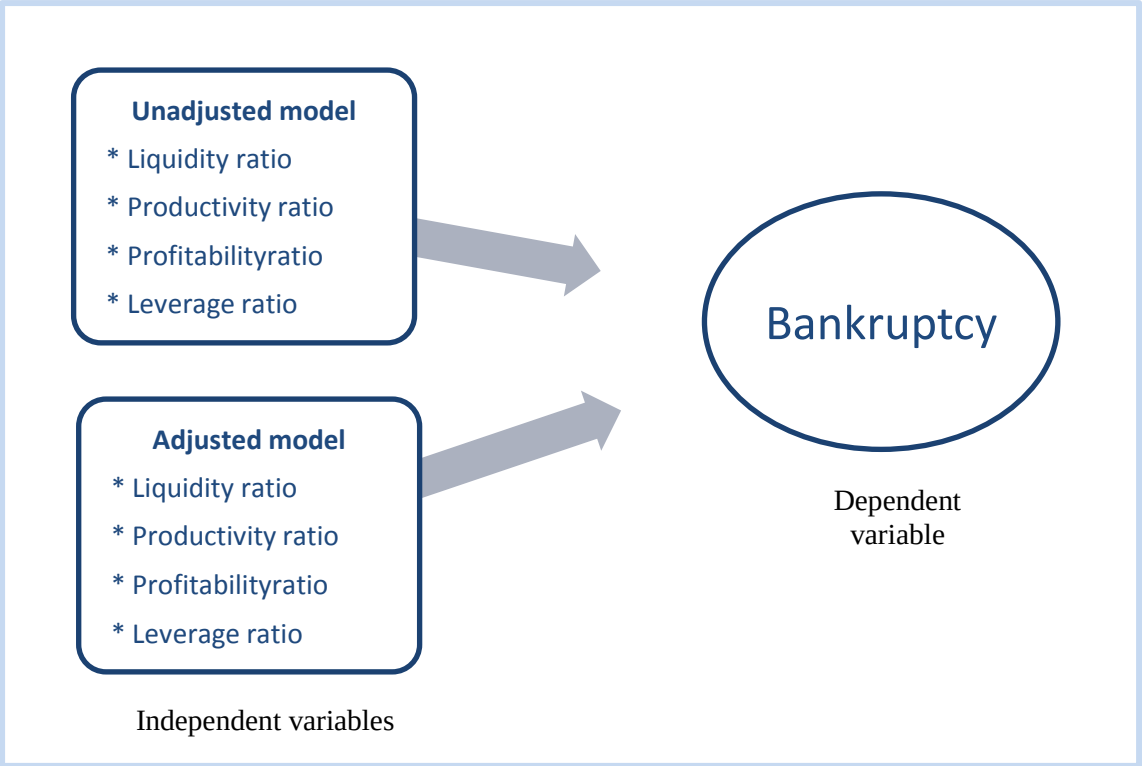

Figure 4.1
Theoretical Framework

Generally, business failure is caused by several reasons, including decrease of profit or increase of losses for several years continually, excessive level of debts, poor cash flow, insufficient working capital, overexpansion and internal fraud such as managerial errors and misjudgment (Bradley and Cowdery, 2004; Schaefer, 2006). All those symptoms that may lead to financial distress are reflected via company's financial statements. Altman (1968) also argued that corporate failure is a long period process and thus the financial statement should include warning signals for the bankruptcy.

Four financial ratios have been selected in this study to determine their significance in predicting financial distress including liquidity ratio (working capital to total assets ratio), profitability ratio (retained earnings to total assets), productivity ratio (earnings before interest and taxes to total assets) and leverage ratio (equity to total liabilities).

Each financial ratio was found to be significant as predictors for financial distress or bankruptcy by many researchers (Altman, 1968; Asch and Kaye, 1996; Fons and Viswanathan, 2004; Thai and Abdollahi, 2011; Bottazzi *et al.*, 2011).

However, with the existence of earning management there might be bias in determine the distress potential of a firm. Thus, it is important to determine whether adjustment should be done on the financial data before proceed to the financial distress analysis. As a result, this study tends to figure out will the accuracy in predicting default tendency using those four financial ratios change when the earning manipulation practices are taking into account.

4.2 Research design

This study focused on the public listed companies in the Main Market of Bursa Malaysia. Firstly, the list of financial distress companies is obtained from the PN 17 list from Bursa Malaysia. Those firms are matched with the same number of non-distress firms using paired sample design. The paired sample design is used in this study in order to compensate the effects of industry and asset size differences. According to Yap, Mohd Haniff Mohd Helmi, Munuswamy and Yap (2011), the matched pair samples of failed and non-failed companies are used before by others researchers such as Beaver (1966), Altman (1968) and Letza, Kalupa and Kowalski (2003). In addition, based on Loman (2003), groups with high similarity or close equivalence can makes easier in arguing the differences in outcomes or results than groups that have preexisting differences. Zulkarnain, Mohamad, Annuar and Zainal (2001) also used the pair sample design in their study to minimize sample bias.

All financial data is collected through Thomson Reuters DataStream. The accounting data for two financial years prior to the year of classification as distressed firm is collected to calculate the distress risk of a company. For example, if company was classified as PN 17 firm in 2012, the financial data for 2011 and 2010 will be used to predict the distress tendency. Besides, the finance sector has been excluded from the sample due to its difference in financial reporting rules and business nature (Fazilah, Mohd Azhar and Roselee, 2009).

4.2.1 Unadjusted model

Based on the literature discussed in previous chapter, four financial ratios have been selected as the independent variables in this study to determine their contributions in predicting financial distress. Those four financial ratios are the liquidity ratio, productivity ratio, profitability ratio and leverage ratio. As a result, the model used in this study to evaluate the credit risk of firms before the earnings management adjustment is formed as follow:

$$Unadjusted = \lambda_0 + \lambda_1 x_1 + \lambda_2 x_2 + \lambda_3 x_3 + \lambda_4 x_4 \quad (3.1)$$

where X_1 = Liquidity ratio

= Working capital / Total assets

X_2 = Productivity ratio

= Retained earnings / Total assets

X_3 = Profitability ratio

= Earnings before interest and taxes / Total assets

X_4 = Leverage ratio

= Book value equity / Total liabilities

4.2.2 Adjusted model

The effect of earnings management has been studies by researchers. According to Yap *et al*. (2012), bias in financial information may cause failure in detecting firm collapse. Furthermore, Shen *et al.* (2012) also found that the effect of financial ratios on credit ratings is significantly affected by the level of information asymmetries. Thus, this study aims to figure out whether earning management adjustment is playing a critical role in estimate the financial distress potential of a firm as accounting figures are used in the prediction model. Based on Cho *et al.* (2012), the adjustment of earning management was needed so that comparison can be made among firms.

By referring to Cho *et al*. (2012), they adjusted the earnings management portions by subtracting the abnormal accruals portions from the financial data used. Thus, in this study, the same method is applied in adjusting the earnings management portions. The Equation 3.2 shows the formula for the model used in predicting financial distress after the earnings management is adjusted:

$$Adjusted = \lambda_0 + \lambda_1\left(\frac{Working\ capital - EM}{Total\ assets - EM}\right) + \lambda_2\left(\frac{Retained\ earnings - EM}{Total\ assets - EM}\right) + \lambda_3\left(\frac{Earnings\ before\ interest\ and\ taxes - EM}{Total\ assets - EM}\right) + \lambda_4\left(\frac{Equity}{Total\ liabilities - EM}\right) \quad (3.2)$$

where EM = earnings management

4.2.2.1 Calculation for adjustment: Earning management

In order to adjust for the earning management, potential distortion amount in earnings is estimated using discretionary accruals method. Based on Chen (2010), there are many approaches can be used to detect earnings management; however, the accrual based models are the most popular approaches. In this study, the Modified Jones model is chosen to calculate the abnormal accruals. According to Cho *et al.* (2012), abnormal accrual can reflect the quality of earnings and capture the influence of accounting policy.

The discretionary accrual model was practiced by researchers to study about the effect of accounting changes to bankruptcy prediction (Dechow, Sloan and Sweeney, 1996; Kothari, Leone and Wasley, 2005; Cho *et al.*, 2012) by estimate the amount of earning that deviated from expected figure by assuming that they are subjected to accounting manipulation. There are three steps involved in the calculations. Firstly, the total accruals before adjustment are calculated as below:

$$TA_{it} = EBXI_{it} - CFO_{it} \quad (3.3)$$

where

TA_{it} = total accruals for firm *i* in year *t*

$EBXI_{it}$ = earnings before extraordinary items for firm *i* in year *t*

CFO_{it} = cash flow from operations for firm *i* in year *t*

Next, after the total accrual for each firm in every industry and year is found, regression analysis is run to predict the value of total accruals by year and industry:

$$TA_{it} = \beta_0 + \beta_1(\Delta Sales_{it} - \Delta AR_{it}) + \beta_2 PPE_{it} + \varepsilon_{it} \quad (3.4)$$

where

$\Delta Sales_{it}$ = change in sales revenue for firm *i* in year *t*

ΔAR_{it} = change in account receivables for firm *i* in year *t*

PPE_{it} = plant and equipment for firm *i* in year *t*

Finally, by replacing the betas found from the regression of Equation (3.4) (classified by year and industry), the abnormal accruals or earning management (EM) portion can be determined as follow:

$$EM_{it} = TA_{it} - [b_0 + b_1(\Delta Sales_{it} - \Delta AR_{it}) + b_2 PPE_{it}] \quad (3.5)$$

where the b values are the parameters estimates from Equation (3.4).

When the EM has been found using Equation 3.5, it is applied in Equation 3.2 to adjust the potential bias among financial figures. As a result, the contributions for those four financial ratios in predicting financial distress after earnings management adjustment can be estimated and the logistic regression can be run to determine the accuracy rate for both unadjusted and adjusted model in predicting financial distress.

4.2.3 Comparison of financial distress prediction

The objective of this study is to compare the accuracy rate in predicting financial distress among Malaysian firms using financial ratio before and after adjust for earnings management. Market players would have a more sophisticated model in managing their credit risk if the adjustment for earnings management is proven to be significant in improving the prediction of financial distress. Thus, in order to measure

the performance for both unadjusted and adjusted model, the logistic regression analysis is used in this study.

Logistic regression is suitable to describe and test a relationship between a categorical outcome variable and one or more categorical of predictor variables (Peng, Lee and Ingersoll, 2002). This method has also been applied by other researchers to determine model accuracy in predicting firm failure or bankruptcy (Ohlson, 1980; Zhu, Han and Ho, 2012; Cho *et al.*, 2012).

The prediction accuracy of financial distress for both unadjusted and adjusted model is analyzed using logistic regression based on the equation below:

$$prob(bankruptcy_{it}) = \lambda_0 + \lambda_1 x_1 + \lambda_2 x_2 + \lambda_3 x_3 + \lambda_4 x_4 + error_{it} \quad (3.6)$$

where

$bankruptcy_{it}$ = 1 if belongs to bankruptcy firm-year and 0 otherwise.

X_1 = Working capital / Total assets or (Working capital – EM) / (Total assets – EM)

X_2 = Retained earnings / Total assets or (Retained earnings – EM) / (Total assets – EM)

X_3 = Earnings before interest and taxes / Total assets or

(Earnings before interest and taxes – EM) / (Total assets – EM)

X_4 = Book value equity / Total liabilities or

(Book value equity – EM) / (Total liabilities – EM)

The results from logistic regression, which are the parameters (coefficients) and proportion of classification, can help to determine which model is more suitable and

accurate to use as financial distress prediction model in the Malaysian market and thus benefits market participants in making their investment decision.

4.3 Measurement of Instrument

Four financial ratios have been selected to predict the financial distress among Malaysian public listed companies including liquidity ratio, productivity ratio, profitability ratio and leverage ratio. Each ratio has its own function in reflecting the financial condition of a firm and the measurements for each ratio are different. The following section will explain the calculation for each ratio and how those ratios reflect the financial condition of a firm.

4.3.1 Working capital to total assets

Working capital to total assets ratio is one of the liquidity ratio. Working capital is the difference between current assets and current liabilities. This ratio is a measurement for net liquid assets of a firm to the total capitalization (Altman, 1968). An increasing in this ratio reflects a positive sign as there is improvement in term of company's liquidity and vice versa. Based on Thai and Abdollahi (2011), they discovered that one of the ratios that useful in identify corporate financial failure is liquidity ratio.

4.3.2 Retained earnings to total assets

Retained earnings to total assets ratio is a profitability ratio that measures a firm's ability to accumulate earnings using its total assets. Based on Thai and Abdollahi (2011), in predicting corporate financial distress, profitability ratio is one of the significant and effective ratio The higher the ratio, it means that the firm relied more in its earning rather than seeking for external financing such as debt or equity

financing. Thus, it is considered a good sign if a company has a higher than industry average retained earnings to total assets ratio. Although there are arguments that this ratio discriminates those new firms, however, there was evidence proven that firms are easier to fail in the early years (Altman, 1993).

4.3.3 Earnings before interest and taxes to total assets

The earnings before interest and taxes to total assets ratio is also recognized as return on capital employed ratio (Asch and Kaye, 1996). This ratio measures the true productivity of a firm's assets without take into account the tax and leverage factors (Altman, 1968) or, in general term, it used to measure the return on total investment in the firm. It indicates the ability of a firm in generating income before contractual obligation must be paid. Bottazzi *et al*. (2011) discovered that higher level of productivity leads to lower level of default.

4.3.4 Equity to total liabilities

According to Altman (1968), the equity to total liabilities ratio helps in determine how much can a firm's assets decline in its value before the liabilities exceed the assets and the firm become insolvent. The reciprocal of this ratio is the debt to equity ratio that commonly used in determining the financial leverage level of a firm (Altman, 1993). Thus, this ratio is playing its role in determine the leverage level of a firm. In addition, Fons and Viswanathan (2004) found that leverage ratio is significant in predicting firm's default risk.

4.4 Data collection

This study is conducted using secondary data. Financial data needed for analysis was collected from the Thomson Reuters DataStream. The period of study covers from 2006 until 2012 which the financial data of two years before the company filed into PN17 will be used to run the analysis. This study focuses on the public listed firms in Bursa Malaysia and sample is selected using paired sample design. Firstly, distressed firms are indicated from the PN 17 list provided by Bursa Malaysia. As updated at 9th September 2013, there are 26 firms listed in the PN 17. Those companies are shown in Table 4.1 as below:

Table 4.1
PN17 firms as updated at 9th September 2013

NO.	COMPANY NAME	DATE LISTED IN PN17	SECTOR
1.	ADVENTA BERHAD	7 January 2013	Industrial product
2.	BINA GOODYEAR BERHAD	19 November 2012	Construction
3.	BIOSIS GROUP BERHAD	26 June 2013	Consumer
4.	ECM LIBRA FINANCIAL GROUP BERHAD	14 December 2012	Finance
5.	GLOBAL CARRIERS BERHAD	1 Mar 2013	Trading & services
6.	GW PLASTICS HOLDINGS BERHAD	11 January 2013	Industrial product
7.	HAISAN RESOURCES BERHAD	09 Jun 2010	Trading & services
8.	HB GLOBAL LIMITED	07 May 2013	Consumer
9.	HEXAGON HOLDINGS BERHAD	28 Feb 2013	Trading & services
10.	HO HUP CONSTRUCTION BERHAD	31 Jul 2008	Construction
11.	HYTEX INTEGRATED BERHAD	03 Jun 2013	Consumer

12.	INTEGRATED RUBBER CORPORATION BHD	28 Dec 2012	Industrial product
13.	IRM GROUP BERHAD	31 May 2013	Industrial product
14.	LFE CORPORATION BERHAD	01 Oct 2012	Trading & services
15.	MAA GROUP BERHAD	30 Sep 2011	Finance
16.	MALAYSIAN AE MODELS HOLDINGS BHD	20 Jun 2013	Industrial product
17.	MAXTRAL INDUSTRY BERHAD	21 Dec 2012	Industrial product
18.	OCTAGON CONSOLIDATED BERHAD	08 Jun 2012	Industrial product
19.	PAN MALAYSIA CAPITAL BERHAD	26 Feb 2013	Finance
20.	PAN MALAYSIAN INDUSTRIES BERHAD	31 May 2013	Properties
21.	PATIMAS COMPUTERS BERHAD	02 Nov 2012	Technology
22.	PETROL ONE RESOURCES BERHAD	30 Aug 2012	Trading & services
23.	SILVER BIRD GROUP BERHAD	29 Feb 2012	Consumer
24.	SUMATEC RESOURCES BERHAD	29 Apr 2011	Trading & services
25.	VASTALUX ENERGY BERHAD	26 Nov 2010	Trading & services
26.	VTI VINTAGE BERHAD	25 Feb 2010	Industrial product

Sources: Bursa Malaysia

The financial information needed in this study includes working capital, total assets, total liabilities, market value of equity, retained earnings, operating income, earnings before extraordinary items, cash flow from operations, sales revenue, account receivables, plant and equipment, and market capitalization. Company is excluded from the sample if those data is unavailable. Beside, firms from financial sector are

eliminated from the sample as they are difference in nature of business (Fazilah *et al*., 2009). Furthermore, industry with only one sample is also eliminated too as regression cannot be ran due to limited sample. Besides, based on Knofczynski and Mundfrom (2008), they studied about the sample size that recommended to be used when using the multiple linear regressions for prediction, the recommended sample size that suitable for two predictor ratios is four. Thus, in this study, the Property sector that has only one distressed firm is not suitable to conduct the multiple linear regressions.

After the sample filtering process, there are 15 companies that suit the term and condition of this study. Those companies are listed as below:

Table 4.2
PN 17 firms after filtering process

NO.	COMPANY NAME	DATE LISTED IN PN17	SECTOR
1.	BINA GOODYEAR BERHAD	19 November 2012	Construction
2.	GLOBAL CARRIERS BERHAD	1 Mar 2013	Trading & services
3.	HAISAN RESOURCES BERHAD	09 Jun 2010	Trading & services
4.	HO HUP CONSTRUCTION BERHAD	31 Jul 2008	Construction
5.	HYTEX INTEGRATED BERHAD	03 Jun 2013	Consumer
6.	INTEGRATED RUBBER CORPORATION BHD	28 Dec 2012	Industrial product
7.	IRM GROUP BERHAD	31 May 2013	Industrial product
8.	LFE CORPORATION BERHAD	01 Oct 2012	Trading & services
9.	MALAYSIAN AE MODELS HOLDINGS BHD	20 Jun 2013	Industrial product

10.	MAXTRAL INDUSTRY BERHAD	21 Dec 2012	Industrial product
11.	OCTAGON CONSOLIDATED BERHAD	08 Jun 2012	Industrial product
12.	PETROL ONE RESOURCES BERHAD	30 Aug 2012	Trading & services
13.	SILVER BIRD GROUP BERHAD	29 Feb 2012	Consumer
14.	SUMATEC RESOURCES BERHAD	29 Apr 2011	Trading & services
15.	VTI VINTAGE BERHAD	25 Feb 2010	Industrial product

Next, these 15 companies are matched one-to-one with another non-financial distress companies according to their market capitalization and industry. The paired sample is as follow:

Table 4.3
Final sample

	FINANCIAL DISTRESS FIRMS	**NON-FINANCIAL DISTRESS FIRMS**
TRADING AND SERVICES	HAISAN RESOURCES BERHAD	AHB HOLDINGS BERHAD
	PETROL ONE RESOURCES BERHAD	SENI JAYA CORPORATION BERHAD
	SUMATEC RESOURCES BERHAD	OGAWA WORLD BERHAD
	GLOBAL CARRIERS BERHAD	MESB BERHAD
	LFE CORPORATION BERHAD	TRANSOCEAN HOLDINGS BERHAD
INDUSTRIAL PRODUCTS	VTI VINTAGE BERHAD	AUTOAIR HOLDINGS BERHAD
	IRM GROUP BERHAD	SMIS CORPORATION BERHAD
	MAXTRAL INDUSTRY BERHAD	MAJOR TEAM HOLDINGS BERHAD
	INTEGRATED RUBBER CORPORATION BHD	LYSAGHT GALVENIZED STEEL BERHAD
	OCTAGON CONSOLIDATED BERHAD	STONE MASTER CORPORATION BERHAD
	MALAYSIAN AE MODELS HOLDINGS BHD	IRE-TEX CORPORATION BERHAD
CONSUMER PRODUCTS	HYTEX INTEGRATED BERHAD	EUROSPAN HOLDINGS BERHAD
	SILVER BIRD GROUP BERHAD	EURO HOLDINGS BERHAD
CONSTRUCTION	BINA GOODYEAR BERHAD	MERGE ENERGY BERHAD
	HO HUP CONSTRUCTION BERHAD	IREKA CORPORATION BERHAD

In summary, there are total 30 companies, including 15 financial distress companies and 15 non-financial distress companies, in the final sample. There are four industries involved in this study which including trading and services (10 companies), industrial

products (12 companies), consumer products (4 companies) and construction (4 companies).

4.5 Techniques of data analysis

There are three techniques of analysis used in this study. They are descriptive analysis, linear regression analysis and logistic regression analysis. All their functions will be discussed in the following section.

4.5.1 Linear regression

The second analysis technique used in this study is linear regression. The linear regression is a multivariate statistical method that commonly used to predict one dependent variable using several independents (Abd Rahim Md Nor, 2009). In this study, this technique is to determine the parameters (coefficients) of the total accruals equation (Equation 3.4) by year and industry. The beta coefficients found will be substituted into Equation 3.5 to indicate the abnormal accruals or earnings management portions for each firm and it is used to adjust the financial data in Equation 3.2 to form the adjusted model in determine financial distress. This technique has also been applied by researchers that used accrual based model (i.e. Modified Jones model) in determine earnings management portions (Dechow *et al.*, 1996; Kothari *et al.*, 2005; Cho *et al.*, 2012).

4.5.2 Logistic regression

Secondly, the logistic regression is run to determine which model is best to be practiced in order to predict financial distress firm in Malaysia. Logistic regression is suitable to describe and test a relationship between a categorical outcome variable and

one or more categorical of predictor variables (Peng *et al*., 2002). This method has also been applied by other researchers to determine model accuracy in predicting firm failure or bankruptcy (Ohlson, 1980; Saeideh, 2009; Baninoe, 2010; Zhu, Han and Ho, 2012; Cho *et al.*, 2012).

The result from logistic regression consists of two parts. Firstly, the first part of the analysis establishes the relationship between outcome (i.e. financial distress) and predictors (independent variables). The coefficients estimated from the regression will indicate how the predictors contribute in determine the outcome of the study. In this study, the contributions of each financial ratio in predicting financial distress (before and after earnings management adjustment) are the main concern as the objective of the study is to determine a more accurate model to predict financial distress. The result with a positive (negative) coefficient indicates that the increment of that financial ratio will increase (decrease) the probability of financial distress (Saeideh, 2009).

The second part of the analysis produces results in analyzing the predictive power for both unadjusted and adjusted model in classifying distress and non-distress firm. There are three types of evaluation criteria display in the classification table. Type I error (alpha error) represents the percentage for misclassify of distressed firm as non-distressed firm while Type II error (beta error) is the percentage for misclassify of non-distress firm as distress firm (Bellovary, Giacomino and Akers, 2007). Another evaluation criterion is the accuracy rate of the model, which is the percentage of correct classification for distressed and non-distressed firm for the model (Saeideh,

2009). Thus, in order to determine which model is best suit to predict financial distress, the three evaluation criterion should take into account.

4.6 Summary

This study aims to determine if the accuracy rate of financial ratio in predicting financial distress companies in Malaysia would be improved if earnings management portions are adjusted. The scope of the study is targeted on Malaysian public listed companies. Paired sample design is used in this study and the period of study covers from 2006 until 2012. Firms with incomplete data are eliminated from the sample and financial sector with different business nature has also excluded from the sample. The final sample of the study consists of 30 Malaysian public listed companies.

The earnings management portions are calculated using the discretionary accruals method used by Dechow *et al.* (1996), Kothari *et al.* (2005) and Cho *et al.* (2012). There are two analysis techniques used in this study which are the linear regression and logistic regression.

CHAPTER FIVE

FINDINGS AND DISCUSSIONS

5.0 Introduction

This chapter is divided into three sections. Section 5.1 describe about the results of logistic analysis that explains on the accuracy of financial distress prediction using unadjusted and adjusted model. Section 5.2 is the summary of this chapter.

5.1 Logistic regression

As described in Chapter Four, the logistic regression is run to determine which model is best to be practiced in order to predict financial distress firm in Malaysia. This technique is chosen due to its suitability to describe and test a relationship between a categorical outcome variable and one or more categorical of predictor variables (Peng, Lee and Ingersoll, 2002). The results are divided into two sections where first part is to distinguish the contributions of each predictor in determine financial distress and the second part is the predictive power for both unadjusted and adjusted model in classify financial distressed firm.

5.1.1 Logistic regression for non-adjusted model

The logistic regression is first run for the unadjusted model to determine its contributions and predictive power in determine financial distress firm. Table 5.1 shows the results for logistic regression before the earnings management is adjusted:

Table 5.1
Results of logistic regression before earnings management is adjusted

Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1	X1	-5.979	1.883	10.083	1	.001**	.003
	X2	3.152	1.577	3.994	1	.046**	23.377
	X3	-7.930	5.040	2.476	1	.116	.000
	X4	-.222	.449	.244	1	.622	.801
	Constant	.985	.509	3.748	1	.053	2.678

**. Correlation is significant at the 0.05 level (2-tailed).

The contributions for each independent variable in unadjusted model are summarized in Equation 5.1 as below:

$$p = \frac{\exp(0.985 - 5.979x_1 + 3.152x_2 - 7.930x_3 - 0.222x_4)}{1 + \exp(0.985 - 5.979x_1 + 3.152x_2 - 7.930x_3 - 0.222x_4)} \quad (5.1)$$

Referring to Table 5.1, the results show that of the four variables that used in the regression, only two variables were found to be significant at 5 percent significance level. They are the working capital to total assets ratio (X_1) and the retained earnings to total assets ratio (X_2). This supports the hypotheses H_1 and H_2 where liquidity ratio and profitability ratio are significance in predicting financial distress before earnings management is adjusted. Besides, the results are in line with Korol's (2013) who found that one of the significant financial ratio in predicting business bankruptcy is the working capital to total assets ratio and Yap *et al.* (2012) who indicated retained earnings to total assets ratio as one of the significant ratio in predicting firm failure. Thus, this study justifies the significant power of these two ratios in proxy financial distress among Malaysian firms before earnings management is adjusted.

The parameter (coefficients) estimated from the logistic regression provide the contributions of each variable in financial distress prediction. The Equation 5.1 is the maximum likelihood estimation for financial distress that explains the contributions of each variable in predicting financial distress firm. From Equation 5.1, it indicates that firm with lower working capital to total assets ratio (X_1), lower earnings before interest and taxes to total assets ratio (X_3), lower book value of equity to total liabilities ratio (X_4), and higher retained earnings to total assets ratio (X_2) is more likely to classify as financial distress company.

The second part of logistic regression is to test the predictive power of the model in predicting financial distress, the results is shown in Table 5.2 as following:

Table 5.2
Frequency of financial distress by prediction (unadjusted model)

Classification Table				
Observed	Predicted			
	Distressed or non-distressed			Percentage Correct
	Non-distressed	Distressed	Total	
Non-distressed	25	5	30	83.3
Distressed	7	23	30	76.7
	Overall percentage			80

The sample used in this study consists of 30 observations for distressed companies and 30 observations for non-distressed companies. Through the results in Table 5.2, it is indicated that out of the 30 non-distressed observations, 25 were classified as non-distressed by the logit model resulting in a 83.3 percent success (with Type II error of 16.7 percent), and out of the 30 distressed observations, 23 were classified as distressed by the logit model resulting in a 76.7 percent success (with Type I error of 23.3 percent). The logit model gives an overall model predictability of 80 percent.

The percentage for correct distress classification in this study which is 76.7 percent is still acceptable although Altman (2000) obtained over 80 percent of accuracy in predicting bankruptcy. This is due to the highest correct classification for distressed firm from past researches can reach to 100 percent using multivariate discriminant analysis (MDA) method[8] (Bellovary *et al*., 2007). Thus, by taking the average of accuracy rate from prior studies, the accuracy rate obtained in this study is considered good and acceptable.

5.1.2 Logistic regression for adjusted model

In the adjusted model, the earnings management portions are calculated using the accruals based model and the abnormal accruals are used to adjust the financial figures before they are applied in the model. The regression results for adjusted model are shown in Table 5.3 as following:

Table 5.3
Results of logistic regression after earnings management is adjusted

Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1	X1	-4.710	1.528	9.501	1	.002**	.009
	X2	1.023	1.063	.926	1	.336	2.782
	X3	6.924	3.434	4.066	1	.044**	1016.278
	X4	-.717	.511	1.971	1	.160	.488
	Constant	1.349	.529	6.511	1	.011	3.855

**. Correlation is significant at the 0.05 level (2-tailed).

[8] Refer Appendix C

The contributions for each independent variable in the adjusted model are summarized in Equation 5.2 as below:

$$p = \frac{\exp(1.349 - 4.710x_1 + 1.023x_2 + 6.924x_3 - 0.717x_4)}{1 + \exp(1.349 - 4.710x_1 + 1.023x_2 + 6.924x_3 - 0.717x_4)} \quad (5.2)$$

Based on Table 5.3, the results show that of the four variables that used in the regression, two variables were found to be significant at 5 percent significance level. They are the working capital to total assets ratio (X_1) and the earnings before interest and taxes to total assets ratio (X_3). This supports the hypotheses H_5 and H_7 that formed in Chapter One. Once again, the result proofs the significance of working capital to total assets ratio in predicting firm failure is still strong after the earnings management adjustment. The significance of earnings before interest and taxes to total assets ratio is similar with Chi and Tang (2006) as operational efficiency ratio is one of the significant financial ratios that can be used to predict bankruptcy.

The contributions of each variable in financial distress prediction is shown in Equation 5.2 indicate that firm with lower working capital to total assets ratio (X_1), lower book value of equity to total liabilities ratio (X_4), higher earnings before interest and taxes to total assets ratio (X_3), and higher retained earnings to total assets ratio (X_2) is more likely to classify as financial distress company.

Similar to the unadjusted model, the predictive power of adjusted model is also analyzed using logistic regression. The result is displayed in Table 5.4:

Table 5.4
Frequency of financial distress by prediction (adjusted model)

Classification Table				
Observed	Predicted			
	Distressed or non-distressed			Percentage Correct
	Non-distressed	Distressed	Total	
Non-distressed	22	8	30	73.3
Distressed	7	23	30	76.7
	Overall percentage			75

Through the prediction results show in Table 5.4, it is indicated that out of the 30 non-distressed observations, 22 were classified as non-distressed by the logit model resulting in a 73.3 percent success (with Type II error of 26.7 percent), and out of the 30 distressed observations, 23 were classified as distressed by the logit model resulting in a 76.7 percent success (with Type I error of 23.3 percent). The logit model gives an overall model predictability of 75 percent.

The percentage for correct distress classification in this study which is 76.7 percent is acceptable as compared to Cho *et al.* (2012) where the accuracy rate found was around 43 percent - 53 percent for correct distressed classification after adjusted for earnings management. Thus, the accuracy obtained in this study is considered high and acceptable.

5.1.3 Comparison of predictive power between unadjusted and adjusted model

The main objective of this study is to determine whether adjustment for earnings management will change the accuracy rate of financial distress prediction. Thus, the prediction power for those estimate parameters in both unadjusted and adjusted model is tested using logistic regression. The results are presented as below:

Table 5.5
Comparison of coefficient significance between non-adjusted and adjusted model

	Unadjusted		**Adjusted**	
	B	**Sig.**	**B**	**Sig.**
X1	-5.979	.001**	-4.710	.002**
X2	3.152	.046**	1.023	.336
X3	-7.930	.116	6.924	.044**
X4	-.222	.622	-.717	.160
Constant	.985	.053	1.349	.011

**. Correlation is significant at the 0.05 level (2-tailed).

Referring to Table 5.5, the results show that for both before and after adjustment for earnings management, there are two statistically significant variables in the unadjusted model. The working capital to total assets ratio (X_1) and retained earnings to total assets ratio (X_2) are significant at 5 percent significance level before the earnings management adjustment. After the adjustment for earnings management, together with working capital to total assets ratio (X_1) that showing significance at 5 percent level is the earnings before interest and taxes to total assets ratio (X_3).

This reflects that in both before and after adjustment for earnings management, the working capital to total assets ratio (X_1) is significant in estimate the probability of financial distress within firms. This is similar with prior studies that found the working capital to total assets ratio (liquidity ratio) as one of the significant factor in determine firm failure or bankruptcy (Kwok *et al.*, 1999; Back, 2001; Thai and Abdollahi, 2011; Tykvová and Borell, 2012; Korol, 2013)

Interestingly, the significances for the retained earnings to total assets ratio (X_2) and earnings before interest and taxes to total assets ratio (X_3) are moved in the opposite

direction. The retained earnings to total assets ratio (X_2) is significant in determine firm financial distress if the earnings management is not take into account. Meanwhile, for the earnings before interest and taxes to total assets ratio (X_3), the ratio is not significantly determine the financial distress before earnings management is adjusted. However, the significance is improved after the earnings management is adjusted. Furthermore, the significance level for market value of equity to total liabilities (X_4) has also improved after the earnings management has been adjusted.

As a whole, the model is improved after the earnings management portions have been adjusted as two out of four variables in the model have been significantly improved in term in their prediction power of financial distress after the earnings management is adjusted. This indicates that earnings management adjustment is significant in improving the predictive power of the model used in this study. The same conclusion also drawn by Cho *et al.* (2012) as they also discovered that earnings management adjustment can improve the performance of bankruptcy prediction model.

As before, the prediction for likelihood of failure for the unadjusted and adjusted model is also compared and the results are displayed as below:

Table 5.6
Comparison of frequency of financial distress by prediction

Classification Table								
	Unadjusted				**Adjusted**			
Observed	Predicted				Predicted			
	Distressed or non-distressed			Correct (%)	Distressed or non-distressed			Correct (%)
	Non-distressed	Distressed	Total		Non-distressed	Distressed	Total	
Non-distressed	25	5	30	83.3	22	8	30	73.3
Distressed	7	23	30	76.7	7	23	30	76.7
	Overall percentage			**80**	**Overall percentage**			**75**

The results in Table 5.6 show that for unadjusted model, the percentage of correct classification for distressed firms is 76.7 percent and thus the Type I error, which is misclassify of distressed firm as non-distressed firm, is 23.3 percent. The same results also obtained by using adjusted model. This indicates that both adjusted and unadjusted model have the same accuracy rate in predicting distressed firm. The correct classification percentage for distressed firm in this study is considered high as Cho *et al.* (2012) obtained around 43 percent to 53 percent in their study for correct classification percentage.

In the other hand, for the Type II error (the percentage for misclassify of non-distress firm as distress firm), the unadjusted model is performing better with a 16.7 percent failure compared with a 26.7 percent failure of adjusted model. This might due to accrual based method is used in this study to calculate earnings management portion. According to Kothari *et al* (2005), using accrual based method for calculation of abnormal accruals can decrease the Type I error. However, at the same time, the Type II error may increase. Thus, the Type II error for adjusted model is higher.

As a whole, hypothesis H_9 is rejected as the unadjusted model is performed better than the adjusted model. Koh (1991) stated that Type I error is more costly as misclassify of distressed firm might cause loss in business volume, loss in firm's reputation and potential lawsuits. Besides, based on Wahlen, Stickney and Baginski (2011), in bankruptcy classification, Type I error is more costly than Type II error as investor may lose the full amount they invested. However, misclassify of non-distressed firm may also lead to losses too. Type II error may costs investors in term of opportunity cost for their investment (Wahlen *et al*., 2011). Thus, by considering the cost for both Type I and Type II errors, the unadjusted model is better and appropriate in predicting financial distress firms in Malaysian market.

5.2 Summary

The results from logistic regression are the main findings for this study. Based on the results, two out of four variables used in the model have improved in their financial distress prediction as their significance is improved through the adjustment of earnings management. However, after the costs for both Type I and Type II errors are take into consideration, the unadjusted model is found as the most appropriate model in predicting financial distress among Malaysian firms.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.0 Introduction

This chapter is divided into several sections. Section 6.1 explains on the credit risk management using financial ratios. Section 6.2 discusses about the contributions of predictors in both unadjusted and adjusted model. Section 6.3 describes about the accuracy rate for unadjusted and adjusted model. Section 6.4 explains on the limitations and recommendations for future research. Finally, Section 6.5 summarized the whole of this chapter.

6.1 Management of credit risk by using financial ratio

The objective of this study is aim to determine whether adjustment for earnings management can improve the accuracy rate for financial distress prediction using financial ratio. Based on Cho *et al.* (2012), adjustments on earning management should be made as the existence of earning management using accounting figures and the changes of accounting principles have made the financial distress prediction model fail to consider earning manipulations that may exist among firms. Besides, the increment in term of bankruptcy cases in Malaysia has also urged the development of a more sophisticated model in managing credit risk.

The scope of the study focuses on Malaysian public listed companies as one of the emerging market. In this study, 15 financial distress firms that are classified as PN 17 firms according to the Practice Note 17/2005 are paired with another 15 non-distressed firms that listed in the Bursa Malaysia. Thus, the final sample in this study

consists of 30 Malaysian public listed companies. The paired sample design is used in this study in order to compensate the effects of industry and asset size differences. Referring to Loman (2003), groups with high similarity or close equivalence can makes easier in arguing the differences in outcomes or results than groups that have preexisting differences.

Four financial ratios including liquidity ratio, profitability ratio, productivity ratio and leverage ratio have been selected to predict financial distress in this study. In order to calculate earnings management portions, the Kothari's discretionary accrual model is used. This method was also found in prior studies for earnings management estimation purpose (Dechow *et al.*, 1996; Kothari *et al.*, 2005; Cho *et al.*, 2012). The model is able to estimate the amount of earning that deviated from expected figure by assuming that they are subjected to accounting manipulation.

Logistic regression technique is applied in this study to analysis the performance of both unadjusted and adjusted model in predicting financial distress before and after adjustment for earnings management portions. This method has also been applied in prior studies to test the accuracy of model in determine bankruptcy firms (Ohlson, 1980; Zhu, Han and Ho, 2012; Cho *et al.*, 2012). By applying this analysis technique, the accuracy rate for both unadjusted and adjusted model can be estimated.

As a result, the findings will help to confirm the necessity of earnings management adjustment when market participants use financial information to analysis and manage credit risk. As consequence, a better decision can be made as the accuracy of analysis has been improved.

6.2 Contributions of predictors in determine financial distress

The first part of the analysis in this study tends to indicate the changes in term of contributions for each variable before and after the earnings management adjustment in order to answer the first research objective. The results support the hypotheses H_1, H_2, H_5 and H_7. The parameters estimated in the logistic regression show that the working capital to total assets ratio are significant at 5 percent significance level before and after the earnings management portions are adjusted. Meanwhile, the retained earnings to total assets ratio are significant at 5 percent significance level before the earnings management adjustment and the earnings before interest and taxes to total assets ratio is showing a significance at 5 percent significance level after the earnings management portions are adjusted. Furthermore, the significance level for market value of equity to total liabilities (X_4) has also improved after the earnings management has been adjusted.

Thus, the variables in unadjusted model are found to be improved after the earnings management portions have been adjusted as two out of four variables in the unadjusted model have been significantly improved in term in their prediction power of financial distress after the earnings management is adjusted. This indicates that earnings management adjustment is significant in improving the predictive power of the model used in this study. The same conclusion also drawn by Cho *et al.* (2012) as they also discovered that earnings management adjustment can improve the performance of bankruptcy prediction model.

6.3 Accuracy rate for unadjusted and adjusted model

The second part of the logistic regression is used to explain the percentage of correct classification for distressed and non-distressed firms. The unadjusted model possess a Type I error of 23.3 percent. The same results also found in the adjusted model. This indicates that both adjusted and unadjusted model have the same accuracy rate in predicting distressed firm and the result is considered acceptable as Cho *et al.* (2012) obtained around 43 percent to 53 percent in their study for correct classification percentage.

In the other hand, for misclassify of non-distress firm as distress firm (Type II error), the unadjusted model is performing better with a 16.7 percent failure compared with a 26.7 percent failure of adjusted model. This phenomenon might be caused by the accrual based method used in this study to calculate earnings management portion. According to Kothari *et al* (2005), using accrual based method for calculation of abnormal accruals can decrease the Type I error. However, at the same time, the Type II error may increase. Thus, the Type II error for adjusted model is higher.

As a conclusion, the hypothesis H_9 is rejected. The unadjusted model is performed better than the adjusted model due to the overall correct classification percentage found in logistic regression indicates that the unadjusted model (80%) is outperformed than the adjusted model (75%). Although Koh (1991) and Wahlen *et al.* (2011) stated Type I error is more costly than Type II error, however, Type II error may costs investors in term of opportunity cost for their investment too. Thus, by considering the cost for both Type I and Type II errors, the unadjusted model is better and appropriate in predicting financial distress firms in Malaysian market.

This result is opposed to the study of Cho *et al.* (2012). They found that the bankruptcy prediction model had been improved in its prediction power after the earnings management is adjusted. This may be caused by the different in term of scope of study where the study of Cho *et al.* (2012) was focused in developed countries while this study is focused in the emerging market, particularly Malaysia. Besides, the prediction model used by Cho *et al.* (2012) is not the same as the model used in this study. However, the study about the impact of earnings management on the bankruptcy prediction is still considered rare in the literature. Thus, comparison cannot be made among different countries or market.

As a whole, investors and other market players that participate in Malaysian market may apply the unadjusted model to predict firm failure. This could make their credit risk management more efficient and improve their decision making process. As a consequence, their credit risk exposure will be reduced and profit gaining might be enhanced too. Besides, this study also contributes to the literature where the effect of earnings management in predicting financial distress or bankruptcy is still rare especially in emerging market.

6.4 Limitations and recommendations for future study

This study has several limitations. Firstly, it focuses only on Malaysian public listed companies. As a result, the findings might not be generalized to other countries (especially developed countries). However, if comparison among emerging countries is needed, it is suggested that the scope of study should be expanded to other emerging countries such as India, Thailand and China.

Secondly, there are only four financial ratios that have been selected in this stdudy. It is recommended that other proxy for financial distress or bankruptcy risk such as the O-score (Ohlson, 1980) can be used in the future study as the proxy for bankruptcy. Thirdly, the study adjusted for earnings management in order to improve the quality of financial statement information. It is suggested that in future research, the quality of financial statement information should be examined by other metric such as value relevance (the association between accounting figures and security market value).

In addition, the method used in this study to calculate earnings management portion is modified from Kothari *et al* (2005). The authors highlighted in their paper that using this methodology in calculating the abnormal accruals can decrease the Type I error. However, at the same time, the Type II error may increase. As a consequence, it is recommended that other earnings management calculation method should be replaced the current one in order to strengthen the results.

6.5 Summary

The findings of the study reveal that the adjustment for earnings management portions fail in increase the accuracy rate in predicting financial distress firms among public listed firms in Malaysia by using selected financial ratios. The limitations of the study should be taking into consideration when interpreting the results.

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