CHAPTER 2: LITERATURE REVIEW

2.1 Literature Review

The literature on financial distress is largely composed of two groups comprising a descriptive-oriented branch outlining legal cases on these acts and an empirical branch in which models to predict the financial status of the companies are examined. Data pertaining to estimating default is mainly obtained from two sources namely financial statements and market prices of the firm's debt and equity.

The prediction of financial distress employing statistical techniques has improved significantly since Beaver (1966) introduced the univariate analysis. Over the past 30 years, various types of failure prediction models have been devised to predict the occurrence of financial distress. Table 2.1.1 summarised the models of failure prediction available.

Table 2.1.1: Failure Prediction Models

<table>
<thead>
<tr>
<th>Derivation</th>
<th>Type of model</th>
<th>Multivariate</th>
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<tbody>
<tr>
<td></td>
<td>Univariate</td>
<td>a) Experimental (Credit Scoring)</td>
</tr>
<tr>
<td>Interative (simulation)</td>
<td>a) Conventional Ratio Analysis</td>
<td>a) Discriminant Analysis</td>
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<tr>
<td>Statistical</td>
<td>b) Systematic Ratio Analysis</td>
<td></td>
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<td></td>
<td>c) Balance sheet decomposition</td>
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<td></td>
<td>Gambler's Ruin</td>
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| Behavioral Reaction | a) share price  
|                     | i) Matched pair controls  
|                     | ii) Systematic factor controls  
|                     | b) Laboratory experiments  
|                     | i) subjects informed of failure rate  
|                     | ii) subjects not informed of failure rate |

*Source: Morris, 1998*

### 2.2 Ratio Analysis

Although accounting ratio models have no theoretical foundation, observations made from the early studies in the 1930s have concluded that financial ratios vary systematically between healthy and failing firms. Companies with weak and unstable financial ratios are more likely to fail than companies with stronger and more stable financial ratios. Nonetheless, the use of financial ratios does not preclude the impact of non-accounting data in failure prediction: “The emphasis upon financial ratios does not imply that ratios are the only predictors of failure. The primary concern is not with predictors of failure per se but rather with financial ratios as predictors of important events – one of which is failure of the firm…” (Beaver, 1966).

Beaver (1966) analysed 79 pairs of bankrupt and non-bankrupt firms over the period from 1954 to 1964. From the samples, he accurately classified 78 percent of the firms five years before failure occurred. He concluded that “based solely upon a knowledge of the financial ratios, the financial state of the firm can be correctly predicted to a much greater extent than would be expected from a random prediction”. By adopting the dichotomous classification technique, Beaver found that the cash flow to total debt ratio was the best predictor of failure.

Using the multiple discriminant analysis to derive five financial ratios, Altman (1968) developed the Z-Score model as a tool to identify failing firms based
on a sample of 66 companies over the period of 1946-1965. All observed ratios had showed deteriorating trend as bankruptcy approaches. He found the model was an accurate forecaster of failure up to two years prior to bankruptcy, with an accuracy rate of 95 percent. He noted that the accuracy of the model diminished substantially as the lead time increased. Subsequently, Altman, Halderman and Narayanan (1977) constructed a second generation model with several enhancements to the original Z-Score approach. The new model known as ZETA model was effective in classifying bankrupt companies up to five years prior to failure based on a sample of companies in the manufacturing and retailing industry.

In spite of the wide usage of ratio analysis in determining the likelihood of financial distress, there has been little agreement between the researchers on the best accounting ratios in the prediction models. Hamer (1983) suggested the ability of models to predict failure was relatively independent of the ratios selected. On the other hand, Karels and Prakash (1987) advocated careful selection to improve prediction accuracy.

Having analysed over 25 ratios from the literature survey on corporate failure, Bhattacharya (1995) observed that funding was the all pervading variable affecting the health of a firm. To determine the financial health of a firm, he derived a single comprehensive ratio known as health ratio. The health ratio could explain analytically the health condition of a firm at its various stages of growth and decline.

Using probit model, Bongini et. al (2000) investigated the build-up of financial vulnerabilities which led to corporate distress during the recent Korean crisis. They found that pre-crisis leverage was systematically higher for firms with lower returns, larger firms and firms belonging to chaebol. From their research, it was concluded that financial vulnerability did not only affect bad performing corporations. Liquidity appeared to affect the probability of bankruptcy although none of the three liquidity variables studied were helpful in predicting bankruptcies for firms belonging to chaebols.
In Singapore, Chong (1989) formulated a new bankruptcy model taking into consideration the local peculiarities and environment. By applying factor profiling and probit analysis to identify the financial ratios, Chong constructed two industry-specific models for manufacturing and commerce with a third model representing general model for comparison. She tested her models using private companies in Singapore over the period from 1982-1987 and deduced that the industry-specific models have a high accuracy rate of more than 99 percent. Hence, she concluded that these models have a higher predictive power for local environment as compared to generic models formulated in the West.

Nuha (1996) explored five categories of financial ratios ranging from liquidity, profitability, leverage, solvency and activity using 70 samples of industrial companies listed in KLSE by applying the multivariate discriminant technique. The study was based on data ranging from 1984-1992. He adopted Tobin-Q Ratio to separate the samples into two categories namely high value companies and lower value companies. The lower value companies were defined as facing a higher risk of bankruptcy. The findings suggested that a distinctive difference in financial ratios of bankrupt vis-à-vis non-bankrupt companies exists.

In another study by Ng (2000) using Section 176 companies in Malaysia as samples, he found that Altman Z-Score was effective in detecting signs of bankruptcy for all sectors, save and except for finance sector, for a period of 3 years preceding the year of classification. The model has an accuracy rate of 73% in predicting corporate failure.

2.3 Market Return Analysis
The application of behavioral reaction in analyzing bankruptcy was pioneered by Beaver(1968). Consistent with market efficiency theory, Beaver found that equity return generally anticipated bankruptcy sooner than the financial ratios. He argued that investors use ratios in assessing the solvency position of failed firms.
Due to a higher risk attached to failed companies, the risk-averse investors would expect a higher return on their investments. For each period, investors recognized and reassessed the solvency position of their investments and thereafter adjusted the market price of the ordinary stock to a level whereby the ex-ante rate of return would commensurate with the higher risk. The inferences drawn implied that the average and marginal rates of return were lower for the failed companies while their dispersion of returns were also greater. The evidence was consistent with the belief that failed companies were riskier in terms of variability of returns.

Extensive cross-sectional and time series analysis conducted earlier indicated certain risk measures based on market data exhibited significantly different behavior between failed and non-failed firms. Aharony et. al (1980) studied 45 industrial firms which went bankrupt during 1970 –1978. The data indicated a significant negative cumulative differential portfolio return around four years before bankruptcy. The unexpected deterioration in the bankruptcy group was high with investors constantly adjusting for declining solvency up to the time of bankruptcy. These results suggested that a solvency deterioration signal using capital market data was available some four years before the happening of the bankruptcy event.

Altman and Brenner (1981) concluded that the bankrupt firms experienced deteriorating capital market returns for at least one year prior to bankruptcy. Clark and Weinstein (1983) indicated that financially distressed firms exhibited negative market returns for at least three years preceding the occurrence of the event. Katz et. al (1985) observed that abnormal stock returns occurred for the 12 months period immediately preceding and immediately following the release of financial information for firms that were deteriorating and for firms that were recovering as classified by Altman Z-Score model. The findings indicated that the market was not entirely efficient for the bankruptcy prediction model to capture the information released or the information not captured has an impact on market behavior.
Zavgen et. al (1988) tested the association between market reaction and unanticipated failure or survival using probit technique. Non-failed firms that had been predicted to fail were expected to demonstrate abnormal positive returns upon recognized survival. The opposite holds true for failed firms. However, firms predicted by the model to survive but actually fail, experienced no dramatic market reaction in the year prior to failure. It supported the hypothesis that publicly available information which were not contained in the annual financial statements influenced stock market behavior.

Dugan and Forsyth (1995) concluded that to a certain extent, market agents use financial statement information in investment decisions. Nonetheless, the association exists was not necessarily linear or monotonic.

If the risk of bankruptcy is systematic, then firms at higher risk should on average, earn higher return than those at lower risk as argued by Beaver (1968). Dichev's (1998) findings however were inconsistent with such expectations. His samples showed firms at a higher probability of bankruptcy on average, under-performed low risk firms by 1.2 percent per month across the period 1980-1995. He argued that mispricing was the likely explanation for these anomalous results. Taffler (1999) expanded Dichev's study by adopting Fama-Macbeth methodology which took into account other potential key determinants of the return generating process. The results confirmed that financially distressed companies, on average, under-performed by 3 to 4 percent per year subject to size, beta, book-to-market and momentum. However, there was also evidence of such returns being a function of economic state variables over time. Weak Z-Score firms out-performed healthy firms in the period leading up to 1987 economic crash in the United Kingdom. Unlike Dichev’s conclusion, Taffler (1999) implied that the rational capital pricing model cannot be rejected.

While many models have been developed to understand business bankruptcy, discussion in this area has not been final. It has been pointed out that the lack of theoretical framework relating to primary variables that are
relevant in categorizing between failing and non-failing firms has been the impediment to the development of a truly scientific approach to bankruptcy prediction. Without sound theoretical foundation on the economic determinants of bankruptcy, it is difficult to ascertain whether a model developed based on data from one set of companies at a particular period of time is appropriate for predicting business failure in a different economic or temporal setting. Although association may not be a reflective of causal effect, the association nevertheless, highlights the significant differences between failed and non-failed samples. The early warning signs drawn act as preventive tools to address the distress situation in the initial stage.

Despite the criticism on the lack of theory to direct the design of empirical studies using financial ratios, the financial distress models using MDA, probit and recently artificial neural networks approaches have been fairly effective in providing warning signs of financial distress. Scott (1981) concluded that “Bankruptcy prediction is both empirically feasible and theoretically explainable”. He developed a coherent theory of bankruptcy. Having tested the theory using Altman’s ZETA Model, he found that its constituent variable set fits the postulated theory quite well.

Altman (2000) examined distressed companies over three separate periods ie. from 1969-1975, 1976-1995 and 1997-1999 using Z-Score model. In the repeated case, the evidence highlighted that the accuracy of Z-Score has been in the range of 80% to 90% based on data from one financial reporting period prior to bankruptcy.

While the past studies are inconclusive on the impact of bankruptcy on stock market returns, it has nevertheless acknowledged the relationship between business failure and stock market returns and the significant differences shown by ex-post samples.

In conclusion, the literature reviews confirm that there are significant differences in the financial distressed companies as compared to viable
companies. The conclusion drawn from the ratio analysis model and market return model signals the deteriorating stage of the financial position prior to occurrence of the event.