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Bankruptcy Situation Model in Small Business: The Case of Restaurant Firms

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Abstract
The purpose of this paper is to describe and discuss the current bankruptcy prediction models. This is done in the context of pros and cons of proposed models to determine the appropriate factors of failure phenomenon in cases involving restaurants that have filed for bankruptcy under Chapter 11. A sample of 11 restaurant companies that filed for bankruptcy between 1993 and 2003 were identified from the Form 8-K reported to the Securities and Exchange Commission (SEC). By applying financial ratios retrieved from the annual reports which contain, income statements, balance sheets, statements of cash flows, and statements of stockholders' equity (or deficit) to the Atlman's mode, Springate model, and Fulmer's model. The study found that Atlman's model for the non-manufacturing industry provided the most accurate bankruptcy predictions.

Keywords
Yang Huo, Food and Beverage

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Bankruptcy Situation Model in Small Business: The Case of Restaurant Firms

By Yang-Huo

The purpose of this paper is to describe and discuss the current bankruptcy prediction models. This is done in the context of pros and cons of proposed models to determine the appropriate factors or failure phenomenon in cases involving restaurants that have filed for bankruptcy under Chapter 11. A sample of 11 restaurant companies that filed for bankruptcy between 1993 and 2003 were identified from the Form 8-K reported to the Securities and Exchange Commission (SEC). By applying financial ratios retrieved from the annual reports which contain, income statements, balance sheets, statements of cash flows, and statements of stockholders' equity (or deficit) to the Atlman's model, Springate model, and Fulmer's model. The study found that Atlman's model for the non-manufacturing industry provided the most accurate bankruptcy predictions.

Introduction

According to Congresswoman Nydia Velazquez (D-NY, 2002), The United States was experiencing one of its worst recessions since World War II. The unemployment rate had grown to 6 percent, with 1.1 million Americans now jobless. Robert Barro (2003) stated, "in the recent slowdown, the unemployment rate increased 2.5 percent points, from 3.9% at its low point in December 2000, to 6.4% in June" (p. 30). In addition, Dun and Bradstreet reported that two thirds of firms that enter the retail trade and services industry do not survive beyond their first five years of operation. Some of the reasons for these failures can be attributed to external environmental factors such as economic woes, a troubled and turbulent economy, highly competitive market conditions, and changes in consumer buying behavior; while others can be attributed to internal environmental factors such as organizational or capital structures (i.e. the degree of financial or operating leverage).

Since bankruptcy rates among small businesses in the U.S. have consistently risen over the past century, the importance of being able to accurately predict and avoid bankruptcy cannot be overstated. Total bankruptcies filed in the calendar year 2002 were 1,577,651, up 5.7 percent from the 12-month period ending December 31, 2001, when filing stood at 1,492,129 (Administrative Office of the Courts, 2003).

A growing body of research (Clark, Foster, Hogan, & Webster, 1997; Darayseh, Waples, & Tsoukalas, 2003; Grice, & Dugan, 2001; Hahnenstein, & Roder, 2003; Khan, 1985; Nishikawa, 2002; Tan, & Dihardjo, H., 2001) indicates that many firms encounter financial difficulties which force some into bankruptcy. An understanding of the mechanisms that lead to bankruptcy is critical to executives of healthy firms because they must know the best way to proceed when their customers or suppliers face the threat of bankruptcy (Brigham, Gapenski, & Ehrhardt, 1999). Owners, operators, investors, and lenders need to be able to identify a company at risk for bankruptcy before they make a decision to invest in and/or alter a company's operating methods. Therefore, they should be interested in any procedure that might help them to identify potential failures. These needs help explain why researchers have attempted to develop a bankruptcy prediction model. As management and practitioners continually seek new and improved prediction models applicable to their firms, discussion and evaluation of bankruptcy models becomes necessary. Specifically, there is a need for the establishment of models appropriate to the restaurant industry.

Literature Review

Models for predicting bankruptcy have been discussed since the mid 1960's. Beaver (1966), a pioneer of research in business failure, defines business failure or bankruptcy as a business defaulting on interest payments on its debt, overdrawing its bank account, missing preferred dividend payments, or declaring bankruptcy (filing for Chapter 11). In 1968, Edward I. Altman developed a traditional model widely used as a quantitative model for predicting business

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failure. Altman used 22 financial ratios from 66 companies: 33 failed and 33 successful. All financial ratios were tested and those that contributed least were discarded. This method was repeated until five financial ratios remained.

Altman's Model

$$Zjk = A + W1X1k + W2X2k + W3X3k + \ldots + WnXnk$$

Or

$$Z = 1.2X1 + 1.4X2 + 3.3X3 + 0.6X4 + 0.999X5$$

Where X1 = Working Capital/Total Assets
X2 = Retained Earnings/Total Assets
X3 = EBIT/Total Assets
X4 = MKT. Value Equity/Total Debt
X5 = Sales/Total Assets

All firms having a Z score of greater than 2.99 fall into the "non-bankrupt" sector, while those firms having a Z score below 1.81 are placed in the "bankrupt" sector. The area between 1.81 and 2.99 is defined as the "zone of ignorance" or "gray area" because of the susceptibility for error classification (Altman, 1968).

Fulmer, Moon, Gavin, & Erwin (1984) determined that Altman's Zeta analysis of 1977 used data from large firms, with average total assets of approximately $100 million (no firm had less than $20 million in assets). Furthermore, Fidleman (1995) criticized and cautioned that the sales/total asset ratio is believed to vary significantly by industry, and likely to be higher for merchandising and service firms than for manufacturers, since the former are typically less capital intensive. He determined that non-manufacturers would have significantly higher asset turnover and Z scores. Therefore, Altman recommended the following correction that eliminates the Sales/total assets ratio.

$$Zjk = 6.56X1 + 3.26X2 + 6.72X3 + 1.05X4$$

The predetermined cutoffs for the Z score are as follows:

The firms is failed when its Z score is less than 1.1 and the zone of ignorance is between 1.1 – 2.6, and the firm is not-failed when Z score is greater than 2.6.

Gordon Springate developed a bankruptcy model in 1978. Springate used step-wise multiple discriminate analysis to select four out of 19 popular financial ratios that most accurately distinguished between sound businesses and those that had actually failed. The Springate model takes the following form:

Springate Model

$$Z = 1.03X1 + 3.07X2 + 0.66X3 + 0.4X4$$

$Z < 0.862$; then the firm is classified as "failed"

WHERE X1 = Working Capital/Total Assets
X2 = Net Profit before Interest and Taxes/Total Assets
X3 = Net Profit before Taxes/Current Liabilities
X4 = Sales/Total Assets

Springate tested this model using 40 companies and achieved an accuracy rate of 92.5%. As the bankruptcy classification models that had been developed prior to the 1980's used publicly available data on large firms (which were not applicable to smaller firms), Fulmer et al., (1984) used step-wise multiple discriminate analysis to evaluate 40 financial ratios using 60 companies with average assets of $455,000; 30 of these companies had failed, and 30 were successful.

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Fulmer Model

$$H = 5.528 (V1) + 0.212 (V2) + 0.073 (V3) + 1.270 (V4) - 0.120 (V5) + 2.335 (V6) + 0.575 (V7) + 1.083 (V8) + 0.894 (V9) - 6.075$$

H < 0; then the firm is classified as "failed"

WHERE
V1 = Retained Earning/Total Assets
V2 = Sales/Total Assets
V3 = EBT/Equity
V4 = Cash Flow/Total Debt
V5 = Debt/Total Assets
V6 = Current Liabilities/Total Assets
V7 = Log Tangible Total Assets
V8 = Working Capital/Total Debt
V9 = Log EBIT/Interest

The application of Fulmer's model showed a 98% accuracy rate in classifying the test companies one year prior to failure, and an 81% accuracy rate more than one year prior to bankruptcy. Fulmer suggested that managers of small firms could use the model as an internal control guideline, investors could use it as one criterion in the selection of small firms for their portfolios, and auditors could apply it to small firms with respect to going concern consideration. Koundinya and Puri (K&P) (1992) also proposed a model related to the prediction of bankruptcy using financial risk factors.

Koundinya & Puri Default Risk Model

Level 1	Level 2 **Risk Attributes**	Level 3 **Measure of Risk Attributors**	Level 4 **Rating of Risk**
Financial Risk	Liquidity Position	• Current Ratio • Cash Flow/Sales Ratio	High
	Earning Power	• Net Profit Margin • Return on Investment	Medium
	Asset Utilization	• Inventory Turnover • Total Asset Turnover	
	Financial Flexibility	• Interest Coverage • Debt Ratio • Debt/Equity Ratio	Low

Clark, Foster, Hogan and Webster (1997) applied the K&P model to the pharmaceutical industry, predicting the status of 25 ongoing firms, and insisted that K&P may be used alone or in conjunction with results from other models, such as Altman's, to predict a company's risk of possible future bankruptcy.

Kwansa and Parsa (1991), adopted the Giroux and Wiggins' (1984) events approach, to determine business failure. Their study identified events in the bankruptcy process that characterize restaurant companies that had filed for bankruptcy under Chapter 11. They found that net losses, management turnover, loan default, credit accommodation, royalty default, declines in unit sales, and renegotiation of franchise contract were major events that contributed to the bankruptcy process. Gu (1999) determined the possibility of restaurant bankruptcy from 34 sampled firms through three ratios: earnings before interest and taxes (EBIT)/total liabilities, retained earnings/total assets, and total liabilities/total assets. Gu's study is limited in that it does

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not provide the coefficient and indicator factors.

Dun & Bradstreet's Business Failure Records shows that the restaurant industry has the highest business failure rates of all segments in the retail trade sector. This high failure rate suggests that there are some common factors that contribute to failure. If models can provide a way of predicting restaurant failure or bankruptcy, restaurant owners and operators can address problems before experiencing a critical failure. By analyzing the information given by Dun & Bradstreet, Business Failure Record, Brigham et al., (1999) determined the causes of business failure as follows: Economic factors, which account for 37.1%, and included industry weakness and poor location; Financial factors, which account for 47.3%, and included too much debt and insufficient capital. The importance of the different factors varies over time, depending on such things as the general state of the economy and interest rate levels. Also, most importantly, failures occur because a number of factors have combined to make the business unsustainable. Signs of potential financial distress generally become evident through ratio analysis long before the firm actually fails. Therefore, researchers use ratio analysis to predict the probability that a given firm will go bankrupt (952).

Previous studies and models have identified a number of accounting dimensions related to the probability of bankruptcy, and have tested and applied these to the manufacturing industry.

Because these studies were limited to the manufacturing industry, it is necessary to analyze and apply the models in the context of the characteristics specific to the restaurant industry.

The Present Study:

The following three questions were utilized in order to determine the direction of this study: What is the most appropriate entry and exit strategy? Which bankruptcy model is most suitable for the restaurant industry? Are there any other latent functions or factors that impact on restaurant business failure besides the functions or factors described in the concurrent model?

The object of this study is two-fold. First, it is to describe and discuss the current bankruptcy prediction models. This is done in the context of pros and cons to determine the appropriate factors or failure phenomenon in cases involving restaurants that have filed for, or are currently in, Chapter 11 bankruptcy. Second, it is to compare those factors to similar restaurants that are either operating successfully (not in bankruptcy) or are no longer operating due to financial failure. Therefore, the research proposition is as follows: To identify the bankruptcy model that most accurately predicts the bankruptcy of a restaurant.

Methodology

An initial discussion and comparison of bankruptcy prediction models was accomplished by using content analysis in order to determine each model's pros and cons in the context of its application to restaurants. A failed restaurant was defined as one that has filed for bankruptcy protection with a loss to creditors (Perry, 2001).

The research design for this study is to apply certain financial and accounting ratios to current bankruptcy prediction models to verify the accuracy of these models.

Sample

The unit of analysis is publicly traded restaurant companies with 5812 SIC codes listed with the Securities and Exchange Commission (SEC). A stratified random sampling method was used in this study. Companies were stratified by industry that was classified into the SIC 5812 code. All 324 publicly traded restaurants companies listed with the SEC were included in the initial screening. The sample data used for this study were drawn from a population of filed bankrupt restaurant companies. In accordance with the requirements of the Securities Exchange

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Act of 1934, a company must report the filing of Form 8-K. Form 8-K is the "current report" used to report material events or corporate changes that have previously not been reported by the company in a quarterly report (Form 10-Q) or annual report (Form 10-K). These events or changes are organized into 12 items, including item 3, which indicates Bankruptcy or receivership. The bankrupt group is comprised of all restaurant companies who had filed a bankruptcy petition under Chapter 11 of the National Bankruptcy Act during the period 1993-2003. After reading Form 8-K, financial ratios were obtained from 10-K annual reports of bankrupted restaurant companies, and were evaluated and calculated as described and discussed in the bankruptcy models. One of the strengths of this study is that it compares the company being evaluated with companies in the same industry. The data used in this study was obtained from forms filed with the SEC, having been audited in a proper manner (i.e., CPA) in accordance with SEC regulations. This source produces highly reliable and useable data.

Measurement Variables

The variables listed in Table 1 were derived and collected from the bankruptcy models. The ratios were chosen on the basis of (1) popularity in the literature and (2) those observed to be relevant to the objective of this study.

Table 1: Ratios Used for Verifying the Bankruptcy Model

Working Capital/Total Assets
Retained Earnings/Total Assets
Earnings before interest and taxes (EBIT)/Total Assets
Market value equity/Par value of debt
Sales/Total Assets
Earnings before Taxes (EBT)/Current Liabilities
EBT/Equity
Cash Flow/Total Debt
Debt/Total Assets
Current Liabilities/Total Assets
Log Tangible Total Assets
Working Capital/Total Debt
Log EBIT/Interest

The working capital/total assets ratio was used to measure the net liquid assets of the restaurant company relative to total capitalization. Current liabilities are subtracted from current assets, and the remainder is divided by the total assets of the restaurant. The retained earnings/total assets ratio is used to measure cumulative profitability over time. As a relatively young restaurant has not had time to build-up cumulative profits, the age of a restaurant company is considered in this ratio. The EBIT/total assets ratio is used in order to measure the true productivity of the restaurant's assets, subtracting any tax or leverage factors (Altman, 1968). The market value of equity/par value of debt ratio is used to determine to what extent the firm's assets can decline in value before liabilities exceed assets, and the firm becomes insolvent (Altman, 1968). Equity is measured by the market value of all shares of stock; and debt includes both current and long-term. The sales/total assets ratio is used to measure capital turnover. Altman (1968) insists that this is one measure of management's capability in dealing with competitive conditions.

Procedures

After the name of bankrupt restaurant companies were derived and selected, and ratios were defined, their respective balance sheet, income statement, and statement of cash flow were collected from the annual report, 10-K, which was filed one year prior to bankruptcy.

Composite ratios of each restaurant company were applied to each model. Two of Altman's models were used, with more attention and emphasis given to the non-manufacturing

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model.

Results and discussions

A description of all 11 bankrupted restaurants involved in this study can be found in Table 2. Table 2 shows that years of operation were between four years and 20 years, with the average being 9.45 years. The average asset size of these companies was $200 million, with a range of between $2.4 million and $1,709 million. The number of units of each restaurant company is also shown in Table 2. As can be seen in the table, seven out of eleven, or 64% of restaurant companies, have more company-owned units than franchised units.

Table 2: Characteristics of Restaurants

Restaurant Company	Years of Operation	Asset Size ($, million)	Company Owned Units	Franchised Units
A	8	233.0	0	184
B	8	1,709.0	847	319
C	6	4.6	5	8
D	13	121.0	40	0
E	20	2.7	10	14
F	5	361.0	539	2
G	12	77.6	91	0
H	9	235.0	30	32
I	4	2.4	18	31
J	10	100.0	73	8
K	9	14.0	97	19
Mean	9.45	260.0	158	55

The ratios retrieved from the financial statements of bankrupt restaurants were applied to each model in order to determine the accuracy of each model.

The Z scores of all 11 restaurants, when applied to Altman's model for non-manufacturing industries, fall below 1.1 (established as the bankrupt sector), with a mean Z score of -11.0384496 (see Table 3).

Table 3: Z Score of Altman's Model (Non-manufacturing Industry Model)

Restaurant	Z score	Variance with Cutoff Point (1.1)
A	-7.3925100	8.49251
B	-2.2296600	3.32966
C	-10.5942300	11.69423
D	-4.5411200	5.64112
E	-22.0202800	23.12028
F	-1.6367100	2.73671
G	-3.1090800	4.20908
H	-9.8775800	10.97758
I	-54.5402600	55.64026
J	-4.2329800	5.33298
K	-1.2486000	2.34860
Mean	-11.0384496	12.13846

Furthermore, the Z scores of all 11 restaurants applied to Altman's model for manufacturing industries fall below 1.8 (established as the bankrupt sector), with a mean Z score of -2.0194869. The major difference between the two models was due to the sales/asset ratio. Three major ratios that contributed to the negative Z score were negative working capital, accumulated deficit (negative retained earnings), and negative earnings before interest and taxes

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(EBIT). The accumulated deficit, or negative retained earnings, reflected the cumulative symptoms of bankruptcy (see Table 4).

Table 4: Z Score of Altman's Model (Manufacturing Industry Model)

Restaurant	Z score	Variance with Cutoff Point (2.99)
A	0.23405	2.75595
B	-0.20913	3.19913
C	-2.75713	5.74713
D	0.09696	2.89304
E	-1.22197	4.21197
F	1.72870	1.26130
G	1.56505	1.42495
H	-3.60555	6.59555
I	-22.10149	25.09149
J	0.58635	2.40365
K	3.46979	-0.47979
Mean	-2.01940	5.00948

Using firms that have assets totaling less than $10 million, Fulmer et al., presented a model in 1984, in which all restaurants companies analyzed in this study show negative Z scores in the range of -60.32645 to -0.88362. Two major figures that contributed to the negative Z scores were accumulated deficit, or negative retained earnings, and negative earnings before taxes (EBT). The mean variance, with cutoff at 0, for the bankrupt or non-bankrupt shows 10.40004 (see Table 5).

Table 5: Z Score of Fulmer's Model

Restaurant	Z score	Variance with Cutoff Point (0)
A	-1.74512	1.74512
B	-4.85122	4.85122
C	-9.22511	9.22511
D	-1.68419	1.68419
E	-16.15930	16.15930
F	-4.67523	4.67523
G	-2.49193	2.49193
H	-9.96579	9.96579
I	-60.32645	60.32645
J	-2.39244	2.39244
K	-0.88362	0.88362
Mean	-10.40003	10.40004

The application of ratios to the Springate model indicated that one restaurant company (company G) resulted in a Z score of 1.04761, compared to the cutoff point of 0.862, with a -0.18561 variance ratio. In addition, it indicated that the inaccuracy rate of Springate's bankruptcy model was 9%. Even the average variance of all 11 restaurants, with a cutoff Z score of 0.862, showed only 2.818956. This Springate model was the only one that contained inaccuracy in the context of bankruptcy prediction (see Table 6).

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Table 6: Z Score of Springate Model

Restaurant	Z score	Variance with Cutoff Point (0.862)
A	-0.00017	0.86217
B	-1.14146	2.00346
C	-3.01780	3.87980
D	-1.13947	2.00147
E	0.38421	0.47779
F	-0.18648	1.04848
G	1.04761	-0.18561
H	-7.32936	8.19136
I	-10.47293	11.33493
J	-0.301883	1.16388
K	0.631213	0.23079
Mean	-1.956957	2.81896

By comparing Z scores derived from all four models, in the context of the variance with the model's acceptable cutoff point, Altman's model for non-manufacturing industries showed the highest variance with 12.13846. As the variance indicates the relative strength of the accuracy of the bankruptcy prediction, the higher variance of the Altman model suggests a higher degree of accuracy in the prediction of bankruptcy (see Table 7).

Table 7: Comparison Analysis of Z Score of Bankrupt Models

Restaurants	Altman's Models		Springate Model	Fulmer Model
	Manufacturing	Non-Manufacturing		
A	0.23405	-7.39251	-0.00017	-1.74512
B	-0.20913	-2.22966	-1.14146	-4.85122
C	-2.75713	-10.59423	-3.01780	-9.22511
D	0.09696	-4.54112	-1.13947	-1.68419
E	-1.22197	-22.02028	0.38421	-16.15930
F	1.72870	-1.63671	-0.18648	-4.67523
G	1.56505	-3.10908	1.04761	-2.49193
H	-3.60555	-9.87758	-7.32936	-9.96579
I	-22.10149	-54.54026	-10.47293	-60.32645
J	0.58635	-4.23298	-0.30188	-2.39244
K	3.46979	-1.24860	0.63121	-0.88362
Mean	-2.01949	-11.03850	-1.95696	-10.40003
Mean Variance	5.00948	12.13846	2.81896	10.40004

Therefore, Altman's model for non-manufacturing industries shows the highest degree of accuracy among the four models tried in this study. The evidence indicates that this bankruptcy classification model appears to be quite accurate in predicting a potentially bankrupt restaurant.

Conclusions and Implications

The purpose of this study was to verify empirically the validity of bankruptcy models. Ratios retrieved from bankrupted restaurant companies were utilized and applied them to the models in question. The development of bankruptcy models has progressed a great deal in the last 15 years. The applicability to many industries has proven the value of accepted bankruptcy models, particularly in the manufacturing industry. Many firms utilize models in order to identify early warning signs of bankruptcy.

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Although models show the effectiveness of using financial or accounting ratios for determining the bankruptcy situation, the models do have broader financial applications. The variables used by all models are important in that they illustrate the usage of financial ratios in the bankruptcy model. The technique appears to be particularly applicable to the problem of predicting bankruptcy. Among financial data, working capital, retained earnings, and EBIT are the most critical factors that contribute to bankruptcy.

For restaurants and restaurant companies to remain operative, management must foresee whether the operation can meet the ultimate goal of operation: maximizing the shareholders' wealth. This study provides valuable information for management to use in determining an operation's current situation by applying the appropriate bankruptcy prediction model. In other words, this study endeavors to discover statistically significant relationships and associations of more than a trivial magnitude. Therefore, the results of this study will aid management in staving off the bankruptcy phenomenon. In addition, small business owners, family businesses, and entrepreneurs will benefit from the ability to determine, through this study's findings, the threat of the bankruptcy phenomenon. The best use of this study is as a filter to identify restaurants in the context of operating effectiveness and survival.

Future research addressing the comparative analysis of bankrupt and non-bankrupt restaurant companies, with its application to the bankruptcy models, is recommended in order to determine the accuracy of the model. Furthermore, extension of other bankrupt models is needed to validate the accuracy of possible bankruptcy.

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