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OF SMALL BUSINESS FAILURE.

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FINANCIAL RATIOS AS DISCRIMINANT PREDICTORS
OF SMALL BUSINESS FAILURE

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By

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The Ohio State University
1970

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CHAPTER I - INTRODUCTION

Background of the Problem

The value of ratios as tools of financial statement analysis for small businesses has neither been empirically established by proponents nor empirically disproved by critics. While ratio enthusiasts have provided factual evidence supporting the usefulness of ratio analysis since the 1930's, only in recent years have researchers conducted scientifically designed studies. These recent studies have been concentrated primarily upon large asset-size firms and have generally ignored the small business.

Pragmatic empiricism has been the dominant approach to ratio analysis during the past forty years, and under pragmatic empiricism the practitioner is required to rely upon the authority of the author's personal experience. As a result, the subject of ratio analysis is ingrained with untested assertions about which ratios should be used and what their proper levels should be. An explicit theoretical structure is noticeably absent while case histories are abundant. Ratio analysis literature is voluminous but consists primarily of instructions for computing ratios.¹ The expected relationship of

¹James O. Horrigan, "A Short History of Financial Ratio Analysis," "The Accounting Review", XLIII, No. 2. (April, 1968), p. 294.

ratios with a specific occurrence or condition has not been quantitatively defined until very recently.

In recent years several articles have reported scientific ratio analysis research. William H. Beaver's study of firms during 1954-64 found that some ratios predicted failure up to five years in advance.² Edward Altman introduced multiple discriminant analysis as a statistical technique in financial ratio research and found five ratios which reliably predicted bankruptcy up to two years prior to its occurrence.³ In his 1969 unpublished dissertation, David Ewert isolated three ratios as good predictors of trade credit quality.⁴ The need for empirical verification of a priori beliefs is being recognized by scholars, and scientific research of ratio analysis is being undertaken. This dissertation will report the results of a study attempting to improve the empirical foundation for a theory of ratio analysis and to answer the question, is ratio analysis of small business financial statements useful in predicting the failure of a small business?

²William H. Beaver, "Alternative Accounting Measures as Predictors of Failure," The Accounting Review, XLIII, No. 1 (January, 1968), p. 69.

³Edward I. Altman, "Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy," The Journal of Finance, XXIII, No. 4 (September, 1968), pp. 589-609.

⁴David Conger Ewert, "Trade Credit Management: Selection of Accounts Receivable Using a Statistical Model," (unpublished Ph.D. dissertation, Stanford University, 1968).

Justification

The studies by Altman and others examined only publicly held manufacturing corporations for which comprehensive financial data were available. None of these studies included small businesses and Altman suggested in his concluding remarks:

An area for future research, therefore, would be to extend the analysis to relatively smaller asset-sized firms and unincorporated entities where the incidence of business failure is greater than with larger corporations.⁵

Ewert's study of Dun & Bradstreet reports included some ratio tests of small asset-sized firms; however, his study was not a rigorous test of ratio analysis and was based upon incomplete and sometimes inaccurate financial reports.⁶ A thorough empirical analysis of small asset-sized firms' financial ratios has not been conducted; a study of small businesses' financial ratios would complement previous studies concentrating on large asset-sized firms.

Definitions

A ratio "is a figure or a percentage representing the comparison of one dollar amount with some other dollar amount as a base."⁷

⁵Altman, "Financial Ratios and the Prediction of Bankruptcy," p. 604.

⁶Ewert, "Trade Credit Management: Selection of Accounts Receivable Using a Statistical Model," p. 85.

⁷Roy A. Foulke, Practical Statement Analysis, 6th ed.; (New York: McGraw-Hill Book Company, 1968), p. 176.

Ratio analysis is variously defined by different authors.

Erich Helfert merely says that:

It is often helpful . . . to relate financial data to each other in order to obtain ratios, or index numbers which express a significant comparison more useful [to the analyst] than the raw figures themselves.⁸

Weston and Brigham utilize ratios to describe specific characteristics of a business and define ratio analysis as part of financial analysis:

Financial analysis, through the calculation of strategic relations, indicates the strengths and weaknesses of the business.⁹

The theoretical definition most appropriate for this study is provided by Donaldson and Pfahl:

Ratio analysis is the process of studying ratios to help predict the future for purposes of decision-making.¹⁰ [Underline added for emphasis.]

Financial failure is the inability of a going concern to meet its obligations as they become due, i.e., technical insolvency.¹¹ In this study, failure will be deemed to

⁸ Erich A. Helfert, Techniques of Financial Analysis (Homewood, Illinois: Richard D. Irwin, 1967), p. 55.

⁹ J. Fred Weston and Eugene F. Brigham, Managerial Finance, 2nd ed.; (New York: Holt, Rinehart and Winston, 1966), p. 67.

¹⁰ Elvin F. Donaldson and John K. Pfahl, Corporate Finance, 2nd ed.; (New York: The Ronald Press Company, 1963), p. 455.

¹¹ Ibid., p. 405

have occurred when the borrower defaults on his Small Business Administration loan and the SBA charges-off the loan. Conversely, a firm will be deemed financially successful if the SBA loan is repaid, even if the firm was delinquent in making payments at some time during the term of the loan.

A ratio combination is a joint condition such as the current ratio exhibiting an upward trend and being greater than 2/1. An industry standard ratio is a summary statistic of ratios of firms in an industrial classification. The Robert Morris Associates Annual Statement Studies (APPENDIX I) and a composite table of SBA borrower statements (APPENDIX II) will be the two bases for computing industry standard ratios.

Statement of the Problem

The primary problem will be to determine if financial ratios and relationships between financial ratios are useful in forecasting small business financial failure. If financial ratios are useful, what combinations of ratios will most reliably predict small business failure?

Objectives of the Research

The primary objective of the research is to provide a comprehensive evaluation of financial ratios as predictors of small business financial failure. As a corollary, the proposed research will also have the objective of indicating financial ratios which predict success.

Limitations

Limitations of this study emanate from limitations of ratio analysis per se and from availability and reliability

of proposed test data. Ratio analysis is rarely considered completely sufficient in most decision situations, but often serves as a guide for additional investigation. Before definitive conclusions can be reached regarding a ratio which varies from the standard, further study of the borrower is necessary.¹² One practicing analyst reports that his procedure is to scan a number of ratios until he spots one which is out of line and then to investigate that area until he receives a satisfactory explanation.¹³ Financial ratio analysis is commonly used as a preliminary step in financial or credit analysis to review quickly the firm's financial history for irregularities on which the analyst will concentrate his attention.

Foulke clearly defined the limits of ratio analysis in his introduction to Part III, "Internal Analysis of Balance Sheets:"

...A knowledge of the significance of important ratios will point out weaknesses and indicate whether a financial condition is wholly or partly good, questionable, or poor; but the great unknown is always management, which has the power to improve the condition or hasten the ruin of any business. It is not the ratio or ratios, ipso facto, that mean a business concern is out of line. The ratio is the symptom, like the blood pressure, the pulse, or the temperature of an individual. Some managements can overcome or mitigate the symptoms; other managements

¹²Ibid., p. 458.

¹³Robert Bartlett, Researcher and past Regional Director, Small Business Administration, Washington, D.C., private interview held in September, 1969.

fail to recognize the symptoms or lack the ability, the aggressiveness, and the knowledge to do so.¹⁴ [underline added]

Data accumulated by the Small Business Administration (SBA) is used in this study to test empirically certain hypotheses of small business failure. The borrowers' data have been transferred to standardized forms by the more than 100 SBA regional and branch offices. The forms are often only partially completed and previous research by the SBA utilizing this data has indicated that inconsistent accounting practices have been applied in preparation of the forms by the field offices. Because of the highly condensed form of the financial statement reports, cross-checks and correcting adjustments are rarely possible. Common accounting practice inconsistencies likely to be included are allocation of officers' salaries to operating expenses in some cases and not in others for partnerships and sole proprietorships, rent out of proportion to economic value sometimes paid to real estate affiliates, and use of normal and accelerated depreciation methods by different companies.

It should also be recognized that the small businesses to be represented in this study will be a special subset of American small businesses. Firms to be used in this study have been granted credit by a governmental agency acting under an important restriction.

¹⁴Foulke, Practical Statement Analysis, p. 177.

By law, the Agency may not make a loan if a business can obtain funds from a bank or other private source. One, therefore, must first seek private financing before applying to SBA.¹⁵

An applicant demonstrates that he is not able to acquire credit on reasonable terms from private sources by being denied credit by one bank in a small city (under 200,000 population) or by two banks in a large city (over 200,000 population). The SBA may then guarantee up to 90 percent or \$350,000, whichever is less, of a bank loan to the small business. The guarantee, most common of all lending programs, is preferred by the SBA, but alternatives are available.

If the entire loan is not obtainable from a private lender and if an SBA guaranteed loan is not available, SBA will then consider advancing funds on an immediate participation basis with a bank. SBA will consider making a direct loan only when these other forms of financing are not obtainable.

The Agency's share of an immediate participation loan may not, at the present time, exceed \$150,000. Direct loans may not exceed \$100,000 and at times may not be available due to Federal fiscal restraints.¹⁶

Maturities for SBA business loans are limited to ten years except those portions of loans for construction purposes which may have a maturity of 15 years. Generally, working capital loans have a maturity of six years or less.¹⁷

¹⁵"SBA Business Loans," a pamphlet issues by The Office of Public Information, Small Business Administration, Washington, D.C., October, 1969, p. 1.

¹⁶Ibid., p. 5.

¹⁷Ibid., p. 60.

Another limitation arises when ratios are used to predict the future because financial statements are based primarily upon past performance and events. Evaluation for credit extension or internal control has significance in what can be expected to happen. Past events are guides only to the extent they can reasonably be considered as clues to the future. They are tempered in practice by the analyst's knowledge about the outlook for the business.¹⁸

Scope of Study

In this study statements from 1958 to 1965 for borrowers obtaining their loans under any SBA program except Development Company (Section 501 and 502), Lease Guarantee, Small Business Investment Company (Section 302) and Housing and Urban Business are analyzed. Businesses included in the study are broken down by Standard Industrial Classification (SIC) as shown in Table 17.

Order of Presentation

Chapter 2 is a brief discussion of the history of ratio analysis and a review of related research. Chapter 3 includes the hypotheses, a description of the test data and samples, and the details of the procedures, statistical techniques, and computer programs used to test the hypotheses. In Chapter 4 the results of the tests and analyses are set forth. Conclusions and suggestions for further research are considered in Chapter 5, followed by the appendixes and bibliography.

¹⁸Helfert, Techniques of Financial Analysis, pp. 56-57.

CHAPTER II - RELATED LITERATURE

Euclid's rigorous analysis of the properties of ratios in Book V of Elements in about 300 B.C. has been ascribed as a primary development in the evolution of ratio analysis. However, it was not until sometime in the late 1890's that financial seers adopted ratios as an analytical technique for appraising financial statements. This section of the dissertation contains present century authors' ideas which have led to current research and practice of ratio analysis.

1900-1929

Following the turn of the century and prior to World War I, four important developments in financial ratio analysis occurred. First, a number of financial ratios were conceived. Second, absolute standards for financial ratios appeared, the best known being the 2 to 1 current ratio criterion. Third, inter-firm analysis was recognized as a valid technique and the first empirical study of ratios by industry and geographical location was performed. Fourth, ratio analysis was adopted as a managerial tool by the Du Pont Company, which began to use a ratio "triangle" system in evaluating operating results. During the decade of the 1920's, interest in and publications on the subject of ratio analysis increased greatly. Industry ratio data were being compiled by trade associations,

universities, credit agencies, and individual analysts.¹

Pragmatic Empiricism and Empirical Research

The empirical bases of ratio analysis received increased attention in the 1930's while the literary discussion of ratios and compilation of industry average ratios continued unabated. During this period, two approaches to the subject of ratio analysis developed which remain separate today. In addition to the empirical research approach, a group of authors introduced pragmatic empiricism.

Foulke

Roy A. Foulke represented and was the most successful promulgator of the approach called "pragmatic empiricism." In this approach, which became the primary modus operandi of ratio analysis in this country,

. . . a priori analysis and/or empirical evidence were rarely provided to substantiate an author's claim that his particular selection of ratios for analyzing financial statements represented an efficient collection of ratios. Rather, the author's group of selected ratios--and sometimes accompanying absolute and relative criteria--were promulgated solely on the authority of his experience in statement analysis.²

Foulke's approach to ratio analysis combines industry composite figures, personal experience, and common sense into a situational explanation including non-financial, as well as

¹James O. Horrigan, "A Short History of Financial Ratio Analysis," The Accounting Review, XLIII, No. 3, (April, 1968), pp. 284-85.

²Ibid., pp. 285

financial information. His basis for selection of ratios is provided in the introduction to his chapters on ratio analysis:

The ratios that are discussed and illustrated in these Chapters have been studied and applied intensively for over 30 years to many tens of thousands of commercial and industrial situations; they are practical in every sense of the word.³

Foulke's literary technique is to provide an historical background of the ratio, define the ratio in terms of balance sheet accounts, discuss the accounts used in the calculation of the ratio, discuss in general the usefulness of the ratio, discuss three cases involving the application of the ratio, and summarize the application of the ratio as a "Maxim." Foulke relies heavily upon cases in his explanation of the application of ratios rather than providing a general or logical argument. Management ability and actions are not divorced from his discussion of financial statements and ratios. Consequently, his analysis does not contain an obvious theory or procedure for analysis. He explicitly rejects the notion of a priori theorizing in regard to ratios and argues that only empirically obtained knowledge--especially ratio criteria--is possible for ratios.⁴

Foulke advocates fourteen ratios and emphasizes the following: current assets to current liabilities, current liabilities to tangible net worth, total liabilities to tangible net worth,

³ Foulke, Practical Statement Analysis, p. 176.

⁴ Ray A. Foulke, "Financial Ratios Become of Age," The Journal of Accountancy (September, 1937), pp. 209-10.

funded debt to net working capital, fixed assets to tangible net worth, net sales to inventory, inventory to net working capital, average collection period, net sales to tangible net worth, net sales to net working capital, net profit to tangible net worth, and net profit to net sales.⁵

Smith and Winakor, 1930

At the same time as Foulke and other pragmatic empiricists became popular, the first carefully developed attempts to utilize the scientific method through empirical research were performed. Raymond F. Smith and Arthur H. Winakor are credited with initiating this approach with their analysis of a sample of firms which had failed in 1926, 1927, and 1928. Financial data were collected for 11 years prior to and including failure for the 29 companies studied. Smith reported in 1930 that 13 of the 29 companies showed signs of weakness more than six years prior to failure, based on the ratios of net earnings to total assets and net income to net worth.⁶

In 1935, Smith and Winakor published the results of a greatly expanded study of financial ratios. This classic study

⁵Foulke, Practical Statement Analysis, pp. 178-444. Not included here are the net profits to net working capital and the current debt to inventory ratios. All fourteen ratios have been published by Dun & Bradstreet, Inc., since 1933.

⁶Raymond F. Smith, "A Test Analysis of Unsuccessful Industrial Companies," University of Illinois Bulletin, No. 31 (University of Illinois, Bureau of Business Research, 1930), pp. 7-59.

of 183 financial statements of failed corporations examined 21 ratios and substantiated the findings of their 1930 preliminary study. The current ratio was again observed to be subject to wide fluctuations while the working capital ratio was smooth. Smith and Winakor reported:

. . . the working capital ratio was a far more steady and accurate, as well as earlier, indicator of unfavorable trends than the Current Ratio. A comparison of current liabilities and current assets at no time revealed a definitely weak condition, nor did the trend of the Current Ratios appear helpful in anticipating difficulties.⁷

Smith and Winakor also reported that the inventory to total assets ratio declined less rapidly than cash or accounts receivable to total assets ratios, indicating that the company was becoming less liquid. However, this tendency was not fully reflected in either the current ratio or net working capital ratio and hence reduced the value of the current and working capital ratios as indicators of failure.

After reviewing several leverage ratios, Smith and Winakor found that when current and long-term debt were combined, all six industrial classifications showed a steady increase in debt ratios. Operating ratios increased, especially during the five years just prior to failure, as sales declined. Dividend policy was found to be little altered in the final years before failure.⁸

⁷Raymond F. Smith and Arthur H. Winakor, "Changes in the Financial Structure of Unsuccessful Corporations," University of Illinois Bulletin, No. 51, (University of Illinois, Bureau of Business Research, 1933), p. 38.

⁸Ibid., pp. 1-37.

Merwin, 1942

The next empirical study of ratios was Charles L. Merwin's 1942 study of 200 firms discontinuing business (for unspecified reasons) during the years 1936-39 in five industries. Discontinuing firms were defined as those which stopped filing Federal Income Tax returns, and he acknowledged that many of these may have discontinued for reasons other than financial difficulty. Merwin plotted the highest and lowest ratios of the continuing business and the average of the discontinuing firms by industry on the same graph.

Merwin examined a large number of ratios with a trial and error method and found three ratios were particularly good "portents of discontinuance." Those three ratios were the current ratio, the net worth to total debt ratio, and the net working capital ratio.⁹

Hickman, 1957

In 1957, W. Braddock Hickman published the results of a study covering bond issues of large publicly held corporations from 1900 to 1943 in an article entitled, "Corporate Bonds: Quality and Investment Performance."¹⁰ Measures of bond quality for prospective bond issues were related to bond quality and yield. The study has interest with respect to financial ratios because one measure applied was the "margin of safety" (ratio

⁹ Charles L. Merwin, Financing Small Corporations (New York: National Bureau of Economic Research, 1942), pp. 90-106.

¹⁰ W. Braddock Hickman, "Corporate Bonds: Quality and Investment Performance," National Bureau of Economic Research Occasional Paper No. 59 (1957), pp. 1-31.

of net income of the companies offering the bonds). Hickman concluded:

The inverse relationship between prospective quality and default rates held almost uniformly throughout the indicated classes of the table for agency ratings, legal status, market ratings, time-charges-earned ratios, ratios of net income to gross income size of issue and asset size of obligor.¹¹ [underline added for emphasis]

Beaver, 1966

William H. Beaver's 1966 study warrants its distinction as a "landmark for future research in ratio analysis" because Beaver introduced a sophisticated statistical technique for direct analysis of an unlimited number of cases and because he computed ratios from funds statement data.¹² Beaver defined failure as a business defaulting on interest payments on its debt, overdrawing its bank account, or declaring bankruptcy. He studied large asset-sized failing firms and a stratified sample of successful firms for the period 1954-64 using multiple discriminant analysis. Similar to Smith and Winakor and Merton, he found that some ratios predict failure up to five years in advance.

Beaver found that the cash flow to total debt ratio misclassified only 13 percent of the sample firms one year before bankruptcy and 22 percent of the sample firms five years

¹¹ Ibid., also see W. Braddock Hickman, Corporate Bond Quality and Investor Experience (Princeton: Princeton University Press, 1958).

¹² Horrigan, "History of Ratio Analysis," p. 291

before bankruptcy. In a later reference to this study,

Beaver said:

This evidence . . . suggested that financial ratios can be useful in the prediction of failure for at least five years prior to the event . . . the user cannot choose among ratios indiscriminantly. Persistent differences in predictive ability were found, many of which were not correctly anticipated by a priori arguments in the literature.¹³

Altman, 1968

Edward I. Altman attempted to assess the quality of ratio analysis as an analytical device in predicting bankruptcy of firms ranging in size from \$0.7 million to \$25.9 million in assets. A group of 33 manufacturing firms declaring bankruptcy under Chapter X during the period 1946-65 was paired with a stratified sample of 33 manufacturing firms not declaring bankruptcy. From an initial list of 22 variables, Altman selected the following for a discriminant function: working capital/total assets, retained earnings/total assets, earnings before interest and taxes/total assets, market value of equity/book value of total debt, and sales/total assets.

F ratios for each variable and the entire equation were calculated and found significant for all but the sales/total assets ratio. The predictive ability of the function on a 66-firm hold-out sample is listed as follows: ¹⁴

¹³ Beaver, "Financial Ratios as Predictors of Failure," p. 73.

¹⁴ Altman, "Financial Ratios and the Prediction of Bankruptcy," pp. 589-609.

<u>Year Before Bankruptcy</u>	<u>Predictive Ability</u>
1st	95%
2nd	72
3rd	48
4th	29
5th	36

Ewert, 1968

In 1968, David Ewert developed a statistical model for classifying trade accounts receivable based upon information supplied in Dun & Bradstreet credit reports. Ewert applied a 17-variable and a 9-variable regression equation to a sample of over 300 trade accounts of a manufacturing concern. Variables for the current ratio and the sales to working capital ratio had significant enough t-values to be included in the 17-variable model but not in the 9-variable model. The 9-variable model, found to be almost as discriminating as the 17-variable model, contained no variables based upon the creditor's financial statements. The discriminating power of the models was tested by determining whether the two cumulative frequencies for the goods and bads (credit accounts) in a hold-out sample were different. The Kolmogorov-Smirnov test showed the distributions of goods and bads for both the 17- and 9-variable models were significantly different at the .001 level. Hence, both regression equations were good forecasting models.¹⁵

Blum, 1969

In a 1969 dissertation at Columbia University, Mark P. Blum constructed a theoretical model, based on accounting and

¹⁵ Ewert, "Trade Credit Management: Selection of Accounts Receivable Using a Statistical Model."

financial market data, which was designed to discriminate between failing and non-failing firms.¹⁶ The model was part of his dissertation studying the Failing Company Doctrine as a defense in antitrust cases. Blum defined failure as "entrance into a bankruptcy proceeding or an explicit agreement with creditors which reduces the debts of the company." Blum's sample consisted of 115 industrial firms which failed during the years 1954-1968 (with liabilities greater than \$1 million) and a paired sample of 115 nonfailed firms similar with respect to industry, annual sales, number of employees, and fiscal year. Employing multiple discriminant analysis, Blum computed a function consisting of the following twelve variables: Market rate of return, quick flow ratio, cash flow/total debt, fair market value of net worth/total debt, net quick assets/inventory, book value of net worth/total debt, standard deviation of net quick assets/inventory, slope (rate of change) of income, slope of net quick assets/inventory, trend breaks of income, and trend breaks of net quick assets/inventory. The independent variables include factors for both trend and variance. Data up to eight years prior to failure were collected when available. However, five years of data prior to failure were found optimal. The model has an over-all accuracy of 93%-95% when failure occurred within one year after the most recent statement date. The accuracy declined to 80% for predictions

¹⁶ Marc Paul Blum, "The Failing Company Doctrine," (unpublished Ph.D. dissertation, Columbia University, 1969).

two years prior to failure and 70% for predictions three years prior to failure.¹⁷

Summary

A summary of ratios included in four recent empirical studies is presented in Table 1. These studies showed that a few ratios can combine to make a discriminate function with a high degree of reliability when applied to data similar to that which determined the function. Although one ratio was found to be a good predictor in more than one study, no one group of ratios is common to the four studies. This implies that the discriminant functions derived in each study can be applied reliably only to situations very similar to the situations analyzed in the particular study.

¹⁷Ibid., pp. 85-156.

TABLE I
SUMMARY OF RATIOS FOUND TO BE SIGNIFICANT
PREDICTORS OF BUSINESS FAILURE IN RECENT
EMPIRICAL RESEARCH

Ratio	Researcher			
	Altman	Beaver	Ewert	Blum*
Current			X	
Net working capital/total assets	X			
Debt/total assets**	X	X		X
Total assets turnover	X			
Net sales/net working capital			X	
Net operating margin	X			
Earnings after taxes/total assets		X		
Market value of equity/book value of total debt	X			
Cash flow/total debt		X		X
Trend Breaks of Net Quick Assets to Inventory				X
Net Quick Assets to Inventory				X
Rate of Return to Common Shareholders				X

* The twelve-variable function was fit on many time periods and the results varied widely. These five variables generally performed best over all of the time periods.

** Defined as debt to net worth in some of the studies.

CHAPTER III - RESEARCH DESIGN

This chapter sets forth the research methodology, procedures and data sources. First, a set of operational definitions are introduced, and where these definitions differ from common usage, alternative definitions are presented also. Second, ratio levels, industry relatives, trends, and combinations used by practitioners or advocated by financial writers are described in empirically testable forms as hypotheses. Third, the test data and sampling technique are described and, fourth, statistical methodology for testing the hypotheses with the sample data is presented.

Operational Definitions

Ratio analysis is operationally defined in this study as the process of studying ratios to help predict whether or not a Small Business Administration (SBA) loan will be charged-off as a loss by the SBA. A small business will be defined as the SBA defines a small business for loan purposes.

. . . one that is independently owned and operated, not dominant in its field and meets employment or sales standards developed by the Agency. For most industries, these standards are as follows:

Manufacturing - small if average employment in the preceding four calendar quarters did not exceed 250, including employees of any affiliates; large if average employment was more than

1,000. If employment exceeded 250 but not 1,000, SBA bases its determination on a specific size standard for the particular industry.

Wholesaling - small if yearly sales are not over \$5 million.

Retailing and Service - small if annual sales or receipts are not over \$1 million.¹

Data are classified into three quartiles: first, median, and third, (dummy variables created for each of the extreme quartiles), as well as measured on a continuous scale. The smaller observations (numerically) are in the first quartile, the middle range of observations are in the median quartile (sometimes termed the "second quartile") and the larger observations are in the third quartile.²

The operational definitions of quartiles differ from Dun & Bradstreet's³ and Robert Morris Associates⁴ definitions of upper and lower quartiles. Whereas the first quartile (defined previously) always refers to the numerically smallest ratios, the lower quartile is defined by Dun & Bradstreet and Robert Morris Associates as the numerically smallest in some instances

¹"SBA Business Loans," a pamphlet issued by The Office of Public Information, Small Business Administration, Washington, D.C., October, 1969, p. 3.

²Paul G. Hoel, Elementary Statistics (New York: John Wiley & Sons, Inc., 1962), p. 29

³Key Business Ratios in 125 Lines - 1964 (New York: Dun & Bradstreet, Inc., 1966).

⁴The Robert Morris Associates Annual Statement Studies (Philadelphia: Robert Morris Associates, 1967-69).

(current assets/current liabilities and net profit/net sales for example) and as the numerically largest in other instances (fixed assets/tangible net worth and debt/tangible net worth, for example). The ratio figures are arranged by these reporting agencies so that the "best" ratio figure is in the upper quartile and the "weakest" figure is in the lower quartile. However, there is not general agreement on what is the "best" ratio for some ratios, especially for the activity ratios. Due to conflicting opinions and the author's desire to conduct the research in a positive manner, the quartiles are defined in a strictly statistical context.

Trend is defined as three consecutive years in which the ratio moved in the same direction. For example, if the ratios for the last three years were 2/1, 3/1, and 4/1, a trend would exist; but if the ratios for the same years were 2/1, 4/1, and 3/1, a trend would not be considered to exist. The up-trend variable is assigned a value of 1 for an increasing trend and 0 for the absence of a trend, and the down-trend variable is assigned the value 1 for a decreasing trend and 0 for the absence of a trend.

Trend is defined statistically as a significant relationship between a dependent variable and time. Trend may be discerned by scanning a chronologically arranged series, plotting the dependent variable and time on a graph, counting the runs, or calculating a regression equation.⁵ A runs count has

⁵Hoel, Elementary Statistics, pp. 202-217.

been selected because it is a simple yet reliable test of trend.

A combination variable is formed by relating two or more ratios with a rule. The rule may state any condition for the relationship to hold or may state that the relationship changes as external conditions change. Combinations are presented in Hypothesis 5.

Hypotheses

The hypotheses set forth in this section reflect in a testable form some of the author's interpretations of ratios often advocated by academicians and practitioners. Following each hypothesis is a description of what it represents and a list of empirically testable variables. Then the reasons and background for the selection of the hypothesis are briefly discussed. Finally, the sources of data other than borrower information are described as required.

Null H-1 The level of each of the ratios listed in Appendix III is not a predictor of financial failure for small businesses.

Alternate H-1 The level of one or more of the ratios listed in Appendix III is a predictor of financial failure for small businesses.

The ratios to be tested (listed and defined in Appendix III) are the quick, current, inventory to net working capital, net working capital to total assets, current assets to total debt, debt to equity, fixed assets to equity, cash flow to

current liabilities, current liabilities to equity, equity and long term debt to fixed assets, inventory turnover, fixed assets turnover, total assets turnover, net sales to net working capital, sales to equity, sales margin, return on assets, return on equity, and cash flow to total debt. This hypothesis represents the use of ratios in their crudest form; no adjustment is made with respect to variation between industries nor are the ratios compared with one another. It is designed to test the theory that there are standards which transcend industry boundaries and apply to all companies.

The following variables will be generated from this hypothesis: continuous variables for the computed value of each ratio, dummy variables representing the upper quartile for each ratio, dummy variables representing the lower quartile for each ratio, and dummy variables representing a ratio falling below an established norm for ratios with norms.

The nineteen ratios listed in Appendix III for use in the hypotheses have been advocated by one or more of the following theorists or have been found to be significant predictors of financial failure by one or more of the following empiricists. The theorists and empiricists, respectively, considered as principal sources of ratios for this research are Benjamin Haggott Beckhart, Elvin F. Donaldson and John K. Pfahl, Roy A. Foulke, Erich A. Helfert, Roland I. Robinson, J. Fred Weston and Eugene F. Brigham and empiricists Edward I. Altman, William H. Beaver, David Ewert, W. Braddock Hickman, Charles

Merwin, J. R. Ramser and Louis O. Foster, Raymond F. Smith and Arthur H. Winakor, and M. Tamari. While the list presented in Appendix III is not exhaustive, it does contain all ratios emphasized by the theorists except the accounts receivable collection ratios and accounts payable payment ratios. It contains all ratios found significant in past empirical studies except the net operating margin ratio. Data for the ratios excluded were not available.

Null H-2 The relationships of all ratios listed in Appendix III of the subject firm to the ratios of other firms in its industry are not predictors of financial failure for small businesses.

Alternate H-2 The relationship of one or more of the ratios listed in Appendix III of the subject firm to the ratios of other firms in its industry is a predictor of financial failure for small businesses.

This hypothesis proposes that comparing the firm's and industry's ratios is a method of predicting small business failure. By dividing the borrower's ratio by the respective industry-size mean ratio, the industry effect is substantially removed. The remaining borrower/industry ratios are termed industry relatives and are used as continuous and first and third quartile variables. The quartiles are used here to emphasize ratios outside the medium range while reducing the effect of a few extremes.

Support for including an industry adjustment is widespread. With few exceptions empirical researchers have provided for differing industrial patterns although some have found certain ratios to be significant across industrial lines. The popularity of industry comparisons is indicated by the construction and publication of industry summaries by Dun & Bradstreet and the Robert Morris Associates. Helfert advocates the use of industry data as a standard, the analyst concentrating his attention on major variations from this standard.⁶ The study uses industry comparative figures from the Robert Morris Associates Annual Statement Studies and develops composite figures from SBA data for the years 1958 through 1968.

Null H-3 The trends of all ratios listed in Appendix III are not predictors of financial failure for small businesses.

Alternate H-3 The trend of one or more of the ratios listed in Appendix III is a predictor of financial failure for small business.

This method of ratio analysis (unadjusted for industry differences) implies that firms will continue trends established over the past three years. Thus companies tending toward failure will continue to weaken and ultimately fail. Ceteris paribus, the effect of activity ratio trends is uncertain and it may be that the activity ratio trends will be predictors of small

⁶Erich A. Helfert, Techniques of Financial Analysis (Homewood, Illinois: Richard D. Irwin, 1967), p. 73.

business failure. However, it would be more useful to reject the hypothesis that they are not predictors than to reject the hypothesis that they are predictors and hence, the ratio trends are all hypothesized alike.

This hypothesis will generate the following variables: continuous variables for the average change of each ratio from the first to third year before the loan was granted, dummy variables representing the quartile with the greatest increasing trend for each ratio, and dummy variables representing the quartile with the greatest decreasing trend for each ratio.

Previous empirical studies considering trends have found that trends of some ratios lead to business failure.⁷ Practitioners have reported that businesses which are "going in the wrong direction" are viewed with greater caution than those whose trend is improving.⁸

Null H-4 The three-year trends of all the industry relative ratios listed in Appendix III are not predictors of financial failure for small businesses.

Alternate H-4 The three-year trend of one or more of the industry relative ratios listed in Appendix III is a predictor of financial failure for small businesses.

⁷Charles L. Merwin, Financing Small Corporations. Raymond F. Smith and Arthur Winakor, "Changes in the Financial Structure."

⁸Richard Nobile, Senior Loan Officer, City National Bank of Columbus, Ohio, telephone interview, September, 1969.

This hypothesis is the same as H-2 except that the ratios are adjusted for industry patterns so that industry trends are eliminated. This provides a measure of the trend of the firm relative to other firms within its industry.

The following variables are generated from this hypothesis: dummy variables for each ratio with the value 1 when the trend is up and 0 otherwise and dummy variables for each ratio with the value 1 when the trend is down and 0 otherwise.

Null H-5 All selected combinations between ratios listed in Appendix III are not predictors of financial failure for small businesses.

Alternate H-5 One or more selected combinations between ratios listed in Appendix III are predictors of financial failure for small businesses.

Hypothesis 5 is a general statement asserting that predictions of failure can be made by comparing two or more ratios. The specific ratios to be compared and the method of comparison are delineated in the sub-hypotheses. Null hypotheses will not be listed for the sub-hypotheses.

Alternate 5-A For each ratio listed in Appendix III, the combination of the industry relative trend and the industry relative level is a predictor of small business failure.

Alternate Hypothesis 5-A states that trend- relative level is a good combination for predicting failure. Such a combination might be an increasing debt/equity ratio which was in the third quartile at the most recent statement date. Each of four

combinations (see Table 2) are tested for each of the nineteen ratios. Variables are formed by multiplying the quartile combinations shown in Table 2 to form four new dummy variables for each ratio.

TABLE 2
COMBINATIONS OF TREND
AND LEVEL EXTREME QUANTILES

LEVEL	Trend	
	Up	Down
1st Quartile	1&U	1&D
3rd Quartile	3&U	3&D

Merwin noted that failing firms have average ratios below the lowest continuing firms and that their trend is generally downward. Weston and Brigham, in an analysis of a sample company, comment "Composite Company's current ratio is below the industry average, a credit analyst would not mark the firm down badly on this count, in view of the favorable trend."⁹

Alternate 5-B The combination of the sales/net working capital ratio level in the third quartile and the fixed assets turnover ratio in the first quartile is a predictor of small business failure.

This hypothesis is generated from a general statement made by Foulke:

⁹J. Fred Weston and Eugene F. Brigham, Managerial Finance, 2nd ed.; (New York: Holt, Rinehart and Winston, 1966), p. 84.

It is not unusual to come across a situation where the relationship of net sales to tangible net worth is in satisfactory proportion, but the relationship of net sales to net working capital is excessive. Such a condition is the concomitant result of a top-heavy investment in fixed or slow assets, leaving a rather moderate net working capital position. As a business concern with this financial condition goes into the peak of its season, the relationship between net sales and net working capital becomes more and more exaggerated.¹⁰

While Foulke does not state that this condition will lead to failure, he goes on to say that this results in relatively heavy current liabilities in relation to current assets given any reasonable volume of sales. This study asserts and tests the proposition that an unbalanced asset position will lead to failure in a small business.

Alternate 5-C The combination of the industry-relative current, quick, and net working capital/total assets ratios in the first quartile is a predictor of business failure.

These ratios are designed to measure liquidity and the hypothesis tests the idea that a firm which is highly liquid now will be able to pay its debts in the future. One dummy variable is the product of the first quartile dummy variables for the current, quick, and net working capital/total asset ratio levels.

¹⁰Foulke, Practical Statement Analysis, p. 418.

Alternate 5-D The combination of the industry relative inventory/net working capital ratio in the third quartile and the industry adjusted inventory/sales ratio in the third quartile is a predictor of failure.

This hypothesis is designed to reflect the borrower who has a large, slow-moving inventory in his business. The combination is represented by a dummy variable formed by multiplying the appropriate dummy variables previously specified.

The combination hypotheses presented above represent some of the many relationships advocated by current writers and practitioners. While only a few of these relationships are given explicit recognition here, other relationships may be recognized in the multivariate discriminate function which shows linear relationships rather than the multiplicative relationships described in the hypotheses.

Summary Description of Variables

This section recapitulates the variables described with each hypothesis and provides a numbering system for the variables eligible for entering discriminant functions. A total of 728 variables were formed as shown in Tables 3 through 7.

Under the heading "Single Ratio Variables" each of the 19 ratios is investigated for level, trend, and relative level with respect to its industry. In a linear discriminant function, the single ratio variables interact in an additive fashion. To provide for possible multiplicative effects, "Combination Ratio Variables" are formed on the basis described in Hypothesis 5.

Table 3

Table of Variable Names and Numbers
for Level Variables (Applicable to
Mono- and Tri-Annual Samples)

		Level			Level Relative To RMA			Level Relative To SBA		
		L	L1	L3	R	R1	R3	S	S1	S3
Quick	QK	1	20	39	58	77	96	115	134	153
Current	CR	2	21	40	59	78	97	116	135	154
Inventory/Net Working Capital	IW	3	22	41	60	79	98	117	136	155
Net Working Capital/Total Assets	WA	4	23	42	61	80	99	118	137	156
Current Assets/Total Debt	CD	5	24	43	62	81	100	119	138	157
Total Debt/Equity	DE	6	25	44	63	82	101	120	139	158
Fixed Assets/Equity	FE	7	26	45	64	83	102	121	140	159
Cash Flow/Current Liabilities	\$L	8	27	46	65	84	103	122	141	160
Current Liabilities/Equity	LE	9	28	47	66	85	104	123	142	161
Equity + LT Debt/Fixed Assets	PF	10	29	48	67	86	105	124	143	162
Inventory/Sales	IS	11	30	49	68	87	106	125	144	163
Fixed Assets/Sales	FS	12	31	50	69	88	107	126	145	164
Total Assets/Sales	AS	13	32	51	70	89	108	127	146	165
Net Working Capital/Sales	WS	14	33	52	71	90	109	128	147	166
Equity/Sales	ES	15	34	53	72	91	110	129	148	167
Sales Margin (Before Taxes)	SM	16	35	54	73	92	111	130	149	168
EBT/Total Assets	AM	17	36	55	74	93	112	131	150	169
EBT/Equity	KE	18	37	56	75	94	113	132	151	170
Cash Flow/Total Debt	\$D	19	38	57	76	95	114	133	152	171

TABLE 4

TABLE OF VARIABLE NAMES AND NUMBERS
FOR TREND AND AVERAGE VARIABLES

Ratio	Trend		RMA Trend		SBA Trend		Average			RMA Average			SBA Average		
	U	D	RU	RD	SU	SD	A	A1	A3	RA	RA1	RA3	SA	SA1	SA3
QK	172	191	210	229	248	267	286	305	324	343	362	381	400	419	438
CR	173	192	211	230	249	268	287	306	325	344	363	382	401	420	439
IW	174	193	212	231	250	269	288	307	326	345	364	383	402	421	440
WA	175	194	213	232	251	270	289	308	327	346	365	384	403	422	441
CD	176	195	214	233	252	271	290	309	328	347	366	385	404	423	442
DE	177	196	215	234	253	272	291	310	329	348	367	386	405	424	443
FE	178	197	216	235	254	273	292	311	330	349	368	387	406	425	444
\$L	179	198	217	236	255	274	293	312	331	350	369	388	407	426	445
LE	180	199	218	237	256	275	294	313	332	351	370	389	408	427	446
PF	181	200	219	238	257	276	295	314	333	352	371	390	409	428	447
IS	182	201	220	239	258	277	296	315	334	353	372	391	410	429	448
FS	183	202	221	240	259	278	297	316	335	354	373	392	411	430	449
AS	184	203	222	241	260	279	298	317	336	355	374	393	412	431	450
WS	185	204	223	242	261	280	299	318	337	356	375	394	413	432	451
ES	186	205	224	243	262	281	300	319	338	357	376	395	414	433	452
SM	187	206	225	244	263	282	301	320	339	358	377	396	415	434	453
AM	188	207	226	245	264	283	302	321	340	359	378	397	416	435	454
RE	189	208	227	246	265	284	303	322	341	360	379	398	417	436	455
\$D	190	209	228	247	266	285	304	323	342	361	380	399	418	437	456

TABLE 5
TABLE OF VARIABLE NAMES AND NUMBERS
FOR LEVEL-TREND COMBINATION VARIABLES

RATIO	R1/RU	R3/RU	R1/RD	R3/RD	S1/SU	S3/SU	S1/SD	S3/SD
QK	457	476	495	514	533	552	571	590
CR	458	477	496	515	534	553	572	591
IW	459	478	497	516	535	554	573	592
WA	460	479	498	517	536	555	574	593
CD	461	480	499	518	537	556	575	594
DE	462	481	500	519	538	557	576	595
FE	463	482	501	520	539	558	577	596
\$L	464	483	502	521	540	559	578	597
LE	465	484	503	522	541	560	579	598
PF	466	485	504	523	542	561	580	599
IS	467	486	505	524	543	562	581	600
FS	468	487	506	525	544	563	582	601
AS	469	488	507	526	545	564	583	602
WS	470	489	508	527	546	565	584	603
ES	471	490	509	528	547	566	585	604
SM	472	491	510	529	548	567	586	605
AM	473	492	511	530	549	568	587	606
RE	474	493	512	531	550	569	588	607
\$D	475	494	513	532	551	570	589	608

TABLE 6

TABLE OF NAMES AND NUMBERS OF
RATIO VARIABLES TWO AND THREE
YEARS PRIOR TO DATE LOAN WAS GRANTED

RATIO	TWO YEARS BEFORE LOAN WAS GRANTED			THREE YEARS BEFORE LOAN WAS GRANTED		
	L	R	S	L	R	S
QK	628	647	666	685	704	723
CR	629	648	667	686	705	724
IW	630	649	668	687	706	725
WA	631	650	669	688	707	726
CD	632	651	670	689	708	727
DE	633	652	671	690	709	728
FE	634	653	672	691	710	729
\$L	635	654	673	692	711	730
LE	636	655	674	693	712	731
PF	637	656	675	694	713	732
IS	638	657	676	695	714	733
FS	639	658	677	696	715	734
AS	640	659	678	697	716	735
WS	641	660	679	698	717	736
ES	642	661	680	699	718	737
SM	643	662	681	700	719	738
AM	644	663	682	701	720	739
RE	645	664	683	702	721	740
\$D	646	665	684	703	722	741

TABLE 7
TABLE OF SELECTED RATIO COMBINATIONS

VARIABLE NUMBER	DESCRIPTION OF COMBINATION
742	1 if variables 109 and 88 = 1, otherwise 0
743	1 if variables 77, 78, and 80 = 1, otherwise 0
744	1 if variables 79 and 106 = 1, otherwise 0
745	1 if variables 166 and 145 = 1, otherwise 0
746	1 if variables 134, 135, and 137 = 1, otherwise 0
747	1 if variables 136 and 163 = 1, otherwise 0

Description of Test Data

The data for testing the hypotheses are made available by the Small Business Administration and the Robert Morris Associates. The SBA provides information for the period 1954-1969 contained in three computer tape files; Beta Business, Financial Growth Data Bank, and Loss Study. The Beta Business file contains 109,913 records of 455 characters each and records information about each borrower and loan from the Loan Application Control form (see APPENDIX IV). The Financial Growth Data Bank (hereafter called Business Growth) contains 192,026 records of 96 characters each and records the information supplied by the borrower on SBA Form 697, Business Growth Data (see APPENDIX V). The Loss Study file contains 8,442 records of 177 characters (see APPENDIX VI). All of the SBA information is stored at high density on six reels of computer tape in a blocked BCD format with an even parity.

The Annual Statement Studies for the years 1958 through 1968 from the Robert Morris Associates is one source of industry comparative figures. The Robert Morris Associates state the following purpose in the introduction to the Annual Statement Studies, 1969:

The Robert Morris Associates is the national association of bank loan and credit officers. It is actively engaged in promoting improvement in principles and practices of commercial lending, loan administration, and asset management in commercial banks. Today RMA's membership includes some 1,200 commercial banks throughout the United States....¹¹

¹¹Annual Statement Studies, 1969, p. 111.

The RMA composite figures may not be representative of an industry due to the collection procedures. First, only Association member banks submit statements and only for companies which have provided the banks with recent figures. Second, companies are classified by their primary product line even though many companies have varied product lines. Third, the number and selection of statements is the sole responsibility of the submitting banks and no attempt is made by the RMA to provide a representative sample by statistical or other means.

As shown in Appendix I, the Statement Studies break each industry into four size classifications, the smallest classification including firms whose total assets are less than \$250,000. The under \$250,000 classification is applicable to almost all the SBA borrowers. When figures from the smallest class are not available, the next larger class is used. The appropriate industry and account data are punched into machine readable cards and the cards are read onto tape.

The study also makes use of the SBA primary data as a source of industry comparative figures. A composite table (Appendix II) showing averages for each SBA balance sheet and income statement account by year and SIC code is formed from all statements of borrowers not categorized by the SBA as losses. The composite table is formed specifically for this research and thus contains only those year-SIC combinations required for the test samples. A total of 44,612 statements were used to compile the table and the number of statements for each composite figure is listed in the right-hand column of the table.

Test Samples

The most desirable sample to test the hypotheses set forth previously is one encompassing all of the relevant variables and sufficiently large to make reliable statistical inferences. Unfortunately, from the large number of loans made by the SBA and an apparently vast amount of information regarding the borrowers, only 42 cases are available for study which meet the following requirements:

1. Three consecutive annual statements are available prior to the final action date of the loan.
2. The financial statements are for the years 1958-1965.
3. Corresponding RMA composite statements exist.
4. Corresponding SBA composite statements can be calculated.
5. Statements report a non-zero amount for current assets and net sales.
6. There are an equal number of loss and good loan cases.

Reducing the first restriction to one statement prior to the final action date increases the number of available cases to 562.

If the sample is drawn on the basis of all of the above restrictions, all of the hypotheses can be tested but the sample size will be relatively small (although large enough to conduct statistical tests). If the sample is drawn with the less restrictive requirements, only the first two hypotheses can be tested but the sample size will be relatively large. Studying both samples incorporates the advantages of each and provides a check on the bias entered into the more restrictive

sample as a result of the additional screening. The more restrictive and smaller sample will be called the "tri-annual sample" and the less restrictive and larger sample will be denoted the "mono-annual sample." If the tri-annual sample produces a significantly different discriminant function than the mono-annual sample for the variables representing hypotheses 1 and 2, then bias has been introduced into the tri-annual sample by the additional screening. While the converse of this argument is not necessarily true, arriving at the same function for both the tri- and mono-annual samples would lend some evidence that the samples are similar and thus improve the generality of the conclusions drawn from the remaining hypotheses tested on the tri-annual sample.

The mono-annual and tri-annual samples contain 100% of the loss cases applicable to each and 15% and 19%, respectively, of the non-loss mono-annual and tri-annual loans. The non-loss loans are selected randomly from cases meeting the restrictions. Given the restrictions above, this procedure provides a maximum sample size.

Description of Data in Samples

Some basic descriptive tools are employed to describe the sample. The objectives of the description are to designate the population outside of the SBA for which the results are applicable and to determine how closely the data conform to the assumptions made in the statistical analysis. The characteristics of both the mono- and tri-annual samples will be described.

The description will include a listing of two-digit SIC codes indicating the frequency of each industrial classification in the sample as a percentage of the total sample. Similarly, a listing of the statement years and frequencies of statements included in the sample will be prepared.

The Discriminant Model

The statistical problem in this research is one of classifying an individual borrower as a member of one of two classes, success or failure, based upon a number of ratio variables. Multiple discriminant analysis is a method for forming a linear model which can be used to classify individual cases based upon observed characteristics and will be used in this study as the primary statistical technique. Multiple discriminant analysis (MDA) will first be described geometrically, then mathematically, and finally computationally.

The geometric interpretation of MDA can best be depicted for the case of two variates and, as in this study, two groups. The bivariate plot for groups I and II is shown in Figure 1, The two variables X and Y are slightly positively correlated, as illustrated. For each group, the locus of points of equal density are indicated by an ellipse called a centour (centile contour).

A straight line is defined by the two points where the centours intersect. If a second line Z is constructed perpendicular to line A, and if the points in the X-Y space are projected onto Z, the overlap between the two distributions will be the

smallest of any line. The individual characteristics are transformed by the discriminant function into a single discriminant score $\bar{Z}$ located on Z . A point such as point b divides the one-dimensional space into two regions, each having a probability of membership in I or II.¹²

A more rigorous explanation of discriminant analysis will be presented now. The objective is still to minimize the probability of a misclassification where the classification of an observation depends on the vector of measurements $x' = (x_1, \dots, x_p)$ where p is the number of classifications variables. A rule is set up such that if the case is characterized by certain sets of values $x_1, \dots, x_p$, it will be classified π_2 .¹³

Given a sample $x_1^{(1)}, \dots, x_{N1}^{(1)}$ from $N(\mu^{(1)}, \Sigma)$ and a sample $x_1^{(2)}, \dots, x_{N2}^{(2)}$ from $(\mu^{(2)}, \Sigma)$, where Σ is the matrix of variances and covariances of each population, it is desired to classify observation x as coming from π_1 or π_2 . Begin with the following equation of the distribution of x : (ith density)

$$(1) \ p_i(x) = \frac{1}{(2\pi)^{1/2p} |\Sigma|^{1/2}} \exp[-1/2(x - \mu^{(i)})' \Sigma^{-1}(x - \mu^{(i)})]$$

¹²William W. Cooley and Paul R. Lohnes, Multivariate Procedures for the Behavioral Sciences (New York: John Wiley & Sons, Inc., 1962), pp. 116-17.

¹³T. W. Anderson, An Introduction to Multivariate Statistical Analysis (N.Y.: John Wiley & Sons, Inc., 1958), p. 127.

Figure 1
Bivariate Plot of Two Groups

The ratio of the densities is

$$\begin{aligned} \frac{p_1(x)}{p_2(x)} &= \frac{\exp[-1/2 (x-\mu^{(1)})' \Sigma^{-1} (x-\mu^{(1)})]}{\exp[-1/2 (x-\mu^{(2)})' \Sigma^{-1} (x-\mu^{(2)})]} \\ (2) \quad &= \exp -1/2 [(x-\mu^{(1)})' \Sigma^{-1} (x-\mu^{(1)}) - (x-\mu^{(2)})' \Sigma^{-1} (x-\mu^{(2)})] \end{aligned}$$

The region of classification (R_1) is the set of x 's for which (2) is $\geq k$ (for K suitably chosen). Since the logarithmic function is monotonic increasing, the inequality can be written as the logarithm of (2) as

$$(3) \quad -1/2 (x-\mu^{(1)})' \Sigma^{-1} (x-\mu^{(1)}) - (x-\mu^{(2)})' \Sigma^{-1} (x-\mu^{(2)}) \geq \log k$$

The left hand side of k can be expanded as

$$(4) \quad -1/2 [x' \Sigma^{-1} x - x' \Sigma^{-1} \mu^{(1)} - \mu^{(1)'} \Sigma^{-1} x + \mu^{(1)'} \Sigma^{-1} \mu^{(1)} - x' \Sigma^{-1} x + x' \Sigma^{-1} \mu^{(2)} + \mu^{(2)'} \Sigma^{-1} x - \mu^{(2)'} \Sigma^{-1} \mu^{(2)}]$$

By rearrangement of terms, the following is obtained:

$$(5) \quad x' \Sigma^{-1} (\mu^{(1)} - \mu^{(2)}) - 1/2 (\mu^{(1)} - \mu^{(2)})' \Sigma^{-1} (\mu^{(1)} - \mu^{(2)})$$

The first term is a linear function of the components of the observation vector and is the discriminant function.¹⁴

Clearly, the best estimate of $\mu^{(1)}$ is (6) $\bar{x}^{(1)} = \sum_{i=1}^{N_1} x_i^{(1)} / N_1$
and $\mu^{(2)}$ is (7) $\bar{x}^{(2)} = \sum_{i=1}^{N_2} x_i^{(2)} / N_2$

and of Σ is S defined by

¹⁴ Ibid., pp. 133-137.

$$(8) \quad (N_1 + N_2 - 2)S = \sum_{i=1}^{N_1} (x_i^{(1)} - \bar{x}^{(1)})(x_i^{(1)} - \bar{x}^{(1)}) + \sum_{i=1}^{N_2} (x_i^{(2)} - \bar{x}^{(2)})(x_i^{(2)} - \bar{x}^{(2)}),$$

The estimated values are used in the present study since population values are not known. The estimator for the discriminant function then appears as follows:¹⁵

$$(9) \quad x'S^{-1}(\bar{x}^{(1)} - \bar{x}^{(2)}) - 1/2(\bar{x}^{(1)} + \bar{x}^{(2)})'S^{-1}(\bar{x}^{(1)} - \bar{x}^{(2)}),$$

The first term of (9) is the discriminant function based on two samples and was first suggested by Fisher in 1936. It is a linear function that has greatest "variance between samples" relative to the "variance within samples."¹⁶

Assumptions of Multiple Discriminant Analysis

The assumptions underlying MDA are summarized below while a discussion of the important violations of the assumptions is contained in Chapter V.

1. The model is linear.
2. The vectors of the discriminant variables are a linearly independent set.
3. The error term u is a random variable.
4. The joint distribution of the u_t is the same for every group from 1 to G .

¹⁴Ibid., pp. 133-37.

¹⁵Ibid., p. 137.

¹⁶R. A. Fisher, "The Use of Multiple Measurements in Taxonomic Problems" Annals of Eugenics, No. 7 (September, 1936), pp. 179-188.

5. The joint distribution of the u 's is normal.
6. The matrix M_{zz} of moments of discriminant variables about zero is well behaved in the limit. This assumption primarily requires that the time series of the exogenous variables (which are conceptually held fixed in repeated samples, and on which all inferences are conditional) be such that $1/T$ times the matrix of their moments should have a nonstochastic limit as the sample size grows without limit.

The two-group case of MDA has the unique and very useful characteristic of being proportional to the regression model when the regression dependent variable is given the dichotomous values of 0 and 1. Anderson shows that the relationship between the discriminant coefficients and the regression coefficients is proportional to the variance-covariance matrix.¹⁷ This result is intuitively reasonable because the discriminant estimator converts the variables to standard normal deviates.

Computer programs for regression analysis are better than programs for MDA in terms of their processing time, number of variables, and options at The Ohio State University. Computations of the discriminant functions are made using a stepwise regression program (OSU/Human Resource Research Center). Data processing is performed on an IBM 360-75 computer through the facilities of The Ohio State University Data Center.

¹⁷ Anderson, Multivariate Statistical Analysis, pp. 140-41.

Selection of Variables

The regression program employed in this study is limited to 99 variables and hence cannot process all hypothesized variables simultaneously. The variables are grouped, processed, and those found most significantly related to the dependent variable in the first run are separated for further processing. The initial groups are arranged with the twin and sometimes conflicting objectives of minimizing multicollinearity and maximizing the opportunity of each variable to enter the final equation. Each variable is eligible for two regressions in the first run.

Because variables in the first run are screened for further processing based on their individual significance and because it is desirable to draw conclusions regarding the individual variables in the final equation, a high degree of multicollinearity would present a formidable problem. With highly intercorrelated variables none of the coefficients (b 's) may be significantly different from zero even though the R^2 is significant. Goldberger describes the manner in which this can happen:

Suppose a simple correlation on X_1 gives a high R^2 , and consider what will happen when a multiple regression is taken on x_1 and x_2 , where x_2 is virtually a constant multiple of x_1 . The R^2 cannot fall, of course, the standard errors will explode. The prevalence of multicollinearity is to be emphasized, as is the inherent obstacle it introduces; reliable estimates of the coefficients may not be made from the sample itself. The sample is poor in terms

of independent movement of the regressors, and one should not expect to obtain estimates of their independent effects from the samples.¹⁸

On the other hand, multicollinearity is not likely to decrease the value of the model as a forecaster as long as the relationships remain constant.

If forecasting is a primary objective, then inter-correlation of explanatory variables may not be too serious, provided that it may reasonably be expected to continue in the future.¹⁹

The existence of a high degree of multicollinearity was recognized by Altman who noted an interesting advantage.

When utilizing a comprehensive list of financial ratios in assessing a firm's bankruptcy potential there is reason to believe that some of the measurements will have a high degree of correlation or collinearity with each other. While this aspect necessitates careful selection of the predictive variables (ratio), it also has the advantage of yielding a model with a relatively small number of selected measurements which has the potential of conveying a great deal of information.²⁰

Highly correlated variables present options to the model builder and the practicing analyst. While observation of one of the correlated variables discloses a great portion of the information contained in all of them, selection of the observed variable depends as much upon availability of data as its

¹⁸ Arthur S. Goldberger, Econometric Theory (New York: John Wiley & Sons, Inc., 1964), p. 193.

¹⁹ J. Johnston, Econometric Methods (New York: McGraw-Hill Book Company, Inc., 1963), p. 207.

²⁰ Altman, "Financial Ratios and the Prediction of Bankruptcy," p. 592.

information content. Hence, some variables are selected for entry into the final function while other almost equally significant predictors are left out.

Variables which appear to be significant predictors but which are not included in the final equation due to multicollinearity are reported with their simple correlation coefficients with the dependent variable.

The formation of each function is summarized by the following sequence.

1. The variable with the highest F-ratio when entered into the function is the first accepted.
2. The variable with the highest F-ratio when entered into the function with previously entered variables is allowed to enter if its simple correlation coefficient with any other variable already in the function is not significant at the .95 level of confidence and its F ratio is significant at the .99 level of confidence.
3. A variable is dropped from consideration or removed from the equation if its diagonal element in the variance-covariance matrix approaches zero. Such an occurrence indicates that the variable is a linear combination of other independent variables and violates the requirement that the variance-covariance matrix be of full rank.

Validation of Discriminant Models

Sample estimates of a model's predictive power are likely to be subject to a strong bias. The proportion of observations

correctly classified in the discriminant analysis can be thought of as being due to three factors: (1) true differences between the groups, (2) sampling errors, and (3) intensive search for the variables that work best for the sample. This third factor could possibly cause an upward bias in the level of prediction. The objective of a validation procedure sample is to determine what part of the observed proportion of correctly classified observations is due to the true differences between the two means of the groups.

Frank, Massy, and Morrison describe two validation procedures for determining an unbiased estimate of the predictive power of a multiple discriminant function.²¹ The split, sometimes called "hold-out", sample approach (V_1) is recommended by them as the preferred method when a large sample is available. The present study has a large number of observations available for the mono-annual sample and will follow the split sample approach as outlined by Frank, et. al.

1. From the original sample of observations, one-half of the observations taken at random are withheld to be used as a validation sub-sample.

2. The coefficients of the discriminate function and a classification table are generated from the remaining observations (analysis sample) of the original sample.

²¹Ronald E. Frank, William R. Massy, and Donald G. Morrison, "Bias in Multiple Discriminant Analysis," Journal of Marketing Research II (August, 1965), pp. 250-258.

3. Using coefficients generated in 2 above, predictions of group membership are made for each member of the validation sample.

4. The resulting classification table is no longer affected by the problems of either intensive search or the sampling errors discussed in the previous paragraph and, therefore, binomial distribution theory can be used as a basis for the following t test:

$$t = \frac{Q-P}{\sigma_p}$$

where

Q is the proportion of sample observation correctly classified by the discriminant analysis,

P is the proportion one expects by chance (in this case, $P=.5$),

σ_p is $\frac{P(1-P)}{n-1}$

The hypothesis that the discriminant function does not discriminate between the populations will be rejected if the t score is significantly different from zero at the .01 level of confidence.

The tri-annual sample contains only 42 observations. The arguments in favor of using the simulated sample approach (V_2) are now greater than those in favor of using the more generally preferred split sample approach. If the split sample approach were used, the analysis sample would be likely to have as few as twelve degrees of freedom (assuming the discriminant function contains eight variables). A large type II error is likely to occur when the tri-annual and mono-annual samples are compared and when tests of significance are performed on the individual

variables of the tri-annual sample. Thus the incorrect conclusions that the two samples are dissimilar and that certain variables are not predictors of failure might be drawn, lessening the value of the results drawn from the additional information available in the tri-annual sample over the mono-annual sample. The primary argument in favor of the split sample approach, accurate measure of the true predictive power of the discriminant function, is further weakened by the existence of 173 variables eligible to enter both the tri-annual and mono-annual functions. It is expected that the final tri-annual function will contain a number of common variables, and therefore, the tri-annual function will be partially validated via the split sample validation of the mono-annual function.

The simulated sample approach (V_2) is generally based on the use of a synthetic validation sample. However, Frank, et. al suggest an alternative method using the original data and having the advantage of maintaining the variance-covariance matrix of the original analysis. The procedure follows this outline.

1. The coefficients of the discriminant function and a classification table are generated with the original sample.
2. The original data is "scrambled" by reassigning individuals to populations at random.
3. Discriminant coefficients are estimated from the scrambled data and the associated classification tables are generated and evaluated.

Since the method of reassigning observations to the two populations ensures that the expected discriminatory power of the analysis is zero, the discriminatory power given by the scrambled sample classification table can be interpreted as a measure of the bias associated with the given numbers of degrees of freedom.²²

Summary

From the five hypotheses stated in this chapter, quantitatively testable variables are suggested. The variables are tested for their ability to predict failure and success of a small business. Through a stepwise procedure each variable is given an opportunity to enter a multiple discriminant function being applied to Small Business Administration data. A function based upon one and a function based upon three years of data is formed and both functions are validated.

²²Ibid., pp. 254-255.

CHAPTER IV - RESULTS

Introduction

This chapter presents the results of the empirical investigation described in the previous chapter. For the purpose of testing each of the five hypotheses, the 728 variables discussed in Chapter III are divided into ten groups. The functions estimated for the ten groups are referred to as follows.

A. Applicable to mono- and tri-annual samples

1. Original
2. RMA relative
3. SBA relative

B. Applicable to tri-annual sample only

1. RMA relative trend
2. SBA relative trend
3. Original average
4. RMA relative average
5. SBA relative average
6. RMA combination
7. SBA combination
8. Comprehensive (all variables)

The RMA relative trend group includes the original trend variables as well as the RMA relatives.

Discriminant functions and other results for the ten groups are presented in the section "Tests of Hypotheses" under the headings Ratio Levels (A-1,2&3), Ratio Trends (B-1&2), Average Ratios (B-3,4&5), Ratio Combinations (B-6&7), and Comprehensive Function (B-8).

Section III provides an empirical description of the sample data and discusses the ancillary question of whether or not financial size is a predictor of failure. Important findings are reviewed briefly in Section IV - Summary.

Failure denotes a firm whose SBA loan was written off as a loss and success refers to a firm whose loan has not been classified as a loss by the SBA. When a borrower's financial ratio is divided by the corresponding industry ratio, the resulting ratio will be referred to as an SBA or RMA relative.

Ratio Levels Hypotheses

The level (numerical value) of each ratio was tested using both the mono- and tri-annual samples. For the mono-annual sample the overall discriminant ability was poor and only a few variables exhibited a significant relationship with failure. A function showing a high validated discriminant ability was not found.

The tri-annual sample produced similar results for one year level variables. Functions based upon the original ratios and their quartiles were not significantly different from the respective synthetic validation functions in ability to discriminate between loss and non-loss loans. This leads the author

to accept Null Hypotheses 1 and 2. The levels and industry relationships of the ratios listed in Appendix III for one year are not predictors of financial failure for small businesses. A summary of the original, RMA, and SBA functions for the tri-annual sample is provided in Table 8. Discriminant functions for the mono-annual sample all showed a discriminant ability of less than 57% on the validation sample.

In addition to the estimation of discriminant functions, simple correlation coefficients between the level variables and failure-success were calculated. Although few of the coefficients are significantly different from zero at the .99 level, the results are generally consistent with one another. Table 9 shows the simple correlation coefficient for variables significant at the .95 level of confidence and the following discussion is based upon results shown in that table.

The research conflicts with some common tenets of ratio analysis by finding that some frequently used ratios are of little predictive value and that the relationships of some ratios to failure are opposite from expected. In other cases, the research affirms financial ratio analysts' beliefs. For the purpose of this discussion, ratio tenets are implied from the selection of ratios and quartile sizes made by Dun & Bradstreet and the Robert Morris Associates. Dun & Bradstreet computes fourteen ratios and arranged the quartiles "so that the best figure is at the top, the weakest at the bottom".¹

¹Key Business Ratios in 125 lines - 1964 (New York: Dunn and Bradstreet, Inc., 1966).

Table 8
Summary of Original, RMA, and SBA
Functions Derived from the Tri-Annual Sample

	Number of Variables	Original Sample Discrimi- nation	Synthetic Sample #1 Discrimi- nation	Synthetic Sample #2 Discrimi- nation	Synthetic Sample #3 Discrimi- nation
Original Ratios	5	76%	73%	63%	63%
Original Ratios/RMA Ratios	5	74%	64%	31%	64%
Original Ratios/SBA Ratios	5	75%	64%	69%	60%

Likewise, the Robert Morris Associates calculates eleven ratios of which six are equivalent to D & B in computation and "best" quartile classification.² Since these tenets are held by credit related organizations, it is assumed that their tenets relate to risk of failure rather than some other objective such as profitability.

As credit analysts might expect, a small cash flow/current liabilities ratio was associated with failure. Slow working capital turnovers were also related to failing firms whereas a large sales margin was associated with successful firms. Among the RMA relatives, inventory/net working capital in the third quartile, sales margin, sales margin in the third quartile, earnings before taxes/total assets in the third quartile, and cash flow/total debt were all positively related to success. On the other hand, current assets/current liabilities, inventory/net working capital in the first quartile, and net working capital/total assets in the first quartile, and net working capital/sales in the first quartile, were inversely related to success.

Among the SBA relatives only the net working capital/total assets ratio in the first quartile showed the expected negative-sign. Unexpectedly, the quick ratio in the third quartile, current assets/current liabilities, and current assets/total debt were inversely related to success. These results again lead to the surprising implication that SBA borrowers

²The Robert Morris Associates Annual Statement Studies, Philadelphia; Robert Morris Associates, 1969.

Table 9

Level Ratio Simple Correlation
Coefficients Significant at .95

<u>Original Ratios</u>	<u>Mono-Annual Sample</u>	<u>Tri-Annual Sample</u>
Inventory/Net Working Capital		.35*
Inventory/Net Working Capital-1st Quartile		-.36
Inventory/Net Working Capital-3rd Quartile	.13	.35
Cash Flow/Current Liabilities-1st Quartile		-.35
Net Working Capital/Sales-3rd Quartile	-.15	
Sales Margin-3rd Quartile		.33
<u>RMA Relative Ratios</u>		
Current Assets/Current Liabilities	-.14	
Inventory/Net Working Capital-1st Quartile		-.36
Inventory/Net Working Capital-3rd Quartile	.17	
Net Working Capital/Total Assets-1st Quartile		-.36
Net Working Capital/Sales-1st Quartile		-.36
Current Assets/Total Debt	-.18	
Current Assets/Total Debt-1st Quartile	-.15	
Net Working Capital/Sales-1st Quartile		-.36
Sales Margin		.32
Sales Margin-3rd Quartile		.39
EBT/Total Assets-3rd Quartile		.33
Cash Flow/Total Debt	.13	
<u>SBA Relative Ratios</u>		
Quick Ratio-3rd Quartile	-.13	
Current Assets/Current Liabilities	-.17	
Current Assets/Current Liabilities-3rd Quartile	-.17	
Net Working Capital/Total Assets-1st Quartile	-.16	
Current Assets/Total Debt	-.14	
Current Assets/Total Debt-3rd Quartile	-.23	
Inventory/Sales	-.15	.39

*Positive and negative coefficients are directly and inversely related, respectively, to the success of the borrower.

with relatively fewer and less liquid current assets coverage of their debts are less likely to fail than their relatively liquid and debt free counterparts.

The sign of the inventory/sales ratio correlation coefficient was negative for the mono-annual samples and positive for the tri-annual sample. Of the level ratios, this is the only inconsistency between the samples and conclusions regarding this ratio are not drawn.

One finding inconsistent with ratio tenets is the inverse relationship of the inventory/net working capital ratio with failure. Simple correlation coefficients are significant at the .95 level for mono- and tri-annual samples. Furthermore, a decreasing trend of this ratio or its RMA relative is directly related to failure. Only a tentative rationale for this occurrence will be presented here because many factors enter into the determination of this ratio. It appears desirable to maintain a relatively large stock of goods while providing for working capital needs primarily from short term sources. While this is a characteristic of illiquidity, it also represents a business which is able to gain maximum support from its trade creditors to stock its shelves. In the long run, short run liquidity may lead to inefficient operations and failure.

Other inconsistencies are noted among some SBA relatives. SBA relatives for the quick, current assets/current liabilities, and current assets/total debt ratios are inversely related to success. These results again lead to the surprising implications that SBA borrowers with relatively fewer and less liquid current

assets coverage of their debts are less likely to fail than their relatively liquid and debt free counterparts.

Ratio Trend Hypotheses

A discriminant function composed of eight original and RMA adjusted ratio trend variables showed a 90% discriminant ability for the analysis sample. Three synthetic validation samples were designed and the model tested for intercorrelation as described in the previous chapter. Functions estimated for the validation samples produced discriminate accuracies of 53%, 63%, and 73%. The accuracy of the analysis function was compared with the mean accuracy of the validation functions and found to be significantly different at the .99 level of confidence. Also, only one of the validation models fell outside the .95 confidence limit for accepting the hypothesis that the function does not discriminate. The author rejects the hypothesis that the RMA trend function's discriminatory power is due to highly intercorrelated independent variables. Alternate hypothesis 3 is accepted and the author concludes that the trend of the ratios used in the RMA trend function are predictors of financial failure for small businesses (See Table 10).

An attempt was made to estimate an equation based upon the trend of SBA adjusted ratios. The optimum function discriminated with 71% accuracy and the validation functions discriminated with 53%, 54%, and 55% accuracy. The SBA trend function discriminated better than the average validation function only at the .95 level of confidence and was substantially less powerful than the RMA function.

Table 10

Discriminant Function for
Original and RMA Trend Variables

Variable	Coefficient	t-value
Constant	.798	6.82
Quick Ratio - trend down	-.347 ^a	-2.47*
Quick Ratio/RMA - trend up	-.808	-4.68**
Inventory/Net Working Capital - trend down	-.179	-1.23
Current Assets/Total Debt/RMA - trend down	-.342	-1.92*
Current Liabilities/Equity - trend up	-.175	-1.34
Total Assets/Sales/RMA - trend down	.369	2.60**
EBT/Equity/RMA - trend up	.308	1.67
Fixed Assets/Equity - trend down	-.292	-2.17**

a With the exception of the constant, positive and negative signs on the coefficients directly relate to success and failure, respectively.

* Significant at .95 level.

** Significant at .99 level.

Based upon simple correlation analysis individual trend variables of particular significance (.95) as forecasters of failure are:

- (1) Fixed Assets/Sales ratio increasing
- (2) Total Assets/Sales ratio remaining the same or increasing
- (3) Cash Flow/Total Debt ratio decreasing
- (4) Quick ratio increasing

The most significant of these is the quick ratio ($r = -.43$), a result which is consistent with that of the level analysis but contrary to the belief of many practicing analysts. Again, the belief that liquidity coincides with credit quality is challenged, at least for term loans.

Average Ratio Hypotheses

Discriminant functions based upon three-year average ratios out-performed corresponding functions based upon only the most recent ratios. Additional tests showed that this occurred even though discriminant ability decreased sharply as the period lengthened between the statement date and loan final action date. The RMA average ratio function was a better discriminator than either the original or SBA average ratio functions. The ten variable RMA average function, largest of those identified as significant, discriminated 88% of the time compared to validation functions with a mean discriminant ability of 70% (65%, 72%, and 74%). The null hypotheses H-4 is rejected with 99% confidence and the alternate hypothesis that the three-year average of the ratios included in the RMA average function is a predictor of financial failure for small business is accepted.

Two of the validation functions showed a discriminant ability significantly (.95) different from that expected, indicating a high degree of intercorrelation among the independent variables. Therefore, the discriminate ability of the function is probably somewhat overstated and the function coefficients may be biased. The discriminant function for RMA average variables is presented in Table 11.

Only two of the 171 average ratio variables had a significant (.95) simple correlation with failure. The Fixed Assets/Sales ratio (divided by RMA ratio) was positively related to failure indicating that an asset turnover slower than its industry forecasts failure. On the other hand, a relatively high Inventory/Sales ratio (divided by SBA ratio) was negatively related to failure. None of the original average variables were significantly (.95) related to failure.

Ratio Combination Hypotheses

Ratio combinations were analyzed to determine the value of viewing ratios jointly for failure prediction purposes. Optimum RMA and SBA functions correctly discriminated 88% and 83%, respectively, on the analysis sample with eight variables in each function. Compared with the respective validation functions, the RMA function was significantly different at the .99 level of confidence and the SBA function was significantly different at the .95 level of confidence. The RMA function compared favorably with other discriminant functions developed in this study and is presented in Table 12. Rejecting Null Hypothesis 5, the alternate hypothesis that the ratios employed in the RMA combination function are predictors of failure is accepted.

Table 11
Discriminant Function for
RMA Average Variables

Constant	.506	2.71*
Quick Ratio/RMA	.258	2.09*
Inventory/Net Working Capital/RMA	.239	1.50
3rd Quartile		
Fixed Assets/Equity/RMA 1st Quartile	-.585	-2.21*
Current Liabilities/Equity/RMA	.217	2.67*
Current Liabilities/Equity/RMA 1st Quartile	.883	2.69*
Inventory/Sales/RMA 1st Quartile	-.697	-3.40**
Fixed Assets/Sales/RMA	-.357	- .99
Net Working Capital/Sales/RMA	.787	1.70
EBT/Total Assets/RMA	.676	2.31*
EBT/Equity/RMA	.087	2.03*

* Significant at 95% level of confidence

** Significant at 99% level of confidence

Some ratio combination variables showed an individual relationship with failure. Loss was significantly correlated (.95) with an Inventory/Net Working Capital ratio (divided by RMA ratio) declining over three years to the first quartile level. On the other hand, non-loss firms were associated with an EBT/Total Assets ratio (divided by RMA ratio) increasing to the third quartile level.

Comprehensive Function

A comprehensive function composed of the "best" variables was developed and tested for the mono- and tri-annual samples. The mono-annual best function was limited to the original, RMA, and SBA level ratios and a significant comprehensive function was not found. However, the tri-annual comprehensive function proved to be an excellent discriminator of failure. Better than any other function, the tri-annual comprehensive equation with seven variables produced a discriminate ability of 92% against a mean ability of 68% for the synthetic validation functions. The analysis function was significantly different from the validation function at the .99 level of confidence. Table 13 shows the comprehensive function for the tri-annual sample.

The signs of all except one of the coefficients were negative and the constant term was highly significant. This occurrence substantially reduces the complexity of interpretation and, as all of the variables are dummies, a matrix defining failure conditions (Table 14) has been constructed. The table

Table 12

Discriminant Function for the
RMA Combination Variables

Variable	Coefficient	t-value
Constant	.735	9.58**
Quick Ratio 3rd Quartile - trend up ^a	-.735	-3.25**
Inventory/Net Working Capital 1st Quartile - trend up	-.602	-2.97**
Inventory/Net Working Capital 3rd Quartile - trend down	-.735	-2.70**
Debt/Equity 1st Quartile - trend down	-.535	-2.33*
Equity and Long Term Debt/Fixed Assets 1st Quartile - trend down	-.735	-1.95
Inventory/Sales 1st Quartile - trend up	-.525	-2.31*
Total Assets/Sales 1st Quartile - trend up	-.735	-1.95
EBT/Total Assets 3rd Quartile - trend up	.400	2.02*

^a Although not shown, all ratios were divided by their respective RMA ratio.

* Significant at 95% level of confidence.

** Significant at 99% level of confidence.

specifies only the necessary and sufficient conditions for failure derived from the comprehensive functions using the rule that a z score of less than .5000 predicts failure. Additional combinations are possible but would include those combinations designated in the table. The table is read vertically and each of the fifteen columns is a separate combination.

Table 13

Comprehensive Discriminant Function for the Tri-Annual Sample

Variable	Coefficient	t-value
Constant	.951	13.17**
Quick ratio/RMA - trend up	-.924	-7.11**
Quick ratio/RMA - 1st Quartile & trend up	0.352	-1.67
Cash Flow/Current Liabilities - 1st Quartile	0.423	-4.24**
Current Liabilities/Equity/SBA, Average- 1st Quartile	.277	2.61*
Inventory/Sales/RMA - 1st Quartile & trend up	-.452	-2.60*
Net Working Capital/Sales/RMA - 1st Quartile	-.482	-4.51**
Equity/Sales - 1st Quartile	-.293	-2.82**

* Singificant at .95 level.

** Significant at .99 level.

Table 14

Necessary and Sufficient
Failure Combinations Derived
from Comprehensive Function

	Combination Number														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Quick ratio/RMA - trend up	X									X					
Quick ratio/RMA - 1st Quartile & trend up		X	X	X							X	X			
Cash Flow/Current Liabilities - 1st Quartile	X				X	X					X		X		
Inventory/Sales/RMA - 1st Quartile & trend up		X			X		X	X						X	
Net Working Capital/Sales/RMA - 1st Quartile			X			X	X		X						X
Equity/Sales - 1st Quartile								X	X			X	X		
Current Liabilities/Equity/SBA Average - 1st Quartile	X	X	X	X	X	X	X	X	X						
Current Liabilities/Equity/SBA Average - 3rd Quartile										X	X	X	X	X	X

Ancillary Analyses

This section contains descriptions of the raw data, analyses of business size and tests of the major assumptions of discriminant analysis. Tables 15 and 16 contain means for borrowers' statement accounts by type of sub-sample and loan outcome classification. While the average borrower in the tri-annual sample had net sales of \$407,000 and total assets of \$164,000, both of these size measures ranged widely. Tests of difference between the means of failing and successful firms indicated that the successful firms, on the average, had greater current assets, inventories, current liabilities, equity, total assets, and net sales than the failing firms.

To test the hypothesis that failure is a function of business size, a step-wise procedure similar to that applied to the ratio data was run on the accounts shown in Table 14. A two variable model (current assets and profits before taxes) emerged with both account sizes being negatively related with failure. The model proved correct 64% of the time (significant at the .99 level of confidence) when tested on the validation sample. However, the failure and success z distributions overlapped substantially and the overall performance of the size function was substantially less than that of the four ratio models discussed earlier. Within the range of firms studied, the author does not believe that size is a highly important factor relating to failure and hence, the ability of ratios to predict failure is independent of borrower size. At least, a strong argument cannot be made that a ratio predicts well simply because it contains a certain account.

Table 17 reports the frequency of statements by year for both samples. The distribution reflects to a large extent data collection efforts of the SBA over the 1958-1966 time period. Most of the statements used in the study were collected after an intensive drive to develop the data bank begun in 1960.

Table 15

Comparison of Statement Account
Means for Failing and Successful Firms
in the Mono-Annual Samples
(Amount in \$000)

Statement Account	ANALYSIS SAMPLE			VALIDATION SAMPLE		
	Means		Differ- ence	Means		Differ- ence
	Failing	Success- ful		Failing	Success- ful	
Current Assets	32.57	70.79	38.13**	48.37	114.87	66.50*
Current Liabil- ities	26.94	43.19	16.25*	36.45	81.03	44.58**
Inventory	19.61	34.01	14.40*	30.47	62.99	32.52**
Other Assets	29.14	65.87	26.73	38.37	68.57	30.30*
Other Liabil- ities	13.66	40.63	26.97	23.52	41.80	18.28
Net Sales	143.27	293.36	149.09**	186.45	427.79	241.34**
Profit	2.78	6.94	3.71*	.63	1.38	.75
Total Assets	71.71	136.57	64.86*	86.74	183.44	96.70**
Equity	31.11	52.76	21.65*	26.77	60.61	33.84**

* Significantly different at .95 level.

** Significantly different at .99 level.

Table 16

Comparison of Statement Account
Means for Failing and Successful Firms
in the Tri-Annual Sample ^a
(Amounts in \$000)

Statement Account	Means		Differ- ence
	Failing	Successful	
Current Assets	54.05	111.77	57.72
Current Liabilities	54.00	85.59	31.59
Inventory	23.40	60.77	37.37*
Other Assets	62.60	101.45	38.95
Other Liabilities	21.45	37.41	15.96
Net Sales	399.10	415.82	15.72
Profit	12.50	16.77	14.27*
Total Assets	116.65	213.23	96.58
Equity	41.20	90.23	49.03

^aStatement prepared within one year prior to final action date of loan.

* Significantly different at .95 level.

Function Size and Discriminant Ability

The four significant functions range from seven to ten variables in size but greater size did not appear to lead to greater discriminant power. On the contrary, scattergrams of size and discriminant ability and net discriminant ability shown in Figure 2 imply that a negative relationship exists between discriminant ability and function size. This result was similar to previous studies which have generally concluded that a small number of variables are nearly as powerful as a large number and are less likely to be intercorrelated.

Composition by Industry

The majority of borrowers studied were classified by the SBA as engaged in wholesale and retail trade. The sample may be broken down into manufacturing, wholesaling and retailing, and other with corresponding mono-annual percentages of 22%, 76%, and 2%; and corresponding tri-annual percentages of 31%, 64%, and 5%.

RMA data were not available for several major industries including contract construction; transportation, communication, electric, gas and sanitary services; as well as some other service industries. SBA loans to borrowers in industries not covered by RMA Statement Studies were not included in this research. Table 18 presents a listing of two digit SIC codes and frequencies for each sample.

Figure 2

Scattergram of Function Size and Discriminant Ability

Figure 3

Scattergram of Function Size and Net Discriminant Ability

Table 17

Frequency of Statements by Year for
the Mono- and Tri-Annual Samples

Balance Sheet Year	Mono-Annual Sample	Tri-Annual Sample*
1958	1	
1959	9	
1960	19	3
1961	72	7
1962	78	6
1963	54	10
1964	165	16
1965	145	
1966	19	

* Only the most recent of the three statements is given here.

Table 18

Listing of Two Digit SIC Code Frequencies
For the Mono- and Tri-Annual Samples

	SIC Code	Mono- Annual Frequency	Sample Z Total	Tri- Annual Frequency	Sample Z Total
Food and kindred products	20	27	4.8Z	3	7.1Z
Textile mill products	22	4	0.7		
Apparel and other finished fabric products	23	2	0.4		
Lumber and wood products except furniture	24	20	3.6	2	4.8
Furniture and fixtures	25	7	1.2	1	2.4
Paper and allied products	26	2	0.4		
Printing, publishing, and allied products	27	14	2.5	1	2.4
Chemical and allied products	28	5	0.9		
Rubber and miscellaneous plastic products	30	3	0.5	1	2.4
Leather and leather products	31	5	0.9		
Stone, clay, glass and concrete products	32	5	0.9	1	2.4
Primary metal industries	33	4	0.7	1	2.4
Fabricated metal products except 19,35,37	34	7	1.2	1	2.4
Machinery, except electrical	35	5	0.9	1	2.4
Electrical machinery, equipment and supplies	36	7	1.2	1	2.4
Transportation equipment	37	1	0.2		
Miscellaneous manufacturing industries	39	6	1.0	1	2.4
Wholesale trade	50	81	14.4	9	21.4
Bldg. materials, hardware, and farm equip. dealers	52	39	6.9	3	7.1
Retail trade of general merchandise	53	26	4.6		
Food stores	54	46	8.2	3	7.1
Automotive dealers and gasoline service stations	55	60	10.7	4	9.5
Apparel and accessory stores	56	33	5.9	1	2.4
Furniture, home furnishings and equip. stores	57	58	10.3	5	11.9
Eating and drinking places	58	34	6.4		
Miscellaneous retail stores	59	50	8.9	1	2.4
Insurance agents, brokers, and service	64	1	0.2		
Hotels, rooming houses, camps and other lodgings	70	1	0.2		
Personal services	72	9	1.6	2	4.8

Tests of Major Assumptions MDA

The assumption that the population Z scores have equal and normal distributions was tested by collecting the z scores ($\hat{y}$'s) into a frequency distribution for each sample group and then graphing the distributions. Corresponding graphs of failing and successful firms were examined to determine if they appeared to be normally distributed (bell shaped) and equal. The frequency distribution graphs are shown in Figures 4 through 11.

The trend function produced the most normal and homoscedastic results whereas the RMA combination function produced the least satisfactory results. The RMA combination function graph for failures showed four peaks and a relatively flat frequency distribution over the range of value. On the other hand, the RMA combination function graph for non-losses was leptokurtic within a narrow range. The occurrence of peaks and zero observation classes is due in part to the large proportion of dummy variables included in the functions, particularly the trend and RMA combination functions which consist entirely of variables whose value is either 0 or 1. Only a relatively small number of z scores are possible when dummy variables are employed, increasing the chances for observations to cluster.

The author believes that the RMA combination function values may indicate a violation of the underlying assumptions of discriminant analysis whereas the values of the other three selected functions appear reasonably consistent with the assumptions. Violations of the normality assumption may affect the results

Fig. 4--Graph of frequency distribution for failures-RMA combination function

Fig. 5--Graph of frequency distribution for successes-RMA combination function

Fig. 6--Graph of frequency distribution for failures-RMA three year average function

Fig. 7--Graph of frequency distribution for successes-RMA three year average function

Fig. 8--Graph of frequency distribution for failures-trend function

Fig. 9--Graph of frequency distribution for successes-trend function

Fig. 10--Graph of frequency distribution for failures-comprehensive function

Fig. 11--Graph of frequency distribution for successes-comprehensive function

in several ways. First, the selection of variables and determination of coefficient estimates may have been altered. Second, tests of differences between the means using sample variances are inappropriate. Third, tests of hypotheses for given z values using the sample variances are inappropriate. This research neither bases its estimate of the discriminatory power upon sample variances nor tests hypotheses regarding z scores and thus the second and third effects are avoided. However, erroneous selection of variables or inaccurate estimation of the coefficients is possible. The effects cannot be specified and an alternative method of analysis is not available.

The author accepts the RMA combination function on the basis that its high discriminatory power indicates that it is highly likely that these variables are the most discriminating group. Furthermore, some variation in the coefficient values will probably not affect the discriminating power of the functions since the effects deriving from changes in the variable conditions are expected to be far greater than effects of changes in the coefficient values. Only those cases having a z value close to the cut-off point are likely to be affected by changes in the parameter values and the RMA combination function produced only one z score close to the 0.5 cut-off point.

Summary

Four functions were found to be particularly good predictors of failure. First, an eight variable model based upon the trend of the original and RMA adjusted ratios showed a 90% discriminant

ability. Second, an 88% discrimination was obtained with combinations of RMA relative ratio levels and trends. Third, the three-year average of RMA relative ratios produced an equation with a discriminant accuracy of 88%. Fourth, a seven variable "best" equation composed of various ratios performed with a 92% level of accuracy. Discriminant ability figures given here are based upon the analysis sample and may overstate the accuracy of the models somewhat.

This chapter also described the sample data and reported the results of analyses designed to test the research methodology. In an effort to determine if the ratio model was a reflection borrower size, a model based solely upon borrower size was constructed and estimated. Although the failing firms tended to be smaller than the successful ones, a model of financial account size achieved only a 64% discriminant ability when applied to the validation sample. Since the ratio model provided results far superior to those of the size model, the ratio model was concluded to be independent of firm size. With respect to the multiple discriminant technique, an analysis of the data and predicted z scores revealed some exceptions to the assumptions of normality and equal variance-covariance matrices but generally supported the MDA assumptions.

CHAPTER V - CONCLUSIONS AND IMPLICATIONS

The results of the study are related to the major research objective in the first section of this chapter. Implications for the practicing ratio analyst are presented in summary form. This second section considers the selection of ratios and analytical methods, the cumulative nature of ratio analysis, alternative ratios and Z score decisions rules. Some overall conclusions are presented in the third section and comments and suggestions for future studies are offered in the fourth section.

The Research Objective Reviewed

The major objective of this research has been to determine whether or not financial ratios could be analyzed so as to predict the future success or failure of a small business. Toward this goal, the research yielded results which generally affirm the advocates' belief in the value of ratio analysis.

Evidence supporting the advocates' position is based upon functions concluded to be significant discriminators. In order of significance, the functions are:

1. Comprehensive function
2. RMA trend function
3. RMA combination function
4. RMA average function.

All of these functions were significantly better discriminators than their respective validation functions at the .99 level of confidence and none discriminated less than 88% on the analysis sample. Additional tests were performed to examine the assumptions of the methodology and technique and to provide additional information.

The major assumptions underlying the multiple discriminant technique were compared with the actual data. In tests of the normality and equal variance-covariance assumptions, the data were shown to be acceptable although not exemplary. Intercorrelation was successfully limited by the selection process employed in the stepwise technique as shown in tests on the synthetic validation sample. The three major assumptions of normality, homoscedacity, and independence appear to have been reasonably well accommodated in this study.

An analysis of the accounts underlying the ratios was performed to determine if failure prediction was dependent upon firm size rather than ratio relationships between assets, liabilities, and operating flows. As previously reported, a function with current assets and profit as the independent variables was found to be the best size function for the mono-annual sample. When this function was tested on the validation sample, it was shown to be a significant predictor of failure but its predictive ability (64%) was low relative to any of the four best functions (lowest being 88%). Account composition, in the author's opinion, is a much greater factor in the prediction of small business failure than absolute business size and profits.

Although the study demonstrates the positive value of ratio analysis, some results show the fruitlessness of specific ratios and types of analysis. Three of the nineteen ratios were not useful under any method of analysis and nine other ratios appeared only once among the 31 variables forming the four best equations (current, net working capital/total assets, and current liabilities/equity ratios). The SBA relative analysis failed to relate any ratio with future small business failure. Concluding that ratio analysis is useful should not be construed as meaning that all ratios and methods of analyzing ratios are useful in predicting failure. The selection of ratios and methods is discussed in the following section.

Choice of Ratios and Methods of Analysis

The author concludes that the predictive power of ratio analysis is dependent upon the choice of analytical methods as well as the selection of ratios. The method of analysis should be suited to the ratio being examined to obtain maximum discriminatory power. As a guide, methods of analysis found useful in this study are summarized as follows:

1. Classification of a borrower's ratio into the first or third quartile relative to other borrowers in the sample
2. Observation of an up or down trend for a three year period
3. Joint analysis of a ratio's trend and recent level
4. Calculation of the average ratio for a three year period
5. Division of a ratio by its respective RMA industry average ratio

Specific ratios and analysis employed in one or more of the four most discriminating functions are presented as a matrix in Table 19. Although the most frequently included ratio was the quick ratio and the most often used method was comparison of the borrowers and RMA average ratios, neither of these would be sufficient for an optimal discriminant model.

Table 19
MATRIX OF RATIOS AND METHODS
OF ANALYSIS FOR VARIABLES
INCLUDED IN THE FOUR MOST
DISCRIMINATING FUNCTIONS

Ratio	Method of Analysis									
	Level in 1st Quartile	1st Quartile Relative to RMA	Trend Up	Trend Down	Trend Up Relative to RMA	Trend Down Relative to RMA	Average Relative to RMA	Average 1st Quartile Relative to RMA	Average 3rd Quartile Relative to RMA	Average 1st Quartile Relative to SBA
Quick Ratio							+			
Inventory/Net Working Capital								+		
Current Assets/Total Debt										
Debt/Equity										
Fixed Assets/Equity										
Current Assets/Equity							+	+	+	
Equity + LT Debt/Fixed Assets										
Inventory/Sales										
Fixed Assets/Sales										
Total Assets/Sales							+			
Net Working Capital/Sales							+			
Equity/Sales										
EBT/Total Assets							+			+
EBT/Equity							+			
Cash Flow/Current Liabilities										
Cash Flow/Total Debt							+			

NOTE: Positive and negative signs show direct and inverse relationships, respectively to the success of the borrower.

Classification of a borrower's ratio by quartile was a valuable technique for two reasons. First, extreme values were nullified and therefore prevented from unduly affecting the discriminant function parameters. Second, combinations of level and trend could be defined and represented as conditional relationships. Continuous variables entered a function only when the ratios were averaged over a three-year period whereas quartile classified variables entered into all but the trend function.

Dividing a ratio by its respective RMA industry average was also shown to be a desirable technique. All four of the best functions employed industry averages for at least some of the variables. Because the SBA averages were constructed from the same population from which the sample was drawn, the author expected them to be more relevant and less subject to industry misclassification (RMA classes do not coincide exactly with the SIC used by the SBA). Unexpectedly, the RMA Statement Studies averages (Appendix I) were clearly superior to the especially constructed SBA composite averages (Appendix II). The RMA averages are concluded to be useful in the prediction of small business failure and the construction of a SBA average appears to offer no advantage.

Cumulative Power of Ratio Analysis

Results of this study indicate that the predictive power of ratios is cumulative. No single variable predicted failure nearly as well as a small group of variables and some which were not significant predictors themselves added discriminant ability to a function containing selected variables. However, when variables were added without consideration of independence, the discriminant power of the analysis function proved to be illusory when applied to the validation data. For the real discriminant power of the function to increase as variables were added, the variable had to explain a borrower characteristic previously ignored.

Only three of the eight variables in the trend function had significant simple correlation coefficients with failure. The remaining five variables added an estimated seven percentage points to the discriminant ability. Nine of the ten RMA average variables were singularly insignificant, and six of the eight RMA combination variables were not significant by themselves yet added 18 percentage points of discriminant power to the function. The first three variables entered in the comprehensive function were highly discriminant, yet the addition of four more variables added about 10 percentage points, bringing the entire function to a highly significant 92%.

Alternate Variables

Table 20 lists groups of variables found to be related to failure and also interrelated with a confidence level of .95. The first ratio in each group is the one selected for entry into

one of the four best functions.

The intercorrelated variables may be considered as substitutes for the included variable. However, substitution is expected to reduce predictive power because the step-wise MDA procedure selected variables having the greatest discriminant ability. Furthermore, any new functions should be validated to insure that the revision does not contain variables which are linearly dependent with one another.

Inclusion of more than one ratio from each group would be expected to increase computational effort without revealing a significant amount of additional information. Since the included and excluded variables in each group are highly correlated, they all contain almost the same information. Hence, the addition of excluded variables to a function should not increase its real discriminatory ability. The appearance of increased ability is likely to result, however, due to the interaction of the now linearly dependent variables. In tests with the mono-annual sample, the author observed that highly accurate discriminant functions could be estimated for the analysis sample when highly correlated variables were allowed to enter the same function. When these functions were applied to the validation sample, they consistently proved to be invalid and unreliable.

TABLE 20

Groups of Ratio Variables Having a High Simple Correlation with a Variable Included^a in One of the Four Best Functions

Group 1

Quick Ratio-trend up
Cash Flow/Total Debt-trend down

Group 2

Assets/Sales/RMA - trend down
Fixed Assets/Sales-trend down
Assets/Sales-trend down
Cash Flow/Total Debt-trend down
Fixed Assets/Equity/RMA-trend down

Group 3

Cash Flow/Current Liabilities-1st Quartile
EBT/Sales/RMA-3rd Quartile
Cash Flow/Total Debt/SBA-trend up

Group 4

Net Working Capital/Sales/RMA-1st Quartile
Inventory/Net Working Capital-1st Quartile
Total Assets/Sales/RMA-trend down
Cash Flow/Total Debt/SBA-trend up
Inventory/Net Working Capital/RMA-1st Quartile & trend down

^aFirst Variable listed

Z Score Decision Rules and SBA Credit Policy

The decision rule for discriminating between failure and success conditions may be altered so that the predictive accuracy of one condition may be improved. Consider failure as one condition and success as the other condition. The improvement in predicting one condition is usually obtained at the expense of a decrease in predictive accuracy for the other condition. The desirable accuracy is determined by the relative costs of error for the two conditions. Until now, it has been assumed that the costs of error have been approximately equal and the following decision rule has been employed: if the Z score (calculated $\bar{Y}$) is less than .5000, the firm will be a failure; otherwise the firm will be a success.

Listed below are Z scores for corner points from 100% prediction of failure to 100% prediction of success for the comprehensive function (applied to the analysis sample of 42 cases).

z-score	Predictive Accuracy for Failure	Predictive Accuracy for Success
up to .469	80%	100%
.470 to .519	85%	95%
.520 to .529	90%	95%
.530 and over	100%	86%

The small number of corner points is primarily due to the sample size and as sample size is increased, the number of corner points would increase to the number of values possible for the discriminant function. If the function contained one or more continuous variables, the z-score distribution would be continuous

in the limit as $N \rightarrow \infty$ and, assuming the distributions to be normal, they would resemble those in Figure 1 (shown in Chapter III).

The z-score cut-off should be selected so as to equate the probability of Type I and Type II errors with the ratio of the explicit cost of accepting a failure to the opportunity cost of rejecting a success, assuming revenues are equal on all loans. This may be represented by the following equality.

$$k \equiv \frac{P_{II}}{P_I} = \frac{MC_I}{MC_{II}}$$

where P_I is the probability of accepting a loan to a failing firm (Type I error).

P_{II} is the probability of rejecting a loan to a successful firm (Type II error).

MC_I is the marginal actual cost of accepting a loan to a failing firm.

MC_{II} is the marginal opportunity cost of rejecting a loan to a successful firm.

The optimal k will equate the ratio P_{II}/P_I with the MC_I/MC_{II} ratio. The SBA belief that small businesses contribute to the public welfare in an amount greater than the interest they pay on their loans increases MC_{II} , decreasing the ratio MC_I/MC_{II} below the level expected of a strictly profit-motivated institution. To reach equality the SBA must reject fewer successes and accept more failures. If the SBA were using a discriminant function, a lower standard could be effected by lowering the z-score cut-off point. On the other

hand, if cost studies and loan prediction research indicated that the following relation held:

$$\frac{P_{II}}{P_I} < \frac{MC_I}{MC_{II}},$$

then the SBA would raise the Z-score (credit score) cut-off point. This would cause fewer "loss-loans" to be accepted and, probably, reject more applicants who would have successfully repaid their loans.

Conclusion

Results of this study indicate that ratio functions may be accurate and efficient at predicting failure of small businesses. The discriminant model developed here demonstrated an ability as great as those functions recently estimated for much larger firms. However, the small business functions failed to discriminate when only one annual statement was available whereas one financial statement was shown by Altman¹ and Beaver² to be sufficient information for a highly discriminant function for large businesses. This leads the author to qualify his conclusion above with the provision that at least three consecutive financial statements be available for the analysis of a small business.

The author also concludes that while ratio analysis may be specifically described in terms of conditions and events, the algorithms are highly complex. Corresponding to each ratio is

¹Altman, "Financial Ratios and the Prediction of Bankruptcy."

²Beaver, "Alternative Accounting Measures as Predictors of Failure."

an optimum analytical method such as averaging, trend observation, or combination of ratios and methods. The optimal weighted set of ratios and methods will minimize errors on one population given discriminant levels on all other populations.

The solution for the optimal set of discriminators requires a study of the specific population from which observations are to be drawn for decisions. This and previous studies have derived somewhat different functions when studying different populations and events. This implies that ratio analysis is sensitive to either or both the purpose and population studied and that efficient and accurate analysis is most reliably based upon experience with a similar population and event.

Future Research

Conclusions drawn in this study that some ratios are not predictors of small business failure may be mitigated by consideration of the SBA credit practices. SBA loan officers utilize financial ratios in selecting borrowers from loan applicants. If the loan officers have properly evaluated the informational content of a financial ratio, then further analysis will be of no value. The author suggests that future studies include rejected applicants.

A future study might also develop functions for failure occurring 1, 2, 3, 4, and 5 years after the last annual statement. This would be directly comparable with previous research

by Altman³, Beaver⁴, and Blum⁵. A larger sample size may be expected since the SBA statement files appear to the author to be more complete subsequent to the loan final action date than prior to it. However, controlling the effects of the SBA decision would tend to reduce the number of cases available.

The research may be expanded in scope to include non-financial as well as financial information. Data for this research could be drawn from loan applications for 105,000 loans granted by the SBA since 1954 which have been summarized and recorded on magnetic tape. The following characteristics would be the basis for hypotheses of small business failure.

1. Location of business
 - a. state
 - b. zip code region
 - c. labor surplus area
 - d. urban-rural
2. Management
 - a. experience rating
 - b. principal's age
 - c. age of firm
 - d. new management for existing firm
 - e. minority group member
 - f. physical handicap
 - g. low-income family background
3. Previous credit record
 - a. prior SBA loan or other government financing record
 - b. Dun & Bradstreet rating
 - c. previous bankruptcy
4. Use of proceeds
 - a. facilities
 - b. equipment
 - c. working capital
 - d. debt reduction
 - e. land acquisition
 - f. liquor inventory

³Altman, "Financial Ratios and the Prediction of Bankruptcy."

⁴Beaver, "Alternative Accounting Measures as Predictors of Failure."

⁵Blum, "The Failing Company Doctrine."

5. Industry (SIC code)
6. Size
 - a. financial
 - b. employment
7. Legal form of organization and business affiliation

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Appendix I

RMA Statement Studies

Sample Page

ROBERT MORRIS ASSOCIATES
STATEMENT STUDIES

YEAR ENDED ON OR ABOUT DECEMBER 31 1963

MANUFACTURING

JEWELRY

ASSET SIZE	UNDER \$250M	\$250M & LESS THAN \$1MM	\$1MM & LESS THAN \$10MM	ALL SIZES
NUMBER OF STATEMENTS	29	34	19	78
ASSETS	\$	\$	\$	\$
CASH	7.78	8.30	6.17	6.90
RECEIVABLES NET	34.55	38.17	33.62	35.02
INVENTORY NET	41.64	40.85	40.53	40.69
MARKETABLE SECURITIES		1.36	1.03	1.08
ALL OTHER	.96	1.68	1.50	1.52
TOTAL CURRENT	84.93	90.36	82.47	85.21
FIXED ASSETS NET	8.36	5.94	11.72	9.81
ALL OTHER	6.71	3.70	5.41	4.98
TOTAL NON CURRENT	15.07	9.64	17.13	14.79
TOTAL	100.00	100.00	100.00	100.00
LIABILITIES				
DUE TO BANKS	11.46	11.73	14.97	13.80
DUE TO TRADE	14.84	16.57	17.00	15.52
INCOME TAXES	1.59	4.06	4.31	4.07
ALL OTHER	11.07	8.59	8.30	8.55
TOTAL CURRENT	38.96	40.94	39.58	39.94
LT DEBT UNSUBORD	2.89	5.82	2.85	3.73
LT DEBT SUBORDINATED	2.31	2.06	.70	.94
TOTAL DEBT	44.16	48.82	42.72	44.61
TANGIBLE NET WORTH	55.84	51.18	57.28	55.39
TOTAL	100.00	100.00	100.00	100.00
INCOME DATA				
NET SALES	100.00	100.00	100.00	100.00
COST OF SALES	70.31	72.88	72.32	72.37
GROSS PROFIT	29.69	27.12	27.68	27.63
ALL OTHER EXPENSE NET	24.27	22.38	22.36	22.49
PROFIT BEFORE TAXES	5.42	4.74	5.32	5.14
INCOME TAXES	1.90	1.82	2.41	2.19
NET PROFIT OR LOSS	3.53	2.92	2.90	2.95
RATIOS				
CURRENT	2.18	2.21	2.09	2.13
WORTH/FIXED	6.68	8.61	4.89	5.65
WORTH/DEBT	1.26	1.05	1.34	1.24
SALES/RECEIVABLES	69 5.55	70 5.15	68 5.28	68 5.74
COST SALES/INVENTORY	111 3.24	103 3.50	113 3.17	110 3.27
SALES/INVENTORY	4.81	4.61	4.38	4.52
SALES/FIXED	22.94	33.06	15.14	18.76
SALES/WORTH	3.43	3.84	3.10	3.32
% PROFIT/WORTH	12.12	11.22	9.01	9.80
SALES/TOTAL ASSETS	1.92	1.96	1.78	1.84
% PROFIT/TOTAL ASSET	6.77	5.74	5.16	5.43
THOUSANDS OF DOLLARS	\$	\$	\$	\$
NET SALES	7227	36303	71490	115020
TOTAL ASSETS	3768	18481	40237	62486

TWO RATIOS SHOW TURNOVER AND DAYS SALES

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Note: Reduced to 70% of original size.

APPENDIX II

COMPOSITE TABLE OF SBA BORROWER STATEMENTS
BY SIC CODE FOR THE PERIOD 1958 THROUGH 1965.

YEAR	SIC	CURRENT ASSETS	CURRENT LIAB.	INVENTORY	OTHER ASSETS	OTHER LIAB.	TOTAL NET ASSETS	PROFIT	DEPREC.	INCOME TAXES	SALARY	RENT	NUMBER
58	0719	0.232	0.315	0.045	0.767	0.250	1989	2765	0.092	0.006	0.015	0.000	15
58	1441	0.241	0.229	0.072	0.756	0.351	4319	5102	0.104	0.002	0.037	0.000	21
58	1511	0.612	0.486	0.187	0.387	0.236	10332	15560	0.025	0.001	0.024	0.000	43
58	1611	0.469	0.399	0.059	0.230	0.202	18862	33073	0.071	0.005	0.024	0.000	71
58	1621	0.505	0.366	0.071	0.494	0.202	13440	26631	0.040	0.003	0.018	0.000	36
58	1711	0.753	0.558	0.201	0.246	0.127	5888	14167	0.012	0.005	0.041	0.000	51
58	2042	0.439	0.274	0.133	0.560	0.166	11416	28481	0.015	0.007	0.019	0.000	36
58	2426	0.439	0.355	0.216	0.560	0.152	2741	2538	0.059	0.002	0.039	0.000	8
58	3441	0.598	0.388	0.321	0.401	0.199	13318	21416	0.020	0.006	0.030	0.000	26
58	3545	0.430	0.301	0.210	0.569	0.324	4185	7765	0.041	0.008	0.051	0.000	26
58	3619	0.660	0.178	0.285	0.339	0.535	56	76	0.026	0.000	0.000	0.000	1
58	4121	0.328	0.179	0.011	0.671	0.045	262	354	0.016	0.002	0.062	0.000	2
58	4151	0.220	0.286	0.016	0.779	0.346	852	560	0.071	0.003	0.053	0.000	7
58	4213	0.264	0.334	0.026	0.735	0.373	10383	70122	0.022	0.001	0.007	0.000	44
58	4221	0.354	0.294	0.135	0.645	0.332	5994	17310	0.024	0.002	0.013	0.000	41
58	5092	0.788	0.490	0.415	0.211	0.189	6860	14327	0.012	0.003	0.027	0.000	35
58	5096	0.737	0.424	0.386	0.262	0.159	3366	7823	0.012	0.006	0.026	0.000	9
58	5099	0.708	0.439	0.368	0.291	0.181	8974	19255	0.015	0.005	0.022	0.000	47
58	5231	0.645	0.348	0.428	0.354	0.205	1263	2120	0.014	0.003	0.058	0.000	16
58	5251	0.673	0.271	0.438	0.326	0.191	4838	8321	0.010	0.006	0.039	0.000	60
58	5411	0.397	0.253	0.243	0.602	0.250	14487	64178	0.012	0.001	0.016	0.000	16
58	5599	0.431	0.317	0.293	0.568	0.402	2173	3573	0.021	0.002	0.025	0.000	96
58	5712	0.733	0.350	0.293	0.266	0.184	11248	15439	0.012	0.004	0.039	0.000	7
58	5732	0.789	0.559	0.407	0.210	0.320	876	2220	0.006	0.000	0.023	0.000	16
58	5733	0.629	0.381	0.412	0.370	0.151	1521	2737	0.018	0.002	0.027	0.000	15
58	5982	0.451	0.257	0.096	0.548	0.263	2654	4655	0.040	0.007	0.027	0.000	15
58	7011	0.050	0.146	0.010	0.949	0.548	5271	3285	0.071	0.002	0.034	0.000	18
58	7013	0.053	0.134	0.016	0.946	0.375	12731	4621	0.134	0.008	0.041	0.000	94
58	7216	0.178	0.230	0.019	0.821	0.360	2907	5113	0.056	0.003	0.057	0.000	62
58	7531	0.510	0.217	0.237	0.589	0.231	290	516	0.034	0.000	0.029	0.000	5
58	7538	0.415	0.269	0.196	0.594	0.304	1512	2787	0.019	0.000	0.035	0.000	24
58	1611	0.462	0.435	0.048	0.537	0.250	28086	48745	0.066	0.004	0.023	0.000	90
58	2011	0.499	0.402	0.186	0.500	0.203	26266	225235	0.004	0.001	0.004	0.000	61
58	2035	0.611	0.458	0.450	0.388	0.218	4500	4070	0.022	0.001	0.025	0.000	11
58	2411	0.332	0.263	0.141	0.667	0.415	2064	4286	0.032	0.002	0.024	0.000	15
58	2992	0.728	0.521	0.168	0.271	0.101	1154	3900	0.008	0.016	0.032	0.000	3
58	3069	0.558	0.327	0.280	0.441	0.227	4834	9415	0.021	0.020	0.022	0.000	12
58	3259	0.403	0.066	0.150	0.596	0.092	1986	1498	0.092	0.048	0.029	0.000	2
58	4111	0.048	0.425	0.000	0.951	0.352	599	581	0.158	0.000	0.032	0.000	1
58	5048	0.555	0.305	0.183	0.444	0.296	2709	8664	0.011	0.000	0.023	0.000	16
58	5049	0.691	0.445	0.394	0.308	0.224	7636	42969	0.007	0.002	0.008	0.000	25
58	5088	0.772	0.652	0.535	0.227	0.057	1100	3576	0.007	0.004	0.007	0.000	5
58	5092	0.436	0.327	0.101	0.563	0.294	6190	14748	0.020	0.002	0.019	0.000	41
58	5252	0.809	0.530	0.617	0.190	0.114	15263	31248	0.007	0.001	0.019	0.000	105
58	5331	0.639	0.277	0.450	0.360	0.235	3271	5476	0.019	0.009	0.027	0.000	32
58	5411	0.374	0.224	0.229	0.625	0.322	24763	103464	0.014	0.012	0.014	0.000	304
58	5511	0.648	0.424	0.458	0.351	0.232	40856	159572	0.005	0.001	0.013	0.000	253
58	5541	0.418	0.221	0.180	0.581	0.227	5801	11894	0.016	0.001	0.025	0.000	44
58	5631	0.444	0.267	0.215	0.555	0.281	153	108	0.009	0.000	0.111	0.000	3
58	5722	0.748	0.447	0.371	0.251	0.199	7019	14950	0.008	0.002	0.026	0.000	59
58	5733	0.647	0.387	0.447	0.352	0.213	1697	3741	0.020	0.001	0.039	0.000	20
58	5912	0.596	0.316	0.421	0.403	0.191	6853	14447	0.018	0.003	0.040	0.000	93
58	5949	0.675	0.480	0.305	0.324	0.216	4534	7814	0.016	0.003	0.026	0.000	24
58	5971	0.749	0.383	0.378	0.250	0.163	5204	6028	0.013	0.010	0.049	0.000	54
58	5983	0.332	0.216	0.086	0.667	0.353	3872	5013	0.064	0.007	0.031	0.000	24
58	7011	0.049	0.176	0.011	0.950	0.450	10270	5570	0.093	0.004	0.024	0.000	41

Appendix II, Continued

YEAR	SIC	CURRENT ASSETS	CURRENT LIAB.	INVENTORY	OTHER ASSETS	OTHER LIAB.	TOTAL ASSETS	NET SALES	PROFIT	DEPREC.	INCOME TAXES	SALARY	RENT	NUMBER
59	7013	0.055	0.137	0.015	0.944	0.406	23089	7657	0.065	0.152	0.007	0.053	0.000	156
59	7312	0.176	0.145	0.042	0.803	0.617	987	742	0.056	0.101	0.009	0.102	0.000	4
59	8021	0.224	0.177	0.010	0.770	0.297	461	330	0.303	0.051	0.012	0.200	0.000	15
59	8092	0.081	0.125	0.007	0.918	0.537	7750	5061	0.055	0.083	0.010	0.060	0.000	49
60	0192	0.415	0.199	0.102	0.584	0.410	1900	2826	0.023	0.033	0.005	0.042	0.000	20
60	0712	0.211	0.177	0.014	0.788	0.342	4160	5632	0.013	0.045	0.000	0.011	0.000	21
60	0715	0.451	0.270	0.090	0.548	0.297	3666	7377	0.016	0.023	0.011	0.013	0.000	12
60	1211	0.383	0.434	0.011	0.616	0.240	5203	18954	0.010	0.027	0.001	0.007	0.000	13
60	1381	0.264	0.479	0.017	0.735	0.245	7582	9903	0.045	0.077	0.000	0.024	0.000	20
60	1389	0.433	0.434	0.064	0.566	0.260	4092	7577	0.033	0.072	0.005	0.047	0.000	19
60	1511	0.511	0.443	0.163	0.454	0.704	16894	30254	0.010	0.021	0.003	0.018	0.000	73
60	1611	0.447	0.448	0.048	0.552	0.252	33587	66275	0.005	0.068	0.003	0.021	0.000	110
60	1711	0.726	0.465	0.268	0.273	0.205	18472	55241	0.013	0.010	0.002	0.018	0.000	95
60	1794	0.355	0.349	0.064	0.644	0.259	5659	9592	0.015	0.087	0.000	0.019	0.000	46
60	1799	0.581	0.365	0.203	0.418	0.203	2492	4641	0.001	0.032	0.003	0.049	0.000	17
60	2011	0.481	0.369	0.172	0.518	0.224	33626	271320	0.004	0.005	0.001	0.004	0.000	75
60	2041	0.458	0.282	0.184	0.511	0.194	8170	26334	0.005	0.009	0.003	0.003	0.000	17
60	2042	0.420	0.301	0.174	0.579	0.217	21977	52384	0.004	0.020	0.004	0.203	0.000	88
60	2099	0.569	0.459	0.223	0.411	0.177	2445	5444	0.024	0.012	0.007	0.025	0.000	13
60	2352	0.784	0.513	0.403	0.215	0.030	325	374	0.044	0.016	0.040	0.010	0.000	3
60	2421	0.483	0.378	0.284	0.516	0.251	56247	95028	0.013	0.015	0.005	0.738	0.000	166
60	2433	0.751	0.615	0.462	0.248	0.134	2043	3456	0.032	0.013	0.020	0.029	0.000	7
60	2512	0.556	0.394	0.314	0.453	0.272	4057	6559	0.006	0.015	0.000	0.020	0.000	22
60	2531	0.604	0.344	0.355	0.395	0.212	3479	7323	0.009	0.018	0.018	0.016	0.000	12
60	2911	0.472	0.639	0.260	0.527	0.182	5980	8669	0.024	0.024	0.005	0.006	0.000	5
60	3141	0.759	0.501	0.461	0.240	0.123	4259	4794	0.014	0.013	0.002	0.022	0.000	12
60	3362	0.601	0.521	0.207	0.394	0.251	529	1060	0.003	0.017	0.000	0.037	0.000	5
60	3449	0.711	0.471	0.336	0.288	0.177	4564	8729	0.022	0.011	0.011	0.021	0.000	14
60	3461	0.594	0.398	0.235	0.405	0.179	13050	30931	0.007	0.020	0.003	0.015	0.000	37
60	3479	0.554	0.322	0.199	0.441	0.160	1170	1942	0.009	0.020	0.003	0.039	0.000	9
60	3522	0.714	0.415	0.432	0.205	0.180	19413	53413	0.002	0.010	0.002	0.016	0.000	54
60	3544	0.534	0.448	0.263	0.465	0.244	8312	16510	0.020	0.033	0.013	0.046	0.000	50
60	3591	0.463	0.341	0.212	0.536	0.265	14420	24700	0.026	0.041	0.008	0.041	0.000	99
60	3679	0.714	0.577	0.353	0.285	0.212	6124	9942	0.033	0.009	0.023	0.024	0.000	19
60	3843	0.480	0.297	0.102	0.520	0.124	225	269	0.029	0.029	0.000	0.115	0.000	3
60	3961	0.730	0.364	0.354	0.269	0.156	1571	3044	0.001	0.073	0.002	0.033	0.000	8
60	3999	0.527	0.387	0.222	0.472	0.307	3976	6991	0.011	0.024	0.002	0.040	0.000	23
60	5049	0.495	0.500	0.339	0.504	0.190	4092	5471	0.011	0.027	0.003	0.032	0.000	14
60	4119	0.145	0.340	0.001	0.554	0.345	1043	1321	0.015	0.056	0.010	0.024	0.000	7
60	4212	0.594	0.347	0.015	0.701	0.311	4516	9729	0.029	0.055	0.004	0.027	0.000	44
60	4213	0.291	0.335	0.027	0.718	0.436	16735	37851	0.004	0.027	0.004	0.020	0.000	44
60	4221	0.371	0.312	0.194	0.428	0.278	25813	53714	0.020	0.031	0.005	0.013	0.000	110
60	4459	0.090	0.575	0.009	0.909	0.000	33	28	0.107	0.071	0.000	0.000	0.000	1
60	5013	0.771	0.367	0.461	0.228	0.146	14453	37706	0.024	0.009	0.004	0.026	0.000	91
60	5047	0.605	0.381	0.213	0.394	0.240	9742	68034	0.007	0.004	0.001	0.008	0.000	34
60	5048	0.522	0.459	0.112	0.477	0.210	4460	15220	0.016	0.023	0.000	0.019	0.000	23
60	5074	0.855	0.351	0.447	0.144	0.197	4731	17308	0.016	0.006	0.007	0.025	0.000	36
60	5092	0.750	0.510	0.426	0.243	0.071	37923	37923	0.004	0.010	0.003	0.026	0.000	81
60	5097	0.714	0.411	0.340	0.285	0.185	1970	5519	0.034	0.011	0.004	0.023	0.000	20
60	5092	0.421	0.304	0.099	0.538	0.287	7422	16523	0.022	0.022	0.002	0.021	0.000	54
60	5093	0.540	0.374	0.290	0.459	0.225	12444	36485	0.008	0.018	0.005	0.023	0.000	51
60	5099	0.733	0.463	0.266	0.364	0.199	16425	35716	0.016	0.012	0.005	0.023	0.000	90
60	5211	0.464	0.350	0.340	0.335	0.229	30079	56597	0.014	0.015	0.003	0.024	0.000	159
60	5251	0.631	0.288	0.424	0.188	0.231	11975	18655	0.036	0.015	0.002	0.033	0.000	129
60	5252	0.792	0.511	0.614	0.207	0.117	21441	39590	0.018	0.023	0.001	0.020	0.000	145
60	5331	0.641	0.318	0.453	0.358	0.274	4981	4092	0.015	0.015	0.004	0.030	0.000	45
60	5392	0.672	0.275	0.465	0.321	0.139	8702	14689	0.047	0.013	0.003	0.034	0.000	105

Appendix II, Continued

YEAR	SIC	CURRENT ASSETS	CURRENT LIAB.	INVENTORY	OTHER ASSETS	LIAB.	OTHER ASSETS	NET ASSETS	PROFIT	DEPREC.	INCOME TAXES	SALARY	RENT	NUMBER
50	5411	0.384	0.250	0.242	0.615	0.292	31922	31362	0.021	0.011	0.001	0.014	0.000	363
60	5422	0.296	0.211	0.145	0.703	0.466	658	1574	0.038	0.023	0.001	0.025	0.000	11
60	5491	0.410	0.316	0.239	0.599	0.227	651	4122	0.007	0.008	0.000	0.009	0.000	7
60	5511	0.697	0.486	0.511	0.302	0.702	52823	198959	0.008	0.005	0.000	0.012	0.000	295
60	5531	0.660	0.340	0.376	0.336	0.202	9151	16015	0.041	0.016	0.002	0.039	0.000	96
60	5541	0.363	0.229	0.150	0.636	0.257	6597	13315	0.033	0.020	0.002	0.076	0.000	79
60	5599	0.610	0.546	0.362	0.389	0.212	4898	7217	0.027	0.023	0.003	0.032	0.000	36
60	5621	0.665	0.315	0.357	0.334	0.196	5703	10964	0.079	0.015	0.006	0.045	0.000	65
60	5699	0.692	0.412	0.509	0.307	0.159	257	482	0.012	0.010	0.012	0.058	0.000	6
60	5712	0.712	0.324	0.290	0.287	0.202	31584	42276	0.044	0.013	0.003	0.036	0.000	223
60	5722	0.724	0.406	0.358	0.275	0.171	7780	15374	0.026	0.009	0.003	0.026	0.000	69
60	5812	0.155	0.210	0.058	0.844	0.337	23510	36966	0.032	0.042	0.004	0.034	0.000	250
60	5943	0.754	0.419	0.480	0.245	0.177	1839	4026	0.053	0.012	0.004	0.049	0.000	30
60	5962	0.395	0.282	0.152	0.604	0.291	14140	40400	0.020	0.020	0.003	0.016	0.000	125
60	5969	0.590	0.481	0.269	0.409	0.218	5981	9059	0.004	0.019	0.003	0.032	0.000	35
60	5971	0.771	0.366	0.336	0.228	0.146	7823	8915	0.065	0.014	0.014	0.054	0.000	80
60	7013	0.073	0.135	0.014	0.226	0.391	46655	15137	0.048	0.144	0.007	0.043	0.000	259
60	7032	0.055	0.099	0.023	0.944	0.399	1881	1106	0.041	0.102	0.004	0.042	0.000	16
60	7211	0.272	0.197	0.064	0.727	0.349	5920	9501	0.035	0.058	0.005	0.036	0.000	58
60	7216	0.160	0.236	0.034	0.839	0.348	5895	9326	0.041	0.061	0.003	0.210	0.000	112
60	7221	0.513	0.385	0.124	0.486	0.198	3342	6039	0.032	0.040	0.010	0.056	0.000	32
60	7281	0.269	0.196	0.059	0.730	0.346	6396	5120	0.105	0.074	0.009	0.082	0.000	69
60	7399	0.358	0.359	0.109	0.641	0.296	10189	17378	0.043	0.056	0.007	0.046	0.000	80
60	7538	0.380	0.293	0.172	0.619	0.254	4363	9314	0.043	0.017	0.003	0.050	0.000	53
60	7696	0.669	0.432	0.398	0.330	0.110	118	179	0.016	0.022	0.005	0.106	0.000	2
60	7699	0.519	0.313	0.138	0.480	0.246	3383	5120	0.019	0.028	0.002	0.051	0.000	36
60	7942	0.043	0.101	0.007	0.956	0.106	413	142	0.021	0.119	0.000	0.028	0.000	5
60	8021	0.158	0.131	0.222	0.841	0.319	1438	820	0.270	0.051	0.013	0.257	0.000	29
61	0713	0.541	0.292	0.207	0.458	0.435	997	2562	0.074	0.032	0.003	0.026	0.000	8
61	0723	0.389	0.372	0.197	0.610	0.312	5135	14296	0.009	0.022	0.005	0.017	0.000	29
61	1301	0.251	0.426	0.013	0.742	0.314	7623	9725	0.004	0.093	0.000	0.037	0.000	23
61	1421	0.387	0.288	0.214	0.612	0.281	12953	8106	0.010	0.122	0.010	0.023	0.000	24
61	1511	0.451	0.380	0.136	0.548	0.269	16259	25607	0.010	0.031	0.001	0.028	0.000	79
61	1611	0.433	0.386	0.048	0.566	0.269	39934	68228	0.002	0.063	0.003	0.021	0.000	122
61	1621	0.447	0.422	0.048	0.552	0.315	19510	33728	0.007	0.046	0.003	0.018	0.000	67
61	1794	0.387	0.383	0.084	0.612	0.209	7562	10418	0.075	0.082	0.002	0.028	0.000	61
61	2011	0.506	0.359	0.180	0.493	0.242	38667	302682	0.194	0.009	0.163	0.036	0.000	87
61	2026	0.374	0.398	0.071	0.625	0.245	10427	30919	0.001	0.027	0.001	0.007	0.000	28
61	2032	0.391	0.274	0.230	0.608	0.455	788	1654	0.028	0.027	0.010	0.055	0.000	4
61	2036	0.432	0.432	0.196	0.567	0.251	1437	6179	0.001	0.019	0.001	0.016	0.000	9
61	2037	0.575	0.483	0.375	0.424	0.171	18189	45941	0.009	0.018	0.006	0.028	0.000	34
61	2042	0.433	0.308	0.173	0.566	0.277	25035	66613	0.011	0.078	0.003	0.012	0.000	99
61	2051	0.321	0.344	0.117	0.678	0.336	8190	20434	0.006	0.029	0.009	0.020	0.000	35
61	2241	0.638	0.434	0.354	0.361	0.203	2663	5562	0.033	0.016	0.002	0.026	0.000	12
61	2421	0.443	0.376	0.273	0.556	0.261	67263	107901	0.007	0.039	0.001	0.018	0.000	197
61	2519	0.750	0.650	0.200	0.250	0.112	80	232	0.043	0.021	0.000	0.000	0.000	1
61	2752	0.495	0.374	0.185	0.504	0.267	15955	31769	0.027	0.034	0.006	0.041	0.000	151
61	2752	0.476	0.352	0.168	0.523	0.302	9787	16822	0.014	0.030	0.007	0.055	0.000	81
61	2833	0.508	0.429	0.270	0.491	0.483	484	876	0.007	0.030	0.000	0.020	0.000	3
61	2873	0.713	0.602	0.216	0.286	0.066	2486	3594	0.027	0.013	0.012	0.060	0.000	7
61	2951	0.568	0.558	0.174	0.431	0.170	2444	3400	0.068	0.073	0.061	0.008	0.000	4
61	3079	0.542	0.493	0.262	0.457	0.227	26944	50322	0.020	0.027	0.004	0.023	0.000	78
61	3141	0.752	0.446	0.433	0.247	0.151	6816	14788	0.025	0.016	0.000	0.018	0.000	14
61	3255	0.388	0.244	0.252	0.611	0.124	682	637	0.017	0.025	0.000	0.025	0.000	4
61	3301	0.543	0.478	0.336	0.456	0.228	3355	7541	0.000	0.024	0.004	0.015	0.000	17
61	3441	0.662	0.421	0.325	0.337	0.197	24466	43387	0.011	0.016	0.003	0.019	0.000	53
61	3443	0.525	0.448	0.257	0.474	0.185	7676	14267	0.008	0.018	0.002	0.015	0.000	18

Appendix II, Continued

YEAR	SIC	CURRENT ASSETS	CURRENT LIAB.	INVENTORY	OTHER ASSETS	OTHER LIAB.	TOTAL ASSETS	NET SALES	PROFIT	DEPREC.	INCOME TAXES	SALARY	RENT	NUMBER
61	3471	0.398	0.336	0.138	0.611	0.285	7019	12326	0.037	0.647	0.007	0.044	0.000	41
61	3591	0.443	0.342	0.206	0.556	0.264	19554	24196	0.021	0.034	0.007	0.038	0.000	41
61	3679	0.675	0.505	0.347	0.347	0.264	7582	11119	0.021	0.014	0.018	0.034	0.000	22
61	3851	0.430	0.347	0.192	0.569	0.164	757	1121	0.001	0.017	0.004	0.054	0.000	4
61	3961	0.733	0.318	0.397	0.266	0.321	3186	4943	0.025	0.019	0.001	0.026	0.000	10
61	3999	0.483	0.420	0.397	0.516	0.200	3677	3884	0.010	0.031	0.005	0.022	0.000	15
61	4213	0.272	0.315	0.024	0.727	0.313	31909	45920	0.025	0.645	0.004	0.019	0.000	94
61	4221	0.343	0.285	0.177	0.654	0.170	56269	56269	0.017	0.031	0.003	0.010	0.000	116
61	4469	0.289	0.127	0.166	0.719	0.119	5501	5626	0.004	0.043	0.001	0.031	0.000	30
61	4784	0.240	0.126	0.000	0.759	0.174	79	38	0.105	0.104	0.000	0.052	0.000	2
61	4953	0.188	0.202	0.004	0.811	0.577	409	522	0.042	0.134	0.003	0.128	0.000	6
61	5013	0.782	0.415	0.476	0.217	0.170	19794	46229	0.022	0.009	0.005	0.030	0.000	124
61	5032	0.753	0.511	0.474	0.244	0.185	3995	14804	0.012	0.007	0.002	0.014	0.000	21
61	5042	0.736	0.379	0.461	0.263	0.167	14495	85331	0.009	0.004	0.000	0.009	0.000	63
61	5043	0.468	0.329	0.122	0.531	0.290	5619	18760	0.005	0.025	0.003	0.008	0.000	27
61	5044	0.554	0.491	0.204	0.445	0.159	4410	29211	0.007	0.006	0.000	0.007	0.000	21
61	5047	0.550	0.404	0.187	0.449	0.244	13571	87443	0.004	0.006	0.001	0.004	0.000	46
61	5048	0.696	0.507	0.071	0.303	0.189	8632	38470	0.001	0.006	-0.001	0.020	0.000	24
61	5051	0.520	0.408	0.260	0.479	0.212	14714	49535	0.009	0.014	0.002	0.010	0.000	53
61	5072	0.764	0.381	0.443	0.235	0.169	7961	15720	0.021	0.005	0.005	0.015	0.000	24
61	5073	0.822	0.456	0.427	0.177	0.157	10734	78001	0.009	0.007	0.004	0.022	0.000	47
61	5077	0.605	0.513	0.324	0.394	0.202	2476	5538	0.007	0.018	0.002	0.025	0.000	11
61	5082	0.714	0.491	0.371	0.280	0.188	22557	41743	0.014	0.015	0.005	0.024	0.000	109
61	5092	0.388	0.294	0.104	0.611	0.124	9865	21797	0.022	0.024	0.002	0.022	0.000	64
61	5093	0.543	0.362	0.294	0.456	0.256	15024	31691	0.020	0.020	0.001	0.024	0.000	50
61	5211	0.665	0.339	0.345	0.334	0.241	32733	57391	0.014	0.016	0.004	0.026	0.000	180
61	5212	0.564	0.358	0.324	0.435	0.259	18595	29304	0.025	0.026	0.002	0.026	0.000	98
61	5251	0.647	0.290	0.424	0.352	0.226	19163	25456	0.032	0.014	0.002	0.033	0.000	167
61	5252	0.784	0.509	0.606	0.215	0.136	27341	51374	0.016	0.008	0.001	0.018	0.000	189
61	5331	0.625	0.275	0.509	0.374	0.231	3969	7015	0.031	0.018	0.001	0.028	0.000	45
61	5392	0.643	0.292	0.441	0.356	0.153	10909	17244	0.057	0.012	0.002	0.037	0.000	120
61	5411	0.382	0.241	0.231	0.617	0.332	45654	190249	0.022	0.011	0.003	0.048	0.000	493
61	5431	0.116	0.139	0.093	0.693	0.358	97	226	0.085	0.021	0.000	0.000	0.000	1
61	5499	0.556	0.298	0.432	0.443	0.268	43	47	0.021	0.026	0.000	0.115	0.000	3
61	5511	0.664	0.436	0.465	0.335	0.226	60273	220250	0.004	0.005	0.002	0.234	0.000	344
61	5531	0.673	0.350	0.351	0.326	0.210	10824	20621	0.032	0.017	0.002	0.039	0.000	116
61	5541	0.404	0.241	0.187	0.595	0.280	9413	21191	0.026	0.019	0.002	0.023	0.000	108
61	5599	0.622	0.444	0.363	0.377	0.183	6134	11736	0.010	0.016	0.001	0.025	0.000	39
61	5641	0.641	0.231	0.441	0.358	0.253	1045	1945	0.035	0.013	0.003	0.041	0.000	20
61	5651	0.710	0.381	0.506	0.269	0.176	3779	5844	0.051	0.011	0.000	0.037	0.000	41
61	5699	0.611	0.363	0.411	0.389	0.274	564	445	0.046	0.017	0.000	0.049	0.000	9
61	5712	0.700	0.325	0.299	0.299	0.210	36597	49286	0.043	0.014	0.003	0.033	0.000	259
61	5732	0.713	0.163	0.337	0.246	0.257	7531	14743	0.024	0.008	0.002	0.029	0.000	73
61	5812	0.140	0.356	0.046	0.959	0.184	3612	6444	0.056	0.017	0.001	0.061	0.000	49
61	5912	0.625	0.356	0.461	0.374	0.209	32219	50365	0.035	0.042	0.004	0.035	0.000	316
61	5962	0.448	0.315	0.169	0.651	0.228	17374	45463	0.023	0.019	1.321	0.014	0.000	136
61	5992	0.592	0.736	0.560	0.407	0.162	216	104	0.115	0.067	0.000	0.000	0.000	1
61	5997	0.498	0.366	0.334	0.501	0.242	1057	1556	0.042	0.026	0.007	0.041	0.000	19
61	6519	0.713	0.419	0.433	0.286	0.202	6659	19228	0.027	0.031	0.004	0.034	0.000	113
61	7013	0.057	0.123	0.105	0.637	0.061	474	868	0.039	0.034	0.016	0.016	0.000	2
61	7211	0.301	0.233	0.082	0.942	0.417	61896	22575	0.028	0.286	0.008	0.041	0.000	314
61	7214	0.143	0.175	0.037	0.698	0.227	24464	39091	0.037	0.035	0.032	0.009	0.000	71
61	7216	0.180	0.202	0.042	0.856	0.356	140	245	0.032	0.122	0.002	0.027	0.000	3
61	7332	0.780	0.531	0.266	0.219	0.139	930	2412	0.021	0.019	0.012	0.067	0.000	140

Appendix II, Continued

YEAR	SIC	CURRENT ASSETS	CURRENT LIAB.	INVENTORY	OTHER ASSETS	OTHER LIAB.	TOTAL ASSETS	NET SALES	PROFIT	DEPREC.	INCOME TAXES	SALARY	RENT	NUMBER
61	7531	0.375	0.248	0.140	0.624	0.370	1131	1641	0.049	0.024	0.004	0.049	0.000	18
61	7534	0.449	0.332	0.186	0.550	0.255	1903	3168	0.031	0.036	0.006	0.042	0.000	21
61	7538	0.332	0.219	0.159	0.667	0.271	6478	10097	0.059	0.021	0.001	0.049	0.000	21
61	7621	0.523	0.342	0.253	0.476	0.230	936	1896	0.064	0.020	0.007	0.089	0.000	28
61	7699	0.414	0.293	0.129	0.581	0.269	5897	9725	0.035	0.027	0.003	0.048	0.000	62
61	7931	0.069	0.196	0.013	0.930	0.478	17035	9020	0.025	0.163	0.004	0.031	0.000	80
61	8011	0.311	0.114	0.007	0.688	0.384	6012	4742	0.054	0.054	0.004	0.054	0.000	52
61	8092	0.074	0.142	0.013	0.925	0.492	17199	11762	0.068	0.072	0.008	0.056	0.000	130
61	8099	0.173	0.215	0.023	0.826	0.410	709	566	0.224	0.054	17.674	0.213	0.000	16
61	8911	0.498	0.476	0.110	0.501	0.200	10114	14241	0.000	0.026	0.000	0.035	0.000	51
62	0715	0.342	0.276	0.119	0.657	0.259	6312	8896	0.018	0.039	0.002	0.022	0.000	21
62	0719	0.282	0.242	0.094	0.717	0.315	3895	12065	0.018	0.020	0.004	0.009	0.000	25
62	0731	0.575	0.374	0.216	0.524	0.287	2441	4518	0.059	0.040	0.010	0.051	0.000	25
62	1211	0.301	0.379	0.034	0.698	0.254	6961	15468	0.009	0.038	0.000	0.015	0.000	14
62	1421	0.371	0.384	0.177	0.428	0.200	10259	9321	0.091	0.044	0.003	0.012	0.000	18
62	1441	0.248	0.408	0.061	0.751	0.335	6200	8080	0.060	0.114	0.005	0.034	0.000	30
62	1511	0.533	0.471	0.120	0.466	0.259	19705	36591	0.072	0.020	0.009	0.018	0.000	94
62	1711	0.670	0.522	0.220	0.329	0.218	29652	67848	0.004	0.011	0.003	0.023	0.000	173
62	1731	0.693	0.471	0.212	0.306	0.353	7275	17682	0.026	0.012	0.003	0.019	0.000	72
62	1741	0.678	0.536	0.090	0.321	0.183	2906	7244	0.020	0.015	0.004	0.017	0.000	14
62	1781	0.483	0.389	0.281	0.516	0.209	1797	3266	0.017	0.038	0.002	0.034	0.000	16
62	2022	0.444	0.375	0.143	0.555	0.383	5400	20086	0.001	0.017	0.002	0.013	0.000	18
62	2024	0.398	0.248	0.203	0.601	0.431	3616	8552	0.000	0.033	0.002	0.026	0.000	18
62	2097	0.073	0.110	0.015	0.926	0.391	2703	1780	0.026	0.080	0.001	0.018	0.000	10
62	2241	0.407	0.554	0.316	0.592	0.228	5384	12409	0.028	0.019	0.000	0.004	0.000	6
62	2341	0.755	0.513	0.400	0.244	0.181	1676	3766	0.031	0.011	0.007	0.018	0.000	7
62	2411	0.317	0.356	0.073	0.692	0.463	6187	11364	0.019	0.070	2.002	0.018	0.000	37
62	2421	0.471	0.372	0.270	0.528	0.279	70296	124086	0.007	0.037	0.002	0.014	0.000	196
62	2752	0.429	0.335	0.133	0.570	0.292	15562	25449	0.028	0.029	0.006	0.056	0.000	99
62	2852	0.324	0.199	0.164	0.675	0.218	376	211	0.279	0.075	0.000	0.151	0.000	3
62	3253	0.484	0.112	0.273	0.515	0.097	2515	1736	0.236	0.081	0.022	0.051	0.000	3
62	3271	0.446	0.305	0.173	0.553	0.297	27849	42016	0.013	0.040	0.009	0.026	0.000	101
62	3323	0.537	0.348	0.303	0.462	0.290	3642	7591	0.008	0.037	0.013	0.026	0.000	11
62	3423	0.488	0.463	0.294	0.511	0.186	4002	5992	0.001	0.024	0.009	0.012	0.000	12
62	3441	0.657	0.405	0.239	0.342	0.242	22756	42284	0.007	0.017	0.003	0.019	0.000	51
62	3451	0.489	0.421	0.193	0.510	0.299	2605	5548	0.009	0.016	0.004	0.022	0.000	17
62	3471	0.438	0.347	0.092	0.561	0.208	5377	9687	0.051	0.052	0.011	0.054	0.000	36
62	3532	0.768	0.315	0.191	0.231	0.156	1618	2061	0.013	0.015	0.012	0.026	0.000	6
62	3537	0.698	0.523	0.395	0.301	0.204	2695	6371	0.023	0.007	0.006	0.013	0.000	9
62	3551	0.366	0.467	0.103	0.633	0.251	3890	4372	0.004	0.027	0.008	0.062	0.000	10
62	3589	0.622	0.358	0.331	0.377	0.275	3196	3627	0.041	0.031	0.000	0.045	0.000	7
62	3713	0.636	0.478	0.367	0.363	0.219	4003	9312	0.003	0.015	0.006	0.023	0.000	19
62	3716	0.675	0.447	0.398	0.326	0.275	7457	12633	0.015	0.023	0.005	0.020	0.000	24
62	3791	0.626	0.539	0.354	0.373	0.224	6519	18339	0.015	0.008	0.001	0.004	0.000	16
62	3988	0.653	0.414	0.316	0.346	0.364	1291	2565	0.012	0.017	0.000	0.027	0.000	12
62	4212	0.259	0.316	0.031	0.740	0.319	11122	20367	0.010	0.017	0.003	0.030	0.000	82
62	4213	0.285	0.339	0.023	0.714	0.335	30399	63468	0.014	0.062	0.003	0.017	0.000	110
62	4221	0.367	0.289	0.195	0.632	0.289	34810	75008	0.015	0.026	0.004	0.011	0.000	128
62	5046	0.550	0.396	0.255	0.449	0.291	5904	22430	0.011	0.014	0.004	0.016	0.000	21
62	5062	0.871	0.513	0.432	0.128	0.220	5258	12350	0.019	0.007	0.001	0.025	0.000	33
62	5097	0.886	0.549	0.399	0.113	0.111	2774	6045	0.009	0.007	0.002	0.023	0.000	15
62	5098	0.640	0.440	0.285	0.359	0.246	30277	68925	0.010	0.018	0.005	0.020	0.000	109
62	5099	0.709	0.419	0.366	0.290	0.213	22046	47200	0.024	0.012	0.003	0.025	0.000	132
62	5211	0.642	0.348	0.335	0.357	0.283	70813	37645	0.019	0.015	0.003	0.016	0.000	206
62	5221	0.676	0.444	0.350	0.323	0.186	1306	3137	0.053	0.015	0.000	0.067	0.000	24
62	5231	0.641	0.307	0.433	0.358	0.205	17554	26021	0.031	0.014	0.001	0.033	0.000	167
62	5252	0.782	0.507	0.599	0.217	0.147	31602	63038	0.020	0.007	0.004	0.018	0.000	204

Appendix II, Continued

YEAR	SIC	CURRENT ASSETS	CURRENT LIAB.	INVENTORY	OTHER ASSETS	OTHER LIAB.	TOTAL ASSETS SALES	NET	PROFIT	DEPREC.	INCOME TAXES	SALARY	RENT	NUMBER
62	5331	0.615	0.230	0.450	0.384	0.164	5147	8786	0.031	0.019	0.003	0.032	0.000	49
62	5392	0.631	0.299	0.432	0.368	0.164	16227	22807	0.051	0.012	0.003	0.033	0.000	158
62	5411	0.367	0.228	0.238	0.612	0.362	56150	222177	0.019	0.011	0.002	0.014	0.000	593
62	5421	0.125	0.125	0.125	0.875	0.500	8	22	0.090	0.000	0.000	0.000	0.000	1
62	5462	0.249	0.263	0.120	0.750	0.307	794	2061	0.065	0.026	0.005	0.036	0.000	20
62	5491	0.333	0.342	0.135	0.666	0.207	642	3479	0.015	0.009	0.000	0.014	0.000	8
62	5511	0.687	0.442	0.477	0.312	0.221	71929	286121	0.012	0.004	0.001	0.011	0.000	401
62	5531	0.660	0.373	0.365	0.339	0.224	15019	26336	0.040	0.016	0.003	0.029	0.000	153
62	5541	0.360	0.233	0.160	0.639	0.346	12297	25513	3.164	0.021	0.003	0.030	0.000	138
62	5612	0.774	0.533	0.598	0.225	0.142	19541	30827	0.015	0.015	0.006	0.037	0.000	128
62	5621	0.653	0.312	0.398	0.346	0.230	9492	17237	0.020	0.015	0.002	0.044	0.000	119
62	5641	0.747	0.315	0.485	0.252	0.194	1650	3265	0.033	0.011	0.003	0.050	0.000	29
62	5712	0.690	0.348	0.312	0.309	0.218	38777	52588	0.040	0.014	0.003	0.034	0.000	283
62	5713	0.668	0.450	0.332	0.331	0.251	3576	8691	0.028	0.011	0.002	0.048	0.000	41
62	5722	0.710	0.359	0.328	0.289	0.313	9418	17502	0.031	0.010	0.004	0.030	0.000	87
62	5732	0.650	0.413	0.383	0.349	0.292	5510	10553	0.051	0.016	0.006	0.060	0.000	67
62	5812	0.137	0.228	0.051	0.862	0.365	39470	65138	0.042	0.041	0.004	0.040	0.000	395
62	5912	0.652	0.386	0.489	0.347	0.208	19685	40653	0.035	0.017	0.004	0.045	0.000	204
62	5943	0.766	0.461	0.450	0.233	0.154	4330	9711	0.020	0.012	0.001	0.041	0.000	52
62	5952	0.751	0.436	0.537	0.244	0.149	3376	5801	-0.011	0.014	0.001	0.038	0.000	47
62	5962	0.461	0.313	0.166	0.538	0.275	20433	57195	0.019	0.019	0.001	0.017	0.000	162
62	5969	0.621	0.489	0.276	0.378	0.265	8423	14128	0.015	0.023	0.001	0.030	0.000	54
62	5971	0.800	0.390	0.428	0.199	0.142	10575	10850	0.085	0.014	0.008	0.057	0.000	114
62	5983	0.427	0.285	0.108	0.572	0.272	7108	11253	0.039	0.050	0.008	0.044	0.000	41
62	5999	0.716	0.392	0.405	0.283	0.220	13011	26155	0.028	0.013	0.001	0.041	0.000	150
62	6411	0.432	0.413	0.034	0.567	0.276	3407	2612	0.081	0.029	0.009	0.071	0.000	35
62	7011	0.041	0.136	0.016	0.958	0.511	27333	12918	-0.019	0.092	0.006	0.016	0.000	76
62	7012	0.045	0.109	0.010	0.954	0.352	5140	2917	-0.004	0.107	0.007	0.039	0.000	23
62	7013	0.052	0.124	0.010	0.947	0.471	79380	29853	0.057	0.246	0.009	0.036	0.000	393
62	7221	0.543	0.368	0.130	0.456	0.259	3321	5675	0.008	0.045	-0.008	0.062	0.000	43
62	7261	0.247	0.153	0.045	0.752	0.351	14477	10110	0.098	0.079	0.007	0.093	0.000	113
62	7399	0.415	0.328	0.135	0.586	0.320	12877	24926	0.030	0.042	0.008	0.047	0.000	105
62	7538	0.404	0.253	0.216	0.595	0.269	5464	8861	0.059	0.024	0.001	0.050	0.000	98
62	7621	0.548	0.300	0.311	0.451	0.279	1411	2838	0.067	0.029	0.005	0.076	0.000	35
62	7699	0.397	0.299	0.108	0.602	0.222	6795	11040	0.015	0.025	0.002	0.042	0.000	88
62	7931	0.052	0.182	0.012	0.947	0.574	28348	11481	0.004	0.171	0.003	0.043	0.000	124
62	7942	0.055	0.126	0.009	0.944	0.455	2654	615	-0.213	0.117	0.011	0.071	0.000	13
62	8021	0.186	0.191	0.132	0.813	0.380	2324	1611	0.342	0.065	0.020	0.149	0.000	52
62	8092	0.083	0.131	0.013	0.916	0.500	22498	15155	0.080	0.068	0.008	0.055	0.000	159
62	8911	0.499	0.399	0.125	0.500	0.271	10079	17168	0.025	0.017	0.005	0.036	0.000	52
63	0712	0.344	0.304	0.082	0.655	0.279	4173	5099	0.049	0.054	0.001	0.018	0.000	23
63	0713	0.472	0.361	0.219	0.527	0.237	1923	4850	0.017	0.027	0.000	0.010	0.000	15
63	0719	0.310	0.301	0.089	0.669	0.309	4641	7297	0.029	0.035	0.005	0.023	0.000	32
63	0722	0.139	0.164	0.028	0.860	0.420	2511	1877	0.265	0.039	0.010	0.086	0.000	38
63	0723	0.480	0.276	0.199	0.519	0.314	5986	36370	0.006	0.006	0.004	0.010	0.000	27
63	0913	0.424	0.330	0.190	0.575	0.319	946	817	0.096	0.052	0.001	0.030	0.000	8
63	1511	0.544	0.431	0.108	0.455	0.266	21282	43957	0.014	0.017	0.006	0.014	0.000	97
63	1611	0.505	0.463	0.045	0.494	0.270	35619	67449	0.030	0.045	0.002	0.030	0.000	120
63	1621	0.462	0.434	0.056	0.537	0.325	19613	32452	0.023	0.052	0.010	0.026	0.000	76
63	1711	0.726	0.522	0.225	0.273	0.215	30647	84602	0.015	0.008	0.004	0.027	0.000	186
63	1731	0.653	0.447	0.186	0.346	0.219	6289	14424	0.027	0.022	0.001	0.048	0.000	26
63	1741	0.709	0.504	0.088	0.290	0.186	2511	7312	0.013	0.014	0.000	0.016	0.000	10
63	1743	0.506	0.339	0.111	0.493	0.382	2407	6318	0.032	0.016	0.004	0.039	0.000	22
63	1751	0.513	0.390	0.238	0.144	0.405	348	908	0.037	0.009	0.000	0.029	0.000	4
63	1771	0.518	0.430	0.082	0.531	0.248	2372	4502	0.002	0.036	0.003	0.024	0.000	15
63	1792	0.236	0.162	0.121	0.763	0.329	3539	3135	-0.091	0.051	0.000	0.060	0.000	4
63	1799	0.560	0.469	0.167	0.439	0.206	3469	6874	0.029	0.032	0.003	0.045	0.000	31

Appendix II, Continued

YEAR	SIC	CURRENT	INVENTORY	OTHER	OTHER	TOTAL	NET	PROFIT	DEPREC.	INCOME	SALARY	RENT	NUMBER
		ASSETS	LIAB.	ASSETS	LIAB.	ASSETS	SALES			TAXES			
63	1951	0.734	0.746	0.413	0.265	0.271	747	903	0.029	0.000	0.024	0.000	3
63	2015	0.600	0.510	0.141	0.399	0.219	14649	85353	0.009	0.004	0.005	0.000	29
63	2013	0.730	0.667	0.598	0.269	0.162	53505	70241	0.019	0.002	0.008	0.000	30
63	2036	0.317	0.443	0.124	0.682	0.498	1656	3762	0.014	0.000	0.011	0.000	8
63	2042	0.414	0.307	0.175	0.585	0.302	26752	62342	0.023	0.003	0.012	0.000	94
63	2051	0.318	0.385	0.104	0.691	0.417	9468	28471	0.025	0.003	0.017	0.000	35
63	2066	0.315	0.291	0.144	0.684	0.390	8944	16574	0.042	0.008	0.025	0.000	41
63	2221	0.492	0.406	0.313	0.507	0.229	4467	11662	0.017	0.000	0.018	0.000	8
63	2253	0.575	0.482	0.370	0.424	0.275	4795	9290	0.014	0.002	0.022	0.000	15
63	2331	0.902	0.355	0.383	0.097	0.342	245	813	0.007	0.011	0.039	0.000	1
63	2389	0.333	0.666	0.166	0.666	0.000	6	44	0.022	0.000	0.113	0.000	1
63	2394	0.720	0.395	0.291	0.279	0.360	1587	4424	0.004	0.001	0.009	0.000	8
63	2411	0.313	0.340	0.093	0.686	0.441	6963	13287	0.059	0.003	0.020	0.000	38
63	2421	0.451	0.361	0.271	0.548	0.350	71096	126720	0.032	0.004	0.015	0.000	199
63	2431	0.656	0.398	0.294	0.343	0.339	13759	30760	0.015	0.010	0.020	0.000	52
63	2442	0.668	0.257	0.258	0.331	0.392	739	1825	0.021	0.002	0.024	0.000	5
63	2499	0.531	0.405	0.296	0.468	0.259	13566	23734	0.005	0.003	0.027	0.000	60
63	2511	0.620	0.436	0.302	0.379	0.292	23995	47566	0.014	0.003	1.703	0.000	78
63	2512	0.287	0.192	0.162	0.712	1.604	13322	18135	0.214	0.081	0.019	0.000	30
63	2515	0.643	0.512	0.341	0.356	0.314	2559	5669	0.003	0.012	0.022	0.000	13
63	2522	0.717	0.474	0.318	0.282	0.174	2868	6066	0.010	0.015	0.034	0.000	7
63	2641	0.453	0.330	0.259	0.546	0.197	2653	3985	0.020	0.002	0.032	0.000	8
63	2711	0.388	0.318	0.203	0.611	0.281	270	545	0.064	0.029	0.071	0.000	4
63	2751	0.454	0.354	0.169	0.545	0.324	22921	44511	0.029	0.039	0.041	0.000	184
63	2752	0.411	0.343	0.121	0.588	0.318	12355	20724	0.021	0.034	0.005	0.000	96
63	2851	0.715	0.455	0.330	0.284	0.197	10007	20396	0.004	0.013	0.038	0.000	36
63	2872	0.547	0.407	0.196	0.452	0.286	5420	11081	0.033	0.030	0.044	0.000	17
63	2951	0.423	0.367	0.137	0.576	0.344	3225	7320	0.000	0.043	0.021	0.000	8
63	3069	0.549	0.476	0.278	0.450	0.220	8514	18077	0.004	0.015	0.002	0.000	17
63	3141	0.783	0.552	0.485	0.216	0.194	8596	21050	0.013	0.013	0.001	0.000	18
63	3199	0.713	0.511	0.503	0.286	0.115	902	1982	0.029	0.010	0.004	0.000	9
63	3281	0.509	0.286	0.188	0.490	0.243	3923	5584	0.047	0.031	0.014	0.000	18
63	3321	0.610	0.392	0.292	0.389	0.344	6380	13133	0.014	0.014	0.006	0.000	16
63	3323	0.567	0.424	0.320	0.432	0.274	5760	11864	0.016	0.026	0.017	0.000	12
63	3442	0.667	0.430	0.330	0.332	0.248	12792	24135	0.003	0.016	0.002	0.000	54
63	3471	0.407	0.334	0.070	0.592	0.246	4491	9879	0.028	0.040	0.049	0.000	35
63	3494	0.620	0.395	0.339	0.379	0.256	6634	11508	0.001	0.024	0.009	0.000	17
63	3498	0.644	0.262	0.430	0.355	0.209	1934	3982	0.016	0.015	0.000	0.000	6
63	3499	0.531	0.330	0.260	0.469	0.257	15389	29319	0.004	0.019	0.031	0.000	47
63	3522	0.673	0.380	0.449	0.326	0.206	21817	45047	0.036	0.016	0.022	0.000	68
63	3541	0.600	0.358	0.228	0.399	0.308	5070	9081	0.021	0.029	0.019	0.000	15
63	3544	0.538	0.378	0.287	0.461	0.269	16413	30596	0.016	0.023	0.011	0.000	67
63	3545	0.475	0.316	0.250	0.524	0.285	12830	19565	0.025	0.031	0.013	0.000	51
63	3591	0.467	0.352	0.195	0.532	0.331	21203	36013	0.026	0.036	0.007	0.000	138
63	3599	0.585	0.393	0.331	0.414	0.262	4177	7924	0.029	0.035	0.007	0.000	18
63	3612	0.472	0.378	0.360	0.327	0.204	2869	6564	0.047	0.014	0.011	0.000	4
63	3642	0.597	0.379	0.332	0.402	0.289	3280	7089	0.011	0.021	0.003	0.000	12
63	3679	0.662	0.459	0.326	0.337	0.256	15421	24962	0.001	0.018	0.011	0.000	38
63	3791	0.641	0.511	0.391	0.358	0.181	6101	16457	0.007	0.010	0.000	0.000	13
63	3799	0.650	0.450	0.402	0.349	0.197	2792	5789	0.013	0.017	0.002	0.000	10
63	4212	0.238	0.323	0.029	0.761	0.409	10591	20220	0.018	0.071	0.000	0.000	80
63	4213	0.288	0.361	0.029	0.711	0.392	27951	58799	0.008	0.057	0.002	0.000	104
63	4214	0.238	0.247	0.014	0.761	0.435	7465	11648	0.032	0.037	0.001	0.000	45
63	4225	0.075	0.095	0.042	0.924	0.432	7952	3328	0.043	0.037	0.009	0.000	12
63	4382	0.583	0.436	0.218	0.416	0.222	19527	34805	0.023	0.020	0.016	0.000	31
63	4721	0.591	0.478	0.047	0.408	0.256	870	589	0.040	0.030	0.042	0.000	5
63	4953	0.197	0.270	0.002	0.802	0.424	855	1053	0.064	0.189	0.016	0.000	16

Appendix II, Continued

YEAR	SIC	CURRENT ASSETS	CURRENT LIAB.	INVENTORY	OTHER ASSETS	OTHER LIAB.	TOTAL ASSETS	NET SALES	PROFIT	DEPREC.	INCOME TAXES	SALARY	RENT	NUMBER
63	5013	0.776	0.381	0.459	0.223	0.187	27800	74399	0.016	0.008	0.003	0.025	0.000	152
63	5032	0.762	0.401	0.447	0.231	0.137	4166	10701	0.022	0.006	0.002	0.014	0.000	30
63	5035	0.629	0.448	0.463	0.170	0.091	1285	2257	0.020	0.004	0.004	0.047	0.000	15
63	5047	0.558	0.396	0.202	0.441	0.275	17755	76552	0.006	0.010	0.001	0.012	0.000	72
63	5048	0.706	0.546	0.081	0.293	0.111	10497	37896	0.005	0.005	0.001	0.021	0.000	35
63	5063	0.432	0.478	0.433	0.167	0.174	4286	12032	0.020	0.006	0.006	0.020	0.000	24
63	5065	0.736	0.412	0.462	0.263	0.216	4458	9190	0.015	0.103	0.008	0.038	0.000	33
63	5077	0.645	0.451	0.296	0.354	0.213	1759	4098	0.032	0.011	0.006	0.036	0.000	12
63	5082	0.711	0.470	0.383	0.288	0.230	29554	58972	0.017	0.015	0.004	0.192	0.000	130
63	5092	0.422	0.315	0.130	0.577	0.275	10064	20573	0.020	0.024	0.001	0.022	0.000	72
63	5098	0.614	0.376	0.264	0.385	0.269	32732	70262	0.017	0.016	0.005	0.019	0.000	109
63	5099	0.712	0.430	0.421	0.287	0.222	25467	59124	0.023	0.011	0.004	0.022	0.000	156
63	5211	0.631	0.350	0.329	0.368	0.270	36965	70766	0.018	0.017	0.003	0.024	0.000	198
63	5212	0.562	0.373	0.242	0.437	0.232	21659	36772	0.027	0.021	0.006	0.027	0.000	118
63	5221	0.688	0.402	0.355	0.311	0.242	1825	4094	0.039	0.014	0.001	0.069	0.000	29
63	5241	0.789	0.526	0.412	0.210	0.180	1728	3770	0.032	0.008	0.005	0.031	0.000	12
63	5251	0.629	0.295	0.430	0.370	0.250	16715	23546	0.039	0.014	0.001	0.031	0.000	184
63	5252	0.794	0.521	0.599	0.205	0.138	35526	69495	0.022	0.009	0.002	0.016	0.000	217
63	5311	0.756	0.340	0.451	0.243	0.215	13821	23698	0.006	0.012	0.001	0.018	0.000	49
63	5331	0.589	0.242	0.456	0.410	0.301	6775	11991	0.035	0.017	0.002	0.030	0.000	67
63	5341	0.262	0.371	0.156	0.737	0.389	5516	12342	0.018	0.030	0.003	0.027	0.000	43
63	5351	0.159	0.134	0.047	0.840	0.554	1377	873	0.245	0.008	0.004	0.098	0.000	3
63	5393	0.516	0.223	0.438	0.368	0.172	18363	27592	0.049	0.012	0.003	0.032	0.000	186
63	5411	0.392	0.237	0.244	0.607	0.334	56801	279323	0.021	0.011	0.045	0.014	0.000	634
63	5422	0.367	0.349	0.187	0.632	0.348	1363	5872	0.009	0.014	0.000	0.019	0.000	23
63	5441	0.157	0.231	0.129	0.842	0.425	104	127	0.009	0.031	0.000	0.023	0.000	4
63	5463	0.276	0.425	0.234	0.723	0.292	73364	291130	0.011	0.004	0.001	0.011	0.000	2
63	5511	0.713	0.492	0.517	0.294	0.202	73364	291130	0.011	0.004	0.001	0.011	0.000	401
63	5531	0.667	0.362	0.373	0.332	0.319	16286	79977	0.035	0.015	0.002	0.037	0.000	172
63	5541	0.409	0.269	0.185	0.590	0.286	13977	32647	0.033	0.016	0.003	0.024	0.000	159
63	5612	0.799	0.405	0.552	0.200	0.217	13563	21862	0.030	0.012	0.003	0.043	0.000	136
63	5621	0.605	0.293	0.358	0.394	0.233	11635	18392	0.024	0.015	0.002	0.041	0.000	138
63	5665	0.734	0.336	0.589	0.265	0.147	4408	6827	0.042	0.017	0.002	0.056	0.000	76
63	5671	0.632	0.695	0.287	0.367	0.091	174	427	0.056	0.019	0.000	0.035	0.000	7
63	5712	0.680	0.343	0.325	0.319	0.236	44014	62416	0.038	0.013	0.004	0.031	0.000	329
63	5722	0.716	0.409	0.348	0.263	0.208	8845	17734	0.031	0.009	0.002	0.025	0.000	87
63	5732	0.603	0.442	0.413	0.396	0.273	4522	8364	0.048	0.012	0.002	0.048	0.000	70
63	5733	0.799	0.512	0.498	0.200	0.193	4668	8249	0.027	0.013	0.002	0.033	0.000	52
63	5812	0.132	0.236	0.270	0.867	2.336	44218	77484	0.029	0.041	0.003	0.036	0.000	441
63	5912	0.658	0.370	0.498	0.341	0.238	18716	39740	0.037	0.017	0.003	0.048	0.000	222
63	5942	0.637	0.511	0.348	0.362	0.212	1395	1132	0.153	0.006	0.000	0.035	0.000	13
63	5943	0.789	0.428	0.449	0.210	0.178	3785	8644	0.036	0.011	0.001	0.035	0.000	47
63	5952	0.686	0.367	0.507	0.313	0.180	4001	7682	0.023	0.014	0.003	0.049	0.000	52
63	5962	0.486	0.317	0.184	0.513	0.272	20967	57379	0.016	0.139	0.001	0.015	0.000	153
63	5972	0.792	0.389	0.466	0.207	0.203	14739	15163	0.071	0.014	0.008	0.052	0.000	131
63	5983	0.442	0.278	0.106	0.557	0.330	7042	11682	0.032	0.040	0.005	0.037	0.000	55
63	5996	0.643	0.374	0.350	0.355	0.205	1721	3613	0.043	0.030	0.002	0.060	0.000	20
63	5999	0.713	0.412	0.420	0.286	0.227	12088	24329	0.021	0.015	0.001	0.041	0.000	158
63	6411	0.404	0.398	0.049	0.595	0.262	2287	2411	0.084	0.019	0.004	0.079	0.000	32
63	7013	0.063	0.124	0.009	0.936	0.476	74636	29453	0.053	0.135	0.009	0.034	0.000	359
63	7021	0.056	0.126	0.003	0.943	0.476	551	168	0.089	0.154	0.000	0.059	0.000	9
63	7032	0.060	0.160	0.010	0.939	0.380	6022	2954	0.000	0.109	0.003	0.032	0.000	48
63	7211	0.321	0.143	0.071	0.678	0.128	29045	39627	0.043	0.035	0.041	0.011	0.000	74
63	7215	0.098	0.188	0.043	0.901	0.267	4101	2291	0.096	0.169	0.004	0.055	0.000	79
63	7216	0.174	0.202	0.039	0.825	0.448	10207	13895	0.042	0.069	0.003	0.076	0.000	135
63	7261	0.221	0.185	0.047	0.778	0.404	13436	9940	0.110	0.072	0.010	0.076	0.000	110

YEAR	SIC	CURRENT	CURRENT	INVENTORY	OTHER	OTHER	TOTAL	NET	PROFIT	DEPREC.	INCOME	SALARY	RENT	NUMBER
		ASSETS	LIAB.	ASSETS	LIAB.	ASSETS	SALES				TAXES			
63	7312	0.216	0.206	0.046	0.783	0.424	2588	2016	0.078	0.126	0.008	0.050	0.000	14
63	7331	0.460	0.396	0.092	0.539	0.287	1456	3987	0.023	0.034	0.001	0.131	0.000	20
63	7349	0.272	0.246	0.077	0.727	0.381	841	1764	0.079	0.020	0.001	0.037	0.000	18
63	7392	0.550	0.429	0.124	0.449	0.260	1107	2241	0.074	0.017	0.002	0.023	0.000	23
63	7399	0.433	0.305	0.170	0.566	0.300	15764	27464	0.033	0.043	0.011	0.047	0.000	128
63	7511	0.273	0.186	0.027	0.726	0.350	774	873	0.074	0.161	0.001	0.022	0.000	9
63	7532	0.421	0.151	0.242	0.578	0.313	394	544	0.049	0.033	0.001	0.055	0.000	6
63	7538	0.340	0.216	0.193	0.639	0.356	5034	7983	0.076	0.026	0.001	0.050	0.000	97
63	7621	0.511	0.352	0.251	0.489	0.269	2026	4305	0.047	0.021	0.005	0.064	0.000	48
63	7699	0.451	0.345	0.158	0.548	0.278	1819	8949	0.045	0.023	0.004	0.060	0.000	59
63	7831	0.128	0.152	0.047	0.671	0.265	1255	1021	0.040	0.062	0.005	0.031	0.000	13
63	7949	0.151	0.144	0.046	0.648	0.185	15733	9883	0.010	0.043	0.002	0.024	0.000	49
63	8021	0.203	0.179	0.020	0.794	0.434	2894	2199	0.346	0.049	0.030	0.163	0.000	70
63	8041	0.394	0.199	0.011	0.605	0.281	256	168	0.398	0.077	0.005	0.220	0.000	9
63	8092	0.102	0.137	0.024	0.897	0.527	24057	17906	0.084	0.070	0.006	0.053	0.000	151
63	8911	0.529	0.421	0.115	0.470	0.265	9942	18547	0.034	0.021	0.002	0.036	0.000	47
63	8931	0.231	0.209	0.003	0.768	0.500	2597	2153	0.250	0.036	0.013	0.120	0.000	40
64	0192	0.654	0.414	0.297	0.345	0.353	1497	4375	0.037	0.021	0.020	0.036	0.000	19
64	0719	0.284	0.295	0.117	0.715	0.298	2679	4223	0.030	0.035	0.000	0.024	0.000	23
64	0722	0.192	0.105	0.026	0.807	0.437	2854	1917	0.314	0.063	0.014	0.187	0.000	38
64	0731	0.280	0.362	0.119	0.719	0.407	989	1346	0.051	0.066	0.005	0.068	0.000	21
64	1211	0.229	0.277	0.064	0.771	0.468	8525	15893	0.015	0.034	0.000	0.017	0.000	22
64	1511	0.562	0.478	0.113	0.437	0.263	22442	45093	0.016	0.016	0.004	0.015	0.000	104
64	1711	0.687	0.553	0.218	0.312	0.218	24557	68279	0.020	0.011	0.004	0.027	0.000	172
64	1721	0.573	0.309	0.102	0.426	0.361	1772	3701	0.044	0.020	0.004	0.079	0.000	31
64	1731	0.719	0.498	0.195	0.280	0.222	6670	17030	0.014	0.014	0.001	0.043	0.000	81
64	1763	0.701	0.410	0.296	0.293	0.182	3441	10924	0.015	0.010	0.000	0.041	0.000	19
64	1761	0.645	0.579	0.144	0.354	0.285	5600	9927	0.004	0.020	0.003	0.047	0.000	43
64	1794	0.349	0.346	0.023	0.650	0.304	6655	10429	0.045	0.065	0.002	0.041	0.000	68
64	2026	0.409	0.391	0.103	0.590	0.299	6676	21075	0.004	0.027	0.000	0.004	0.000	15
64	2033	0.710	0.724	0.579	0.269	0.193	44762	60281	0.071	0.020	0.001	0.007	0.000	29
64	2042	0.409	0.296	0.149	0.590	0.302	24545	53214	0.006	0.023	0.003	0.012	0.000	77
64	2086	0.320	0.270	0.147	0.679	0.375	10644	17876	0.030	0.044	0.012	0.027	0.000	40
64	2094	0.340	0.272	0.199	0.659	0.316	2006	4057	0.014	0.038	0.002	0.010	0.000	5
64	2269	0.379	0.308	0.416	0.620	0.566	1521	1572	0.062	0.024	0.000	0.027	0.000	4
64	2341	0.633	0.373	0.324	0.366	0.245	1521	3531	0.021	0.005	0.022	0.006	0.000	7
64	2392	0.639	0.364	0.399	0.360	0.270	2781	6977	0.036	0.017	0.001	0.040	0.000	12
64	2411	0.389	0.467	0.164	0.610	0.313	7887	16771	0.025	0.055	0.007	0.017	0.000	31
64	2427	0.441	0.367	0.262	0.558	0.360	63605	130652	0.013	0.031	0.005	0.014	0.000	177
64	2470	0.448	0.303	0.303	0.551	0.123	4313	6731	0.029	0.020	0.002	0.012	0.000	10
64	2473	0.640	0.391	0.197	0.359	0.266	3767	7171	0.013	0.018	0.000	0.008	0.000	15
64	2512	0.622	0.430	0.306	0.418	0.293	2471	4771	0.048	0.022	0.003	0.027	0.000	12
64	2511	0.622	0.430	0.306	0.377	0.290	20329	41024	0.024	0.137	0.003	0.020	0.000	73
64	2521	0.650	0.423	0.342	0.349	0.224	5585	15662	0.004	0.008	0.007	0.023	0.000	25
64	2521	0.653	0.429	0.424	0.346	0.264	5042	9816	0.007	0.011	0.001	0.026	0.000	9
64	2531	0.510	0.459	0.210	0.489	0.294	1969	3539	0.003	0.018	0.000	0.034	0.000	9
64	2645	0.272	0.219	0.013	0.727	0.735	3302	484	0.163	0.041	0.000	0.045	0.000	3
64	2655	0.726	0.341	0.139	0.773	0.469	503	785	0.071	0.062	0.000	0.059	0.000	4
64	2751	0.484	0.391	0.184	0.578	0.316	24148	44523	0.026	0.029	0.000	0.043	0.000	174
64	2752	0.421	0.341	0.096	0.578	0.320	11907	21319	0.030	0.034	0.003	0.050	0.000	98
64	2771	0.788	0.358	0.236	0.211	0.165	1145	1619	0.027	0.016	0.004	0.022	0.000	3
64	2792	0.584	0.326	0.247	0.415	0.206	18980	31920	0.044	0.020	0.004	0.000	0.000	4
64	3141	0.746	0.519	0.369	0.231	0.278	6594	16660	0.003	0.018	0.001	0.018	0.000	17
64	3269	0.393	0.260	0.205	0.606	0.231	1092	1660	0.033	0.039	0.013	0.011	0.000	5
64	3272	0.506	0.332	0.170	0.493	0.282	15963	25637	0.003	0.049	0.007	0.030	0.000	52
64	3293	0.403	0.260	0.064	0.596	0.057	364	448	0.092	0.040	0.000	0.072	0.000	2
64	3321	0.491	0.372	0.277	0.509	0.323	10190	15662	0.007	0.028	0.009	0.015	0.000	13

Appendix II, Continued

Appendix II, Continued

YEAR	SIC	CURRENT ASSETS	CURRENT LIAB.	INVENTORY	OTHER ASSETS	OTHER LIAB.	TOTAL NET ASSETS SALES	PROFIT	DEPREC.	INCOME TAXES	SALARY	RENT	NUMBER
64	3442	0.714	0.490	0.330	0.285	0.205	14003 29779	0.019	0.012	0.003	0.024	0.000	43
64	3444	0.587	0.447	0.212	0.412	0.236	11056 21214	0.002	0.023	0.005	0.033	0.000	37
64	3444	0.509	0.411	0.227	0.493	0.324	10666 24221	0.025	0.021	0.003	0.033	0.000	59
64	3559	0.550	0.444	0.210	0.449	0.204	4091 7922	0.025	0.031	0.003	0.029	0.000	12
64	3591	0.470	0.350	0.181	0.529	0.368	18903 33765	0.034	0.034	0.006	0.039	0.000	135
64	3651	0.764	0.449	0.412	0.235	0.225	1089 2347	0.029	0.013	0.014	0.035	0.000	7
64	3679	0.615	0.359	0.357	0.384	0.214	17253 23213	0.006	0.025	0.005	0.027	0.000	45
64	3691	0.764	0.356	0.357	0.235	0.214	671 1149	0.053	0.017	0.007	0.033	0.000	4
64	3713	0.648	0.456	0.395	0.351	0.180	6311 13556	-0.010	0.018	0.001	0.015	0.000	18
64	3911	0.881	0.499	0.378	0.118	0.135	1657 3378	0.034	0.005	0.015	0.027	0.001	14
64	3931	0.566	0.328	0.427	0.433	0.287	627 834	0.013	0.034	0.003	0.000	0.000	2
64	3949	0.706	0.525	0.451	0.293	0.253	13171 24576	0.015	0.020	0.013	0.013	0.000	30
64	3961	0.674	0.410	0.305	0.325	0.214	3345 7931	0.011	0.012	0.003	0.044	0.000	23
64	3962	0.919	0.519	0.661	0.090	0.133	210 271	0.000	0.003	0.000	0.047	0.000	3
64	3993	0.522	0.353	0.174	0.477	0.361	7654 9421	0.031	0.033	0.001	0.031	0.000	36
64	4119	0.191	0.381	0.009	0.808	0.355	2529 3788	0.017	0.060	0.002	0.025	0.000	13
64	4212	0.244	0.343	0.034	0.755	0.466	11161 19659	0.019	0.076	0.001	0.035	0.000	90
64	4214	0.239	0.301	0.016	0.760	0.337	6397 11522	0.019	0.046	0.003	0.029	0.000	36
64	4253	0.247	0.251	0.035	0.752	0.507	1702 2554	0.054	0.089	0.003	0.119	0.000	19
64	5022	0.837	0.470	0.424	0.162	0.205	3444 16412	0.012	0.012	0.001	0.012	0.000	24
64	5032	0.682	0.317	0.428	0.317	0.203	1495 3127	0.039	0.011	0.004	0.029	0.000	21
64	5035	0.888	0.558	0.668	0.111	0.230	2045 5029	0.015	0.006	0.002	0.027	0.000	13
64	5044	0.574	0.475	0.284	0.425	0.215	8025 45942	0.004	0.006	0.000	0.006	0.000	24
64	5045	0.647	0.298	0.343	0.352	0.176	1939 10569	0.009	0.008	0.000	0.008	0.000	11
64	5047	0.573	0.396	0.209	0.426	0.283	20907 110109	0.004	0.007	0.001	0.008	0.000	64
64	5048	0.460	0.325	0.165	0.539	0.337	16739 31100	-0.042	0.023	0.000	0.020	0.000	35
64	5063	0.766	0.436	0.371	0.233	0.263	5102 11504	0.017	0.009	0.005	0.021	0.000	27
64	5065	0.409	0.466	0.476	0.590	0.244	10942 16583	-0.003	0.008	0.002	0.018	0.000	37
64	5074	0.794	0.461	0.415	0.205	0.226	11988 33174	0.009	0.006	0.003	0.019	0.000	41
64	5082	0.707	0.452	0.395	0.292	0.252	23877 47471	0.010	0.017	0.004	0.028	0.000	120
64	5087	0.662	0.408	0.293	0.337	0.259	4982 11905	0.019	0.011	0.002	0.033	0.000	51
64	5091	0.723	0.449	0.371	0.276	0.237	2427 7654	0.009	0.006	0.000	0.034	0.000	22
64	5097	0.677	0.431	0.384	0.322	0.153	3117 5845	0.018	0.007	0.001	0.018	0.000	15
64	5099	0.687	0.422	0.383	0.317	0.208	24893 54987	0.019	0.011	0.001	0.024	0.000	156
64	5211	0.446	0.353	0.355	0.353	0.254	25523 53946	0.026	0.013	0.002	0.024	0.000	159
64	5212	0.39	0.320	0.242	0.460	0.293	19250 29330	0.030	0.022	0.005	0.026	0.000	114
64	5221	0.666	0.433	0.352	0.333	0.267	1783 4641	0.037	0.014	0.001	0.049	0.000	29
64	5231	0.654	0.315	0.478	0.341	0.234	13871 20322	0.046	0.012	0.001	0.034	0.000	154
64	5252	0.797	0.524	0.625	0.202	0.158	33968 67144	0.019	0.007	0.001	0.019	0.000	196
64	5323	0.893	0.397	0.680	0.106	0.113	141 220	0.154	0.004	0.000	0.049	0.000	5
64	5331	0.635	0.294	0.507	0.364	0.272	5951 12104	0.039	0.013	0.005	0.027	0.000	65
64	5392	0.677	0.313	0.484	0.322	0.222	18232 28612	0.058	0.010	0.004	0.030	0.000	171
64	5411	0.379	0.234	0.234	0.620	0.349	50130 195900	0.023	0.011	0.001	0.014	0.000	575
64	5422	0.349	0.304	0.157	0.650	0.417	1376 5957	0.014	0.012	0.001	0.018	0.000	25
64	5462	0.185	0.316	0.094	0.814	0.345	794 1737	0.066	0.031	0.002	0.037	0.000	23
64	5511	0.719	0.484	0.410	0.280	0.202	59599 236257	0.012	0.004	0.001	0.010	0.000	311
64	5521	0.665	0.438	0.523	0.334	0.246	1795 8634	0.023	0.003	0.000	0.023	0.000	31
64	5531	0.654	0.368	0.381	0.345	0.251	15040 27162	0.037	0.016	0.001	0.033	0.000	164
64	5541	0.449	0.264	0.181	0.551	0.283	12841 32924	0.033	0.014	0.004	0.024	0.000	178
64	5599	0.664	0.529	0.454	0.331	0.259	12756 24565	0.014	0.012	0.001	0.019	0.000	69
64	5612	0.772	0.414	0.544	0.227	0.179	16146 26525	0.044	0.018	0.004	0.046	0.000	145
64	5613	0.807	0.392	0.607	0.192	0.144	1871 3645	0.017	0.011	0.004	0.037	0.000	12
64	5621	0.697	0.355	0.439	0.302	0.226	11049 19762	0.027	0.012	0.002	0.041	0.000	163
64	5634	0.894	0.459	0.648	0.105	0.184	407 1036	0.011	0.011	0.001	0.056	0.000	11
64	5641	0.632	0.259	0.465	0.367	0.230	1717 2083	0.034	0.027	0.003	0.033	0.000	30
64	5651	0.618	0.289	0.444	0.381	0.340	7028 8481	0.043	0.013	0.003	0.033	0.000	61
64	5665	0.749	0.359	0.613	0.250	0.246	4301 7220	0.040	0.012	0.000	0.055	0.000	80

Appendix II, Continued

YEAR	SIC	CURRENT ASSETS	CURRENT LIAB.	INVENTORY	OTHER ASSETS	OTHER LIAB.	TOTAL NET ASSETS	PROFIT	DEPREC.	INCOME TAXES	SALARY	RENT	NUMBER	
64	5681	0.888	0.369	0.440	0.111	0.063	252	349	0.014	0.002	0.034	0.000	5	
64	5712	0.691	0.337	0.317	0.318	0.263	4098	63276	0.047	0.003	0.037	0.000	317	
64	5713	0.685	0.504	0.357	0.314	0.259	4851	12807	0.002	0.010	0.001	0.045	0.000	47
64	5719	0.405	0.305	0.556	0.594	0.289	498	467	0.023	0.000	0.049	0.000	6	
64	5722	0.678	0.418	0.365	0.321	0.190	5782	11674	0.027	0.010	0.001	0.034	0.000	80
64	5732	0.668	0.396	0.432	0.331	0.276	6777	13182	0.044	0.013	0.002	0.059	0.000	79
64	5733	0.773	0.481	0.553	0.226	0.212	3973	7656	0.045	0.011	0.002	0.034	0.000	48
64	5812	0.144	0.247	0.045	0.855	0.419	46412	75869	0.038	0.038	0.002	0.037	0.000	455
64	5912	0.677	0.377	0.502	0.322	0.263	17810	39860	0.045	0.014	0.002	0.034	0.000	212
64	5932	0.402	0.170	0.264	0.597	0.276	246	198	0.116	0.035	0.000	0.111	0.000	7
64	5933	0.583	0.166	0.250	0.416	0.416	12	11	0.090	0.090	0.000	0.000	0.000	1
64	5934	0.541	0.217	0.236	0.458	0.259	262	227	0.039	0.017	0.000	0.044	0.000	5
64	5942	0.255	0.425	0.677	0.144	0.131	988	2126	0.057	0.009	0.020	0.023	0.000	14
64	5952	0.771	0.391	0.550	0.229	0.191	3436	6085	0.053	0.012	0.000	0.059	0.000	58
64	5962	0.498	0.341	0.203	0.501	0.276	21557	60530	0.012	0.015	0.001	0.014	0.000	144
64	5971	0.757	0.402	0.393	0.242	0.173	12854	12225	0.083	0.015	0.006	0.047	0.000	129
64	5982	0.338	0.296	0.140	0.661	0.339	1711	3076	0.011	0.035	0.001	0.025	0.000	12
64	5993	0.648	0.559	0.268	0.351	0.182	279	264	0.041	0.053	0.000	0.041	0.000	4
64	5994	0.730	0.444	0.506	0.269	0.203	1327	2532	0.002	0.014	0.005	0.048	0.000	16
64	5997	0.660	0.324	0.472	0.339	0.250	2073	3368	0.053	0.022	0.004	0.035	0.000	41
64	5999	0.655	0.387	0.385	0.344	0.280	16378	30367	0.027	0.015	0.000	0.047	0.000	199
64	7011	0.064	0.150	0.014	0.935	0.505	26274	12079	0.018	0.097	0.004	0.029	0.000	74
64	7013	0.061	0.124	0.012	0.938	0.455	73138	30733	0.049	0.119	0.004	0.037	0.000	309
64	7021	0.068	0.191	0.002	0.931	0.438	221	-0.036	0.126	0.004	0.054	0.000	5	
64	7216	0.153	0.246	0.027	0.846	0.439	8030	11049	0.057	0.059	0.001	0.061	0.000	145
64	7231	0.221	0.241	0.079	0.778	0.321	1033	1922	0.109	0.045	0.013	0.075	0.000	46
64	7302	0.611	0.358	0.152	0.585	0.221	1434	17995	0.014	0.003	0.003	0.006	0.000	31
64	7319	0.362	0.290	0.100	0.637	0.337	18181	27803	0.041	0.045	0.009	0.042	0.000	150
64	7511	0.244	0.267	0.013	0.755	0.407	1055	924	0.011	0.204	0.002	0.009	0.000	9
64	7538	0.374	0.261	0.184	0.625	0.327	5063	8543	0.042	0.024	0.000	0.048	0.000	100
64	7621	0.473	0.297	0.216	0.526	0.347	1665	2795	0.073	0.031	0.002	0.073	0.000	55
64	7641	0.511	0.477	0.189	0.488	0.344	264	988	0.009	0.012	0.001	0.036	0.000	9
64	7699	0.430	0.335	0.154	0.569	0.406	4332	7353	0.051	0.028	0.003	0.067	0.000	69
64	7931	0.051	0.176	0.011	0.949	0.588	20919	9326	0.011	0.172	0.002	0.057	0.000	109
64	7949	0.083	0.155	0.033	0.916	0.425	18174	9137	0.023	0.104	0.006	0.032	0.000	83
64	8011	0.212	0.125	0.019	0.787	0.466	6846	4013	0.233	0.074	0.021	0.178	0.000	56
64	8021	0.222	0.186	0.029	0.777	0.454	2141	1706	0.376	0.056	0.019	0.141	0.000	62
64	8211	0.034	0.112	0.473	0.965	0.403	374	189	0.105	0.095	0.015	0.232	0.000	8
64	8262	0.204	0.192	0.021	0.795	0.398	1690	1932	0.049	0.035	0.006	0.072	0.000	15
64	8911	0.645	0.401	0.131	0.354	0.207	9731	19150	0.063	0.020	0.013	0.036	0.000	57
65	0731	0.297	0.235	0.140	0.702	0.437	944	1381	0.091	0.052	0.005	0.088	0.000	20
65	1511	0.569	0.481	0.198	0.430	0.316	16856	29960	0.014	0.013	0.006	0.019	0.000	80
65	1611	0.495	0.379	0.054	0.504	0.297	16509	30632	0.037	0.042	0.002	0.018	0.000	56
65	1711	0.774	0.601	0.224	0.225	0.177	31970	77917	0.012	0.008	0.002	0.020	0.000	147
65	1721	0.561	0.437	0.126	0.458	0.302	1048	2360	0.093	0.016	0.009	0.055	0.000	20
65	1761	0.578	0.448	0.113	0.421	0.254	2520	5708	0.017	0.018	0.002	0.026	0.001	29
65	1771	0.516	0.507	0.098	0.483	0.303	2809	4759	0.004	0.036	0.006	0.023	0.000	11
65	1999	0.530	0.491	0.357	0.469	0.201	2523	3366	0.046	0.021	0.000	0.021	0.000	3
65	2013	0.604	0.611	0.290	0.395	0.199	6420	24444	0.009	0.009	0.002	0.013	0.002	18
65	2097	0.029	0.094	0.001	0.970	0.594	1530	434	0.002	0.156	0.013	0.018	0.000	4
65	2099	0.364	0.282	0.219	0.635	0.493	3716	6730	0.009	0.024	0.001	0.013	0.000	13
65	2323	0.366	0.459	0.180	0.163	0.081	61	99	0.060	0.020	0.000	0.040	0.000	2
65	2335	0.637	0.461	0.459	0.362	0.102	1427	4595	0.010	0.012	0.002	0.018	0.000	9
65	2395	0.591	0.462	0.497	0.408	0.126	1101	3499	0.024	0.003	0.001	0.002	0.000	2
65	2599	0.497	0.303	0.236	0.502	0.374	211	444	0.002	0.018	0.000	0.013	0.000	4
65	3545	0.429	0.256	0.215	0.570	0.319	5628	9806	0.029	0.030	0.011	0.038	0.000	26
65	3662	0.719	0.511	0.369	0.280	0.285	6743	8872	0.030	0.022	0.006	0.015	0.002	13

Appendix II, Continued

YEAR	SIC	CURRENT ASSETS	CURRENT LIAB.	INVENTORY	OTHER ASSETS	OTHER LIAB.	TOTAL ASSETS	NET	PROFIT	DEPREC.	INCOME TAXES	SALARY	RENT	NUMBER
65	3799	0.715	0.509	0.359	0.284	0.200	2355	5520	0.015	0.020	0.005	0.009	0.000	5
65	3988	0.696	0.871	0.505	0.303	0.124	419	665	-0.030	0.025	0.000	0.073	0.000	6
65	3993	0.610	0.325	0.235	0.399	0.506	3399	5946	0.052	0.023	0.003	0.058	0.000	23
65	4212	0.196	0.228	0.017	0.803	0.497	9490	14084	0.021	0.075	0.002	0.033	0.011	55
65	4225	0.294	0.294	0.082	0.705	0.305	733	1516	0.019	0.032	0.000	0.017	0.002	7
65	5053	0.872	0.596	0.663	0.127	0.189	1464	1465	0.022	0.012	0.001	0.067	0.001	7
65	5097	0.727	0.409	0.361	0.272	0.283	3534	8747	0.023	0.010	0.005	0.087	0.004	27
65	5093	0.583	0.366	0.240	0.416	0.274	15492	51535	0.019	0.014	0.007	0.011	0.000	39
65	5231	0.456	0.256	0.279	0.543	0.423	3920	5128	0.036	0.017	0.001	0.056	0.012	41
65	5252	0.787	0.514	0.590	0.212	0.183	33158	68896	0.020	0.006	0.001	0.017	0.000	158
65	5331	0.584	0.231	0.497	0.415	0.394	3935	7320	0.048	0.036	0.001	0.062	0.006	57
65	5392	0.434	0.272	0.421	0.365	0.257	13036	17673	0.060	0.013	0.005	0.034	0.007	131
65	5411	0.386	0.235	0.222	0.613	0.368	39860	144337	0.022	0.012	0.001	0.014	0.002	419
65	5531	0.680	0.335	0.393	0.319	0.288	12231	20886	0.044	0.021	0.002	0.040	0.009	127
65	5541	0.467	0.284	0.258	0.532	0.277	9906	75243	0.012	0.004	0.001	0.007	0.015	139
65	5599	0.652	0.559	0.485	0.347	0.295	10701	19517	-0.002	0.017	0.002	0.019	0.003	48
65	5621	0.596	0.286	0.369	0.403	0.311	9420	14341	0.031	0.018	0.003	0.040	0.007	114
65	5651	0.641	0.292	0.457	0.358	0.258	5387	7256	0.040	0.013	0.004	0.045	0.004	44
65	5699	0.784	0.471	0.503	0.215	0.253	1336	2042	0.016	0.009	0.000	0.015	0.000	12
65	5712	0.699	0.332	0.334	0.300	0.259	33972	53201	0.046	0.011	0.003	0.036	0.004	241
65	5713	0.676	0.501	0.357	0.323	0.235	4552	11779	0.022	0.011	0.001	0.037	0.003	43
65	5812	0.147	0.232	0.044	0.852	0.458	32672	56648	0.032	0.076	0.002	0.042	0.006	379
65	5943	0.716	0.419	0.417	0.283	0.241	2821	5745	0.033	0.016	0.004	0.043	0.003	36
65	5952	0.810	0.602	0.578	0.189	0.233	3635	6498	0.035	0.590	0.001	0.042	0.010	45
65	5962	0.555	0.351	0.211	0.444	0.289	18084	46458	0.014	0.015	0.001	0.012	0.000	103
65	5999	0.618	0.345	0.333	0.381	0.297	12055	22704	0.030	0.014	0.001	0.032	0.005	169
65	6411	0.409	0.381	0.032	0.590	0.268	1737	1431	0.122	0.024	0.004	0.169	0.011	37
65	7032	0.065	0.125	0.017	0.934	0.496	6485	3084	0.002	0.107	0.001	0.044	0.000	49
65	7216	0.140	0.187	0.025	0.859	0.480	10015	14850	0.030	0.058	0.002	0.031	0.010	101
65	7261	0.272	0.195	0.060	0.727	0.374	8226	6559	0.046	0.068	0.007	0.082	0.004	74
65	7311	0.665	0.521	0.018	0.334	0.174	1427	5539	0.017	0.004	0.000	0.060	0.000	11
65	7349	0.317	0.345	0.047	0.682	0.304	564	1354	0.117	0.043	0.008	0.077	0.001	20
65	7531	0.316	0.215	0.100	0.683	0.478	915	1804	0.054	0.026	0.002	0.071	0.013	22
65	7621	0.466	0.302	0.204	0.533	0.424	1811	3604	0.067	0.029	0.006	0.068	0.004	43
65	8071	0.382	0.402	0.109	0.617	0.386	259	552	0.092	0.032	0.000	0.041	0.007	7

Appendix III

Definition of Ratios

Quick: The total of cash, short-term marketable securities and net receivables divided by the total current liabilities.

Current: The total current assets divided by the total liabilities.

Inventory to Net Working Capital: Inventory divided by net working capital (net working capital equals total current assets minus total current liabilities).

Net Working Capital to Total Assets: Net working capital divided by total assets.

Current Assets to Total Debt: Current assets divided by total current and long term liabilities.

Debt to Equity Ratio: The total of current and long term liabilities divided by total net worth.

Fixed Assets to Equity: The net fixed assets (plant and equipment less reserve for depreciation) divided by the net worth.

Cash Flow to Current Liabilities: Earnings before income taxes plus depreciation and amortization divided by the total current liabilities.

Current Liabilities to Equity: The total current liabilities divided by the net worth.

Equity and Long Term Debt to Fixed Assets: The total of equity and long term liabilities divided by fixed assets (as defined above).

Inventory to Sales: Inventory divided by net sales. [The RMA comparative ratio uses cost of sales rather than net sales.]

Fixed Assets to Sales: Fixed assets divided by net sales.

Total Assets to Sales: Total assets divided by net sales.

Net Working Capital to Sales: Net working capital (defined above) divided by net sales.

Equity to Sales: Equity divided by net sales.

Sales Margin: Net earnings before taxes divided by net sales.

Return on Assets: Earnings before taxes divided by total assets.

Cash Flow to Total Debt: Earnings before income taxes plus depreciation and amortization divided by the total current and long term debt.

Return on Equity: Earnings before taxes divided by net worth.

APPENDIX IV

SAMPLE LOAN APPLICATION CONTROL AND
PROGRAM EVALUATION DATA FORMS

1. Application Case No. 100100 00 12		2. Ofc. No. 1010		18. (a) Name of Applicant John Smith	
3. Location ☒ (1) Urban ☐ (2) Rural		4. Janitor/Employee ☐ (1) Yes ☒ (2) No		(b) Sec. Sec. No. 000-00-0000	
5. Credit Rating (1) Dun & Bradstreet 0:6:2		(2) Other ☐ (1) Acceptable ☐ (2) Unacceptable ☐ (3) None		19. Trade Name of Applicant Standard Food Corp.	
6. If Application is Declined or Withdrawn, give Reasons ☐ ☐ ☐ ☐ ☐		7. Is this a Reconsideration of a Previously Declined Appl. ☐ (1) Yes ☒ (2) No		20. Previous Government Financing (Other Than SBA) ☐ (1) Never ☐ (2) Repaid ☐ (3) Defaulted ☒ (4) Present	
8. Labor Surplus Area ☐ (1) Yes ☒ (2) No		9. FDA Declared Area ☐ (1) Yes ☒ (2) No		21. If Present, What is Status ☒ (1) Current ☐ (2) Delinquent ☐ (3) Maturity Accelerated	
10. No. of Employees (a) At time of application 90 (b) If Loan Made 100		11. Employer I. O. No. 123456789		22. If Applicants Had Previous SBA Financing, Show Loan Number(s)	
12. Franchise ☐ (1) Yes ☒ (2) No		13. Principal's Age 52		23. Will This Loan Repay an Existing SBA Loan ☐ (1) Yes ☒ (2) No	
14. Principal's Management Experience 18 yrs.		15. Applicant is: ☐ (1) Individual (If a Partnership- ☐ (2) Partnership No. of Partners ☒ (3) Corporation		24. Agreement of Compliance - SBA Form 601 ☒ (1) Yes ☐ (2) No	
16. Business Affiliation ☒ (1) Independent ☐ (2) Parent ☐ (3) Subsidiary ☐ (4) Affiliate		17. Year Firm Established (1) Originally 1928 (2) Under Present Management 1949 (3) New Business ☐ (1) Yes ☒ (2) No		25. Assurance of Compliance - SBA Form 652 ☒ (1) Yes ☐ (2) No	
26. If Loan is for Construction, is Contract in Excess of \$50,000.00 ☒ (1) Yes ☐ (2) No		27. Annual Net Sales (1) Total \$ 400,000 (2) Primary SIC \$ 340,000 (3) Secondary SIC \$ 30,000		28. Use of Proceeds - Enter Dollar Amount on Line. Also Enter Appropriate Code in Box for Each Line Used. Codes Are: 1-Research and Development, 2-Marketing, 3-New Product Line, 4-Production, and 5-Other	
1. Land Acquisition		☒		\$ 14,000	
2. New Building or plant construction		☒		\$ 60,000	
3. Plant relocation and acquisition		☐		\$	
4. Plant expansion and repair		☐		\$	
5. Debt Payment		☐		\$	
6. Acquisition and/or repair of machinery and equipment		☒		\$ 26,000	
7. Working Capital - Inventory		☐		\$	
8. Working Capital - All Other		☐		\$	
9. Acquisition of all or part of an existing business		☐		\$	
10. Total				\$ 100,000	
29. Other Required Data					
30. Prepared By _____ Date _____					

APPENDIX IV (continued)

SAMPLE LOAN APPLICATION CONTROL AND PROGRAM EVALUATION DATA FORMS

• LOAN APPLICATION CONTROL

1. Application Case No. DL200200 00 12DAL				17. Name of Applicant Robert L. Johnson	
2. Ofc. No. 1010	3. County 057	4. Cong. Dist. 05	5. State 42	18. Trade Name N/A	
6. Date Recd. 011066	7. Date Accept. 011066	8. Appl. Amt. \$ 5,000.00	9. Alpha Code JOHNS	19. Permanent Street Address 5800 Central Parkway	
10. Prim. SIC N/A	11. Sec. SIC N/A	12. Min. Code 7	13. Distr. No. 079108	20. City and State Dallas, Texas	21. ZIP Code 75205
14. Program Fund ☐ (0) Business ☒ (1) Disaster ☐ (7) HUD ☐ (2) Lease Guar. ☐				22. Name of Participant Texas Bank of Dallas	
15. Sub-Program ☐ (1011) L ☐ (2014) DPA ☐ (4071) S01 ☐ (1015) SBLP ☐ (2016) EIDL ☐ (4191) S02 ☐ (1016) SEMP ☐ (2017) PDL ☐ (6011) 302 ☐ (1018) DBL ☐ (3011) EOL-I ☐ (6131) 303 ☒ (2011) DL ☐ (3021) EOL-II ☐ (7011) HUD				23. Street or P. O. Address (if any) 298 Commerce Street	
16. Loan Type ☐ (01) Direct ☒ (03) IP Bank Svc. ☐ (04) IP SBA Svc. ☐ (07) Guaranty ☐				24. City and State Dallas, Texas	25. ZIP Code 75207
26. Bank Tr. No. 0320000		27. No. of Part. 1	28. HUD Case No.		
29. This Loan is: ☐ (1) Companion to 502 ☐ (2) Pool Loan ☐ (3) Timber Access		30. Loan Involves Constr. ☒ (1) Yes ☐ (2) No			
31. Prog. Structure Code 05 01 01		32. Disaster Loans ☒ (1) Home ☐ (2) Bus.			
Action Control					
33. Final Action and Date ☒ (1) Approved 011566 ☐ (2) Withdrawn ☐ (3) Declined		34. Amount Approved Total \$ 5,000.00 SBA's Share \$ 2,500.00 35. Maturity Terms 060 months		36. Interest Rate SBA 3.000 % Bank 6.000 % 37. SBA Share 050.000 % Part. Share 050.000 %	
40. Authorizing Signature, Title and Date Disaster Br Mgr 1/15/66		38. Collateral Value Real \$ 10,000.00 \$ 2,500.00 Other \$ 0 \$ Appraisal Code 2		39. Other Required Data	

SBA FORM 135(11-65) PREVIOUS EDITIONS ARE OBSOLETE

2000

FORM 697 BUSINESS GROWTH DATA

Enter 10 digit loan numbers in columns 1-10. Enter 6-digit numbers in columns 1-6, and fill in 7-10 with zeros.

Four J a!! \$ amounts to the nearest thousand, omit the last three zeros, and enter the remaining digits as far to the right as

Record minus signs, if appropriate, only in columns headed "minus" (cols. 53, 62, 67).

CARD 1 and 2														CARD 1 only																																			
Loan Number														As Of		Current Assets (Including Inventory)	Current Liabilities	Inventory	Other Assets	Other Liabilities	P/L Period																												
																					From		To																										
														Mo.	Yr.						Mo.	Yr.	Mo.	Yr.	Mo.	Yr.																							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48		

		CARD 2	
Office Ident. Code		<input type="text"/>	<input type="text"/>
		22 23	24 25
Applicant ☐ (1)	Errorer ☐ (2)		
26	26		
Month <input type="text"/>	Year <input type="text"/>		
27 28	29 30		
(use 01 for Jan., 02 Feb., etc.)			

[illegible]

APPENDIX VI
LOSS STUDY FILE

<u>Item Description</u>	<u>Record Position</u>	<u>Size/ Class</u>	<u>Remarks</u>
Identification No.	1 - 6	6N	
Blank	7 - 50		
Servicing Office	51 - 54	4N	
State Code	55 - 56	2N	
SIC Code	57 - 60	4N	
Sub Program	61 - 64	4N	
SBA Per Cent of Approval	65 - 70	6N	
Loan Type	71 - 72	2N	
Major Program Code	73	1A	
Gross Disbursement Code	74 - 75	2N	
SBA Disbursement Code	76 - 77	2N	
Gross Charge-Off	78 - 87	10N	
Charge-off Date	88 - 93	6N	
Charge-off Code	94	1N	
SBA Accrued Interest Charge-off	95 -104	10N	
SBA Share of Charge-off	105 -114	10N	
Estimated Loss (gross)	115 -124	10N	
Estimated Loss (blank)	125 -134	10N	
Initial Disbursement Date	135 -140	6N	
Latest Disbursement Date	141 -146	6N	
Gross Disbursement	147 -156	10N	
SBA Disbursement	157 -166	10N	
Blank Disbursement	167 -176	10N	
Year of Charge-off Code	177	1A	

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