THE CREDIT QUALITY OF BANK DEBT IN THE PUBLIC VERSUS PRIVATE MARKET

by

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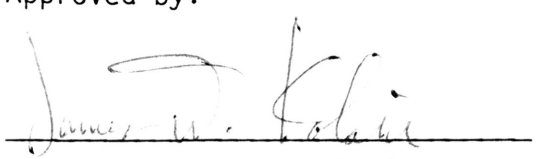

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ABSTRACT

Long-term debt has become an important vehicle for raising capital in the commercial banking industry. Competition, changing balance sheet structures, and new banking legislation have caused long-term debt as a percentage of total new equity to increase from 14.2% in 1970 to 40% in 1977.

Banks can acquire debt in either of two markets: the public market allows banks to issue their debt to the public at large through underwriters, while the private market involves directly "placing" the dbt with a small group of investors. It is interesting to note that interest costs are higher in the private market, thus marking it a more costly avenue by which to borrow. However, it can be inferred that there must be some nonpecuniary reasons for issuing debt in the private market or it would not exist in the first place. If these nonpecuniary characteristics of the private market offset the lower interest costs of the public market, we would expect to see free arbitrage between the two markets as investors seek to maximize their total returns. Free arbitrage would indicate that there was relatively little difference between the two markets; however, if arbitrage is limited, certain banks may be restricted from using the market which best fits their unique characteristics. Because a lack of credit-quality in one of the two markets may indeed cause limited arbitrage, this study seeks to determine if there is any difference between the credit-quality of debt issues in the public and private markets.

There are two competing arguments concerning the relative credit-quality of the two markets. Hemple [10] argues that bank debt is riskier because it is subordinated to deposits by regulatory mandate. This higher level of risk would cause private-market investors, who invest a huge portion of funds in one issue, to shy away from all but the the highest-quality debt issues leaving public-market investors, who spread their risk over a number of issues, to purchase those securities of relatively lower credit-quality. Thus, the bulk of the lower-quality issues would be in the public market.

Conversely, Shapiro and Wolf [26] argue that private borrowers are usually financially weaker and that their debt issues are thus of lower credit-quality. Beacause public issues are rated by the national rating agencies, these financially insecure firms would receive such a low rating that it would be extremely difficult to induce investors to buy the issues. Thus, the financially weaker firms would be forced to go to the private market for their capital needs where, because there are no ratings, their borrowing chances would be better.

Thus, these conflicting viewpoints give rise to the following testable null-hypotheses:

1. The overall credit-quality of bank debt issues in the private market is on the average the same as that found in the public market.

    A. The relative importance of specific financial variables indicative of default-risk is the same for banks issuing debt in these two markets.

The current literature on this subject is sparce. One

study by Peavy [18] centered on the building of a model for classifying the debt of bank holding companies into the catagories used by the major rating agencies. Peavy found that certain financial variables (total assets and total interest/total revenues) were especially significant in explaining bond ratings.

Hardy [8] cites confidentiality, flexibility, and nominal transactions costs as reasons why many investors use the private market. Zinberg [36] augmented the Hardy study by citing other private-market advantages including "negative clauses", which allow the lender to monitor the borrowers financial structure during the holding period, and "blind spots", which give the borrower a "grace period" before the commencement of debt service.

Shapiro and Wolf [26] note that when "switching" between the two markets does occur, it is usually based on interest-cost differentials, while Rea and Brockshmidt [22] found that other factors, such as those mentioned above, cause borrowers to forfeit the lower interest cost of the public market in lieu of nonpecuniary advantages associated with the private market.

The present study takes the Peavy paper a step further by rating private market issues with a model used to classify public bonds in an attempt to determine if there is any credit-quality differences between the two markets.

The statistical sample was gathered using data presented in Irvine Trust's Corporate Securities Issued: Commercial Banking [1] and included public and private bonds issued by banks from 1972-1979. The

sample was then screened to include only those banks whose financial data is on the COMPUSTAT [3] computer-based tape series. Ratings were obtained from Moody's Investor Service [17]. The Multiple Discriminant Analysis (MDA) method of multivariate statistics was used to find a model which was effective in predicting the ratings of bonds. Then, this same model (in various forms) was used to assign a rating to the private issues. By observing the differences in credit-quality ratings of the two markets, an inference can be made as to which market, if any, is financially stronger.

The results of the analysis are as follows:

1. Little difference is observed between the credit quality of bank debt issues in the public and private markets--an equivalent amount of low and high quality issues was found in both markets.
2. The MDA model performed the poorest in trying to distinguish between A and AA rated issues.
3. The most significant financial variables were total assets (variable x12), borrowed funds (variable x11), and purchased funds (variable x10). Relatively insignificant financial variables were return on assets (variable x4), equity to loans (variable x7), and U.S. Treasury holdings (variable x9)
4. The important variables in number 3 (above) were significant in rating issues in both the public and private markets.

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To Laurie

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INTRODUCTION[1]

Since 1967, the issuance of long-term debt by United States banks has shown a steady and marked increase. Indeed, the ratio of long-term debt to new equity has increased from 14.2% in 1970 to 40% in 1977 [8]. There are three possible reasons for this trend. First, banks have sought to lengthen the maturity structure of their liabilities to match, or hedge, their relatively longer-term asset holdings. Second, banks have been forced to compete for funds in a much more aggressive manner in recent years and, in turn, are becoming less dependent on traditional sources of funds (i.e., deposits) and utilizing new sources such as long-term debt. Finally, and perhaps most important, when government regulations redefined bank capital to include debt in 1963, expansion-minded banks recognized this as an opportunity to meet capital adequacy requirements while obtaining a low cost[2] form of new external financing. These three factors have played a major role in the proliferation of bank debt in the post-war era.

Banks can acquire debt in either the public market or the private market. In the public market, the bank uses an underwriter to distribute the securities to the public at large. In the private market, the issue is placed directly with an institutional investor. It is interesting to note that the interest cost of a private placement is usually much higher. Why then would a bank issue debt in the private market? The answer lies in the advantages of the private placement including: (1) distribution

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[1]The format of this paper is consistent with that found in The Journal of Finance.

[2]Interest paid on debt is deductable for income tax purposes.

costs are virtually eliminated since the issuer incurs no S.E.C. registrative fees, and (2) private issues can usually be negotiated and placed much more rapidly than public offerings. Of course, banks should freely move from one market to the other (or arbitrage) based on their best interests. If this were the case, there should be no differences among banks participating in either market. However, if arbitrage is restricted in any way, certain banks may be prevented from issuing debt in one of the two markets. This study seeks to measure the extent of such limited arbitrage by comparing the credit quality of banks in the public versus private debt market.

The paper is organized into seven parts. The next section gives a statement of the problem and underlying rationale for its controversial nature. The third section states the research hypotheses applicable to this problem in a statistically testable manner. The methodology is detailed in the fourth section with the results thereof appearing in the fifth section. The last section contains a summarization of the study in addition to important conclusions and implications for future research.

STATEMENT OF THE PROBLEM

Evidence of differences in credit quality may be inferred to support the existence of limited arbitrage (i.e., banks cannot freely issue debt in the most appropriate market). Hence, the key problem and sub-problem that this study will address are:

1. Is the overall credit-worthiness of private market banks different than public market banks with respect to long-term indebtedness?
   A. What financial factors are most important in determining bank debt credit quality?

The main focus of this study concerns two conflicting viewpoints over the differences in credit-worthiness of banks issuing debt in the two markets. First, some feel (e.g., see Shapiro and Wolf [26, p. iii] and Hempel [10, p. 128]) that the credit quality of banks in the private market is relatively lower. They point out that were a bank to attempt to place a low quality rating issue (see Appendix Exhibit A-1 for explanation of bond ratings) in the public market, it would be too difficult to induce anyone to buy the issue. This would, in effect, "crowd out" all of the lower quality debt in the public market leaving only higher quality issues.

Another line of reasoning which conflicts with the "credit-quality" argument is presented by Hempel [10] and centers on a "regulatory effect." Hempel points out that in the event of a liquidation the claims of owners of debt are subordinated to the claims of depositors. This puts the holder of debt in a riskier position relative to the depositors. This problem is exacerbated in the private market because the lenders

purchase the entire issue of debt themselves (often, millions of dollars) and stand to lose a large portion of their money in the event of liquidation. This implies that private lenders would only be willing to buy the debt of banks they consider to be of the highest credit rating. The lower-quality private borrowers would be "crowded out" and forced to go to the public market for their funds.

The second, or subordinate, problem we intend to address is the financial factors most relevant to bank credit quality. The rating agencies point out a number of important ratio-type indicators measuring the risk of default but do not specify the relative weights of recommended financial variables which investors/banks should use in evaluating alternative debt securities.

RESEARCH HYPOTHESIS

The corresponding testable research hypotheses of the above-mentioned problems therefore are as follows:

1. The overall credit-quality of bank debt issues in the private market is on the average the same as that found in the public market.
    A. The relative importance of specific financial variables indicative of default-risk is the same for banks issuing debt in these two markets.

The first hypothesis, stated in null form, will be tested to find if there are, indeed, any differences in the credit quality of debt in the two markets. Shapiro and Wolf [26] state explicitly: "The most important characteristic of the private placement market is that it serves as the major source of long-term debt financing for smaller, less financially secure companies." [26, p. iii] Conversely, Rea and Brockschmidt [23] do not attribute the use of the private market for debt financing to financial insecurity, but rather to the special borrowing needs exhibited by some firms which only the flexibility of the private market can satisfy: "Real estate firms require the flexible negotiation characteristics of the private placement loan agreement to facilitate their complicated borrowing needs." [23, p. 22] This argument would support the hypothesis that there is no credit quality difference between the two markets, but rather that bankers use the two markets based on their own special needs. By using a model which can "rate" the credit quality of specific issues in both the public and private markets, this study may serve to substantiate which of the arguments is better supported.

The second hypothesis seeks to determine which financial factors are the most important in determining credit quality. This question is important for two main reasons:

1) Banks can examine their own financial statements to determine credit-worthiness based on the important financial factors found in this study.
2) Lenders in the long-term bank debt market can use these same factors to determine the level of risk (a lack of credit-worthiness) they are accepting if they purchase the debt of a specific bank.

The significance of this study stems from its importance to private lenders and borrowers alike. If, after testing, we observe that lower quality debt is found in the private market, investors would be cautious before lending money in that sector. Also, banks who recognize that their financial condition is poor would not attempt to raise funds in the public market knowing that the public market is useful only for the highest quality institutions.

Since the rating agencies have not released data explaining which variables are most important in their assessment of credit quality, this study will seek to broaden the knowledge of borrowers and lenders in the long-term debt market, enabling them to choose the best market for their debt placements based on their own specific characteristics.

REVIEW OF LITERATURE

Little or no research has been conducted on the subject of the credit quality of bank debt. One study by Peavy [18], to be discussed shortly, has analyzed public market issues of bank holding companies, but research on private market issues has been peripheral in most respects. For example, researchers [2, 6, 8, 36, 37] have discussed the relative credit quality of issuers in these two markets, and one study [9] even compares the default-risk determinants of debt costs (or returns) but few authors [22, 35,13] focus their attention specifically on public and/or private bank debt. This study is intended to provide some background knowledge of bank debt based on the aforementioned limited body of literature.

The Peavy Study

The first attempt at examining the credit quality of banks in the public debt market was carried out by Peavy [18]. Peavy attributed three factors to the increased use of debt by bank holding companies. First, bank holding companies have experienced phenomenal growth in the post-war era due mainly to restrictive branching laws in the U.S. Holding companies represent a legal means of by-passing unit-bank laws which prevent multi-office operations of banking organizations from providing geographically diversified deposit and credit services. Second, there has been an increase in the amount of bank debt outstanding, as pointed out in earlier discussion. Finally, this proliferation of bank debt has served to broaden the market, causing increased acceptance

of the securities by individuals and institutions.

Peavy used 25 independent variables to examine and identify the specific areas of profitability, capital adequacy, liquidity and asset risk significantly associated with Moody's rating system. After gathering 42 nonsubordinated debentures placed in the public market and their respective ratings (the dependent variable), Peavy identified nine statistically significant variables shown in Figure 1.

Figure 1

Nine Significant Variables for Rating Bonds: The Peavy Study

1. Total Assets
2. Total Interest Paid/Total Revenues
3. Short-Term Debt/Total Assets
4. Loans/Total Deposits
5. Stockholders Equity/Risk Assets
6. Five-Year Average Growth of Earnings Per Share
7. Common Price/Earnings Ratio
8. Dividend Yield on Common Stock
9. Net Profits After Taxes

The multivariate statistical method of multiple discriminant analysis (MDA) was employed to formulate a discriminant function to classify the bonds according to predicted ratings. This function classified 90.5% of the 42 bonds in the same way as Moody's. Peavy used stepwise regression to determine the most significant variables of the nine in Figure 1. He found total assets to be the most significant, followed closely by total interest paid/total revenues.

Other Related Studies

Other researchers have focused on the characteristics of the private market itself. Hardy [8] found a number of advantages for borrowers who use the private instead of the public market. For example, because there are no requirements for costly SEC disclosures, the private market allows anonymity and greater confidentiality. This could be important if the firm felt that information concerning the need for capital could blemish the image of the company in the eyes of the public. Furthermore, private placements require less time and cost to transact. Most private placements can be completed in 30 days rather than the four-month lag found in the public market. In addition, lower legal fees, few accounting expenses, and absence of printing, underwriting and other distribution costs reduce transaction fees to a very low level. Relatedly, borrowers of very small or large amounts (i.e., less than $25 million and greater than $1 billion) find the private market better suited to their needs. Lastly, and most important, the private placement loan contract allows the borrower and the lender greater flexibility. Large, institutional lenders in the private market, mainly life insurance companies and pension funds, are most likely to pursue mutually beneficial borrower-lender arrangements. Many companies, because of their unique and complex financing needs, prefer to borrow from financial experts at life insurance companies and pension funds rather than leaving the fate of their debt placement to less skilled investors in the public market. In the event of unforeseen circumstances, it is much easier to make changes in contract covenants, or promises, with one private investor than 200 public bond holders, for instance.

Lenders, too, have a number of advantages in using the private market for investing their funds. First, most private placements require maintenance of a sinking fund where periodic contributions are made to fund the retirements of the principal of the loan at maturity. This sinking fund can be monitored by the lender to assure the safety of his principal.

Zinberg [36] has noted other advantages for the borrower in the private market. Many times the borrower is allowed a "blind spot" where he is not required to service the debt for the first two to three years. Moreover, the borrower usually receives the option to double any required debt installments without penalty provided it does not exceed some predetermined percentage of the principal.

Zinberg pointed out that the lender's biggest advantage lies in the inclusion of restrictive provisions in the loan contract. These "negative clauses" serve to restrict the borrower from allowing his financial condition to deteriorate to a point where the repayment of the loan is in jeopardy. Usually, one of the negative clauses prohibits the borrower's working capital or current ratio from falling below a certain level. Corporate outlays, such as dividends on common and preferred stock and loans or investments in subsidiaries are also restricted. However, because of the flexibility of the private placement loan agreement, the borrower can often renegotiate portions of the negative clauses during the term of the loan. Obviously, those factors which work to the detriment of the borrower are a boon to the lender and vice versa. However, it is also clear that the characteristics of the private placement leave both the borrower and the lender with a great

deal of flexibility. This flexibility may help explain the increase in private placements as a percentage public placements from 19% in 1970 to 52% in 1972 [35].

Another portion of the literature has been devoted to the switching behavior of borrowers and lenders in the public and private markets for debt. Shapiro and Wolf [26] note that commercial banks move from one market to the other due primarily to relative cost comparisons. Rea and Brockschmidt [22] on the other hand, observed little switching from the private to the public market on account of yield spreads by investors, as most tend to concentrate their purchases in one market or the other. Indeed, life insurance companies are the chief purchasers in the private market due in part at least to the availability of expertise and financial resources required to make large direct placements. Rea and Brockschmidt concluded that the allocation of bonds between the two markets is largely determined by distribution of investors' demand for bonds between the two markets, since investors tend to confine their purchases to one market. Thus, for example, rapid inflows of funds to the bond market from life insurance customers, as has occurred since 1970, lead to increases in private placements relative to public offerings. The cause of increase in private placements relative to public offerings, therefore, is more a result of the actions of investors who deal exclusively in the private market rather than a response by borrowers to narrowing yield spreads.

Obviously there are a number of conflicting viewpoints on the part of researchers concerning the roles of participants in the long-term bank debt markets. The focus of this study transcends the actions of the

participants, per se, and concentrate on determining the credit-quality of the long-term debt instruments, themselves. A more comprehensive understanding of these instruments may serve to better define the roles of the participants in the debt markets.

The present study differs from any of the aforementioned research in one important aspect: a function used to classify a group of public bonds will be used to predict a "rating" for private issues. Since private issues are not assigned a credit-rating by the rating agencies, investors in the private market are at a disadvantage to those in the public market when attempting to determine credit quality. The function developed in the present study will enable private-market investors to assign a credit-rating to potential debt purchases in an effort to determine the amount of credit risk they are accepting in the event that they buy a specific issue. This may reduce, to an extent, some of the uncertainty which is typical of private-market investing.

The present study also seeks to determine the validity of opposing arguments concerning the credit-quality of the public versus the private market. Researchers have assumed a certain level of credit-quality for each of the two markets without examining the underlying reasons for preferences of one market over the other. This study may determine if there is indeed any difference in credit-quality between the two markets and the reasons, if any, for these differences.

METHODOLOGY

Given the purpose of this research is to study the relative credit quality of bank debt issues in the public versus private market for debt, a statistical model was needed to estimate the credit-worthiness of unrated private placements. Numerous researchers have found financial ratios and other accounting-based information available from income-statement and balance-sheet reports valuable in evaluating the credit quality of banks and nonbank, corporate businesses (e.g., see Scott [25] for an excellent review of this literature). Indeed, as previously cited, Peavy has combined such variables in a multiple discriminant analysis (MDA) model and successfully classified 38 of 42 bank holding company debt issues according to Moody's letter-grade rating system. The relevant implication of this study of these findings is that MDA may be employed to estimate private issues' letter-grade ratings. In this section the sample, variables, and MDA model design used to formulate estimates of private debt ratings is described.

Sample

All notes and bonds issued by bank holding companies (BHCs) during the period 1972-1979 were gathered from Irving Trust's Capital Securities Issued: Commercial Banking [1]. After removing convertible issues (which may be converted into common stock ownership at some future date) 244 public and 216 private issues were submitted to the following screens: (1) issue sizes of at least $2 million, (2) maturity of at least four years, (3) only one issue per BHC in either market, and (4) availability of financial data on the COMPUSTAT [3] computer-based tape series on

quarterly bank holding company information. Regarding public issues, the further requirement of a rating by Moody's Investors Services [17] was utilized. After the year 1975 all BHCs' issues were rated by Moody's while some issues in prior years have been retroactively rated. Because ratings are intended to measure the average credit quality of the borrower over the entire term of the debt contract, ratings generally do not change, except upon the development of unforeseen changes in the financial condition of the bank or firm. The relatively static nature of ratings thus makes retroactive rating a reasonable process for most issues currently outstanding. The resultant sample sizes derived from this screening procedure were 37 public and 39 private issues. Tables 1 and 2 list the companies selected and some basic characteristics of the correspondent debt securities (i.e., issue date, issue size, and term-to-maturity).

Scope. The sampling procedure yielded a group of debt issues by banks affiliated with the largest and most prominent holding companies in the United States. Nonaffiliated banks are excluded, however, many of which are smaller banks. Recall that smaller banks may be forced to seek private funding due to either the inability to obtain a rating or the receipt of rating lower than investment quality. Consequently, tests of the null hypothesis concerning the "credit-quality effect" may be influenced to some degree by raising the quality of private issues above their population level. And, the "regulatory effect" may be exaggerated somewhat as creditors of nonafilliated banks are believed to be more likely to recover a portion of their claims in the event of liquidation [10, p. 128]. Although these sampling omissions may incur some bias in

Table 1

Private Bond Issues

Bank	Issue Date	Principal ($000)	Maturity (yrs)
American Security Corp.	QTR III-1972	$ 2,500	20
Arizona Bank	QTR II-1978	10,000	20
CBT Corp.	QTR II-1974	4,000	30
Centron Corp.	QTR II-1977	21,000	6
Citicorp	QTR IV-1976	250,000	25
Citizens and Southern of Georgia	QTR II-1977	10,000	20
Continental Illinois Corp.	QTR IV-1976	150,000	20
Crocker National	QTR IV-1976	75,000	20
Equimark	QTR II-1972	20,000	20
First Alabama Bank	QTR III-1973	10,000	25
First Chicago	QTR IV-1975	60,000	18
First International Bank	QTR IV-1977	50,000	20
First Maryland Bank	QTR II-1978	5,000	15
First National Bank	QTR III-1976	2,000	20
First Pennsylvania Corp.	QTR III-1978	10,000	25
First Security Bank	QTR I-1977	50,000	20
Girard Company	QTR III-1977	20,000	20
Heritage Bank	QTR II-1978	10,000	20
Huntington Bank	QTR II-1976	20,000	20
Industrial National	QTR III-1977	10,000	20
Industrial Valley Bank & Trust	QTR IV-1978	5,000	30
Liberty National Corp.	QTR I-1977	5,000	15
Marine Corp.	QTR II-1976	17,500	15
Marshall and Isley Corp.	QTR III-1975	25,000	15
Mercantile of Texas	QTR II-1977	35,000	20
Michigan National Bank	QTR IV-1978	5,000	15
New England Merchants	QTR III-1976	10,000	4
Northwest Bancorp	QTR II-1973	10,000	20
Rainier Bancorp	QTR IV-1977	6,000	5
Republic of Texas Corp.	QTR I-1976	20,000	7
Republic New York Corp.	QTR IV-1979	15,400	25
Society Corp.	QTR II-1976	25,000	20
South Carolina National	QTR I-1978	20,000	20
Southeast Bancorp	QTR III-1976	25,000	17
Texas American Bancshares	QTR I-1976	2,000	25
Trust Company of Georgia	QTR IV-1972	15,000	25
Union National	QTR II-1977	3,000	15
United Bank of Colorado	QTR IV-1975	14,000	10
United Jersey Bank	QTR I-1979	1,200	15
Wells Fargo	QTR IV-1973	50,000	25

Table 2

Public Bank Bonds

Bank	Rating	Issue Date	Principal ($000)	Maturity (yrs)
Bank of America	AAA	QTR I-1977	$200,000	30
Bankers Trust New York Corp.	AA	QTR IV-1977	100,000	25
Centran Company	A	QTR II-1972	250,000	30
Chase Manhattan	AAA	QTR II-1979	300,000	30
Chemical New York Corp.	AAA	QTR II-1979	100,000	25
Citicorp	AAA	QTR III-1978	200,000	20
Continental Illinois Corp.	AAA	QTR II-1979	200,000	8
Crocker National Corp.	AA	QTR IV-1977	100,000	25
First Bank System	AAA	QTR II-1979	125,000	10
First Chicago Corp.	AAA	QTR III-1976	125,000	10
First International Bancorp	AA	QTR IV-1974	65,000	9
First Maryland Bancorp	A	QTR IV-1975	25,000	8
First National Boston	AAA	QTR IV-1972	100,000	8
First National State Bancorp	A	QTR II-1978	30,000	10
First Security Corp.	AA	QTR I-1972	25,000	8
Girard Company	A	QTR II-1979	50,000	8
J. P. Morgan Bancorp	AAA	QTR I-1976	150,000	10
Manufacturers Hanover	AAA	QTR III-1977	150,000	30
Maryland National Bancorp	A	QTR IV-1976	35,000	10
Mercantile Bancorp	AA	QTR I-1974	40,000	30
Mercantile of Texas Corp.	AA	QTR I-1979	35,000	20
Mid Atlantic Banks	A	QTR II-1976	20,000	8
New England Merchants	A	QTR I-1974	20,000	25
Northwest Bancorp	AAA	QTR II-1979	100,000	10
Ranier Bancorp	A	QTR III-1975	30,000	10
Republic New York Corp.	A	QTR II-1976	50,000	25
Seafirst Corp.	AA	QTR II-1976	60,000	25
Security Pacific Corp.	AA	QTR II-1976	100,000	7
Southeast Banking Corp.	A	QTR II-1975	40,000	8
Southwest Bancshares	A	QTR III-1976	40,000	25
State Street Boston Finance Corp.	A	QTR I-1975	25,000	9
Texas Commerce Bancshares	AA	QTR III-1975	50,000	10
United Bancorp of New York	AA	QTR II-1977	20,000	10
United States Bancorp	AA	QTR II-1978	50,000	10
United States Trust Company	AAA	QTR IV-1976	25,000	25
Virginia National Bancshares	A	QTR III-1976	30,000	10
Wells Fargo	AA	QTR IV-1972	75,000	25

the results, the total volume and size of individual issues by bank holding companies is generally much greater than among nonaffiliates. Thus, the sample is indicative of the largest and most representative banks acquiring debt in recent years in the United States.

Limitations. Data on the COMPUSTAT bank tapes is limited to 151 bank holding companies while the number of domestic affiliates was approximately 2,426 in 1980 [24, p. 81] during the 1972-1979 period. Hence, the sample of banks in this study is not randomly drawn from the population but dependent on the COMPUSTAT list of banks. Despite this drawback, the samples achieved in the public and private market are, in our opinion, large enough for statistical significance testing. Also, in contrast to the Peavy study relying on short-form income-statement and balance-sheet statements in Moody's Bank and Finance Manual [16], accounting items have been adjusted by COMPUSTAT for the 151 companies listed to reflect differences in accounting methods and other reporting standards. The comparability of data analyzed in this study's samples may, therefore, be more reliable relative to Peavy's data to the extent that such changes were warranted. Another possible improvement is the use of quarterly data from COMPUSTAT as opposed to annual data in the Peavy study. Because data was collected in connection with the issue date, at which time credit worthiness is scrutinized most closely by the rating agencies, the data in this study coincides more closely with the rating process itself and, thus, may be more valid. In sum, the data analyzed in this study is bounded by COMPUSTAT-based bank holding companies but is believed more reliable and valid than data employed in previous related work.

Variables

Dependent Variable. The dependent variable in this study is simply the rating assigned public issues by Standard and Poor's in addition to the estimated rating assigned by the MDA model(s). The chosen sample of public issues were rated as either Aaa, Aa, or A by Moody's, which were given dummy values in the MDA model development phase of the analyses.

Independent Variables. Table 3 summarizes the predictor variable set--including each variable's label to be referred to in various MDA models shortly, definition in accounting terms, name used in later text discussion, and calculation from COMPUSTAT codes. The first 11 variables were selectively chosen from four financial factors (i.e., asset risk, profitability, capital ratios, and liquidity) utilized by Standard and Poor's [4] in the process of assigning bank holding company ratings of debt issues. An evaluation of other factors, such as management capability and expected future earnings prospects for example, is also recommended, but as Peavy has noted [18, p. 18], numerous studies have been able to reproduce with fair success (viz., about 75 percent correct classifications) the rating systems of Standard and Poor's and Moody's by using various combinations of statistical variables.

Unfortunately, there is no theoretical foundation underlying financial ratios, nor any concensus among researchers, either of which would make the task of variable selection more straightforward. For example, appendix Tables B-1 and B-2 show the variables employed to predict problem bank situations (or banks experiencing financial difficulties) and bank failure, respectively, in the most well-known studies of the association between financial variables and bank

Table 3

The Predictor Variable Set

Variable Label	Variable Definition	Variable Name	COMPUSTAT Code
	Asset Risk Measures		
X1	EBT+Provision for Loan Losses/Provision for Loan Losses	Charge-Off Coverage	(113+106)/106
X2	Bad Debts Charged to Reserves/Gross Loans	Loan Losses	(106-59)/14
X3	Average Gross Loans/Average Gross Assets	Total Loans	32/34
	Profitability		
X4	Net Operating Earnings/Average Gross Assets	Return on Assets	(113/34)*100
X5	Net Income Available for Common/Total Book Value of Common Equity	Return on Equity	(127/67)*100
X6	Aggregate Loan & Investment Revenue Minus Total Interest Expense/Average Gross Assets	Net Interest Margin	((78+79+87)/34)*100
	Capital Ratios		
X7	Total Book Value of Common Equity Plus Reserve for Bad Debt Losses on Loans/Gross Loans	Equity to Loans	(67+59)/14
X8	Long-term Debt Not Classified as Capital Plus Capital Notes and Debentures/Total Book Value of Common Equity Plus Long-term Debt	Long-term Indebtedness	(64+48)/(67+64+48)
	Liquidity Measures		
X9	U.S. Treasury Securities/Total Assets	U.S. Treasury Holdings	2/27
X10	Federal Funds Purchased Under Agreement to Purchase Plus Large CD's Plus Other Liabilities/ Total Assets	Purchased Funds	(46+36+49)/27

Table 3 (Cont'd)

Variable Label	Variable Definition	Variable Name	COMPUSTAT Code
X11	Total Time and Savings Deposits Plus Federal Funds Sold Under Agreement to Repurchase Plus Commercial Paper/Total Earning Assets	Borrowed Funds	(33+36+11+47)/27
X12	Total Assets	Asset Size	27

condition in the last decade. Only X4, X8, and X9 (shown by asterisks in the appendix Tables B-1 and B-2) have been reported in these studies as important indicators. Furthermore, there appears to be little overlap between this study's variables and those found in operational systems of Federal bank regulatory bodies--namely, the Federal Reserve System (FRS), the Federal Deposit Insurance Corporation (FDIC), and the Office of the Comptroller of the Currency (OCC)--as is obvious from appendix Table B-3 (where asterisks mark variables found in Tables A-1 and A-2). Thus, previous bank condition literature and regulatory authorities have all appeared to emphasize, for the most part, different variables in the assessment of bank condition than the variables examined in this study recommended by the rating agencies.

For lack of any definite guidelines for variable selection, and due to the focus on credit quality in this study, our approach is to choose variables on the basis of rating agencies' recommendations. Because Moody's does not publicly suggest any particular variable set, but Standard and Poor's has, the latter's is used here. Notably, the two agencies' ratings are typically the same implying that their approaches are very similar. In fact, the public issues in our sample were rated identically by both agencies whenever letter grades were available in both cases. Finally, in comparison to the Peavy study, variables were selected from studies of bank condition in the spirit of Tables B-1 and B-2, rather than from agency recommendations; and, Moody's, as opposed to Standard and Poor's ratings, were gathered as dependent variables.

Model Design

As in the Peavy study and many other studies of bank or firm conditions, the multivariate statistical method of MDA is used to measure the quality of sample banks' debt issues. However, a distinct difference between this study and most others (including Peavy's in particular) is the testing of alternative models constructed from the variables in Table 2. These models are defined as follows:

Model I: $Z = f(X1, X6, X7, X9, X11)$

Model II: $Z = f(X2, X4, X8, X10, X12)$

Model III: $Z = f(X3, X5, X7, X9, X12)$

Model IV: $Z = f(X2, X4, X7, X9, X12)$

Model V: $Z = f(X3, X4, X8, X10, X12)$

In each of these five models the inter-correlations between the independent variables was less than $\pm$ 0, 70, so that each variable in any model contains new, or additional, information not provided by other variables. In the Peavy study a stepwise routine was utilized to reduce collinearity problems, but this potential solution (1) omits variables from analysis and (2) may arrive at a different set of significant variables depending on sample and/or variable selection. A more general approach, which accounts for the simultaneity of financial data while scanning various configurations for some "best" set of predictors, is to test a variety of models with variables conveying somewhat different information. From an applied standpoint, this involves testing a battery of models as specified above.

Another major departure from prior studies is the use of the MDA model to predict the bank credit quality of unrated bank debt issues for

RESULTS

The five MDA models were first tested for two fundamental assumptions. The first assumption is the equality of the variance covariance, or dispersion, matrices between the different rating categories. Linear models are appropriate given the equality of dispersion matrices, but nonlinear, quadratic models are advised if they are not equal (see Eisenbeis [5] for a synthesis of pitfalls in the use of discriminant analysis). A second assumption is that the MDA model significantly separates the group means of the rating groups. If separation is not significant, the model may be considered ineffective at discriminating one group from another. Table 4 gives the results of F statistic tests of these assumptions. Only for Model I is the null hypothesis of equal dispersion matrices not rejected, so that it should be performed in a linear fashion and the other models in a quadratic form (Note: Unequal dispersion matrices were reported by Peavy). In reference to the separation of group means, the significance levels of two-tail tests of the null hypothesis of equal means reveals that models III and IV are not significant. Alternatively, models I, II, and V are very significant ($\alpha \leq .005$) and are most relevant to further analyses of the data.

Tables 5 and 6 summarize the linear and quadratic classification results, respectively. Peavy also ran both types of functions, but found the results identical [18, p. 21, footnote 5], as the groups (i.e., Aaa, Aa, A) were distinctly separate. Comparing the results of the models by casual inspection, it is obvious that the results vary depending on the classification rules utilized, and that the groups

Table 4

Statistical Tests of Model Assumptions

Model	Variable Set	Test of Equal Dispersion Matrices Between Groups		Test of Equality of Group Means	
		F Statistic	Significance Level	F Statistic	Significance Level
I	X1, X6, X7, X9, X11	1.88	0.238	4.78	.005
II	X2, X4, X8, X10, X12	2.98	0.000	5.16	.002
III	X3, X5, X7, X9, X12	3.61	0.000	2.90	.502
IV	X2, X4, X7, X9, X12	2.86	0.000	3.14	.278
V	X3, X4, X8, X10, X12	3.21	0.000	4.71	.001

Table 5

Linear Classification Results of Public Issues

Model	Variable Set	Percentage (Number) Correct Classifications				Percentage (Number) Incorrect Classifications of Ratings from Group X (into Group Y)						
		AAA	AA	A	Total	AAA(AA)	AAA(A)	AA(AAA)	AA(A)	A(AAA)	A(AA)	Total
I	X1, X6, X7, X9, X11	92.3% (12)	45.5% (5)	69.2% (9)	70.3% (26)	7.7% (1)	0.0% (0)	9.1% (1)	45.4% (5)	15.4% (2)	15.4% (2)	29.7% (11)
II	X2, X4, X8, X10, X12	84.6 (11)	54.5 (6)	53.8 (7)	64.9 (24)	7.7 (1)	7.7 (1)	9.1 (1)	36.4 (4)	7.7 (1)	38.5 (5)	35.1 (13)
III	X3, X5, X7, X9, X12	69.2 (9)	45.5 (5)	7.7 (1)	40.5 (15)	0.0 (0)	30.8 (4)	18.2 (2)	36.3 (4)	7.7 (1)	84.6 (11)	59.5 (22)
IV	X2, X4, X7, X9, X12	61.5 (8)	63.6 (7)	53.8 (7)	59.5 (22)	15.4 (2)	23.1 (3)	9.1 (1)	27.3 (3)	7.7 (1)	38.5 (5)	40.5 (15)
V	X3, X4, X8, X10, X12	84.6 (11)	63.6 (7)	46.2 (6)	64.9 (24)	7.7 (1)	7.7 (1)	9.1 (1)	27.3 (3)	7.7 (1)	46.1 (6)	35.1 (13)

Table 6

Quadratic Classification Results of Public Issues

Model	Variable Set	Percentage (Number) Correct Classifications				Percentage (Number) Incorrect Classifications of Ratings from Group X (into Group Y)						
		AAA	AA	A	Total	Aaa(AA)	AAA(A)	AA(AAA)	AA(A)	A(AAA)	A(AA)	Total
I	X1, X6, X7, X9, X11	76.9% (10)	54.5% (6)	69.2% (9)	67.6% (25)	7.7% (1)	15.4% (2)	27.3% (3)	18.2% (2)	15.4% (2)	15.4% (2)	32.4% (12)
II	X2, X4, X8, X10, X12	76.9 (10)	27.3 (3)	84.6 (11)	64.9 (24)	23.1 (3)	0.0 (0)	18.2 (2)	54.5 (6)	7.7 (1)	7.7 (1)	35.1 (13)
III	X3, X5, X7, X9, X12	69.2 (9)	36.4 (4)	69.2 (9)	59.5 (22)	23.1 (3)	7.7 (1)	27.3 (3)	36.3 (4)	15.4 (2)	15.4 (2)	40.5 (15)
IV	X2, X4, X7, X9, X12	53.8 (7)	27.3 (3)	76.9 (10)	54.1 (20)	38.5 (5)	7.7 (1)	27.3 (3)	45.4 (5)	7.7 (1)	15.4 (2)	45.9 (17)
V	X3, X4, X8, X10, X12	76.9 (10)	54.5 (6)	46.2 (6)	59.5 (22)	7.7 (1)	15.4 (2)	9.1 (1)	36.4 (4)	7.7 (1)	46.1 (6)	40.5 (15)

are not as easily separated as Peavy found. Indeed, the best classification results were achieved by Model I in Table 5 using linear rules; however, at 70.3 percent the findings are outperformed considerably in comparison to the 90.5 percent accuracy of the Peavy model. One might suspect that additional variables would improve the discriminatory power of the models but rests of larger predictor batteries showed little or no improvement in results. Turning to the other models exhibited in Tables 5 and 6, Models III and IV, which did not pass the groups' means difference tests, were least effective (i.e., 40.5 percent to 59.5 percent correct classifications), whereas in rank order Models I, II, and V performed best (i.e., 59.5 percent to 67.9 percent accuracy). These bank bond and capital note classification findings parallel those of researchers investigating the predictive capabilities of similar models in conjunction with industrial bond ratings [11, 20, 34, 19, 12].

Which ratings were most difficult to distinguish? The AA and A rated issues were generally misclassified the most often. For example, the best model, or Model I in Table 5, wrongly identified five AA issues as A rated debt securities. Fewer AAA-AA misclassifications occurred, and AAA-A errors were even more infrequent. On a positive note, the AAA issues were sorted out by the significant models (i.e., Models I, II, and V) from 76.9 percent to 92.3 percent of the time.

Because the success of results generated by the linear and quadratic functions are comparable to other debt rating models in the corporate financial literature, they were employed next to estimate the ratings of private placements of bank debt securities. Though the results differed somewhat depending on the classification rules used,

neither method appears to dominate the other. Consequently, both were applied to rating private issues.

Table 7 presents the percentage distribution (and numbers of issues) by rating category. First, notice that the distribution estimated by the linear and quadratic procedures for each model are fairly consistent, albeit slightly different, which coincides with the public issues' findings. Second, the ratings for the private issues are balanced quite evenly across rating groups in Models I and V, the most significant models according to the group means' tests in Table 3. Model II distributes the ratings not too unlike the insignificant Models III and IV--namely, a preponderance of AA ratings and relatively more A than AAA ratings.

Assuming Models I and V are therefore the most reliable for the models, the credit quality of private issues appears to be very similar to the ratings assigned public issues by Standard and Poor's. That is, if the evidence is interpreted in this way, the results are mixed concerning the competing viewpoints of credit-quality versus regulatory effects on relative credit quality. This means that either arbitrage is not limited by buyers and sellers in these bank debt markets, or that the dual effects on sellers of default-risk-oriented buyers, who are influenced by (1) ratings in the public market and (2) regulatory leniency concerning creditor claims in the private market, cancel one another out. The absence of lower rated issues in our public market sample, as well as in the Peavy study, strongly favors the latter inference. Thus, the conclusion to be drawn from this evidence is that the credit quality of private issues is in all likelihood very similar

Table 7

Predicted Private Bank Credit Ratings

Model	Variable Set	Linear Model Percentages (Numbers) AAA	AA	A	Quadratic Model Percentages (Numbers) AAA	AA	A
I	X1, X6, X7, X9, X11	30.8% (12)	35.9% (14)	33.3% (13)	30.8% (12)	30.8% (12)	38.4% (15)
II	X2, X4, X8, X10, X12	15.4 (6)	61.5 (24)	23.1 (9)	10.3 (4)	41.0 (16)	48.7 (19)
III	X3, X5, X7, X9, X12	20.5 (8)	43.6 (17)	35.9 (14)	25.6 (10)	28.2 (11)	46.2 (18)
IV	X2, X4, X7, X9, X12	10.3 (4)	64.1 (25)	25.6 (10)	7.7 (3)	48.7 (19)	43.6 (17)
V	X3, X4, X8, X10, X12	30.8 (12)	41.0 (16)	28.2 (11)	35.9 (14)	38.5 (15)	25.6 (10)

to public issues due in part by bank regulatory effects in the private market which tend to raise the otherwise lower expected average quality of private debt. Relative costs would therefore be the prime determining factor influencing the supplies of issues in each market, and, unfortunately, many lesser-known and/or financially-insecure banks are prevented to some extent from obtaining external funding from long-term debentures and capital notes.

Lastly, the results of the importance of each of the variables in the various models is presented in Table 8. Other methods are available for evaluating the relative contribution of variables, but as Eisenbeis [5, p. 884] has observed, the conditional deletion method which ranks the discriminatory power added by each variable given the other variables in the model is probably the most appealing. In this regard, the percentage of discrimination explained by each variable, all else held constant, is statistically equivalent but has the further redeeming quality of being interpreted in a manner compatible with the general theme of discrimination. Scanning the findings in Table 8, it is apparent that most variables explain from 10 percent to 30 percent of the models' discriminatory power. Variables with relatively lower explanatory ability included X4 (return on assets), and, depending on the other variables in the model, X7 (equity to loans) and X9 (U.S. Treasury holdings). The most significant variables were X10 (purchased funds), X11 (borrowed funds), and X12 (total assets). By contrast, Peavy found total assets followed by total interest paid/total revenues to be most important. Hence, size appears to be a prime determinant of bank debt credit (e.g., AAA-rated banks were more than three times the asset size of

Table 8

Percentage Contribution of the Independent Variables to the Total Discriminatory Power of Alternative Models

Independent Variables		Model				
Label	Name	I	II	III	IV	V
X1	Charge-Off Coverage	11.6%				
X2	Loan Losses		4.5%		9.7%	
X3	Total Loans			28.5%		15.8%
X4	Return on Assets		16.8%		14.1%	15.6%
X5	Return on Equity			11.7%		
X6	Net Interest Margin	25.1%				
X7	Equity to Loans	7.9%		20.4%	22.0%	
X8	Long-term Indebtedness		27.5%			24.2%
X9	U.S. Treasury Holdings	19.4%		1.0%	15.8%	
X10	Purchased Funds		32.9%			25.4%
X11	Borrowed Funds	36.0%				
X12	Asset Size		18.3%	38.4%	38.4%	19.0%
Total		100.0%	100.0%	100.0%	100.0%	100.0%

A-rated banks in the public issues sample), but other financial factors, especially liquidity, are given weight by Standard and Poor's.

SUMMARY

The objectives of this research were: (1) to determine if the overall credity-quality of bank debt issues in the private market is on the average the same as that found in the public market and, (2) to determine if the relative importance of specific financial variables indicative of default risk is the same for banks issuing debt in these two markets. The method used to achieve the first objective was to build a model which would rate issues in the private market and to compare these ratings to those found in the already-rated public market. If the distribution of ratings (AAA, AA, A) was relatively the same in both the public and private market, we can infer that there is no credit quality difference between the two markets. The method used to achieve the second objective was to statistically manipulate certain financial variables to determine which ones were most significant in assigning ratings in the public versus the private markets. If the significant financial variables discovered were the same for both markets, we can infer that indications of default risk are equally applicable in both markets.

CONCLUSIONS

Based on the above analyses, the main conclusions regarding the two research hypotheses are:

1. After rating classifications of private issues using a statistically-designed model are compared to the public issues rated by Standard and Poor's, relatively little difference in credit quality is observed. Thus, the first research hypothesis is accepted.
2. The most important variables (purchased funds, borrowed funds, and total assets) were significant for debt issues in both the public and the private market. These variables explained approximately the same proportion of the model's discriminatory power in both the public and the private market. Thus, the second research hypothesis is accepted.

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APPENDIX A

EXPLANATION OF AGENCY RATING SYSTEMS

EXHIBIT A-1

THE AGENCY RATING SYSTEMS

Moody's and Standard and Poor's[1] are the two best-known rating agencies. Their rating system involves assigning a letter code to securities which corresponds to a specific level of credit and default risk as described below.

Aaa/AAA	Bonds with this rating are obligations of the highest grade. They provide the ultimate degree of protection for both principal and interest. And their prices move up and down only as interest rates move up and down.
Aa/AA	Bonds with this rating also qualify as high-grade obligations and differ from AAA bonds only in small degree. Their prices also move in conjunction with interest rates.
A/A	Bonds with this rating are regarded as upper medium grade. Their principal and interest payments are safe, and they have considerable investment strength. But their prices reflect not only changes in interest rates but, to some extent, changes in economic and trade conditions as well.
Baa/BBB	Bonds with this rating are considered medium grade. They have adequate asset coverage and normally are protected by satisfactory earnings. But their prices respond more to business conditions than to interest rates, and they need constant watching. In short, these bonds fall between definitely sound obligations, and those dominated by a speculative element, and are the lowest grade of bond qualifying for investment by institutions.
Ba/BB	Bonds with this rating are regarded as lower medium grade. The fortunes of the companies that issue them may change swiftly as economic conditions change. Utility bonds in this category consistently earn interest--by narrow margins. Other kinds of bonds generally earn interest by a fair margin. Yet, in poor periods, deficit operations are possible.
B/B	Bonds with this rating are regarded as speculative. When difficult economic conditions prevail, interest payments cannot be assured.
Caa/CCC	Bonds with this rating are regarded as extremely speculative. Their issuers pay interest, but it is questionable whether they will do so if trade conditions become poor.

Ca/CC	Bonds with this rating are more speculative yet. Their issuers may have agreed to pay interest only when they earn income. And, under any conditions, payments may be small.
C/C	Bonds with this rating meet two clear-cut criteria: Their issuers have agreed to pay interest only when they earn income. And they presently are doing neither. (Note: Standard and Poor's reviews all its bond ratings from time to time as conditions warrant.)
DDD, DD and D	Bonds with these ratings are in default. The particular rating indicates the bond's salvage value in relation to other bonds' salvage value.

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[1]Standard and Poor's also may "attach" a (+) or (-) to their ratings.

Source: Adapted from Hugh C. Sherwood, "How They'll Rate Your Company's Bonds," Business Management (March 1966): p. 41.

APPENDIX B

VARIABLES REPORTED IN BANK FAILURE STUDIES SCREENING RATIOS OF THE FEDERAL FINANCIAL REGULATORY AGENCIES

Table B-1

Variables Reported in Problem Bank Studies

Ratio Variables	Stuhr and Van Wicklen (1974)	Sinkey Winter (1975)	Sinkey March (1975)	Korobrow, Stuhr and Martin (1977)	Sinkey (1978)
	[28]	[29]	[27]	[14]	[30]
Capital					
Total Capital/Total Assets	X				
Total Capital/Risk-Adjusted Assets		X		X	
Excess Capital Funds/Risk-Adjusted Assets		X			
Total Loans/Capital and Reserves*			X		
Adjusted Capital Ratio					X
Net Capital Ratio					X
Profitability					
Net Income Before Taxes/Total Capital	X		X		
Dividends/Total Capital	X				
Interest and Fees on Loans/Total Operating Income		X			
Net Income/Total Assets		X			X
Interest Paid on Deposits/Total Revenut			X		
Net Income/Total Capital			X		
Asset Quality					
Loans/Assets	X		X		
Classified and Specialty Assets/Total Book Capital	X				
Total Loans and Discounts/Total Assets		X			
Total Loans/Total Revenue			X		
U.S. Treasury Securities/Total Revenue			X		
State and Local Obligations/Total Revenue			X		

Table B-1 (Cont'd)

Ratio Variables	Stuhr and Van Wicklen (1974)	Sinkey Winter (1975)	Sinkey March (1975)	Korobrow, Stuhr and Martin (1977)	Sinkey (1978)
	[28]	[29]	[27]	[14]	[30]
Gross charge-offs/Net Income and Provision for Losses				X	
Classified Loans/Total Assets					X
Classified Loans/Total Loans					X
Substandard Loans/Total Loans					X
Liquidity					
Cash and U.S. Government Securities/Total Assets			X		
Interest Sensitivity and Liabilities for Borrowed Money					
Total Borrowings/Total Capital	X				
Efficiency					
Operating Expenses/Operating Revenue		X	X	X	
Other Expenses/Total Revenue			X		
Other Ratios					
Bank Size	X				
Commercial and Individual Loans/Total Loans		X			
Commercial and Industrial Loans/Total Loans				X	

Table B-2

Variables Reported in Bank Failure Studies

Ratio Variables	Meyers and Pifer (1970) [15]	Sinkey Spring (1975) [28]	Hanweck (1977) [7]	Sinkey (1977) [31]	Rose and Scott (1978) [23]
Capital					
Total Loans/Total Capital and Reserves*		X	X		
Total Capital/Book Value of Assets			X		
Total Capital and Reserves for Bad Debts/Total Assets				X	
Profitability					
Operating Income/Total Assets	X			X	X
Rate of Interest on Securities	X				
Rate of Interest on Time Deposits	X				
Net Income/Total Assets		X		X	X
Net Income/Total Capital		X		X	X
Net Operating Income/Total Assets*			X	X	
Interest and Fees on Loans/Operating Income				X	
Interest and Fees on Loans/Total Loans					X
Revenue on Loans/Total Loans					X
Interest on Investments/Operating Income					X
Cash Dividends/Operating Income					X
Asset Quality					
Questionable Assets/Total Assets	X				
Losses on Assets/Total Capital					X

Table B-2 (Cont'd)

Ratio Variables	Meyers and Pifer (1970) [15]	Sinkey Spring (1975) [28]	Hanweck (1977) [7]	Sinkey (1977) [31]	Rose and Scott (1978) [23]
Liquidity					
Cash and Securities/Total Assets	X				
Customer's Liability on Acceptances Outstanding/Total Assets		X			
U.S. Government Securities/Total Assets*				X	
State and Local Government Securities/Total Assets				X	X
Interest Sensitivity and Liabilities for Borrowed Money					
Time Deposits/Demand Deposits	X				
Deposits of States and Political Divisions/Total Deposits		X			
Acceptances Executed by or for Account of This Bank and Outstanding/Total Liabilities		X			
Interest on Deposits/Time and Savings Deposits					X
Efficiency					
Operating Expenses/Operating Income		X		X	X
Indebtedness of Directors, Officers, Employees (DOE) and Affiliates/Total Capital		X			
Operating Revenue/Operating Expenses	X				
Net Occupancy Expense/Operating Income		X			
Interest on Other Borrowings/Operating Income		X			
Operating Expenses/Total Assets				X	X
Interest on Other Borrowings/Total Expenses					X
Other Expenses/Total Expenses					X
Employee Fringe Benefits/Total Expenses					X
Interest on Deposits/Total Expenses					X

Table B-2 (Cont'd)

Ratio Variables	Meyers and Pifer (1970) [15]	Sinkey Spring (1975) [28]	Hanweck (1977) [7]	Sinkey (1977) [31]	Rose and Scott (1978) [23]
Change Ratios					
Rate of Growth of Cash and Securities/Total Assets	X				
Asset Growth Ratio		X	X		
Deposit Growth Ratio		X			
Capital Growth Ratio		X			
Rate of Change: Net Operating Income			X		
Other Ratios					
Total Loans	X				
Consumer Loans/Total Assets	X				X
Real Estate Loans/Total Assets	X				
Fixed Assets/Total Assets	X				
Total Assets (Natural Logarithm)			X		
Total Loans/Total Assets				X	
Net Federal Funds/Total Funds				X	
Commercial Real Estate Loans/Total Assets					X
Loans to Banks/Total Loans					X
Security Loans/Total Assets					X
Business Loans/Total Assets					X
Federal Funds Sold/Total Assets					X
Federal Funds Purchased/Total Assets					X

Table B-3

Screening Ratios of the Federal Financial Regulatory Institutions*

Ratio	Federal Reserve Bank	Federal Deposit Insurance Corp.	Office of the Comptroller of the Currency
Capital			
(1) Equity Capital Decrease		X	
(2) Equity Capital/Total Assets			X
(3) Retained Earnings/Average Equity Capital			X
(4) Equity Capital/Adjusted Risk Assets	X		
(5) Gross Capital/Adjusted Risk Assets	X		
(6) Reserves to Total Loans			
(7) Net Scheduled Item/Net Worth			
Profitability			
(1) Net Operating Income/Average Total Assets*		X	
(2) Net Income/Assets			X
(3) Interest Expense on Deposits and Federal Funds Purchased and Borrowings/Total Operating Income		X	
(4) Total Expenses-(Provision for Loan Losses + Dividends)/Gross Income			
(5) Adjusted Return on Assets			X
(6) Net Income/Total Assets-Cash Item	X		
(7) Total Other Earnings/Average Assets			X
(8) Gross Operating Income/Average Assets			
(9) Net Income/Gross Income			
(10) Net Operating Income/Gross Operating Income			

*See Putnam [17]

Table B-3 (Cont'd)

Ratio	Federal Reserve Bank	Federal Deposit Insurance Corp.	Office of the Comptroller of the Currency
Asset Quality			
(1) Delinquent Loans/Total Assets			
(2) RFO and LTF's/Total Assets			
(3) Delinquent Loans/All Reserves			
(4) Delinquent Loan Ratio			
(5) Gross Loan Losses/NOI + Provision	X		
(6) Provision for Possible Loan Losses/Average Assets			X
(7) Speculative Lending/Total Assets			
(8) Gross Charge-Offs-Recoveries/Average Loans		X	
(9) Net Scheduled Item/Total Assets			
Liquidity			
(1) Net Borrowings-Mortgages/Cash and Due from Banks + Total Securities maturing in one year or less		X	
(2) Notes Payable-(Cash + Investments)/Shares			
(3) Loans + Leases/Total Sources of Funds	X		
(4) Liquid Assets/Total Sources of Funds	X		
(5) Gross Loans + Discount/Total Deposits		X	
Interest Sensitivity and Liabilities for Borrowed Money			
(1) $100,000 or more Time Deposits + Net Borrowings/Total Loans		X	
(2) Advances + Borrowed Money/Total Savings			
(3) Interest-sensitive Funds/Total Sources of Funds	X		
(4) High-rate Savings/Total Savings			

Table B-3 (Cont'd)

Ratio	Federal Reserve Bank	Federal Deposit Insurance Corp.	Office of the Comptroller of the Currency
Efficiency Ratios			
(1) Total Operating Expenses/Total Operating Income	X		
(2) Noninterest Expense/Total Operating Income - Interest Expense	X		
(3) Cost of Savings (YTD)/Total Savings			
(4) Net Interest Earnings/Average Assets			X
(5) Operating Expense/Average Assets			
(6) Cost of Money/Average Savings and Borrowings			
Change Ratios			
(1) Asset Growth Ratio			
(2) Change in Asset Mix			X
(3) Change in Liability Mix			X
(4) Change in Loan Mix			X
(5) Percent Change in Total Savings			
(6) Percent Change in Mortgage Loans			
(7) Percent Change in Shares (from previous period)			
(8) Percent Change in Time Deposits		X	
(9) Percent Change in Other Time Deposits		X	
(10) Loan Growth Exceeds Deposit Growth		X	
(11) (1) Cash Dividends on Common + Preferred Stock/Net Income		X	
(12) (2) Cash Dividends/Net Income	X		
Other Ratios			
(1) Commercial and Industrial Loans/Total Loans, Gross	X		
(2) Mortgage Commitments/Total Assets			
(3) All Other Commitments/Total Assets			