To the Graduate Council:

I am submitting herewith a dissertation written by Nicholas G. Apostolou entitled "An Empirical Evaluation of the Relationship Between Accounting Information and Municipal Bond Net Interest Cost." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Business Administration.

Hartwell C. Herring III, Major Professor

We have read this dissertation
and recommend its acceptance:

Accepted for the Council:

Vice Chancellor
Graduate Studies and Research

AN EMPIRICAL EVALUATION OF THE RELATIONSHIP BETWEEN ACCOUNTING INFORMATION AND MUNICIPAL BOND NET INTEREST COST

A Dissertation

Presented for the

Doctor of Business Administration

Degree

The University of Tennessee, Knoxville

Nicholas G. Apostolou

August 1982

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ABSTRACT

The objective of this study was to test the association between the surplus/deficit of selected Minnesota municipalities and the net interest cost of the general obligation bonds issued by these municipalities. The effect on net interest cost of the surplus/deficit was tested by employing a pooled time-series cross-sectional design. After modeling the primary determinants of net interest cost, a test of the reaction of net interest cost to changes in the expectation of the surplus/deficit became feasible.

The sample was dichotomized into two groups: those municipalities with positive forecast errors and those municipalities with negative forecast errors. A two-way analysis of variance was employed to determine if there was a significant difference in the effect on net interest cost between positive and negative forecast errors.

To enhance the validity of this study, an additional test was performed that employed the criteria developed by Standard & Poor's to evaluate the financial condition of municipalities. According to Standard & Poor's, two consecutive years of deficits may indicate fiscal stress. This study employed this criterion in comparing the effect on net interest cost of the bonds of municipalities with two consecutive years of surpluses and municipalities with two consecutive years of deficits.

The ANOVA results of both tests indicate that the surplus/deficit is not correlated with increases/decreases in the net interest cost of the bonds issued by a municipality. The results were unaffected by the exclusion of bond ratings as an independent variable.

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CHAPTER I

INTRODUCTION

Research concerning the association between accounting information and security prices has appeared frequently in the accounting literature. These studies were performed in response to the dissatisfaction among certain academicians with the existing a priori approach to accounting research (Gonedes and Dopuch, 1974). The pioneering study that addressed this issue was by Ball and Brown (Ball and Brown, 1968). Their paper examined the reaction of the capital market to a set of firms with positive earnings changes as compared with a set of firms with negative earnings changes.

Only one study has extended security price research to a broader class of "securities" markets. Davis, et al., examined the impact of accounting earnings data on corporate bond price behavior (Davis, Boatsman, and Baskin, 1978). The results of the study indicate that the inferences drawn from security price research may be extrapolated to the convertible segment of the bond market.

No study has extended security price research to the market for municipal securities. This omission is more a function of the methodological difficulties encountered in pursuing this research rather than an indication of the importance or lack thereof of the municipal securities market. Long-term municipal issuances have grown from a volume of $17.8 billion in 1970 to 29.3 billion in 1975 and 47.1 billion in 1980 (Moody's, 1982, p. a7). In contrast, the gross

proceeds from the sale of corporate bonds totaled 30.3 billion in 1970, 42.8 billion in 1975 and 52.5 billion in 1980 (Moody's, 1981, p. a31). The sale of common stock resulted in gross proceeds of 7.2 billion in 1970, 8.3 billion in 1975 and 16.7 billion in 1980 (Moody's, 1981, p. a31).

Extensive research has appeared in the public finance literature about the determinants of interest paid by individual state and local governments on their new long-term bond issues. This research suggests that interest may be a function of market conditions, issuer characteristics, issue characteristics, underwriting method and level of bidder competition (Sorensen, 1980; Hendershott and Kidwell, 1978; Kessel, 1971; West, 1967). However, the potential role of accounting information in determining net interest cost has been largely ignored.

The value of accounting information for the analysis of municipal securities has been questioned (Forbes, 1980, pp. 92-99). Financial accounting information about municipalities is generally not as reliable, comparable, or timely as information about corporations (Coopers & Lybrand, 1976). Financial statements are provided annually by most cities. However, this information is often not prepared in accordance with generally accepted accounting principles and may not be audited by independent certified public accountants. Moreover, few cities publish interim quarterly financial reports. Furthermore, municipal financial statements generally lag fiscal year closings by six to nine months, in contrast to the average corporate lag of three months (Ingram, 1980, p. 3). The U.S. Census Bureau collects data on

municipalities, whose population exceeds 50,000. These data are published approximately two years after the fiscal year-end in City Government Finances.

Although there is widespread concern about the quality of financial reporting by municipalities, there is strong empirical support for the usefulness of financial statements. A survey of 106 banks in the United States, each of which had total assets exceeding $1 billion, determined that 82 percent of the bankers surveyed consider financial statements useful and employ them at least moderately as a source of information for evaluating municipal bond issues (Boyett & Giroux, 1978). Only 4 percent of the respondents indicated that financial statements are not considered useful.

Purpose of Research

The objective of this research is to investigate the relationship between accounting information and municipal bond net interest cost.[1] If the municipal securities market is efficient and unbiased,

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[1]As a result of the difficulty of computing true interest cost (TIC), net interest cost (NIC) is the most commonly reported statistic as the market measure of interest. NIC is calculated as follows:

$$NIC = \frac{\text{total coupon interest payments}^{*} + \text{bid discount (or - bid premium)}}{\text{number of bond year dollars}^{**}}$$

$$^{*}\ \Sigma \left[\text{coupon rate on each maturity} \times \text{par amount in each maturity} \times \text{number of years to maturity}\right]$$

** bond year dollars = sum of the product of the par values of each bond and the number of years to its maturity, i.e.,

$$\Sigma \left[\text{par amount in each maturity} \times \text{number of years to maturity}\right]$$

where Σ = sum over all maturities (Wallace, p. 252, 1980).

then the market will rapidly adjust the net interest cost of bonds issues to that information. If the net interest cost of bonds does in fact adjust to new accounting information as this information becomes available, then changes in net interest cost will reflect the flow of information to the market.

This study extends the pioneering effort of Ball and Brown in assessing the usefulness of accounting income numbers by examining the information content and timeliness of these numbers. Their method of relating accounting income to security prices focused on the information that is unique to a particular firm. Specifically, they constructed two alternative models of what the market expects income to be and then investigated the market when its expectations proved false. An analogous methodology is adopted in this study, with adjustments required for data availability problems in the public sector.

Revenues and Expenditures

The accounting information evaluated is the difference between revenues and expenditures of the municipality. Although revenues minus expenditures may not equal in importance the net income figure reported by private business enterprises, this difference can provide an early warning signal of financial crisis. The deficit, if severe, results in an accumulated fund deficit that in turn must be financed with short-term loans. If these deficits continue, the unit may be unable to obtain renewal of the short-term loans and will be in default.

The example of New York City illustrates the difficulties that can arise from continuing budgetary deficits. The period from 1960-

1975 was characterized by continual deficits that required the increasing use of short-term debt. Table 1-1 provides the evidence available from U.S. Census figures that should have forewarned observers of the approaching debacle that occurred in the winter of 1975-1976 when the credit market closed to the city, placing it in virtual default. The need to finance the deficits required the use of increasing amounts of short-term debt (see Table 1-2). By late 1974, New York City accounted for over 40 percent of short-term tax-exempt financing in the United States (Morris, 1980, p. 223).

Standard and Poor's Corporation has emphasized its concern about the importance of the revenues minus expenditures balance (hereafter called the surplus/deficit) by the attention devoted to this figure in its list of early warning indicators about a community's financial status. The first three items are concerned with the surplus/deficit balance (see Table 1-3).

Moody's analyzes four major categories of variables in determining a bond rating: (1) measures of a community's economic base; (2) financial factors; (3) measures of the amount of debt and the debt burden; and (4) administrative factors. Financial factors focus on the revenue structure, the balance among different types of taxes, and the relationship between expenditures and revenues. Both revenue trends and expenditure trends are listed as important variables under financial factors (see Table 1-4).

The importance of the difference between revenues and expenditures is examined by determining if there is a statistically

Table 1-1. New York City Budget Data, Fiscal 1960-1974 (Millions of Current Dollars).

Date	Revenue	Current Expenditures Plus Debt Retirement	Current Account Surplus
1960	2,769.6	2,726.5	43.1
1961	2,901.0	2,948.2	- 47.2
1962	3,119.5	3,170.0	- 50.5
1963	3,408.4	3,459.0	- 50.6
1964	3,688.8	3,788.5	- 99.7
1965	3,961.1	4,015.4	- 54.3
1966	4,367.5	4,537.0	-169.5
1967	5,174.8	5,176.0	- 1.2
1968	6,085.8	6,144.1	- 58.3
1969	6,864.7	6,945.6	- 80.9
1970	7,233.9	7,775.4	-541.5
1971	8,274.8	9,053.9	-779.1
1972	9,501.5	10,119.6	-618.1
1973	10,774.9	10,807.2	- 32.3
1974	11,291.5	11,779.1	-487.6

Source: Edward M. Gramlich, The American Economic Review, May, 1976, p. 416.

Table 1-2. New York City Volume of Municipal Borrowing (1967-1975) (Amounts Are Par Values in Millions of Dollars).

Year	Long-Term	Short-Term	Total
1967	14,300	8,000	22,300
1968	16,300	8,600	24,900
1969	11,700	11,700	23,400
1970	18,888	17,811	35,999
1971	25,006	26,259	51,265
1972	23,748	24,705	49,018
1973	23,957	24,705	48,662
1974	24,317	29,543	53,860
1975	30,124	33,932	64,056

Source: Congressional Budget Office, New York City's Fiscal Problem: Its Origins, Potential Repercussions, and Some Alternative Policy Response, 1975, p. 8.

Table 1-3. Standard and Poor's Corporation Early Warning Indicators.

Early Warning Indicators
1. Current year operating deficit
2. Two consecutive years of operating fund deficit
3. Current year operating deficit that is larger than the previous year's deficit
4. A general fund deficit in the current year--balance sheet current position
5. A current general fund deficit (2 or more years in the last 5)
6. Short-term debt outstanding (other than BAN) at the end of the fiscal year, greater than 5% of main operating fund revenues
7. A two-year trend of increasing short-term debt outstanding at fiscal year end
8. Short-term interest and current year debt service greater than 20% of total revenues
9. Property taxes greater than 90% of the tax limit
10. Net debt outstanding greater than 90% of the debt limit
11. Total property tax collections less than 92% of total levy
12. A trend of decreasing tax collections--two consecutive years on a three-year trend
13. Declining market valuations--two consecutive years--three year trend

Source: Farnham and Cluff, The Municipal Bond-Rating Process: Implications for Local Government Decisions, 1981, p. 30.

Table 1-4. Moody's Investors Service, Inc.--Major Variables Analyzed in Determining Municipal Bond Ratings.

Financial Analysis
Use of short-term debt
Assessed value of property--level and trends
Tax rates
Tax structure--balance among types of taxes
Mandated expenditures
Debt service as percent of total expenditures
Percent taxes collected
Revenue trends
Expenditure trends

Source: Moody's Investors Service, Inc., Pitfalls in Issuing Municipal Bonds, 1982, pp. 17-19.

significant association between changes in the surplus/deficit and changes in net interest cost. If such an association is discovered, this association does not necessarily imply that changes in the surplus/deficit cause changes in net interest cost. Rather, the surplus/deficit either includes information or reflects information that the market place captures in determining net interest cost. Assuming a significant association exists, new information about the surplus/deficit should cause an adjustment in net interest cost as this information becomes available throughout the year.

Sample Selection

The bonds selected for this study are the general obligation bonds issued by Minnesota municipalities and sold by competitive bid from the period 1977-1980. General obligation bonds are financed by all taxpayers of the issuing governmental units and are secured unconditionally by the full faith, credit, and taxing powers of the issuing government. Revenue bonds are comparable to bonds issued by private enterprises because the debt service payments are financed by user charges. Since the assurance of repayment of general obligation bond debt is so dependent on revenues and expenditures generated by the municipality, the focus of this study is general obligation bonds rather than revenue bonds.

Research Design

Two prediction models were necessary for the completion of this study: (1) a model predicting net interest cost, and (2) a model

predicting the surplus/deficit. A random-walk model, i.e., the expected value of this year's surplus/deficit is equal to last year's surplus/deficit, was used to predict the surplus/deficit each year. In addition, changes in the surplus/deficit beyond certain threshold levels were tested for their effect on net interest cost.

As previously noted, extensive research has appeared in the public finance literature about the determinants of net interest cost. The model adopted in this study included variables employed in previous studies that were of significance in explaining the variation of net interest cost of Minnesota municipalities. Four independent variables--market interest rate, average maturity of the bond issue, population and bond ratings were included as independent variables. The data needed for the model were in The Weekly Bond Buyer (The Bond Buyer, New York, New York), and the index used to capture changes in the market interest rate was provided by Dain Bosworth Incorporated of Minneapolis, Minnesota.

This study dichotomized municipalities into those with positive forecast errors and those with negative forecast errors. Positive forecast errors occur where the actual difference between revenues and expenditures of the municipality exceeds the predicted difference between revenues and expenditures. Negative forecast errors occur where the actual difference between revenues and expenditures of the municipality is less than the predicted difference between revenues and expenditures.

A pooled times-series cross-sectional design was employed with the experimental group composed of those municipalities with positive forecast errors and the comparison group composed of those municipalities with negative forecast errors. Multiple regression was used for each group to model the determinants of net interest cost. The independent variables were the market interest rate at the date of issue, average maturity of the bond issue, Moody's rating of the issue, and the population of the municipality.

A two-way analysis of variance was then employed with the residual measuring the difference between predicted and actual net interest cost as the dependent variable and the two factors coded as dummy variables consisting of the forecast error and the issuance date relative to the announcement date of the surplus/deficit. The F-distribution enabled this study to determine if there was a statistically significant difference between the two groups.

The determination of the announcement date of the surplus/deficit was a difficult task. Minnesota cities with a population exceeding 2,500 must submit either a financial report or an audited financial statement that conforms with GAAP to the State auditor within 180 days after the close of the fiscal year (as of 1979, all cities have adopted the calendar year as their fiscal year). Cities with a population of less than 2,500 must prepare a detailed financial statement in the form prescribed by the State Auditor and submit the statement within

90 days of the close of the fiscal year. All counties must publish the financial report within 95 days of the end of the fiscal year or during August.

There is no agency comparable to the SEC that closely monitors the disclosure of financial information; neither is there a publication such as The Wall Street Journal that serves as a unique venue for disseminating financial information. Those users desiring financial information have various information sources, e.g., access to public officials, that can provide this information on a timely basis. In addition, elected officials can choose to reveal this information at any time without fear of sanction by a public agency.

There is no research that can be cited as support for the choice of a given announcement date. Discussions with state officials and municipal analysts provided various opinions about the choice of an announcement date. However, there was general agreement that unaudited results are available soon after the year-end. As a result, two different announcement dates are tested in this study: one month after year-end and three months after year-end.

Contributions of the Study

Dyckman, et al., have stated that the efficient market hypothesis "in its more general form can be extended to cover any organized market, such as the market for government

obligations, corporate bonds, and commodities" (Dyckman, Downes and Magee, 1975, p. 78). However, empirical studies have been primarily confined to securities traded on the New York Stock Exchange. No study has addressed the relationship between accounting information and municipal market efficiency. Granoff recognized this deficiency by stating: "How ironic that accounting researchers, who for the last decade have directed so much of their research efforts to examining intricate relationships between accounting information and capital market efficiency, have virtually ignored such a key sector of the capital market (Granoff, 1978, p. 2).

This study represented the initial effort to perform efficient market research in the public sector by testing the null hypothesis that accounting data lack information content because of measurement and aggregation errors and because there exist more timely sources of information about municipalities. More specifically, this study offered evidence about the inclusion of accounting data in the set of relevant information that determined the net interest cost of municipalities. To detect whether accounting data were in this set of relevant information, this study assessed the association of the changes in net interest cost with changes in the sign of accounting data.

CHAPTER II

LITERATURE REVIEW

Since the research design of this study has similarities to that design employed by Ball and Brown, a detailed review of their approach is appropriate. In addition, two other studies will be examined that furnish evidence about the association between security returns and earnings.

In considering the impact of financial reporting on net interest cost, one must consider the possible effect of other determinants of interest cost as identified in past studies. Most research in the area has been performed by academicians in finance. The empirical results of these studies provide a foundation for accounting extensions.

In addition, the Wallace study (1981) represents the initial attempt to test for an association between various accounting and auditing variables and net interest cost. Although the Wallace study has certain limitations, e.g., small sample size, models with very low adjusted R^2, and the treatment of the surplus/deficit as a dummy variable, it does provide useful insights for this study.

Ball and Brown

The earliest and most widely quoted study on the relationship between accounting information derived from annual accounting numbers and stock price movements was by Ball and Brown (1968). Ball and Brown tested the reaction of the capital market to a set of firms with

positive earnings changes versus a set of firms with negative earnings changes. This reaction was examined in the twelve months prior to the earnings announcement and the six months subsequent to that announcement.

Two models were used to determine the market forecast of earnings for individual firms. The first model used was a simple random-walk model of earnings expectations, i.e., the expected value of this year's earnings is last year's earnings. A firm has a positive change if this year's earnings exceeded last year's earnings and a negative change if last year's earnings exceeded this year's earnings.

Ball and Brown also used a cross-sectional regression model that related this year's earnings to a market index of earnings. They estimated the coefficients from the linear regression of the change in a firm's income on the change in the average income of all firms in the market using data through the end of the previous year. The expected income change for each firm in the current year is then given by the predicted value of the dependent variable using the change in the average income for the market in the current year. Those firms with income greater than the expected income derived from the cross-sectional regression model are classified as having positive earnings changes, and those whose actual income is less than expected income are classified as having negative earnings changes.

Ball and Brown reasoned that the reaction of a stock's price would reflect the difference between the firm's actual earnings and the market's forecast of the firm's earnings. The reaction was

measured as if the market participant had foreknowledge of the annual earnings number. Presumably, foreknowledge of the annual earnings number would enable the investor to earn superior returns.

The authors adopted what Foster calls a cumulative abnormal return (CAR) methodology in estimating security returns in the period surrounding the earnings announcement (Foster, 1978, p. 334). This methodology estimates the firm-specific change in the returns on a security. The model estimated by Ball and Brown was:

$$R_{it} = A + BR_{mt} + U_{it}$$

where A,B = the vertical intercept and slope of the regression model, respectively,

R_{it} = return on security i in period t,

R_{mt} = return on an equally weighted index of all NYSE securities in period t, and

U_{it} = the residual which estimates the effect on the returns of security i of firm-specific information made available in period t.

The estimates of U_{it} for each firm were determined for the twelve months prior to the earnings announcement and the six months subsequent to that announcement. The a priori expectation was that the holders of securities with positive earnings changes would have positive cumulative abnormal security returns and holders of securities with negative earnings changes would have negative cumulative abnormal security returns.

The results conformed to expectations, as the average cumulative abnormal return of firms with positive earnings began to rise twelve months prior to the actual earnings announcement, with the excess return reaching about 7.5 percent by the time of the announcement. Conversely, those firms with negative earnings changes had negative cumulative abnormal security returns. This study concludes the following about the importance of annual income numbers:

> Of all the information about an individual firm which becomes available during a year, one-half or more is captured in that year's income number. Its content is therefore considerable. However, the annual income report does not rate highly as a timely mechanism, since most of its content (about 85 to 90 percent) is captured by more timely media which, perhaps, include interim reports. Since the efficiency of the capital market is largely determined by the adequacy of the data sources, we do not find it disconcerting that the market has turned to other sources which can be acted upon more promptly than annual net income (Ball and Brown, 1968, p. 176).

Beaver and Dukes

The purpose of the study by Beaver and Dukes (1972) was to extend the research of Ball and Brown in three important respects: (1) to examine alternative accounting methods of measuring earnings, (2) to examine a broader class of expectation models, and (3) to examine a broader class of methods of transforming the earnings variable. Their study examined three measures of earnings, and four forms of earnings variables, and each form was tested using five expectations models. The results tested the sensitivity of Ball and Brown's results to model specification issues.

The sample consisted of 123 NYSE Compustat firms whose fiscal year end was December 31. The forecast errors were computed for each

of the years 1963 through 1967. In all cases, the month of the earnings announcement was assumed to be the third month following the end of the fiscal year.

The results strongly support those of Ball and Brown. There was a wide variety of models exhibiting significant association between the sign of the forecast error and the CAR. An analysis employing the chi-square test was conducted of the percentage of time that the forecast error and the CAR had the same sign. A statistically significant association was found for 48 out of 60 models tested at the .01 level.

Foster

Foster (1975) investigated the relationship between accounting earnings and stock prices for an important segment of the over-the-counter (OTC) market. The firms selected were 73 stock insurance companies, 63 of whom were listed on the OTC market. The period of analysis was from 1965-1972. Foster adopted a CAR methodology similar to that of Ball and Brown.

A distinctive feature of the study was the separate examination of three subearnings series of insurance companies:

(1) underwriting earnings,

(2) investment earnings,

(3) capital gains and losses on marketable equity securities.

These series represent the three main activities of these insurance companies. Index models were used to predict the annual earnings from each of the above activities. The sign of the residual for each

subearnings series was used to distinguish between positive and negative earnings changes.

The results were similar to those of Ball and Brown. The capital market discriminates between the positive and earnings change groups for each series in the twelve months up to the earnings announcement month. In addition, most of the capital market's reaction occurs prior to the announcement of annual earnings.

Kessel

Kessel (1971) studied the effects of competition upon underwriting costs. In this study, the degree of competition in underwriting is measured by the number of bids submitted for new issues. The data utilized consisted of cbservations on all new issues, 9420 in number, reported by the Bond Buyer as submitted between the Spring of 1959 and the Spring of 1967. The variables observed were (1) quality rating, both Standard and Poor's and Moody's; (2) size of issue; (3) average life of issue; (4) amount of prior outstanding tax-exempt bonds of the issue; (5) absence or presence of call provisions and, if the bonds were callable, the first call data; (6) date of issue; (7) number of bids submitted; (8) general obligation or revenue; (9) dollar cost of issue to underwriters; (10) dollar receipts of underwriters derived from reoffering prices; (11) twenty-year reoffering yield, that is, the yield-to-maturity of the twenty-year bond in an issue, (12) the net interest cost; and (13) whether the manager of the winning syndicate is a commercial bank or an investment banker.

Kessel determined that the larger the number of bids (the more competitive the market), the lower the underwriting costs of the issuer. Competition involves a search for buyers, and the greater the degree of competition, the more the market is searched by underwriters for buyers. The more extensive the canvass of the market, the higher the prices received by underwriters, and, therefore, the higher the price the underwriters will be willing to pay for the bonds.

Hendershott and Kidwell

Hendershott and Kidwell (1978) established the presence of regional-market segmentation within the tax-exempt bond market. Previous research had indicated that regions issuing large volumes of bonds appear to pay higher interest rates than all other regions, all other things equal (Hendershott and Kidwell, 1978, p. 338). The authors used a variety of tests to determine that changes in the supply of tax-exempt securities in a region affect regional borrowing costs and costs on particular bond issues, relative to nationwide tax-exempt rates.

The authors extended previous research on the determinants of net interest cost by adding another variable which reflects the impact differences in maturity should have on borrowing costs. The higher long-term rates are relative to short-term rates, the greater the borrowing cost should be of a particular issue, other things equal. The actual variable they employed is the product of the spread between twenty- and one-year Salomon Brothers' rates on AA to A bonds ($i_{20} - i$) and the natural logarithm of the fiscal maturity (Table 2-1).

Table 2-1. Regression Equations for Estimating New Issue Borrowing Costs for Tax-Exempt Bonds Sold in Indiana.

	Equation (1.1)		Equation (1.2)		Equation (1.3)	
	Coefficient	t-Value	Coefficient	t-Value	Coefficient	t-Value
Constant	-2.146	- 9.24	-2.346	-10.18	-2.711	- 9.37
In issue size (S)	0.055	2.46	0.061	2.82	0.122	3.29
Number of bids	-0.042	- 5.31	-0.048	- 6.22	-0.050	- 6.40
Interest rate level of (%)	1.067	33.79	1.107	34.68	1.078	33.05
In final maturity (years)	0.739	15.17	0.666	13.31	0.634	12.56
Revenue bond dummy	0.292	5.90	0.256	5.24	0.265	5.48
Call provision dummy	0.161	2.89	0.148	2.72	0.148	2.77
Credit rating dummy:						
AAA	-0.391	- 3.59	-0.422	- 3.98	-0.413	- 3.94
AA	-0.296	- 4.37	-0.314	- 4.75	-0.300	- 4.59
A	-0.139	- 2.58	-0.125	- 2.38	-0.115	- 2.20
nonrated	-0.056	- 0.87	-0.062	- 0.99	-0.064	- 1.03
$(i_{20} - i_1)$ In final maturity			0.047	4.64	0.056	5.05
WTISS					0.169	2.78
WTISS·In issue size					-1.850	- 2.30
R^2 (adjusted)		0.843		0.851		0.855
SEE*		0.367		0.357		0.352
N[t]		389		389		389

*The equation standard error of estimate.

[t]Number of observations.

Including this yield curve variable in equation 2 results in reducing the unexplained variance ($1 - R^2$) by 5 percent (.008/.157).

To test for the impact of relative security supply on net interest cost, two variables were added. The first was a monthly Indiana relative supply variable, WTISS. The second was the product of WTISS and the natural logarithm of size. The principal reason given for the importance of WTISS was that smaller issues are marketed locally and must, therefore, offer a premium over larger nationally marketed issues. Thus, the larger the size of the issue, the smaller should be the response of NIC to WTISS. Adding these two variables reduced the unexplained variance by another 2.5 percent (.004/.149).

Sorensen

Sorensen (1980) constructed and fitted a model by one-stage ordinary least squares regression with net interest cost as the dependent variable and the independent variables grouped according to market conditions, issuer characteristics, issue characteristics, underwriting method and level of bidder competition, and a proxy for issue demand uncertainty

$$Y_1 = f(X_1, X_2, \sum_{i=3}^{8} \overline{X}_i, X_9, X_{10}, X_{11}, X_{12}, \overline{X}_{13}, \sum_{K=14}^{16} \overline{X}_k, X_{17})$$

where:

Y_1 = NIC = net interest cost.

X_1 = the level of interest rates; average yield of 5, 10, 15, and 20-year municipal bonds sold on the last day of the reporting week

in which the issue was sold and the last day of the previous week as reported by Salomon Brothers.

X_2 = the absolute weekly change in average yield (defined in X_1) over the week previous to the sale; this variable serves as a proxy for underwriter inventory risk because of market fluctuations.

$\overline{X_i}$ = Risk of default as measured by Moody's credit rating.

X_9 = First time issuers; issuers who have never before sold bonds are expected to subject underwriters to increased risks because of issue demand uncertainty. (1 = yes, 0 = no)

X_{10} = Purpose category, e.g., highways, schools, airports, etc.

X_{11} = Size of the issue in $1,000's.

X_{12} = (Average term to maturity) x (20 - 1); where 20 and 1 are the yields on prime 20 and 1-year municipal bonds sold in the last day of the week prior to the sale date as reported by Salomon Brothers.

$\overline{X_{13}}$ = Number of years to first call date rounded to the nearest year.

$\overline{X_k}$ = Number of bids received in a competitive bid sale.

X_{17} = A residual spread measure directly related to demand uncertainty, and thus NIC, not accounted for in other variables.

The independent variables Sorensen chose for his model have appeared in previous studies. This model has an R^2 of .80, with a standard error of the estimate of .482. The signs and magnitude of the regression coefficients are consistent with expectations.

Wallace

Wallace (1981) examined the perceived importance by municipal market decision makers of accounting and auditing attributes of municipal bond issuers, and assessed if such attributes actually have a significant effect on borrowing costs and bond ratings. Data were collected on all general obligation bonds and utility revenue bonds issued in Florida for 1974 (23 issues), 1975 (34 issues), and 1976 (51 issues). Thirty-nine municipalities, fourteen counties, and two school boards were represented in the data base. Of the 110 issues, 73 were issues of cities.

Two models were employed in the empirical tests using variables commonly applied in the literature.

$$\text{Net Interest Cost} = b_o + b_1X_1 + b_2X_R + b_3X_y + b_4X_T + b_5X_5 + b_6X_6 + b_7X_p - b_8X_B - b_9X_m$$

$$\text{Bond Rating} = b_o + b_1X_2 - b_2X_m + b_3X_u - b_4X_v - b_5X_F + b_6X_p + b_7X_y + b_8X_A$$

where:

X_1 = Bond Buyer's Index of 20 Municipal Bonds.

X_R = Moody's and Standard & Poor's Credit Rating.

X_Y = Years-to-Last-Maturity.

X_T = Total Revenue Minus Total Expense (1 = negative).

X_S = Spread.

X_C = Type of Issue, 0 = County and 1 = Municipality.

X_p = Prime Rate.

X_B = Number of Bids.

X_m = MBIA Insurance (dummy variable, 1 = insured) - the Municipal Bond Insurance Association (MBIA) provides insurance to bondholders in case of default.

X_L = Population change ratio of last census date to previous census date.

X_u = Ratio of Issue Size to Population.

X_V = Revenue or General Obligation Bond (1 = General Obligation).

X_F = Florida Turnpike Yield-to-Maturity for Week Prior to Issue.

X_D = Log of Outstanding Debt.

X_A = Assessed Value per capita.

In addition, Wallace expanded the model by incorporating a variety of accounting and auditing variables. The accounting and auditing variables did not significantly contribute to the explanation of the variation in net interest cost at a .05 level. Wallace then excluded bond rating from the equation to determine if the accounting and auditing variables were captured by the bond rating variable. The results indicate that the accounting and auditing variables significantly contribute to the explanation of variation in bond rating at a .05 level. But in separate tests of the accounting and auditing variables, only the auditing variables were significant at a .05 level.

Summary

The Ball and Brown study introduced the cumulative abnormal return methodology to determine if there is an association between

earnings and security price returns. Two other studies which employed this methodology were also discussed. The Beaver and Dukes study examined the sensitivity of the results of Ball and Brown to model specification issues. Their results support those results of Ball and Brown. Foster used the cumulative abnormal return methodology to examine the capital market's reaction to the annual earnings of stock insurance companies, most of whom were listed over-the-counter. Again, the results are similar to Ball and Brown supporting one's confidence in the generality of their results.

Four of the most important studies on the determinants of net interest cost were also discussed. These studies indicate that net interest cost is a function of market conditions, issuer characteristics, issue characteristics, underwriting method, and level of bidder competition.

The use of a pooled time-series cross-sectional design, and a model incorporating variables cited by other studies as the determinants of net interest cost, enabled this study to test for the association between the surplus/deficit and net interest cost. An association would imply that there is a correlation between the events that affect changes in the surplus/deficit and changes in net interest cost. In addition, evidence of an association is consistent with the notion that net interest cost acts as if investors perceive that the surplus/deficit figure conveys information about the value of a bond.

CHAPTER III

METHODOLOGY

An exposition of the methodology introduced in Chapter I is presented in this chapter. Unfortunately, there is little empirical research employing public sector accounting data that could be used as a foundation for this study. Consequently, this study employed a design unique to not-for-profit accounting research. This design permitted flexibility in the choice of an announcement date.

This study employed a cross-sectional multiple regression time-series design that tested for the association between the surplus/deficit and net interest cost. The sample was dichotomized into two groups: those municipalities with positive forecast errors, and those with negative forecast errors. Positive forecast errors occur when the actual surplus/deficit exceeds the predicted surplus/deficit, and negative forecast errors occur when the actual surplus/deficit is less than the predicted surplus/deficit. The effect on net interest cost of positive and negative forecast errors is determined by modeling net interest cost for those municipalities having positive errors separately from the municipalities having negative errors. Analysis of variance is then employed to determine if there is a significant difference between the two groups.

Major topics are presented in the following order: (1) sample selection, (2) model employed to predict net interest cost, (3) market interest rate, (4) bond rating, (5) population, (6) maturity of the bonds, (7) announcement date, (8) revenues and expenditures, and (9) summary.

Sample Selection

The sample selected for this study was composed of bond issuances of Minnesota municipalities for the period from July 1, 1977 - June 30, 1980. Minnesota was selected for several reasons. First, Minnesota municipalities issue a large number of general obligation bonds. In addition, the State Auditor closely supervises the accounting and reporting practices of Minnesota municipalities, which should insure greater uniformity and adherence to GAAP.

Minnesota ranked eleventh in terms of the dollar amount of bonds sold during the 1977-1979 period (Bond Buyer's 1979 Municipal Finance Statistics, p. 6). Minnesota is characterized by a large number of small municipalities. In 1978, Minnesota had 2,647 municipalities including cities, boroughs, and townships, compared with the national average of 714 municipalities per state (MFOA, State Roles in Local Government Financial Management: Nine Case Studies, p. 14). The average population of these municipalities was 1,500 compared with the national average of 5,000. The small size of these municipalities does not prevent them from issuing bonds. Bond issuances of less than $500,000 are common in Minnesota (see Table 3-1). Because Minnesota municipalities have a reputation for thrift, efficiency, and a commitment to repaying loans, a ready market is available for issues of even the smallest municipalities (conversation with Jana Ristamaki, municipal analyst with Ehlers and Associates, Inc., of Minneapolis, Minnesota).

Another reason for the choice of Minnesota's general obligation bonds as the focus of this study is Minnesota's active involvement in

Table 3-1. Size of Municipal Bond Issues in Minnesota Sample (Sample Size - 531)

Size (Amount in $)	Absolute Number	Relative Frequency (%)
100,000 - 249,000	61	11.5
250,000 - 499,000	121	22.8
500,000 - 999,000	100	18.8
1,000,000 - 4,999,999	200	37.7
5,000,000	49	9.2
	531	100.0

local financial management. A state law, enacted in 1977, gives the State Auditor significant control over the accounting and reporting practices of Minnesota municipalities. This act had the following significant effects:

(1) it carried strict enforcement provisions to guarantee a high level of compliance;

(2) it affected both statutory and home-rule cities;

(3) it provided flexibility in the treatment of cities having a population of 2,500 or less; and

(4) it provided the State Auditor with a stronger post-audit review of cities (MFOA, State Roles in Local Government Financial Management: Nine Case Studies, 1979, pp. 13-15).

Cities with a population of greater than 2,500 must prepare financial reports in conformance with generally accepted accounting principles. A uniform chart of accounts is recommended, but not prescribed, for cities whose population exceeds 2,500. Counties are required to use the classification of accounts and prepare financial statements as prescribed by the State Auditor. The account structure and statements follow the recommendations of the National Council on Governmental Accounting.

Cities with a population in excess of 2,500 must submit an audited financial statement within 180 days after the close of the fiscal year. It must be attested to by a certified public accountant, a public accountant, or the State Auditor (MFOA, State Roles in Local Government Financial Management, p. 15). State law does not require

audits for cities less than 2,500 unless they have a combined clerk-treasurer.

Financial reporting practices are strictly regulated. Cities with a population exceeding 2,500 are required to:

(1) adopt the calendar year as their fiscal year;

(2) present a financial report to the governing body, and publish it or summarize it in a local newspaper;

(3) prepare the report in conformance to GAAP; and

(4) submit either a financial report or an audited financial statement that conforms with GAAP to the State Auditor within 180 days after the close of the fiscal year.

Cities with a population of less than 2,500 are required to:

(1) adopt the calendar year as their fiscal year;

(2) voluntarily comply with the same requirements for cities over 2,500 or prepare a detailed financial statement in the form prescribed by the State Auditor and submit the statement within 90 days of the close of the fiscal year.

All counties are required to:

(1) prepare a financial report within 65 days of the end of the fiscal year or during March and;

(2) publish the financial report within 95 days of the end of the fiscal year or during August (MFOA, State Roles in Local Government Financial Management: Nine Case Studies, p. 17).

Model Employed to Predict Net Interest Cost

Net Interest Cost = $f(\overset{+}{Mkt}, \overset{+}{Avg\ Mat}, \overset{-}{Pop}, \overset{-}{Brate})$. (The sign above each variable indicates the direction of the expected statistical relationship.

Mkt = a weekly index provided by Dain Bosworth Incorporated measuring changes in the interest rate of a portfolio of 20-tax-free municipal bonds with 10-year maturities.

Avg Mat = log of the average maturity of the bond issue.

Pop = log of the population of the municipality.

Brate = dummy variable capturing the seven categories of Moody's bond ratings of the bonds included in this study.

Each of the variables in the above model has been included in other predictive models. The variables are discussed in detail in the following sections.

Market Interest Rate

Market conditions affect the interest cost received by issues through variation in the level of yields and the level of general market uncertainty. The level of interest rates is determined by the supply and demand for borrowed funds. It is a property of all financial instruments. Several investment services publish data on the movement of municipal bond interest

rates. One commonly used series is published by Salomon Brothers, and includes the 5, 10, 15, 20, 25, and 30 year yields for various grades of municipal bonds. Hendershott and Kidwell (1978) and Sorensen (1980) used an average of selected yields reported by Salomon Brothers in constructing a market index.

Wallace (1981) used the Bond Buyer's Index, the single most widely followed indicator of municipal bond prices. The Bond Buyer's Index is the average yield on twenty different general obligation bonds that have a 20-year maturity. The general obligation bonds employed to compile the index are mostly high grade bonds, with an average rating of A-1 (Moody's). Municipal dealers and brokers are surveyed each week to estimate the yield at which a 20-year par bond would be offered in a hypothetical new issue by each of the members of the index. Dealers' estimates are averaged, and the average of the yields assigned to the 20 bonds is the figure used for the index.

Although both of these indexes would have been acceptable for this study, they fail to capture the regional differences in interest rates that occur. Regional supply and demand for tax-exempt securities can cause geographic differences in borrowing rates (Hendershott and Kidwell, 1978, p. 340). As a result, this study adopted the index published by Dain Bosworth Incorporated of Minneapolis. This index of municipal bond performance was introduced in 1976 to aid investors and municipal officials in evaluating the performance of representative issues from communities in Minnesota, Wisconsin, North Dakota, South Dakota, Montana, Colorado, Arizona, Iowa, Nebraska, and Illinois.

Formally entitled the Dain Bosworth Regional Municipal Index (the DBI), it is prepared each week on Thursday by the bond department and it is included in a bulletin of bond information mailed to subscribers.

The DBI provides statistical averages for 20 selected tax-free municipal bonds with 10-year maturities issued in the midwest and western states. The index is limited to bonds with 10-year maturities because these types of bonds give the most consistent indication of market trends. The following municipalities are included:

Aaa-rated: Minneapolis, Minnesota
Madison, Wisconsin
Omaha, Nebraska
Des Moines, Iowa

Aa-1-rated: Sioux Falls, South Dakota
Champaign, Illinois

A-1-rated: Duluth, Minnesota
Huron, South Dakota
Mesa, Arizona
Spencer, Iowa

A-rated: Menominee, Wisconsin
Jamestown, North Dakota
Billings, Montana
Weld County, Colorado

Baa-1-rated: Colbinsville, Illinois

Baa-rated: International Falls, Minnesota

(Information provided by Judy Harvey, Municipal Research Department, Dain Bosworth, Inc., Minneapolis, Minnesota.)

Bond Rating

To a large extent, the borrowing cost depends upon the risk of default of a municipality. This risk can be described as the probability that the issuer will at some point in time be unable to make the required interest and/or principal payments. In the case of general obligation bonds, this risk varies with the ability of the appropriate tax base to generate the required debt service payments and to finance regular current expenditures. This ability is a function of various economic, financial, debt, and administrative factors that investors and credit rating agencies have to evaluate in ranking the credit quality of the issuer.

Several financial advisory services undertake credit evaluations to reduce the costs of search and analysis to smaller investors. However, the two major municipal bond credit rating agencies are Moody's Investor Service and Standard and Poor's. While both of these services examine the entity's debt, economic base, finances, and management of the municipality, a fundamental difference exists in their approaches. Moody's emphasizes the analysis of debt: "The first factor considered in the rating analysis is what the debtor has pledged to pay" (Moody's Investor Service, Pitfalls in Issuing Municipal Securities, pp. 10-11). For Standard & Poor's, the economic base is the most important factor: "We consider an issuer's economic base the most critical element in our determination of municipal bond ratings" (Lamb & Rappaport, 1980, p. 58). The ratings assigned by Moody's and Standard & Poor's differ on approximately 20 percent of

those issues rated by both agencies (Public Securities Association, 1982, p. 40).

Moody's rates more municipal bonds than Standard & Poor's. It now has rated approximately 15,000 municipal bonds and rates another 4,500 a year while Standard & Poor's has rated approximately 7,000 municipal bonds with 1,500 additions each year (Public Securities Association, 1982, p. 40). In this study's sample, many of the smaller bonds are rated by Moody's, but not by Standard & Poor's. The larger bond issues are usually rated by both agencies. All of the bonds rated by Standard & Poor's are rated by Moody's. As a result, this study will employ Moody's bond ratings as a measure of the credit quality of the bond issue.

Table 3-2 gives the distribution of the bond ratings for the sample of issues in this study. Table 3-3 defines the ratings categories used by Moody's. Only the highest four categories are defined since all of the bonds in this study have a rating of at least Baa.

There are numerous empirical studies establishing an inverse relationship between interest cost and bond ratings (Petersen, 1974). Ceteris paribus, investors will accept lower yields for higher rated bonds (see Table 3-4). Kessel, Wallace, Hendershott and Kidwell, and Sorensen all used credit ratings assigned by major credit rating agencies as a proxy for risk of default.

Table 3-2. Moody's Bond Ratings of Minnesota Bond Issuances (Sample Size - 531).

Bond Rating	Absolute Number	Relative Frequency (%)
Aaa	24	4.5
Aa	37	7.0
A-1	53	10.0
A	218	41.1
Baa-1	105	19.8
Baa	43	8.1
Unranked	51	9.6
Total	531	100.1

Table 3-3. Key to Moody's Municipal Bond Ratings.

Ratings
Aaa
Bonds which are Aaa are judged to be the best quality. They carry the smallest degree of investment risk and are generally referred to as "gilt edge." Interest payments are protected by a large or by an exceptionally stable margin, and principal is secure. While the various protective elements are likely to change, such changes as can be visualized are most unlikely to impair the fundamentally strong position of such issues.
Aa
Bonds which are rated Aa are judged to be of high quality by all standards. Together with the Aa groups, they comprise what are generally known as high-grade bonds. They are rated lower than the best bonds because margins of protection may not be as large as in Aaa securities, or fluctuation of protective elements may be of greater amplitude, or there may be other elements present which make the long-term risks appear somewhat larger than in Aa securities.
A
Bonds which are rated A possess many favorable investment attributes and are to be considered as upper medium grade obligations. Factors

Table 3-3 (continued)

Ratings
giving security to principal and interest are considered adequate, but elements may be present which suggest a susceptibility to impairment some time in the future.
Baa
Bonds which are rated Baa are considered as medium grade obligations. Interest payments and principal security appear adequate for the present, but certain protective elements may be lacking, or may be characteristically unreliable over any length of time. Such bonds lack outstanding investment characteristics and, in fact, have speculative characteristics as well.
Those bonds in the Aa, A, and Baa groups which Moody's believes possess the strongest investment attributes are designated by the symbols Aa1, A1, and Baa1.

Source: Moody's Investor Service, Pitfalls in Issuing Municipal Securities, 1982, pp. 10-11.

Table 3-4. Interest Rates on Long-Term Municipal Bonds with Different Credit Ratings.

Month	Avg. Int.	Aaa	Aa	A	Baa
January	9.39	8.98	9.19	9.50	9.90
February	9.81	9.46	9.74	9.88	10.15
March	9.95	9.50	9.80	10.08	10.40
April	10.34	9.78	10.19	10.53	10.85
May	10.59	9.90	10.35	10.82	11.28
June	10.54	9.86	10.30	10.76	11.21
July	10.86	10.21	10.63	11.04	11.51
August	12.07	11.10	11.98	12.38	12.78
September	12.76	11.55	12.60	13.25	13.60
October	12.68	12.05	12.50	12.84	13.34
November	11.73	10.98	11.21	12.05	12.69
December	12.44	11.70	12.16	12.60	13.30

Source: Moody's Investor Service, Moody's Municipal & Government Manual, 1982, p. all.

Population

Several studies have attempted to explain and predict municipal bond ratings. One of the variables employed in these studies is population. Carlton and Lerner (1969) used discriminant analysis to analyze the ratings of 691 general obligation bonds selected from the 1967 Moody's Municipal Bonds. Based upon a review of the literature and conversations with bond analysts, they chose the following independent variables:

1. School district;
2. Debt/assessed valuation;
3. Debt/population;
4. Logarithm of population. The log of population was employed to reduce the disproportionate impact of the large cities that appeared in the sample.
5. Logarithm of debt;
6. Average current tax collection rate.

Horton (1970) extended the study by Carlton and Lerner by separating bonds into two groups--those rated above Ba and those rated Ba and below. This classification is important because only those bonds rated above Ba are considered investment grade and qualify for purchase by many financial institutions. The equation that resulted in the highest classification accuracy includes five independent variables: debt, assessed value, population, average tax collection rate, and the state in which the district issuing the bonds is located.

Population size does appear to be a variable influential in determining bond ratings. Large communities are more likely to be rated than smaller communities, and the bond ratings of larger communities tend to be higher than those of smaller communities. These relationships are illustrated in Table 3-5 for three different states--California, Texas, and Massachusetts.

Since population was so influential in determining bond ratings, and so strongly correlated with net interest cost, population was chosen as a variable that might significantly impact net interest cost. In addition, one of the models to predict net interest cost excluded bond ratings as an independent variable because bond ratings may reflect changes in the surplus/deficit, which might prevent a legitimate testing of the association between the surplus/deficit and net interest cost. When bond ratings were excluded as an independent variable, a marked increase in the significance of population in determining net interest cost was detected in the statistical tests. Table 3-6 gives the distribution of the population of Minnesota municipalities that issued bonds in the period covered in this study.

Maturity of the Bonds

The variable "term to maturity" has been employed as an independent variable in all of the studies modeling the determinants of net interest cost. To the extent that the yield curve (rate of return of an investment divided by the price paid) is not flat, the average term to maturity will have an effect upon net interest cost.

Table 3-5. Moody's Municipal Bond Ratings and City Size (July, 1977).

Number of Cities with Population	Aaa	Aa	A-1	A	Baa-1	Baa	Unrated	Total
				California				
10,000-19,999	0	0	3	13	1	6	41	64
20,000-49,999	1	7	11	23	1	4	50	97
50,000-99,000	0	10	9	12	0	1	21	53
100,000+	3	9	3	4	0	0	2	21
Total	4	26	26	52	2	11	114	235
				Massachusetts				
10,000-19,999	0	10	23	38	0	0	1	72
20,000-49,999	4	25	8	17	2	0	0	56
50,000-99,000	2	4	3	5	0	1	1	16
100,000+	0	1	1	1	1	1	0	5
Total	6	40	35	61	3	2	2	149
				Texas				
10,000-19,999	0	1	3	14	15	12	15	60
20,000-49,999	0	1	10	17	5	6	5	44
50,000-99,000	0	2	6	6	1	1	0	16
100,000+	3	7	2	0	1	0	0	13
Total	3	11	21	37	21	19	20	133

Source: Farnham and Cluff, 1981, pp. 15-16.

Table 3-6. Population of Minnesota Municipalities Issuing Bonds (Sample Size - 531).

Population	Absolute Frequency	Relative Frequency (%)
1 - 4,999	222	41.8
5,000 - 19,999	191	36.0
20,000 - 49,999	70	13.2
50,000 - 99,999	10	1.9
100,000+	38	7.2
Total	531	100.1

The typical yield curve is upward sloping because investors are willing to pay a premium to avoid fluctuations in security values caused by interest rate changes. Since short-term assets fluctuate less than long-term assets, investors will accept a lower rate on shorter-term assets than on longer-term assets (Kidwell and Peterson, 1981, p. 283).

The bonds in this study have been restricted to those with an average maturity of at least five years. The mean of the bonds in this sample is 9.5 years with a range of from 5-20 years. The distribution of the maturity terms of the bonds in this study is given in Table 3-7.

Revenues and Expenditures

Generally accepted accounting principles were established by the National Council on Governmental Accounting (NCGA) in its 1968 publication, Governmental Accounting, Auditing, and Financial Reporting (GAAFR). This publication was revised and updated by NCGA Statement 1, Governmental Accounting and Financial Reporting Practices, and by NCGA Statement 2, Grant, Entitlement and Shared Revenue Accounting and Reporting by State and Local Governments, both published in 1979.

Governmental accounting systems are organized and operated on a fund basis. A fund is "defined as an independent fiscal and

Table 3-7. Average Term to Maturity of the General Obligation Bonds (Sample Size - 531).

Average Term to Maturity (Years)	Absolute Frequency	Relative Frequency (%)
5 - 7	156	29.7
8 - 10	180	33.9
11 - 13	132	24.9
14 - 20	63	11.9
Total	531	100.0

accounting entity with a self-balancing set of accounts recording cash and/or other resources together with all related liabilities, obligations, reserves, and equities, which are segregated for the purpose of carrying on specific activities or attaining objectives in accordance with specific regulations, restrictions, or limitations (GAAFR, 1968, p. 7)." The Council requires the use of fund accounting because of the nature of governmental operations and the necessity of demonstrating legal compliance. According to the Council, these characteristics preclude the use of a single, unified set of accounts for recording and summarizing all of the financial transactions of a governmental unit. Instead, the required accounts are organized on the basis of funds, each of which is completely independent of any other. These purposes are accomplished by providing a complete self-balancing set of accounts for each fund that display its assets, liabilities, reserves, fund balances or retained earnings, revenues, and expenditures.

The following types of funds are employed by state and local governments:

Governmental Funds

(1) The General Fund--to account for all financial transactions not properly accounted for in another fund;

(2) Special Revenue Funds--to account for the proceeds of specific revenues sources (other than special assessments or to finance specified activities as required by law or administrative regulation;

(3) Debt Service Funds--to account for the payment of interest and principal on long-term debt other than special assessment and revenue bonds;

(4) Capital Projects Funds--to account for the receipt and disbursement of moneys used for the acquisition of capital facilities other than those financed by special assessment and enterprise funds;

(5) Special Assessment Funds--to account for special assessments levied to finance public improvements or services deemed to benefit the properties against which the assessments are levied.

Proprietary Funds

(6) Enterprise Funds--to account for the financing of services to the general public where all or most of the costs involved are paid in the form of charges by users of such services;

(7) Intragovernmental Service Funds--to account for the financing of special activities and services performed by a designated organization unit within a governmental jurisdiction for other organization units within the same governmental jurisdiction;

Fiduciary Funds

(8) Trust and Agency Funds--to account for assets held by a governmental unit as trustee or agent for individuals, private organizations, and other governmental units (GAAFR, 1968, pp. 7-8).

GAAFR permits both the accrual or modified accrual basis of accounting depending upon the fund structure. There are five funds whose operations are considered suitable by GAAFR for the full accrual basis of accounting. These are the Enterprise, Capital Projects, Special Assessment, Intragovernmental Service, and Trust Funds. In each of these funds, expenditures can be recorded as soon as the liabilities are incurred, and revenues and other resources can be recorded when earned or levied. GAAFR does not consider the full accrual basis to be feasible for the General, Special Revenue, and Debt Service Funds because of their financial operations and revenue sources. The expenditures of these funds do not generate and are not directly associated with fund revenues raised by taxation and other revenue-producing powers unique to state sovereignty. GAAFR therefore considers it to be illogical to match revenues and expenditures for the purpose of determining net income in the generally accepted manner applicable to profit-making organizations (GAAFR, p. 12). As a result, the Committee recommends the modified accrual basis for these particular funds.

The modified accrual is an amalgam of both cash basis accounting and full accrual basis accounting. Revenue sources that should be recorded on the accrual basis include property taxes, charges for current services, grants from all governments, and sales and income taxes whether taxpayer liability has been definitely established and is legally enforceable. Other revenue sources such as sales taxes, gross receipts taxes and such miscellaneous sources as parking meter

revenues, fines, and forfeits are recognized as revenues when the cash is received.

Expenditures from General and Special Revenue Funds may be recorded either at the time the liability is incurred or when cash is disbursed in payment of the obligation. However, the Council has specific recommendations in accounting for debt interest costs that are recorded in Debt Service Funds. The outlays of Debt Service Funds are restricted to principal and interest payments that are precisely known in advance and are not subject to change during the course of a fiscal period. Moreover, the budgeted revenues and expenditures of such funds in any given fiscal year are normally restricted to an amount equal to actual interest and principal payments and no provision is made for actual interest unpaid at the end of the year. Therefore, the Council claims that "accrual of interest would not only fail to serve any useful purpose but could actually be misleading by producing a fund deficit equal to the amount of interest that is actually not due until the next interest date on the bonds (GAAFR, 1968, p. 13)."

The surplus/deficit for the cities included in this study are taken from the Report of the State Auditor of Minnesota on the Revenues, Expenditures, and Debt of the Cities in Minnesota. This publication is published yearly by the State Auditor. The report covers the financial operations of the 855 cities in Minnesota. The source of these data are annual city financial reporting, forms, reports of audits by public accountants and the State Auditor, county auditor's tax abstracts and reports of indebtedness, and the Department

of Revenue records of state shared tax distributions and grants, taxable valuations, and tax levies (Report of the State Auditor on the Revenues, Expenditures, and Debt of the Cities, 1980, p. 3).

Cities with a population greater than 2,500 are required to report using the modified accrual basis, or accrual basis of accounting. The data in the report for the larger cities was taken from audited reports, "the majority of which were prepared on the accrued or modified accrual basis of accounting (Report of the State Auditor on the Revenues, Expenditures, and Debt of the Cities, 1980, p. 3)." Cities under 2,500 in population are not required to be audited, and the data in the report is "taken in most cases from statements of cash receipts and disbursements (Report of the State Auditor on the Revenues, Expenditures, and Debt of the Cities, 1980, p. 3)."

Announcement Date

The regression equations employed to test the association between the surplus/deficit and net interest cost are given below. Also shown are the expected signs of the coefficients.

Positive forecast errors: Actual Surplus/Deficit > Expected Surplus/Deficit

$$NIC = f\ (\underset{+}{Mkt},\ \underset{+}{Avg\ Mat},\ \underset{-}{Pop},\ \underset{-}{Brate})$$

Negative forecast errors: Actual Surplus/Deficit < Expected Surplus/Deficit

$$NIC = f\ (\underset{+}{Mkt},\ \underset{+}{Avg\ Mat},\ \underset{-}{Pop},\ \underset{-}{Brate})$$

where

NIC = net interest cost,

Mkt = market interest rate,

Avg Mat = log of the average maturity of the bond issues,

Pop = log of the population of the municipality,

Brate = Moody's bond rating of the issue.

The effectiveness of this two-group cross-sectional time-series design is predicated on the proper specification of the predictors of NIC. The models tested in this study have an adjusted R^2 of approximately 90 percent. The independent variables have significant "t" values, and the coefficients have the appropriate signs. The difference between predicted net interest cost and actual net interest cost is the residual that was employed in the next step to determine if there was a significant difference between the two groups.

The two-way analysis of variance was employed to test the null hypothesis that changes in the surplus/deficit are not associated with changes in net interest cost. The dependent or criterion variable is the residual obtained by subtracting predicted net interest cost from actual net interest cost. The two nonmetric independent variables included in the analysis are the dummy variables representing the relationship of the issuance date of the bonds to the assumed announcement date (0 = bonds are issued before the announcement of the surplus/deficit; 1 = bonds are issued after the announcement of the surplus/deficit) and the division of municipalities into those

with positive and negative forecast errors or those with surpluses and deficits. In other words, this design includes two independent variables that are assigned values of 0 and 1 while the dependent variable represents a metric variable.

Analysis of variance enabled this study to test the significance of the difference between sample means. In an analysis of variance, the total variation of all observations is partitioned into its component parts. The hypothesis test is based on a computed ratio of the variance among groups to the variance within groups. Using the F distribution, this study could determine the probability of obtaining a ratio as large as the one computed, if all samples come from populations having the same mean (SPSS, 1975, pp. 399-400).

Summary

The research design employed to test the association between the surplus/deficit and net interest cost was described in this chapter. This chapter was divided into the following sections: (1) sample section, (2) model employed to predict net interest cost, (3) market interest rate, (4) bond rating, (5) population, (6) maturity of the bonds, (7) announcement date, (8) the surplus/deficit, and (9) summary.

The sample employed in this study consisted of Minnesota general obligation bond issuances from 1977 through 1980. The sample was divided into two groups determined by a comparison between actual and expected surplus/deficit. One group was composed

of the general obligation bond issuances of those municipalities with positive forecast errors while the other group is composed of the general obligation bond issuances of those municipalities with negative forecast errors. The effect of positive and negative forecast errors was determined by modeling net interest cost for those municipalities that have positive forecast errors separately from those municipalities that have negative forecast errors.

Two-way analysis of variance was employed to test the null hypothesis that changes in the surplus/deficit are not associated with changes in net interest cost. This analysis enabled this study to test the significance of the difference between the sample means by computing a ratio of the variance among groups to the variance within groups. Using the F distribution, this study could then determine the probability of obtaining the computed ratio.

CHAPTER IV

EMPIRICAL RESULTS

Initially, the equation modeling the determinants of net interest cost was determined for all the issues comprising the sample. Subsequent equations were employed to test the reaction of net interest cost to positive and negative forecast errors. Because the surplus/deficit may be reflected in the bond ratings, bond ratings were excluded as independent variables in some of the equations. In addition, Standard & Poor's early warning indicators were employed to test the reaction of net interest cost to two consecutive years of surplus and two consecutive years of deficits.

Major topics are presented in the following order: (1) modeling the sample, (2) positive and negative forecast errors, (3) consecutive surpluses and deficits, (4) first month as the announcement date, and (5) conclusion.

Modeling the Sample

Table 4-1 models the determinants of net interest cost of all Minnesota general obligation bond issues, with an average maturity of at least five years, from the period July 1, 1977 through June 30, 1980. The results indicate that, on the average, net interest cost increases significantly as average term to maturity increases, as credit rating decreases, as the population decreases, and as the interest rate increases. Issues that were rated Aaa or Aa sold for approximately

Table 4-1. Regression Estimate for the Sample (N - 531).

	Coefficient	t-Value	Partial Correlation
Constant	- .8163		
Market Int. Rate	1.0339	76.83*	.90
Average Term (Log)	.5876	20.389*	.26
Population (Log)	- .0163	1.82**	-.16
Rating:			
Aaa	- .4807	7.13*	-.11
Aa	- .4622	8.94*	-.07
A1	- .3567	8.14*	-.06
A	- .2605	7.80*	-.06
Baa1	- .0726	2.11*	.12
Unranked	- .0379	.92	-.02

Adjusted R^2 = .93.

See = .20.

N = 531.

* = Statistically significant at .05 level.

** = Statistically significant at .10 level.

48 basis points and 46 basis points lower than issues rated Baa or lower, respectively. Issues rated A1 or A sold for approximately 36 basis points and 26 basis points lower than Baa or lower rated issues. The coefficients have the appropriate signs, and the regression equation has an adjusted R^2 of .93, with a standard error of the estimate of .20.

Positive and Negative Forecast Errors

The sample was divided into positive and negative forecast errors. A naive model, e.g., the expected value of this year's surplus/deficit is equal to last year's surplus/deficit, was employed to test the association between the surplus/deficit and net interest cost. A municipality has a positive forecast error if this year's surplus/deficit exceeds last year's surplus/deficit and a negative forecast error if this year's surplus/deficit was less than last year's surplus/deficit. Appendix Table A-1 models net interest cost for municipalities that had positive forecast errors. This table presupposes that the announcement of the surplus/deficit occurs in March. Therefore, the issuances from July 1 of the preceding year to the last day of February would be coded as "0" in the analysis of variance, and the issuances from April 1 through June 30 would be coded as "1."

Appendix Table A-2 depicts the model for municipalities that had negative forecast errors. The announcement date is again assumed to occur in March. The models for positive and negative forecast errors are statistically compared in Table 4-2 by use of analysis of variance (ANOVA). ANOVA is employed to determine if there is a significantly significant

Table 4-2. Positive and Negative Forecast Errors (Announcement Date: March).

Source of Variation	Sum of Squares	DF	Mean Squares	F	Significance of F
Main Effects	33882.54	2	16941.27	.44	.65
Event*	33810.06	1	3381.06	.87	.35
Forecast	4.16	1	4.160	.00	.99
2-Way Interest:					
Event Forecast	295.95	1	295.95	.01	.93
Explained	34178.50	3	11392.83	.29	.83
Residual	19792208.00	511	38732.31	.29	.83
Total	19826387.00	514	38572.74		

*Event = Announcement Date.

difference between the equation modeling positive forecast errors and the equation modeling negative forecast errors. In Table 4-2, both the main effects of the announcement date and the forecast error on net interest cost and the interaction of announcement date and forecast error on net interest cost are statistically insignificant. The F-statistic determining the effect of the interaction of event and forecast on net interest cost is .01 with a significance level of .93. In other words, the difference in the effect on net interest cost between positive and negative forecast errors is not statistically significant.

Because changes in the expectation of the surplus/deficit may be captured by bond ratings (Wallace, 1981, p. 510), Table 4-3 compares the models employed for positive and negative forecast errors without including bond ratings as an independent variable. Both the main effects and interaction effects have insignificant F-statistics. The F-statistic for the interaction effect is .06 with a significance level of .81.

Consecutive Surplus or Deficits

In Tables 4-4 through 4-5, this study employed the early warning indicators developed by Standard & Poor's (Table 1-3, page 8). The first and second indicators listed are: (1) current year operating deficit, and (2) two consecutive years of operating fund deficits. Therefore, this study compared the effect on net interest cost of bonds issued by municipalities with two consecutive years of surplus and municipalities with two consecutive years of deficits. In other

Table 4-3. Positive and Negative Forecast Errors (Announcement Date: March Without Bond Ratings).

Source of Variation	Sum of Squares	DF	Mean Squares	F	Significance of F
Main Effects	76446.42	2	38223.21	.78	.46
Event	76362.81	1	76362.81	1.56	.21
Forecast	623.40	1	623.40	.01	.91
2-Way Interaction:					
Event Forecast	2987.83	1	2987.83	.06	.81
Explained	79434.25	3	26478.08	.54	.66
Residual	25030440.00	511	48983.25		
Total	25109874.00	514	48851.90		

Table 4-4. Surpluses and Deficits (Announcement Date: March).

Source of Variation	Sum of Squares	DF	Mean Squares	F	Significance of F
Main Effects	25477.35	2	12738.68	.51	.60
Event	25477.31	1	25477.31	1.02	.32
Surpluses/Deficits	100.10	1	100.10	.00	.95
2-Way Interaction:					
Event Surpluses/ Deficits	10664.74	1	10664.74	.43	.52
Explained	36142.06	3	12047.35	.48	.70
Residual	6272486.80	250	25089.95		
Total	6308628.80	253	24935.29		

words, this study compared those municipalities that are noticeably successful in generating operating surpluses and those municipalities whose financial results would qualify for concern when employing criteria espoused by Standard & Poor's. Table 4-4 compares the effect of two consecutive years of surpluses and two consecutive years of deficits on net interest cost. The difference is not statistically significant with an F-statistic measuring the interaction effect of .43 with a significance level of .52. The test was repeated without bond ratings as an independent variable in Table 4-5 with similar results.

First Month as the Announcement Date

In Tables 4-6 through 4-9 the announcement date is assumed to be January. Therefore, all bond issuances from July 1 of the preceding year to December 31 of that year are coded as "0" while bond issuances from February 1 of the subsequent year to June 30 of the subsequent year are coded as "1." The assumption of January for the announcement date presupposes the rapid dissemination of an unaudited figure for the surplus or deficit incurred during the prior year to interested parties.

Table 4-6 depicts the effect of positive and negative forecast errors on net interest cost. Again, both main effects and interaction effects have insignificant F-statistics. In Table 4-7, bond ratings are excluded as an independent variable with similar results.

Table 4-5. Surpluses and Deficits (Announcement Date: March Without Bonds).

Source of Variation	Sum of Squares	DF	Mean Squares	F	Significance of F
Main Effects	21270.17	2	10653.09	.27	.76
Event	20884.50	1	20884.50	.53	.47
Surpluses/Deficits	942.64	1	942.64	.02	.88
2-Way Interaction:					
Event Surpluses/ Deficits	9246.30	1	9246.30	.24	.63
Explained	30516.50	3	10172.17	.26	.86
Residual	9823021.30	250	39292.09		
Total	9853537.80	253	38946.79		

Table 4-6. Positive and Negative Forecast Errors (Announcement Date: January).

Source of Variation	Sum of Squares	DF	Mean Squares	F	Significance of F
Main Effects	621.84	2	310.92	.01	.99
Event	266.44	1	266.44	.01	.93
Forecast	402.91	1	402.91	.01	.92
2-Way Interaction:					
Event Forecast	253.78	1	253.78	.01	.94
Explained	875.50	3	291.83	.01	.99
Residual	19616334.00	502	39076.36		
Total	19617209.00	505	38845.96		

Table 4-7. Positive and Negative Forecast Errors (Announcement Date: January Without Bond Ratings).

Source of Variation	Sum of Squares	DF	Mean Squares	F	Significance of F
Main Effects	2240.57	2	1120.28	.02	.98
Event	4.97	1	4.97	.00	.99
Forecast	2205.46	1	2205.46	.05	.83
2-Way Interaction:					
Event Forecast	203.67	1	203.67	.00	.95
Explained	2444.25	3	814.75	.02	.99
Residual	24765731.00	502	49334.13		
Total	24768175.00	505	49045.89		

Table 4-8. Surpluses and Deficits (Announcement Date: January).

Source of Variation	Sum of Squares	DF	Mean Squares	F	Significance of F
Main Effects	26.09	2	13.04	.00	.99
Event	26.05	1	26.05	.00	.97
Surpluses/Deficits	.67	1	.67	.00	.99
2-Way Interaction:					
Event Surpluses/ Deficits	37495.57	1	37495.57	1.50	.22
Explained	37521.63	3	12507.21	.50	.68
Residual	6270723.20	250	25082.89		
Total	6308244.80	253	24933.77		

Table 4-9. Surpluses and Deficits (Announcement Date: January Without Bond Ratings).

Source of Variation	Sum of Squares	DF	Mean Squares	F	Significance of F
Main Effects	17617.51	2	8808.75	.23	.80
Event	17581.28	1	17581.28	.45	.50
Surpluses/Deficits	148.86	1	148.86	.00	.95
2-Way Interaction:					
Event Surpluses/ Deficits	33245.84	1	33245.84	.86	.36
Explained	50863.38	3	16954.46	.44	.73
Residual	9675084.60	250	38700.34		
Total	9725948.00	253	38442.48		

Table 4-8 compares the effect on net interest cost of two consecutive surpluses and two consecutive deficits. An F-statistic of 1.50 and a significance level of .22 indicates that there is not a statistically significant relationship between consecutive surpluses or deficits and net interest cost. In Table 4-9, bond ratings are excluded as an independent variable. The results are similar to those obtained in Table 4-8.

Conclusion

The reaction of net interest cost to positive and negative forecast errors is tested in this study with the announcement date of the surplus/deficit assumed to occur in January or March. When March is assumed to be the announcement date, the F-statistics were insignificant for both the main effects and interaction effects. Similar results were obtained when January is assumed to be the announcement date.

This study also tested the effect on net interest cost of municipalities with two consecutive years of surplus and municipalities with two consecutive years of deficits. The announcement date of the surplus/deficit is assumed to occur in either January or March. The F-statistics were again insignificant for both months.

The results (summarized in Table 4-10) support the null hypothesis that changes in the surplus/deficit are not associated with changes in net interest cost. However, these results are

Table 4-10. Summary of Statistical Tests.

Criteria	Includes Bond Rating	Announcement Date	Interaction Effect F-Statistic	Significance Level
Positive Forecast Errors Negative Forecast Errors	yes yes	March March	.01	.93
Positive Forecast Errors Negative Forecast Errors	no no	March March	.06	.81
Surpluses (Two Years) Deficits (Two Years)	yes yes	March March	.43	.52
Surpluses (Two Years) Deficits (Two Years)	no no	March March	.24	.63
Positive Forecast Errors Negative Forecast Errors	yes yes	January January	.01	.94
Positive Forecast Errors Negative Forecast Errors	no no	January January	.00	.95
Surpluses (Two Years) Deficits (Two Years)	yes yes	January January	1.50	.22
Surpluses (Two Years) Deficits (Two Years)	no no	January January	.86	.36

conditional upon the models and estimation procedures employed. In addition, the announcement date is assumed to occur in January or March for all municipalities.

CHAPTER V

CONCLUSIONS AND LIMITATIONS

The conclusions reached relate to the objectives of the study and to the modeling procedures used to evaluate the research questions. The major finding relates to the role of certain accounting data in the determination of net interest cost of selected municipalities. Additional conclusions concern the importance of certain independent variables in the determination of net interest cost.

Conclusions

The purpose of this study was to test the association between the surplus/deficit of selected Minnesota municipalities and the net interest cost of the general obligation bonds issued by these municipalities. The effect on net interest cost of the surplus/deficit was tested by employing a pooled time-series cross-sectional design. By accurately specifying the primary determinants of net interest cost, a test of the reaction of net interest cost to changes in the expectation of the surplus/deficit became feasible.

The sample was dichotomized into two groups: those municipalities with positive forecast errors and those municipalities with negative forecast errors. A two-way analysis of variance was employed to determine if there was a significant difference in the effect on net interest cost between positive and negative forecast errors.

The ANOVA results support the null hypothesis that changes in the surplus/deficit are not associated with changes in the net interest cost of the bonds issued by a municipality. The results were unaffected by the exclusion of bond ratings as an independent variable.

To enhance the validity of this study, an additional test was performed that did not require a prediction of the surplus/deficit. Rather, municipalities with two consecutive years of surpluses were compared with municipalities with two consecutive years of deficits. The test employed the criteria developed by Standard & Poor's to evaluate the financial condition of municipalities. The result of a single year may be misleading because of the large shifts in capital expenditures that can occur. In any given year, a large deficit may occur because of a substantial investment in infrastructure. If the marketplace regards the investment as enhancing the municipality's economic prospects, the deficit produced may not be perceived as worrisome. However, Standard & Poor's lists two consecutive years of deficits as results that can indicate cause for concern. This study employed this criterion in comparing the effect on net interest cost of the bonds of municipalities with two consecutive years of surpluses and municipalities with two consecutive years of deficits. The results of the ANOVA indicate that there was no significant difference in the effect on net interest cost between municipalities with two consecutive years of surpluses and municipalities with two consecutive years of deficits.

Another problem identified in this study was the choice of an announcement date of the surplus/deficit. When was information about the surplus/deficit available to interested parties and how quickly was it impounded into their decision-making process? Prior empirical evidence is not available in solving the announcement date problem. Although audited results are available approximately six months after year-end, unaudited results are usually available sooner. Clearly, the announcement date of the surplus/deficit may vary depending upon such factors as the size of the municipality, its auditors, political factors, state requirements, and the persistence of analysts in obtaining the information. In addition, the announcement date for a municipality may vary from year to year. This study treated the announcement date as an empirical question by considering two alternatives: one month, and three months after the year-end (calendar year equals the fiscal year for Minnesota municipalities). An association between the surplus/deficit and net interest cost was not detected when either January or March is assumed to be the announcement date of the surplus/deficit.

This result does not necessarily imply that the reported surplus/deficit is meaningless to users. Rather, the results indicate that the reported figure in any given year is not significant in affecting the net interest cost of municipalities. This conclusion contrasts with the results obtained in appraising the importance of earnings to business firms. This difference can be explained by

reference to both the differences in accounting for municipalities and business firms, and the factors influencing the appraisal of the financial health of municipalities not captured by accounting data.

The surplus/deficit reported by municipalities is subject to wide fluctuations as a result of changes in capital expenditures. A deficit may be produced by a substantial capital investment that enhances the economic prospects of the municipality. A surplus may result from a municipality's failure to provide sufficient funds to adequately maintain the units' infrastructure. Therefore, the surplus/deficit has to be viewed in terms of the long-term economic benefit to the community.

The fund balance of the community has to be considered in appraising the importance of the surplus/deficit. A large fund balance may enable the municipality to produce several years of deficits without arousing the concern of the investment community. If the fund balance is small, a deficit assumes greater importance.

The tax capacity of the municipality influences the significance of the surplus/deficit. A deficit produced in Houston differs in importance from a deficit produced in Cleveland. An expanding economic base increases the tax capacity of the municipality which means current deficits can be eliminated by rising tax receipts. On the other hand, a stagnant tax capacity limits the ability of the municipality to increase tax receipts to cover deficits.

As a result, the surplus/deficit has to be viewed as one factor among many in appraising the economic health of a municipality.

It does not have the importance that earnings have to business firms. As a figure viewed in isolation, the surplus/deficit for a single year is a relatively unimportant indicator of the financial health of a municipality.

Limitations

This study dichotomized the sample into those municipalities with positive forecast errors and those municipalities with negative forecast errors to test the effect of the change in the expectation of the surplus/deficit on net interest cost. This study also dichotomized the sample into those municipalities with two consecutive years of surplus and those municipalities with two consecutive years of deficits.

Two models are employed in this study: the model to predict net interest cost, and the model to predict the surplus/deficit. In addition, regression analysis is used to predict net interest cost, and ANOVA is used to detect a significant difference between the samples. Municipalities are exceedingly complex entities affected by a staggering array of endogenous and exogenous variables. Similarly, the interest cost of the bonds these municipalities issue will reflect the multitudes of influences affecting the municipality. In addition, net interest cost is affected by the provisions and covenants of the bond issue itself. Inevitably, simplification is required if analysis is to be feasible. Therefore, the results obtained are conditional upon the models and estimation procedures employed.

Suggestions for Future Research

The ideal extension of this study will be to replicate the effort of Ball and Brown (1968) to test the association between income and stock prices. The cumulative abnormal return methodology employed in the Ball and Brown study could theoretically be applied in the municipal sector to test the association between the surplus/deficit and net interest cost. The first step would be to dichotomize municipalities into those with positive forecast errors and those with negative forecast errors. The bond issuances would be divided into two portfolios six months before the announcement date of revenues and expenditures based upon the difference (positive or negative) between the actual and predicted surplus/deficit of each municipality. Each month, therefore, two postfolios would be formed comprised of those municipalities that issue bonds that month. Since municipalities do not issue bonds each month, the municipalities included in the portfolios would differ over time.

Net interest cost for each bond issuance would be computed employing a multiple regression model. The deviation between the actual value of net interest cost and the predicted value is the residual. The residual of each bond issuance would be examined for evidence about the information content of the surplus/deficit. The cumulative average of these residuals permits an estimate of the municipality-specific change in net interest cost of a municipal bond as a result of changing expectations of the surplus/deficit.

The expectation is that positive forecast errors are associated with actual net interest cost being lower than the predicted value of net interest cost (residual is negative). Negative forecast errors should be associated with actual net interest cost exceeding predicted net interest cost (residual is positive). In other words, for the years in which a municipality experiences a positive residual change in the surplus/deficit, there should be a negative residual change in net interest cost and, conversely, for the years in which there is a negative residual change in the surplus/deficit, there should be a positive residual change in net interest cost.

The mean residual would be computed for each portfolio, and the summation of these average residuals would be plotted against each month in the relevant time span. The relevant time span for this study would be the period from six months before the announcement date to four months after the announcement date. In the case of positive forecast errors (actual surplus/deficit greater than expected surplus/deficit), the average cumulative abnormal return is expected to rise months prior to the actual announcement of the surplus/deficit, because of alternate sources of information. A mirror image of the same behavior is expected when negative forecast errors occur, with a negative cumulative abnormal return by the announcement of the actual surplus/deficit. In both cases, the a priori expectation is that the cumulative abnormal return would show little change following the announcement of the surplus/deficit.

Summary

This chapter presented the conclusions and limitations of this study. In addition, a suggestion for future research was offered. The evidence presented in this study indicates that the surplus/deficit of a municipality is not associated with the net interest cost of the bonds issued by that municipality.

This hypothesis was tested in two different ways. First, a predictive model was employed. The actual results were then compared with the predicted results to determine the effect of a deviation from hypothesized results on net interest cost. The next step employed the early warning indicators of Standard & Poor's by comparing municipalities with surpluses and municipalities with deficits. Both tests produced results indicating that no association exists between the surplus/deficit of a municipality and the net interest cost of bonds issued by that municipality.

The external validity of this study remains to be determined. Because of differing state regulations, this study was confined to a single state. Eventually, improved accounting and reporting practices may permit a study that covers the general obligation bonds of all the states.

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APPENDIX

REGRESSION RESULTS

Table A-1. Positive Forecast Errors (Announcement Date: March).

	Coefficient	t-Value	Partial Correlation
Constant	- .7011	46.606*	
Market Int. Rate	1.0148	13.11*	.88
Average Term (Log)	.5821	1.33	.18
Population (Log)	- .0190	4.57*	-.25
		5.43*	
Rating:		4.89*	
Aaa	- .4570	4.66*	-.20
Aa	- .4379	.12	-.10
A1	- .3266	.85	-.01
A	- .2442		.03
Baa1	.0067		.09
Unraked	- .0594		-.07

Adjusted R^2 = .91.

See = .209.

N = 250.

* = Statistically significant at .05 level.

Table A-2. Negative Forecast Errors (Announcement Date: March).

	Coefficient	t-Value	Partial Correlation
Constant	- .9294		
Market Int. Rate	1.0563	57.71*	.91
Average Term (Log)	.5905	14.36*	.33
Population (Log)	- .0242	1.87	-.01
Rating:			
Aaa	- .4752	4.78*	-.02
Aa	- .4624	6.33*	-.00
Al	- .3575	5.83*	-.08
A	- .2624	5.96*	.14
Baal	- .1090	2.48*	.14
Unranked	- .0287	.56	-.00

Adjusted R^2 = .94.

N = 265.

See = .19.

* = Statistically significant at .05 level.

Table A-3. Positive Forecast Errors (Announcement Date: March Without Bond Ratings).

	Coefficient	t-Value	Partial Correlation
Constant	- .6823		
Market Int. Rate	.9986	42.24*	.88
Average Term (Log)	.5876		.18
Population (Log)	- .0846		-.25

Adjusted R^2 = .89.

N = 250.

See = .23.

* = Statistically significant at .05 level.

Table A-4. Negative Forecast Errors (Announcement Date: March Without Bond Ratings).

	Coefficient	t-Value	Partial Correlation
Constant	-1.0942		
Market Int. Rate	1.0585	52.173*	.91
Average Term (Log)	.6224	13.83*	.33
Population (Log)	- .0903	9.07*	-.01

Adjusted R^2 = .92.

N = 265.

See = .21.

* = Statistically significant at .05 level.

Table A-5. Surplus for Two Consecutive Years (Announcement Date: March).

	Coefficient	t-Value	Partial Correlation
Constant	- .7149		
Market Int. Rate	1.0176	42.30*	.93
Average Term (Log)	.5009	9.97*	.30
Population (Log)	.0146	.80	-.15
Rating:			
Aaa	- .5798	4.46*	-.23
Aa	- .3123	3.23*	.07
A1	- .2550	3.24*	-.12
A	- .1598	2.34*	.12
Baa1	.1113	1.51	.07
Unranked	- .0192	.24	-.20

Adjusted R^2 = .94.

N = 144.

See = .1617.

* = Statistically significant at .05 level.

Table A-6. Deficit for Two Consecutive Years (Announcement Date: March).

	Coefficient	t-Value	Partial Correlation
Constant	- .6355		
Market Int. Rate	1.0593	47.05*	.93
Average Term (Log)	.4841	8.99*	.30
Population (Log)	- .0306	2.025*	-.34
Rating:			
Aaa	- .3948	3.52*	-.26
Aa	- .5199	6.72*	-.15
Al	- .3198	4.53*	.07
A	- .3362	6.40*	-.18
Baal	- .1916	3.46*	.13
Unranked		.67*	.13

Adjusted R^2 = .95.

N = 122.

See = .18.

* = Statistically significant at .05 level.

Table A-7. Surplus for Two Consecutive Years (Announcement Date: March Without Bond Ratings).

	Coefficient	t-Value	Partial Correlation
Constant	- .6132		
Market Int. Rate	1.0069	39.17*	.93
Average Term (Log)	.4949	8.88*	.30
Population (Log)	- .0652	5.02*	-.15

Adjusted R^2 = .93.

N = 144.

See = .18.

* = Statistically significant at .05 level.

Table A-8. Deficit for Two Consecutive Years (Announcement Date: March Without Bond Ratings).

	Coefficient	t-Value	Partial Correlation
Constant	- .8389		
Market Int. Rate	1.0590	37.57*	.93
Average Term (Log)	.5157	7.54*	.30
Population (Log)	- .0896	7.54*	-.34

Adjusted R^2 = .94

N = 122.

See = .21.

* = Statistically significant at .05 level.

Table A-9. Positive Forecast Errors (Announcement Date: January).

	Coefficient	t-Value	Partial Correlation
Constant	- .7965		
Market Int. Rate	1.0260	45.83*	.88
Average Term (Log)	.5944	13.41*	.18
Population (Log)	- .0189	1.35	-.24
Rating:			
Aaa	- .4460	4.44*	-.18
Aa	- .4395	5.53*	-.09
Al	- .3243	4.89*	-.03
A	- .2371	4.51*	.01
Baal	.0047	.08	.09
Unranked	- .0377	.52	-.08

Adjusted R^2 = .91.

N = 246.

See = .21.

* = Statistically significant at .05 level.

Table A-10. Negative Forecast Errors (Announcement Date: January).

	Coefficient	t-Value	Partial Correlation
Constant	- .9220		
Market Int. Rate	1.0608	56.84*	.91
Average Term (Log)	.5776	14.23*	.32
Population (Log)	- .0259	1.95**	.00
Rating:			
Aaa	- .4715	4.69*	.02
Aa	- .4862	6.70*	.02
A1	- .3561	5.81*	-.11
A	- .2561	5.74*	-.12
Baa1	- .1164	2.65*	.12
Unranked	- .0244	.47	.00

Adjusted R^2 = .94.

N = 260.

See = .19.

* = Statistically significant at .05 level.

** = Statistically significant at .10 level.

Table A-11. Positive Forecast Errors (Announcement Date: January Without Bond Ratings).

	Coefficient	t-Value	Partial Correlation
Constant	- .7517		
Market Int. Rate	1.0009	41.59*	.88
Average Term (Log)	.5949	12.26*	.18
Population (Log)	- .0865	9.46*	-.24

Adjusted R^2 = .89.

N = 246.

See = .23.

* = Statistically significant at .05 level.

Table A-12. Negative Forecast Errors (Announcement Date: January Without Bond Ratings).

	Coefficient	t-Value	Partial Correlation
Constant	-1.0565		
Market Int. Rate	1.0627	51.32*	.91
Average Term (Log)	.5977	13.33*	.32
Population (Log)	- .0930	9.11*	.00

Adjusted R^2 = .92.

N = 260.

See = .21.

* = Statistically significant at .05 level.

Table A-13. Surplus for Two Consecutive Years (Announcement Date: January).

	Coefficient	t-Value	Partial Correlation
Constant	- .7149		
Market Int. Rate	1.0176	42.30*	.93
Average Term (Log)	.5009	9.97*	.31
Population (Log)	.0146	.80	-.16
Rating:			
Aaa	- .5798	4.46*	-.22
Aa	- .3123	3.23*	.04
Al	- .2550	3.24*	-.15
A	- .1598	2.34*	.15
Baal	.1113	1.51	.05
Unranked	- .0192	.24	-.18

Adjusted R^2 = .94.

N = 138.

See = .17.

* = Statistically significant at .05 level.

Table A-14. Deficit for Two Consecutive Years (Announcement Date: January).

	Coefficient	t-Value	Partial Correlation
Constant	- .6355		
Market Int. Rate	1.0593	47.05*	.93
Average Term (Log)	.4841	8.99*	.31
Population (Log)	- .0306	2.03*	-.32
Rating:			
Aaa	- .3948	3.52*	-.23
Aa	- .5199	6.72*	-.14
A1	- .3198	4.53*	.08
A	- .3362	6.40*	-.20
Baa1	- .1916	3.46*	.14
Unranked	.0458	.67	.09

Adjusted R^2 = .96.

N = 116.

See = .16.

* = Statistically significant at .05 level.

Table A-15. Surplus for Two Consecutive Years (Announcement Date: January Without Bond Ratings).

	Coefficient	t-Value	Partial Correlation
Constant	- .6132		
Market Int. Rate	1.0069	39.17*	.93
Average Term (Log)	.4949	8.88*	.31
Population (Log)	- .0652	5.02*	-.16

Adjusted R^2 = .93.

N = 138.

See = .19.

* = Statistically significant at .05 level.

Table A-16. Deficit for Two Consecutive Years (Announcement Date: January Without Bond Ratings).

	Coefficient	t-Value	Partial Correlation
Constant	- .8389		
Market Int. Rate	1.0590	37.57*	.93
Average Term (Log)	.5157	7.54*	.31
Population (Log)	- .0896	7.54*	-.32

Adjusted R^2 = .94.

N = 116.

See = .21.

* = Statistically significant at .05 level.

VITA

Nicholas G. Apostolou, son of George and Madeline Apostolou, was born on November 14, 1942, in Corning, New York. Upon graduation from Corning Free Academy in 1960, he entered Union College, Schenectady, New York and in June 1964, he received a Bachelor of Arts degree in Economics.

In June 1964, he accepted a management trainee position with the New York Telephone Company. He resumed his education in February 1965 at U.C.L.A. and completed requirements for an M.B.A. in August 1966.

From 1966-1967, he owned and operated a retail store in Corning, New York. From 1968-1970, he was employed as a registered representative with Townsley, Liptak & Company of Corning, New York.

In 1971, he accepted a position as an instructor of accounting at Alabama State University in Montgomery, Alabama. In 1973, he became Assistant Professor of Accounting at Radford Uni-ersity in Radford, Virginia. In 1977, he taught in the Accounting Department at Appalachian State University in Boone, North Carolina. In September, 1978, he entered The Graduate School at The University of Tennessee and received the Doctor of Business Administration degree in August, 1982. He is a member of the American Accounting Association and Beta Alpha Psi.