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The North Dakota Public Employees Retirement System: An Investment Analysis

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THE NORTH DAKOTA PUBLIC EMPLOYEES RETIREMENT SYSTEM:
AN INVESTMENT ANALYSIS

by
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ABSTRACT

This study applies quantitative financial measures of
portfolio performance in a comparison of the North Dakota
Public Employee Retirement System and the TIAA/CREF
pension funds. Ten years of data were collected for each
retirement system. The data was broken down into fixed
income and equity components so that similar categories
of investments could be compared. All quantitative
measures indicated that the North Dakota pension fund was
not achieving an adequate risk adjusted rate of return.
It is concluded that the relatively small size of, and
conservative nature of the North Dakota pension fund has
limited its investment opportunities.

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ACKNOWLEDGEMENTS

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INTRODUCTION

This study was designed as an inquiry into the
investment performance of the North Dakota Public
Employees Retirement System. The Public Employees
Retirement System covers all state government employees
who do not participate in another state sponsored plan.
One large group that does not participate is state
college and university faculty members. Eligible faculty
and staff are members of the much larger TIAA/CREF system.

The intent of this study was to analyze the
performance of the state pension fund's investments in
relation to the assumed risk. Investing is a two
dimensional process involving both return and risk.
Performance should be evaluated on a risk-adjusted basis.
When the rate of return is adjusted for risk, a
portfolio's performance may then be compared to some
other portfolio. This study compared the risk
adjusted returns of the state pension fund to the
TIAA/CREF funds. Methods of improving the return/risk
balance of the North Dakota pension fund was then
examined.

NEED FOR THE STUDY

Providing a valued fringe benefit such as a pension plan is a method of rewarding employees, particularly those who have not had a pay raise for several years. Most career employees would agree that a dependable source of retirement income is important to them. Thus, the State of North Dakota has decided that a public employee retirement system is in the best interest of society. The state is therefore responsible to assure that the system is of a sound financial nature.

It is of interest to the state of North Dakota and pension fund beneficiaries to know the relative performance of the portfolio. As more and more dollars flow into the North Dakota Pension Fund, portfolio performance is expected to increase in importance. Pension funds have always been major participants in the capital markets. This is true even today as most funds continue to experience rapid growth. These public and private pension funds are making an impact as a major force in the capital markets.

RESEARCH METHODOLOGY

The material on which this project was based is both from primary and secondary sources. Much data regarding the history of and current issues in pension funds was sourced from various periodicals, pamphlets, and books. Periodicals and trade journals included Pension World,

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Institutional Investor, Financial World, and Pensions
and Investment Age. Primary data was compiled by an
examination of the pension fund's records and by personal
interviews with the fund's managers.

The hypothesis to be tested in this study is that
due to the rather small size and conservative nature of
the North Dakota Pension Fund, the portfolio's return
will be less than that of a larger fund. It is suggested
that the North Dakota pension fund portfolio is managed
more conservatively and therefore, less efficiently than
larger pension funds. Quantitative measures of investment
performance will be used to test the hypothesis. The
Capital Asset Pricing Model is one method of comparing
portfolios using its security market line and beta risk.
Additional analysis will draw upon Capital Market Theory
and other portfolio performance measures.

HISTORICAL BACKGROUND

A retirement system is a plan established by an
employer to provide systematically for the payment of
definitely determinable retirement benefits to employees
for a period of years, usually for life, after a specified
age.

Modern pension funds essentially began 38 years ago
when General Motor's president Charles Wilson proposed
the establishment of a pension fund for GM workers.
The General Motor's President wanted the company-managed

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pension fund to invest in the American economy instead of strictly government securities as was common at that time. Investing in the common stocks of large corporations would allow pension assets to grow at the same rate as the general economic expansion of the United States. The proposal was accepted and the General Motors Pension Fund began to operate in October of 1950. The GM plan had an unprecedented impact as a result of its innovative approach for investing in the productive assets of America. Within one year of its inception, 8000 new plans had been set up and every one copied GM's innovation.(1)

Public employee pension funds were relative latecomers to the equity capital markets. It was not until the late 1970s that many states liberalized the investment guidelines for their pension plans. New investment policies allowed public pension fund managers to achieve as high a return as private pension funds. No longer restricted to only the most conservative investments, the public employee pension funds have diversified and improved their yields using increasingly sophisticated management techniques.

It is estimated that today over 90 percent of all government employees are covered under some form of public pension plan. The popularity of this type of retirement system can be attributed to the attractive tax

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features and the desirable effects on employee morale.

The explosive growth of employee pension funds has resulted in numerous legislative acts. Abuses and inconsistencies in pension fund administration inspired the Employee Retirement Income Security Act of 1974 (ERISA). The primary goal of ERISA is to increase the probability that employees who are covered by a retirement plan will in fact receive benefits upon retirement. ERISA effectively converted employer pension obligations from gratuities to corporate liabilities. Guidelines were established to put private pension programs on a secure financial footing. Directives of the act dealt with eligibility for pensions, funding, vesting, financing, survivor's benefits, and disclosure to participants. Although state and local government plans are excluded from ERISA guidelines, many state plans voluntarily comply with ERISA provisions.

CURRENT ISSUES IN PENSION ADMINISTRATION

Many interesting issues came to the authors attention during the research of this project. These topics indicate that pension plan management has evolved into a very dynamic process. The external environment is having a significant impact on the way that pension funds operate.

The Senate Banking Committee recently heard testimony advocating the taxation of short-term trading

profits of presently tax-exempt institutions. Several
prominent financial experts are prescribing a cure for
the short-term focus of American business by taxing the
short-term trader but not the long-haul investor. It
is said that some pension funds have become hair-trigger
traders, selling out at the first sign of an earnings
decline or the first offer from a corporate raider.
Pension fund managers defend their actions saying that
they have a fiduciary responsibility to always accept a
higher price.(2)

Will congress pass a law to tax the pension funds?
It has already removed the Individual Retirement Account
from the reach of many Americans. A tax on pension funds
would affect at least as many citizens including those
covered by the North Dakota Public Employee Retirement
System and the TIAA/CREF System. The administrators of
both funds need to keep current on congressional action
in this area. A change in investment strategy may be
necessary if a tax on securities transactions becomes a
reality.

In 1985 that the Department of Labor first allowed
corporate pension funds to enter into performance-based
asset management fees. It has been discovered, through
an industrial survey, that most investment management
services have not been compensated in relation to their
performance. The survey, conducted by Institutional

Investor in 1987, found that less than 4% of the funds
surveyed had installed incentive fee arrangements.
When asked about the industry trend, 36% felt that
incentive fees would eventually be arranged. Most of
those in favor of the concept believed the chief
advantage would be that money managers would have a
further incentive to do well. Studies of some funds
have shown that in about half the cases total fees
would have been lower under a performance fee
arrangement. Those opposed to the fees felt that the
returns would not improve measurably. Still others
indicated a fear that performance based fees might
encourage managers to take larger risks or abandon their
investment style.(3)

Due to the large volume of equity transactions
executed by pension plans, they would seem to be an
excellent prospect for discount brokers. In reality, the
discount brokers are having difficulty drawing pension
funds as clients. Most pension fund officers avoid using
discounters for several reasons.

Some pension administrators worry about the quality
of trade execution. They are not willing to save a
nickel on the commission and lose an eighth on the
execution price as a result of market impact. Still
other fund managers prefer to use the institutional
houses because they have drawn upon these brokers'

research.   Most of the funds with outside managers usually leave the choice of a broker to the manager's discretion.

The Abel/Noser Corp., which considers itself an institutional discount broker, argues that transaction costs are too high. Their cost analysis service shows that the quality of execution remains the same no matter what price an investor pays. Due to this fact, and the legal requirements that pension sponsors monitor brokerage costs and quality, many pension officials are telling their money managers to go for lower costs. As previously mentioned, the funds seem to be avoiding the discounters in favor of negotiating a lower fee with their current brokers.(4)

There is currently much concern among pension managers over FASB statement #87. The Financial Accounting Standards Board (FASB), together with the Securities and Exchange Commission (SEC), establishes the rules under which a firm reports its financial results. FASB #87 provided new rules regarding the reporting of pension costs and liabilities.

Under the new rules, which will be phased in by the end of 1989, some pension plan information will be shown directly on the balance sheet. A major change is that now pension liabilities as well as assets will have to be computed using the current market interest rates annually. The requirement is expected to lead to extreme volatility

in the size of net pension positions. The answer to this situation would seem to be to match the durations of the investments and the liabilities. Total immunization is inadvisable in the real world because the liabilities will be affected over time by inflation, salary increases, and interest rate changes.

FASB #87 should not affect public employee plans to a great extent. Indeed, the main fear of private pension plans is that a large pension liability will adversely affect the price of its stock. The ultimate effect of FASB #87 has yet to be seen.(5)

A new type of retirement plan that provides future income for employees is the 401(k) deferred compensation plan. The plan, which is named for the Internal Revenue Code section 401(k), was first made available to public sector employees in 1982. Under 401(k) rules, employees may elect to defer receiving compensation they now earn, choose a method for investing the deferred monies, and begin receiving payments after retirement. This type of a plan compliments an employees basic retirement plan and social security.(6)

A FUNCTIONAL DESCRIPTION OF THE NDPERS

The North Dakota Public Employees Retirement System utilizes a defined benefit pension plan. Most retirement plans are of the defined benefit type. Retirement benefits are computed according to a formula based on

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years of service, age at retirement, and final average salary. This type of a plan is popular because it provides a determinable benefit at a reasonable cost.

The North Dakota pension plan is a contributory plan which means that both the employer and the employee share the cost in a prescribed proportion. Several states including North Dakota, also pay the employees portion. Although the state pays the employees share, the employee is legally entitled to take out this contribution with interest if he leaves before his rights have vested.

The chief responsibility of the North Dakota Public Employees Retirement System is to make sure that money is available to pay retirement benefits. Consequently, the directors of the fund must find ways to maximize the amount of money available to meet plan liabilities. Increases in employer contributions are not feasible in this budget-lean state, therefore, the only way to pump more money into the fund is to improve the rate of return on investments.

The North Dakota pension fund is in the very favorable position of being fully funded. This means that current assets are sufficient to cover expected future liabilities. If this fund were a private or corporate fund, the employer would probably reduce his contribution to the pension fund. However, in the case

of state employee funds, the tendency is to improve or increase retirement benefits. In North Dakota, where most public employees have not had a raise for several years, enhancing retirement benefits has been the only way to reward state employees and improve morale. During the next legislative session, the NDPERS Board of Directors will seek approval to increase retirement benefits.

In the event of continued retirement benefit increases, an instant unfunded liability would occur. Thus, although the pension fund is currently fully funded, it is important to ensure that a maximum return is being achieved.

INVESTMENT OBJECTIVES OF NDPERS

The official goal of the North Dakota Public Employees Retirement System (NDPERS) is "to provide income through various investments and employer and employee contributions, sufficient to pay benefits and allow for benefit enhancements as defined under the Retirement Act".

It is the policy of the board of directors that the assets of NDPERS should be managed to keep the return at a maximum within acceptable risk parameters. The NDPERS assets are to be invested in compliance with the "Prudent Person Rule". The "Prudent Person Rule of Investment" states that while investing and reinvesting monies, acquiring, retaining, managing, and disposing of

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investments, judgment and care shall be exercised under the circumstances then prevailing, which individuals of prudence, discretion, and intelligence exercise in the management of their own affairs, considering the potential income as well as the degree of safety of their capital.

The Board sets additional guidelines that cover the areas of diversification, quality, and restricted transactions. The long term objective of the fund is to achieve a minimum return of 4.5% in excess of the annual rate of inflation. However, the return is to be no less than the 7.5% required to pay future benefits. The long term objective for performance is to rank above the 40th percentile of a data base composed of a popular investment measurement service.

MANAGEMENT TECHNIQUES

The Investment Officer, with approval of the board of directors, engages several Investment Counselors to actually invest the pension monies. The Investment Counselors have full discretionary authority in the selection and retention of investments. It is the duty of the Investment Officer to monitor the Investment Counselor's performance to assure that the agreed upon strategy is being followed. Consistency in strategy and investment philosophy is important because money managers are selected according to their past results.

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Many different capital management companies and investment counselors are available to pension fund managers. Of increasing popularity today is the strategy of indexing or holding investments in such a proportion that they will track the Standard & Poor's 500 stock index. Currently about 30 percent of all pension fund assets are indexed. A reason for the popularity of indexing is the general belief that active managers cannot beat the market. There are however, many investment strategies from which a fund manager can make a selection.

The Investment Counselors are of course restricted from some transactions. Restricted transactions include short sales and investing in securities issued by governments other than the United States. Of prime importance is the directive that no transactions shall be made which threaten the tax exempt status of the fund.

Money managers are scrutinized very carefully by the NDPERS before they are hired. Only money managers registered under, or in compliance with the requirements of the Investment Advisors Act of 1940 will be considered. The first step of the interview process is to convey to the manager the NDPERS investment goals and objectives and obtain an indication of what role they intend to play in achieving those goals and objectives. The money manager is asked for a description of his investment philosophy

and strategy. The investment philosophy will give the board an insight into the manager's style of management. The investment strategy allows for an analysis of the risk/reward attributes of a manager's style. The risk/reward strategy is an important factor in determining the proper diversification of the total portfolio.

The number of years the firm has been in business can indicate its experience and maturity. It is advantageous for an advisor to have been in business long enough to have experienced a complete market cycle. That experience would indicate the manager has become seasoned and developed investing skills under different market conditions.

The manager's staffing is examined to determine its capability to manage NDPERS's portfolio. This is accomplished by requesting detailed bibliographies and an organizational chart. Other information usually requested is the number of client relationships each portfolio manager is responsible for and any other non-investment duties of the manager.

The control function of the investment officer has to do with analyzing the performance of the investment advisors. Money managers have been replaced because they did not follow the investment strategy or meet goals agreed upon. An appropriate performance measure is

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needed to properly monitor an investment advisors
performance. Quarterly percentage returns however, do
not tell the whole story. Information is required in
order to make a thorough quantitative and qualitative
analysis. A good analysis technique will allow the fund
manager to identify potential problem areas before they
can have a serious impact on the portfolio's performance.

RETURN AND RISK ANALYSIS

An objective of this study is to determine if the
North Dakota pension fund is an efficient investment.
An efficient portfolio is one that has the smallest
portfolio risk for a given level of expected return, or
the largest expected return for a given level of risk.

The rate of return is the single most important
aspect of an investment. In today's turbulent capital
markets the rate of return is insufficient information on
which to adequately evaluate a portfolio's performance.
The rate of return is meaningful only when it is compared
to some benchmark. An appropriate measure of risk must be
considered along with the return yield. Performance may
then be evaluated on a risk-adjusted basis.

The North Dakota pension fund's assets are invested
into two categories of investments. These are known as
equities and fixed income assets. The equity portion
consists of common and preferred stock, while the fixed
income portion is invested in government securities,

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corporate bonds, and mortgages. Currently about 55% of the
the fund is invested in equities and the remaining 45% is
invested in fixed income assets.

The state college faculty members participate in the
TIAA/CREF System which will serve as a basis of comparison
for this study. The College Retirement Equities Fund
(CREF) is similar to the State's equity component, while the
Teachers Insurance and Annuity Association functions like
the State's fixed income component. Currently about 52.5%
of the total funds assets are invested in the TIAA fund and
the remaining 47.5% is invested in the CREF fund.

These percentages have allowed the formation of a
composite fund for each system using a weighted average
of the components. The tables in Appendix A contain
10 years of data for each funds components and its
composite. A 10 year average return, the variance, and
the standard deviation were all computed from the data
sets. The beta of each portfolio's component and
composite was calculated using the S&P 500 as a market
proxy. The next step is to conduct a quantitative analysis
of the data.

The capital asset pricing model (CAPM) is perhaps the
most informative type of quantitative analysis that can be
performed. The graphical representation of the CAPM, with
its Security Market Line (SML), divulges the "bottom line".
It answers the fundamental question, "Was the portfolio's

investment return justified by the amount of risk which
was taken?"

Graph 1 shows the position of the North Dakota and
TIAA/CREF funds relative to the Security Market Line. The
SML is the line that connects the risk-free rate of
return to the rate of return of the market and it is
considered to be the efficient frontier. The proxy for
the risk-free rate of return is the 90 day treasury bill
and the proxy for the market return is the Standard & Poors
500 stock index.

Graph 1

TIAA/CREF and NDPERS Ten-Year Average

Returns Shown in Relation to the SML

Beta
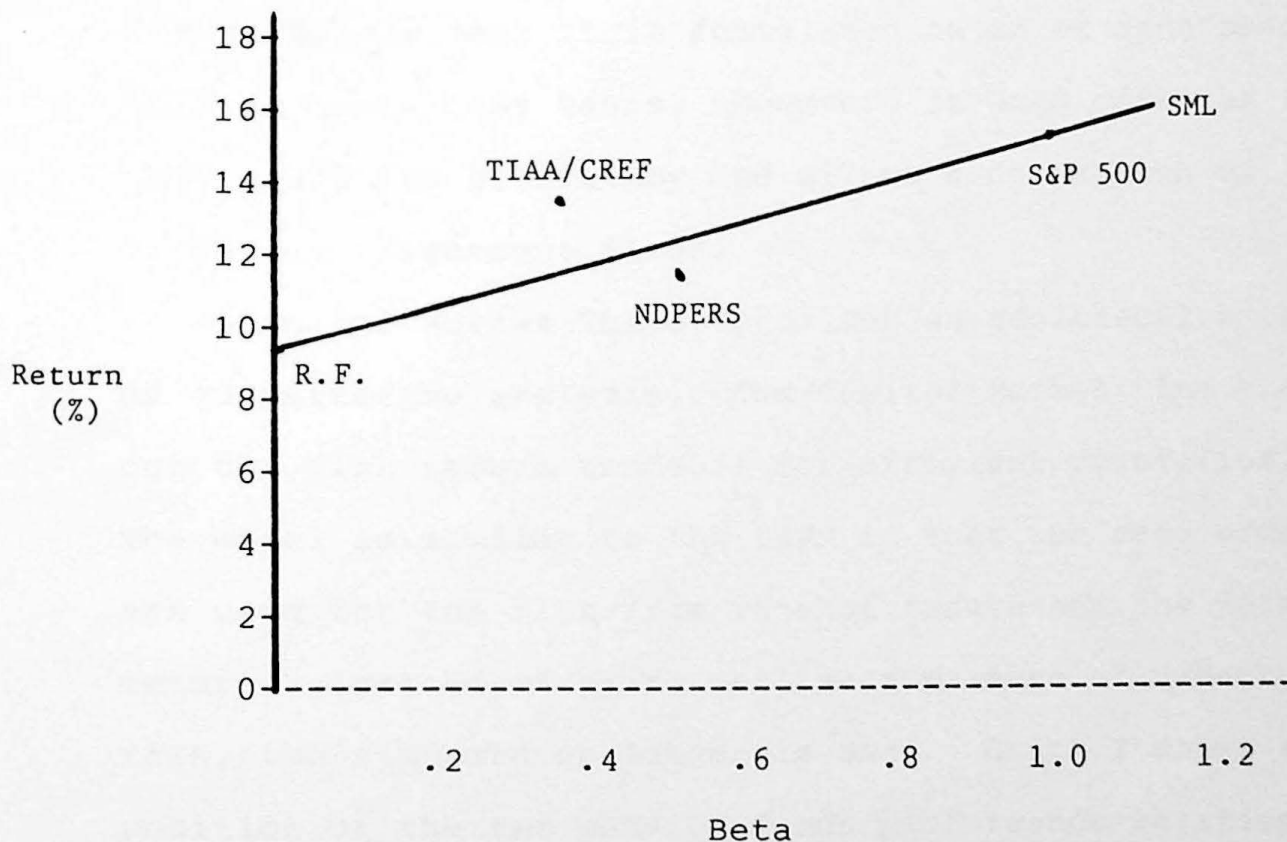
Interpreting the graph, we can see that the
TIAA, CREF, and TIAA/CREF composite are all located above
the SML. Alternately, the ND equity component, the ND
fixed income component, and the ND composite fund are all
located below the SML. Portfolios that plot above the
SML are said to be good performers, while those that plot
below are not achieving an adequate risk-adjusted return.
According to the graph, the TIAA/CREF fund is more effective
than the North Dakota fund and it is adding more relative
value. The return that the North Dakota fund is achieving
is not justified by the risk that was taken.

The CAPM has not been proved empirically and it is not
an exact predictor of performance. A major problem with the
CAPM model is that it is formulated on an ex ante basis but
used on an ex post basis. However, it does offer an insight
into portfolio efficiency and allows a comparison of
different investment funds.

Capital Market Theory provides an additional method
of quantitative analysis. The Capital Market Line traces
out the risk-return tradeoff for efficient portfolios.
The model is similar to the CAPM in that the same proxies
are used for the risk-free rate of return and the markets
return. Instead of using beta as a measure of expected
risk, the standard deviation is used. Graph 2 shows the
position of the two pension funds performance relative to
the Capital Market Line (CML).

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Graph 2

TIAA/CREF and NDPERS Ten-Year Average

Returns Shown in Relation to the CML
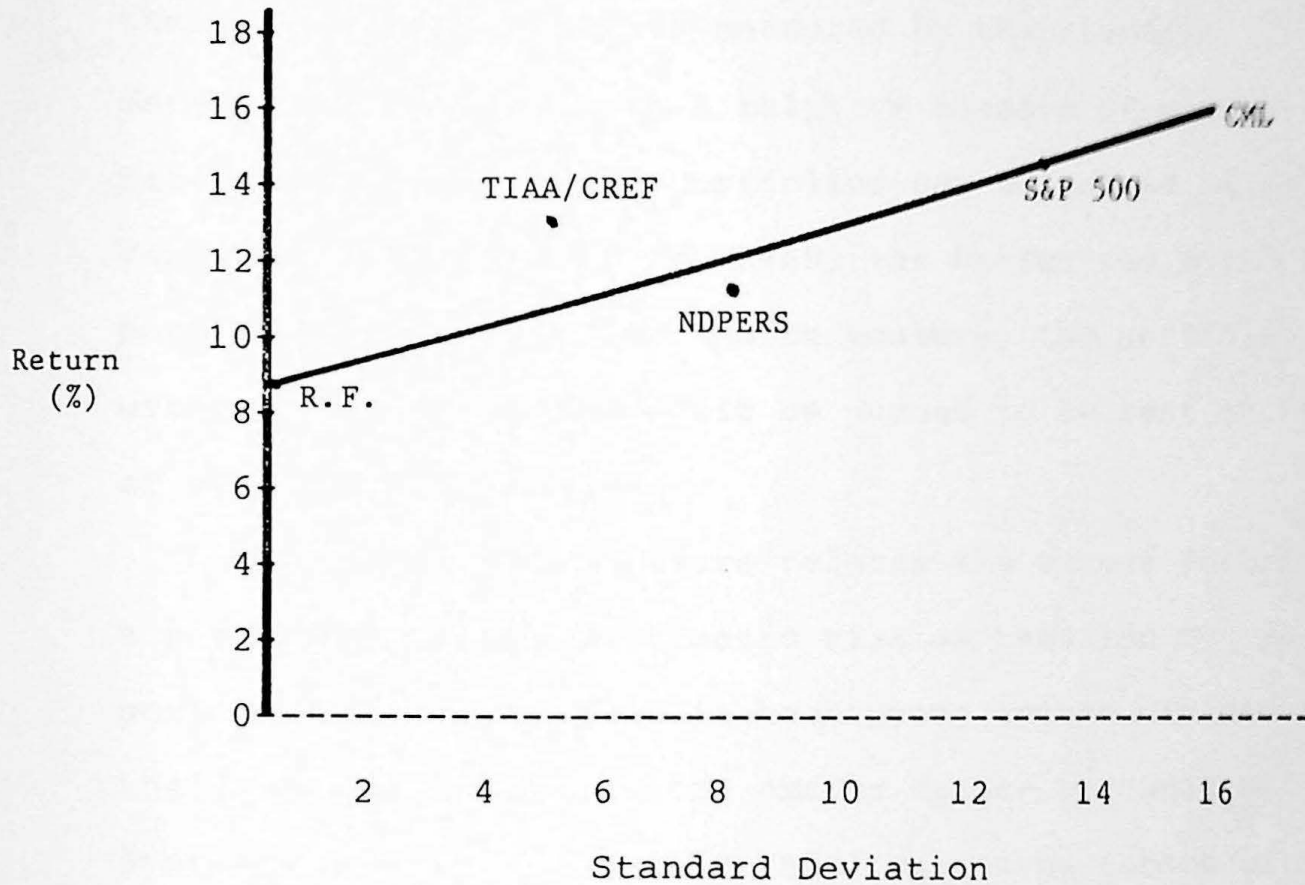
Since the North Dakota fund falls below
the CML it is not earning a sufficient risk adjusted
return. The conclusion of this graphical presentation
is that the North Dakota fund is inefficient. The pension
fund is not achieving an adequate risk-adjusted rate of
return.

Two other portfolio performance measures are Sharpe's
Reward to Variability (RVAR) and Treynor's Reward to
Volatility (RVOL). Both measures relate the excess return
on a portfolio to a measure of risk. The excess return is
defined to be the holding period yield less the risk-free

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rate of return. Sharpe's RVAR uses the standard deviation as a measure of risk and Treynor's RVOL uses beta.

RVAR is defined to be the excess return divided by the total risk, which is measured by the standard deviation. Since it is a relative measure of portfolio performance, different portfolios can be ranked on this variable. The higher the RVAR, the better the portfolio performance. Using the Sharpe measure, the portfolio with the highest RVAR would be judged to be best in terms of ex post performance.

Treynor's RVOL measure relates the excess return of a portfolio to its systematic risk as measured by the portfolio's beta. RVOL is the excess return divided by the risk and it yields the excess return per unit of systematic risk. Again, portfolios can be ranked with the higher RVOL being the better performing portfolio.

Table 1 shows how the two pension fund composites compare to each other and to the market. The performance measures indicate that the TIAA/CREF composite has outperformed the market on the basis of its excess return to risk ratio.

Table 1

Comparison of Portfolio Performance

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Fund	Sharpe's RVAR	Treynor's RVOL
TIAA/CREF Composite	.76	10.69
S&P 500 Index	.42	5.53
NDPERS Composite	.25	3.98

In this case, both measures indicated the TIAA/CREF fund outperformed both the market and the North Dakota pension fund. Differences in rankings can result from a lack of complete diversification in the portfolio. The choice of which measure to use depends upon the type of risk that the investor thinks is correct.

CONCLUSIONS

This study has utilized several financial analysis models to compare the investment performance of the NDPERS pension fund to the TIAA/CREF pension fund. The four quantitative analysis methods all indicated that the NDPERS was not earning a sufficient risk-adjusted rate of return. Not only was the TIAA/CREF system earning a higher rate of return as compared to the NDPERS, but its portfolio risk was lower.

Portfolio risk, as measured by beta and the standard deviation of returns, is relatively high for the NDPERS portfolio compared to the TIAA/CREF system. The rate of return is simply insufficient to justify the risk that was taken. The North Dakota Pension Fund needs to either improve their rate of return without raising the risk level, or lower their portfolio risk while sustaining the current rate of return.

RECOMMENDATIONS

The following recommendations are based on conclusions made from analyzing the data of this study. While these plans of action have not been studied as to their effect, on the fund, they do represent a logical alternative to the present system. These recommendations are worthy of further study and perhaps, serious consideration.

The portion of the pension fund invested in Fixed Income securities is not achieving an appropriate risk-adjusted return. The NDPERS should consider reallocating this portion of the fund to some investment that would earn a better risk-adjusted rate of return.

As seen in Graph 1, the equity component is not achieving its required risk-adjusted rate of return. The return is lower and the beta risk is higher than the S&P 500 market proxy. Since the equity portion is not beating the market return, perhaps indexing the fund is a

solution. If the fund were indexed, the return should track the markets return.

If the present system of active management is retained, some improvement may be realized by reducing transaction costs. The use of discount brokers should be investigated. There are some brokers, such as Abel/Noser Corp. that do business exclusively with large institutional investors and are very responsive to their needs. The potential savings in transaction costs could be quite large.

The use of incentive fees for money managers should be investigated. If an investment manager can "beat the market", then he should be rewarded. Should the money manager not perform as well as he had claimed he would, a savings in management fees would be realized.

The NDPERS should consider a switch to a defined contribution system. This type of plan can hold down costs because the annual contribution is determined at the plans outset. It produces a variable benefit, but it eliminates a fund surplus and the temptation to use it for other than retirement benefits. Currently there is a proposal to use the NDPERS surplus for a venture capital fund for North Dakota businesses. The objective is not to earn a high return for the NDPERS, but to create jobs by stimulating the economy. This is a political proposal that is not in keeping with the fiduciary

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responsibility of the pension fund.

The state should investigate the 401(K) plan and consider making it available to state employees. If this type of plan were available, employees could choose to invest additional capital in the pension fund. The larger pension fund should increase its investment opportunities. The 401(K) has proved itself as being very popular where it is available. Its primary strength is its tax deductibility.

The state should consider a reorganization of the several different pension funds. This student recommends bringing the Teachers Fund for Retirement and the Highway Patrolmen's Retirement System into the Public Employees Retirement System. This consolidation would reduce administrative overhead and standardize management procedures. The resulting fund would be much larger than the current NDPERS fund and should therefore have more investment opportunities.

The state may wish to consider using a computer modeling technique to adjust the equity/fixed income asset allocation. The allocation has remained fairly constant over the past few years. Shifting the asset allocation would allow the investment managers to take advantage of short term trends.

Finally, the question of taxation of pension funds continues to be brought up in congress. The funds

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managers should contact North Dakota's Congressional
Delegation and express their concern about this issue.
If some type of taxation is implemented, the investment
strategy of the fund will have to be revised.

SUMMARY

The North Dakota Public Employees Retirement System
is responsible for providing dependable retirement
income for the state's employees. This study has
investigated the investment performance of the North Dakota
pension fund's investments. The fund's return and risk were
compared to the much larger TIAA/CREF fund using the
CAPM model, Capital Market Theory, Sharpe's RVAR, and
Treynor's RVOL.

It has been shown that the North Dakota pension fund
has achieved an average return that is less than the risk
adjusted required rate of return. In comparison to the
TIAA/CREF system, which has outperformed the market, the
NDPERS fund appears to be a low performer.

However, comparing the pension fund of a small
conservative state like North Dakota to the huge
TIAA/CREF system may not be entirely appropriate.
The ND pension fund is simply not playing in the major
leagues. Vastly different investment opportunities exist
for the TIAA/CREF fund because of the large amount of
funds that it controls.

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It is not the conclusion of this study that the
NDPERS is poorly managed. Indeed, the NDPERS is
achieving the objectives required of it. The fund has
enjoyed a return in excess of the annual rate of
inflation and in excess of what is required to pay future
benefits. Even though the North Dakota pension fund is
achieving its objectives, there is an opportunity for
improvement.

FOOTNOTES

1 Drucker, Peter F., <u>The Unseen Revolution</u>. New York: Harper & Row, 1976.

2 Flanigan, James. "Why We Should Tax Pension Funds." <u>Financial World</u>. (April 21, 1987):108.

3 "Are Incentive Fees The Wave Of The Future?" <u>Institutional Investor</u>. (July 1987):127-128.

4 Ring, Trudy. "Funds Not Rushing To Discounters." <u>Pensions & Investment Age</u>. (September 7, 1987):31.

5 Rosenberg, Hilary. "The Mad, Mad World of FASB #87." <u>Institutional Investor</u>. (October 1987):191-195.

6 Bott, Bob. "Fine Tuning the Pension Machine." <u>American City and County</u>. (March 1986):56-62.

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TABLE A-1

Ten Years of Return Yields for
The North Dakota Pension Fund

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	Equities	Fixed Inc.	Composite
1986	12.51%	16.19%	12.91%
1985	32.89%	16.17%	22.49%
1984	1.15%	13.64%	6.55%
1983	23.13%	6.54%	13.72%
1982	19.77%	33.26%	27.36%
1981	-7.00%	6.29%	0.09%
1980	28.32%	-3.98%	12.63%
1979	26.46%	0.81%	12.71%
1978	5.29%	0.54%	4.84%
1977	-8.58%	3.14%	-1.39%

Average	13.39%	9.26%	11.19%
Variance	2.02%	1.07%	0.75%
Std. Dev.	14.23%	10.33%	8.64%
Covariance W/ Market	0.02	0.00	0.01
Beta	1.04	0.14	0.54
RVAR	0.31	0.02	0.25
RVOL	4.19	1.56	3.98

TABLE A-2

Ten Years of Return Yields for
The TIAA/CREF System

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	TIAA	CREF	Composite
1986	11.54%	21.82%	16.42%
1985	11.66%	32.68%	21.64%
1984	11.50%	4.69%	8.27%
1983	11.07%	25.09%	17.73%
1982	10.73%	21.86%	16.02%
1981	10.11%	-1.46%	4.61%
1980	9.44%	26.58%	17.58%
1979	8.97%	15.83%	12.23%
1978	8.71%	8.68%	8.70%
1977	8.39%	6.44%	7.46%

Average	10.21%	16.22%	13.07%
Variance	0.01%	1.12%	0.28%
Std. Dev.	1.19%	10.57%	5.30%
Covarianc W/ Market	0.00	0.01	0.01
Beta	0.04	0.75	0.38
RVAR	0.98	0.68	0.76
RVOL	31.51	9.55	10.69

TABLE A-3

Summarized Data Used for
Comparitive Analysis

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	NDPERS Comp.	TIAA/CREF Comp	S&P 500	Treas. Bill
1986	12.91%	16.42%	18.55%	6.00%
1985	22.49%	21.64%	31.84%	7.50%
1984	6.55%	8.27%	6.17%	9.60%
1983	13.72%	17.73%	22.46%	8.60%
1982	27.36%	16.02%	21.49%	10.70%
1981	0.09%	4.61%	-4.93%	14.00%
1980	12.63%	17.58%	32.45%	11.50%
1979	12.71%	12.23%	18.40%	10.00%
1978	4.84%	8.70%	6.52%	7.20%
1977	-1.39%	7.46%	-7.22%	5.30%

	NDPERS Comp.	TIAA/CREF Comp	S&P 500	Treas. Bill
Average	11.19%	13.07%	14.57%	9.04%
Variance	0.75%	0.28%	1.75%	
Std. Dev.	8.64%	5.30%	13.23%	
Covariance W/ Market	0.01	0.01	0.02	
Beta	0.54	0.38	1.00	
RVAR	0.25	0.76	0.42	
RVOL	3.98	10.69	5.53	