A PENSION FUND INVESTMENT STUDY

by

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ABSTRACT

This study is an analysis of issues in the management of private pension fund investment portfolios. A basic objective of this thesis was to study management trends in the pension fund industry and to relate these trends to the management and evaluation of a specific fund, designated as Fund X, which is an equity-based fund supporting a supplementary variable annuity pension plan.

The case study analysis related industry issues of management and investment strategy to Fund X through analyses of the fund's management, growth due to contributions and investment return, and composition and trading activities, and attempted to determine the influence of market performance on Fund X performance. The results of these analyses showed that through wide diversification the fund managers have developed a fund whose return is strongly linked to market return. Management's failure to exhibit significant ability to pick high-return investments means that they should continue their policies of low turnover and wide diversification as long as market-linked return remains at levels satisfactory to the management.

The observed industry and Fund X trends of heavy investment in common stocks will continue over the near future, but as legislative and economic pressures build, the pension funds will have to look toward higher-yielding, less liquid investments as larger portions of their fund portfolios.

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CHAPTER ONE

INTRODUCTION AND PURPOSE

1.1 Introduction

The management of pension funds has become an increasingly important task as these funds attract larger porportions of dollars flowing into financial institutions and intermediaries. Tax advantages, increased saving desire and ability, increased life expectancy, and earlier retirement and preference for more leisure time have contributed to high fund growth rates and large magnitudes associated with pension coverage, beneficiaries, and related activities of pension funds since World War II.

Tremendous growth prompted many questions from corporations developing these funds and from money managers directing them: Who is eligible for benefits? How should the plan be funded? How are the funds managed to generate dollars to cover future obligations at reasonable costs to the employing corporation?

After these questions came a newer question as competition among portfolio managers increases: How are the fund and its management evaluated with respect to the fund's objectives and in comparison to other funds? The purpose of this paper is to present an overview of the pension fund industry and to address some aspects of the question of

evaluation through an analysis of a specific fund, referred to as Fund X.

Fund X is a $21 million equity-based fund supporting a supplementary variable annuity plan within the framework of a corporate pension system. The Fund X analysis includes a look at annual fund growth and return since 1966, a performance comparison to a major market indicator, and a view of internal characteristics such as portfolio composition, turnover, and effectiveness of securities purchases and sales in recent years.

1.2 Plan of the Thesis

Chapter Two presents a historical view of private pension fund industry growth and portfolio composition characteristics since 1945, along with a look at past and current investment strategies.

Chapter Three addresses key issues of investment strategy, asset management, and management performance and evaluation.

Chapter Four presents a historical sketch of the case study fund, Fund X, and provides a description of the Fund X management and cash flow and portfolio composition characteristics. The composition description includes quarterly holdings, broken down by investment type and industry classification, along with recent purchase and sales trends.

Chapter Five describes several analytical techniques applied in the case study performance evaluation of Fund X during 1967-1973. The techniques include investigation of the influence of market performance on Fund X return, comparison of Fund performance with that of a naively-managed fund of similar characteristics, and analyses of recent purchase and sales influence on Fund X return.

Chapter Six concludes this paper with observations on the outlook for trends in private pension fund management within the framework of future economic and legislative action.

CHAPTER TWO

THE PENSION FUND INDUSTRY

2.1 Background

The growing accumulation of corporate pension fund capital reflects both the increased numbers of plans and persons covered along with the lag of outflows behind receipts even in the well-established plans. As shown in Table 2-1 on the following page, market value of pension fund assets rose from $2.8 billion in 1945 to $18.3 billion in 1955, to $101 billion in 1968, and topped $150 billion by 1972. Looking ahead, cash addition growth rates can be expected to drop off eventually as a natural consequence of numbers of plans and coverage topping out. In addition, new coverage will increase more slowly as new groups, such as smaller firms and transient employment groups, develop pension coverage. However, in terms of pure size total pension fund assets are likely to reach levels that dwarf even the present levels, which are now over twenty-five times the 1945 assets in constant dollars.

Pension funds are collections of financial assets held against the obligations for retirement payments incurred by pension plans. One might expect the dynamics of an individual fund's asset accumulation to follow this general pattern:

Initial contributions are geared to the levels of future and current benefit payments (which are at low levels during

Table 2-1

Private Pension Fund Assets

Year	Year-End Assets ($ billions) Current Dollars	Year-End Assets ($ billions) Constant Dollars	% Holdings in Common Stock	% Holdings in U.S. Gov't. Securities & Corp. Bonds
1945	$ 2.8	$ 2.8	7.7 %	56.7 %
1950	6.7	5.9	16.5	71.9
1955	18.3	14.1	33.3	58.9
1960	38.2	25.9	43.3	48.2
1965	73.6	46.6	55.4	35.7
1966	75.8	46.1	52.1	37.3
1967	89.4	52.7	57.1	32.3
1968	101.4	57.2	60.6	29.5
1969	102.5	55.1	60.1	29.7
1970	110.8	56.3	60.7	29.5
1971	130.5	64.0	67.9	24.3
1972	152.3	72.3	73.4	20.4

Source: Federal Reserve Board Flow of Funds Accounts

early stages of fund development), causing rapid accumulation of assets. As accumulation continues, earnings grow, and as more workers retire total current benefits close the gap on current contributions. At some point the benefit payments may exceed contributions, but accumulation continues because earnings on the large fund will more than cover the excess costs, though by continually smaller amounts.

Eventually, with a population with constant characteristics of age, employment, benefits, and wage scales, the benefits should just balance contributions plus earnings. At this point the matured fund will no longer grow. However, the plan of a growing firm will not mature in this way. Firm growth means that more workers are hired than retired, wage scales are shifting, and benefit and option plans can be added and modified. These characteristics are common today even in the well-established corporate pension funds.

2.2 Investment Policy

The growing accumulation of corporate pension fund capital was second among financial institutions in rate of growth during the 1960's, following growth in the savings and loan industry. This tremendous growth generated a major demand in the capital markets. Table 2-1 also illustrates the fund holding percentages in common stock and corporate bonds and government securities. Note the strong shift toward

common stock - one third of 1955 assets, over half in 1965, and over seventy per cent in 1972.

Common stock popularity arose for several reasons. Long-term stock return generally exceeds insurance company annuity and corporate vond returns. Increased confidence in the economy has made equity investments appear less risky than many years earlier, and common stock is sometimes regarded as an inflation hedge over long-run return.

A wide range of investment policies are employed by pension funds. Some hold only Federal securities, some may hold only common stock. Investment policy is affected by changes in market and business conditions, by flows of fund contributions, and by flows of benefit payments.

Investment policy usually reflects important fund objectives. A fund such as Fund X, which has a variable benefit distribution plan, often concentrates in common stock because of potentially high return and absence of rigid payment liability constraints which might limit risk-taking; in this fund the recipients can benefit from superior fund performance in addition to suffering, often along with the corporation, in times of poor performance. A fund that supports a strongly fixed benefit plan may have large holdings of high-grade corporate bonds and government securities;for example, a fund supporting a fixed-benefit annuity plan might have assets split 50-50 between common stock and fixed-return assets.

As an extreme case some fixed-benefit plans are totally invested in fixed-income securities.

Consider now the major types of assets generally held by private pension investment funds.

Federal securities holdings dropped from 30 per cent of 1950 assets to less than 3 per cent of 1972 assets. Three factors contributed to this decline: 1) Growing funds need little liquidity since benefit payments lag far behind cash receipts. 2) Fixed-income yield alone is often relatively unimportant since funds expect good asset appreciation to enhance fund return. 3) Common stock offers greater potential growth and return opportunity.

Fixed-income securities such as corporate bonds hold an an important position, remaining at relatively stable dollar volume levels ($25 to $30 billion) through the late 1960's and early 1970's, though the holding percentage dropped from 50 per cent in 1954 to 18 per cent in 1972. These bonds provide steady cash income through proper spacing of maturities to meet benefit expenses as needed. Large bond holdings are common in funds that guarantee repayment of employees' contributions, in funds that have profit-sharing plans, and in funds that provide vested benefits on death, withdrawal, or early retirement.

Where asset appreciation is of prime importance common stock has attracted the largest share of fund dollars.

Pension funds have had their greatest impact in this capital market arena. Consider the volume of total new stock issues for cash and net pension fund acquisitions of common stock in the 1960's. In 1960 new stock issues totalled $1.8 billion and pension funds acquired a net $1.9 billion of common stock. New stock issues climbed to $2.7 billion in 1964 along with net fund acquisitions of $2.3 billion. Corporate funds acquired a net of $5.8 billion in stock shares during 1968, a year in which there were only $3.9 billion in new stock issues for cash. Thus the pension funds have increased their market share of common stock holdings.

High return on common stock serves as a means to lower the employer's cost of financing a pension plan, or may permit an employer to provide more generous benefits at no additional contribution cost. Strong desire for these long-run high returns is reflected in the supergrowth of common stock holdings to over 73 per cent of assets by the end of 1972.

It is interesting to observe the activities and expectations for pension fund returns in recent years. In 1971 and 1972 the large pension funds heavily invested in growth stocks and big-fund managers were generally bullish on the economy and stock market. During these years fund managers became much more aggressive investors, in general, and were not too enthusiastic about corporate and mortgage-backed bonds. The 1973 outlook was for a continued market recovery

with moderated inflation and absence of a serious credit crunch.[1]

One group of assets that many funds acquired in 1973 were securities of the Government National Mortgage Association. By July 1973 the GNMA observed that pension funds, which generally held only 15 per cent of the outstanding GNMA securities issues, had purchased 35 to 40 per cent of the issues marketed in 1973, signalling part of the shift out of common stock during 1973.[2] These pooled-mortgage securities offer three advantages over some debt issues and other mortgage issues not widely held by pension funds: 1) The payback of interest and principal is passed through directly to investors on a monthly basis. 2) The securities are federally-backed. 3) The securities trade through a number of brokerage houses.

Turn now to evaluating overall 1973 pension fund performance. Pension fund managers paid a high price for continued investing in "top tier" stocks which suffered severe setbacks in 1973. Professor Peter Dietz, a noted pension fund analyst, tabbed 1973 as "one of the worst years ever for pension funds."[3]

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[1] "Pension Funds Pass the Supergrowth Stage," Business Week, (December 23, 1972) p.105.

[2] "Ginnie Maes Lure New Funds," Business Week (July 14, 1973) p. 64.

[3] "Pension Funds Sort Out the Disaster of '73," Business Week, (February 23, 1974) p. 33.

The majority of funds project a 5 or 6 per cent return in calculating their annual contribution requirements of corporate dollars. Most pension fund equity portfolios did worse than the Standard & Poor's 500-Stock Index (which dropped over 14 per cent in 1973), with equity holdings priced down close to 20 per cent on average.[1] As a result corporate pension fund contribution costs in 1974 could rise as high as 25 per cent above costs projected for 1973.

Fund managers now insist that they will invest in a wider range of stocks in 1974 than in the last two years, with stronger interests also in cash equivalents and stocks associated with natural resources and financial institutions. Fund managers, along with economic forecasters, are puzzled by the 1974 outlook. Most expect little economic growth, lower corporate profits, higher unemployment, and possible inflationary recession.

A very recent major trend may be developing toward debt instruments, particularly in high-quality bonds. Other more attractive items include real estate, private placements, and insurance-company arrangements offering 8 per cent annual return on five- to ten-year dollar commitments. There also exists hope for a 1974 market rally because of the re-entry of institutional money held on the sidelines early in 1974 amidst confusion about the market and economy.

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[1] "Pension Funds Sort Out the Disaster of '73," Business Week, (February 23, 1974) p. 33.

CHAPTER THREE

PENSION FUND MANAGEMENT

3.1 Strategy, Management, and Evaluation Issues

A pension fund investment strategy develops with regard for the long-run consideration for high return and the short-run considerations for conservation of principal and liquidity. The favorable historical performance of common stock has recently caused investment strategy for many funds to develop around a primary objective of productivity associated with relatively continuous full investment and a generally low level of cash on hand, implying that contributions are quickly invested by the funds.

An important strategic issue is the way a fund balances current liabilities with current assets and long-term obligations with long-term investments. This balancing brings up the issue of separation of short-term versus long-term strategic planning. It is certainly important to be able to meet current benefit obligations, but continued growth of cash inflows to most funds should make it easy to support most current liabilities with incoming cash and a minimum of very liquid invested funds. As a result, corporate managers and investment managers can concentrate on achieving maximum long-run return in an effort to save large sums of corporate money which could be needed to cover future obligations which

investment return may not be sufficient to cover.

An employing corporation that accepts responsibility for maintaining the obligatory soundness of a pension fund often places chief responsibility for controlling the fund assets directly with a financial manager. The manager could be either a person within the company or an appointed trustee through one of several trust agreement options:

1) a pension committee which instructs the investment trustee in all activities,

2) a specific trustee, with a company pension committee holding veto powers over all transactions,

3) a joint pension committee-trustee group, or

4) a trustee with sole authority over investment decisions.

No matter how responsibility is delegated, there are several items a fund manager must recognize and for which be made responsible - earning an adequate rate of return on assets, assuring sufficient assets to meet an appropriate proportion of promised benefits, and appropriately allocating pension fund operating costs. The manager should account for these factors in the current fund environment, and, while developing long-term strategic planning, should require regular reviews of the investment program in the context of investment return attained, probable changes in benefit payment structure, and alternative options for future funding and investing.

Developing an appropriate investment strategy introduces the need to adequately measure investment performance. Performance measurement is an essential ingredient to sound investment management - it is necessary to determine an actual rate of contribution needed to fund a benefit plan with a given rate of return on invested assets. Methods of valuation can also significantly affect reported corporate earnings, tax payments, and stock prices.

The evaluation procedure, especially in light of inter-fund performance comparisons, is hampered by the fact that no single measure can adequately deal with the problems of collecting data on a comparable basis, finding appropriate measures of risk and return, dealing with differences in investment philosophy, and dealing with variable market levels and irregular cash inflows and outflows. Despite these problems it is necessary for managers to analyze factors which determine both his investment strategy and the company's evaluation of the manager and fund performance.

These factors include measures of overall performance on decisions of allocating funds to different investment types in order to produce the desired portfolio characteristics (e.g. risk, return, and liquidity), measures of ability to choose specific securities to carry out broad policy objectives, and measurment of investment policy adaptability to changing market and economic conditions.

As a final note on pension fund growth and investment strategy consider the growth trends of pension funds along with the trends of the broad stock market averages. Although the comparative growth rates vary widely, pension fund and market average growth rates are all increasing along declining growth trends, i.e. the rates are increasing by smaller successive amounts.[1] Also, pension fund rate variation around its smoothed growth trend corresponds very closely with the variations of the stock market averages around the corresponding trends.

These trends forewarn a problem for pension fund investors - slower future growth in stock prices over the very long future. Recent management philosophy has recently moved toward efforts to match average market performance rather than expecting better-than-market returns. These efforts reflect the difficulty encountered by institutional investors in achieving returns consistently better than, or even as good as, those of any broad stock market index.

The plan for developing an index fund - one that rises and falls with the market index - is becoming more popular since it is difficult to be confident that a long succession of management teams could produce results significantly better than the market. The long-run management problem arises from

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[1]Paul Cretien,"The Big Money Yesterday and Tomorrow," The Commercial and Financial Chronicle,(August 23, 1973), p. 19-20.

the projected declining growth rate trend for common stocks, which for an "index fund" could lead to a "growth rate crunch" to haunt fund managers pressured to achieve returns large enough to cover pension obligations so that future corporate contributions need not be greatly increased.

This potential problem hits back at the need for strategic planning of high-return long-range investments. Proper management of long-term assets certainly can be very beneficial to the employing company. Most pension funds have heavily invested in listed common stocks and high-grade corporate bonds, and thus have assets that are very liquid relative to the general spectrum of investment opportunities. The funds have not seriously invested in the less liquid, but potentially higher yielding, investments such as real estate, oil and gas production investments, and various mortgage securities. In short, the funds are giving up higher potential returns in order to retain a very high level of relative liquidity - a position that is often not required under the present conditions of fast growth and distant lag of obligations behind contributions. With the declining growth trend for common stock becoming more apparent, those less-liquid, higher-yielding investments should become more attractive to institutional investors such as pension investment managers.

CHAPTER FOUR

FUND X

4.1 Investment Management Environment

Fund X is a $21 million equity-based fund for a supplementary variable annuity benefit plan within a $160 million framework of a corporation's total pension fund assets. The assets not held in Fund X are invested in funds supporting fixed- and guaranteed-benefit plans; thus, these other funds are more heavily invested in fixed-income securities.

The management responsibility for the Fund rests with a corporation investment committee that consults with its outside trustee. The committee, more precisely the representatives in the Treasurer's Office, hold final authority over all investment decisions.

The variable benefit nature of the Fund makes total fund return the major concern. The management does not dwell on great distinction between asset appreciation and earned income. The managers set no hard-line requirements for income or total return due to the variable nature of benefits and long-run growth emphasis, though they do want the fund return to reflect the long-run appreciation generally expected for an equity-based fund with holdings mostly in common stock. Also, the fund investment strategy is not limited by strict investment policy restrictions on allocation of funds among

different types of securities. Short-term liquidity needs are very low, but when short-term cash-equivalent investments do occur they are limited primarily to U.S. Government Securities and commercial paper of the top financial corporations.

The fund also has no specific goals or limits on asset turnover. Since the portfolio concentrates on long-term performance and is managed to reflect general market movements and conditions, the portfolio's turnover, as a percentage of total assets, is very small. Thus, asset acquisition is generally long-term oriented though short-term return is certainly not ignored. Chapter Five provides a detailed examination of Fund X activity and operation in recent years.

Benefits to member accounts are organized on a dollar value basis. No account is associated with any specific group of security investments. Benefit distribution occurs through two processes. Interest income is distributed at fixed portion rates which vary among the accounts. The older accounts have higher participative rates and thus benefit more from asset earnings of interest. Other income and appreciation gains are distributed on a proportionate dollar basis relative to the size of the individual accounts, with all accounts participating in this second form of benefit allocation. Thus, good appreciation performance benefits all accounts.

4.2 Cash Flows

Large net cash inflows are an important factor in recent Fund X growth. Table 4-1 on the next page displays year-end total market values, annual net cash flows, and new cash inflow rates for the Fund since 1966. Annual net cash inflow is the sum of net annual contributions (contributions less benefit payments) plus dividend and interest income earned on the assets. The New cash inflow rate is the percentage obtained by dividing annual new cash inflow by the year-end market value for the previous year.

Prior to the mid-1960's it was difficult to find relatively mature funds for which investment decisions could be evaluated with long-run perspective on past performance. When new money is in high proportion to total investment performance measures may be subject to large uncontrollable distortions. Where annual cash inflow rates hold steadily below the 15 per cent level portfolio performance becomes more strongly based on entire fund performance and not primarily on new money investments.[1] Fund X cash inflow rates imply that new money influence on performance could be quite significant in evaluating performance prior to 1973.

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[1]Peter O. Dietz, Pension Funds: Measuring Investment Performance (The Free Press, 1966), p. 10.

Table 4-1

Fund X Assets and Net Cash Inflows

Year	Year-End Total Market Value	Total Net Cash Inflow	Net Cash Inflow Rate
1966	$ 5.5 million	-	-
1967	7.4	$ 1.43 million	25.9 %
1968	10.1	1.83	22.8
1969	11.1	1.75	16.7
1970	13.3	2.11	18.7
1971	17.1	2.44	18.4
1972	22.6	2.69	15.8
1973	21.4	2.74	12.2

4.3 Portfolio Composition and Activity

The composition of Fund X is a key to its index-fund performance, performance that generally moves along with the market, exhibited during 1970-1973. Chapter Five provides a summary of this index-linked performance while this section presents a general view of fund composition as a preview to its performance evaluation.

Table 4-2A on the next page gives a quarterly status report on the general Fund X makeup, providing the numbers of different stocks and bonds held and the distribution of dollars among investment types - common stock, corporate bonds, and cash equivalents (including cash, U.S. Treasury Bills, commercial paper, and certificates of deposit). Table 4-2B follows and gives a more detailed quarterly composition listing by industry and investment type.

Table 4-3 concludes this set of exhibits and provides data on recent quarterly and annual sales expressed as a percentage of beginning of the period market value of the fund.

Fund X composition distribution remained very stable through the first three quarters of 1970, with the common stock share decreasing and cash equivalent share increasing in the final quarter. The number of stocks held dropped from 55 to 50 during the year, and Treasury Bill holdings rose late in the year.

Table 4-2 A

Fund X Composition by Investment Type

Quarterly Status 1970 - 1973

Date	# Bonds	# Stocks	Distribution of Assets as % of Fund Market Value		
			Common Stock	Corporate Bonds	Cash & Cash Equivalent
3/70	7	53	89.6 %	9.2 %	1.2 %
6/70	7	51	89.8	8.0	1.2
9/70	7	50	87.2	8.4	4.4
12/70	7	53	84.6	7.7	7.6
3/71	7	54	90.4	7.3	2.4
6/71	6	52	92.2	5.9	1.9
9/71	5	55	93.0	3.6	3.3
12/71	5	55	94.6	3.5	1.9
3/72	5	59	97.8	3.5	1.2
6/72	5	57	96.5	3.2	0.4
9/72	4	59	96.8	2.3	0.8
12/72	4	61	97.0	2.2	0.8
3/73	4	60	94.3	2.2	3.5
6/73	4	60	90.4	2.2	7.4
9/73	3	62	91.3	1.6	7.3
12/73	3	59	87.8	1.6	10.6

Table 4-2 B

Fund X Composition
Distribution As a % of Total Fund Value

	3/71	6/71	9/71	12/71	3/72	6/72
Cash & Cash Equivalent						
Cash	1.6 %	1.9 %	3.3 %	1.9 %	1.2 %	0.4 %
U.S. Treasury Bills	0.8	0.0	0.0	0.0	0.0	0.0
Commercial Paper	0.0	0.0	0.0	0.0	0.0	0.0
Convertible Bonds						
Metals & Mining	0.7	0.6	0.5	0.5	0.5	0.4
Drugs & Cosmetics	1.3	1.1	1.0	1.0	1.0	1.0
Petroleum	1.0	0.9	0.8	0.8	0.8	0.6
Aerospace	0.5	0.0	0.0	0.0	0.0	0.0
Publishing	0.8	0.6	0.6	0.6	0.6	0.6
Machinery	0.8	0.6	0.6	0.6	0.6	0.6
Retail	2.2	2.1	0.0	0.0	0.0	0.0
Common Stock						
Aerospace	1.6	1.4	1.2	1.4	1.5	1.3
Drugs & Cosmetics	4.7	4.5	4.1	6.2	9.4	9.9
Metals & Mining	1.6	1.7	1.4	1.3	1.4	1.6
Building	4.7	4.2	4.0	3.1	3.2	5.3
Office Equipment & Computer	9.2	8.5	7.2	8.7	8.8	7.1
Precision Instrument	4.8	4.9	4.6	4.3	4.9	5.1
Textile & Apparel	2.4	1.9	2.0	1.6	1.6	1.5
Chemical	2.2	2.1	2.2	2.6	3.6	1.7
Petroleum	9.4	11.1	9.9	11.7	9.7	7.8
Tire & Rubber	1.2	1.3	1.2	1.1	1.0	0.9
Machinery	2.6	2.2	2.5	2.1	2.0	0.0
Electrical Equipment & Electronics	16.7	16.9	16.2	13.6	13.0	14.4
Auto & Truck	3.4	1.5	1.6	1.4	1.4	1.2
Railroad	1.4	1.4	1.5	1.2	1.0	0.9
Telecommunications	2.0	5.2	4.8	4.7	4.1	2.1
Electric Utility	3.6	3.4	3.6	3.6	3.1	2.8
Retail	4.5	4.5	6.6	7.0	6.6	6.9
Bank & Finance	6.3	8.9	11.0	11.1	13.9	17.4
Insurance	2.7	2.5	2.8	3.7	3.6	5.1
Personal Service	1.3	1.2	1.3	1.3	1.2	0.8
Recreation & Toy	2.8	2.9	2.8	2.8	2.9	2.8
Natural Gas	0.0	0.0	0.0	0.0	0.0	0.0

Table 4-2 B (cont'd.)

Fund X Composition
Distribution As a % of Total Fund Value

	9/72	12/72	3/73	6/73	9/73	12/73
Cash & Cash Equivalent						
Cash	0.8 %	0.8 %	0.2 %	0.3 %	0.4 %	0.2 %
U.S. Treasury Bills	0.0	0.0	0.0	0.0	0.0	0.0
Commercial Paper	0.0	0.0	3.3	7.1	6.9	10.4
Convertible Bonds						
Metals & Mining	0.4	0.4	0.4	0.4	0.0	0.0
Drugs & Cosmetics	0.9	0.8	0.8	0.8	0.8	0.8
Petroleum	0.0	0.0	0.0	0.0	0.0	0.0
Aerospace	0.0	0.0	0.0	0.0	0.0	0.0
Publishing	0.5	0.5	0.5	0.5	0.4	0.4
Machinery	0.5	0.5	0.5	0.5	0.4	0.4
Retail	0.0	0.0	0.0	0.0	0.0	0.0
Common Stock						
Aerospace	1.2	2.2	1.9	1.6	1.7	1.5
Drugs & Cosmetics	9.4	7.9	7.5	8.4	8.2	9.2
Metals & Mining	1.6	1.4	1.6	1.5	1.6	1.7
Building	4.9	5.5	4.8	4.7	5.1	4.8
Office Equipment & Computer	7.3	6.6	7.4	7.4	6.0	8.7
Precision Instrument	4.6	4.7	4.8	4.8	4.1	4.9
Textile & Apparel	1.2	1.3	1.3	1.0	1.1	0.0
Chemical	1.6	1.6	1.7	1.6	2.4	3.8
Petroleum	8.5	8.7	9.3	9.5	9.2	9.4
Tire & Rubber	0.8	0.3	0.2	0.2	0.2	0.1
Machinery	1.2	1.2	0.7	0.6	0.7	0.5
Electrical Equipment & Electronics	12.8	12.3	11.0	10.5	10.5	7.1
Auto & Truck	2.3	2.1	2.0	2.0	3.1	2.2
Railroad	1.0	0.8	0.0	0.0	0.0	0.0
Telecommunications	2.2	3.1	3.1	3.1	2.9	2.7
Electric Utility	2.7	2.8	3.5	3.6	3.2	2.3
Retail	6.5	6.8	6.4	5.8	7.3	6.8
Bank & Finance	18.4	19.5	19.4	17.7	19.0	18.0
Insurance	5.1	5.3	4.7	3.7	2.9	2.8
Personal Service	0.6	0.8	0.6	0.4	0.4	0.3
Recreation & Toy	2.7	0.0	0.0	0.0	0.0	0.0
Natural Gas	0.0	2.0	2.5	2.1	1.7	1.0

Table 4-3

Fund X Sales Activity

Period (mo/yr-mo/yr)	Stock Sales As a % of Beginning of Period Fund Value	Total Sales As a % of Beginning of Period Fund Value
1/71- 3/71	0.5 %	7.5 %
4/71- 6/71	4.0	4.2
7/71- 9/71	0.0	0.0
10/71-12/71	3.2	7.4
1/71-12/71	8.9	21.1
1/72- 3/72	0.0	2.6
4/72- 6/72	9.4	10.2
7/72- 9/72	0.6	2.5
10/72-12/72	4.1	5.5
1/72-12/72	16.2	23.5
1/73- 3/73	0.8	4.4
4/73- 6/73	0.5	13.5
7/73- 9/73	1.5	26.0
10/73-12/73	8.3	34.7
1/73-12/73	11.1	75.3

During 1971, with holdings in 52-55 common stocks and 6 or 7 corporate bonds, common stock gained a larger fund share (90 to 95 per cent during most of the year) than in 1970. During 1971 the Standard & Poor's 500-Stock Index price maintained levels generally higher than in 1970, and the Fund X stock shares in total reflected efforts to benefit from this general market upswing.

Industry breakdowns of Fund X holdings do indicate areas where the incoming cash was invested. Holdings in drug and cosmetic shares rose from 4.8 to 6.2 per cent of total fund value from January to December 1971. Over the same period holdings in office equipment and computer stocks rose from 6.4 to 8.7 per cent, chemical stocks' share increased from 0.8 to 2.6 per cent, petroleum stock holdings rose from 9.7 to 11.7 per cent, and communication industry shares jumped from 2.3 to 4.7. Retail store holdings leaped from 4.6 to 7.0 per cent of fund value and bank and finance investment increased from 7.7 to 11.1 per cent. The largest year-end holdings, 13.6 per cent of the fund, were in the electric equipment and electronics industry.

Table 4-3 shows that 1971 sales levels were generally low, due to favorable market movement, with sales made in nine different stocks and two bonds, and purchases in shares of twenty-one common stocks, several of which were already held by the fund.

Common stock holdings in 1972 reached even higher percentage levels (93.5 to 97 per cent of fund value) with common stock investment in up to 61 different issues, bond holdings down to four securities, and very low cash equivalent levels. A general market rise continued through 1972 with the S & P 500-Stock Index ending 1972 15 per cent above the 1971 closing price. During the year Fund X made purchases in 18 different stocks and sold shares of 11 securities.

The most significant 1972 composition shift came in the bank and finance holdings, which jumped from 10.8 to 19.5 per cent of total value by year end. Other share increases due to purchases occured in drugs and cosmetics (from a 6.1 to 7.9 per cent fund share), building (3.1 to 5.5 per cent), automobiles (1.4 to 2.1 per cent), insurance (3.5 to 5.3 per cent), and natural gas (from 0 to a 2 per cent share). Important share decreases due to sales occurred in office equipment and computers (from 9.1 down to a 6.6 per cent share), chemicals (3.6 to 1.6 per cent), petroleum (11.0 to 8.7 per cent), communications (4.6 to 3.1 per cent), and recreation (2.9 to 0 per cent).

On a percentage of fund basis 1972 stock sales (16.6 per cent) were much higher than 1971 levels (8.9 per cent) while percentage of total turnover rose only slightly (21.1 to 23.5 per cent).

Fund X composition shifts in 1973 contrast sharply

with 1972 activity. Major influences were the general market declines in the first half and last quarter of the year, with the year-end S & P 500 Index down 17 per cent from a year earlier. Fund X common stock holdings dropped from 96 to below 88 per cent of fund value, a level not attained since early 1971. The fund purchased shares in only 11 different stocks during 1973, with over 80 per cent of the dollar-volume stock purchased made during the last quarter in stocks such as Ford, IBM, Xerox, Merck, Dow and J.C. Penney. The Fund sold shares in 12 stocks and bonds during 1973.

A large increase in commercial paper holdings (as high as 12.7 per cent in November 1973) matched the drop in fund share holdings of common stock, implying that much of the incoming contributions went into commercial paper purchases since stock purchases and sales were at low levels during the first three quarters of the year. The low level of trading activity brought small fund share rises in holdings of drugs and office equipment stocks, and caused small declines in holdings of electronic equipment, insurance, and natural gas stocks. Largest holdings at the end of the year were in the industries of bank and finance (18.0 per cent), petroleum (9.4 per cent), drugs and cosmetics (9.2 per cent), and office equipment and computers (8.7 per cent).

Total stock sales for 1973 were up to 11 per cent of

initial 1973 fund value, while total sales activity was very high (over 75 per cent) due to the large commercial paper transactions which began in March and remained at high levels from June through December.

In Chapter Five the constant-composition and sales-and-acquisitions analyses add reflections on the effectiveness of Fund X trading activities during the 1970's.

CHAPTER FIVE

CASE STUDY ANALYSIS

This chapter presents a statistical analysis of Fund X performance, Fund volatility with respect to market returns as represented by the Standard & Poor's 550-Stock Index, a constant-composition yardstick evaluation, and an evaluation of sales' and purchases' contributions to Fund return.

5.1 Return and Regression Analysis

A common way of developing a comparative yardstick for tracking investment performance is the unit method in which shares of the fund are formed on a dollars-invested basis so that a fund unit value index is formed that is comparable to some general market index. The Fund X management employs a unit value scheme which tracks the portfolio on an appreciation and internal cash flow basis. New fund contributions are used to "purchase" new fund units and the unit value tracks performance without the distortion effects of external cash flows and becomes a useful basis for determining a fund rate of return on investment. Fund X management actively tracks both Fund X unit value performance and the S & P 500-Stock Index performance on a monthly basis as indicators of fund performance relative to the general market. As a point of reference, Fund X unit value as of June 30, 1966 was given a value of 100.00, and all succeeding unit value calculations

are measured relative to this base date index value.

Table 5-1A presents year-end Fund X unit values and S & P 500 Index prices for 1967-1973 along with index return values (based on year-end to year-end price ratios) and total return values (based on index return plus dividend plus interest income.

Prices of many common stocks generally move up and down together. As a result it is meaningful to discuss market fluctuations and volatility and to analyze investment managers' ability to outguess the market by correctly anticipating whether the market will rise or fall and then adjusting portfolio composition accordingly. Expecting the market to fall, a manager should shift into less volatile securities, possibly bonds. With an expected rise the manager could shift into more volatile securities such as higher-beta common stock.

One might expect managers of funds such as mutual funds, which are generally more active in trading than pension funds, to exhibit these volatility shifts and to demonstrate some ability to predict market swings. Though Fund X is a long-term oriented, low-turnover pension fund, it is useful to examine the Fund activity for general volatility characteristics.

By plotting period-by-period rate of return for a managed fund against a similarly-derived rate of return for

Table 5-1 A

Year-End Unit Values and Annual Returns

Year	Fund X			S & P 500-Stock Index		
	Unit Value	Index Return	Total Return	Index Price	Index Return	Total Return
1967	108.49	15.7 %	18.8 %	96.47	20.0 %	23.7 %
1968	114.97	6.0	9.0	103.86	7.7	10.9
1969	104.60	-9.0	-6.3	92.06	-11.4	-8.4
1970	101.50	-3.0	0.1	92.15	0.1	3.9
1971	111.10	9.5	13.2	102.09	10.8	14.2
1972	128.01	15.2	17.8	118.05	15.6	18.9
1973	106.76	-16.6	-13.9	97.55	-17.4	-14.7

a market average, such as the S & P 500-Stock Index, one generates a pattern that can be fitted by a characteristic line whose slope reflects fund return volatility relative to market index performance.

A straight characteristic line results when the linear slope is the same for both years in which the market rises and years in which the market declines. With this characteristic of constant volatility the degree of scatter around the characteristic line provides a measure of fund diversification - the more perfect the diversification the less scatter around the line because the more accurately the fund reflects the stocks in the market average yardstick.

The diagrams on the next page highlight some possible characteristic line forms. In Figure A is a characteristic line of constant slope representing a fund with constant return volatility.

If a fund manager attempts to outguess the market by shifting to higher volatility to catch a market rise and shifting to lower volatility when predicting a market decline, the characteristic line takes on varied forms depending on the degree of forecasting accuracy attained.

A characteristic line such as that exhibited in Figure B indicates very successful market predictive ability - high volatility and return in market rises, low volatility and small losses in market declines. Figure C, on the other hand,

Illustrative Volatility Characteristic Lines

Figure A

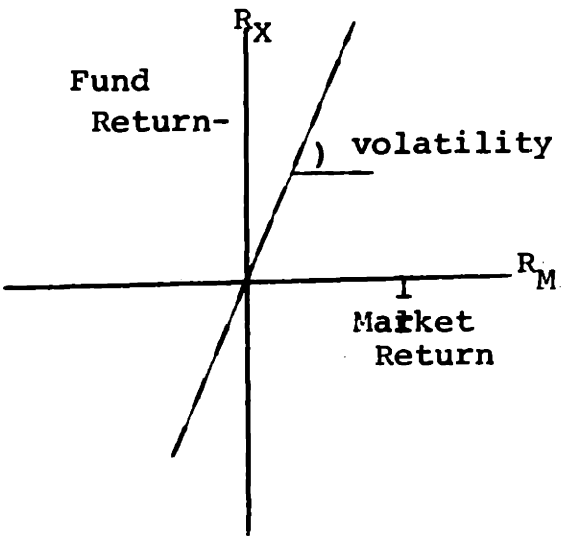


Figure B

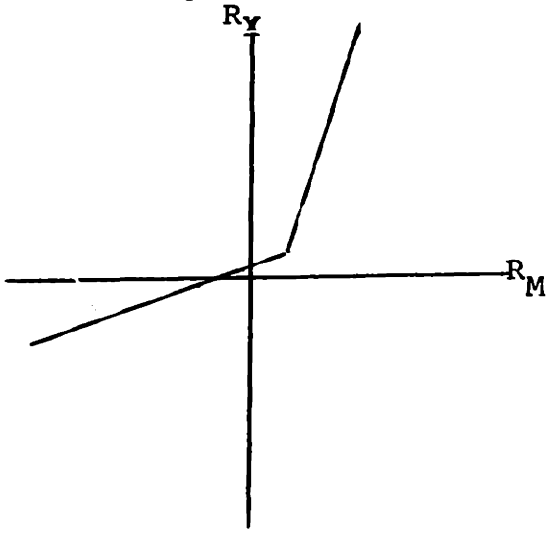


Figure C

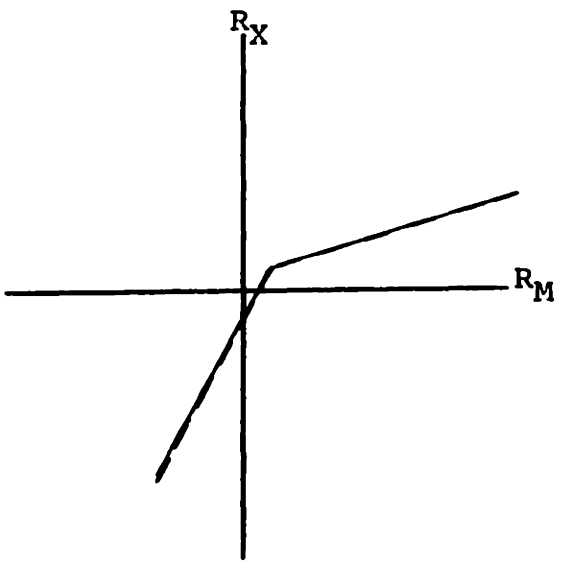
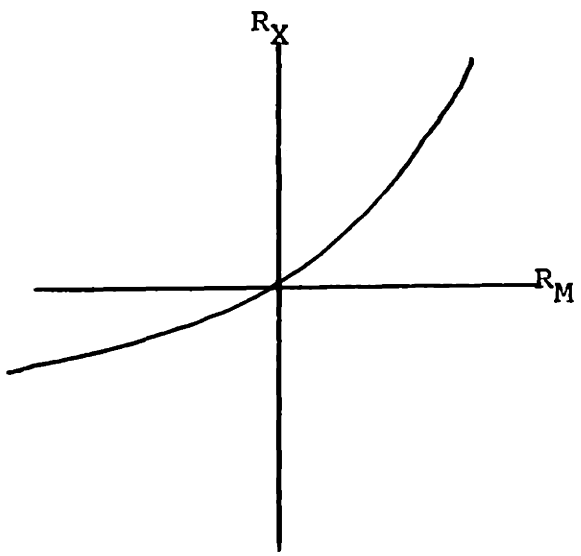


Figure D



would result for a manager consistently fooled by the market - attaining low volatility during market rises and high volatility during market slides.

The last figure, Figure D, has a characteristic line for a successful fund manager who has outguessed the market with better-than-average success. In this case the inaccurate guesses caused the line to form a smoothed curve which has generally little slope in the negative return region and increasing slope in the higher market return region.

Mutual fund managers would hope to have a characteristic curve similar to the form in Figure D.However, a study of 57 mutual funds by Treynor and Mazuy showed no significant evidence that any of the fund managers consistently outguessed the market.[1] Since pension funds tend to have lower turnover rates than mutual funds, one would not expect to find that pension fund managers demonstrated any significant market forecasting ability. For example, the plot of Fund X returns versus the S & P market returns can be reasonably fitted to straight characteristic lines, indicating fairly constant volatility over time.

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[1]Jack L. Treynor and Kay K. Mazuy, "Can Mutual Funds Outguess the Market?", Harvard Business Review (July-August 1966), p. 131.

As shown in Table 5-1A Fund X annual return is consistently less volatile than corresponding S & P 500 return. Graph 5-1A is a plot of Fund X return versus S & P 500 annual return with a straight-line characteristic line fitted by a least-squares regression analysis of the Fund versus market returns. The regression yielded the following results:

$R_X = -.548 + .877R_M$ $\qquad R^2 = 0.9816$, where

R_X = total annual Fund X return,

R_M = total annual S & P 500-Stock Index return, and

the R^2 statistic represents the per cent of variation in the dependent variable, R_X, which is explained by variation in the independent variables.

The R^2 value of 0.98 indicates that the market return explains a very high percentage of the observed Fund return. The intercept at -.5 per cent indicates that the excess return of the Fund over the market is very near zero.

Table 5-1B displays quarterly data for the Fund and market total returns. The quarterly Fund returns do not exhibit the consistent volatility Relative to the S & P Index as found in the annual rate comparisons. A graph of these data, Graph 5-1B, also displays a linear volatility characteristic line. The corresponding least squares regression yielded

$R_X = -.290 + 1.069R_M$, $\qquad$ with $R^2 = 0.9573$,

where R_X and R_M are the quarterly Fund and market returns, respectively. As the data suggest, quarterly return volatil-

Graph 5-1 A

Annual Fund X Return v. Annual Market Return

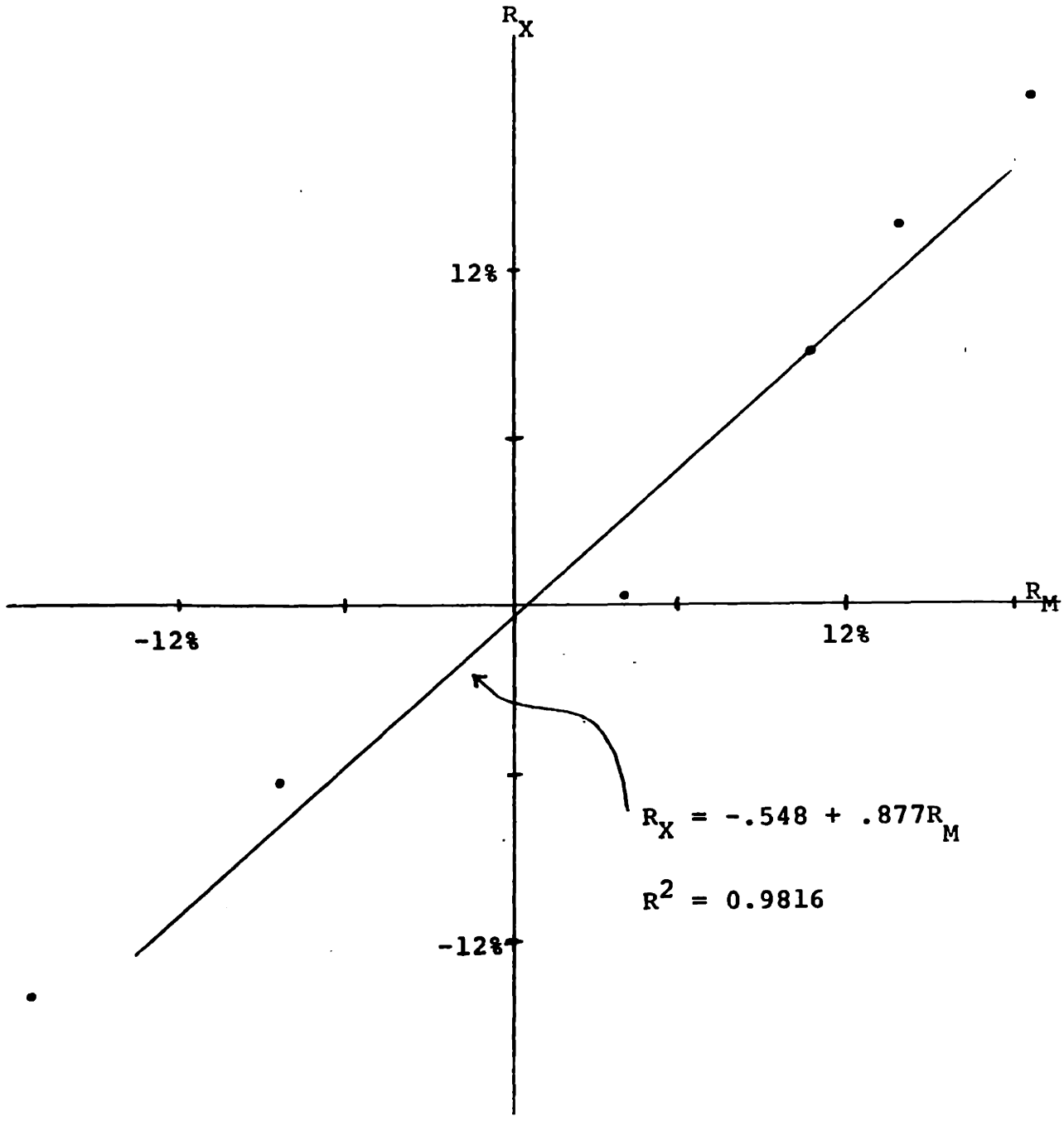


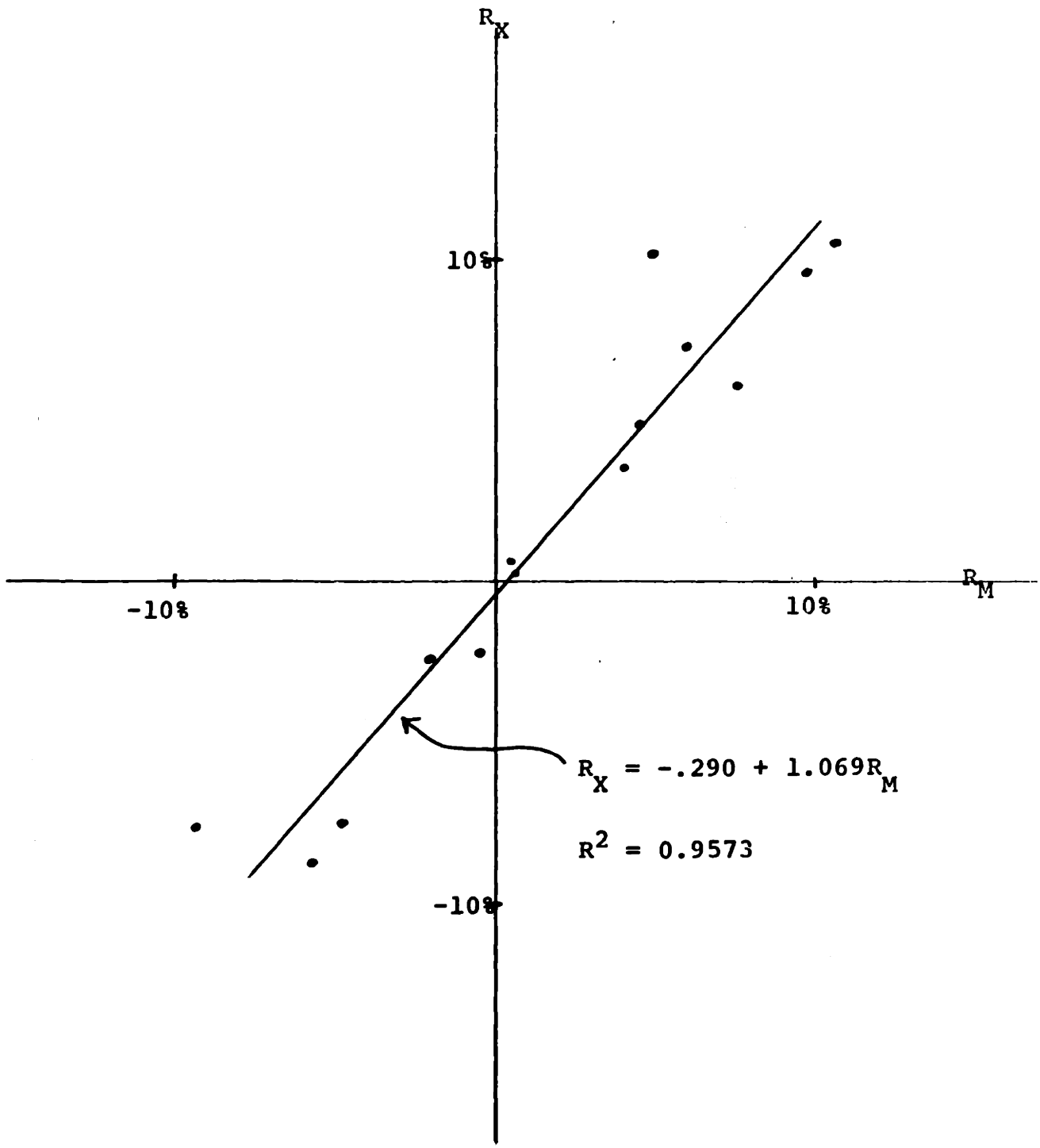
Table 5-1 B

Quarterly Unit Values and Returns
1970 - 1973

Period (mo/yr-mo/yr)	Fund X		S & P 500-Stock Index	
	Unit Value	Total Return	Index Price	Total Return
1/70- 3/70	101.40	-2.4 %	89.24	-2.2 %
4/70- 6/70	80.49	-19.7	72.72	-17.5
7/70- 9/70	92.77	16.1	84.21	16.8
10/70-12/70	101.50	10.4	92.15	10.3
1/71- 3/71	110.20	9.6	100.31	9.6
4/71- 6/71	110.00	0.8	99.70	0.3
7/71- 9/71	107.00	-2.2	98.34	-0.4
10/71-12/71	111.10	4.9	102.09	4.5
1/72- 3/72	118.50	7.2	107.20	5.7
4/72- 6/72	117.51	0.2	107.14	0.6
7/72- 9/72	121.50	3.6	110.55	3.9
10/72-12/72	128.01	6.0	118.05	7.4
1/73- 3/73	117.74	-7.4	111.52	-4.9
4/73- 6/73	106.53	-8.7	104.26	-5.8
7/73- 9/73	116.63	10.1	108.43	4.8
10/73-12/73	106.76	-7.6	97.55	-9.2

Graph 5-1 B

Quarterly Fund X Return v. Quarterly Market Return



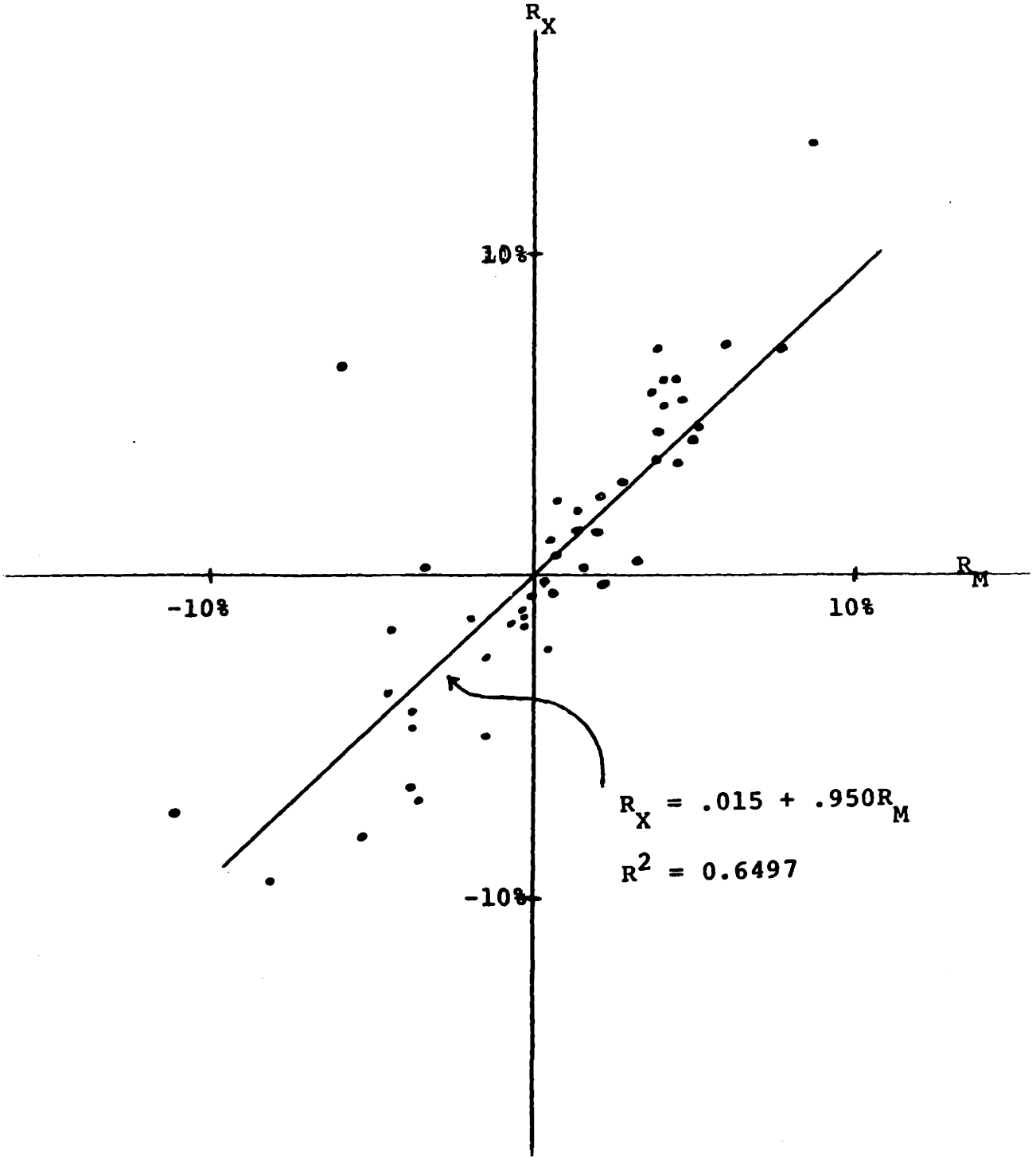
ity is greater than the relative annual return volatility, and the R^2 = 0.95 indicates strong market influence over Fund returns even on a quarterly basis.

Graph 5-1C presents a plot of monthly Fund X total returns versus monthly S & P 500 returns. These are the shortest periodic returns regularly tracked by the Fund management. The scatter about this linear characteristic line is much greater than found in the quarterly and annual plots, and the R^2 of 0.64 reflects a weaker relationship between Fund and market returns over these monthly intervals. This might be expected since Fund X monthly turnover rates are very low and Fund composition remains fairly stable over the single-month periods. Despite the low turnover, the wide diversification, with holdings in over 50 different common stocks, does make market performance still an important determinant of Fund return over this short time period.

In conclusion, the low turnover and wide diversification are important contributing factors to the strong influence of market returns on Fund X performance over both short and long periods of time.

Graph 5-1 C

Monthly Fund X Return v. Monthly Market Return



Reconsider now the annual Fund and market returns along with the additional multiple-year and internal rate of return figures in Table 5-2. Inter-fund comparisons are difficult due to variations in management objectives and their related fund composition, but it is useful to evaluate the fund with respect to a stock market index, especially when the fund is heavily invested in common stock.

The first part of Table 5-2 lists total annual return rates which reflect appreciation and earned income for the year as a percentage of beginning-of-the-year index levels. Since Fund X invests primarily with long-term goals in mind, time-weighted returns averaged over multiple-year periods become very relevant for Fund X performance evaluation. The single-year returns for the Fund are consistently less volatile than market returns, and thus, the annual returns averaged over multiple-year periods are also less volatile than the respectively averaged market returns as shown in the table.

The figures show that the Fund has achieved a 4.9 per cent average annual return from 1966 through 1973 while the S & P Index achieved a 6.1 per cent average return during the same period. The figures align with the common policy of many corporations who use a 5 or 6 per cent return figure in estimating annual corporate contributions to their pension funds. In light of these returns it is reasonable that fund

Table 5-2

Comparative Returns

A. Time-Weighted Total Annual Return

Year	Fund X Return	S & P 500-Stock Index Return
1967	18.8 %	23.7 %
1968	9.0	10.9
1969	-6.3	-8.4
1970	0.1	3.9
1971	13.2	14.2
1972	17.8	18.9
1973	-13.9	-14.7

B. Fund X Internal Rate of Return

Year	Fund X IRR
1967	18.4 %
1968	10.2
1969	-6.3
1970	2.4
1971	13.0
1972	18.4
1973	-14.0

C. Time-Weighted Average Total Annual Return

Period	Fund X	S & P 500-Stock Index
1967 - 1973	4.9 %	6.1 %
1968 - 1973	2.7	3.4
1969 - 1973	1.5	2.0
1970 - 1973	3.5	4.8
1971 - 1973	4.7	5.0
1972 - 1973	0.7	0.7

managers have developed index funds which can generate this expected level of fund return.

Of course, if a fund wished to show a consistent 5 or 6 per cent return each year the index fund policy would not have worked very well since 1966. Individual year returns have fluctuated very widely around the long-run S & P 500 average annual return.

It is important to remember that Fund X assets have nearly quadrupled ($5.5 million to $22 million) since 1966 due to asset appreciation and $14.7 million in contributions and earned income. Due to these relatively large inflows of cash to this fund it is also important to determine a measure of performance that reflects the combined impact of principal appreciation and both internal and external cash flows.

Investment funds often calculate an internal rate of return which reflects the influence of large external cash flows, such as the net contributions in the case of a pension fund, over a long time period. Though inter-fund comparisons of internal rates of return are not a good base for comparative performance evaluation due to the variations in individual cash flow patterns and management objectives, an internal rate of return measurement does provide a useful internal fund evaluation tool combining the effectiveness of investment decisions of the manager and the effects of size and timing of cash flows not controllable by the management.

Table 5-2 displays the annual internal rate of return figures for Fund X during 1967-1973. These values are based on the monthly return value r which solves the following equation:

$$V_I(1 + r)^{12} + \sum_{t=1}^{12} C_t(1 + r)^{12-t+1} = V_F \quad , \text{ where}$$

V_I = Fund market value at end of previous year,

V_F = Fund market value at end of current year,

C_t = monthly-aggregated contributions to be invested at the beginning of the t^{th} month of the year, and

r = monthly rate of return solution which holds for the given values of V_I, V_F, and C_t.

Therefore, the annual internal rate of return is given by

$$IRR = (1 + r)^{12} - 1.$$

The internal rate of return figures reflect rates very close to the time-weighted annual Fund X return rates, exceeding the time-weighted values in three years and showing weaker performance in three years. The internal rate of return values reflect some success in developing market-linked fund performance by indicating returns more similar to the S & P 500 time-weighted returns than to the time-weighted Fund X returns. Thus the Fund X investments seem to have helped generate the desired index-linked return. The large new cash contribution rates during 1967-1973 make these internal rate of return figures relevant in determining the general influence of new investments on total fund performance.

5.2 Constant Composition Analysis

A popular yardstick for investment portfolio evaluation is the naive buy-and-hold strategy in which no active trading occurs. Due to the existence of large incoming cash flows to pension funds, a modified yardstick - the constant composition strategy - develops as an appropriate yarstick for evaluation. In a buy-and-hold strategy the non-existence of external cash flows implies that portfolio composition remains constant except for the effects of asset appreciation. In a constant-composition strategy purchases with incoming dollars should be distributed in dollar-weighted proportions equivalent to the holding distributions among the securities at the time of the inflows. Thus a growing pension fund would naively invest its net contributions so as to retain the current proportionate distribution of fund assets.

A performance index of a constant-composition strategy for a pension fund will indicate the same performance as a fund index of a fund adopting a buy-and-hold strategy and having no external cash flows. In comparing actual Fund X returns with returns for an equivalent but naively-managed fund one hopes to determine some view of the ex post effectiveness of the Fund X investment decision making. Table 5-3 summarizes over several recent time periods the actual Fund returns and theoretical returns for an equivalent fund adopting a constant-composition investment strategy over

Table 5-3

Constant Composition Returns

Period (mo/yr-mo/yr)	Constant Composition Return	Actual Fund X Unit Value Return
1/70- 1/71	9.5 %	9.2 %
1/71- 1/72	3.6	8.6
1/72- 1/73	8.2	6.8
1/73-12/73	-13.2	-11.9
1/70-12/73	8.2	11.6
1/71-12/73	-2.6	2.2
1/72-12/73	-1.0	-5.9

the same periods. The data includes returns over four one-year periods and three multiple-year periods. The multiple-year figures are returns over the entire period and are not expressed on an annual return basis.

The annual returns show that the actual Fund unit return outperformed the naive strategy in only two of the four years. In 1970, a year of relatively little Fund trading and change in composition, the two strategies achieved similar positive returns. For 1971 both strategies generated positive index returns, with the Fund strategy achieving significantly greater return. As indicated earlier in the fourth chapter, 1971 trading activity caused significant composition increases in holdings of drugs, office equi!ment and computer, petroleum, communications, bank and finance, and insurance stocks.

The constant-composition strategy proved superior in 1972. Fund X holding appreciation increases were greatest in the precision instrument, electric equipment, and retail store industries, while 1972 purchases were greatest in the finance, drug, and insurance industries. Thus the new and re-purchases were not in the areas of most favorable return development.

Both strategies incurred major losses in 1973, with actual Fund X activity superior, probably due to large purchases of commercial paper rather than investing incoming

dollars in common stocks whose value generally plummeted during the year.

The multiple-year figures summarize performance in two-, three-, and four-year periods ending in 1973. The actual Fund strategy was superior in the two longer time spans, but the constant-composition strategy fared better over 1972-1973 with its largest holdings in the office equipment and computer, petroleum, and electric equipment and electronics industries.

5.3 Sales and Acquisitions Analysis

Fund X was still experiencing large cash inflow rates (18.4 to 12.2 per cent per year) during 1971-1973. This section presents an analysis of common stock sales and purchases during this period. Fund X management concentrates primarily on developing long-term common stock appreciation, but also retains the flexibility to deal with short-term market fluctuations by retaining high liquidity through shifts between common stock and cash equivalent investments such as short-term commercial paper.

This trading activity analysis attempts to split the effects on return of Fund purchases and Fund sales from overall Fund performance in order to judge management ability to choose between more risky and less risky investments and ability to choose securities relative to market conditions. The BUY and SELL analysis funds are generated by simulating the purchase and sale transactions executed by Fund X.

The BUY fund represents a portfolio which purchases securities in circumstances identical to purchases made by Fund X and holds these securities for the same period of time that they were held by the Fund. Similarly, the SELL fund purchases securities in the quantities and at the prices identical to the Fund X sales transactions and holds these securities until the end of the 1971-1973 simulation period. The analysis procedure then evaluates the performance of

these fictitious portfolios relative to yardsticks based on S & P 500-Stock Index performance.

The notation described below applies to both the BUY and SELL portfolio evaluations:

Let P_{ib} = share price of the i^{th} security at time b, the date of purchase,

P_{is} = share price of the i^{th} security at time s, the ending (sale) date of the holding period for the i^{th} security,

N_i = number of shares of the i^{th} stock purchased,

$\sum_i N_i P_{ib} = V$ = total market value of purchases in the analysis fund,

$x_i = \frac{N_i P_{ib}}{V}$ = share of total purchases made in the i^{th} security on a dollars-invested basis,

$R_i = \frac{P_{is}}{P_{ib}} - 1$ = per dollar return on the i^{th} stock over its holding period,

R_{im} = per dollar return of the S & P Index over the holding period of the i^{th} stock.

The dollar weighted total return figure for the portfolio is thus $R = \sum_i x_i R_i$. To develop an evaluation yardstick prepare similar calculations by substituting the appropriate S & P return for the individual stock return in the preceding equation, yielding $R_M = \sum_i x_i R_{im}$. This provides simulation of an investment strategy in which the fund purchases shares of a fund with composition equivalent to the S & P Index.

The forecasted market return for a specific i^{th} security is given by $\beta_i R_{im}$, where

R_{im} = market return per dollar over the i^{th} stock holding period, and

β_i = volatility coefficient of the expected price movement of the i^{th} stock relative to market activity.

Then $\sum_i x_i (R_i - \beta_i R_{im})$ results as a measure of excess per dollar return on a risk-adjusted basis. This value reflects the multiple effects of individual stock return, stock volatility relative to the market, and market return over the appropriate holding periods, and reflects the influence of risk on ability to choose desirable stocks.

On a non-risk-adjusted basis, excess returns are given by $\sum_i x_i (R_i - R_{im})$. This excess return measurement reflects the securities performance relative to the observed market activity.

To determine the significance of these excess return figures, calculate a measure of the expected residual return

variance and standard deviation for the S & P yardsticks using residual variance $=\sum_i (0.07x_i^2)$, and

standard deviation = (residual variance)$^{1/2}$, with the standard deviation useful as a yardstick for determining the significance of the observed excess returns on the BUY and SELL portfolios. The 0.07 in the preceding calculations represents an appropriate factor for the residual variance of observed market behavior.

The calculations performed with the Fund X data were based on end-of-the-month prices due to the format of the data available. The BUY and SELL funds were formed as aggregates of trading activity over a three-year period because of the low level of transactions during a single year. The purpose of these calculations is to determine a view of the general effectiveness of Fund X trading activities, and the multiple-year aggregation provides a wash out of some noise effects of individual transactions.

Over the observation period the BUY fund acquired $10.4 million in common stock and the SELL fund purchased $5.8 million in stock. Table 5-4 summarizes the performance indicators resulting from these analyses.

The BUY fund suffered a 9.1 per cent loss based on value-weighted observed return and achieved a -2.9 per cent risk-adjusted excess return for the entire period. The standard deviation yardstick indicates that the excess loss of

Table 5-4

Sales and Acquisitions Analysis

Characteristic	BUY Fund Value	SELL Fund Value
$\Sigma x_i R_i$	-.091	-.146
$\Sigma x_i R_{im}$	-.060	-.066
$\Sigma x_i (R_i - R_{im})$	-.030	-.081
$\Sigma x_i (R_i - \beta_i R_{im})$	-.029	-.073
Residual Standard Deviation Yardstick	.041	.055

2.9 per cent is not significant in determining management ability to choose good securities on relative risk bases. The Fund X unit value achieved a 5.2 per cent positive return during 1971-1973; thus, the BUY fund transactions did not contribute to desirable overall Fund X performance.

The SELL fund return does indicate trading activity that contributed to desirable Fund X return through liquidations of stocks that generally performed poorly after the date of sale. Value-weighted SELL fund return was -14.6 per cent, and the SELL fund excess return of -7.3 per cent was significant relative to the standard deviation yardstick. Thus the Fund X management did better its overall performance through its securities sales, though this analysis does not include any sensitivity testing to indicate whether different sales timing could have been more beneficial.

The similarities between the risk-adjusted and non-risk-adjusted return values do not provide any insight into management ability to choose between favorable more risky and less risky investments, but the non-risk-adjusted SELL excess return does indicate some ability to pick individual stock performance relative to overall market activity. The failure to exhibit definite stock-choosing ability suggests that Fund X should retain its low common stock turnover level with its wide diversification policy as long as the index-linked returns are considered satisfactory.

5.4 Evaluation Summary

The analyses in Chapters Four and Five show that Fund X management has developed a very diversified portfolio - with holdings in over 50 securities in over 20 industries - which has achieved returns strongly linked to market performance, as described using the Standard & Poor's 500-Stock Index. Low common stock turnover rates, in addition to the wide diversification, have made the Fund return volatility relative to market return fairly constant over short and long time periods.

The managers have successfully met their objective of developing a fund with long-term market-linked performance, though the actual Fund return did not match the higher S & P return over a recent seven-year period. This result is in line with the observed Fund return volatility coefficient value less than 1.0.

Though the management plans primarily to meet its long-term objectives, it also provides the flexibility to deal with short-term market shifts by retaining high liquidity through shifting between common stock and cash equivalents such as commercial paper rather than shifting in and out of corporate bonds. Note that there were no corporate bond purchases during the entire 1971-1973 period. During the market slide late in 1973 the Fund registered one of its largest recent levels of stock sales and shifted many dollars along with new contributions into short-term commercial paper, with the intent of

returning to common stock at a later date.

The failure of management to exhibit significant ability to pick high-return stock investments suggests that the managers should continue to retain relatively low turnover levels, concentrating on stock sales in order to minimize losses while continuing purchases to retain the diversification which promotes the desired market-linked performance. Switching to new areas of investment - particularly higher-yielding but less liquid investments - might become desirable if continued market-linked return proves unsatisfactory to the corporation's performance plans for this part of the total pension fund system.

CHAPTER SIX

CONCLUSION

Pension fund investment managers must deal with several inter-related policy decisions - What benefit levels should they provide? What funding and investment policies should they develop? What actuarial and evaluative procedures should they follow?

Important investment policy considerations intermingle with the management answers to these questions. Inflation is a factor in setting both desirable current fund return and projections of future return and corporation contributions and benefit obligations. Return considerations depend on the portfolio characteristics of risk and diversification; investing in many securities across several industries decreases unsystematic risk of the total portfolio, leaving the systematic risk relative to the market. This risk level is then controllable by proper mixing of securities in the portfolio.

A secondary risk issue is the problem of risk-bearing of pension fund costs - does the corporation bear the cost risks of supporting the pension fund operations, or do the corporate shareholders bear this risk? A very important policy determinant is management investment ability. Managers must be aware of their degree of ability to make proper investment decisions so that they can both limit potential problems in

weak-ability areas and take advantage of strong-ability areas.

Future investment policy will also have to deal with the legislative requirements that do not exist at present but are developing for the near future. Congressional action is now pending on the issues of mandatory vesting that will establish an employee's right to collect a deferred pension if he leaves the company before retirement age, enforced funding requirements, financial re-insurance policies, and pension credit portability as corporations enter an era where pensions are viewed more and more as a right rather than a privilege.

Mandatory vesting will provide some guarantee of benefit payments which employees are growing to count on. Enforced funding requirements will firm up corporate support for the benefit plans, and re-insurance would provide financial support guarantees of the pension system at another back-up level. Pension portability would enable employees changing jobs to carry over pension credit during their entire working life. Portability is the issue least likely to survive near-term legislation since improved vesting would reduce the need for assured portability; also, keeping central records of all pension credits seems an insurmountable stumbling block unless the Social Security System absorbs the private pension system.

The cost impact of legislation will fall most heavily on companies that have not stayed up to date in the areas of vesting and improved benefits, and rising pension costs will

create a pinch on earnings, forcing pension managers to move some funds out of stocks and bonds into investments that are higher yielding but less liquid. Some larger pension funds have already begun to develop large real estate investments that actively net 8 and 9 per cent annual returns.

As a result of higher costs, more burden of responsibility will rest on corporate management as conditions of a company's pension fund become a more important factor in evaluating the company's common stock value. Fund managers must realize that only the top management in the corporation know enough about where the company is headed to anticipate future pension costs with reasonable accuracy.

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