OVERSIGHT VRS Report

JOINT LEGISLATIVE AUDIT & REVIEW COMMISSION
OF THE VIRGINIA GENERAL ASSEMBLY

The VRS Investment Program

Report Summary and Contents

Profile: Virginia Retirement System Investments

Chief Investment Officer: Erwin H. Will
Total Assets: $16.6 billion
Actuarial Return Assumption: 8%
Number of VRS Investment Staff: 15
Current Number of Outside Managers: 70
Number of Active VRS Members: 263,071
Number of Retired VRS Members: 73,200

Total Return on Investments

(Most Recent Full Fiscal Years)

1991	*1992*	*1993*	*1994*
6.4%	**11.2%**	**11.5%**	**1.7%**

(Time Periods Ending 12/31/94)

10 years	*5 years*	*3 years*	*1 year*
11.6%	**7.2%**	**4.9%**	**0.0%**

Asset Allocation (as of December 31, 1994)

	Asset Allocation (% of Total Assets)		*Where Invested* (% of Asset Class)		*Investment Strategy* (% of Asset Class)	
Asset Class	**Target**	**Actual***	**Domestic**	**International**	**Active**	**Passive**
Equity	**70%**	**56%**	**85%♦**	**15%**	**64%**	**36%**
Fixed Income	**21%**	**28%**	**91%**	**9%**	**100%**	**0%**
Real Estate	**9%**	**7%**	**100%**	**0%**	**70%▽**	**30%**

*Of total assets, 1% was cash and 8% was tactical asset allocation. ♦Includes private equity. ▽Includes RF&P Corporation
Source: Virginia Retirement System.

The VRS Investment Program

INTRODUCTION

In response to legislation enacted by the 1994 General Assembly, the investment policies and procedures of the Virginia Retirement System (VRS) are in the process of intense review and substantial change. This process of examination and revision is ongoing, and many key policy decisions remain to be made. A complete evaluation of the effectiveness of the VRS investment program is premature at this time. However, a review of the issues affecting the investment program, and how those issues are being addressed, is appropriate.

The 1994 General Assembly made two significant statutory changes affecting the VRS investment program. First, the General Assembly eliminated the legal list of authorized investments, and established a new prudence standard for VRS investments. Under the new statutory provision, the VRS Board of Trustees (the Board) may make any investment provided that it is made "with the care, skill, prudence, and diligence under the circumstances then prevailing that a prudent person acting in a like capacity and familiar with such matters would use in the conduct of an enterprise of a like character and with like aims."

Second, the General Assembly strengthened the required membership of the Investment Advisory Committee (IAC) and the Real Estate Advisory Committee (REAC). As a result of the new requirements, a greater level of investment expertise is now present on each committee. In addition, both of the advisory committees were made mandatory for the VRS Board. Each advisory committee is required to provide the Board with "sophisticated, objective, and prudent investment advice."

VRS is attempting to address many important and complex investment issues. Several major issues, particularly asset allocation and the relationship between VRS assets and long-term pension liabilities, have been largely resolved. But some other issues, especially concerning the strategies by which the new asset allocation will be implemented, have not yet been fully addressed. These issues have all been difficult to address, and should continue to require a significant amount of time and effort on the part of the VRS Board, its advisory committees, and the VRS staff.

Study Mandate

The Virginia Retirement System Oversight Act (Section 30-78 et seq. of the *Code of Virginia*) requires VRS to submit semi-annual and annual reports on its investment program to JLARC. The statute requires that the report be in a format approved by the Commission and that it include information concerning (i) planned or actual material changes in asset allocation, (ii) investment performance of all asset classes and sub-classes, and (iii) investment policies and programs.

Study Approach

This report was prepared based on information provided by VRS, in response to a proposal developed by JLARC staff for VRS investment reporting. JLARC staff defined the specific investment issues for VRS to address. These issues included asset allocation, investment policy and performance, long-term assets and liabilities, and short-term investments and liquidity. JLARC staff met with VRS staff to discuss the investment reporting proposal prior to the compilation of the requested information. This report is a summary of the investment information provided by VRS.

OVERSIGHT VRS Report

***VRS Oversight Report* is published periodically by the Joint Legislative Audit and Review Commission (JLARC) in fulfillment of Section 30-78 *et seq*. of the *Code of Virginia*. This statute requires JLARC to provide the General Assembly with oversight capability concerning the Virginia Retirement System (VRS), and to regularly update the Legislature on oversight findings.**

The Joint Legislative Audit & Review Commission
Suite 1100, General Assembly Building
Capitol Square, Richmond, Virginia 23219
(804) 786-1258 Fax: 371-0101

Report Organization

This report provides a summary update of the investment policies, procedures, and performance of VRS. The first section of the report examines asset allocation. The second section reviews other elements of the VRS investment policy. The third section discusses VRS investment performance. The fourth section presents a discussion of the relationship between VRS long-term assets and liabilities. The final section examines VRS short-term investments and liquidity.

ASSET ALLOCATION

Asset allocation is probably the most important investment policy decision made by the VRS Board. On average, 85 to 90 percent of total investment return may be controlled by the asset allocation decision. The VRS Board of Trustees, with the assistance of its advisory committees, is in the process of modifying the pension fund's investment policy and asset allocation.

Initially, the IAC worked with VRS staff and a consultant, J.P. Morgan, to develop an alternative asset allocation policy using an "asset-only" approach. Under this approach, pension fund risk is defined as the volatility of investment return. Based on this approach, an asset allocation recommendation was made to the Board. The Board voted to approve the recommended allocation (70 percent equity, 21 percent fixed income, and nine percent real estate) at its September, 1994 meeting.

However, at the request of the VRS Board, VRS staff and the IAC worked with Buck Consultants (Buck) on a different type of asset allocation study. In that study, Buck used an "asset/liability" approach, wherein pension fund risk is defined as the volatility of the VRS funding level and contribution requirements. Based on the results of the study, which was presented to the VRS Board at its December 1994 meeting, the Board reaffirmed the allocation previously determined using the asset-only approach. However, Buck recommended that the newly-approved VRS asset allocation be modified by increasing the pension fund's investment exposure to long-term bonds and international equities. This section describes the process used by VRS to develop its asset allocation policy.

"Asset-Only" Approach to Asset Allocation

Under this approach, which is prevalent in the pension industry, assumed rates of investment return, rate of return variance, and correlations between the returns of different asset classes are used to generate a number of possible asset allocations. A computer modeling program, known as an optimizer, uses these inputs to generate a number of asset allocation alternatives. Each of these possible allocations is efficient, meaning that the expected return is maximized given the corresponding amount of risk. Each potential allocation differs based on the amount of expected return and underlying risk. Using this type of approach, pension fund risk is defined as the variance in the expected rate of return. Typically, as the expected risk increases so does the return. These potential allocations serve as a starting point for further analysis.

While the alternative allocations which result from this approach are all efficient, they are not necessarily realistic for VRS. For example, preliminary results obtained for VRS included allocations that did not contain any U.S. equities, while also including large exposures to highly illiquid, rather expensive asset classes. Given this difficulty, VRS developed some realistic constraints for the optimizer model. For example, at least 25 percent of the VRS assets had to be invested in the domestic equity market, and at least ten percent of VRS assets had to be invested in fixed income instruments.

Capital Market Assumptions. The assumed rates of return, risk, and correlation used in the optimization process were developed based on information obtained from a number of sources. These included VRS consultants, as well as IAC members and VRS investment staff. Based on a consensus view, the IAC decided to use long-term equilibrium capital market assumptions developed by J.P. Morgan, with some minor revisions. The investment return and risk assumptions are summarized in Table 1.

Recommended Asset Allocation. Based upon the work done by VRS consultants and staff using the asset-only approach, the IAC recommended a revised asset allocation policy to the Board. This revised policy, which was approved by the Board in September 1994, made two significant changes. First, the percentage of assets to be invested in equities was substantially increased, while the percentage to be invested in fixed income instruments decreased substantially. Second, managed futures was eliminated as a distinct asset class. The allocation to real estate was increased to a lesser degree.

The expected return and risk of the new allocation policy is slightly higher than that of the prior policy. The allocation policy approved by the Board is based on an expected return of 11 percent and a standard deviation of 12 percent. This is higher than the 10.1 percent return and 11.1 percent standard deviation of the prior asset allocation policy. Figure 1 summarizes the revisions made to the VRS asset allocation policy.

Elimination of Managed Futures. As part of its overall review of VRS asset allocation, VRS eliminated managed futures as a separate asset class. This was

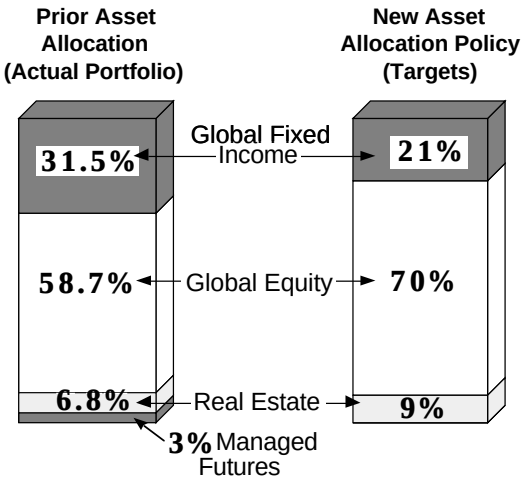
Table 1: VRS Asset Allocation Assumptions -- Investment Return and Risk

Asset Class	*Asset Sub-Class*	*Nominal Rate of Return (%)*	*Standard Deviation (%) of Rate of Return*
Equity	Domestic - Large Capitalization	10.55	16.0
	Domestic - Small Capitalization	12.11	20.0
	International - EAFE*	12.22	19.0
	International - Emerging Markets	15.02	25.0
Fixed Income	Domestic - U.S. Government/Corporate	7.02	7.5
	Domestic - High Yield	9.62	13.0
	International Bonds	7.33	12.8
Real Estate		7.80	15.0
Private Equity/Other		14.20	30.0

* Morgan Stanley European, Australian, and Far Eastern index.

Source: J.P. Morgan Equilibrium Capital Market Assumptions.

Figure 1: VRS Asset Allocation



Source: Virginia Retirement System.

done primarily in response to concerns about the relatively high costs and perceived risks that were believed to be associated with the program. The Board believed that these costs and perceived risks offset the potential for above-average rates of return. However, the Board did decide to continue to search for ways to include futures trading within the investment program in order to help realize its overall investment objectives.

"Asset/Liability" Approach to Asset Allocation

This type of approach identifies the mix of asset and sub-asset classes which best addresses a retirement system's projected liabilities and funding requirements. Forecasting techniques are employed to analyze the relationships between five variables: (1) funding ratio, (2) planning horizon, (3) contribution rate, (4) investment policy, and (5) confidence level. This type of approach to asset allocation, which integrates investment policy and funding policy, is new for VRS. Historically, investment policy and funding policy have been largely independent of one another. Prior to 1994 there had been little, if any, interraction between the VRS investment department and the VRS actuary. This analysis, which was the result of close collaboration between VRS investment staff and the VRS actuary, provides the VRS Board with information enabling it to answer the following type of question:

Given an asset allocation of A, what contribution rate is required over a period of B years in order to achieve a funding ratio of C with a probability of D percent?

The funding ratio used by Buck in its study for VRS is the market value of pension fund assets divided by the value of accumulated benefits. Under the asset/liability approach, this ratio serves as the financial goal for the pension fund. The planning horizon refers to the number of years required to achieve the financial goal. The contribution rate is expressed as a percentage of payroll. Investment policy refers to the allocation of plan assets among different asset classes. Finally, the confidence level is the likelihood that the stated result will actually be achieved.

In addition to serving as a decision-making tool for asset allocation, this type of analysis can also be used to help establish pension funding policy. In other words, how much money should be contributed to the pension fund, and when should the contributions be made? Traditionally, pension funding policy has been determined using actuarial valuation methods and as-

sumptions, and amortization periods. However, forecasting techniques allow the plan sponsor to participate more directly in the policy setting process.

Definitions of Risk and Reward. An important feature of the asset/liability approach, which significantly differentiates it from the asset-only approach, is how the concepts of pension fund risk and reward are defined. Under the asset-only approach, risk is defined as variable investment performance as compared to the expected rate of return. The asset/liability approach, by contrast, defines risk as volatile funding ratios and contribution rates. The asset-only approach defines reward as expected investment return, while the asset/liability approach defines reward as expected increases in funding ratios and expected decreases in contributions.

The question of exactly how VRS pension fund risk should be defined is difficult to answer. There may not be any one single measure of risk for VRS. For example, pension fund risk could relate to the volatility of return, or to the volatility of funding status, or to the volatility of contribution rates. In practice, in order to design effective long-term investment policies designed to protect the pension fund and the interests of VRS members and beneficiaries, VRS needs to examine risks which extend beyond the mere volatility of expected return. The asset/liability study recently completed by Buck represents a positive step in that direction. The specific methods and the results of that study are discussed in detail later in this report.

INVESTMENT POLICY

The VRS Board is in the process of reviewing the overall investment policy of the pension fund. As part of the review, VRS prepared a draft investment policy statement. While the draft statement, as a whole, has not yet been approved by the Board, various policy elements contained within the document have been approved. Other elements, including the use of active and passive management strategies for various asset classes, have not yet been approved.

The draft policy statement includes a clear objective for the pension fund. "The overriding objective of the VRS is to help secure the Commonwealth of Virginia's obligation to pay pension benefits to qualifying employees." Moreover, "the assets of the VRS are to be invested in a prudent manner which is intended to provide for the anticipated growth of VRS's pension liability."

Asset allocation is an integral component of investment policy, but many other important policy elements have also been under review. These include the delegation of authority and responsibilities, performance objectives, manager strategy, and asset class guidelines. These elements all pertain to the manner and means by which VRS will implement its new asset-allocation policy over the long term. This section examines the elements of VRS investment policy that have been, and are continuing to be, examined by VRS.

Investment Responsibilities and Authority

The Board of Trustees, as the fiduciary of the fund, determines the appropriate investment policies to meet the fund's stated objectives and establishes guidelines under which the policies will be carried out. The IAC and the REAC determine the appropriate investment program structure, based on the recommendation of the investment department staff, in order to implement Board policies within established guidelines. VRS investment staff, under the direction of the chief investment officer (CIO), work closely with investment managers and consultants to implement the investment policy within the approved program structure.

The investment policy statement contains a proposal for allocating a number of responsibilities among the VRS Board, the IAC, and the CIO (Table 2). These responsibilities encompass the areas of policy and guidelines, program structure, manager strategy, consultants, and administration. The objective of this division of responsibilities is, to the greatest extent possible, to keep the Board focused on broad policy decisions as opposed to administrative micro-management.

VRS Advisory Committee Membership. Section 51.1-124.26 of the *Code of Virginia* specifies that the IAC and the REAC shall both have seven members. While the REAC has had seven members since the committee was reconstituted in March 1994, the IAC has had only six members during this period of time. The committee has discussed the need to obtain a seventh member, preferably an individual with a strong background in fixed income investments. However, no one as yet has been appointed to fill the vacancy. Having a seventh member is especially important since it is rare for all six IAC members to be present at each meeting. In eight IAC meetings held between June and December 1994, at least two committee members were absent during four of the meetings.

VRS Investment Staffing. Another source of potential difficulty is the amount of professional and support staffing within the VRS investment department. As of December 1, 1994, the VRS investment department had a total of 20 authorized positions, 15 of which are filled. The following positions are vacant:

- Managing Director,
- Senior Investment Officer,
- Investment Officer,
- Financial Analyst, and
- Office Manager.

Table 2: Proposed Allocation of VRS Investment Responsibilities

Responsibility	*Chief Investment Officer*	*Investment Advisory Committee*	*Board of Trustees*
Policy and Guidelines			
Approve Proposed Policy/Guidelines	Recommend	Recommend	Approve
Approve Long-Term Asset Allocation and Ranges	Recommend	Recommend	Approve
Approve New Asset Classes	Recommend	Recommend	Approve
Set Actuarial Investment Earnings Assumption			Approve
Program Structure			
Determine Target Allocation within Ranges	Recommend	Approve	Review
Approval of Proposed Structure	Recommend	Approve	Review
Rebalancing of Manager Allocations within Ranges	Approve	Review	Review
Manager Strategy			
Initiation and Development of Search	Recommend	Review	Review
Screenings and Interviews	Review		
Final Decision	Recommend	Approve	Review
Fee Negotiation	Approve	Review	Review
Ongoing Monitoring	Review		
Quarterly Performance	Review	Review	Review
Dismissals	Recommend	Approve	Review
Consultants			
Selection	Recommend	Approve	Review
Termination	Recommend	Approve	Review
Administration			
Hire Chief Investment Officer		Recommend	Approve
Soft Dollar Budget	Approve	Review	Review
Hire/Dismiss Custodian Bank	Approve	Review	Review

Note: In cases for which the Board chooses to delegate approval authority to the IAC, a monthly report shall be made to the Board summarizing all such approvals.
Source: Virginia Retirement System.

VRS is currently studying the staffing requirements for its investment department. VRS has hired a consultant, William M. Mercer, Inc., to assist in the review of the organization, staffing, and pay structure of the investment department. While this study is still in progress, Mercer's report indicates that VRS, having more than $16 billion in assets, should have a total of 21 investment staff.

Asset Allocation Implementation Strategies

The asset allocation policy approved by the VRS Board represents a set of long-term investment targets for the pension fund. Given the large amount of system assets, and the significant changes in asset allocation policy, these targets cannot be reached quickly. Historically, VRS has used a five-year plan to implement its asset allocation policy. This type of strategy enables VRS to smooth the growth of asset classes in light of expected and realized rates of return. This approach also enables VRS to take advantage of cost effective investment opportunities that may arise, such as manager terminations.

The IAC, with the assistance of VRS investment staff and consultants, is continuing to examine and discuss a wide variety of asset allocation implementation strategies. One of the key implementation recommendations that the IAC has made, and which the VRS Board approved in December 1994, is to decrease emphasis on the domestic U.S. equity market, while increasing emphasis on emerging and private equity markets. Other progress made to-date in this area of implementation includes establishment of asset allocation ranges around the long-term asset allocation targets. In addition, the IAC is reviewing the merits of active and passive investment strategies, as well as internal and external investment programs.

Asset and Sub-Asset Class Allocation Ranges. As previously mentioned, the VRS Board has adopted long-term asset allocation targets for global equity (70 percent), global fixed income (21 percent), and real estate (nine percent). In practice, actual asset allocation percentages will fall within a permissible range around a policy target. These ranges were approved by the VRS Board at its December 1994 meeting. Figure 2 summarizes the asset allocation ranges approved by the VRS Board.

Investment Performance Objectives. The primary performance objective for the VRS pension fund is to produce a rate of return in excess of the long-term policy return over rolling ten-year periods. The VRS long-term policy return is the cumulative sum of the allocation percentage of each asset class multiplied by its benchmark return. Performance objectives for active investment programs will be measured against the passive performance of their respective program benchmarks. Performance objectives for individual investment managers will be determined based on management style, such as active or passive management. The benchmarks for each asset class and subclass are as follows:

- Domestic Equity - Russell 3000 index return over rolling five year periods;
- International Equity (including emerging markets) - Morgan Stanley EAFE 50/50 index return over rolling five-year periods;
- Private Equity/Other - Russell 3000 index return plus 400 basis points over rolling ten year periods;
- Fixed Income - Lehman Brothers Aggregate Bond index return over rolling five-year periods; and
- Real Estate - Russell NCREIF index return.

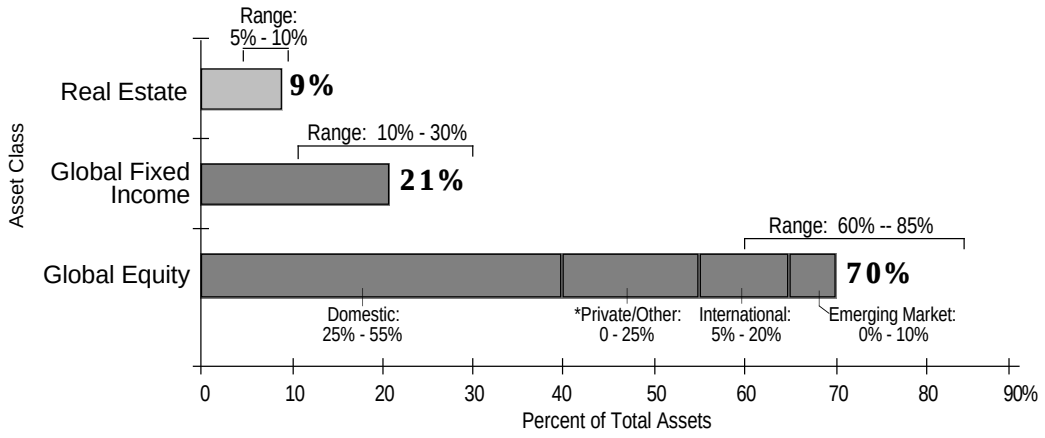
Investment Manager Strategy. The IAC has the responsibility to hire, fund, rebalance, and terminate managers across investment styles in order to provide diversification for the pension fund as a whole. These decisions are made with the assistance of VRS staff recommendations. Specific procedures for hiring, monitoring, and terminating investment managers vary slightly for each asset class. VRS staff is responsible for conducting the manager search, interviews and recommending managers for hire. The IAC makes the final hiring decision, subject to final contract and fee negotiations which are handled by staff.

VRS staff conducts ongoing monitoring and due diligence activities. This includes annual requests for information concerning changes in personnel, investment process, manager style, amount of assets under management, performance, and fee structure. VRS staff review manager performance with the IAC and the VRS Board on a quarterly basis. In addition, VRS staff conduct periodic on-site visits with each investment manager.

The IAC is responsible for the approval of investment manager terminations. This is done in response to the recommendation of VRS investment staff. Staff may recommend that a manager be terminated for a number of reasons, such as:

- changes in investment style not approved by VRS;

Figure 2: VRS Asset Allocation Ranges



*Private/other includes venture capital, buyouts, growth capital, subordinated debt, company turnarounds, and energy.

Source: Virginia Retirement System.

- failure to meet defined performance objectives over a reasonable time horizon;
- changes in personnel or ownership that might adversely affect the manager's ability to provide the required level of performance; or
- change in the manager's ability to handle the amount of assets committed.

Active and Passive Management. The IAC, with the assistance of VRS staff and consultants, is continuing to examine the active and passive investment strategies used by VRS, along with the relative strengths and weaknesses of each approach. Under active management, a manager's portfolio decisions are based on valuation and judgment, rather than on replicating an index. This type of strategy assumes that a manager can outperform a benchmark such as the S&P 500. Such a manager assumes that securities may be worth more or less than their current prices and actively tries to buy those undervalued securities and sell those overvalued securities. One particular type of active management strategy that is still under review is tactical asset allocation. This refers to investment strategies which dynamically allocate assets between two or more asset classes, typically equity, fixed income, and cash.

There are some difficulties associated with active management strategies. The ability to find, fund, and monitor successful active managers, given the amount of VRS assets to be committed to various asset classes, is limited by the size of VRS staff. Second, in order to have an impact on the total fund, the minimum asset commitment to an individual manager increases as total fund size increases. However, a manager's ability to add value often decreases as their total assets under management increase.

Passive management aims to achieve the return of the market within an asset class without attempting to search out mispriced securities. Indexation is one of the most widely used types of passive management. This type of strategy avoids any investment risk other than the risks of that market itself, thereby avoiding the costs of seeking information on possible excess returns. Once the portfolio is structured, there is theoretically no subsequent management other than rebalancing. Passive management strategies are characterized by relatively low fees.

A combination of active and passive management strategies allows VRS to take advantage of the positive elements of both. According to the IAC, VRS passive management should be limited, at present, to the domestic equity program. The IAC believes that the domestic equity program should maintain a minimum 50 percent passive exposure. Currently, this program has a 43 percent passive exposure. All other asset classes should be actively managed, due to the lack of viable passive investment alternatives. Such a strategy would pose a significant change for the international equity program, which currently has a 37 percent passive exposure. At its December 1994 meeting, the VRS Board approved a minimum 50 percent passive exposure for the domestic equity program. However, the Board has not yet taken formal action concerning approval of active and passive investment strategies for the other asset classes

Internal Asset Management. The vast majority of the $16.6 billion in VRS assets are managed externally by professional managers hired by VRS. However, approximately $917 million of VRS assets, or 5.5 percent of the total fund, are managed internally by VRS investment staff. Internally managed assets are limited to domestic equities. Three professional staff are responsible for the internal asset management function.

Five different investment strategies are currently used for internal asset management. Each strategy is distinctive in terms of its investment style (i.e. value or growth), capitalization range (i.e. large or small companies), and quantitative methodology. Internal asset management primarily uses active management strategies. Approximately 73 percent of the assets are managed actively, with only 27 percent managed passively.

According to VRS staff, there are several advantages to internal asset management. First, internal active management is less expensive than external active management. However, internal asset management expenses are still greater than those for passive management, at the current level of assets. Second, it is believed that internal asset management helps VRS to attract and maintain a strong professional staff. In addition, it increases the amount of in-house expertise available to analyze external investment managers and programs. It also provides VRS with a "window" to the financial markets and to the problems faced by external managers.

However, there are some potential problems associated with the internal asset management program. These include staff and salary competition with the private sector, and the need to structure the portfolio management process appropriately in order to ensure continued satisfactory performance in the event of staff turnover.

VRS staff have recommended to the IAC that VRS retain its internal management function. However, staff recommends that the internal asset management strategy be revised by combining three of the current active strategies into a single, more diversified portfolio. Under this revised portfolio, a greater emphasis would be placed on risk control in order to lower the volatility of returns. In addition, VRS staff recommend that internal asset management attain the same split between active and passive management that is

ultimately used for the overall domestic equity program. The IAC adopted the staff recommendation, and presented the recommendation to the VRS Board. The Board approved the recommendation concerning continued internal asset management at its November 1994 meeting.

Use of Soft Dollars and Third-Party Brokerage. The total internal asset management budget is approximately $988,000. Approximately one-third of this amount is paid for with "soft dollars." Soft dollars refer to payments by VRS brokers, to vendors who provide support services used by the internal asset management group, from commission fees paid by VRS. This practice has been used by VRS for many years.

Most of the soft dollars used to purchase support services for internal asset management are paid using a third-party brokerage arrangement. Under this type of arrangement, the broker processes payments for services provided to VRS by a third-party vendor. However, there are some instances where the broker and the vendor are the same firm. In those instances third-party brokerage arrangements are not involved. Services purchased with soft dollars include econometric modeling, stock market data, and technical analysis. According to VRS, it has reduced the amount of its soft dollar budget by more than one third since March 1994.

In response to concerns expressed by the VRS Board concerning the use of third-party brokerage arrangements, VRS staff is acting to eliminate this practice internally. However, even after third-party brokerage arrangements are completely eliminated, commission dollars will continue to be used to purchase support services for internal asset management. However, this will occur only in situations where the broker and the vendor are the same entity. VRS intends to process eliminated soft dollar arrangements through the VRS budget.

INVESTMENT PERFORMANCE

VRS investment staff prepare a monthly investment performance report for the IAC and the VRS Board. This monthly report compares the investment rate of return for the total fund, and for each asset class, against established benchmarks. Total VRS investment return over the past year is far below the rate of return achieved over the past three and five year periods. VRS staff are in the process of designing a new quarterly reporting package that incorporates additional analytics and statistics that the staff examines as part of its ongoing monitoring of investment programs. This section provides a summary description of VRS investment performance. In addition, this section also reviews recent actions by VRS to reduce the number of its investment managers and consultants.

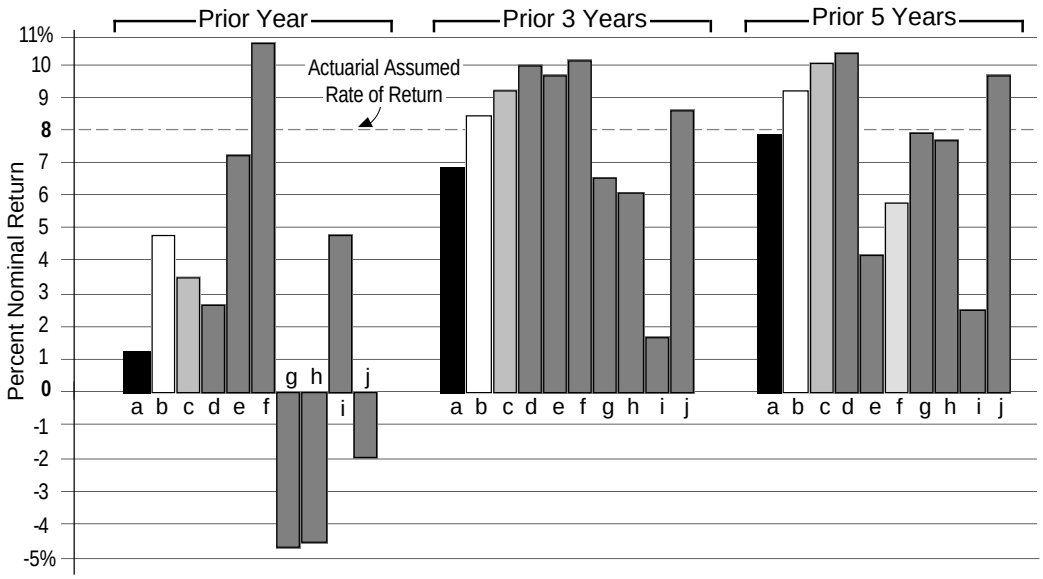
VRS Performance Reporting

The monthly performance summary prepared for the IAC and the Board compares the rates of return for the total fund, and for each broad asset class (i.e. domestic equity, international equity, and fixed income) against established benchmarks. Performance is measured over the following prior time periods: quarter, year-to-date, one year, three years, and five years. Performance data is reported at the sub-asset class and investment style levels. The current market value of each broad asset class is also reported. VRS has experienced mixed results in terms of investment performance relative to its established benchmarks. Figure 3 summarizes the investment performance of VRS assets against selected benchmarks for periods ending October 31, 1994.

VRS staff compiles this report using data provided by the Boston Safe Deposit and Trust Company, which serves as the VRS master custodian. The rates of return reported in the VRS investment performance summary are time-weighted, which is a pension industry standard for non-appraised assets. Returns for real estate, alternative investments and cash are included in total fund performance data but are not reported separately by VRS staff to the VRS Board. Rather, performance data for those three asset classes are reported by Callan Associates, Brinson Partners and the Virginia State Treasurer, respectively, each quarter. Callan Associates reports to the REAC, while Brinson Partners and the State Treasurer report to the IAC. The returns for real estate and alternative investments are calculated and reported to VRS on a dollar-weighted basis, which reflects the investment manager's discretion in controlling cash flow. Time-weighting and dollar-weighting methodologies typically produce different rates of return for any given asset class.

Real Estate Performance. VRS real estate investment performance has recently experienced significant improvement. Direct equity investments, made pursuant to the recommendations of REAC beginning in 1992, have been responsible for this significant turnaround. The policy decision to make direct equity investments was in response to a desire by VRS to have more decision-making control over its real estate portfolio. Other types of VRS real estate investments include pooled investments, and 50/50 partnerships with private insurance companies. Compared to direct equity investments, the degree of VRS control of these investments is relatively minimal. Overall, the rate of return for real estate investments has exceeded the program's performance benchmark, even when the assets of the RF&P Corporation are included. Figure 4

Figure 3: VRS Time-Weighted Investment Performance for Periods Ending October 31, 1994



KEY:

a = Total Fund Performance
b = Total Equity
c = Domestic Equity
d = Russell 3000 (domestic equity benchmark)
e = International Equity
f = EAFE 50/50 (international equity benchmark)
g = Fixed Income
h = Lehman Aggregate Bond Index (fixed income benchmark)
i = Real Estate / Alternative Investments / Cash
j = Tactical Asset Allocation

Source: Virginia Retirement System Performance Summary for Periods Ending October 31, 1994.

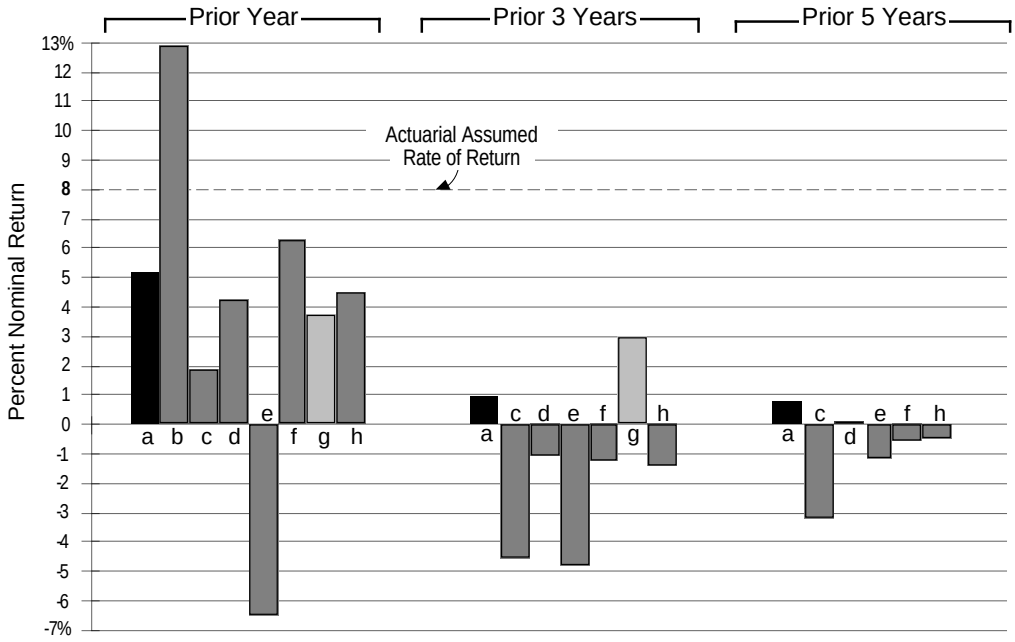
(page 11) provides a summary of real estate investment performance for the quarter ending September 30, 1994.

Alternative Investment/Private Equity Performance. The vast majority of these alternative investments are direct equity investments in privately-owned companies. Private equity investments are diversified across various niches. These include early and later stage venture capital, leveraged buyouts and growth capital, subordinated debt, company turnarounds, and energy.

Some of these investment niches warrant brief description. A leveraged buyout is the takeover of a company using borrowed funds. Most often, the target company's assets serve as security for the loans taken out by the acquiring firm, which repays the loans out of the cash flow of the acquired company. Turnaround investing may involve acquiring control of a potentially promising business which is experiencing financial or operating difficulties, and selling at favorable prices. Turnaround investing can also involve purchasing a portfolio of company securities, most of which are often already in bankruptcy. This type of investment anticipates that the portfolio value should increase as a result of the company reorganization process. In either type of turnaround investment, the investor's objective is to sell the revamped company at a higher price. Energy involves all stages of the energy cycle including the exploration, development and manufacturing of energy products.

The majority of the private equity investments are made by VRS as a limited partner through general partnerships. The remainder of the investments are through direct co-investments alongside general partners. Brinson Partners, Inc., serves as investment advisor to VRS, and provides VRS with a quarterly report of investment performance. The performance statistics are calculated on a dollar-weighted basis. VRS made its initial partnership investments in 1989, and as of June 30, 1994 has obtained a cumulative, annualized net return of 10.02 percent. The initial direct co-investments were made in 1992. VRS has received a cumulative net return of 7.30 percent on its direct investments since 1992. VRS estimates that the overall return for the private equity program is ten percent.

Figure 4: VRS Real Estate Investment Performance



KEY:

a = Total VRS Real Estate Portfolio
b = Direct Equity
c = Pooled
d = Shared 50/50
e = Other
f = Total REAC Real Estate Investments
g = RF&P Corporation
h = NCREIF Index (real estate benchmark)

Note: Direct equity was not applicable for prior 3 and 5 years because direct equity investments were first made in 1992; RF&P was not applicable for prior 5 years because RF&P was purchased in 1991.

Source: Real Estate Performance Report for Quarter Ending September 30, 1994 prepared by Callan Associates, Inc. for the Virginia Retirement System.

Investment Manager and Consultant Hirings and Terminations

Since July 1, 1993, VRS has terminated 22 manager relationships. Terminations have occurred for a number of reasons, such as:

- the manager's inability to perform in accordance with a stated objective;
- VRS lost faith in the manager's ability to maintain its performance objective in the future;
- the VRS Board decided to eliminate a specific investment program; and
- the manager or firm ceased to exist.

Since FY 1994, VRS has terminated two investment consulting relationships. Lewis Bailey was terminated because VRS determined that a different consultant, Brinson Partners, could provide the same quality of service at a lower cost. Rogers Casey was terminated as a general pension fund consultant. VRS determined that it was more cost effective to hire investment consultants on a project-specific basis rather than keeping a single general consultant on a retainer basis.

Overall, VRS has reduced its number of managers and consultants by 12 percent since July 1993. Table 3 summarizes recent decisions made by VRS to hire and terminate investment managers and consultants.

LONG-TERM ASSETS AND LIABILITIES

As part of its overall review of asset allocation and investment policy, the VRS Board is attempting to ensure that its investment program effectively provides for the anticipated growth in pension benefit liability. This desire on the part of the Board is reflected in the draft VRS investment policy statement. According to the draft, "investment of the fund is structured to provide reasonable assurance as to the security of the re-

Table 3: VRS Investment Manager and Consultant Hirings and Terminations -- July 1, 1993 to December 1, 1994

Asset Class	*Number of Managers/ Consultants (7/1/93)*	*Number Hired*	*Number Terminated*	*Number of Managers/ Consultants (12/1/94)*
Equity (totals)	71	8	12	67
Domestic	43	3	11	35
International	9	2	1	10
Emerging Markets	0	0	0	0
Private Equity/Other	19	3	0	22
Fixed Income	13	1	3	11
Real Estate	11	1	1	11
Managed Futures	6	0	6	0
Consultants	4	0	2	2
TOTALS	105	10	24	91*

Source: Virginia Retirement System. *Reduced to 70 by 1/30/95.

tirement benefits." The policy statement further provides that "the assets of the VRS are to be invested in a prudent manner which is intended to provide for the anticipated growth of VRS' pension liability."

As part of the Board's effort in this area, Buck Consultants performed a special study of VRS long-term assets and liabilities. One of the study's objectives was to determine how the VRS asset allocation should be configured to best enable VRS to address its projected long-term pension liabilities. As previously stated, Buck performed its asset allocation anlaysis using an asset/liability approach, as opposed to an asset-only approach.

The asset/liability approach aims to alleviate some perceived weaknesses of the asset-only approach. In particular, the asset/liability approach recognizes that there are some common causes, such as interest rate sensitivity, to the value of both assets and liabilities. For example, while decreases in interest rates may have a positive effect on the value of certain assets, the present value of pension liabilities also increases as interest rates decline. According to Buck Consultants, implicit within the asset/liability approach is the recognition that pension fund liabilities may act as a good hedge against risk in investment return. This section discusses the issues addressed in the Buck study, and summarizes the results of the study as well as the recommendations made to the VRS Board.

Buck Evaluated Seven Potential VRS Asset Allocations

The Buck study examined the relationship between VRS asset allocation and pension funding, over 5-, 15-, and 25-year time horizons, for State employees and teachers. Projections of funding status and contribution rates were made, using both favorable and unfavorable investment environments, for seven different asset allocations (Table 4). These allocations included the current actual VRS portfolio (Portfolio I), as well as the new asset allocation policy approved by the VRS Board (Portfolio II). In addition, the following five alternative allocations were analyzed:

- Portfolio III: Same as portfolio I, except all fixed income assets are long-term bonds;
- Portfolio IV: Same as portfolio I, except international equity exposure is increased to 50 percent of total equity;
- Portfolio V: Same as portfolio I, except equity allocation increased to 85 percent of total assets by adding small capitalization equity;
- Portfolio VI: Same as portfolio II, except equity allocation increased to 85 percent of total assets by adding small capitalization equity; and
- Portfolio VII: Same as portfolio VI, except for larger international equity and long-term bond allocations.

In the study, VRS contribution rates were compared among the alternative investment portfolios, while holding constant the target funding ratio, confidence level, and planning horizon. VRS funding ratio was defined as the market value of pension fund assets divided by the value of the VRS accumulated benefit obligation (ABO). ABO is a measure of the present value of pension benefit liability, which is calculated based on an individuals salary and service credit at the time of the valuation. Buck calculated ABO to include

Table 4: Alternative VRS Asset Allocations Evaluated in Buck Consultants' Study

		Allocations Modeled (% of Each Asset Class)						
	Portfolio →	*I*	*II*	*III*	*IV*	*V*	*VI*	*VII*
Asset Class	Intermediate Term Bonds	26.0	14.9	0.0	26.0	8.0	8.0	0.0
	Long Term Bonds	5.3	3.1	34.0	5.0	2.0	2.0	10.0
	Large Cap Stocks	34.3	28.0	34.0	20.0	36.0	26.0	17.5
	Small Cap Stocks	12.7	12.0	13.0	8.0	31.0	26.0	17.5
	International Equity	8.1	10.0	8.0	27.0	13.0	13.0	30.0
	International Bonds	2.5	3.0	0.0	3.0	0.0	0.0	0.0
	Private Equity	4.0	15.0	4.0	4.0	5.0	15.0	15.0
	Real Estate	7.1	9.0	7.0	7.0	5.0	5.0	5.0
	Emerging Markets	0.0	5.0	0.0	0.0	0.0	5.0	5.0

Source: *Virginia Retirement System, 1994 Investment Policy Study*, prepared by Buck Consultants.

anticipated cost-of-living adjustments (COLAs), on a pre-funded basis. By way of contrast, the projected benefit obligation (PBO) is a measure of the present value of pension liability which is calculated based on the amount of service credit at the time of the valuation date, while also reflecting assumed future salary increases.

Study Assumptions. In preparing its forecasts of funding ratios and contribution rates, Buck made several key assumptions. First, the State employee and teacher workforce was assumed to grow at an annual rate of one percent for ten years, with the workforce remaining stable thereafter. Employee payroll was projected to increase consistently with the underlying inflation projections, which averaged a compound rate of 4.4 percent over the forecast period. The investment risk and return assumptions used by J.P. Morgan during its VRS asset allocation study were also used by Buck.

Aggressive Investment Policy Requires Less Contributions Over Long Term

As previously stated, the Buck study examined the effect of alternative asset allocations on VRS funding status and contribution rates. In its report, Buck suggested that VRS pay particular attention to the 50th percentile results (i.e. a 50 percent probability) of achieving a funding status of 120 percent over a 25-year time horizon, and the 90th percentile results (i.e. a 90 percent probability) of achieving a 100 percent funding status over a five-year time period.

Regardless of the asset allocation or the target funding ratio, a 90th percentile result will always require a greater contribution than a 50th percentile result. That is because the 90th percentile contribution rate result in effect presumes that actual investment performance of the asset allocation has been much lower than expected. The 50th percentile contribution rate, by contrast, effectively presumes that actual investment performance of the asset allocation has been the same as expected.

There is a tradeoff between reduced contribution rates that may be achieved over the long-term by reallocating assets, and a potential increase in contribution requirements in the short-term if investment experience is poor. Buck concluded that over the long-term a more aggressive VRS investment policy, such as that reflected by the VRS Board's new asset allocation policy, will require less contributions to meet long-term funding goals than would be required by maintaining the current actual asset allocation. Table 5 provides a summary of the results of Buck's forecast for a 25-year time horizon.

However, over a short five-year time horizon, such an aggressive investment program could result in modest increases in required contributions over that required with the current actual portfolio, due to the possibility of lower than expected investment performance. Table 6 summarizes the results of Buck's analysis concerning the difference in required contribution rates between the current actual VRS asset allocation, and the new asset allocation policy approved by the VRS Board.

Increased Exposure to Long-Term Bonds and International Equity Recommended

In order to further improve the asset allocation already approved by the VRS Board, Buck strongly recommends that VRS consider increasing the duration of its fixed income portfolio to that of a long-term bond portfolio. Currently, the VRS target allocation for fixed income is equally weighted between short, intermediate, and long-term bonds. In the aggregate, VRS fixed income investments currently have a market duration of only about five years. In addition, Buck recommended that VRS increase the international component of its equity allocation.

Based on the results of the Buck study, the IAC recommended that the asset allocation policy approved by the Board in September 1994 (70 percent global equity, 21 percent fixed income, and nine percent real

Table 5: Effect of Alternative VRS Asset Allocations on Contribution Rates Over a 25-Year Period

		*Required Contribution Rate (%) for **State Employees***				*Required Contribution Rate (%) for **Teachers***			
		Funding Status / ConfidenceLevel				*Funding Status / Confidence Level*			
		100 / 50	100 / 90	120 / 50	120 / 90	100 / 50	100 / 90	120 / 50	120 / 90
Portfolio	**I**	8.30	15.31	9.69	17.19	10.08	18.58	11.80	21.42
	II	6.10	13.93	7.26	15.79	7.26	17.29	8.74	19.75
	III	7.97	14.64	9.29	16.66	9.48	18.04	11.14	20.41
	IV	7.86	14.51	9.22	16.52	9.59	17.64	11.23	20.25
	V	6.43	15.41	7.67	17.43	7.87	19.09	9.22	21.81
	VI	5.16	14.22	6.41	16.28	6.44	17.77	7.76	19.91
	VII	4.50	12.42	5.53	14.42	5.56	15.58	6.90	17.86

Note: Contribution rates are the sum of required employer and employee rates. Required employee rate assumed to be five percent for State employees and four percent for teachers.
Source: *Virginia Retirement System, 1994 Investment Policy Study*, prepared by Buck Consultants.

Table 6: Effect of Current and New VRS Asset Allocations on Contribution Rates Over a 5-Year Period

*Required Contribution Rate(%) for **State Employees***		*Required Contribution Rate (%) for **Teachers***	
Current Actual Allocation	*New Allocation Policy*	*Current Actual Allocation*	*New Allocation Policy*
18.0	18.1	25.1	25.5

Note: Required contribution rates estimated to ensure a 90 percent chance of attaining 100 percent funding status within a five-year period.
Source: *Virginia Retirement System, 1994 Investment Policy Study*, prepared by Buck Consultants.

estate) be reaffirmed. The IAC also recommended that its commitments to the sub-asset classes (i.e. 40 percent domestic equity, 10 percent international equity, 15 percent private equity/other, and 5 percent emerging markets) also be reaffirmed by the Board. The VRS Board approved this recommendation at its December 1994 meeting. In addition, the IAC recommended that VRS staff study the issues involving increased exposures to long-term bonds and international equity, and provide a recommendation within 60 days. That study is currently in progress.

SHORT-TERM INVESTMENTS AND LIQUIDITY

The Virginia Retirement System maintains a sufficient level of cash to meet its current and short-term needs. This cash is invested in various short-term instruments by both the Treasurer of Virginia and Mellon Trust. Each quarter VRS prepares a forecast of all anticipated cash inflows and outflows for the next twelve months. During FY1994, for the first time, VRS benefit expenses were greater than employer and employee contributions.

VRS estimates that the difference between benefit expenses and contributions will continue to increase, reaching $133 million by fiscal year 1998. As a result, investment income will be needed to pay an increasingly larger share of VRS benefit expenses. This section examines the VRS short-term investment program, and how that program is used to help maintain the necessary level of liquidity within the pension fund.

Short-Term Investment Program

Sufficient cash is maintained with the Treasurer of Virginia (Treasurer) to cover the VRS retiree payroll, refunds to members, administrative expenses, insurance premiums and claims, and retiree health care credits. Cash necessary to meet the short-term obligations of VRS investment operations is maintained with Mellon Trust (Mellon). Examples of such investment obligations include drawdowns by private equity and real estate managers, and fundings of new programs. Derivatives are not included as eligible investments by either the Treasurer or Mellon. VRS anticipates that less than one percent of pension fund assets will be held by the Treasurer or Mellon at any point in time.

Treasurer of Virginia. VRS deposits pension and group life insurance contributions into a short-term investment account (STIA) held by the Treasurer. The STIA is the balance in unallocated cash which VRS does not require for its day-to-day operating needs, and which has not yet been committed to a specific manager or asset class. On a daily basis, the Treasurer moni-

tors the cash needs of VRS and invests any excess cash left in the account in eligible short-term investments. During the month of November, 1994, the average invested balance was approximately $60 million. The investment yield during November was 5.34 percent.

There are three investment objectives for the STIA. First, it should assure the safety and repayment of principal. Second, it should provide needed liquidity, on a daily basis if necessary. Third, it should generate a rolling 90 day return in excess of the return on the 91-day U.S. Treasury Bill. In addition, the STIA return should at least equal the net return provided by the Mellon Trust short-term investment fund.

The STIA is invested in accordance with guidelines established by the VRS Board. The guidelines address the issues of maturity, liquidity, and credit quality for the purpose of avoiding undue credit or interest rate risk. The average maturity target range of STIA is between 15 and 50 days. Maturities generally cannot exceed one year. Eligible short-term investments include:

- certificates of deposit of domestic and foreign banks;
- bankers acceptance of domestic and foreign banks;
- commercial paper;
- treasury, federal agency securities, and U.S. government guaranteed securities;
- repurchase agreements; and
- other debt instruments such as corporate notes and bonds.

According to VRS, it is highly unlikely that it would ever need all or even a large portion of the funds in the STIA at any one time. Nevertheless, 25 percent of the funds are required to be available on 30 days' notice from VRS. Furthermore, 50 percent of the funds must be available on 60 days' notice, with zero market value adjustment.

Mellon Trust. If VRS accumulates excess cash with the Treasurer, the excess is transferred to the Mellon short-term investment fund (STIF). Designed specifically for the cash management needs of employee benefit trusts, the STIF serves as an investment vehicle for very short-term funds or reserves. The STIF is managed to provide no investment risk, maximum liquidity, and a reasonable competitive return. VRS estimates that, on average, less than $100 million of its assets will be held in the STIF at any one time. VRS assets invested in the STIF earned a 3.7 percent rate of return during the twelve months ending October 31, 1994.

The STIF is invested in prime grade securities of very short maturities, with an average maturity schedule of approximately 46 days. Types of investments include repurchase agreements backed by the U.S. government, guaranteed collateral, high grade commercial paper, certificates of deposit, bankers' acceptances, and U.S. treasury and government agency short-term obligations. Mellon charges VRS a management fee equivalent to 12 basis points charged against the gross yield.

VRS Cash Forecast and Liquidity

Each quarter VRS prepares a forecast of all anticipated cash inflows and outflows for the next 12 months. A portion of the overall forecast, which pertains specifically to the Treasurer's short-term investment account, is an estimate of net "new money." Net new money includes the difference between anticipated VRS contributions and expenses. This portion of the overall cash forecast is used to help foresee cash excesses and shortages in the Treasurer's account.

In addition to the estimate of net new money, the VRS cash forecast includes all other anticipated cash flows that affect its cash balance. However, the forecast does not consider cash flows of VRS public equity and fixed income managers since these managers are presently allowed to maintain or re-invest any cash they may generate through the sale of assets or receipt of dividend or interest income.

Prior to the beginning of each quarter, VRS raises cash to meet its estimated needs for the quarter. Cash is raised by selling assets such as equities or fixed income instruments, or by requiring public equity or fixed income managers to transfer a portion of their dividend and interest income back to the pension fund. If any assets are to be liquidated, the decision regarding which asset class or classes to liquidate depends on target allocation amounts.

Analysis of Net New Money. VRS expects that pension fund expenditures will exceed contributions by $105 million during the period October 1, 1994 through September 30, 1995. Therefore, the amount of net new money will be negative. According to VRS, $69.1 million of the anticipated negative net contribution is due to State-mandated reductions in actuarially-determined contribution rates for pension and life insurance benefits. The remainder is primarily attributable to increases in pension benefit expenses.

This current estimate of the net contribution represents a worsening of the estimate from just three months prior, when a negative net contribution of $86.3 million was forecast. As a point of comparison, VRS net new money was consistently positive from 1988 to 1992, averaging approximately $325 million. Table 7 summarizes the VRS analysis of expected net new money. VRS estimates that the amount of its negative contribution will continue to increase, reaching $133 million by FY 1998 (Figure 5).

Table 7: Expected VRS Contributions and Expenditures -- October 1, 1994 to September 30, 1995

Contributions	**Amount**
Teachers	$370,100,000
State Employees	$238,000,000
Political Subdivision Employees	$162,200,000
Judges	$10,700,000
State Police	$7,700,000
Retiree Health Care Credit	$18,900,000
Group Life Insurance	$14,300,000
Total Contributions	$821,900,000
Expenditures	
Annuities	$773,000,000
Refunds	$ 68,400,000
Insurance Premiums & Claims	$ 60,000,000
Administrative	$ 13,200,000
Retiree Health Care Credits	$ 13,200,000
Total Expenditures	$927,800,000
Net New Money	$(105,900,000)

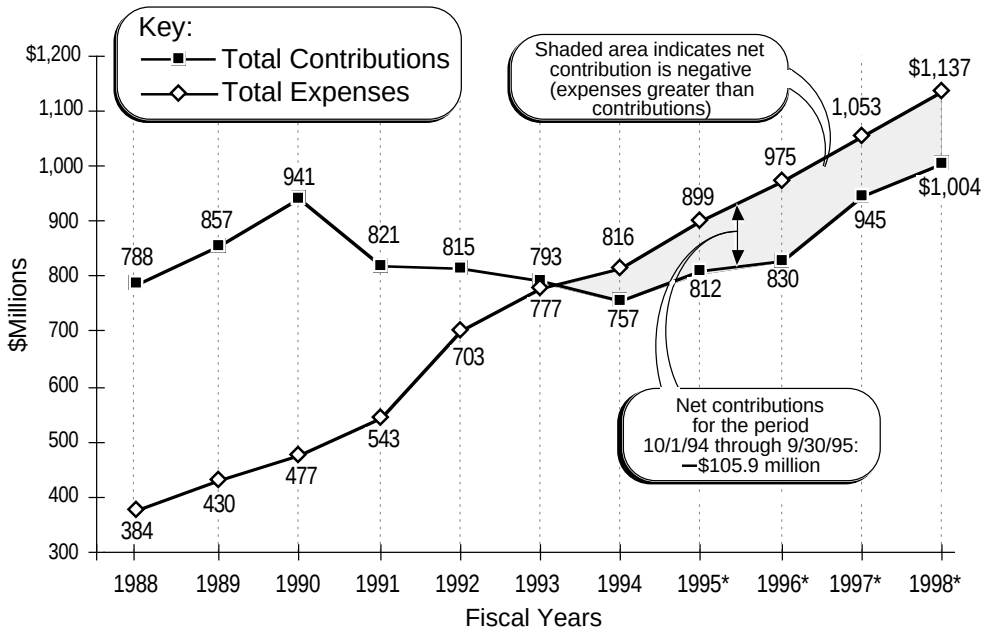
Source: Virginia Retirement System.

CONCLUSION

During 1994, the VRS Board of Trustees undertook an in-depth review of the investment policies and programs of the Virginia Retirement System. The impetus for this review grew, in part, from the establishment of a new prudence standard for VRS investments. The scope and quality of the review was strengthened by new membership requirements for the IAC and REAC. Changes in the prudence standard and in the advisory committee membership requirements were enacted by the 1994 General Assembly.

The VRS investment review process, which is on-going, has resulted in several significant policy changes, particularly in asset allocation. Some policy decisions in other areas, such as implementation of specific investment programs, await the results of further study. Given the long-term nature of a pension fund investment program, it will take several years for VRS to fully implement its new policies, particularly the revised asset allocation. Consequently, a complete evaluation of the effectiveness of the new VRS investment policies and programs is premature at this time. However, given the amount and complexity of the investment issues which have been addressed, the approach taken by the VRS Board and its advisory committees to date appears to have been reasonable.

Figure 5: VRS Total Contributions *vs.* Total Expenses



*Estimated
Source: Virginia Retirement System.