



**JOINT LEGISLATIVE AUDIT
& REVIEW COMMISSION**
OF THE VIRGINIA GENERAL ASSEMBLY

Semi-Annual VRS Investment Report: May 1996

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 VRS investment staff are working with the actuary on an asset/liability study designed to improve the asset allocation process. JLARC recommends that this study be expanded to address development of a customized liability index for investment management purposes, and also to address the establishment of investment earnings assumptions.
- **Investment Risk Management is an Increasing Concern Page 9**
 VRS is examining its entire process for defining, quantifying, and managing all of the potential risks that could materially impact the value of its trust funds, now approximately \$21 billion. The size of the fund imposes even greater oversight concerns and needs than existed in 1993. JLARC recommends that VRS modify its investment policy statement to define the types and levels of risk that it is willing to assume within the investment program. JLARC also recommends that VRS examine investment department staffing requirements.

Profile: Virginia Retirement System Investments																						
Market Value of Assets: \$20.9 billion Number of VRS Investment Staff: 21 Number of External Managers: 66 Number of External Investment Accounts, Direct Investments, and Partnerships: 100 FY 1996 Investment Expenses (Projected): \$56 Million				<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="4" style="background-color: #e0e0e0; padding: 2px;">Total Return on Investments</th> </tr> <tr> <th colspan="4" style="font-size: small; padding: 2px;">(Time Periods Ending 12/31/95)</th> </tr> <tr> <th style="padding: 2px;">10 years</th> <th style="padding: 2px;">5 years</th> <th style="padding: 2px;">3 years</th> <th style="padding: 2px;">1 year</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 2px;">11.2%</td> <td style="text-align: center; padding: 2px;">12.3%</td> <td style="text-align: center; padding: 2px;">11.7%</td> <td style="text-align: center; padding: 2px;">26.1%</td> </tr> </tbody> </table>			Total Return on Investments				(Time Periods Ending 12/31/95)				10 years	5 years	3 years	1 year	11.2%	12.3%	11.7%	26.1%
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Investment Policy Indicators (as of December 31, 1995)																						
<u>Asset Class</u>	<i>Asset Allocation</i> (% of Total Assets)		<i>Where Invested</i> (% of Asset Class)		<i>Type of Management</i> (% of Asset Class)																	
	<u>Target</u>	<u>Actual*</u>	<u>Domestic</u>	<u>International</u>	<u>Active</u>	<u>Passive</u>																
Equity	70%	68%	83%	17%	50%	50%																
Fixed Income	21%	20%	99%	1%	60%	40%																
Real Estate	9%	7%	100%	0%	70%	30%																

*Of total assets, 2% was cash and 3% was reserves.

Semi-Annual Report on the VRS Investment Program

INTRODUCTION

The Virginia Retirement System Oversight Act requires the preparation of a semi-annual report on the Virginia Retirement System (VRS) investment program. The statute requires that the report include information concerning (1) planned or actual material changes in asset allocation, (2) investment performance for all asset classes and sub-classes, and (3) investment policies and programs.

Over the past three years, the VRS investment portfolio has grown by \$5 billion, more than 30 percent. It is now the 24th largest public pension fund in the United States. This tremendous growth in assets poses three significant challenges for the management and operation of the VRS investment program. The first challenge pertains to the appropriate allocation of VRS funds among different asset classes. The second challenge is to provide cost effective management of VRS assets. The third challenge relates to the ability of VRS to identify and manage the material risks inherent in its vast portfolio. Successfully addressing these issues is crucial to the successful operation of the investment program.

Asset allocation is a challenging, ongoing policy development and implementation process. VRS desires to have an asset allocation policy that appropriately balances the need for portfolio diversification with the ability of its internal and external managers to locate prudent investment opportunities that satisfy VRS risk and return expectations. Achieving this type of balance has proved to be difficult, perhaps more difficult than VRS realized at the time its current policy was established in September 1994.

This challenge that VRS has experienced with asset allocation - particularly in terms of implementation - has prompted a re-assessment of its asset allocation policy. However, VRS needs to ensure that its asset allocation policy is not revised solely because it lacks the necessary staff and resources to implement it. Asset allocation policy development, responsive to the unique benefit liability structure of VRS, must coincide with planning to obtain the staff, systems and processes necessary to implement and manage the asset allocation. VRS investment staff are beginning to examine the manner by which they make asset allocation decisions, including the treatment of illiquid asset classes, and the consideration given to the VRS liability structure.

Risk management involves the identification and quantification of significant risks and the development of strategies to manage those risks. VRS does not want

to eliminate all risks from its investment portfolio. Rather, it wishes to be fairly compensated - through return on investment - for bearing risks which it makes an explicit policy decision to assume. A key component of risk management is identifying and mitigating material risks that VRS does not wish to assume, and for which it would not be fairly compensated. VRS staff are in the process of conducting a comprehensive assessment of risk management issues.

Like virtually all pension funds with a majority allocation to equity assets, VRS investment performance increased substantially during the 12 month period ending December 31, 1995. The total VRS rate of return was 26.1 percent. Most of the favorable investment performance was due to the performance of the domestic equity market, and not by active investment management decisions made by equity managers. A recent study by VRS investment staff produced evidence that its actively managed domestic equity program - as currently designed - has fallen short of its goals. VRS is continuing to examine the relative merits of active and passive investment management, and how to improve its approach to active management.

APPROPRIATENESS AND EFFECTIVENESS OF THE ASSET ALLOCATION POLICY

Asset allocation is the major determinant of pension fund investment performance. Consequently, the asset allocation decision has significant implications for VRS. The process by which asset allocation policy

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.

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is determined, implemented, and evaluated has been the source of ongoing discussion - and some difference of opinion - within the VRS Board and its two advisory committees. This ongoing debate illustrates the fact that, while clearly offering benefits, prudent asset allocation is not easily achieved and can be expensive in terms of short-term investment performance.

Allocations Within Approved Ranges But Not at Long-Term Targets

The allocations of VRS funds to each of the six approved asset classes are within the broad policy ranges established by the Board in September 1994. However, while some are very close, none of the allocations have yet reached the long-term allocation target for the asset class. Figure 1 compares the actual allocation to each asset class with the policy range and long-term target.

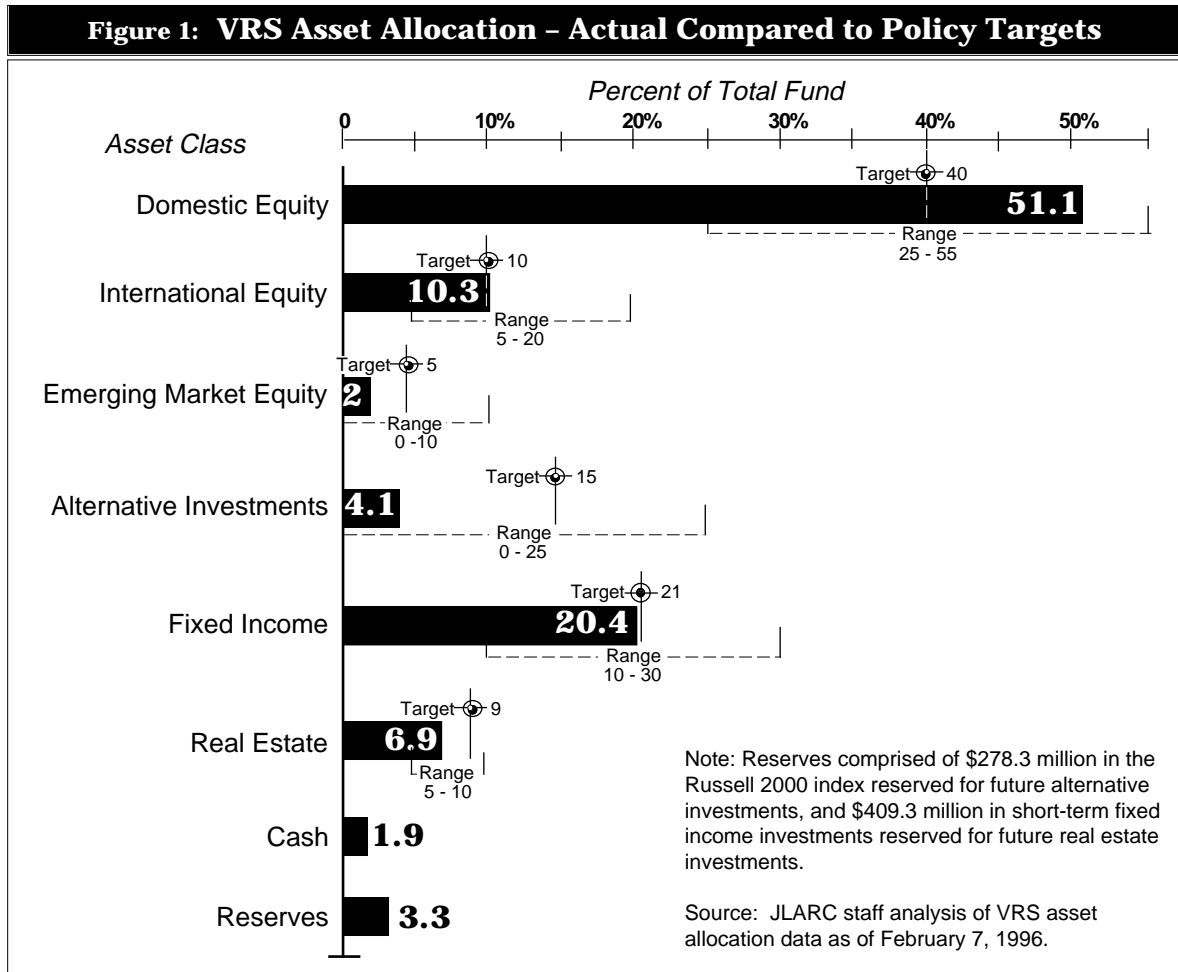
Asset Allocation Policy Is Under Review

Tremendous increases in the market value of domestic equity investments over the past year have

been primarily responsible for recent substantial increases in the size of the total VRS portfolio. The market value of the total fund increased from \$18.8 billion on June 30, 1995 to \$20.2 billion on December 31, 1995. This rate of increase was much greater than VRS projected at the time it developed the asset allocation policy. Since allocation targets are expressed as percentages of total fund assets, the dollar amount of assets required to be allocated into the various asset classes has increased rapidly.

The prospect of having to invest larger dollar amounts into all of the asset classes raises a number of issues concerning the approach that VRS should take in order to develop, implement and evaluate its asset allocation policy. Five key issues are being reviewed by VRS:

- the relative importance of asset allocation ranges and long-term allocation targets;
- the distinction between liquid and illiquid asset classes;
- the advisability of rebalancing the portfolio;
- pension liability structure; and



- staffing levels and available investment opportunities.

Strategic Ranges versus Policy Targets. The relative importance given to asset allocation ranges and long-term targets affects any evaluation of the implementation of VRS asset allocation policy. If primary focus is placed on the ranges, then VRS has fully implemented its asset allocation policy. If primary emphasis is placed on the long term targets, then full implementation of the policy - particularly for domestic equity investments - has not yet occurred.

According to the Investment Advisory Committee (IAC), the strategic asset allocation ranges are very large by design. Large strategic ranges do not force VRS into imprudent investments simply to satisfy a percentage-based allocation target. Likewise, large ranges do not force VRS out of successfully performing asset classes - to satisfy a percentage-based allocation target - if a downward correction in the market value of another asset class causes a decline in the total value of fund assets.

Liquid versus Illiquid Asset Classes. Compared to liquid assets (primarily domestic equity and fixed income), illiquid assets (primarily real estate and private equity) cannot be quickly sold and converted to cash. This fact has caused some within VRS to express the opinion that any efforts to quickly reach long-term allocation targets for real estate and private equity would be misguided. According to this view, VRS funds could end up being over-allocated in illiquid asset classes in the event of a downward correction in the value of the domestic equity market, and a resulting reduction in market value of the total fund.

In an attempt to address the issue of allocations to illiquid asset classes, the IAC approved the use of short-term, dollar-based allocation targets for real estate and private equity in March 1996. Over the next two years, the VRS objective will be to reach a total allocation of \$1 billion in real estate and \$1.2 billion in private equity. This would represent an increase of approximately \$150 million in real estate and \$300 million in private equity investments over that time period. The view has been expressed within VRS that these dollar-based targets are more realistic, given the amount of VRS investment staff and the availability of prudent investment opportunities in the real estate and private equity markets. However, the long-term strategic allocation targets and ranges for these asset classes will remain in effect.

Two members of the IAC did not see the need for, and voted against, implementation of the new dollar-based targets. Two objections were cited. First, since allocations were within the strategic ranges they considered the policy change to be unnecessary. Second, they regarded the change as an overreaction to a short-

term increase in the value of the domestic equity market, whereas the asset allocation policy was premised on long-term expectations of market performance.

Portfolio Rebalancing. In order to help ensure that no asset class falls outside of its approved allocation range, the IAC has a portfolio rebalancing policy. Rebalancing is a means of forcing a disciplined, long-term approach to diversification onto the pension fund. The IAC rebalancing policy states that :

If at any time the deviation of an asset class is greater than ten percent of the long term target for the asset class, staff will make a recommendation for a suggested course of action that would reduce the deviation to less than ten percent.

Ever since the asset allocation policy was approved in September 1994, VRS has been relatively overweighted in domestic equity, and relatively underweighted in alternative investments and real estate. Currently, the allocations to domestic equity and alternative investments exceed the ten percent variance threshold stated in the rebalancing policy. In April, 1995 the Board approved the IAC's recommendation to allow temporary overweighting in domestic equity until the full amount of planned investments in emerging markets and alternative investments can be made. While rebalancing the portfolio has been discussed by the IAC and the Board, VRS has decided not to rebalance the portfolio at this time.

Implementation of portfolio rebalancing -- by moving away from domestic equity and into emerging markets, alternative investments and real estate -- is in apparent conflict with the issues previously discussed concerning allocation to illiquid asset classes. The other apparent conflict involved with rebalancing is the cost of diversification. One view expressed within VRS is that allocating funds away from domestic equity and into emerging markets and alternative investments will result in a reduction in overall return to the fund. An alternative view contends that such costs are worth the long-term benefits and protection that diversification provides to the fund. Some individuals also contend that failure to rebalance in effect constitutes a "market timing" approach to investment that has traditionally not been utilized by VRS.

Analysis of Pension Liability Structure. Asset allocation policy could potentially be improved by explicitly accounting for VRS pension liability characteristics at the beginning of the policy development process. VRS will be working with its new actuary, Watson Wyatt, to develop an asset/liability modeling approach to asset allocation. Under this approach, pension fund risk is quantified by liability measures such as the level and volatility of funded ratios and contribution rates. This approach is based on the recognition that inflation and interest rates affect the economic value of

both assets and liabilities. A similar asset/liability study was performed by Buck Consultants (Buck) in December 1994. However, that study was conducted after the asset allocation policy had already been approved by the Board.

The 1994 Buck study was used primarily to verify the results of the “asset-only” approach to asset allocation policy. Under an asset-only approach, pension fund risk is defined as the volatility of returns on invested assets. Results using this approach are heavily dependent on assumptions concerning the magnitude and volatility of investment returns, and the correlation of returns among various asset classes. A weakness of this approach is, given that all pension funds have unique liability structures, allocations that fail to account for liability characteristics can not possibly be optimal. According to VRS staff, the study to be performed by Watson Wyatt will utilize a more sophisticated methodology than the study performed by Buck Consultants.

INVESTMENT PERFORMANCE CONTINUES TO LAG BENCHMARKS

Like all pension funds, VRS evaluates the effectiveness of its investment program by comparing its rate of investment return to a series of performance benchmarks. The benchmarks, which have evolved over time, are researched and proposed by VRS staff, approved by the chief investment officer (CIO), and subject to review by the IAC. As measured by VRS over the past several years, actual investment performance has been low relative to the benchmarks, with the singular exception of fixed income.

Active management of equity investments continues to pose difficulty for VRS. In addition to underperforming passively managed investments, active domestic equity management is characterized by uncompensated risk. In order to better quantify and manage this uncompensated risk, and also better evaluate the results of active management, VRS is in the process of developing customized benchmark indices for its domestic equity managers.

Below-Benchmark Returns Are Attributed to a Number of Factors

The VRS custom benchmark consists of 70 percent of the return of the S&P 500 equity index, 21 percent of the return of the Lehman Government/Corporate Bond index, and nine percent of the return of the National Council of Real Estate Investment Fiduciaries (NCREIF) index. Actual VRS investment performance trailed that of the VRS custom benchmark by 460 basis points (4.6 percentage points) for the 12 months ending December 31, 1995. VRS attributes a

portion of the 460 basis point underperformance to each of the following factors:

- International equity slightly underperformed the EAFE 50/50 index, but substantially underperformed the Russell 3000 (-220 basis points).
- Domestic equity slightly underperformed the Russell 3000 index (-120 basis points).
- Private equity substantially underperformed the Russell 3000 index (-55 basis points).
- On average, VRS was overweighted in its allocation to fixed income, underweighted in its allocations to equity and real estate, and held about 1.5 percent of the portfolio in cash (-50 basis points).
- The average cash position earned a 5.8 percent return (-20 basis points).
- Emerging market equity substantially underperformed the Russell 3000 index (-20 basis points).
- Total real estate slightly underperformed the NCREIF index (-15 basis points).
- Fixed income slightly outperformed the Lehman Brothers Aggregate Bond Index (+55 basis points).

Any evaluation of pension fund investment performance is highly dependent on the period of time for which returns are calculated, the applicable benchmark, and the asset allocation. For example, when compared to a benchmark that corresponds to allocations within equity sub-classes, VRS investment performance trailed the benchmark by only ten basis points for the year ending December 31, 1995, and by 50 basis points for a five-year period ending on that same date. Table 1 presents a summary of VRS investment performance - relative to benchmarks established by VRS - over various time periods ending December 31, 1995.

Reporting of Real Rate of Return for Real Estate Should Be Expanded

As indicated by Table 1 (page 6), the objective for the real estate program (exclusive of the RF&P Corporation) is to obtain a five percent real (inflation adjusted) rate of return. The real rate of return will always be less than the nominal rate of return, which is not adjusted for inflation. While VRS reports the real rate of return for various components of its real estate program, it does not report the real return for the program as a whole for prior three and five-year time periods. The real return for the entire program can be calculated by subtracting the reported inflation rate from the nominal return. Through its real estate investment consultant - Callan Associates - VRS should calculate and report the real rate of return for the overall real estate program for prior three and five year time

periods. This is particularly important as VRS broadens the scope of the program to include real estate investment trusts and possibly timber.

Recommendation (1). The Virginia Retirement System should calculate and report the real rate of return for its overall real estate program for prior three and five-year time periods.

Table 1: VRS Investment Performance Compared to Benchmarks for Periods Ending December 31, 1995

VRS Program Performance Objective for the Program	Prior 1 Year	Prior 3 Years	Prior 5 Years
VRS Total Fund <i>Custom Benchmark</i>	26.1 <i>30.7</i>	11.7 <i>12.7</i>	12.3 <i>13.3</i>
Domestic Equity <i>Russell 3000</i> <i>S&P 500</i>	34.5 <i>36.8</i> <i>37.6</i>	14.5 <i>15.0</i> <i>15.4</i>	16.5 <i>17.4</i> <i>16.6</i>
Domestic Equity (Actively Managed Portion) <i>Russell 3000 + 100 basis points</i> <i>S&P 500</i>	33.3 <i>37.8</i> <i>37.6</i>	14.1 <i>16.0</i> <i>15.4</i>	16.4 <i>18.4</i> <i>16.6</i>
International Equity <i>EAFE 50/50</i> <i>S&P 500</i>	11.9 <i>12.1</i> <i>37.6</i>	15.6 <i>17.2</i> <i>15.4</i>	9.8 <i>9.9</i> <i>16.6</i>
International Equity (Actively Managed Portion) <i>EAFE 50/50 + 200 basis points</i>	11.8 <i>14.1</i>	15.2 <i>19.2</i>	9.7 <i>11.9</i>
Emerging Market Equity <i>IFC Investable Liquidity Tiered Index</i>	n/a <i>(5.2)</i>	n/a <i>21.5</i>	n/a <i>27.6</i>
Alternative Investments (Equity) <i>Russell 3000 + 400 basis points</i>	24.1 <i>40.8</i>	13.7 <i>19</i>	8.9 <i>21.4</i>
Fixed Income <i>Lehman Aggregate Bond Index</i>	20.8 <i>18.5</i>	9.5 <i>8.1</i>	10.4 <i>9.5</i>
Total Real Estate <i>Russell NCREIF Index</i>	6.3 <i>8.5</i>	2.9 <i>3.7</i>	(0.4) <i>0.3</i>
REAC Real Estate (nominal return)	8.9	6.8	0.9
REAC Real Rate Estate (real return)	6.4	4.1	(1.8)
<i>Objective: Five Percent Real Return</i>	<i>5.0</i>	<i>5.0</i>	<i>5.0</i>

Notes: Performance objectives are in *italics*. Emerging Market program received initial investment on 7/1/95. Fixed Income benchmark was changed effective 1/1/96 to 60% Lehman Aggregate Bond / 40% Lehman Long Government/Corporate. This new benchmark was also incorporated into VRS custom benchmark. Total real estate portfolio includes RF&P Corporation, and returns are lagged by one quarter. REAC real estate does not include RF&P, and returns are not lagged.

Source: JLARC staff analysis of VRS data.

Actively-Managed Assets Underperformed Passively-Managed Assets

The data in Table 1 (opposite) illustrate that the actively-managed portion of the VRS domestic and international equity portfolio has consistently underperformed the domestic and international equity portfolio as a whole. This indicates that the passively-managed portion of the equity program has done better than the actively-managed portion. VRS continues to be cognizant of the problems typical of active management. These include documented underperformance relative to benchmarks, difficulty finding efficient and effective managers, and higher management fees. For some time, 50 percent of the domestic equity portfolio has been actively-managed. In addition, VRS recently moved about 40 percent of its fixed income out of actively-managed funds and into passively-managed funds.

Domestic Equity Program Contains Uncompensated Risk

VRS staff recently concluded a three-year study of the domestic equity investment process. The study reached several significant conclusions:

- The active domestic equity portfolio is not very active. Virtually all of the portfolio's investment return is attributable to investment style of the manager rather than to individual stock selection.
- The domestic equity portfolio is significantly overweighted relative to the Russell 3000 index in some areas (materials and services), while being significantly underweighted in others (utilities).
- The portfolio is characterized by unintended biases toward investments in small companies and growth-oriented stocks, and away from investments in medium-sized, value-oriented stocks.

Structural Misfit in the Portfolio. According to VRS staff, all of these unintended biases represent a structural misfit between the composition of the actively managed domestic equity portfolio and the benchmark Russell 3000 index. According to VRS staff, the ultimate effect of these structural misfits is that the performance of the actively managed domestic equity portfolio is largely random. For example, the entire program could underperform its benchmark even if every individual manager outperforms his benchmark. In 1995, the program happened to be structurally underweighted in the best performing investment styles (large growth, large value, and medium value) while overweighted in the worst performing styles (medium growth, small, and cash.)

Customized Benchmarks for Domestic Equity Managers. If VRS is to continue to rely on active

management for some portion of its domestic equity program, it is essential that it develop an effective process for properly evaluating the ability of individual managers to add value to the fund. According to VRS staff, the broad market indices currently used to evaluate performance of individual managers are not usually appropriate benchmarks over relatively short time periods.

VRS is developing customized benchmarks to more fully reflect the unique investment styles of its external managers. For example, some managers only buy stocks with low stock price to book value ratios. Others only buy stocks whose dividend yield is superior to the S&P 500. It is the intention of VRS to separate the effects of conscious decisions by its active managers (i.e. the decision to buy or sell specific securities) from the effects of long-term investment style preferences, unintentional biases toward specific market sectors, and arbitrary decisions. Once the individual benchmarks have been completed, VRS plans to aggregate the custom benchmarks in order to quantify and manage the uncompensated risk inherent in the active domestic equity program as a whole.

BENEFIT LIABILITY ANALYSIS WITHIN THE INVESTMENT PROGRAM

The ultimate objective of any pension fund investment program is to help fund the liability for future benefit payments. VRS has historically compared its total investment return with the investment earnings assumption used in the actuarial valuation, currently set at eight percent. This comparison has been used as the test of whether the investment program is effective in helping VRS meet its funding requirements. However, a weakness of this approach is that it does not compare the actual rate of asset growth to the actual rate of liability increase. VRS investment staff have begun to explore issues pertaining to asset/liability analysis.

VRS does not currently use any liability benchmark to evaluate its investment performance. Conceptually, this type of benchmark could supplement existing benchmarks as a means of improving the assessment of overall fund performance. The development of a custom liability index, that properly represents the present value growth of the VRS liability schedule, could help to more accurately measure asset growth as compared to liability growth that those assets are supposedly funding.

Liability Growth Has Recently Exceeded Asset Growth

During the period from FY 1983 to FY 1995, the value of VRS pension trust fund assets grew more than twice as fast, on an average annual basis, as did the

present value of total actuarial liabilities. However, over the more recent time frame of FY 1993 to FY 1995, liabilities have increased more than twice as fast as assets. This is due to the inclusion of COLA liability in the 1994 actuarial valuation. Table 2 presents data on asset and liability growth rates over these periods.

Table 2: VRS Assets and Liabilities: Average Annual Growth Rates FY 1983 to FY 1995

<i>Asset or Liability</i>	<i>FY 1983 to 1995</i>	<i>FY 1993 to 1995</i>
Book Value of Total Pension Trust Fund Assets	39.4	9.2
Market Value of Total Pension Trust Fund Investments	41.8	8.8
Present Value of Total Actuarial Liabilities	19	19.3
Source: JLARC staff analysis of VRS Annual Reports.		

Change in asset value is not necessarily the same as return on investment. Moreover, whether the recent trend of liability value growth exceeding asset value growth is a temporary aberration or the beginning of a long term trend is uncertain. That uncertainty could be addressed by incorporating liability growth monitoring within management and oversight of the investment program.

VRS Investment Staff Have Begun to Analyze Liability Issues

In addition to the previously mentioned study that is planned with Watson Wyatt for asset allocation purposes, VRS investment staff have conducted other types of liability analysis. A November 1995 staff report - concerning fixed income investment policy - made a number of findings pertaining to the analysis of assets and liabilities:

- When interest rates rise, the present value of pension liabilities decreases due to an increased discount rate and, all other things being equal, the plan’s financial status improves.
- For each 100 basis point decrease in interest rates, the present value of VRS liabilities increases by 6.5 percent.
- Market-based interest rates, as measured by the ten-year Treasury Bond, have decreased 150 basis points since the June 30, 1994 actuarial valuation.
- Historically, pension liability discount rates have been slow to respond to changes in mar-

ket-based interest rates. However, in recent years the frequency of adjustment by private pension plans has increased due to high bond market volatility and changes in accounting standards for private plans established by the Financial Accounting Standards Board (FASB).

- While the Governmental Accounting Standards Board (GASB) has not yet adopted similar standards for public sector pension plans, it is reasonable to assume that this will occur at some point in the future. Such a change would introduce more volatility into the funding status of the VRS plan and the required contribution rates.

Approach to Valuation of Investments Differs from Valuation of Liabilities

Analysis of VRS asset growth and investment performance, as compared to the growth in the present value of liabilities, is complicated by inherent differences in the way the investment department values assets and the way liabilities are valued by the actuary. These differences involve the frequency of valuations, the treatment of interest rates, and the use of investment earnings assumptions.

Frequency of Valuations. Asset values, for investment purposes, are recalculated far more frequently than the value of VRS liabilities. The value of most VRS assets (public equity and fixed income) are re-calculated by the custodian bank each month based on market values. The value of VRS pension liabilities, by contrast, is calculated just once every two years. Therefore, while asset values is considered relatively dynamic, liability values are viewed as relatively stable.

Treatment of Interest Rates. Another key difference in the valuation of VRS assets and liabilities involves interest rates. The values of VRS assets are calculated by the custodian bank within the context of a wide range of market-based factors, including prevailing interest rates. On the other hand, the present value of total pension liabilities is calculated by the actuary using an eight percent discount rate. This eight percent rate is commonly referred to as the investment earnings assumption, because it is established based on what VRS expects to earn on its investments. When the investment earnings assumption was changed from 6.5 percent to 8 percent in 1988, the present value of VRS pension liabilities was significantly reduced thereby enabling the required employer contribution rates to be reduced.

Use of Different Investment Earnings Assumptions. VRS utilized a more aggressive investment earnings assumption of 11 percent during the development of its asset allocation policy in 1994. That assumption was based on research performed by the investment firm of J.P. Morgan, and reflected its long-

term capital market expectations. This investment earnings assumption is significantly higher than the 8 percent used in the actuarial valuation. However, both are represented by VRS to be long-term expectations. VRS investment staff recently obtained updated data on the long-term investment earnings expectations of the capital markets. According to analysis of that data, long-term investment earnings expectations for VRS asset classes are now somewhat lower than what was anticipated in 1994. This is primarily due to a decrease in expected inflation rates.

GASB Standards for Investment Earnings Assumption. GASB Statement No. 27, "Accounting for Pensions by State and Local Governmental Employers," states that investment return assumptions may be based on current or expected long-term rates, depending on the purpose for which the actuarial calculations are made. Statement No. 27 also provides that:

The investment return (discount) rate commonly selected for governmental pension plan calculations is based on an estimated long-term rate of return on current and expected future plan investments....The investment return assumptions selected for a particular plan should be best estimates at the actuarial valuation date of that plan's earnings on current and expected future investments.

GASB Statement 25, "Financial Reporting for Defined Benefit Pension Plans and Note Disclosures for Defined Contribution Plans," also discusses the investment earnings assumption. It states that:

The investment return assumption (discount) rate should be based on an estimated long-term investment yield for the plan, with consideration given to the nature and mix of current and expected plan investments and the basis used to determine the actuarial value of assets.

Customized Liability Index System. A concept that is emerging in the private sector is the development of a customized liability index system that values a plan sponsor's pension liabilities based on changes in market interest rates. This is done in conformance with FASB standards, and is based on the belief that an investment program must frequently know the plan's liability growth rate. Under such a system, measurement of investment performance can then be assessed as the rate of change in the value of assets versus the rate of change in the value of liabilities.

This approach to investment performance benchmarking is not yet widely used, and could lead to a substantially different assessment of pension fund investment management and performance. Public pension funds are not required by the Governmental Accounting Standards Board (GASB) to frequently revalue their liabilities based on changes in market interest rates, as private plans are. Furthermore, a bench-

mark of this type is not intended for use in evaluating the performance of individual investment managers. Nevertheless, such a benchmark could be of value to the Board of Trustees and VRS management, and warrants further examination.

Recommendation (2) *The Virginia Retirement System should examine the advantages, disadvantages, and feasibility of developing a customized pension liability benchmark for use in evaluating the performance of its investment program. This study should be performed in conjunction with the ongoing asset/liability study being done for asset allocation purposes. As part of this study, the Virginia Retirement System should also examine its approach to establishing investment earnings assumptions for asset allocation and actuarial valuation purposes.*

INVESTMENT RISK MANAGEMENT IS AN INCREASING CONCERN

The assumption of risk on the part of a pension fund investment program is normal and necessary in order to obtain a respectable rate of return. VRS desires to take certain risks in its investment programs but wants to be fairly compensated, through acceptable investment returns, in exchange for assuming that level of risk. The avoidance of all risk, even if it were possible, would severely limit the investment returns that VRS could realistically expect to earn. However, risk that is incorrectly quantified, mismanaged, or misunderstood can have disastrous consequences for an investment program. A crucial element of any investment program is the explicit determination of the extent to which the plan is willing to accept risk, and how risk is defined in terms of specific factors. Once the acceptable level of risk has been defined and quantified, a pension plan must ensure that it has the necessary staff, systems, policies, and controls in place to effectively manage that risk.

Risk Management Concerns Originated with Publicized Investment Losses

Numerous, and well publicized, investment debacles on the part of large institutions over the past two years have focused the attention of other large investors, including VRS, on the importance of risk management. While there are varied details and situations to each of these incidents - involving Orange County, California (\$2 billion loss); Barings Bank (\$1 billion loss); and The Common Fund (\$147 million loss) among others - some general trends are fairly evident. First, senior management within each of these entities were not sufficiently aware of all the different types of securities that they owned at a given point in time. Second, senior management failed to understand the

magnitude of the impact that changes in specific risk factors, such as interest rates, could have on particular types of investments such as derivatives. In addition, several of these episodes involved unauthorized securities trading, resulting in significant losses.

These unfortunate occurrences within the investment industry, while widely publicized, still appear to be the exception. Nevertheless, these occurrences have had an effect on VRS and other institutional investors. No investment fund wants to be the next to suffer a highly publicized loss. Furthermore, there appears to be an emerging consensus among institutional investors that trust of external investment managers is no longer a sufficient safeguard. These concerns have caused VRS to wonder if it is sufficiently aware of all the significant activity occurring within its portfolio.

Reimbursed Losses in Securities Lending Program. Another incident which has focused VRS attention on risk management issues involves its securities lending program. Since 1989, VRS has participated in a securities lending program managed by its custodian bank, Mellon Trust (Mellon). Under the program, Mellon loans securities which it holds on behalf of VRS to third-party brokers. Brokers typically borrow securities in order to execute short sales of stock. Brokers pay collateral to Mellon in exchange for borrowing the securities. Mellon invests the collateral, retains 30 percent of the net investment earnings, and credits the other 70 percent to VRS. Originally, Mellon invested the collateral for VRS securities in a commingled pool with the collateral of its other securities lending clients. By 1994, Mellon was making investments in certain interest-rate sensitive derivatives using funds from the commingled pool.

In the Fall of 1994, VRS obtained indications that there were some problems within the securities lending program. VRS met with Mellon staff and obtained assurances about the operation of the program. However, one month later Mellon notified the VRS chief investment officer that it was writing off a \$135 million after-tax loss on its securities lending portfolio. Mellon reimbursed VRS in full for its share, \$12.6 million, of the total loss.

In October 1995, VRS and Mellon entered into an agreement whereby VRS was taken out of the commingled pool, and placed in its own separate account. In addition, new investment guidelines prohibiting the use of derivatives were instituted. While the immediate problem was corrected in this instance, the CIO remains concerned that VRS was unable to fully identify and effectively address this problem prior to receiving notice of a multi-million dollar loss.

Internal Audit Findings and Recommendations. Over the past 18 months, the VRS internal auditor has released a series of reports on the VRS investment department. These numerous internal audit reports

produced two recurring findings. First, the need to identify and assess non-investment risks within the portfolio. Second, the need to develop written procedures for the day-to-day operation of the various investment programs. These reports have been an additional factor behind the current review of risk management issues. VRS management has represented to the internal auditor that all of the audit recommendations either have been implemented, or will be in the near future.

The Investment Department Has Undertaken a Risk Management Project

In response to all of the previously mentioned concerns, VRS is examining its entire process for defining, quantifying, and managing all the potential risks that could materially impact the value of the VRS trust funds. The scope of this review, originally focused primarily on the use and monitoring of derivative investment instruments, has been expanded to assess risks posed by a number of other potential situations and conditions. One of the primary risk management issues being examined is the adequacy of safeguards to protect against significant losses arising from the unauthorized securities trading in VRS accounts. VRS wants to develop an enhanced early warning system, so that a sudden loss of a substantial amount of money is not its first indication of a problem within the portfolio.

Definition of Pension Fund Risk. Pension funds such as VRS face a wide range of potential risks. There are three general risk categories: market risk, credit risk, and operational risk. **Market risk** arises from factors such as volatility of returns, liquidity of assets, and correlation among the returns of different asset classes. **Credit risk** stems from factors such as downgrades, defaults, and failure to settle contracts. The third category, **operational risk** concerns items such as authorization to trade in specific securities, legal contracts, technological capabilities, human error, failure of audits to detect significant problems, and fraud. The risks in these three categories are further complicated and interrelated when dealing with investments in foreign countries and foreign currencies.

Given the wide array of potential risks, it is possible for a pension fund to operationally define its acceptable risk threshold in any number of ways. However, the VRS Investment Policy Statement does not contain any expression of how VRS defines or quantifies the types and levels of risks that it wishes to accept. Traditionally, VRS has expressed its pension fund risk primarily in terms of the volatility of investment returns.

Quantification of Pension Fund Risk. In attempting to quantify the amount of risk that its portfolio is exposed to, a pension fund must answer three important questions. First, what variables, given a small

move in value, may cause a large movement in the price of securities in the portfolio? Second, which key variables affecting the portfolio may have a high likelihood of change in value? Third, what variables or exposures are considered to potentially offset each other, and by how much?

One method of quantifying the amount of risk within the portfolio, which VRS is currently examining, is called “value-at-risk.” This is a measure of market risk that estimates the potential loss on a portfolio of exposures. This method is intended to enable a pension fund to determine, at a 95 percent confidence level, that it will lose no more than a calculated dollar amount based upon assumed market movements.

According to VRS, there are many limitations to the value-at-risk methodology. In particular, there is no system currently available that calculates value-at-risk across all asset classes. VRS has currently assigned a lower priority to determining its value-at-risk, and is focusing on a review of internal and external operational policies and procedures.

External Investment Manager Controls Are Being Examined

There are two key risk management issues pertaining to external investment managers. First, what does the manager’s contract provide for in terms of authorized investment practices? Second, is the manager adhering to the contractual investment guidelines? According to VRS staff, contractual investment guidelines are important. However, ongoing due diligence and knowing what each manager is doing is even more important.

Investment Contracts. As part of its risk management project, VRS is conducting a review of its external investment manager contracts. Particular attention is being given to contractual investment guidelines. These include the types of investment strategies and products that are specifically authorized and specifically prohibited.

The investment guidelines in each investment contract can vary, depending on the range of investment authority that VRS decides to grant to the manager. Managers with relatively limited authority typically have a lengthy list of investment restrictions in their contract. This can include prohibitions on short sales, margin transactions, securities without a readily ascertainable market value, and purchase of more than five percent of any class of securities of a single issuer.

JLARC Staff Review of Investment Contracts. JLARC staff reviewed the contract files of each VRS domestic equity, international equity, and fixed income manager. A total of 31 contract files were reviewed. The contracts of six domestic equity managers did not contain any specific investment guidelines concerning types of authorized or restricted investments. Each of the managers was hired between 1982 and 1986. In its

1993 review of the VRS investment program, Bear Stearns made a similar finding. Bear Stearns recommended that VRS domestic equity staff draft and implement appropriate investment guidelines for its external managers.

Derivatives Monitoring. Once a year, VRS compiles an accounting of its derivatives exposure for its annual financial report. One of the reasons that derivative investments pose so much of a risk management concern is that losses from derivatives trades must be settled in cash pursuant to the terms of the instrument. Stock and bond losses, on the other hand, result in reductions in asset value but do not require any cash settlement. Some VRS external managers are specifically authorized to use derivatives as part of their management of VRS assets. Other external managers have no specific authorization to use derivatives. VRS fixed income staff require their external managers to submit monthly reports concerning the amount and type of derivatives that they are holding, as well as the interest rate sensitivities of those positions. However, VRS equity staff currently have no such requirement for their managers.

Due Diligence. The IAC policy guidelines include due diligence procedures for the selection, monitoring and termination of investment managers. As part of its risk management project, VRS is examining the extent to which its due diligence procedures effectively address risk management and internal control issues. This includes computer and accounting systems; internal audit capability, segregation of duties, and liability insurance coverage.

Controls and Operations of Custodian Bank Are Under Review

The key issue concerning custodial controls is does VRS really own the securities and other assets that it thinks it owns? Under current procedures, neither VRS investment staff nor Mellon look at every stock or bond trade prior to settlement. It is not practical for the staff to do so. On a daily basis, therefore, no one is really responsible for checking that a manager is in fact authorized to perform a particular trade. Rather, at the end of each month, VRS staff examine reports from the external managers which document investment holdings and performance. Consequently, VRS only knows at the end of the month what happened with the portfolio on each day during the month. According to VRS staff, a manager involved with derivatives trading could - within a month under a worst case scenario - potentially lose a great deal of money. Managers are required to reconcile their records with Mellon on a quarterly basis. VRS staff monitor the reconciliation process.

As part of the risk management project, VRS is trying to significantly reduce the amount of time that

elapses before it finds out if any of its contractual investment guidelines were violated. In order to detect and prevent settlement of trades that are out of compliance with contractual guidelines, VRS needs to obtain the appropriate information systems. VRS is working to obtain technology - along with appropriate policies and procedures - that will provide it with same-day, real-time risk management capability that includes exceptions reporting for authorized trading, as well as daily reporting of derivatives exposure. VRS is evaluating whether such technology is best obtained through Mellon, another vendor, or through in-house development.

Monitoring of Investments Not Custodied By Mellon Trust. A similar issue concerns the ability of VRS to identify and examine specific investment holdings which it has in funds that are not in the custody of Mellon. Passively managed index funds are examples of funds that are not custodied at Mellon. VRS is working to develop what it calls "look-through" technology that will enable it to examine these holdings on a real-time basis.

Assessment of Investment Department Controls and Operations

One key issue concerning internal controls and operations is the adequacy of investment department staffing levels given the current size and growth rate of the total fund. The chief investment officer describes the VRS investment program as consisting of "lots of moving parts." The CIO expressed concern to JLARC staff regarding a relative lack of senior, experienced staff within the investment department. The number of staff has also been cited by some within VRS as a concern. For example, one member of the staff is directly responsible for internally-managed equity investments, and externally-managed domestic, international, and emerging market equity investments. This constitutes well over 60 percent of the total fund.

In January 1995, the consulting firm of William M. Mercer, Inc. (Mercer) provided VRS with a report on investment department organization and compensation. Based on its study, Mercer recommended that the investment department should have one staff person for every \$750 million in assets. At the time of the study, the market value of VRS assets was approximately \$16 billion. Therefore, Mercer recommended 21 staff for the investment department. Counting the CIO, the investment department now has 21 staff positions. In addition, three investment accounting positions - while not officially part of the investment department - are for all practical purposes located within the department.

According to Mercer's analysis, the investment department should ideally have 28 staff positions. The market value of VRS assets is now approximately \$21 billion. At the time that Mercer performed its study,

VRS projected that it would not reach \$21 billion in assets until approximately June 30, 1997. Two additional positions are authorized for the investment department beginning July 1, 1996, which will bring the total number of positions to 23.

According to some VRS investment staff, issues pertaining to risk management and internal controls have recently been assigned a higher priority than they had in the past. For example, the CIO recently hired a new staff member to have primary responsibility for completing the risk management project. The individual, who is on a 12 month contract, has the following responsibilities:

- analyze internal and external risk management and control functions as it pertains to the investment function; and
- implement an appropriate risk management program for the VRS investment department.

Recommendation (3). *The Virginia Retirement System should use the results of its risk management project to define and quantify, within its investment policy statement, the types and levels of risk that it is willing to assume within its investment program.*

Recommendation (4). *The Virginia Retirement System should examine staffing requirements within its investment department, taking into consideration the current and projected amount of assets to ensure proper oversight of its investment functions and risks.*

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