

# **SAILS – A Self-Adjusting Investment Strategy**

**MMI Annual Convention**

**March 29-30, 2005**

**Philadelphia**

### Hypothesis:

A pension investment strategy closely linked to the underlying pension liabilities can outperform the traditional strategic asset allocation model (SAA).

Our self-adjusting investment strategy is designed to adjust a pension plan's asset allocation to changes in plan liability characteristics, market values of plan assets, and general financial market conditions (primarily term structure of interest rates and inflation).

We used plan data from a client pension plan as of 12/31/2003, and summary information from the pension plan's provisions document.

Based on the plan's liability data, we tested investment strategies over three alternative Funding Ratios: 130%, 100%, and 70%.

We ran 40-year pension plan projections reflecting interest rates, equity returns, inflation and mortality. We projected annual expected plan contributions, inflation adjusted plan contributions, and actual gain/loss adjusted plan contributions.

We segmented the pension plan into three assumed risk capacity components:

### Retired lives – low risk capacity

Assets backing retired lives are invested using a 100% fixed income portfolio that reflects the duration, convexity and cash flow characteristics of the liabilities.

### Active lives – moderate risk capacity

Assets backing active lives are invested using a traditional SAA methodology, i.e., 60% equity and 40% bonds.

### Surplus – highest risk capacity

Assets backing plan surplus, if positive, are allocated 100% to the highest alpha asset classes consistent with the plan's risk tolerance. The highest alpha asset class included for purposes of this research project is equity.

In addition to the basic SAILS strategy we tested a variety of alternative investment strategies for each of the three components (retired, active and surplus). The primary investment strategy combinations we tested were:

- i. Fixed income allocations of 100%, 90%, ..., 10%, 0%,
- ii. Variations in degree of immunization.

The client also suggested that we test a hybrid asset. The hybrid asset is a hypothetical fixed income asset that exactly matches each projection year's actual liability return (retired and active) plus portable alpha from other investment sources. We tested the hybrid asset at three alpha levels: 0 bp, 100 bp, and 250 bp.

### Term Structure Model

- Markov Chain Generator, equilibrium model
- Implementation of model developed by S.L. Christiansen (1992, 1994)

### Stock Market Return Model

- Extreme Value Distribution
- Fit to Russell 1000 returns between December 1979 and March 2004

### Inflation Model

- Implemented approach developed by F.S. Mishkin (1990) and enhanced by J.A. Frankel and C.S. Lown (1994)

## Primary evaluation metrics:

1. Present value of future gain/loss/inflation adjusted plan contributions (known as PV FAD, or present value of future actual deposits), and
2. Standard deviation of PV FAD

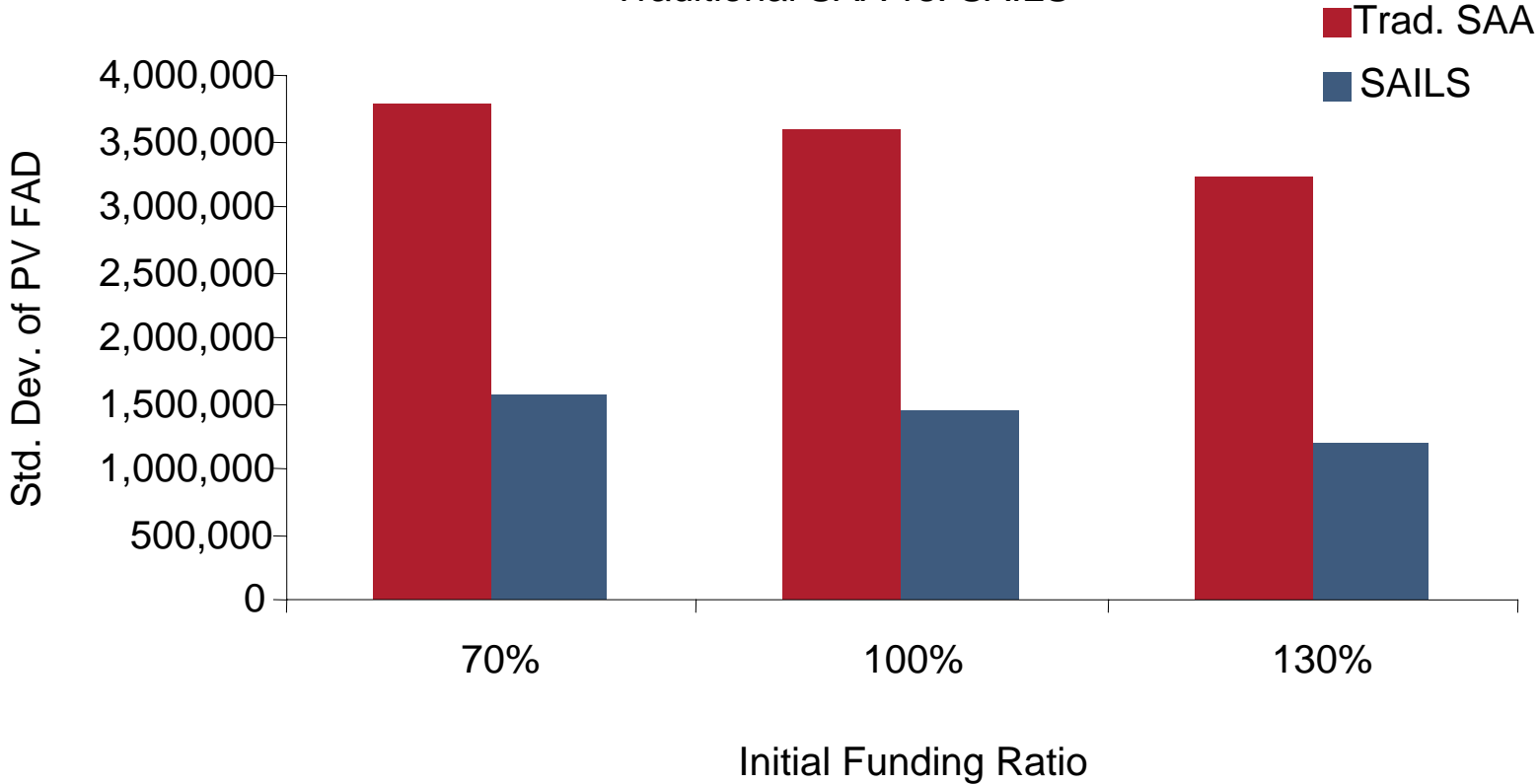
### SAILS

Our results indicate SAILS provides a substantial risk reduction relative to SAA (e.g., up to 60% lower standard deviation of PV FAD) with no increase in expected plan cost. In fact, the use of SAILS resulted in lower costs (e.g. up to 40% lower PV FAD) than the traditional SAA of 60% equity and 40% bonds.

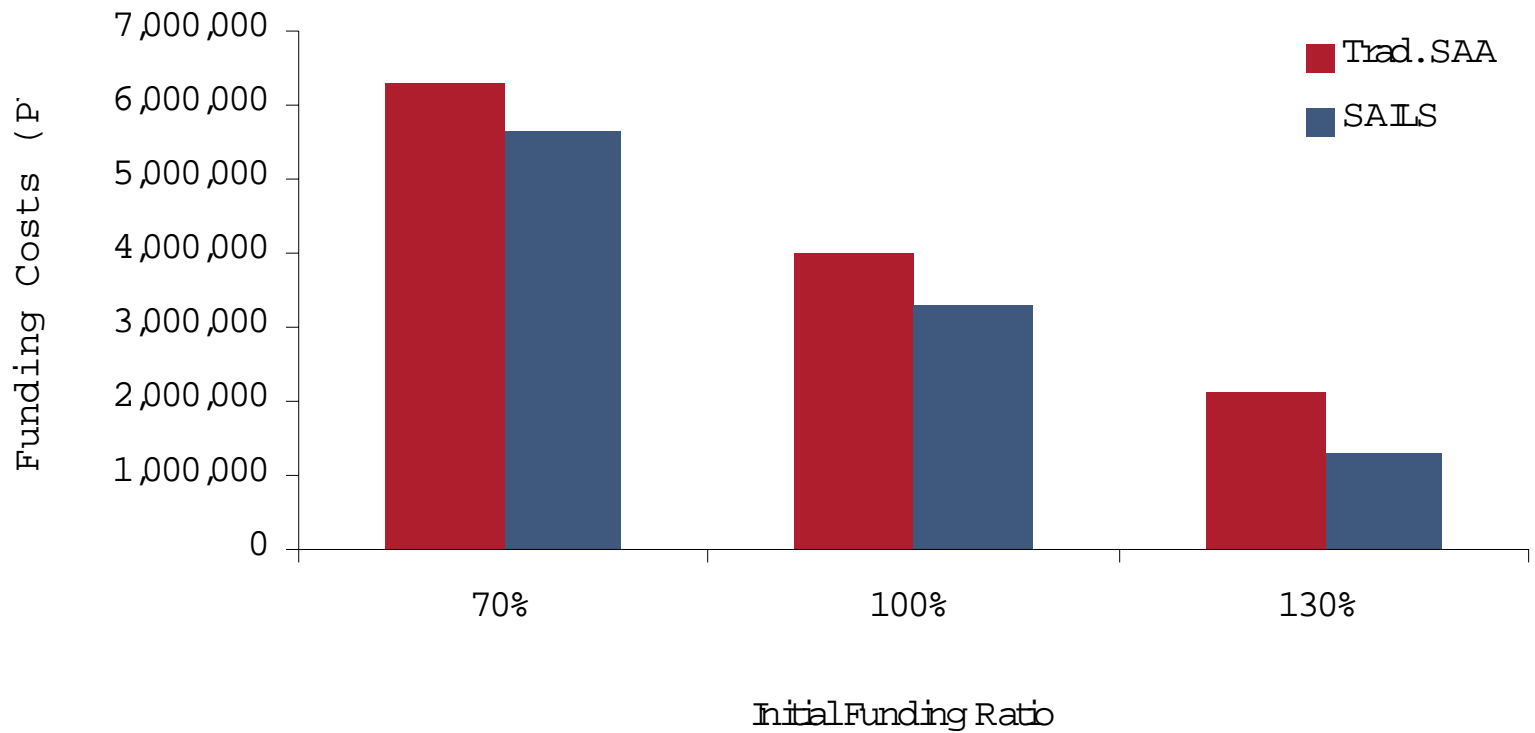
### Hybrid

The hybrid investment strategy exhibited virtually no risk – up to a 99% reduction in standard deviation of PV FAD. Using 100 basis points of portable alpha, plan costs were also up to 74% lower than SAA.

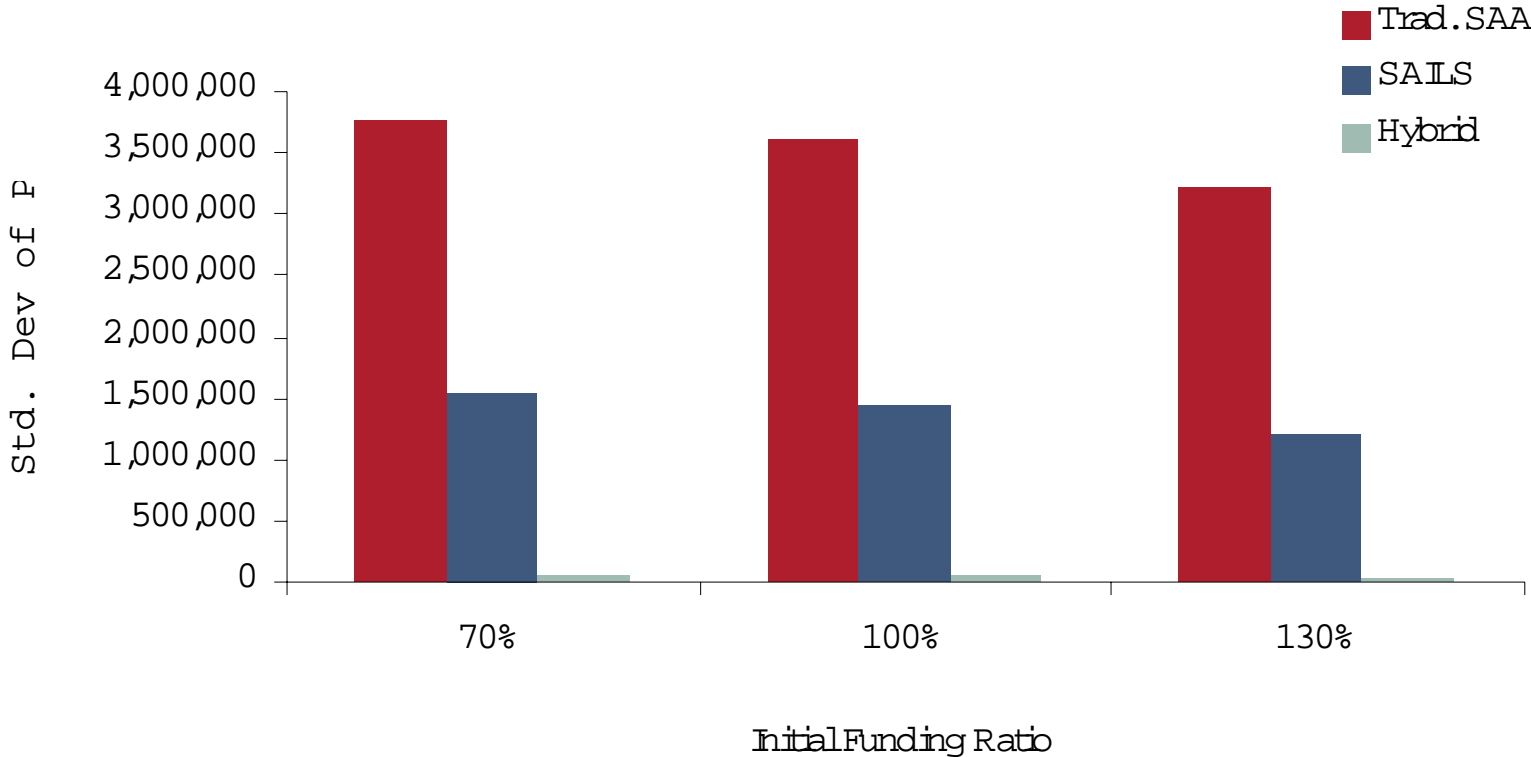
Risk Comparison  
Traditional SAA vs. SAILS



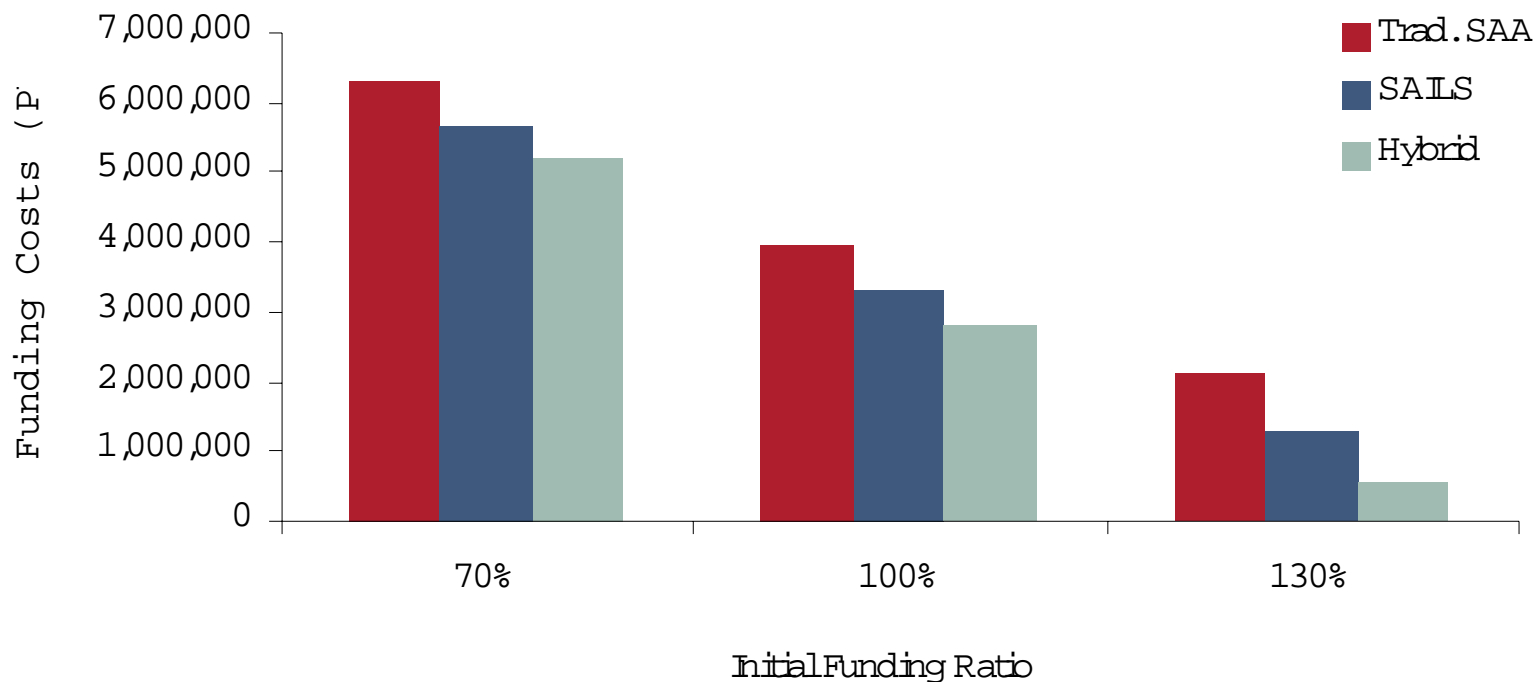
Cost Comparison  
Traditional SAA vs. SALS



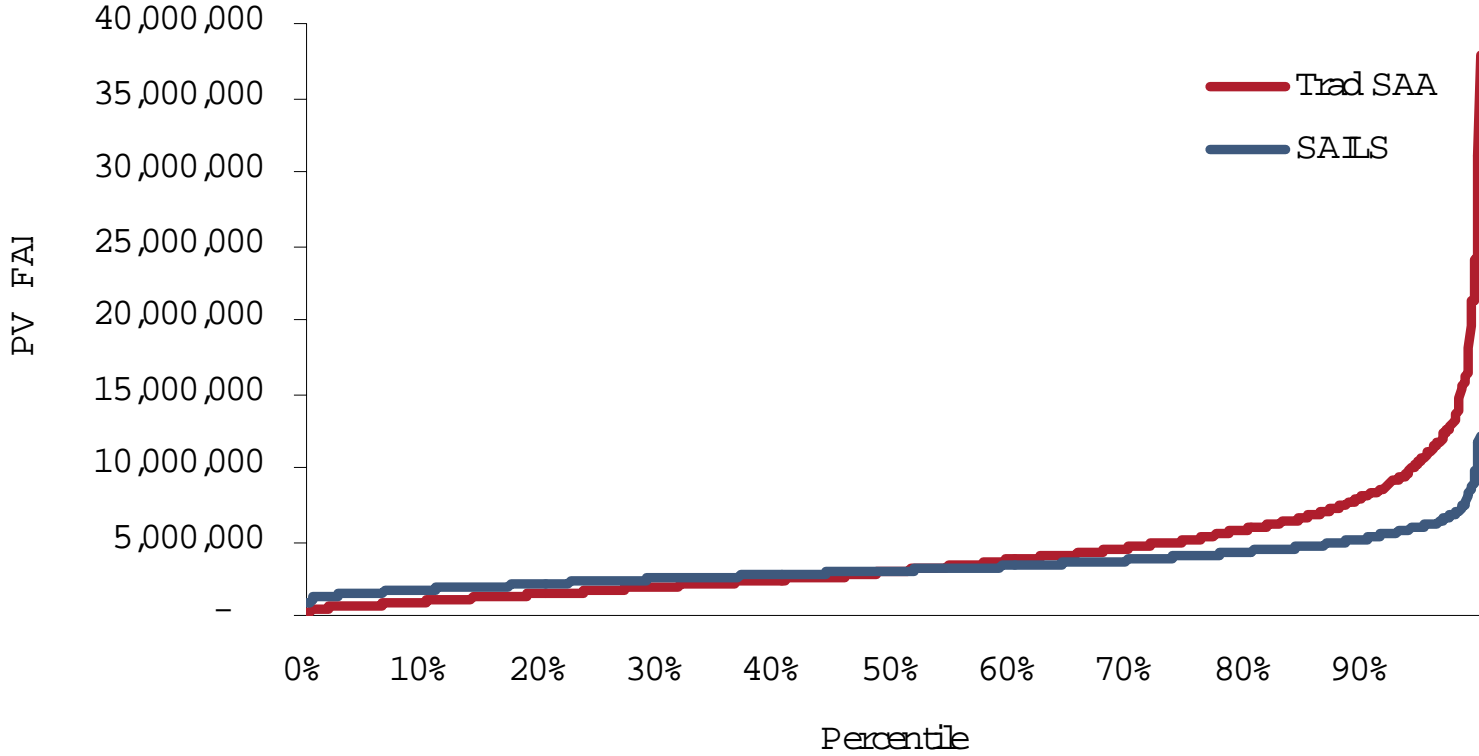
Risk Comparison  
Traditional SAA vs. SAILS vs. Hybrid



Cost Comparison  
Traditional SAA vs. SAILS vs. Hybrid



Sorted Funding Cost Comparison



- Correlation Analysis
- Liability Analysis
- Hybrid with Tracking Error