Figure 4.7 illustrates the mean-variance asset allocation for the investment group that is willing to accept the most risk of them all in the constrained model.

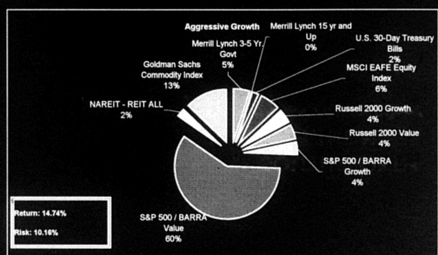

Figure 4.7 Aggressive Growth

In this investment profile, the allocation has moved away from cash and the majority of the investment is placed in large cap value stocks. The purpose of the constraints was to discourage this kind of "chunking" within an asset class. However, at the extremes of the efficient frontier, in the capital preservation profile eighty percent of the investment was in cash and the aggressive growth model sixty percent lands in large cap value stocks. In the case of the aggressive growth model, an improvement was made from the unconstrained version. Instead of eighty-six percent of the investment in large cap value stocks, only sixty percent resides in that asset class now allowing for a more diverse portfolio than before. In the instances when this happens within an equity asset class, the portfolio must rely on sector diversification such as cyclicals, durables, technology, energy, financials, transportation, utilities and conglomerates.

5. Minimax Model

The minimax model used in this study was developed by Young [1998]. This model handles the portfolio selection process in a linear programming framework, which is easier to implement then the quadratic programming approach taken by Markowitz. The measure of volatility in this model is the minimum return obtainable. The reasoning behind this is that the portfolio with the smallest variance will also be the one with the largest first order statistic given a mean return value. This is contrasting to Markowitz's mean-variance model that is a quadratic programming model that uses the variance as a measure of volatility subject to some mean return level. This model does require a historical dataset or dataset generated by a probability model of returns. The minimax model uses an L_∞ norm as a measure of downside risk thereby indicating a strong absolute aversion to downside risk. Young gives two equivalent formulations of the model and both formulations are studied here.

The first formulation maximizes the minimum return on the portfolio subject to the constraint that the average return on the portfolio exceeds some value, in this case it is the average return on an investor profile specified by Merrill Lynch's Asset Allocation documentation, and the sum of the allocations is one.

$$\text{Max } M_p \qquad (5.1)$$

Subject to:

$$\sum_{j=1}^{N} w_j y_{jt} - M_p \ge 0 \quad t = 1, \ldots, T \qquad (5.2)$$

$$\sum_{j=1}^{N} w_j \bar{y}_j \ge G \qquad (5.3)$$