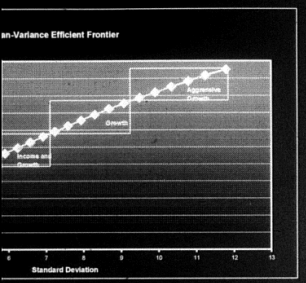
an-Variance Efficient Frontier



nt Frontier

ninimum return of seven percent at a risk level of
n return of sixteen and a half percent at an eleven and
frontier is divided into five segments, each
on the asset allocation mixes for the investor profiles.
osen and the average of the middle two portfolios
he respective risk portfolio. In this case, the risk and
ard deviation and sample average, respectively, of
s. The results for each investor profile are

	Merril Lynch 3-5 Yr. Govt	Merril Lynch 15 yr and Up	U.S. 30-Day Treasury Bills	MSCI EAFE Equit Index	Russell 2000 Growth	Russel 2000 Value	S&P 500 / BARRA Growth	S&P 500 / BARRA Value	NAREI - REIT ALL	Goldman Sachs Commodity Index	Std Dev.	Retur
Capital Preservation	0.00	0.00	85.59	1.48	0.00	0.12	3.41	6.06	0.00	3.34	2.65	7.56
Income	11.75	0.00	54.74	1.30	0.00	0.00	1.41	25.57	0.00	5.22	4.16	9.84
Income and Growth	25.68	0.00	25.67	1.31	0.00	0.00	0.03	40.24	0.00	7.08	6.07	11.79
Growth	35.04	0.00	0.00	1.05	0.00	0.00	0.00	55.35	0.00	8.57	8.12	13.71
Aggressive Growth	7.53	0.00	0.00	0.00	0.00	0.00	0.00	86.42	0.00	6.05	10.57	15.66

Table 4.3 Mean-Variance Investor Profile Outputs

Interestingly, real estate, long-term bonds and small cap growth are never considered in the asset allocation. International stocks, small cap value and large cap growth have little presence in the efficient portfolios. These results beg the question: is it worth it to divide the asset classes into smaller groups than just stocks, cash and bonds?

In order to assess how this model performed, it is compared to a similar study done by Merrill Lynch. Merrill Lynch portfolios were generated using a four-step process. First step is to select portfolio assets. In this case, four asset classes were used: domestic stocks, international stocks, bonds, and cash. Emerging market stocks were not considered in the international stocks because of the inconsistency of the risk and return characteristics of that sector. The four asset classes are represented by the following indices:

- Domestic stocks – S&P 500 Total Return Index
- International stocks – Datastream Developed World ex-US Total Return Index in US dollar terms
- Domestic Bonds – Merrill Lynch Government Bond All Maturity Total Return Index

- Cash proxy – an equal weighted total return index based on the three month T-bill and three month CD

The next step is determining the investment horizon. The profiles serve as guidelines for a three to five year investment horizon. The third step deals with determining long run expected return and risk. Merrill Lynch uses historical monthly data to estimate long-term annualized returns for the four asset classes. A twenty-year time period is employed to calculate the returns and the covariance matrix used to determine the risk levels. Risk is measured as the annualized standard deviation of monthly returns over the sample period. The fourth step uses Merrill Lynch's proprietary asset allocation software, ML-GRIP. This software produces forward looking, risk adjusted portfolios based on their analysts' return expectations for stock, bond and currencies throughout the world. The application uses Markowitz's mean variance optimization to generate an efficient frontier, thus asset allocation becomes crucial. The efficient frontier is comprised of thirty portfolios. The efficient frontier is divided into five segments to position the asset allocation mixes for the investor profiles. The mid-point of each segment is chosen and that portfolio represents the recommendation for the respective risk portfolio. However, this recommendation only provides the percentage of investments into the four major asset classes.

When the results are compared to Merrill Lynch's, the following observations can be made from Table 4.4.