included in the portfolio should have an expected return at least as great as any position

however bonds rose 6.2% and cash equivalents rose .6%. A diverse less than the loss sustained by the stocks. Table 2.2 summarizes the in this research by each author and points out the areas covered in

	Active Portfolio Management	Asset Allocation Policy	Benefits of Investing in Multiple Stocks	Effect of Constraints on Asset Allocation	Investor Profiles	Risk Estimation Error	Style Analysis
unkle [2000]							✔
	✔						✔
bower [1991]		✔					
ubbs [1998]				✔			
					✔		
							✔
od [1999]						✔	
			✔				
		✔	✔	✔			

location Topics in Research

3. Problem Statement

The purpose of this thesis is to examine how asset allocation is affected when it is expanded from the broad asset allocation of stocks, bonds and cash as pertaining to mean-variance model and the minimax model.

Most portfolio theory research looks at asset allocation applied to three broad categories: stocks, bonds and cash. In this work, a lot of effort was put into how to break up these categories into representative asset classes. Initially, domestic stocks were broken down into five asset classes: small cap growth and value, mid-cap, and large cap growth and value stocks. But a preliminary run of an asset allocation model showed that the optimal portfolio chose the middle road of mid cap stocks, instead of picking a side such as large cap or small cap. Since the companies included in the extremes of the mid-cap stock index can fluctuate up to large cap or down to small cap stock indices, this index was eliminated from consideration due to the large amount of gray area associated with this index. The domestic stock asset classes are small cap value, small cap growth, large cap value, and large cap growth. Another concern was whether or not to include cash in the asset class mix. Typically, people with investment portfolios include just stocks or bonds and their cash is really separate from the portfolio itself. It was included in this paper so that comparisons could be made between the asset allocation models and the investor profiles generated by Merrill Lynch. Another debate in dealing with the cash asset class was to use the U.S. 30-day Treasury Bills or the U.S. 90-day Treasury Bills to represent the cash asset class. The 30-day t-bills were selected since they are more liquid, like regular cash would be, than the 90-day t-bills. In dealing with the bonds sector, originally, this class was captured using only one index, the Lehman Brothers Aggregate

Bond Index. Instead, we thought it was important to break this asset class into short-term and long-term bonds because of the implications that it places on the liquidity and the return volatility of the portfolio. The next obstacle was to define the meaning of a short-term bond. Preliminary models were run using the Merrill Lynch 1-3 year Government Bond Index and the Merrill Lynch 3-5 year Government Bond Index. The effect on the efficient frontier was minimal and the Merrill Lynch 3-5 year Government Bond Index was selected to represent short-term bonds because it was deemed that the other index spanning one to three years was too liquid. Unlike other studies, this one includes the use of the defensive asset class. Defensive assets are becoming increasingly popular due to their lack of correlation with the equity and fixed income classes. Real estate and commodities are used as the defensive asset classes in this study. The ten asset classes used in this study are:

- Short-term bonds
- Long-term bonds
- Cash
- Small Cap Growth stocks
- Small Cap Value stocks
- Large Cap Growth stocks
- Large Cap Value stocks
- International stocks
- Real Estate
- Commodities

Table 3.1 describes the indices used for each of the above asset classes.