1. Introduction

The recent events involving the demise of the multi-billion dollar energy company Enron, the seventh largest corporation in the nation, and the billion dollars in losses sustained by the employees who invested in the company for their retirement savings in their 401(k)s beckons to the need for a more prescriptive form of portfolio management. According to one study by Hewitt Associates as quoted by Costello [2001], about one-third of assets in 401(k)s are in company stock. The figures are based on a survey of 1.5 million plan participants. This certainly defies the whole principle of diversification and yet this is what employees are relying on to sustain them in their golden years.

In the past couple of years, companies have moved away from offering pension plans to their employees toward offering them 401(k) programs. The company no longer manages the fund, the employees now have the choice of which funds to invest their hard-earned dollars. For some people, having this kind of retirement plan or investment decision is like putting their life savings in a slot machine in Las Vegas. What percentage of the work force is aware of the concepts of diversification and risk versus return? After all, not everyone is a finance or economics major. The emphasis now is on how to save enough money for retirement since social security benefits will be almost nonexistent for the generations after the baby boomers. There are numerous IRA accounts that can be created. Some offer tax benefits now but taxes will be owed on the winnings later. Roth IRAs do not allow people to claim any tax relief in that investment now but when it is cashed out, that money is tax-free. Internet companies such as E*trade and Ameritrade allow you to place your stock orders on-line, just eight dollars a

trade. People are making a living off of day trading. The key to the game is "buy low, sell high." Wall Street's slogan should be "show me the money." The days of having a personal stockbroker are over for the average American. One question still remains, what is the optimal portfolio?

In the early nineteen hundreds, Irving Fisher [1906] was a major player in defining the functions of the credit markets, the importance of allocating resources over time and to describe asset returns in terms of a probability distribution. It was during this time that the economists of the day began to conceive the theory of portfolio selection. There were two views of the financial markets at this time. One was that the markets represented a casino. On the other hand, John Burr Williams [1938] challenged this notion and created a fundamentalist viewpoint that stated that the asset prices represented the inherent value of the asset. It was not until Harry Markowitz [1952] put this all together and capitalized on the expected utility theory developed by John von Neumann and Oskar Morgenstern [1944]. Markowitz developed the notion of an optimal portfolio selection based on the tradeoffs of risk and expected return. He used the idea of diversification as a way to reduce the risk in a portfolio. Diversification could be achieved by solving for the covariances of the assets thereby giving a correlation factor. This idea was the birth of modern portfolio theory. James Tobin [1958] took this idea and created the two-fund separation theorem, which added a risk-free asset to mix. Building on a Keynesian macroeconomic problem, he argued that people would determine their attitude toward risk in the way they combined the risk-free asset and the portfolio of risky assets. With technology not being what it is today, it was very costly at that time to compute the covariance matrix developed by Markowitz. In 1964, William Sharpe[1964] developed a