Investment and Portfolio Management: Portfolio Risk and Return Analysis

Michael Frank is an individual investor who is currently considering the purchase of $4,000 worth of Intel's common stock. Mike already has a significant amount invested in the computer industry, but he feels Intel will be one of the leading companies in the future. One of the reasons for this perceived future success is the Research and Development being done in the area of parallel supercomputers.

Justin Rattner, Intel's former scientist of the year, is a leading researcher in parallel supercomputing. Parallel supercomputing breaks down a complex problem into many, easier to manage components. Further, all of these components can be manipulated simultaneously. It is analogous to Tom Sawyer getting all his friends to paint the fence.

The speed of parallel computers is much faster than their larger and supposedly faster computers competitors. Computer chip manufacturers are concerned primarily with speed and the size of the components necessary to generate the speed. With Intel leading the way in this emerging area, Mike feels he should own their stock. One concern Mike has is how the inclusion of Intel's common stock will affect the overall return and risk of the computer stocks he currently owns. Presently, Mike holds $2,000 worth of IBM, $3,500 in Compaq, and $4,500 in Apple.

To determine the impact of the purchase of $4,000 worth of Intel, Mike has calculated the expected annual returns over the next eight years for each of the four stocks. The expected returns for each are shown in the table below.

Years into the future	Expected Return for each Company (%)			
	IBM	Compaq	Apple	Intel
1	6.2	0.1	-4.2	4.8
2	7.8	2.8	6.6	10.2
3	6.9	-1.9	12.2	11.3
4	-4.1	2.9	7.8	18.1
5	8.9	7.7	4.3	6.6
6	10.2	15.1	-2.1	-1.8
7	15.3	19.3	8.4	2.7
8	9.2	14.2	10.2	10.9

The beta of Intel is projected to be 1.1 over the next eight years. The betas of IBM, Compaq, and Apple assumed to be 0.7, 1.6, and 1.0, respectively. Mike wants to see what affect the purchase of Intel will have on the beta of his overall portfolio. He is assuming the beta of each firm will remain constant over the eight year period.

Questions

1. Calculate the expected return for each of the next eight years without the inclusion of Intel.

2. Calculate the expected return for each of the next eight years with the inclusion of Intel.

3. Calculate the standard deviation for each of the next eight years without the inclusion of Intel.

4. Calculate the standard deviation for each of the next eight years with the inclusion of Intel.

5. Calculate the beta of the portfolio both with and without Intel.

6. We have assumed that beta will be constant over the next eight years. How realistic is this assumption. That is, does beta tend to remain constant over time?

7. Which measure of risk is more appropriate when considering Intel's inclusion into Mike Frank's portfolio, standard deviation or beta?