Chapter 2
Understanding Risk and Return

OUTLINE

SUMMARY

The two key concepts in finance are the time value of money and the fact that a safe dollar is worth more than a risky dollar. The tradeoff between risk and return is the central theme in the investment decision-making process. Most investors are risk averse, meaning they only take a risk if they believe they will be rewarded for doing so.

A holding period return is independent of the passage of time and should be used only to compare investments over identical time periods. The holding period return considers both the yield of an investment from interest or dividends and appreciation from a change in the investment value.

Time value of money calculations overcome the shortcomings of the holding period return. They permit a direct comparison between a particular sum today and amounts in the future. The interest rate that satisfies a time value of money equation is a compound annual return. The number of compounding periods per year can significantly influence the compound annual return.

A risky situation must involve a chance of loss. Risk is inseparable from time. The greater the time period, the greater the possible dispersion of results. Investment losses are especially consequential because an investment that loses $x\%$ must rise by more than $x\%$ just to break even.

Virtually all investors are risk averse with significant sums of money. In other words, they will not take a risk with their money unless they believe the risk is warranted by the potential future returns from the investment.

Total risk encompasses the complete variability of investment results. Total risk can be partitioned into diversifiable and undiversifiable components. The marketplace only rewards undiversifiable risk.

Risk is unavoidable if an investor seeks more than a trivial return. A direct relationship exists between expected return and unavoidable risk. Risky investments do not guarantee a return, nor does unnecessary risk warrant any additional return.

ANSWERS TO END OF CHAPTER QUESTIONS AND PROBLEMS

1. This statement is generally true, although the concept of risk normally assumes there are certain adverse outcomes involving a chance of loss.

2. You cannot comment on the relative performance of competing investments without knowing their relative risk. It is also possible that investment B was a $1 million venture, while investment A was a $250 activity. Dollars are what matter, not percentages. If you have the choice between earning 100% on a $250 investment and 20% on a $1 million investment, everyone will prefer the latter.

3. A single large loss requires substantial subsequent gains to overcome the loss. The same is true of a series of small losses. A key point is that a loss of x% requires a gain of more than x% to break even.

4. Individual preference. People do not like risk, and since choice 2 appears more risky, the possible payoff on choice 2 for 51-100 coming up must be greater than 0 so that the average payoff is greater than $100. It depends on the individual, however, to make that choice since people also differ in terms of how risk averse they are.

5. Increasing the investment horizon increases the potential variability of returns, and hence the range of possible outcomes from the investment. Given that a wider range of values means more uncertainty about the outcome, from one perspective more time implies more risk.

6. See text discussion under "Partitioning Risk."

Business Risk	Variability of sales
Financial Risk	Variability of net earnings from financial leverage
Purchasing Power Risk	Variability of real return from inflation
Interest Rate Risk	Variability of return, given changes in market interest rates
Foreign Exchange Risk	Variability of return caused by varying exchange rates in investment period
Political Risk	Variability of return related to change in governmental decisions
Social Risk	Variability of return related to changing consumer and business reaction to social issues

7. Tobacco investments, environmental protection, sweatshop businesses, child labor laws outside the U.S.

8. Individual preference.

9. Individual preference.

10. There is a greater difference with annual versus monthly compounding. As the rate of compounding increases the incremental increase in dollars earned decreases. There is a smaller difference between daily and continuous compounding compared to going from annual to monthly compounding.

11. If interest rates are zero, there is no time value to money. As interest rates increase, present values decrease and future values increase. The higher the interest rate, the greater the "interest on interest" earned. The more frequent the compounding, the sooner the "interest on interest" resets.

12. $3,355.04 = PV annuity of 8i, 10n, $500 pmt on financial calculator

13 $2,940.12 = PV of $4000FV, 4n, 8i

14. $2,829.13 = PV of $4000FV, 4.5n, 8i

15. $937.50 = PV of $75 payment perpetuity at 8i, 100n, or $75/.08

16. $2,876.41 = PV of $500 annuity (pmt), 10n, 8i, or $3355.04 discounted (enter as a FV) for 2n, 8i to present. The first payment of this ordinary annuity, received at the end of the third year, must be discounted back two years.

17. $7,243.28 = FV of 10n, $500 annuity (pmt), 8i

18. $1,469.33 = FV of $1000PV, 5n, 8i

19. $1,485.95 = FV of $1000PV, $5 \times 4 = 20n$, $8/4 = 2i$

20. $1,491.82 = FV of $1000, 5 years, continuous compounding = .08 x 5 =.40 $e^x \times$ $1000

21. Monthly returns:

January 2004	-0.0200	January 2005	-0.0029
February 2004	0.0051	February 2005	-0.0010
March 2004	0.0051	March 2005	0.0059
April 2004	0.0202	April 2005	0.0078
May 2004	0.0149	May 2005	-0.0048
June 2004	-0.0166	June 2005	-0.0126
July 2004	-0.0030	July 2005	0.0108
August 2004	-0.0010	August 2005	0.0049
September 2004	-0.0090	September 2005	0.0087
October 2004	0.0151	October 2005	-0.0048
November 2004	0.0010	November 2005	0.0029
December 2004	0.0199	December 2005	-0.0087

Mean (all 24 months) = 0.0016 = 0.16%

22. Quarterly Returns

Q1 2004	-0.0100	Q1 2005	0.0020
Q2 2004	0.0182	Q2 2005	-0.0098
Q3 2004	-0.0129	Q3 2005	0.0246
Q4 2004	0.0281	Q4 2005	-0.0106

Mean (8 quarters) = 0.0037 = 0.37%

23.   4.14%
24.   0.000114
25.   0.000299