4.2: Dealing With Risk

To prepare for this lecture, read Hirschey, chapter 16, 644 – end

In this lecture, we define the meaning of risk aversion and look at additional tools for analyzing risk, such as sensitivity analysis. Then we briefly discuss tools for dealing with risk.

Economic Meaning of Risk Aversion
In general, economists employ two approaches to the definition of risk aversion (conversely, risk tolerance):

1. Choices in terms of mean-variance

Given a choice between two options with equal expected values and different standard deviations, a risk averse person will choose the option with the lower standard deviation. Furthermore, given a choice between two options with equal standard deviations and different expected values, a risk-averse person will choose the option with the higher expected value. This definition has limitations.

2. Nonlinearity in the utility of wealth or income

In general, a risk averse person is someone who is willing to pay a risk premium for the removal of risk. The general idea behind this concept and the non-linearity of wealth or income is usually summarized with a diagram such as this:
Sensitivity Analysis
This is the examination of the sensitivity of a derived strategy to variations in the judgmental inputs. In its simplest form, this involves changing one’s assumptions about probabilities in order to see how different one’s assumptions would have to be in order for a different decision to become optimal.

Dealing With Risk
Aside from merely avoiding risk, there are three broad strategies for dealing with it:

1. **Diversification**: This is the practice of balancing one’s interests (or investments) across activities (or assets) that are not perfectly correlated.
2. **Hedging**: This involves making an investment to reduce the risk of adverse price movements in an asset. Normally, a hedge consists of taking an offsetting position in a related security, such as a futures contract.
3. **Purchase of insurance**: This is most usefully thought of as transferring risk with cost to another economic agent who may be better suited for dealing with the risk.

Applying Risk Analysis to Valuation Issues
There are two primary methods for adjusting the basic valuation model to account for decision making under conditions of risk. These are certainty equivalent adjustments and risk-adjusted discount rates. If we recall the basic valuation model (Lecture 1.2), the first of these methods involves adjusting the numerator in the valuation model. If expected values entail risk, the decision maker must multiply the expected value by some certainty equivalent adjustment factor, $a$ (see Hirschey, p. 646), thereby transforming the expected payoff into a certain amount. All such certainty equivalents are then discounted at a common rate. Alternatively, the decision maker can discount expected payoffs at different rate depending on the perceived riskiness of the payoff, with riskier payoffs being discounted at higher rates (see Hirschey, p. 648).

These two methods are summarized in this figure:

1. **Certainty Equivalent Adjustments**, where $x$ is a certain payoff that is considered equivalent to a risky payoff.

   $$\text{Discounted Value} = \frac{x}{(1 + k)^t}$$

2. **Risk-Adjusted Discount Rates**, where $k$ is a risk-adjusted discount rate.

Relevant Textbook Problems: 16.1, 16.2, 16.6, 16.8, 16.9