Risk Summary and Outline

So far we have studied how prices, income, and preferences affect consumer choices. This analysis assumed that we know the outcome of all our decisions with certainty. In reality, the outcome of many choices we make are uncertain at the time the choices are made. When you buy a lottery ticket, you hope but do not know if it is a winning ticket. When you invest in the stock market, you do not know what will happen to stock prices in the future. Research may suggest that a given company’s stock will go up or it may suggest the likely range in which a stock's price will fall over the next week, or 6 months, or 3 years. Most Notre Dame students expect the football team to go to a good bowl game in their senior year but regrettably that too is not guaranteed.

When you have to make a decision in which the outcome is uncertain, the risk associated with this uncertainty can influence the choices you make. With risk, there is a difference between good decisions and good outcomes. In order to understand how risk influences the choices people make, we need to develop a way to describe and quantify the risk associated with any decision problem. The main approach used in economics is Expected Utility Theory. We will use expected utility theory to evaluate the cost of risk to an individual and to study how to make decisions when risk is present.

Outline
I. Modelling uncertain outcomes - Using probability concepts.
II. Expected utilities - The main method for incorporating risk into decision problems.
III. Making decisions under uncertainty and managing risk - We will look at how risk affects individual decisions and how risk can be managed or traded.

Key Ideas
- Decision problems that involve uncertain events can be described using lotteries and probabilities.
- The riskiness of a decision can be described in terms of the expected value and the variance of the outcomes.
- For someone who is averse to bearing risk, the best option is the one that maximizes the
person's expected utility.

- Expected utility allows one to calculate a certainty equivalent or guaranteed outcome that is equivalent in utility terms to an uncertain outcome.
- The cost of the risk to an individual from making a choice that has an uncertain outcome can be quantified. Risk can be transferred or traded.

**Important Skills**

- Describe a choice associated with an uncertain outcome using the concept of a lottery.
- Calculate the expected value and variance of a lottery.
- Compare two lotteries to determine which one may involve more risk.
- Calculate the expected utility, certainty equivalent, and risk premium of a lottery. Understand how to use this information to choose between several options that may involve uncertain outcomes.
- Explain how and why people might trade risk.

**Important Concepts and Terms**

- **Lottery** – A description of an event with an uncertain outcome that associates a probability with each possible outcome.
- **Expected Value** – The probability-weighted average outcome of a lottery.
- **Variance** – A measure of the extent to which a lottery's outcomes differ from the expected outcome.
- **Expected Utility** – The probability-weighted average of the utilities associated with each of a lottery's outcomes.
- **Certainty Equivalent** – A guaranteed outcome that provides a utility equal to the expected utility of a lottery.
- **Risk Premium** – The maximum amount an individual would be willing to give up to be guaranteed the expected value of a lottery instead of playing the lottery.