Chapters 1 and 2

Outline, Chapter 1
- The Four Questions of Public Finance
  - When Should the Government Intervene in the Economy?
  - How Might the Government Intervene?
  - What Are the Effects of Alternative Interventions?
  - Why Do Governments Do What They Do?

Outline, Chapter 2
- Utility maximization
- Labor supply example
- Efficiency
- Social welfare functions

Question 1: When Should the Government Intervene in the Economy?
- Normally, competitive private markets provide efficient outcomes for the economy.
- In many circumstances, it is hard to justify government intervention in markets. Two common justifications are:
  - Market failures
    - What is a market failure?
  - Redistribution
    - Shifting resources from some groups to others.

When Should Government Intervene? An example of market failure
- In 2003, there were 45 million people without health insurance in the United States, or 15.6% of the population.
- Lack of insurance could cause negative externalities from contagious disease—the uninsured may not take account of their impact on others.
- Measles epidemic from 1989-1991, caused by low immunization rates for disadvantaged youth, was a problem.
- Government subsidized vaccines for low-income families as a result.

When Should the Government Intervene? Redistribution
- Of the uninsured, for example, roughly three-quarters are in families with incomes below the median income level in the United States.
- Society may feel that it is appropriate to redistribute from those with insurance (who tend to have higher incomes) to those without insurance (who tend to have lower incomes).
- Redistribution often involves efficiency losses.
- The act of redistribution can change a person’s behavior. Taxing the rich to distribute money to the poor could cause both groups to work less hard.
Question 2: How Might the Government Intervene?

- If the government wants to intervene in a market, there are a number of options:
  - Using the **price mechanism** with taxes or subsidies.
  - Tax credits that lower the “effective price” of health insurance.
  - **Mandate** that either individuals or firms provide the good.
  - “Pay-or-play” mandates that require employers to provide health insurance, such as California’s Health Insurance Act.
  - **Public Provision**
    - The Medicare program for U.S. senior citizens.
  - **Public Financing of Private Provision**
    - Medicare prescription drug cards, where private companies administer the drug insurance.

Question 3: What Are the Effects of Alternative Interventions?

- Much of the focus of empirical public finance is assessing the “direct” and “indirect” effects of government actions.
- **Direct effects** of government actions assume “no behavioral responses” and examine the intended consequences of those actions.
- **Indirect effects** arise because some people change their behavior in response to an intervention. This is sometimes called the “law of unintended consequences.”

Question 4: Why Do Governments Do What They Do?

- Positive (as opposed to normative) question.
- Governments do not simply behave as benign actors who intervene only because of market failure and redistribution.
- Tools of **political economy** helps us understand how governments make public policy decisions.
- Just as market failures can lead to market inefficiency, there are a host of **government failures** that lead to inappropriate government intervention.

Part 2: Review (Quickly) Economics 301

- Constrained Utility Maximization is based on
  - Preferences (indifference curves), and
  - Budget sets.
    - Start with a discussion of preferences.
  - A **utility function** is a mathematical representation
    \[ U = f(X_1, X_2, X_3, \ldots) \]
    - Where \( X_1, X_2, X_3 \) and so on are the goods consumed by the individual,
    - And \( f(\cdot) \) is some mathematical function.
Preferences and indifference curves

- One formulation of a utility function is 
  \[ U(Q_M, Q_C) = Q_M Q_C \] 
  where \( Q_M \) = quantity of movies and \( Q_C \) = quantity of CDs.

- The combinations \{1, 2\} (bundle \( A \)) and \{2,1\} (bundle \( B \)) both give 2 “utils.”

- The combination \{2, 2\} (bundle \( C \)) gives 4 “utils.”

- With these preferences, indifferent to \( A \) or \( B \).

  Figure 2 illustrates this.

Constrained Utility Maximization: Marginal utility

- With the utility function given before, \( U = Q_M Q_C \), the marginal utility is:
  \[ MU_{Q_M} = \frac{\partial U}{\partial Q_M} = Q_C \]

- Take the partial derivative of the utility function with respect to \( Q_M \) to get the marginal utility of movies.

  Normally, preferences exhibit diminishing marginal utility, as would be the case if \( U = (Q_M Q_C)^{0.5} \), since

Constrained Utility Maximization: Marginal rate of substitution

- Marginal rate of substitution—slope of the indifference curve is called the MRS, and is the rate at which consumer is willing to trade off the two goods.

- Direct relationship between MRS and marginal utility.

  \[ MRS = -\frac{MU_{Q_M}}{MU_{Q_C}} = -\frac{Q_C}{Q_M}, \text{ when } U = Q_M Q_C \]

- MRS shows how the relative marginal utilities evolve over the indifference curve.

- Returning to the (CDs, movies) example, Figure 4 illustrates this.
Constrained Utility Maximization: Budget constraints

- The **budget constraint** is a mathematical representation of the combination of goods the consumer can afford, given income.
- Assume there is no saving or borrowing.
- In the example, denote:
  - $Y =$ Income level
  - $P_M =$ Price of one movie
  - $P_C =$ Price of one CD

\[ Y = P_M Q_M + P_C Q_C \]

Constrained Utility Maximization: Putting it together: Constrained choice

- What is the highest indifference curve that an individual can reach, given a budget constraint?
- Preferences tells us what a consumer wants, and the budget constraint tells us what a consumer can actually purchase.
- This leads to utility maximization, shown graphically, in **Figure 8**.
Figure 8: Utility Maximization

<table>
<thead>
<tr>
<th>Q_M (quantity of movies)</th>
<th>Q_CD (quantity of CDs)</th>
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<tr>
<td>0</td>
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This indifference curve is not utility-maximizing, because there are bundles that give higher utility.

This indifference curve gives much higher utility, but is not attainable.

This bundle of goods gives the highest utility, subject to the budget constraint.

Constrained Utility Maximization: Putting it together: Constrained choice

- Thus, the marginal rate of substitution equals the ratio of prices:
  \[ MRS = \frac{MU_M}{MU_C} = \frac{P_M}{P_C} \]

- At the optimum, the ratio of the marginal utilities equals the ratio of prices. But this is not the only condition for utility maximization.
  - The second condition is that all of the consumer’s money is spent.

The Effects of Price Changes: Substitution and income effects

- A change in price consists of two effects:
  - **Substitution effect**—change in consumption due to change in relative prices, holding utility constant.
  - **Income effect**—change in consumption due to feeling “poorer” after price increase.

**Figure 11** illustrates this.

Figure 11: Illustration of Income and Substitution Effects

<table>
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Movement from one indifference curve to the other is the income effect.

Movement along the indifference curve is the substitution effect.

Decline in Q_M due to income effect.
Income and Substitution Effects (price of rooms rises)

SE: Find a hypothetical budget line with the new price ratio just tangent to the original IC.

Figure 18 Derive Demand Curves: First, increase in the price of Movies

QM (quantity of movies)

QCD (quantity of CDs)

Raising PM even more gives another (PM, QM) combination with even less movies demanded.

Raising PM gives another (PM, QM) combination with fewer movies demanded.

Initial utility-maximizing point gives one (PM, QM) combination.

Figure 19 Deriving the Demand Curve for Movies: Second, plot the optimal price-quantity pairs

EQUILIBRIUM AND SOCIAL WELFARE Elasticity of demand

A key feature of demand analysis is the elasticity of demand. It is defined as:

$$\varepsilon_D = \frac{\Delta Q_M}{\Delta P_M} \cdot \frac{P_M}{Q_M}$$

That is, the percent change in quantity demanded divided by the percent change in price.

Demand elasticities are:
- Typically negative number.
- Not constant along the demand curve (for a linear demand curve).
- It is easy to define other elasticities (income, cross-price, etc.)
EQUILIBRIUM AND SOCIAL WELFARE: Supply curves

- We do a similar drill on the supply side of the market. Firms have a production technology (we might write it as)
  \[ Q_M = f(L_M, K_M) \]
- We can construct isoquants, which represent the ability to trade off inputs, fixing the level of output.
- Firms also have an isocost function, which represent the cost of various input combinations.
- Firms maximize profit (minimize cost) when the marginal rate of technical substitution equals the input price ratio.
- Also MR=MC at the profit-maximizing level of output.

EQUILIBRIUM AND SOCIAL WELFARE Equilibrium

- In equilibrium, we horizontally sum individual demand curves to get aggregate demand.
- We also horizontally sum individual supply curves to get aggregate supply.
  - A firm’s supply curve is the MC curve above minimum average variable cost.
  - Competitive equilibrium represents the point at which both consumers and suppliers are satisfied with the price/quantity combination.
  - Figure 21 illustrates this.

EQUILIBRIUM AND SOCIAL WELFARE Social efficiency

- Measuring social efficiency is computing the potential size of the economic pie. It represents the net gain from trade to consumers and producers.
- Consumer surplus is the benefit that consumers derive from a good, beyond what they paid for it.
- Each point on the demand curve represents a “willingness-to-pay” for that quantity.
- Figure 22 illustrates this.
Figure 22: Deriving Consumer Surplus

The willingness-to-pay for the first unit is very high. Yet the actual price paid is much lower. The willingness to pay for the second unit is a bit lower. The consumer surplus at \( Q^* \) is the area between the demand curve and market price. The total consumer surplus is this triangle. The consumer’s “surplus” from the next unit is this trapezoid. There is still surplus, because the price is lower.

The producer surplus at \( Q^* \) is the area between the demand curve and market price. Yet the actual price received is much higher. The marginal cost for the first unit is very low. The producer’s “surplus” from the first unit is this trapezoid.

Figure 24 illustrates this.

EQUILIBRIUM AND SOCIAL WELFARE

Social efficiency

- *Producer surplus* is the benefit derived by producers from the sale of a unit above and beyond their cost of producing it.
- Each point on the supply curve represents the marginal cost of producing it.
- Figure 24 illustrates this.

The total social surplus, also known as “social efficiency,” is the sum of the consumer's and producer's surplus.

Figure 25 illustrates this.
Figure 25: Social Surplus

The surplus from the next unit is the difference between the demand and supply curves.

The area between the supply and demand curves from zero to $Q'$ represents the surplus.

This area represents the social surplus from producing the first unit.

The area between the supply curve and demand curve from zero to $Q$ represents the surplus.

EQUILIBRIUM AND SOCIAL WELFARE

Competitive equilibrium maximizes social efficiency.

- The *First Fundamental Theorem of Welfare Economics* states that the competitive equilibrium, where supply equals demand, maximizes social efficiency.
- Any quantity other than $Q'$ reduces social efficiency, or the size of the “economic pie.”
- Consider restricting the price of the good to $P < P'$.
- *Figure 26* illustrates this.

Figure 26: Deadweight Loss from a Price Floor

This triangle represents lost surplus to society, known as “deadweight loss.”

Restriction, the quantity falls to $Q'$, and there is excess demand.

EQUILIBRIUM AND SOCIAL WELFARE

The role of equity

- Societies usually care not only about how much surplus there is, but also about how it is distributed among the population.
- *Social welfare* is determined by both criteria.
- The *Second Fundamental Theorem of Welfare Economics* states that society can attain any efficient outcome by a suitable redistribution of resources and free trade.
- In reality, society often faces an equity-efficiency tradeoff.
Society’s tradeoffs of equity and efficiency are models with a **Social Welfare Function**. This maps individual utilities into an overall social utility function.

The **utilitarian** social welfare function is:

$$SWF = \sum U_i$$

- The utilities of all individuals are given equal weight.
- Implies that government should transfer from person 1 to person 2 as long as person 2's gain is bigger than person 1's loss in utility.

Utilitarian SWF is maximized when the marginal utilities of everyone are equal:

$$MU_1 = MU_2 = \ldots = MU_i$$

Thus, society should redistribute from rich to poor if the marginal utility of the next dollar is higher to the poor person than to the rich person.

The **Rawlsian** social welfare function is:

$$SWF = \min(U_1, U_2, \ldots, U_N)$$

- Societal welfare is maximized by maximizing the well-being of the worst-off person in society.
- Generally suggests more redistribution than the utilitarian SWF.