Chapter 2
Theoretical Tools of Public Finance

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Introduction
Theoretical Tools of Public Finance

- **Theoretical tools** are a set of tools used to understand economic decision making. They are primarily graphical and mathematical.
- **Empirical tools** allow you to examine the theory with data. (will do in chapter 3)

CONSTRANGED UTILITY MAXIMIZATION

- **Constrained utility maximization** means that all decisions are made in order to maximize the well-being of the individual, subject to his available resources.
- Utility maximization involves preferences and a budget constraint.
- One of the key assumptions about preferences is non-satiation—that “more is preferred to less.”

**Constrained Utility Maximization:**

- In this figure, the utility maximizing choice occurs where the indifference curve is tangent to the budget constraint.
- This implies that the slope of the indifference curve equals the slope of the budget constraint, where the marginal rate of substitution equals the ratio of prices:

\[ \frac{MU_M}{MU_C} = \frac{P_M}{P_C} \]

**Figure 8** Utility Maximization

Constraints 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**.
The Effects of Price Changes: Substitution and income effects

- Consider a typical price change in our framework:
- Increase the price of movies, $P_M$
- This rotates the budget constraint inward along the x-axis.
- Figure 10 illustrates this.

![Figure 10](image)

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](image)

PUTTING THE TOOLS TO WORK

**TANF and labor supply among single mothers**

- **TANF** is “Temporary Assistance for Needy Families.”
- Cash welfare for poor families, mainly single mothers.
  - For example, in New Mexico, family of three receives $389 per month.
  - Assume the two “goods” in utility maximization problem are leisure and food consumption.
  - Whatever time is not devoted to leisure is spent working and earning money.

PUTTING THE TOOLS TO WORK

**Identifying the budget constraint**

- What does the budget constraint look like?
- Assume the person can work up to 2000 hours per year, at a wage rate of $10 per hour, and that TANF is not yet in place.
- Price of food is $1 per unit.
PUTTING THE TOOLS TO WORK
Identifying the budget constraint

- The “price” of one hour of leisure is the hourly wage rate.
- Creates a direct tradeoff between leisure and food: each hour of work brings her 10 units of food.
- Figure 12 illustrates this.

PUTTING THE TOOLS TO WORK
The effect of TANF on the budget constraint

- Now, let’s introduce TANF into the framework. TANF has two key features:
  - Benefit guarantee, $G$ – amount that a recipient with $0$ earnings gets.
  - Benefit reduction rate, $t$ – rate at which benefit guarantee falls as earnings increase.

PUTTING THE TOOLS TO WORK
The effect of changes in the benefit guarantee

- One possible “policy experiment” is reducing the benefit guarantee level $G$.
- What happens when $G$ falls from $5,000$ to $3,000$, holding all other parameters constant?
- Figure 14 illustrates this.
PUTTING THE TOOLS TO WORK
How large will the labor supply response be?

- What is the expected labor supply response to such a policy change?
- It depends on where the single mother initially was on the budget constraint.
- (1) If she initially earned less than $6,000 and more than $5,000 per year, the policy change involves only an income effect, not a substitution effect.
- Figure 15 illustrates this.

PUTTING THE TOOLS TO WORK
How large will the labor supply response be?

- (2) If she initially earned between $6,000 and $10,000 per year, the policy change involves both an income and substitution effect.
- The substitution and income effects go in the same direction.
- Figure 16 illustrates this.

PUTTING THE TOOLS TO WORK
How large will the labor supply response be?

- Economic theory clearly suggests that such a benefit reduction will increase labor supply, but does not speak to the magnitude of the response.
- (3) For example, some welfare recipients who were not initially working continue to choose not to work.
- Figure 17 illustrates this.
**PUTTING THE TOOLS TO WORK**

How large will the labor supply response be?

- The actual magnitude of the labor supply response therefore depends on the preferences of various welfare recipients.
- To the extent the preferences are more like the first two cases, the larger the labor supply response.
- Thus, theory alone cannot say whether this policy change will increase labor supply, or by how much.
- Must analyze available data on single mothers to figure out the magnitude.

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**EQUILIBRIUM AND SOCIAL WELFARE**

- Welfare economics is the study of the determinants of well-being, or welfare, in society.
- This involves a normative question: Does the policy change make society as a whole better off or not?
- This depends on:
  - Determinants of social efficiency, or size of the economic “pie.”
  - Redistribution.

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**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.
- Competitive equilibrium represents the point at which both consumers and suppliers are satisfied with the price/quantity combination.
- Figure 21 illustrates this.

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**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.
Social efficiency

- **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](image)

- Consumer surplus is determined by market price and the elasticity of demand:
  - With inelastic demand, demand curve is more vertical, so surplus is higher.
  - With elastic demand, surplus is lower.
- **Figure 23** illustrates this.

![Figure 23 Consumer Surplus and Inelastic Demand](image)

- **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.

![Figure 24 Producer Surplus](image)
Similar to consumer surplus, producer surplus is determined by market price and the elasticity of supply:
- With inelastic supply, supply curve is more vertical, so producer surplus is higher.
- With elastic supply, producer surplus is lower.

The total social surplus, also known as “social efficiency,” is the sum of the consumer’s and producer’s surplus. Figure 25 illustrates this.

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.

A policy like price controls creates deadweight loss, the reduction in social efficiency by restricting quantity below the competitive equilibrium.
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.

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EQUILIBRIUM AND SOCIAL WELFARE
The role of equity

- The utilitarian social welfare function is:
  \[ SWF = \sum_i U_i \]
  - 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 defined in terms of utility, not dollars. Society not indifferent between giving $1 of income to rich and poor; rather indifferent between one util to rich and one util to poor.

EQUILIBRIUM AND SOCIAL WELFARE
The role of equity

- 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.

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EQUILIBRIUM AND SOCIAL WELFARE
The role of equity

- 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.

The Rawlsian social welfare function is maximized by maximizing the well-being of the worst-off person in society. Generally suggests more redistribution than the utilitarian SWF.
WELFARE IMPLICATIONS OF BENEFIT REduCtIONS: TANF continued

- Efficiency and equity considerations in introducing or cutting TANF benefits.
- In a typical labor supply/labor demand framework, these changes shift the labor supply curve for single parents.
- Figure 27 illustrates this.

Figure 27 Market Equilibrium with Labor Supply and Demand

WELFARE IMPLICATIONS OF BENEFIT REDUCTIONS: TANF continued

- Different policies involve different deadweight loss triangles, but also different levels of redistribution for the poor.
- SWF helps determine the right policy for society.