HONG KONG COMMUNITY COLLEGE

CC 2104

Introduction to Microeconomics

Study Guide
This Study Guide supports the course materials of *Introduction to Microeconomics (CC 2104)*. It consists of seven parts.

For Part 5 "Study Guide By Topics", each chapter contains:

- Information about the reading items from the textbook
- Overview
- Learning Objective
- Chapter Summary
- Glossary
- Supplementary Exercises (Section A: Multiple Choice; Section B: Short/Long Questions)
- Suggested Solutions

Please note that many questions have no definitive answer, and hence the solutions provided here are only suggestive. The most important thing is how students understand the given situations, analyze the questions and choose the appropriate approach to solve the questions.

I would like to express my gratitude to the Subject Team of Economics, namely Miss Teresa Poon, Dr. Ada Chan, Miss Aggie Chei and Mr. Alvin Wong, for encouraging and supporting me to compile this Study Guide. I also wish to extend my appreciation to the Study Guide Working Group for helping me to prepare this edition. In particular, Mr. Tsang Chun Pong who is efficient in coordinating this project, Miss Wing Chan and Miss Janet Ho who have read through the final manuscript and page proofs with me. Last but not least, I would thank the support provided by Hong Kong Community College for publishing this study guide.

Fione Chiu  
Subject Leader of the course "Introduction to Microeconomics (CC2104)"
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1. Syllabus

CC2104  Introduction to Microeconomics

Level      2
Credits      3
Nature      Non-Science
Medium of Instruction    English
Mode of Study    28 hours of Lecture
                   14 hours of Tutorial
Prerequisites     Nil
Assessment      50% Coursework
                   50% Examination

Aims
This subject equips students with analytical skills that are necessary for the understanding of economic issues from a micro perspective. It provides the conceptual framework to analyse microeconomic behaviour of economic agents, business decisions, and market efficiency. Studying the subject will also help develop students’ critical thinking for their life-long learning.

Learning Outcomes

On successfully completing this subject, students will be able to:

- understand the issues involved in the allocation of scarce resources for individual economic agents and the economy as a whole.
- apply relevant economic knowledge to conduct economic analysis of the behaviour of firms and markets.
- identify market failure and discuss the effectiveness of government economic policy upon the tradeoff between efficiency and equity.
- use concepts of market force interaction to analyse and predict changes in markets.

Indicative Contents

- **Scope of Microeconomic Analysis**
  Concept of scarcity, choice and opportunity cost; Nature of economics as a science for understanding human behaviour.

- **Demand, Supply and the Price Mechanism**
  The law of demand; Elasticity of demand; The law of supply; Production and cost; Price control; The functions of price and the market system.
- **Production and Costs**
  Production function; Law of diminishing returns; Various measures of cost; Costs in the short run and long run; Economies and diseconomies of scale.

- **Market Structures**
  Perfect competition; Monopoly; Monopolistic competition; Oligopoly; Profit maximization under different market structures.

- **Efficiency of Markets**
  Efficiency and social interest; Market failure and government; Taxation; Externalities and property rights; Public goods and common resources.

**Teaching/Learning Approach**

Lectures focus on the introduction and explanation of key economic concepts, with specific reference to current economic issues wherever appropriate. Occasional group discussions will be conducted.

Tutorials provide students with the opportunity to deepen their understanding of the concepts taught in lectures and to apply the theories to the analysis of real-life economic issues. The activities in tutorials include student presentations and discussions of problem sets and case studies.

**Assessment Approach**

A variety of assessment tools will be used, including presentations, case studies, written reports, tests and an examination designed to develop and assess critical thinking as well as analytical and communication skills.

**Indicative Readings**

**Recommended Textbook**

**References:**


Learning Outcomes

- To understand the issues involved in the allocation of scarce resources for individual economic agents and the economy as a whole.
- To apply relevant economic knowledge to conduct economic analysis of the behavior of firms and markets.
- To identify market failure and discuss the effectiveness of government economic policy upon the tradeoff between efficiency and equity.
- To use concepts of market force interaction to analyze and predict changes in markets.
### Tentative Teaching Schedule:

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<th>Lecture</th>
<th>Textbook</th>
<th>Study Guide</th>
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<td>Ch. 1</td>
<td>5.1</td>
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<tr>
<td>2</td>
<td>Interdependence and the Gains from Trade</td>
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<td>5.3</td>
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<td>5</td>
<td>Supply, Demand and Government Policies</td>
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<td>Ch. 6</td>
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<td>7</td>
<td>The Efficiency of Markets and Costs of Taxation</td>
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<td>The Costs of Production</td>
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<td>Firms in Competitive Markets</td>
<td>Ch. 14</td>
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<td>Ch. 14</td>
<td>5.8</td>
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<td>Monopoly</td>
<td>Ch. 15</td>
<td>5.9</td>
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<td>12</td>
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<td>Ch. 10</td>
<td>5.10</td>
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<td>Public Goods and Common Resources</td>
<td>Ch. 11</td>
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<tr>
<td>14</td>
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<td>Ch. 11</td>
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<tr>
<th>Week</th>
<th>Tutorial (Presentation)</th>
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<tr>
<td>1</td>
<td>Introduction</td>
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<tr>
<td>2</td>
<td>Principles of Economics</td>
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<tr>
<td>3</td>
<td>Interdependence and the Gains from Trade</td>
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<td>4</td>
<td>The Market Forces of Supply and Demand</td>
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<td>5</td>
<td>Elasticity and its Application</td>
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<td>14</td>
<td>Public Goods and Common Resources</td>
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### Assessment Weighting

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<tr>
<th>Assessment</th>
<th>Weighting</th>
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<tbody>
<tr>
<td>Coursework</td>
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<tr>
<td>Examination</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
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</table>

### Assessment Methods for Coursework

- **Test 1**: 40%
- **Assignment 1**: 20% (Individual)
- **Assignment 2**: 20% (Individual)
- **Tutorial Work**: 20% (Group work)

**Total**: 100%
**Attendance and other rules / regulations**

The attendance requirement and all other rules and regulations in the HKCC Student Handbook and in the respective Programme Definitive Document apply. Please refer to these documents for details.

**Lecture/Tutorial Notes and Assignments**

Students are required to download lecture/tutorial notes and assignments from the SMILE e-learning system.

**Text and References**

**Textbook:**

**References:**


**Leisure Reading:**

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Guideline for Tutorial Meetings

General Notes

- The activities in the tutorial meetings include presentation of problem-set questions and Q&A.
- The class will be divided into five groups. Each group will consist of 4 to 5 students.
- Tutorial questions will be posted on e-Learning Platform and each group is required to prepare for ALL questions before class. One of the tutorial questions will be assigned to each group by the lecturer at the beginning of the tutorial presentation. The group has to present the answer of the assigned problem-set question and the other groups will raise questions and give comments on their presentation.
- Please note that the tutorial presentation is team work. Do make an effort to help each other when preparing the answers of problem sets as well as during the presentation in class.
- For the whole semester, each student must take part in at least i) one presentation if you are the only one presenter or ii) two presentations if you present with another group member.
- You may present your materials with the aid of a visualizer, PowerPoint file or MS Word file.
- Students are encouraged to raise questions to the presenting group as well as to the lecturer regarding the subject matters.

The grading of your group presentation will be evenly distributed on the following aspects:

- Preparation - 6 points
- Accuracy - 6 points
- Clarity of presentation - 6 points

Structure of the tutorial presentation

- **Beginning:** Greeting
  Introduce yourself and your partner to your class
- **Presentation:** Briefly highlight the key points in the selected questions and explain your answer (~around 5-7 minutes)
- **Q&A:** Invite questions from your classmates and answer them (~around 3-5 minutes)
### Assessment Criteria

<table>
<thead>
<tr>
<th></th>
<th>1-2</th>
<th>3-4</th>
<th>5-6</th>
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</thead>
<tbody>
<tr>
<td><strong>Preparation</strong></td>
<td>- totally unprepared</td>
<td>- prepared to some extent</td>
<td>- fully prepared</td>
</tr>
<tr>
<td></td>
<td>- contains no or very little information</td>
<td>- contains most relevant information</td>
<td>- contains all relevant information</td>
</tr>
<tr>
<td></td>
<td>- preparation without much thoughts</td>
<td>- shows some efforts in preparation</td>
<td>- shows great efforts in preparation</td>
</tr>
<tr>
<td><strong>Accuracy of Analysis</strong></td>
<td>- content is totally irrelevant to the topic</td>
<td>- content is relevant to the topic and covers some key issues</td>
<td>- all contents are highly relevant to the topic and cover all key issues</td>
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<tr>
<td></td>
<td>- fails to analyse information</td>
<td>- can analyse a limited range of information</td>
<td>- can analyse new or abstract data using appropriate technique</td>
</tr>
<tr>
<td></td>
<td>- demonstrates poor understanding on the topic</td>
<td>- demonstrates understanding in a style which is mostly logical and coherent on the topic</td>
<td>- demonstrates excellent understanding of the topic</td>
</tr>
<tr>
<td><strong>Clarity of Presentation</strong></td>
<td>- disorganized / incoherent</td>
<td>- shows some attempt to organize in a logical manner</td>
<td>- shows a careful and logical organization</td>
</tr>
<tr>
<td></td>
<td>- material is difficult to understand due to poor structure</td>
<td>- clearly structured and addressed to audience</td>
<td>- presentation of material resulting in clarity of message and information</td>
</tr>
<tr>
<td></td>
<td>- Poor audibility</td>
<td>- satisfactory pace and audibility</td>
<td>- appropriate pace and audibility to audience</td>
</tr>
<tr>
<td></td>
<td>- full of grammar or spelling mistakes</td>
<td>- minor grammar or spelling mistakes</td>
<td>- no grammar or spelling mistakes</td>
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Subject Learning Outcomes
(a) To understand the issues involved in the allocation of scarce resources for individual economic agents and the economy as a whole.
(b) To apply relevant economic knowledge to conduct economic analysis of the behavior of firms and markets.
(c) To identify market failure and discuss the effectiveness of government economic policy upon the trade-off between efficiency and equity.
(d) To use concepts of market force interaction to analyze and predict changes in markets.

Learning Outcome Matrix for each topic

<table>
<thead>
<tr>
<th>Topic</th>
<th>Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(a)</td>
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<tr>
<td>1. Principles of Economics</td>
<td>✓</td>
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<tr>
<td>2. Interdependence and the Gains from Trade</td>
<td>✓</td>
</tr>
<tr>
<td>3. The Market Forces of Supply and Demand</td>
<td>✓</td>
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<tr>
<td>4. Elasticity and its Application</td>
<td>✓</td>
</tr>
<tr>
<td>5. Supply, Demand and Government Policies</td>
<td>✓</td>
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<tr>
<td>6. The Efficiency of Markets and Costs of Taxation</td>
<td>✓</td>
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<tr>
<td>7. The Costs of Production</td>
<td>✓</td>
</tr>
<tr>
<td>8. Firms in Competitive Markets</td>
<td>✓</td>
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<tr>
<td>9. Monopoly</td>
<td>✓</td>
</tr>
<tr>
<td>10. Externalities</td>
<td>✓</td>
</tr>
<tr>
<td>11. Public Goods and Common Resources</td>
<td>✓</td>
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</table>

Learning Outcome Matrix for the coursework

<table>
<thead>
<tr>
<th>Coursework Components</th>
<th>Learning Outcomes</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>(a)</td>
</tr>
<tr>
<td>Mid-term Test</td>
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<tr>
<td>Assignment 1</td>
<td>✓</td>
</tr>
<tr>
<td>Assignment 2</td>
<td>✓</td>
</tr>
<tr>
<td>Tutorial Exercises</td>
<td>✓</td>
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5. Study Guide By Topics

5.1 Principles Of Economics

Teaching Material (Textbook)


Overview

Chapter 1 introduces ten fundamental principles that will serve as building blocks for the rest of the text. The ten principles can be grouped into three categories:

- How people make decisions,
- How people interact, and
- How the economy works as a whole.

For the course of CC2104, we only discuss Principles 1 to 7.

Learning Objective

In this chapter you will

- learn that economics is about the allocation of scarce resources.
- examine some of the trade-offs that people face.
- learn the meaning of opportunity cost, the core concept in Economics.
- see how to use marginal reasoning when making decisions.
- discuss how incentives affect people’s behaviour.
- consider why trade among people or nations can be beneficial to everyone.
- discuss why markets are a good, but not perfect, way to allocate resources.

After accomplishing these goals, you should be able to

- define scarcity and illustrate the concepts with daily examples.
- apply the concepts of marginal costs and marginal benefits when making decisions
- explain why specialization and trade improve people’s choices


**Chapter Summary**

The principles of decision making are as follows:

1) People face tradeoffs.
2) The cost of any action is measured in terms of the foregone opportunities.
3) Rational people make decisions by comparing marginal costs and marginal benefits.
4) People respond to incentives.

The principles of interactions among people are as follows:

5) Trade (exchange) can make each trader better off.
6) Markets are usually a good way of arranging and coordinating economic activities.
7) Government can potentially improve market outcomes if there is a market failure or if the market outcome is inequitable.

**Glossary**

- **Efficiency:**
  means that society is getting the maximum benefits from its scarce resources.

- **Equity:**
  means that those benefits are distributed fairly among society’s members.

- **Externality:**
  refers to the impact of one person’s action on the welfare of a bystander. It is also known as the “third-party effect”.

- **Incentive:**
  is something (such as the possibility of receiving a punishment or a reward) that persuades a person to act.

- **Marginal Changes:**
  Economists use this term to describe small incremental (additional) adjustments to an existing plan of action.

- **Market Economy:**
  refers to an economy at which the resources are mainly allocated through a decentralized choice system.
• **Opportunity Cost:**
  The opportunity cost of an item is what one person gives up to get that item. It can also be measured in terms of the highest value option foregone.

• **Rational People:**
  They systematically and purposefully try their best to achieve their goals, given the opportunities they incur.

• **Scarcity:**
  It refers to the limited nature of society’s resources as human wants are unlimited.

### Supplementary Exercises

#### Section A: Multiple Choice

(Questions with ‘*’ are more challenging.)

**A1.** Economics is the study of
   A. production methods.
   B. how a society manages and allocates its scarce resources among different competing ends.
   C. how households decide who perform which tasks.
   D. the interaction of business and the government.

**A2.** Which of the following questions is not answered by the decisions that every society must take?
   A. What determines consumer preferences?
   B. What to produce?
   C. How to produce?
   D. For whom to produce?

**A3.** The phenomenon of *scarcity* stems from the fact that
   A. most economies’ production methods are not very good.
   B. in most economies, wealthy people consume disproportionate quantities of goods and services.
   C. governments restrict production of too many goods and services.
   D. resources are limited relative to unlimited human wants.
A4. Economists use the phrase “There is no such thing as a free lunch,” to illustrate the principle that
   A. inflation almost always results in higher prices over time.
   B. nothing is free in a market economy.
   C. making decisions requires trading off one goal against another.
   D. if something looks too good to be true, it probably is not worth pursuing.

A5. To say that “people respond to incentives” is to say that
   A. changes in costs (but not changes in benefits) influence people’s decision and their behaviour.
   B. changes in benefits (but not changes in costs) influence people’s decision and their behaviour.
   C. changes in benefits or changes in costs influence people’s decisions and their behaviour.
   D. tradeoffs can be eliminated by rational people who think at the margin.

*A6. Rachel decides to spend three hours working overtime rather than watching a video with her friends. She earns $80 an hour. Her opportunity cost of working is
   A. the $240 she earns from working overtime.
   B. the $240 minus the enjoyment she would have received from watching the video.
   C. the enjoyment she would have received if she had watched the video.
   D. nothing, since she would have received less than $240 of enjoyment from the video.

*A7. Ryan has spent $500 purchasing and repairing a second-hand mini-notebook, which he expects to sell for $800 once the repairs are complete. Later on, Ryan discovers that, in addition to the $500 he has already spent, he needs to make an additional repair, which will cost another $400, in order to make the notebook worth $800 to potential buyers. Otherwise, he can sell the notebook as it is now for $300. What should he do?
   A. He should sell the notebook as it is now for $300.
   B. He should keep the notice since it would not be rational to spend $900 on repairs and then sell the notebook for $800.
   C. He should complete the repairs and sell the notebook for $800.
   D. It does not matter which action he takes; the outcome is the same either way.
When society requires firms to reduce pollution, there is

A. a tradeoff because of reduced incomes to the firms’ owners and workers.
B. a tradeoff only if some firms are forced to close.
C. no tradeoff, since the cost of reducing pollution falls only on the firms affected by the requirements.
D. no tradeoff, since everyone benefits from reduced pollution.

**Section B: Short/Long Questions**

(Questions with '*' are more challenging.)

B1. Give the definition of the opportunity cost of an item. If you attend a 2-year program offered by the HKCC, what is your opportunity cost? (The issue of present value is ignored.)

*B2. Suppose 20,000 sets of commemorative twenty-dollar bank notes are to be issued for the Olympic 2008 in Hong Kong and long queues appear outside those assigned branches of Bank of China.

Use at least THREE economic concepts discussed in this chapter to explain this phenomenon.
**Suggested Solutions**

**Section A: Multiple Choice**

A1. B  
A2. A  
A3. D  
A4. C  
A5. C  

*A6. C*

- Based on the given condition, the chosen option is working overtime. Therefore, Rachel forgoes an opportunity to use the same time period to watch a video with her friends.
- Since the opportunity cost is defined as the highest value option forgone when a choice is made, the opportunity cost of working is measured in terms of the enjoyment she forgoes if she has watched the video with her friends.
- The $240 she earns from working overtime simply represents the benefit she obtains from the chosen option, not the cost of her decision.

*A7. C*

- Marginal (Additional) cost of repairing the mini-notebook = $400
- Marginal (Additional) benefit of repairing the mini-notebook  
  = $(800 – 300) = $500
- There is a positive net gain of making additional repair, i.e. $100  
  ( = $500 – $400 )

Thus, it is worthwhile to have the mini-notebook repaired.

*A8. A*

- The concept of tradeoff can be applied to any decision makers no matter whether they play the role of consumers, producers or workers when they face more than one option.
- To reduce pollution means to reduce production. Obviously, the tradeoff is to reduce the income of firms’ owners and workers in order to obtain a cleaner environment.

**Section B: Short/Long Questions**

B1.

- The opportunity cost of an item is what you must give up to get it. It can be measured in terms of the highest value option forgone. The opportunity cost can consist of both the explicit cost and implicit cost.
- If I attend the 2-year program offered by the HKCC, the costs include both the explicit costs, i.e. tuition fee, cost of textbooks and other relevant money expenses, and the implicit cost, i.e. the wages forgone for these two years.
*B2.

**Scarcity:**
As long queues appear outside those assigned branches of Bank of China in order to wait for the purchase of these sets of commemorative twenty-dollar bank notes, the quantity wanted by the public is more than the quantity available. This illustrates the concept of scarcity.

**Opportunity cost:**
Those people who are interested in purchasing the commemorative bank notes need to pay a cost for them. In fact, it involves both the explicit cost and implicit cost. Besides paying $20 (explicit cost) for each commemorative bank note, they also incur time cost as they have to queue up outside those assigned branches and cannot spend the same time period on other activities.

**Rational decision:**
Although long queues appear outside those assigned branches of BOC, it does not mean that every person in Hong Kong will line up for that. For those whose time cost is high or those who do not place a high value on the commemorative bank notes will not line up outside the branches.

This reflects that people make rational decision by comparing marginal costs and marginal benefits.

(Any reasonable discussion and explanation will also be accepted).

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(Material is mainly adapted from
5.2 Interdependence And The Gains From Trade

Teaching Material (Textbook)
Mankiw, N. Gregory, Principles of Microeconomics, Thomson South-Western (latest ed.), Chapter 3

Overview
- Chapter 3 is one of the chapters providing the introduction of the text.
- In this chapter, it shows how people and countries gain from trade (which is the main idea of Principle 5 discussed in Chapter 1).
- The aim of this chapter is to demonstrate how everyone can gain from trade.
  Trade allows people to specialize in producing goods and services for which they have a comparative advantage, i.e. producing at a lower opportunity cost. Then, they can trade for things produced by other people.
  Because of specialization, total output increases. Moreover, through trade, we are all able to share this desirable result. This is true for countries as it is for individuals.

Learning Objective
In this chapter, you will
- consider how everyone can benefit when people trade with one another.
- learn the meaning of absolute advantage and comparative advantage.
- see how comparative advantage creates the gains from trade.
- apply the theory of comparative advantage to everyday life and national policy.

After accomplishing these goals, you should be able to
- show how total production rises when individuals specialize in the production of goods for which they have a comparative advantage.
- explain why all people have a comparative advantage even if they have no absolute advantage in producing any goods or services.
- demonstrate the link between comparative advantage and opportunity cost.
- explain why people who are good at everything still tend to specialize.
**Chapter Summary**

- Interdependence and trade allow everyone to enjoy a greater quantity and variety of goods & services.

- Comparative advantage refers to the ability to produce a good at a lower opportunity cost.
  
  Absolute advantage refers to the ability to produce a good with fewer inputs.
  
  The gains from trade are based on comparative advantage, not absolute advantage.

- When people – or countries – specialize in the goods in which they have comparative advantage, the economic “pie” grows and trade can make everyone better off.

- The principle of comparative advantage is used to advocate free trade among countries.

**Glossary**

- **Absolute Advantage:**
  
  refers to the ability to produce a good using fewer inputs than another producer.

- **Comparative Advantage:**
  
  refers to the ability to produce a good at a lower opportunity cost than another producer.

- **Exports:**
  
  are goods produced domestically and sold abroad.

- **Imports:**
  
  are goods produced abroad and sold domestically.

- **Production Possibility Frontier:**
  
  shows the combinations of output that the economy can possibly produce given the available factors of production and the available production technology.

- **Term of Trade (Exchange Ratio):**
  
  is the amount of a good that must be exported in order to exchange for one unit of import.
Supplementary Exercises

Section A: Multiple Choice

(Questions with ‘*’ are more challenging.)

A1. If a country specializes and exports Good A, it implies that
   A. this country can produce Good A at a lower cost than other Goods.
   B. this country uses fewer resources than other countries for producing the same amount of Good A.
   C. this country needs to give up less of other Goods than other countries in order to produce Good A.
   D. this country has more resources than other countries for producing Good A.

A2. Refer to the following table

<table>
<thead>
<tr>
<th></th>
<th>Wheat (units)</th>
<th>Computer (units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>China’s output per man-hour</td>
<td>30 OR 20</td>
<td></td>
</tr>
<tr>
<td>U.S.A.’s output per man-hour</td>
<td>50 OR 40</td>
<td></td>
</tr>
</tbody>
</table>

(1) The U.S.A. has an absolute advantage in producing both goods.
(2) The U.S.A. has an absolute advantage in producing computer only.
(3) China has a comparative advantage in producing wheat.
(4) China has a comparative advantage in producing computer.

A. (1) and (3) only       B. (1) and (4) only
C. (2) and (3) only       D. (2) and (4) only

A3. The following table shows the production of two goods in two countries

<table>
<thead>
<tr>
<th></th>
<th>One unit of resources can produce</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Watches</td>
</tr>
<tr>
<td>Country X</td>
<td>2</td>
</tr>
<tr>
<td>Country Y</td>
<td>6</td>
</tr>
</tbody>
</table>

Suppose 1 unit of watches can be exchanged for 2 units of toys through trade,

A. Both X and Y will gain from trade.
B. Both X and Y will not gain from trade.
C. X will not gain from trade.
D. Y will not gain from trade.
A4. Suppose a country has an absolute advantage in Good A. Which of the following is correct?

A. The country will also have a comparative advantage in Good A.
B. The country will have an absolute disadvantage in another good.
C. The country can produce a greater amount of Good A than another good with the same amount of resources.
D. It is possible that the country has a higher opportunity cost of producing Good A than another country.

Use the table below for Questions A5 and A6. Suppose there are only two countries, Country X and Country Y. The output of oranges and shoes per unit of input of the two countries are as follows:

<table>
<thead>
<tr>
<th>Oranges (Units)</th>
<th>Shoes (Units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country X</td>
<td>4 OR 12</td>
</tr>
<tr>
<td>Country Y</td>
<td>2 OR 4</td>
</tr>
</tbody>
</table>

A5. Which of the following statements is correct?

A. Country X has both an absolute and comparative advantage in the production of oranges.
B. Country X will export shoes.
C. Country Y will import oranges.
D. Both countries will gain if 1 unit of oranges is exchanged for 4 units of shoes.

*A6. There are 4 units of resources in each country. Before trade, both countries use 1 unit of input to produce oranges and 3 units to produce shoes. If complete specialization takes place in the two countries, what will be the change in the total output of oranges and shoes of the two countries?

A. Only the production of oranges will increase.
B. Only the production of shoes will increase.
C. The production of oranges will increase but the production of shoes will decrease.
D. The production of both oranges and shoes will increase.

*A7. The following diagrams show the production possibilities frontiers and consumption combinations of Farmer A and B when trade is prohibited between them.
Suppose that the exchange ratio is 8 units of meat for 20 units of potatoes. Which of the following options is correct?

A. Farmer A should specialize in producing meat; the consumption combination after trade is 2 units of meat and 22 units of potatoes.

B. Farmer A should specialize in producing potatoes; the consumption combination after trade is 8 units of meat and 20 units of potatoes.

C. Farmer B should specialize in producing meat; the consumption combination after trade is 6 units of meat and 14 units of potatoes.

D. Farmer B should specialize in producing meat; the consumption combination after trade is 16 units of meat and 20 units of potatoes.

*A8. Refer to the following table. It shows the amount of resources (in man-hours) required to produce 1 unit of Good X or 1 unit of Good Y in Country A and Country B, respectively.

<table>
<thead>
<tr>
<th></th>
<th>Good X</th>
<th>Good Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country A</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Country B</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Both countries will gain from trade if 1 unit of X can be exchanged for

A. 0.5 Y   B. 0.6 Y   C. 0.75 Y   D. 1 Y
Section B: Short/Long Questions

B1. Suppose there are only two countries and two goods in the world. Every year each country has 40 units of resources. Each uses 20 units of resources per year to produce each good. The resource input per unit of output is shown below:

<table>
<thead>
<tr>
<th></th>
<th>Clothing (units)</th>
<th>Food (units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country A</td>
<td>2</td>
<td>OR 1</td>
</tr>
<tr>
<td>Country B</td>
<td>4</td>
<td>OR 1</td>
</tr>
</tbody>
</table>

i) Which country has a comparative advantage in producing food? Explain your answer.

ii) Calculate the increase in the total output per year of each good after complete specialization, based on the principle of comparative advantage. Show your workings.

iii) What kind of information is needed to determine the distribution of the increase in outputs between these TWO countries?

*B2 The following table shows the actual output of Country A and Country B. Each country employs 80% of resources to produce food and the other 20% to produce watches.

<table>
<thead>
<tr>
<th></th>
<th>Food (units)</th>
<th>Watches (units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country A</td>
<td>320</td>
<td>And 40</td>
</tr>
<tr>
<td>Country B</td>
<td>800</td>
<td>And 160</td>
</tr>
</tbody>
</table>

i) Calculate the opportunity cost of producing one unit of food for EACH country and explain which country will export food if they trade with each other.

ii) What is the minimum transportation cost per unit of food (expressed in terms of watches) which will result in both countries NOT gaining from trade? Explain your answer.
**Suggested Solutions**

**Section A: Multiple Choice**

A1. C  
A2. A  
A3. C  
A4. D  
A5. B

<table>
<thead>
<tr>
<th>Country</th>
<th>Opportunity cost of producing 1 unit of orange</th>
<th>Opportunity cost of producing 1 unit of shoe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country X</td>
<td>(\frac{12}{4} = 3) shoes</td>
<td>(\frac{4}{12} = \frac{1}{3}) orange</td>
</tr>
<tr>
<td>Country Y</td>
<td>(\frac{4}{2} = 2) shoes</td>
<td>(\frac{2}{4} = \frac{1}{2}) orange</td>
</tr>
</tbody>
</table>

For country X, its opportunity cost of producing 1 unit of shoe is lower than that of country Y; therefore, country X should specialize and export shoes.

*A6. A*

Before trade, according to the given allocation of resources, the production of 2 goods of countries X and Y is shown as follows:

<table>
<thead>
<tr>
<th>Oranges</th>
<th>Shoes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country X</td>
<td>(4 \times 1 = 4)</td>
</tr>
<tr>
<td>Country Y</td>
<td>(2 \times 1 = 2)</td>
</tr>
<tr>
<td>Total</td>
<td>(6)</td>
</tr>
</tbody>
</table>

After specialization, the total production of 2 goods of countries X and Y is shown as follows:

<table>
<thead>
<tr>
<th>Oranges</th>
<th>Shoes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country X</td>
<td>(0)</td>
</tr>
<tr>
<td>Country Y</td>
<td>(2 \times 4 = 8)</td>
</tr>
<tr>
<td>Total</td>
<td>(8)</td>
</tr>
</tbody>
</table>

Obviously, only the production of oranges increases by 2 units.

*A7. D*

The opportunity cost of producing one unit of meat and potatoes is shown as follows:

<table>
<thead>
<tr>
<th></th>
<th>Meat ((M))</th>
<th>Potato ((P))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer A</td>
<td>(\frac{24}{8} = 3) (P)</td>
<td>(\frac{1}{3}) (M)</td>
</tr>
<tr>
<td>Farmer B</td>
<td>(\frac{48}{24} = 2) (P)</td>
<td>(\frac{1}{2}) (M)</td>
</tr>
</tbody>
</table>

- Farmer B should specialize in producing meat and the total production will be 24 units of meat and 0 unit of potato.
- With the exchange ratio: \(8M = 20P\)
  Farmer B will consume 16 (=24-8) units of meat and 20 units of potatoes so that he will consume beyond his production possibilities frontier.
The opportunity cost of producing 1 unit of Good X and Y is shown as follows:

<table>
<thead>
<tr>
<th>Country</th>
<th>Good X</th>
<th>Good Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country A</td>
<td>( \frac{1}{2} ) Y</td>
<td>2 X</td>
</tr>
<tr>
<td>Country B</td>
<td>( \frac{3}{4} ) Y</td>
<td>( \frac{4}{3} ) X</td>
</tr>
</tbody>
</table>

- The terms of trade of trading 1 unit of X is:
  \[ \frac{1}{2} \leq 1X \leq 0.75 \text{ Y} \]
- Therefore, both countries will gain from trade if 1 unit of X can be exchanged for 0.6Y which is in between the upper and lower bound of the terms of trade.

**Section B: Short/Long Questions**

**B1(i)**

<table>
<thead>
<tr>
<th>Country</th>
<th>Opp. cost of producing 1 unit of Clothing</th>
<th>Opp. cost of producing 1 unit of Food</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country A</td>
<td>( \frac{2}{1} ) F = 2F</td>
<td>( \frac{1}{2} ) C = 0.5C</td>
</tr>
<tr>
<td>Country B</td>
<td>( \frac{4}{1} ) F = 4F</td>
<td>( \frac{1}{4} ) C = 0.25C</td>
</tr>
</tbody>
</table>

- The opportunity cost of producing 1 unit of food in Country A is 0.5 unit of clothing.
- The opportunity cost of producing 1 unit of food in Country B is 0.25 unit of clothing.
- Country B has a comparative advantage in producing of food because she can produce food at a lower opportunity cost.

**B1(ii)**

<table>
<thead>
<tr>
<th>Country</th>
<th>Clothing (units)</th>
<th>Food (units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country A</td>
<td>( \frac{20}{2} = 10 \text{C} )</td>
<td>( \frac{20}{1} = 20 \text{F} )</td>
</tr>
<tr>
<td>Country B</td>
<td>( \frac{20}{4} = 5 \text{C} )</td>
<td>( \frac{20}{1} = 20 \text{F} )</td>
</tr>
<tr>
<td>Total production</td>
<td>15C</td>
<td>40F</td>
</tr>
</tbody>
</table>
After Specialization

<table>
<thead>
<tr>
<th>Clothing (units)</th>
<th>Food (units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country A</td>
<td>40/2 = 20C</td>
</tr>
<tr>
<td>Country B</td>
<td>0</td>
</tr>
<tr>
<td>Total production</td>
<td>20C</td>
</tr>
</tbody>
</table>

- According to the above calculation, there is no change in the total production of food, which remains at 40 units.
- However, the total production of clothing increases by 5 units ( = 20 units – 15 units)

B1(iii)

The information about the terms of trade is needed to determine the distribution of the increase in outputs between these TWO countries.

*B2(i)

The following table shows the actual output of Country A and Country B if they allocate 100% of resources to produce either food or watches.

<table>
<thead>
<tr>
<th></th>
<th>Food (units)</th>
<th>Watches (units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country A</td>
<td>400 ( = 320</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.8 )</td>
<td>200 ( = 40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.2 )</td>
</tr>
<tr>
<td>Country B</td>
<td>1,000 ( = 800</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.8 )</td>
<td>800 ( = 160</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.2 )</td>
</tr>
</tbody>
</table>

- The opportunity cost of producing one unit of food in Country A is:
  = $\frac{200}{400}$ units of watches = 0.5 units of watches
- The opportunity cost of producing one unit of food in Country B is:
  = $\frac{800}{1000}$ units of watches
  = 0.8 units of watches
- As Country A has a lower opportunity cost in producing food, she should specialize in producing and exporting food.
*B2(ii)*

- Trade is mutually beneficial if the term of trade is between the opportunity costs of two countries.
- No one will gain from trade if the transportation cost per unit of food is greater than or equal to the total gain of trade per unit of food.
- In this case, the minimum transportation cost per unit of food:
  
  $$(0.8 - 0.5) \text{ units of watches}$$
  
  $$= 0.3 \text{ units of watches}$$

(Material is mainly adapted from
5.3 The Market Forces Of Supply And Demand

Teaching Material (Textbook)

Mankiw, N. Gregory, *Principles of Microeconomics*, Thomson South-Western (latest ed.), *Chapter 4*

Overview

- The theory of demand and supply is one of the fundamental concepts in Economics.
- This chapter introduces the factors that cause changes to demand and supply.
- It also shows how the demand and supply forces interact, and determine the equilibrium price and quantity in a market economy.

Learning Objective

In this chapter, you will

- learn the characteristics of a competitive market.
- learn the characteristics of the Law of Demand and the law of supply.
- examine the factors that determine the demand for a good in a competitive market.
- examine the factors that determine the supply of a good in a competitive market.
- understand how the demand and supply forces interact with each other in determining the equilibrium price and quantity in a competitive market.

After accomplishing these goals, you should be able to

- define the competitive market.
- explain the Law of Demand, and identify the nature of the demand curve.
- explain the Law of Supply, and identify the nature of the supply curve.
- distinguish a change in demand (shifting of the demand curve) from a change in quantity demanded (movement along the demand curve).
- distinguish a change in supply (shifting of the supply curve) from a change in quantity supplied (movement along the supply curve).
- identify various factors that cause changes to demand and supply curves.
- use the demand and supply model to analyze and predict the market equilibrium.
**Chapter Summary**

- A competitive market is defined as a market in which there are many buyers and sellers. Each individual is assumed to have little or no influence on the market price.

- According to the Law of Demand, the demand curve is a downward sloping curve (the quantity demanded increases as the price of a good falls, other things being equal).

- According to the Law of Supply, the supply curve is an upward sloping curve (the quantity supplied increases as the price of a good increases, other things being equal).

- Factors such as changes in income, the prices of related goods, tastes, expectations and the number of buyers may cause shifts of a demand curve.

- Factors such as changes in input prices, technology, expectations and the number of sellers may cause shifts of a supply curve.

- The intersecting point of the demand and supply curves determines the equilibrium of a market.

**Glossary**

- **Competitive market:** is a market in which there are many buyers and sellers. Each individual is assumed to have little or no influence on the market price.

- **Quantity demanded:** refers to the amount of a good that buyers are willing and able to buy.

- **Law of demand:** states that the quantity demanded increases (decreases) as the price of a good falls (rises), other things being equal.

- **Demand curve:** refers to the downward-sloping curve that shows the inverse relationship between the price and quantity demanded of a good.

- **Normal good:** If the demand of a good increases when income increases, the good is characterized as a normal good.

- **Inferior good:** If the demand of a good decreases when income increases, the good is characterized as an inferior good.
• **Quantity supplied:** refers to the amount of a good at which sellers are willing and able to produce and sell.

• **Law of supply:** states that the quantity supply increases (decreases) as the price of a good increases (decreases), other things being equal.

• **Supply curve:** refers to the upward-sloping curve that shows the positive relationship between the price and quantity supplied of a good.

• **Equilibrium:** refers to the intersection of demand and supply curves. It is a stable market condition when other things remain constant.

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**Supplementary Exercises**

**Section A: Multiple Choice**

*(Questions with “*” are more challenging.)*

A1. Which of the following items is one of the characteristics of a competitive market?
   A. Only a few sellers in the market.
   B. Each individual seller has a limited influence over the price of his product.
   C. There is only one buyer in the market.
   D. If one seller stops selling his product from the market, the price of a product will rise.

A2. John loses his job and hence he buys fewer jackets. In this situation, jacket is considered to be a(n)
   A. luxury good.
   B. inferior good.
   C. normal good.
   D. complementary good.

A3. Suppose there are evidences showing that instant food ABC noodle is not good to health. We would expect to see
   A. no change in the demand for ABC noodle.
   B. a decrease in the demand for ABC noodle.
   C. an increase in the demand for ABC noodle.
   D. an increase in the supply of ABC noodle.
A4. Which of the following events would result in a movement upward along the supply curve for computers?

A. The number of sellers of computers increases.
B. There is an advance in technology that reduces the cost of producing computers.
C. A decrease in the input price in the production of computers.
D. The price of computers increases.

A5. If buyers today are more willing and able than before to purchase larger quantities of a product at each price of the product,

A. we will observe a movement downward along the demand curve for the product.
B. we will observe a movement upward along the demand curve for the product.
C. the demand curve for the product will shift to the right.
D. the demand curve for the product will shift to the left.

*A6. Which of the following sets of events would unambiguously lead to a decrease in the equilibrium price of cotton sock?

A. an increase in the price of wool sock and a decrease in the price of raw cotton
B. a decrease in the price of wool sock and a decrease in the price of raw cotton
C. an increase in the price of wool sock and an increase in the price of raw cotton
D. none of the above

*A7. Assume “Tasty” chocolate is a normal good. Suppose both the equilibrium price and quantity of the chocolate have fallen over time. Which of the following items would explain this observation?

A. Consumers have experienced an increase in income and production technology has improved.
B. The price of food has risen and the input price of “Tasty” chocolate has fallen.
C. New medical evidence has been released that indicates a negative correlation between a person’s consumption on “Tasty” chocolate and his or her health.
D. The demand curve for “Tasty” chocolate must be positively sloped.
A8. Which of the following sets of events would most likely lead to an increase in the price of a new car?

A. higher wages for labors, increases in consumer incomes, increases in population and expectations of higher car prices in the future
B. lower wages for labor, lower consumer incomes, decreases in population and expectations of higher car prices in the future
C. lower input prices, decreases in consumer incomes, decreases in expectations of higher car prices in the future
D. none of the above

Section B: Short/Long Questions
(Questions with '*' are more challenging.)

B1. What would the impact of each of the following changes impose on the demand or supply of the hot chocolate market. Illustrate your answer with a separate diagram of each change. You are also required to show how equilibrium price and quantity have changed.

(a) Winter starts and the temperature drops sharply.
(b) The price of hot coffee falls.
(c) Input price of chocolate falls.
(d) Suppose a new ingredient which is good to health has been newly included in the production of hot chocolate.

*B2. Table 1: The demand schedule describing hamburgers demanded per week.

<table>
<thead>
<tr>
<th></th>
<th>Price</th>
<th>Quantity Demanded</th>
</tr>
</thead>
<tbody>
<tr>
<td>John</td>
<td>$4.00</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>$6.00</td>
<td>2</td>
</tr>
<tr>
<td>Tom</td>
<td>$4.00</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>$6.00</td>
<td>3</td>
</tr>
<tr>
<td>Shirley</td>
<td>$4.00</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>$6.00</td>
<td>3</td>
</tr>
</tbody>
</table>

Suppose John, Tom and Shirley are the only buyers of hamburgers.

(a) If the current price of a hamburger is $4.00 and the quantity supplied of hamburger is 10:
(i) Find out amount of surplus or shortage, if any, in this situation.
(ii) Discuss what happens to the price.

(b) If the current price of a hamburger changes to $6.00 and the quantity supplied of hamburgers increases to 12:

(i) Find out amount of surplus or shortage, if any, in this situation.
(ii) Discuss what happens to the price.

(c) If the current price of a hamburger remains constant at $6.00 but the quantity supplied of hamburgers changes to 8:

(i) Find out amount of surplus or shortage, if any, in this situation.
(ii) Discuss what happens to the price.

*** 📓 ***
**Suggested Solutions**

**Section A: Multiple Choice**


*A6. B*
- Given that wool sock is a substitute of cotton sock.
- When the price of wool sock decreases, the demand for cotton sock decreases and this leads to a fall in the equilibrium price of cotton sock.
- At the same time, when the price of raw cotton drops, the cost of producing cotton sock decreases, too. It leads to an increase in the supply of cotton sock and hence its equilibrium price.

*A7. C*
- Only the effects of Option C will lead to a decrease in the demand for chocolate. This will lead to a fall in both equilibrium price and quantity.

*A8. A*
- The cause of an increase in the price of a new car can be an increase in demand of it, a decrease in supply or the combined effect of both changes.
- Only Option A involves both mentioned changes.

**Section B: Short/Long Questions**

B1.
B2.

a (i) There is a shortage of 4 hamburgers.
(ii) The price would be expected to increase from its current level.
(Students are required to show all the steps of calculation and explain the answers)

b (i) There is currently a surplus of 4 hamburgers.
(ii) The price of a hamburger is expected to fall from the current level.
(Students are required to show all the steps of calculation and explain the answers)

c (i) There is no surplus or shortage; the current situation is at equilibrium.
(ii) The price of a hamburger should remain unchanged.
(Students are required to show all the steps of calculation and explain the answers)

---

(Material is mainly adapted from
5.4 Elasticity And Its Application

Teaching Material (Textbook)

Mankiw, N. Gregory, *Principles of Microeconomics*, Thomson South-Western (latest ed.), *Chapter 5*

Overview

- In Chapter 4, we mainly identified the factors that cause the changes in demand and supply. Then, we discussed the direction of how the quantity demanded (or supplied) moves but not the magnitude of the change.
- In this chapter, the concept of elasticity is introduced to measure how much buyers and sellers respond to changes in market conditions.

Learning Objective

In this chapter, you will be able to

- learn the concept of elasticity.
- learn the determinants of price elasticity of demand.
- learn the determinants of price elasticity of supply.
- understand the relationship between elasticity and total revenue as well as other applications.

After accomplishing these goals, you should be able to

- define the concept of elasticity, price elasticity of demand and price elasticity of supply.
- compute price elasticity of demand and price elasticity of supply.
- identify varieties of demand and supply curves.
- identify determinants of the price elasticity of demand and price elasticity of supply.
- analyze the relationship between elasticity and total revenue as well as other applications.
- understand other demand elasticities.

Chapter Summary

- A competitive market is defined as a market in which there are many buyers and sellers. Each individual is assumed to have little or no influence on the market price.
• The price elasticity of demand measures how much the quantity demanded of a good responds to the change in price of that good.

• Price elasticity of demand tends to be larger
  (i) if more close substitutes are available,
  (ii) if a good is a luxury,
  (iii) if the market is more narrowly defined, or
  (iv) if more time is available for buyers to respond.

• For elastic demand curves, an increase in price leads to a decrease in total revenue. For inelastic demand curves, an increase in price leads to an increase in total revenue.

• The price elasticity of supply measures how much the quantity supplied of a good responds to the change in price of that good.

• Time horizon is one of the determinants of price elasticity of supply. In general, supply is more elastic in the long run when compared with the short run situation.

• The tools of demand and supply, together with the concept of elasticity, can be applied to analyze different market situations.

Glossary
• Price Elasticity of demand:
The price elasticity of demand measures how much the quantity demanded of a good responds to the change in price of that good.
It can be computed as the percentage change in quantity demanded of a good divided by the percentage change in price of that good.

• Income elasticity of demand:
The price elasticity of demand measures how much the quantity demanded of a good responds to the change in income of consumers.
It can be computed as the percentage change in quantity demanded of a good divided by the percentage change in income of consumers.
The figure can indicate whether the good is a normal good, an inferior good or necessity.
• **Cross-price elasticity of demand:**
  The price elasticity of demand measures how much the quantity demanded of one good (e.g. Good A) responds to the change in price of another good (e.g. Good B).
  It can be computed as the percentage change in quantity demanded of a good (Good A) divided by the percentage change in price of another good (Good B).
  The figure can indicate whether these two goods are substitutes, complements or non-related goods.

• **Price Elasticity of supply:**
  The price elasticity of supply measures how much the quantity supplied of a good responds to the change in price of that good.
  It can be computed as the percentage change in quantity supplied of a good divided by the percentage change in price of that good.

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**Supplementary Exercises**

**Section A: Multiple Choice**

(Questions with ‘*’ are more challenging.)

A1. Which of the following items describes the situation about a necessity good?
   A. Quantity demanded tends to respond at a great extent to a change in price.
   B. Demand curve tends to be inelastic.
   C. The law of supply often does not apply.
   D. None of the above is correct.

A2. Assuming all other forces unchanged, if the price of car increases, the number of car demanded would decrease substantially over an eight-year period because
   A. buyers tend to be much less sensitive to a change in price when given more time to react.
   B. buyers tend to be much more sensitive to a change in price when given more time to react.
   C. buyers will have saved more income over an eight-year period.
   D. none of the above
A3. If the price elasticity of demand for coffee is 1.65, then a 4 percent decrease in price results in a
   A. 0.8 percent increase in the quantity demanded.
   B. 1.8 percent increase in the quantity demanded.
   C. 6.6 percent increase in the quantity demanded.
   D. 5.5 percent increase in the quantity demanded.

A4. If the demand for sandwiches is elastic, then a decrease in the price of sandwiches will
   A. increase the total revenue of sandwiches sellers.
   B. decrease the total revenue of sandwiches sellers.
   C. not change the total revenue of sandwiches sellers.
   D. increase the cost of sellers.

A5. Assume coffee and tea are substitutes. Their cross-price elasticity will be
   A. positive.
   B. negative.
   C. zero.
   D. Not enough information

*A6. Suppose that the price elasticity of demand for jackets is 1.2. A 3.2% decrease in the price of jackets will increase the quantity demanded of jackets by
   A. 1.51% and jackets sellers' total revenue will increase as a result.
   B. 2.66% and jackets sellers' total revenue will decrease as a result.
   C. 3.84% and jackets sellers' total revenue will increase as a result.
   D. 0.375% and jackets sellers' total revenue will decrease as a result.

*A7. Suppose a producer is able to separate customers into two groups, one having an inelastic demand and the other having an elastic demand. If the producer's objective is to increase total revenue, she should
   a. charge the same price to both groups of customers.
   b. increase the price for both groups of customers.
   c. increase the price charged to customers with the elastic demand and decrease the price charged to customers with the inelastic demand.
   d. decrease the price charged to customers with the elastic demand and increase the price charged to customers with the inelastic demand.
Section B: Short/Long Questions
(Questions with ‘*’ are more challenging.)

B1. Suppose the price of coffee fell from $2.70 to $2.30. Then the quantity demanded of orange juice dropped from 130 to 100 per day.
   (a) Using the midpoint method, compute the cross elasticity between these two goods.
   (b) Discuss the relationship between these two products.

*B2. (a) Suppose the quantity demanded of donuts increases from 100 units to 120 units if the price decreases $3 to $2. Using the midpoint method, compute the price elasticity of demand of donuts.
   (b) Discuss four determinants of price elasticity of demand.
   (c) “We should increase price so that we can increase our revenues.” Comment on this statement.

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Suggested Solutions

Section A: Multiple Choice

* A6. C
   • Given: the price elasticity of demand = \( \frac{\% \text{ change in } Q_d}{\% \text{ change in } P} \)
   \[
   \therefore 1.2 = \frac{\% \text{ change in } Q_d}{3.2\%} \Rightarrow \% \text{ change in } Q_d = 3.84%
   \]
   • Since the elasticity of demand is greater than 1 which means that it is elastic demand, the total revenue will increase after the price decreases.
*A7. D
- To maximize the total revenue, the price should decrease when the demand is elastic and increase when the demand is inelastic.

*A8. C
- When the capacity of a firm approaches maximum, the firm is unable to adjust its production level if there is an increase in the price. The supply becomes inelastic.
- However, at a lower level, the firm faces excess capacity and is able to increase its production level in response to an increase in price. Thus, the supply is more elastic.

**Section B: Short/Long Questions**

B1. (a) 1.625  
(b) The two goods are substitutes (the cross-price elasticity is positive).

*B2. (a) 0.4545

(b)
- Number of close substitutes
- Necessity/luxury goods
- Narrowly/broadly defined
- Time horizon
  (students are required to elaborate on each item)

(c)
- Depends on price elasticity of demand
- For elastic demand curves, an increase in price leads to a decrease in total revenue.
- For inelastic demand curves, an increase in price leads to an increase in total revenue.

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(Material is mainly adapted from  
5.5 Supply, Demand And Government Policies

Teaching Material (Textbook)
Mankiw, N. Gregory, *Principles of Microeconomics*, Thomson South-Western (latest ed.), *Chapter 6*

Overview
- Chapters 4 and 5 (i) introduce the fundamental concepts of supply and demand, and elasticity; (ii) explain the factors affecting demand and supply as well as the equilibrium, and (iii) discuss the determinants of elasticity under the free market.
- In this chapter, the application of demand and supply analysis to the mixed market economy, including the roles of sellers, buyers, and the government, is also provided.
- The possible effects of price controls and taxation introduced by the government are studied.

Learning Objective
In this chapter, you will
- examine the effects of price ceiling placed by the government in the market.
- examine the effects of price floor placed by the government in the market.
- consider how a tax placed on a good affects the price of the good and the quantity sold, with the help of the demand and supply diagram.
- learn the concept of tax burden on buyers and sellers, and how the burden of tax is split between them.

After accomplishing these goals, you should be able to
- show graphically the market outcomes (price, quantity supplied, quantity demanded, shortage) subject to a binding price ceiling imposed on the market.
- show graphically the market outcomes (price, quantity supplied, quantity demanded, surplus) subject to a binding price floor imposed on the market.
- explain that a tax places a wedge between buyers and sellers, regardless of whether the tax is placed on the buyer or the seller.
- show graphically the shift in supply and demand curves, and the change of equilibrium price and quantity that are resulted from the imposition of a tax.
- explain how the tax incidence on buyers and sellers is determined by the relative elasticities of supply and demand.
Chapter Summary

- A price ceiling such as the rental control is a legal maximum on the price of a good. If the price ceiling is below the equilibrium price, it is binding and causes a shortage. Therefore, a rationing mechanism other than price is required.
- A price floor such as a minimum wage is a legal minimum on the price of a good. If the price floor is above the equilibrium price, it is binding and causes a surplus.
- A tax on a good places a wedge between the price buyers paid and the price sellers received, and causes the equilibrium quantity to fall no matter whether the tax is imposed on buyers or sellers.
- The incidence of a tax is reflected in the division of tax burden between buyers and sellers, and is not depended on whether the tax is imposed on buyers or sellers. The price elasticities of supply and demand are the key determinants.
- Each of the policies discussed in this chapter affects the allocation of society’s resources. So, it is important for policymakers to consider and apply such policies very carefully.

Glossary

- **Price Ceiling**
  refers to ‘a legal maximum on the price at which a good can be sold’.

- **Price Floor**
  refers to ‘a legal minimum on the price at which a good can be sold’.

- **Tax**
  refers to a specific amount on each unit bought or sold that the government made the buyers or sellers paid.

- **Shortage**
  refers to ‘a situation in which quantity demanded is greater than quantity supplied’ at a controlled price.

- **Surplus**
  refers to ‘a situation in which quantity supplied is greater than quantity demanded’ at a controlled price.
• **Tax incidence**
  refers to 'the manner in which the burden of a tax is shared among participants in a market'.

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**Supplementary Exercises**

**Section A: Multiple Choice**

*(Questions with ‘*’ are more challenging.)*

A1. A legal maximum price at which a good can be sold is
   - A. a price floor.
   - B. a price ceiling.
   - C. a price leverage.
   - D. taxation.

A2. Refer to Figure 1. Which of the panels represents a binding price floor?

**Figure 1**

- A. panel (a) but not panel (b)
- B. panel (b) but not panel (a)
- C. panel (a) and panel (b)
- D. neither panel (a) nor panel (b)

A3. Which of the following will be resulted from either a price ceiling or a price floor?
   - A. better efficiency.
   - B. surplus.
   - C. shortage.
   - D. undesirable rationing mechanisms.
A4. If the rent control exists for a long time, then housing shortages caused by rent control

A. increase, because the demand for, and supply of, housing are more elastic in the long run.
B. increase, because the demand for, and supply of, housing are more inelastic in the long run.
C. decrease, because the demand for, and supply of, housing are more elastic in the long run.
D. decrease, because the demand for, and supply of, housing are more inelastic in the long run.

A5. Refer to Figure 2. The per-unit burden of the tax is

\[ \text{Figure 2} \]

- A. $3 on buyers and $7 on sellers.
- B. $5 on buyers and $5 on sellers.
- C. $4 on buyers and $6 on sellers.
- D. $7 on buyers and $3 on sellers.

*A6. If the government imposes a tax on wine, and buyers of wine are required to pay the tax, it shifts

A. the supply curve downward, causing the price received by sellers to fall and the equilibrium quantity to rise.
B. the supply curve upward, causing the price received by sellers to rise and the equilibrium quantity to fall.
C. the demand curve downward, causing both the price received by sellers and the equilibrium quantity to fall.
D. the demand curve upward, causing both the price received by sellers and the equilibrium quantity to rise.
*A7. Suppose there is currently a tax of $50 per package of cigarette and sellers are required to pay the tax to the government. If the tax is reduced from $50 per package to $20 per package, then

A. the demand curve will shift upward by $30 and the price paid by buyers will decrease by $30.
B. the demand curve will shift downward by $30 and the price paid by buyers will decrease, but the decrease will be less than $30.
C. the supply curve will shift upward by $30 and the effective price received by sellers will increase by $30.
D. the supply curve will shift downward by $30 and the price paid by buyers will decrease, but the decrease will be less than $30.

*A8. Suppose the demand for Product A is inelastic and the supply of Product A is elastic, and the demand for Product B is inelastic and the supply of Product B is elastic. If a tax were levied on the sellers of both Product A and Product B, which of the following would be resulted?

A. Tax burden of both products would fall more heavily on the buyers than on the sellers.
B. Tax burden of Product A would fall more heavily on the sellers than on the buyers, and the tax burden of Product B would fall more heavily on the buyers than on the sellers.
C. Tax burden of the Product A would fall more heavily on the buyers than on the sellers, and the tax burden of Product B would fall more heavily on the sellers than on the buyers.
D. Tax burden of both products would fall more heavily on the sellers than on the buyers.

Section B: Short/Long Questions

B1. Explain how price elasticity of demand and price elasticity of supply affect the distribution of tax burden among buyers and sellers.

*B2. The government decides to impose the minimum wage for the construction workers.
(i) With the aid of a diagram, explain what will happen if the minimum wage is set below the market equilibrium.
(ii) If you were the construction workers, would you be happy if the government set the minimum wage above the market equilibrium? Explain with a diagram.

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Suggested Solutions

Section A: Multiple Choice


*A6. C
- When the tax is imposed on the buyers, it lowers their incentive of consumption. Therefore, it leads to a leftward (downward) shift of the demand curve.
- Other things being equal including the position of the supply curve, when there is a decrease in demand, the quantity transacted will decrease too.
- Thus, the effective price paid by the buyers will increase after the imposition of tax. As the tax burden is shared among buyers and sellers, the price received by sellers hence decreases.

*A7. D
- When the size of the tax reduces, the supply or demand increases.
- In this question, the tax is imposed on the sellers and the size of tax is reduced by $30 (= $50 - $20). Therefore, the supply increases (or the supply curve shifts downward) by exactly $30.
- When the supply increases, the price paid by buyers decreases. As the tax burden is shared among buyers and sellers, the benefit of this tax reduction is also shared among them. Thus, the price paid by buyers will be decreased though the amount of reduction is less than $30. (Why? Hint: Consider the elasticities of demand and supply.)

*A8. A
- Tax burden is shared among buyers and sellers. The size of tax burden borne by each party depends on the elasticities of demand and supply.
- When supply is more price-elastic than demand, sellers are relatively more price-sensitive and able to evade bearing the tax burden. Technically speaking, the supply curve is less steep than the demand curve.
- Since the demand for Product B is inelastic and buyers only have limited alternatives, they have to share a larger portion of tax because the market price is pushed up after the imposition of tax.
**Section B: Short/Long Questions**

B1.
- The relationship between the elasticities and tax burden is that the greater the elasticity, the smaller the tax burden.
- When demand (supply) is more price-elastic than the other, buyers (sellers) are relatively more price-sensitive, and they have relatively more alternatives, so they can avoid most of the tax.
- Therefore, if supply is more elastic than demand, buyers bear most of the tax burden.
- On the other hand, if demand is more elastic than supply, sellers bear most of the tax burden.

*B2 (i)*

- If the minimum wage is set below the market equilibrium, there will be no effect in the market of construction workers, and so the equilibrium wage and equilibrium quantity of labour are the same (W1 & Q1).

*B2(ii)*
• If the minimum wage is set above the equilibrium, there will be a surplus of construction workers, i.e. the unemployment will exist in the construction industry. It will be very difficult for the workers to be employed.

• If I were the one seeking the job, I would not be happy.

• But, if I were the one remained employed, I would be happy because I could get a higher pay ($W_m > W_1$) than before.

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(Material is mainly adapted from
5.6 The Efficiency Of Markets and Costs of Taxation

Teaching Material (Textbook)

Mankiw, N. Gregory, *Principles of Microeconomics*, Thomson South-Western (latest ed.), *Chapters 7 and 8*.

Overview

- As an introduction, Chapters 4, 5 and 6 provide an overview of the basic analysis of supply and demand, and the government policies.
- In Chapters 7 and 8, the concepts of welfare economics become the focus of study.
- Through the concepts, whether the market forces -- supply and demand -- can produce a socially desirable outcome is discussed.
- Is the free market mechanism maximizing the social well-being? This chapter also looks at how taxation distorts behavior and causes the deadweight loss to a society.

Learning Objective

In this chapter, you will

- examine the relationship between the buyers’ willingness to pay for a good and the demand curve.
- examine the relationship between the sellers’ cost of producing a good and the supply curve.
- learn the fundamental concepts of consumer surplus and producer surplus such as their definition and the measurement methods.
- learn how the interaction of market forces and the determination of market equilibrium maximize the total surplus in a market.
- examine how taxes reduce consumer and producer surplus, and create the deadweight loss to the society.

After accomplishing these goals, you should be able to:

- show the relationship between a market demand curve and the buyers’ willingness to buy for a good.
- explain the meaning of consumer surplus – additional benefit to the consumer beyond the price paid.
- show the relationship between market supply curve and the sellers’ willingness to sell for a good.
- explain the meaning of producer surplus – excess received by the seller beyond the cost of production when
the seller just breaks even on the last unit produced.

- demonstrate graphically how the competitive equilibrium of supply and demand maximizes the combined producer and consumer surplus in the free market.
- show graphically how and why a tax reduces total surplus and results in deadweight losses.
- explain the relationship between the size of deadweight loss and the elasticities of demand and supply.

**Chapter Summary**

- The height of demand curve reflects the value of the good to buyers, and so it reflects the buyers’ willingness to pay for a good.
- Consumer surplus equals buyers’ willingness to pay for a good minus the amount they actually pay for it.
  
  Consumer surplus can also be shown by indicating the area between price and the demand curve. It helps to measure the benefit buyers get from participating in a market.
- The height of the supply curve is sellers’ cost of producing the good; therefore, the sellers are willing to sell if the price they get is at least as high as their cost.
- Producer surplus equals the amount sellers receive for their goods minus their cost of production.
  
  Producer surplus can also be shown by indicating the area between price and the supply curve. It helps to measure the benefit sellers get from participating in a market.
- Total surplus, a measure of society’s well-being, is the sum of consumer and producer surplus.
- An allocation of resources is efficient when that total surplus is maximized --- which means that the goods are produced by sellers with the lowest cost, and they are consumed by buyers who value them the most.
- A tax on a good reduces the welfare of buyers and sellers and results in deadweight loss (DWL) - the fall in total surplus (consumer surplus, producer surplus, and tax revenue). A DWL is resulted because tax causes consumers to buy less and producers to sell less, thus shrinking the market quantity below the level that maximizes total surplus.
- The price elasticities of demand and supply measure how much buyers and sellers respond to price changes. Therefore, when the government imposes tax on goods with different elasticities, the size of DWLs varies, i.e. higher elasticities imply higher DWLs.
Glossary

- **Welfare Economics:**
  is ‘the study of how the allocation of resources affects economic well-being’.

- **Willingness to pay:**
  refers to ‘the maximum amount that a buyer will pay for a good’.

- **Consumer Surplus:**
  equals to ‘a buyer’s willingness to pay minus the amount the buyer actually pays’.

- **Marginal Buyer:**
  refers to ‘the buyer who would leave the market if the price were any higher’.

- **Cost**
  is ‘the value of everything a seller must give up to produce a good, i.e., the opportunity cost’.

- **Producer Surplus**
  equals to ‘a seller is paid for a good minus the seller’s cost’.

- **Marginal Seller**
  refers to ‘the seller who would leave the market if the price were any lower’.

- **Total Surplus**
  measures ‘the total gains from trade in a market’. It is the sum of consumer surplus and producer surplus.

- **Efficiency**
  is ‘the property of a resource allocation of maximizing the total surplus received by all members of society’.

- **Deadweight Loss:**
  is referred to a fall in total surplus that results from a market distortion.

Supplementary Exercises

**Section A: Multiple Choice**
(Questions with ‘*’ are more challenging.)

A1. If John places a value of $20 on a kite and if the price of the kite is $22, then
   A. John has consumer surplus of $2 if he buys the good.
   B. John does not purchase the good.
   C. the market is a monopoly market.
   D. the price is going to be lower soon.
A2. Refer to Figure 1. Which area represents consumer surplus when the price is $P_1$?

A. A  B. B  C. C  D. E

A3. Refer to Figure 1. Which area represents producer surplus when the price is $P_1$?

A. A  B. B  C. C  D. E

A4. Efficiency in a market is achieved when

A. the government decides the quantity buyers should buy or sellers should sell.
B. the consumer surplus is maximized.
C. the total surplus is maximized.
D. all sellers produce at the same costs and all buyers have the same value of the products.

A5. When a tax is levied on a good,

A. only sellers are made worse off.
B. only buyers are made worse off.
C. neither buyers nor sellers are made worse off.
D. both buyers and sellers are made worse off.

*A6. Suppose DVD players are a normal good and buyers of DVD players experience a decrease in income. As a result, consumer surplus in the television market

A. decreases.  B. is unchanged.  C. increases.  D. is uncertain.
*A7. Suppose a tax of $1 per unit is imposed on a good. The more elastic the supply of the good, other things being equal,
   A. no effect in the market.
   B. the smaller is the tax burden on sellers relative to the tax burden on buyers.
   C. the larger is the deadweight loss of the tax.
   D. None of the above is correct.

*A8. Under the downward sloping demand curve and upward sloping supply curve, suppose the equilibrium quantity in the market for cigarette is 200 units per month when there is no tax imposed. Then a tax of $5 is imposed. The effective price paid by buyers increases by $2 and the after-tax price received by sellers falls by $3. The government is able to raise $900 per month in revenue from the tax. The deadweight loss from the tax is
   A. $250.
   B. $125.
   C. $75.
   D. $50.

**Section B: Short/Long Questions**
(Questions with * are more challenging.)

B1. The local government attempts to discourage the citizens from smoking. Suppose the government chooses to levy a per-unit tax on the supplier of cigarettes. Use a diagram to indicate and explain the changes in consumer surplus, produce surplus, deadweight loss, and government tax revenue after the levy of this per-unit tax.

*B2. Suppose a technological advance reduces the cost of producing DVD players.
   i) Use a supply-and-demand diagram to show what happens to price, quantity, consumer surplus, and producer surplus in the market for DVD players.
   ii) DVD players and VCD players are substitutes. Use a supply-and-demand diagram to show what happens to price, quantity, consumer surplus, and producer surplus in the market for VCD players.
   iii) DVD players and DVDs are complements. Use a supply-and-demand diagram to show what happens to price, quantity, consumer surplus, and producer surplus in the market for DVDs.
Suggested Solutions

Section A: Multiple Choice


*A6. A
- If DVD players are normal goods, the demand for DVD players also decreases (D1 to D2) when the income of buyers decreases.
- The original consumer surplus is (A+B). The new consumer surplus is (B+C). The net change of consumer surplus is (-A+C); therefore, the consumer surplus decreases.

*A7. C
- When a tax is imposed, consumers buy less and hence producers sell less. Therefore, a tax distorts the market outcome in the way that the equilibrium quantity is below the surplus-maximizing quantity.
- Besides, elasticity is used to measure how much buyers and sellers respond to changes in price. So it determines how much the tax distorts the market outcome.
- When the supply is more elastic, the decrease in equilibrium quantity will be much larger. It also means that the increase in the deadweight loss will be much higher.

*A8. D
- The quantity transacted after tax is 180 units (= \(\frac{900}{5}\)); therefore, the DWLs equals 50 \(\text{[} = (200-180) \times \frac{5}{2}\text{]}\).
Section B: Short/Long Questions

B1.

- When the unit tax is levied on the sellers, the supply curve shifts to the left (from \( S_0 \) to \( S_1 \)). The price paid by the buyers is \( P_c \) and the price received by the sellers is \( P_s \). The quantity transacted decreases from \( Q_0 \) to \( Q_1 \).
- The consumer surplus is reduced to area A only and areas B + C represent the loss in consumer surplus.
- Correspondingly, producer surplus is reduced to area F and areas E + G represent the loss in producer surplus.
- Tax revenue is indicated by areas B + G, which equals to the per-unit tax times the quantity transacted in the market.
- Without tax, total surplus equals areas A + B + C + E + F + G. With tax, total surplus equals to areas A + B + F + G. The loss in total surplus (or the deadweight loss) thus equals areas C + E.

![Diagram showing supply and demand curves with tax and without tax](image)

*B2(i).*

- The effect of falling production costs in the market for DVD players results in an increase of supply.
- As a result, the equilibrium price of DVD players decreases and the equilibrium quantity increases.
- The decline in the price of DVD players increases consumer surplus from area A to areas A + B + C + H, and an increase in the amount B + C + H.
- Prior to the shift in supply, producer surplus was areas B + E. After the shift in supply, producer surplus is areas E + F + G. So producer surplus changes by the amount \( F + G - B \). The net change is positive.
• Since consumer surplus rises by areas $B + C + H$ and producer surplus rises by areas $F + G - B$, total surplus rises by areas $C + F + G + H$.

*B2(ii).

• Because VCD players are substitutes for DVD players, the decline in the price of DVD players means that people substitute DVD players for VCD players, shifting the demand for VCD players to the left.
• The result is a decline in both the equilibrium price and equilibrium quantity of VCD players.
• Consumer surplus in the VCD players market changes from areas $A + B$ to $A + C$, a net change of $C - B$.
• Producer surplus changes from areas $C + E + F$ to area $E$, a net loss of $C + F$.

*B2(iii).

• Since DVD players and DVDs are complements, the decline
in the price and increase in the quantity of DVD players means that the demand for DVDs increases, shifting the demand for DVDs to the right.

- The result is an increase in both the price and quantity of DVDs.
- Consumer surplus in the DVDs market changes from areas B + C to areas A + B, a net change of A – C.
- Producer surplus changes from E to areas C + E + F, an increase of C + F.

(Material is mainly adapted from King, S. P. & Harris, R.B. (2003). *Principles of microeconomics : study guide* (Chapter 7 & 8). Southbank, Vic. : Thomson.)
5.7 The Costs Of Production

Teaching Material (Textbook)
Mankiw, N. Gregory, Principles of Microeconomics, Thomson South-Western (latest ed.), Chapter 13

Overview
- The information in this chapter provides a crucial foundation for next chapters.
- This Chapter looks at a firm’s cost of production, revenue and profit, and distinguishes economic aspect from accounting aspect.
- The aim of Chapter 13 is to examine firm behavior in more details and give you a better understanding of what decisions lie behind the supply curve in the market.
- The analysis in this Chapter will provide the tools necessary to understand how all firms behave under different types of market conditions.

Learning Objective
In this chapter, you will
- examine what items are included in a firm’s cost of production.
- analyze the relationship between a firm’s production process and its total costs.
- learn the meaning and the link between average total cost and marginal cost.
- derive the shapes of a typical firm’s cost curves from the Law of Diminishing Marginal Returns.
- illustrate the relationship between the short-run and long-run costs.

After accomplishing these goals, you should be able to
- calculate and distinguish cost and profit from economic and accounting points of view.
- explain why the marginal product of an additional worker declines as more workers are hired and is related it to the increasing slope of total-cost curve.
- derive marginal cost and average cost from total-cost curve, then distinguish between the two and explain how marginal cost affects average cost.
• indicate the links between marginal cost, average total cost, average variable cost, and average fixed cost.
• explain why fixed cost disappears in the long run, show its effect on the long-run cost curves, and then differentiate diminishing marginal product (short run) from decreasing returns to scale (long run).

**Chapter Summary**

- The firm’s goal is to maximize profit. It is total revenue minus total cost.
- To an economist, cost means opportunity cost which includes the explicit costs and implicit costs. To an accountant, cost means explicit costs only. Thus, a firm which shows an accounting profit actually may be losing money in an economic sense.
- A firm’s costs reflect its production process. Many costs are fixed in the short run but variable in the long run.
- As marginal product diminishes, the firm’s total cost begins to rise at an increasing rate because of the Law of Diminishing Marginal Product.
- For a typical firm, marginal cost rises with output when the point of diminishing marginal product is reached. The rising MC curve intersects the U-shaped ATC curve at its minimum.
- The following equations show the mathematical relationships among different cost measures:
  
  Total cost (TC) = Fixed cost (FC) + Variable cost (VC)
  
  Average fixed cost (AFC) = \( \frac{FC}{Q} \)
  
  Average variable cost (AVC) = \( \frac{VC}{Q} \)
  
  Average total cost (ATC) = \( \frac{TC}{Q} \); or \( ATC = AFC + AVC \)
  
  Marginal cost (MC) = \( \frac{\Delta TC}{\Delta Q} = \frac{\Delta VC}{\Delta Q} \)
  
  where \( \Delta = \text{‘change in’} \)

**Glossary**

- **Total Revenue:**
  is the amount a firm receives for the sale of its output.

- **Total Cost:**
  is the market value of the inputs a firm used in production.
• **Explicit Costs:**  
  are input costs that require an outlay of money by a firm.

• **Implicit Costs:**  
  are input costs that do not require an outlay of money by a firm.

• **Economic Profit:**  
  is measured by total revenue minus total cost, including both explicit and implicit costs.

• **Accounting Profit:**  
  is measured by total revenue minus total explicit cost.

• **Production Function:**  
  shows the relationship between quantity of inputs used to make a good and the quantity of output of that good.

• **Marginal Product:**  
  is the increase in output that arises from an additional unit of input.

• **Law of Diminishing Marginal Product:**  
  states that when more and more variable inputs are added to a given amount of fixed inputs, marginal product will eventually diminishes, other things being constant.

• **Fixed Costs:**  
  are costs that do not vary with the quantity of output produced.

• **Variable Costs:**  
  are costs that vary with the quantity of output produced.

• **Average Total Cost:**  
  is the total cost divided by the quantity of output.

• **Marginal Cost:**  
  is the increase in total cost that arises from an extra unit of production.

• **Efficient Scale:**  
  occurs at the quantity of output that minimizes average total cost.

• **Economies of Scale (Increasing Returns to Scale):**  
  occurs when the long-run average total cost falls as the quantity of output increases.
• **Diseconomies of Scale (Decreasing Returns to Scale):**
  occurs when the long-run average total cost rises as the quantity of output increases.

• **Constant Returns to Scale:**
  occurs when the long-run average total cost stays the same as the quantity of output increases.

---

**Supplementary Exercises**

**Section A: Multiple Choice**

(Questions with '*' are more challenging.)

A1. Economists are primarily interested in
   
   A. the marginal cost of production in a firm.
   B. the accounting profits generated by a firm.
   C. how firms make production and pricing decisions.
   D. the value of a firm as manifest in stock price.

A2. Diminishing marginal product suggests that the marginal

   A. product of an extra worker is less than the previous worker’s marginal product.
   B. cost of an extra worker is less than the previous worker’s marginal cost.
   C. product of an extra worker is greater than the previous worker’s marginal product.
   D. cost of an extra worker is unchanged.

A3. If a firm produces nothing, which of the following costs will be zero?

   A. variable cost
   B. total cost
   C. average cost
   D. opportunity cost

A4. When a factory is operating in the short run,

   A. total cost and variable cost are usually the same.
   B. average fixed cost rises as output increases.
   C. it cannot adjust the quantity of fixed inputs.
   D. it cannot alter variable costs.

A5. Marginal cost tells us

   A. the marginal increment to profitability when price is constant.
   B. the value of all resources used in a production process.
C. the amount total cost rises when output rises by one unit.
D. the amount fixed cost rises when output rises by one unit.

*A6. Johnny is a sophomore in college and has a 1.5 cumulative grade point average (GPA). Johnny’s cumulative GPA will be better next semester if
(i) he performs better than he did last semester.
(ii) he performs better than his cumulative GPA.
(iii) he gives an average performance.
A. (i) only B. (ii) only C. (i) and (iii) D. All of the above

*A7. Which of the following can be inferred from the figure above?
(i) Marginal costs vary for different levels of output.
(ii) Diminishing marginal product does not occur directly after the first worker.
(iii) Marginal product of the second worker exceeds that of the first.
A. (i) and (ii) B. (ii) and (iii) C. (i) and (iii) D. All of the above

*A8. A U-shaped long-run average total cost curve can be explained by firms when they increase their firm size
(i) to take advantage of greater specialization.
(ii) to avoid coordination problems.
(iii) to avoid fixed costs.
A. (i) and (ii) B. (ii) and (iii) C. (i) only D. All of the above
Section B: Short/Long Questions
(Questions with '*' are more challenging.)

B1. Joe wants to start his own business. The business he wants to start will require that he purchases a factory that costs $300,000. He is planning to use $100,000 of his own money, and borrows an additional $200,000 to finance the factory purchase. Assume the relevant interest rate is 10 percent.

a) What is the explicit cost of purchasing the factory for the first year of operation?

b) What is the opportunity cost of purchasing the factory for the first year of operation?

*B2. Andy’s Pizza’s production function is shown in the table above. Andy currently operates Plant 1. He hires workers at a wage rate of $50 a day and his total fixed cost is $100.

<table>
<thead>
<tr>
<th>Labor (workers)</th>
<th>Output (pizzas per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Plant 1</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>3</td>
<td>26</td>
</tr>
<tr>
<td>4</td>
<td>31</td>
</tr>
<tr>
<td>5</td>
<td>34</td>
</tr>
<tr>
<td>6</td>
<td>35</td>
</tr>
<tr>
<td>7</td>
<td>33</td>
</tr>
<tr>
<td>Ovens</td>
<td>1</td>
</tr>
</tbody>
</table>

Suppose the total fixed cost increases to $200. Explain what changes occur in the costs.
**Suggested Solutions**

**Section A: Multiple Choice**


*A6. B*

His 1.5 cumulative grade point average (GPA) is the average GPA for all semesters. His cumulative GPA can only be higher if his marginal GPA in the next semester is higher.

*A7. D*

The slope of total cost curve measures the marginal cost of the firm.

*A8. C*

Firms increase their sizes to take advantage of greater specialization (economies of scales).

**Section B: Short/Long Questions**

**B1.**

a) In this case, only interest expenses paid for the bank loan involved money outlay; i.e. $20,000 ( = $200,000*10%).

b) Opportunity cost = explicit cost + implicit cost
   = Interest paid for the bank loan
   + interest forgone from investing his own money in other alternative(s)
   = $20,000 + $100,000*10% = $30,000

*B2.**

a)

<table>
<thead>
<tr>
<th>Labor (workers)</th>
<th>Output (pizzas per day)</th>
<th>TVC (dollars per day)</th>
<th>TC (dollars per day)</th>
<th>MC (dollars per day)</th>
<th>AFC (dollars per day)</th>
<th>AVC (dollars per day)</th>
<th>ATC (dollars per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
<td>50</td>
<td>150</td>
<td>6.25</td>
<td>12.50</td>
<td>6.25</td>
<td>18.75</td>
</tr>
<tr>
<td>2</td>
<td>18</td>
<td>100</td>
<td>200</td>
<td>5.00</td>
<td>5.56</td>
<td>5.56</td>
<td>11.11</td>
</tr>
<tr>
<td>3</td>
<td>26</td>
<td>150</td>
<td>250</td>
<td>6.25</td>
<td>3.85</td>
<td>5.77</td>
<td>9.62</td>
</tr>
<tr>
<td>4</td>
<td>31</td>
<td>200</td>
<td>300</td>
<td>10.00</td>
<td>3.23</td>
<td>6.45</td>
<td>9.68</td>
</tr>
<tr>
<td>5</td>
<td>34</td>
<td>250</td>
<td>350</td>
<td>16.67</td>
<td>2.94</td>
<td>7.35</td>
<td>10.29</td>
</tr>
<tr>
<td>6</td>
<td>35</td>
<td>300</td>
<td>400</td>
<td>50.00</td>
<td>2.86</td>
<td>8.57</td>
<td>11.43</td>
</tr>
</tbody>
</table>
b) The increase in total fixed cost raises the average fixed costs and average total costs. However, the increase in the fixed costs has no effect on the average variable cost or the marginal cost. Thus, the ATC and AFC curves shift upward, but the AVC and MC curves do not change.

(Material is mainly adapted from King, S. P. & Harris, R.B. (2003). Principles of microeconomics: study guide (Chapter 13). Southbank, Vic.: Thomson.)
5.8 Firms In Competitive Markets

Teaching Material (Textbook)

Mankiw, N. Gregory, *Principles of Microeconomics*, Thomson South-Western (latest ed.), *Chapter 14*

Overview

- This Chapter extends the analysis of previous chapter to cover profit maximization by competitive firms in the short run and long run.
- The aim of Chapter 14 is to examine how firms make production decisions in competitive markets.

Learning Objective

In this chapter, you will

- see what characteristics make a market competitive.
- examine the output decision and pricing decision of competitive firms.
- examine when and why competitive firms decide to shut down production temporarily in the short run.
- examine how competitive firms decide whether to exit or enter a market in the long run.
- learn how firm behavior determines a market’s short-run and long-run supply curves.

After accomplishing these goals, you should be able to

- identify the characteristics of a competitive market.
- interpret the profit-maximization rule for competitive firms.
- illustrate why a firm will shut down temporarily if its total revenue is less than its variable costs.
- explain the role of economic profit (loss) as a signal for competitive firms to enter (leave) the market.
- derive the market supply curve from the summation of all individual firms’ marginal-cost curves above the average variable cost in the short run, and demonstrate why the long run supply for a constant-cost competitive market is horizontal.
**Chapter Summary**

- A perfectly competitive market is characterized by
  (i) a large number of buyers and sellers,
  (ii) a standardized product, and
  (iii) easy entry and exit of the market.
  Therefore, all buyers and sellers are price takers. The price of the good equals both the firm’s average revenue and its marginal revenue.
- Fixed costs are irrelevant for making output decisions. For any price, a competitive firm determines how much output to produce by equating marginal revenue and marginal cost.
  As marginal revenue equals the market price for a competitive firm, the firm will choose the quantity supplied by looking at the marginal cost curve, which makes that curve the firm’s supply curve.
- If \( P < AVC \), a firm cannot recover its fixed costs. The firm will shut down temporarily in the short run.
  If \( P < ATC \), a firm cannot recover both its fixed and variable costs in the short run. The firm will exit the market in the long run.
- If economic profits exist, new firms will enter the market in the long run, supply increases and price decreases until the economic profits disappear.
  If economic losses exist, firms will exit the market in the long run, supply decreases and price increases until the economic loss disappears.
- In a market with free entry and exit, the long run equilibrium occurs when profits are driven to zero. This means that all firms produce at the price equal to its minimum ATC (the efficient scale) and the number of firms is adjusted to satisfy the quantity demanded at this price.

**Glossary**

- **Competitive Market:**
  is a market with many buyers and sellers trading largely similar products so that each buyer and seller is a price taker.
- **Average Revenue:**
  is total revenue divided by the quantity sold.
- **Marginal Revenue:**
  is the change in total revenue from an additional unit sold. It is identical to price under the competitive market structure.
- **Sunk cost:**
  is a cost that has already been committed and cannot be recovered.

---

**Supplementary Exercises**

**Section A: Multiple Choice**

(Questions with '*' are more challenging.)

A1. A market is competitive if
   (i) each buyer is small compared to the market.
   (ii) each seller is small compared to the market.
   (iii) firms have the flexibility to price their own product.
       A. (i) and (ii) only   B. (i) and (iii) only
       C. (ii) and (iii) only   D. all of the above

A2. When marginal revenue equals marginal cost
       A. the firm must be generating economic profits.
       B. the profit maximizing firm should always increase its level of production.
       C. the firm must be generating economic losses.
       D. losses may be minimized, rather than profits being maximized.

A3. When a profit maximizing firm in a competitive market is unable to generate enough revenue to pay all of its fixed costs it should, in the short run,
       A. shut down and incur the total loss of its fixed costs.
       B. continue to produce as long as marginal cost is less than average revenue.
       C. continue to produce as long as revenue is sufficient to pay variable costs.
       D. shut down until it is able to produce where average revenue exceeds average fixed cost.

A4. A firm's short-run supply curve is part of which of the following curves?
       A. marginal cost  
       B. average variable cost  
       C. marginal revenue  
       D. average total cost
A5. In long-run equilibrium of a competitive market, the number of firms in the markets adjusts so that all of the market demand is satisfied at a price equal to
   A. maximum marginal cost.
   B. minimum average total cost.
   C. minimum average variable cost.
   D. sunk cost.

*A6. If a firm in a competitive market increases production and its marginal revenue remains positive, raising production will
   A. be profitable.
   B. cause the firm to incur losses.
   C. leave profit unchanged.
   D. It is impossible to tell from the information provided.

*A7. A profit-maximizing firm in a competitive market is able to sell its product for $9. At its current level of output the firm's average total cost is $10. Marginal cost is $9 at an output level of 10 units. What is the total loss of this firm?
   A. more than $10
   B. exactly $10
   C. less than $10
   D. None of the above is necessarily correct.

*A8. If the market starts in equilibrium at point C in panel (b), a decrease in demand will ultimately lead to
   A. more firms in the industry, but lower levels of production for each firm.
   B. a new long-run equilibrium at point D in panel (b).
   C. fewer firms in the market.
   D. none of the above.
Section B: Short/Long Questions
(Questions with ‘*’ are more challenging.)

B1. Discuss the process that induces firms to operate at efficient scale in the long run in a competitive market with free entry and exit.

*B2. The following table shows the information for a competitive firm:

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Total Revenue</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$0</td>
<td>$10</td>
</tr>
<tr>
<td>1</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>3</td>
<td>27</td>
<td>25</td>
</tr>
<tr>
<td>4</td>
<td>36</td>
<td>32</td>
</tr>
<tr>
<td>5</td>
<td>45</td>
<td>40</td>
</tr>
<tr>
<td>6</td>
<td>54</td>
<td>49</td>
</tr>
<tr>
<td>7</td>
<td>63</td>
<td>59</td>
</tr>
<tr>
<td>8</td>
<td>72</td>
<td>70</td>
</tr>
<tr>
<td>9</td>
<td>81</td>
<td>82</td>
</tr>
</tbody>
</table>

a) What is the current market price? Does the firm operate in the short-run or in the long run?

b) What is the profit maximization output level for the firm? Calculate the profit at this output level.

c) Discuss what happen to the firm’s output, market price and profits in the long run.

d) What are the long run equilibrium price and output level for the firm?

*** 🎈 ***

_Suggested Solutions_

Section A: Multiple Choice


*A6. D*

Marginal revenue and marginal cost are used to determine profit maximization quantity. It is not used to determine profit level.
*A7. B
Loss = TC - TR OR = (ATC - AR)*Q = ($10 - $9)*10 = $10

*A8. C
Starting from the intersection of D1 and S1, price will decrease from P1 to P0 after a decrease in demand from D1 to D0. Existing firms suffer loss in the short run. In the long run, marginal firms will leave the market.

Section B: Short/Long Questions
B1.
• If all firms in a competitive industry face the exact same cost structure, the exit and entry of firms will force every firm in the market to operate at the efficient scale of production.
• If it does not operate at efficient scale, it will be incurring economic losses because market price will settle at the minimum of long-run average cost.
• Firms that choose a level of production that is not at the point of minimum of long-run average cost will experience P > ATC.

*B2.
a) The current market price is $9 since MR is equal to $9 at every quantity. Since there is a fixed cost of $10 when the quantity is 0, the firm is operating in the short run.
b) MR = MC = $9 at 6 units. Thus, the profit maximizing quantity is 6 units. At this output level, profit is equal to $5 dollars ($54 - $49 = $5).
c) Positive profits will attract new firms to enter the industry. The entry of new firms will increase the industry supply. The market price will fall. As more firms enter the industry, each firm’s output will continue to fall until the price equals to the average total costs for each firm. All firms will now be earning normal profits (zero profit) only and it will no longer be worthwhile for new firms to enter the industry.
d) In the long run, price will drive down to the minimum ATC. That is, $8 at output level of 5 units.

*** ☑ ***

(Material is mainly adapted from
5.9 Monopoly

Teaching Material (Textbook)


Overview

- This Chapter extends the analysis of previous chapter to monopoly, the case in which barriers to entry protect a single seller from competition.
- The aim of Chapter 14 is to examine how a monopoly makes production decisions with market power.

Learning Objective

In this chapter, you will
- understand why there is only one seller in some markets.
- analyze why monopolists can earn economic profit in the long run.
- examine the output decision and pricing decision of a monopoly.
- see how the market power alters the relationship between a firm’s costs and the price at which it sells its product to the market.
- learn how the monopoly’s decisions affect economic well-being.

After accomplishing these goals, you should be able to
- identify the three barriers to entry of a monopoly and show their role in making monopoly possible.
- explain why MR curve is downward sloping rather than horizontal as in the case of competitive firms.
- compare and contrast the general profit-maximization rule, MR = MC, for perfect competitors where P = MR while for monopolists where P > MR.
- illustrate the deadweight loss from underproduction in the monopoly case.

Chapter Summary

- A monopoly arises when a single firm (i) owns a key resource, (ii) has exclusive rights granted by government, (iii) is able to supply the entire market at a lower cost than several small firms.
Due to the barriers to entry, a monopoly is a sole producer in its market. It is a price setter and may be able to earn profit in the long run.

- As a monopolist is the only seller in the market, the firm faces the downward sloping market demand directly. It must cut price on all its sales in order to sell more units. This price effect partially offsets the output effect that raises total revenue when output increases. Therefore, unlike competitive firms, marginal revenue is always lower than the price of its goods.
- Similar to a competitive firm, a monopoly firm maximizes profit by producing the quantity at which MR = MC. However, a monopoly sets its price along the demand curve at this quantity. Since P > MR, its price exceeds its marginal cost.
- By producing the output where MC = P, the competitive firm produces the efficient level of output. By producing where MC = MR < P, the monopolist produces less than the efficient level of output. Some consumers who value the good more than its cost of production do not buy it. Deadweight loss will be resulted as total surplus is not maximized due to underproduction.

**Glossary**

- **Monopoly:**
  is a firm that is the sole seller of a product without close substitutes.

- **Market power:**
  is the ability of a firm to influence market price.

- **Natural Monopoly:**
  is an industry in which one firm can supply a good or service to an entire market at a lower cost than can two or more firms.

**Supplementary Exercises**

**Section A: Multiple Choice**

(Questions with ‘*’ are more challenging.)

A1. Which of the following conditions is/are qualified as barriers to entering a monopoly market?
   (i) A key resource’s ownership is not defined.
   (ii) The government has given the existing monopoly the exclusive right to produce the good.
   (iii) The costs of production make a single producer more efficient than a large number of producers.

   A. (i) and (ii)  
   B. (ii) and (iii)  
   C. (i) only  
   D. all of the above
A2. If a monopolist faces a downward sloping market demand curve, its:

A. average revenue is always less than marginal revenue.
B. marginal revenue is greater than the price of the units it sells.
C. average revenue is less than the price of its product.
D. marginal revenue is always less than the price of the units it sells.

A3. A profit maximizing monopolist will produce the level of output at which:

A. marginal revenue is equal to marginal cost.
B. average revenue is equal to average total cost.
C. average revenue is equal to marginal cost.
D. total economic revenue is equal to opportunity cost.

A4. The key difference between a competitive firm and a monopoly firm is the ability to select:

A. the price of its output.
B. the level of competition in the market.
C. the level of production.
D. inputs in the production process.

A5. The economic inefficiency of a monopolist can be measured by:

A. the number of consumers who are unable to purchase the product because of its high price.
B. the deadweight loss.
C. the excess profit generated by monopoly firms.
D. the poor quality of service offered by monopoly firms.

*A6. Which of the following statements is true for monopolies?

A. Monopolies can charge any price they want.
B. Unlike competitive firms, monopolies are not constrained by market demand.
C. Monopolies will always increase their revenue by selling more of their goods.
D. all of the above

*A7. For a monopolist, when does marginal revenue exceed demand?

A. when output is less than profit maximizing output
B. when output is greater than profit maximizing output
C. when price is subject to the Law of Demand
D. Never.
*A8. The figure below reflects the cost and revenue structure for a monopoly firm.

A profit maximizing monopoly would have profit equal to
A. \((P_3 - P_0) \times Q_2\)
B. \((P_3 - P_0) \times Q_4\)
C. \(P_3 \times Q_2\)
D. \(P_2 \times Q_4\)

Section B: Short/Long Questions
(Questions with * are more challenging.)

B1. What is the defining characteristic of a natural monopoly? Give an example of a natural monopoly.

*B2. The following tables show the demand and production of Pendo’s Gold Mines, a monopoly in the market:

<table>
<thead>
<tr>
<th>Price (dollars per ounces)</th>
<th>Quantity demanded (ounces per day)</th>
<th>Quantity produced (ounces per day)</th>
<th>Total cost (dollars per ounces)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>100</td>
<td>0</td>
<td>6,000</td>
</tr>
<tr>
<td>200</td>
<td>80</td>
<td>20</td>
<td>7,200</td>
</tr>
<tr>
<td>300</td>
<td>60</td>
<td>40</td>
<td>8,800</td>
</tr>
<tr>
<td>400</td>
<td>40</td>
<td>60</td>
<td>10,800</td>
</tr>
<tr>
<td>500</td>
<td>20</td>
<td>80</td>
<td>13,200</td>
</tr>
<tr>
<td>600</td>
<td>0</td>
<td>100</td>
<td>16,000</td>
</tr>
</tbody>
</table>

a) Calculate the marginal revenue, marginal cost and average total cost schedules.
b) What are the profit maximizing output and price? How much is the economic profit at this output level?
c) Does the firm use resources efficiently? Explain your answer.

*** 📖 ***
**Suggested Solutions**

**Section A: Multiple Choice**


*A6. A*

Both competitive firms and monopolies are constrained by the downward sloping demand. Selling more may not increase revenue which depends on the elasticity of demand.

*A7. D*

Marginal revenue of the first unit sold equals the price of the goods. But thereafter, the monopolist’s marginal revenue is less than the price because a monopoly must reduce the price it charges for every unit it sells in order to sell more units.

*A8. A*

The profit-maximizing quantity is at Q2. Price is P3 and ATC is at P0. Therefore, profit = (P3 - P0)*Q2.

**Section B: Short/Long Questions**

**B1.**

The defining characteristic of a natural monopoly is when a firm can supply goods or services to an entire market at a lower cost than two or more firms can. The examples provided in the text include a water distribution system and a bridge.

*B2.*

a)

<table>
<thead>
<tr>
<th>Quantity (ounces per day)</th>
<th>Price</th>
<th>TR</th>
<th>MR Per ounce</th>
<th>TC</th>
<th>MC Per ounce</th>
<th>ATC</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>600</td>
<td>---</td>
<td>---</td>
<td>6,000</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>20</td>
<td>500</td>
<td>10,000</td>
<td>500</td>
<td>7,200</td>
<td>60</td>
<td>360</td>
</tr>
<tr>
<td>40</td>
<td>400</td>
<td>16,000</td>
<td>300</td>
<td>8,800</td>
<td>80</td>
<td>220</td>
</tr>
<tr>
<td>60</td>
<td>300</td>
<td>18,000</td>
<td>(100)</td>
<td>10,800</td>
<td>100</td>
<td>180</td>
</tr>
<tr>
<td>80</td>
<td>200</td>
<td>16,000</td>
<td>-100</td>
<td>13,200</td>
<td>120</td>
<td>165</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
<td>10,000</td>
<td>-300</td>
<td>16,000</td>
<td>140</td>
<td>160</td>
</tr>
</tbody>
</table>

b) The firm maximizes its profit by producing 60 ounces of gold per day. At this output level, MC = MR = $100.

The price is $300 per ounce. Since ATC is $180 per ounce, economic profit is $300 – 180, which is $120 per ounce and the total economic profit is $7,200 per day.
c) Inefficiency.

Because it produces at the output level where the price $300 exceeds the marginal cost $100.

Not all consumers who value the good at more than its cost buy it. Total surplus is not maximized. A deadweight loss is caused to our society.

5.10 Externalities

Teaching Material (Textbook)


Overview

- Free markets can usually decide on how to use the scarce resources efficiently. However, under some circumstances, the market does not perform efficiently.
- This chapter looks at
  (i) how the market works when decision-makers do not bear the full costs / benefits of their actions and
  (ii) what the government can do to improve the situations.

Learning Objective

In this chapter, you will be able to

- learn the meaning of “externality”.
- understand why the market outcomes are inefficient when there are externalities.

After accomplishing these goals, you should be able to

- define positive and negative externalities.
- give examples of positive and negative externalities.
- show graphically and explain why negative externalities lead to inefficient over-production / consumption.
- show graphically and explain why positive externalities lead to inefficient under-production / consumption.
- explain why government intervention is needed when there are externalities.
- explain how taxes / subsidies can internalize the externalities and achieve a more efficient outcome.

Chapter Summary

- When a production or consumption activity that directly affects a third party, an externality arises.
  If the economic activity imposes a harmful effect such as pollution on the third party, the socially optimal quantity in a market is less than the equilibrium quantity.
If the activity imposes a beneficial effect such as technology spillovers on the third party, the socially optimal quantity is greater than the equilibrium quantity.

- In order to correct such market imperfections, government can intervene by using corrective taxes or subsidies.

Glossary

- **Externality**: refers to “the uncompensated impact of one person’s actions on the well-being of a bystander.”

- **Negative Externality**: refers to the harmful side-effect of a production or consumption activity.

- **Positive Externality**: refers to the beneficial side-effect of a production or consumption activity.

- **Social Cost**: refers to the total cost of production comprising private costs and external costs.

- **Social Value**: refers to the sum of private benefits and external benefits.

- **Internalizing Externalities**: refer to the actions that can alter people’s incentives so that people will take into account of the external effects of their actions.

- **Pigouvian Taxes**: refer to the taxes set equal to the external cost of pollution in order to internalize the negative externality.
Supplementary Exercises

Section A: Multiple Choice
(Questions with ‘*’ are more challenging.)

A1. The “invisible hand” guides a market to maximize
   A. producer surplus from the transaction.
   B. total benefit to society from that market.
   C. both equity and efficiency in that market.
   D. total output of goods or services in that market.

A2. Private markets fail to account for externalities because
   A. there won’t be any externalities in private markets.
   B. the costs associated with externalities are reflected in
      the price set by the sellers.
   C. decision makers in the market fail to take account of
      the external effects of their behavior.
   D. the government cannot correct any harmful effect on
      the market that externalities may cause.

A3. Markets are often inefficient when negative externalities are
    present because
   A. private costs exceed social costs at the market
      equilibrium.
   B. externalities cannot be corrected without government
      regulation.
   C. social costs exceed private costs at the market
      equilibrium.
   D. production externalities always lead to consumption
      externalities.

A4. Internalizing an externality refers to making
   A. buyers and sellers take into account the external
      effects of their actions.
   B. sure that all benefits from the transactions go only to
      the sellers.
   C. sure that government does not disrupt the operations
      of the free market.
   D. buyers pay the full price for the products they
      purchase.

A5 Since private producers do not bear the external cost of
   pollution,
   A. the efficient level of production is achieved.
   B. production is below the efficient level.
   C. production is beyond the efficient level.
   D. the market price is too high and the output is too low.
*A6. According to Figure 1, which price and quantity combination is the social optimum?
   A. P1 and Q1
   B. P2 and Q2
   C. P2 and Q1
   D. P3 and Q1

*A7. Which of the following is true when there is negative externality?
   A. The marginal benefit to consumers is equal to the marginal cost to society of the last units produced.
   B. The marginal benefit to consumers is above the marginal cost to society of the last units produced.
   C. The marginal benefit to consumers is below the marginal cost to society of the last units produced.
   D. None of the above.

*A8. When there is positive externality,
   A. the marginal benefit to society is equal to the marginal cost to producers of the last units produced.
   B. the marginal benefit to society is less than the marginal cost to producers of the last units produced.
   C. the marginal benefit to society is above the marginal cost to producers of the last units produced.
   D. None of the above.
Section B: Short/Long Questions
(Questions with '*' are more challenging.)

B1. Explain why negative externalities lead to inefficient market outcomes and how government policies can remedy the situation.

*B2. The marginal cost of a primary school education is a constant $600 a year. The marginal external benefit from a primary school education is $400 per student per year. Table 1 shows the marginal private benefit from primary school education.

<table>
<thead>
<tr>
<th>Cost/Tuition Fee Per Year</th>
<th>No. of Students Per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1000</td>
<td>1000</td>
</tr>
<tr>
<td>$800</td>
<td>2000</td>
</tr>
<tr>
<td>$600</td>
<td>3000</td>
</tr>
<tr>
<td>$400</td>
<td>4000</td>
</tr>
<tr>
<td>$200</td>
<td>5000</td>
</tr>
</tbody>
</table>

Table 1

(a) If all primary schools are private and there is no government involvement in the education sector, what is the number of students and what will the tuition fee be?
(b) What is the number of students at social optimum?
(c) If the government decides to provide public primary schools, what tuition fee will these schools charge in order to achieve the efficient number of students? How much will taxpayers have to pay?
(d) If the government decides to subsidize private primary schools, how much subsidy the government has to pay in order to achieve the efficient number of primary school students?
Suggested Solutions

Section A: Multiple Choice


*A6. C
At the social optimum price and output level, marginal social cost is equal to marginal private cost plus marginal external cost.

*A7. C
When there is negative externality, marginal cost to society is equal to marginal private cost plus marginal external cost.

*A8. C
When there is positive externality, marginal benefit to society is equal to marginal private benefit plus marginal external benefit.

Section B: Short/Long Questions

B1.

• External costs are costs of production that fall on people other than the producer of goods or services. Marginal social cost equals to marginal private cost plus marginal external cost.

• When there is negative externality, the cost to society of producing the goods is larger than the costs to the private producers. As producers only take into account of their private costs, the market quantity produced by them will exceed the optimal quantity. Inefficiency is resulted as the costs to society exceed the value to consumers at the market equilibrium.

• Governments might overcome externalities by using taxes. Through internalizing the externality, the sellers have an incentive to take account of the external effects of their actions.

*B2.

(a) The tuition fee will be $600 a year, and 3000 students will enroll where marginal private benefits equal to marginal costs (= $600).

(b) The efficient number of students is 5000 a year where marginal social benefits equal to marginal costs (= $600).

(c) To enroll 5000 students, public primary schools would charge $200 per student and taxpayers would pay $400 per student.

(d) The subsidy would be $400 per student, which is equal to the marginal external benefit.

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(Material is mainly adapted from

### 5.11 Public Goods And Common Resources

#### Teaching Material (Textbook)


#### Overview

- The market can allocate resources efficiently when market prices act as a signal for guiding the decisions of buyers and sellers. Unfortunately, problems arise when the price system is absent.
- This chapter looks at how the market works when a good does not have a price attached to it and why private market cannot ensure efficient resource allocation.

#### Learning Objective

In this chapter, students will be able to

- explain how goods can be categorized based on whether they are rival or excludable.
- learn the meaning of public goods and common resources.
- examine why private markets fail to provide public goods.
- examine why common resources are usually being over-used.

After accomplishing these goals, you should be able to:

- define public goods and common resources.
- give examples of public goods and common resources in our economy.
- explain the effect of the free-rider problem on the ability of private markets to provide public goods.
- explain the problem of over-consumption in common resources.
- explain what types of government intervention is needed for public goods and common resources.

#### Chapter Summary

- Goods differ on the basis of whether they are excludable and rival in consumption. Excludability means that it is possible to prevent someone...
from using it whereas rivalry means that one person’s consumption of the good reduces other people’s ability to use it.

Markets allocate the resource efficiently for private goods as they are both excludable and rival in consumption. However, for public goods and common resources, there is market failure.

- Public goods are non-rival and non-excludable. Fireworks displays, national defense, lighthouse, the law, and the creation of fundamental knowledge are examples of public goods.
  
  As no one can be excluded from consuming the public goods, everyone has an incentive not to pay for them and to be a free rider when the good is provided privately.
  
  Hence, governments have to provide public goods and decide the quantity provided based on the cost-benefit analysis.

- Common resources are rival but non-excludable. Common grazing land, clean air, wood from a forest, and congested roads are examples of common resources.
  
  As there is a lack of clearly defined and enforced property right, people are not charged for their use of common resources. As a result, common resources are used excessively. In this case, government intervention is needed aiming to limit the use of common resources.

Glossary

- **Excludability**: refers to ‘the property of a good whereby a person can be prevented from using it.’

- **Rival**: refers to ‘the property of a good whereby one person’s use diminishes other people’s use.’

- **Private Goods**: are a type of ‘goods that are both excludable and rival in consumption.’

- **Public Goods**: are a type of ‘goods that are neither excludable nor rival in consumption.’

- **Common Resources**: refer to the ‘goods that are rival in consumption but not excludable.’

- **Natural Monopoly**: provides the goods that are non-rival in consumption but excludable.
• **Free-rider Problem:** refers to ‘a person who receives the benefit of a good but avoids paying for it.’

• **Tragedy of the Commons:** refers to ‘a parable that illustrates why common resources get used more than is desirable from the standpoint of society as a whole.’

• **Property Rights:** are the specific ownership and use of a good or resource.

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**Supplementary Exercises**

**Section A: Multiple Choice**

(Questions with ‘*’ are more challenging.)

**A1.** Excludability means that
- A. one person’s use of the good diminishes another person’s ability to use it.
- B. people can be prevented from using the good.
- C. a few people can use the good simultaneously.
- D. everyone will be excluded from using the good.

**A2.** If one person’s use of a good diminishes another person’s enjoyment of it, the good is
- C. non-rival.   D. non-Excludable.

**A3.** The government provides public goods because
- A. private producers compete among themselves in the production of public goods.
- B. free riders make it difficult for private markets to supply the socially optimal quantity.
- C. markets are always better off under government control.
- D. external benefits will occur to the market.

**A4.** Government can avoid over-exploitation of a common resource by
- A. taxing the use of common resources.
- B. issuing tradable permits for use of common resources.
- C. issuing quotas or legal limits for use of common resources.
- D. All of the above.
A5. The efficient level of production of a public good occurs where
   A. there is the maximum number of free riders.
   B. marginal cost of production is equal to the marginal benefit realized by consumers.
   C. total cost of production is equal to the total benefit realized by consumers.
   D. marginal cost of production is at minimum.

*A6. Market failure associated with the free-rider problem is a result of
   A. the problem associated with common resources.
   B. benefits that accrue to those who don’t pay.
   C. losses that accrue to suppliers of the good.
   D. losses where marginal costs exceed marginal benefits.

*A7. A group of friends decide to meet at a Chinese restaurant for lunch. They decide that each one will order a dish and they will share the dishes and split the cost evenly among each person. In this particular case, a tragedy of the commons is likely because of each of the following EXCEPT
   A. Each person has an incentive to eat as fast as possible since their individual rate of consumption will not affect their individual cost.
   B. There is an externality associated with eating the food on the table.
   C. When one person eats, he/she may not take into account how his choice affects his friends.
   D. Each dish would be both excludable and rival.

*A8. The social cost of cutting trees in a forest is
   A. the increasing chance of flooding as more trees are cut.
   B. the increasing chance of flooding as more trees are cut plus the private cost of the cutting.
   C. the opportunity cost to the individual of cutting the wood.
   D. the marginal costs of cutting the last tree.

Section B: Short/Long Questions

B1. Explain how goods can be categorized on the basis of whether they are rival in consumption or excludable.

*B2. State the main characteristics of public goods and common resources, and explain how to find the efficient quantities of public goods and common resources.
Suggested Solutions

Section A: Multiple Choice


*A6. B
Free riding involves individuals benefiting from the consumption of goods but not paying for them.

*A7. D
The problem associated with common resources for the excessive use is called the tragedy of the commons. Common resources are non-excludable but rival in consumption.

*A8. B
Social Costs
\[ = \text{Private Costs} + \text{External Costs} \]
\[ = \text{Private cost of the cutting} + \text{The increasing chance of flooding} \]

Section B: Short/Long Questions

B1.
- Excludability means that it is possible to prevent someone from using it whereas rivalry means that one person’s consumption of the good reduces other people’s ability to use it.
- Private goods are both rival and excludable.
  - Natural monopolies are excludable but non-rival.
  - Common resources are rival in consumption but non-excludable.
  - Public goods are non-rival and non-excludable.

*B2.
- Public goods have two characteristics.
  - First, consumption of public goods is non-rival, i.e. one person’s consumption does not diminish another person’s consumption.
  - Second, public goods are non-excludable, i.e. it is impossible to exclude anyone from consuming the goods.
  - Firms cannot profitably supply public goods such as national defense because no one has the incentive to pay for them, and the government often takes the responsibility for providing them.
  - The market demand curve for private goods can be found by adding the quantity-demanded by each consumer at each price level.
  - For the demand curve for public goods, it is found by adding the price each consumer vertically would be willing to pay for each quantity of the goods.
The optimal quantity of public goods occurs where the demand curve intersects the marginal cost curve.

- The tragedy of the commons refers to the problem of the excessive use of common resources and it is a result of the lack of clearly defined and enforced property rights.
  In this case, we cannot find the efficient quantity as the usage of common resources is not efficient.

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(Material is mainly adapted from
6. Past Paper

You can download the past papers of the course according to the following steps:

1) Use any computer available on either Hunghom Bay or West Kowloon Campus to visit the website of CPCE Library of the Hong Kong Polytechnic University: http://www.cpce-polyu.edu.hk/lib/

2) Click the icon of "Examination Papers Database" on your right hand side and you will see the following webpage.
3) Select “CC2104” for the “subject code” and click the icon of “submit”. Then, you can find the list of past papers available for browsing. You can download the past papers and save them in your portable hard disk such as flash disk.

7. Reference

References:


Leisure Reading:


THE END