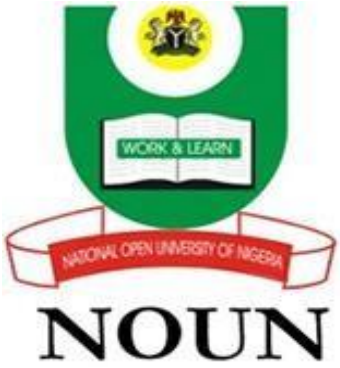


**NATIONAL OPEN UNIVERSITY OF NIGERIA**

# INTERNATIONAL ECONOMICS
## ECO 344

**FACULTY OF SOCIAL SCIENCES**

**COURSE GUIDE**

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**CONTENT**



**Introduction**

Welcome to ECO: 344 INTERNATIONAL ECONOMICS.

ECO 344: International Economics is a three-credit and one-semester undergraduate course for Economics students. The course is made up of fifteen units spread across fifteen lecture weeks. This course guide gives you an insight to international economics in year three-second semester. It tells you about the course materials and how you can work your way through these materials. It suggests some general guidelines for the amount of time required of you on each unit to achieve the course aims and objectives successfully. Answers to your tutor marked assignments (TMAs) are therein already.

**Course Content**

This course is basically on International Economics, which is an extension to a more broader discussion of what is happening in the international trade and the players of tin trade between countries. The topics covered include Economy and Global trade, the theory of gains from trade, differences in technology, the factor model and Government policies as determinants of trade.

**Course Aims**

This course aims to give students an in-depth understanding of the International Economics as regards

- Fundamental concepts and practices of international Economics
- To familiarize students with the issue of the theory of gains from trade

- To stimulate student's knowledge of differences in technology

- To make the students understand what is the factor model and Government policies as determinants of trade

- To expose the students to the differences between home trade and foreign trade

- To ensure that the students know more about the theory of doing trade with other countries in the world.

**Course Objectives**

To achieve the aims of this course, there are overall objectives which the course is out to achieve though, there are set out objectives for each unit. The unit objectives are included at the beginning of a unit; you should read them before you start working through the unit. You may want to refer to them during your study of the unit to check on your progress. You should always look at the unit objectives after completing a unit. This is to assist the students in accomplishing the tasks entailed in this course. In this way, you can be sure you have done what was required of you by the unit. The objectives serve as study guides, such that student could know if he is able to grab the knowledge of each unit through the sets of objectives in each one. At the end of the course period, the students are expected to be able to:

- Understand the Heckscher-Ohlin theorem
- Understand the meaning of Stolper Samuelson and Rybesynski theorem
- Define and understand the meaning of trade theory with many goods and factors.
- Understand the factor-content theorem.
- Understand the meaning of Productivity of labour
- Know how to determine the Marginal Productivity, commodity prices and factor prices.
- Define and understand the meaning of trade theory with many goods and factors.
- Understand the meaning of endowments changes, factor endowments and factor prices
- Define and understand the meaning of endowment changes and outputs.
- Understand the Pattern of trade.
- Understand the meaning of gain from trade
- Know the meaning of Factor Market Distortion
- Understand the analysis of Competitive Equilibrium.

**Working Through the Course**

To successfully complete this course, you are required to read the study units, referenced books and other materials on the course.
Each unit contains self-assessment exercises called Student Assessment Exercises (SAE). At some points in the course, you will be required to submit assignments for assessment purposes. At the end of the course, there is a final examination. This course should take about 15weeks to complete and some components of the course are outlined under the course material subsection.

**Course Material**

The major component of the course, what you have to do and how you should allocate your time to each unit in order to complete the course successfully on time is listed as follows:

1. Course guide
2. Study unit
3. Textbook
4. Assignment file
5. Presentation schedule

**Study Unit**

There are 15 units in this course which should be studied carefully and diligently.

| | |
|---|---|
| **MODULE ONE** | **ECONOMY AND GLOBAL TRADE** |
| Unit ONE | Global Economy |
| Unit TWO | Supply and Production Possibilities |
| Unit THREE | Goods and Factor Model |
| Unit FOUR | General Equilibrium in a Closed Economy |

| | |
|---|---|
| **MODULE TWO** | **THE THEORY OF GAINS FROM TRADE** |
| UNIT ONE | Gains from Trade |
| UNIT TWO | Gain from Exchange |
| UNIT THREE | Cause and Consequences of trade |

| | |
|---|---|
| **MODULE THREE** | **DIFFERENCES IN TECHNOLOGY** |
| UNIT ONE | Model of Production Function Differences |
| UNIT TWO | Role of Wages In The Ricardian Framework |
| UNIT THREE | The Heckscher-Ohlin Model |
| UNIT FOUR | The Stolper-Samuelson and Rybczynski Theorems |

**MODULE FOUR THE FACTORS MODEL AND GOVERNMENT POLICIES AS DETERMINANTS OF TRADE**

UNIT ONE The Specific Factors Model
UNIT TWO Endowment Changes and Factor Prices
UNIT THREE Government Policies as Determinants of Trade
UNIT FOUR Gains from Trade as a Result of Government Policy

Each study unit will take at least two hours, and it includes the introduction, objective, main content, self-assessment exercise, conclusion, summary and references. Other areas border on the Tutor-Marked Assessment (TMA) questions. Some of the self-assessment exercises will necessitate discussion, brainstorming and argument with some of your colleagues. You are advised to do so in order to understand and get acquainted with the historical economic events as well as notable periods.

There are also textbooks under the references and other (online and off-line) resources for further reading. They are meant to give you additional information if only you can lay your hands on any of them. You are required to study the materials; practice the self-assessment exercise and tutor-marked assignment (TMA) questions for greater and in-depth understanding of the course. By doing so, the stated learning objectives of the course would have been achieved.

**Textbook and References**

For further reading and more detailed information about the course, the following materials are recommended:


Adefele, A. A., (2015). Towards the development of world trade Business: Africa perspective, 1st edition, Dalenton Press limited.

Adesua, D. F., (2012). The Element of International Trade, 1st edition, JSK Press Limited, Lagos, Nigeria.

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Balance, R.H., Forstner, H. and Murray T. (1987) "Consistency Tests of Alterative Measures of comparative advantage" review of economics and statistics 69: 157 – 161.

Bhagwati, J. & Srinivasan, T.N (1983). Lectures on International Trade. Cambridge: MIT Press, chapter 20–23.

Brecher R.A., (1971). Optimal Commercial Policy for a minimum wage Economy Journal of International Economics 4: 139–149.

Bebe, O. O., (2013). Introduction to International Economics, a broader perspective, 1st

edition, Sandy Press Limited, Lagos
Chipman, J.S. (1965). A Survey of the Theory of International Trade, Part 2, The Neo-Classical theory Economic 33: 685-760.
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Dollar, D and Wolff, E. N. (1993). Competitiveness, comvergence, and international specialization. Chicago: university of chucago press.
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Graham F.D., (1948). The theory of international value. Princeton, Princeton university press.
George, M. K., (2013). The theory of Absolute and Comparative Advantage in developed and developing countries, 1st edition, Mill world Publication, Lagos, Nigeria.
Haberler, A.C. (1950). Some problems in the pure theory of international trade economic journal 70:215-240
International Monetary Fund (1992), International Finance statistics year book: Washington, D.C.: International Monetary Fund.
Jones R.W and Neary J.P. (1984). The positive theory of international trade. In R.W. Jones and P. Kenen (editors) Handbook of international economics value 1. Amsterdan north Holland 1-62
Johnson, H. G. (1961). Factor endowments international trade if factor prices, in H. G. Johnson, ed international trade and economic growth. Cambridge, mass harvard university press, 17-30
Jones, R. W. (1956-57). Factor proportions and the heckscher-ohlin theorem, Review of economic studies 24: 1-10
Jones. R. W. (1965). The structure of simple general equilibrum models. Journal of political economy studirs 24:1-10
Jones, R.W. (1971). A three factor model in theory and history in J. Bhagwati et al eds. Trade balance of payments and growth, chapter 1 Amsterdam north Holland
Johnson, H.G. (1959). International Trade, Income Distribution and the Offer Curve. Manchester School 27: 241-260

Kemp, M. C. (1989). The Pure Theory of International Trade and Investment. Englewood Cliffs, N.J.: Prentice-Hall.
Lerner, A.P. (1953). Essays in Economic Analysis. London: Macmillan
Leaner, E. E. (1980). The leontief paradox reconsidered. Journal if political ecinomy 88 495-503.
Magee, S.P (1978). Three simple tests of the stolper-samuelson theorem. In P. Oppenheimer, ed. Issues in international economics, chapter 10 stocksfiled. England. Oriel press
Mayer W. (1974). Short run and long run equilibrium for a small open economy. Journal of political economics 82, 955 - 967
Melvin, J. R. (1971). On the Derivation of the Production Possibility Curve. Economics 39:287-294.
Meade, J.E. (1952). Geometry of International role London: Allen and Unwin.
Melvin, J.E. (1985). Domestic Taste Differences, transportation cost and international Trade, Journal of International Economics 18: 65-82.
Melvin J.R (1969) On a demand assumption made by graham Southern economic journal 36:36-43
Melvin J.R (1969). Mill's law of international value, southern economic journal 36: 36-43
Markusen, J. R. and Melvin. J. R. (1985). The Gains-from-Trade Theorem with Increasing Returns to Scale, in H. Kierzkowski (editor), Monopolistic Competition in International Trade. London: Oxford University Press.
Ogunsanjo, A. O., (2014). Introduction to international trade theory, 1st edition, Melting Point Press Limited, Lagos

Ricardo D, (1817). On the principles of political economy and taxation. London John Murray
Savosnick, K. M. (1958). The Box Diagram and the Production Possibility Curve, Swedish Economic Journal 60, 183-197.
Samuelson, P.A. (1939). The Gains from International Trade. Canadian Journal of Economics and Political Science 5: 195-205.
Ruffin. R.J (1988). The missing link. The Richardian approach to the factor endowments theory of trade American economic review 78: 759 - 772
Waziri, M. L., (2014). International Trade and the Economy, 1st edition, Waxxy Publisher Limited, Lagos, Nigeria

**Assignment File**

Assignment files and marking scheme will be made available to you. This file presents you with details of the work you must submit to your tutor for marking. The marks you obtain from these assignments shall form part of your final mark for this course. Additional information on assignments will be found in the assignment file and later in this Course Guide in the section on assessment.
There are four assignments in this course. The four course assignments will cover:
Assignment 1 - All TMAs' question in Units 1 – 4 (Module 1)

Assignment 2 - All TMAs' question in Units 5 – 7 (Module 2)
Assignment 3 - All TMAs' question in Units 8 – 11 (Module 3)
Assignment 4 - All TMAs' question in Unit 12 – 15 (Module 4).

**Presentation Schedule**

The presentation schedule included in your course materials gives you the important dates for this year for the completion of tutor-marking assignments and attending tutorials. Remember, you are required to submit all your assignments by the due date. You should guide against falling behind in your work.

**Assessment**

There are two types of assessment of the course. First are the tutor-marked assignments; second, there is a written examination.

In attempting the assignments, you are expected to apply information, knowledge and techniques gathered during the course. The assignments must be submitted to your tutor for formal Assessment in accordance with the deadlines stated in the Presentation Schedule and the Assignments File. The work you submit to your tutor for assessment will count for 30 % of your total course mark.

At the end of the course, you will need to sit for a final written examination of three hours duration. This examination will also count for 70% of your total course mark.

**Tutor-Marked Assignments (TMAs)**

There are our tutor-marked assignments in this course. You will submit all the assignments. You are encouraged to work all the questions thoroughly. The TMAs constitute 30% of the total score.

Assignment questions for the units in this course are contained in the Assignment File. You will be able to complete your assignments from the information and materials contained in your set books, reading and study units. However, it is desirable that you demonstrate that you have read and researched more widely than the required minimum. You should use other references to have a broad viewpoint of the subject and also to give you a deeper understanding of the subject.

When you have completed each assignment, send it, together with a TMA form, to your tutor. Make sure that each assignment reaches your tutor on or before the deadline given in the Presentation File. If for any reason, you cannot complete your work on time, contact your tutor before the assignment is due to discuss the possibility of an extension. Extensions will not be granted after the due date unless there are exceptional circumstances.

**Final Examination and Grading**

The final examination will be of three hours' duration and have a value of 70% of the total course grade. The examination will consist of questions which reflect the types of

self-assessment practice exercises and tutor-marked problems you have previously encountered. All areas of the course will be assessed

Revise the entire course material using the time between finishing the last unit in the module and that of sitting for the final examination to. You might find it useful to review your self-assessment exercises, tutor-marked assignments and comments on them before the examination. The final examination covers information from all parts of the course.

**Course Marking Scheme**

The Table presented below indicates the total marks (100%) allocation.

| **Assignment** | **Marks** |
|---|---|
| Assignments (Best three assignments out of four that is marked) | 30% |
| Final Examination | 70% |
| **Total** | **100%** |

**Course Overview**

The Table presented below indicates the units, number of weeks and assignments to be taken by you to successfully complete the course, International Economics (ECO 344).

| **Units** | **Title of Work** | **Week's Activities** | **Assessment (end of unit)** |
|---|---|---|---|
| | Course Guide | | |
| | **Module 1 Governance and Corruption** | | |
| 1 | Global Economy | Week 1 | Assignment 1 |
| 2 | Supply and Production Possibilities | Week 2 | Assignment 1 |
| 3 | Goods and Factor Model | Week 3 | Assignment 1 |
| 4 | General Equilibrium in the Close Economy | Week 4 | Assignment 1 |
| | **Module 2 Civil Society and Development** | | |
| 1 | Gains from Trade | Week 5 | Assignment 2 |
| 2 | Gain from Exchange | Week 6 | Assignment 2 |
| 3 | Cause and Consequences of trade | Week 7 | Assignment 2 |
| | **Module 3 Globalization as a Developmental Issue** | | |
| 1 | Model of Production Function Differences | Week 8 | Assignment 3 |
| 2 | Role of Wages In The Ricardian Framework | Week 9 | Assignment 3 |
| 3 | The Heckscher-Ohlin Model | Week 10 | Assignment 3 |

| | | | |
|---|---|---|---|
| 4 | The Stolper-Samuelson and Rybczynski Theorems | Week 11 | Assignment 3 |
| | **Module 4 Poverty, Equity and Well-Being** | | |
| 1 | The Specific Factors Model | Week 12 | Assignment 4 |
| 2 | Endowment Changes and Factor Prices | Week 13 | Assignment 4 |
| 3 | Government Policies as Determinants of Trade | Week 14 | Assignment 4 |
| 4 | Gains from Trade as a Result of Government Policy Poverty-Targeted Intervention. | Week 15 | Assignment 4 |
| | **Total** | **15 Weeks** | |

## How To Get The Most From This Course

In distance learning the study units replace the university lecturer. This is one of the great advantages of distance learning; you can read and work through specially designed study materials at your own pace and at a time and place that suit you best.
Think of it as reading the lecture instead of listening to a lecturer. In the same way that a lecturer might set you some reading to do, the study units tell you when to read your books or other material, and when to embark on discussion with your colleagues. Just as a lecturer might give you an in-class exercise, your study units provides exercises for you to do at appropriate points.

Each of the study units follows a common format. The first item is an introduction to the subject matter of the unit and how a particular unit is integrated with the other units and the course as a whole. Next is a set of learning objectives. These objectives let you know what you should be able to do by the time you have completed the unit.
You should use these objectives to guide your study. When you have finished the unit you must go back and check whether you have achieved the objectives. If you make a habit of doing this you will significantly improve your chances of passing the course and getting the best grade.

The main body of the unit guides you through the required reading from other sources. This will usually be either from your set books or from a readings section. Some units require you to undertake practical overview of historical events. You will be directed when you need to embark on discussion and guided through the tasks you must do.
The purpose of the practical overview of some certain historical economic issues are in twofold. First, it will enhance your understanding of the material in the unit. Second, it will give you practical experience and skills to evaluate economic arguments, and understand the roles of history in guiding current economic policies and debates outside your studies. In any event, most of the critical thinking skills you will develop during studying are applicable in normal working practice, so it is important that you encounter them during your studies.

Self-assessments are interspersed throughout the units, and answers are given at the ends of the units. Working through these tests will help you to achieve the objectives of the unit and prepare you for the assignments and the examination. You should do each self-assessment exercises as you come to it in the study unit. Also, ensure to master some major historical dates and events during the course of studying the material.

The following is a practical strategy for working through the course. If you run into any trouble, consult your tutor. Remember that your tutor's job is to help you. When you need help, don't hesitate to call and ask your tutor to provide it.

1. Read this Course Guide thoroughly.
2. Organize a study schedule. Refer to the `Course overview' for more details. Note the time you are expected to spend on each unit and how the assignments relate to the units. Important information, e.g. details of your tutorials, and the date of the first day of the semester is available from study centre. You need to gather together all this information in one place, such as your dairy or a wall calendar. Whatever method you choose to use, you should decide on and write in your own dates for working breach unit.
3. Once you have created your own study schedule, do everything you can to stick to it. The major reason that students fail is that they get behind with their course work. If you get into difficulties with your schedule, please let your tutor know before it is too late for help.
4. Turn to Unit 1 and read the introduction and the objectives for the unit.
5. Assemble the study materials. Information about what you need for a unit is given in the `Overview' at the beginning of each unit. You will also need both the study unit you are working on and one of your set books on your desk at the same time.
6. Work through the unit. The content of the unit itself has been arranged to provide a sequence for you to follow. As you work through the unit you will be instructed to read sections from your set books or other articles. Use the unit to guide your reading.
7. Up-to-date course information will be continuously delivered to you at the study centre.
8. Work before the relevant due date (about 4 weeks before due dates), get the Assignment File for the next required assignment. Keep in mind that you will learn a lot by doing the assignments carefully. They have been designed to help you meet the objectives of the course and, therefore, will help you pass the exam. Submit all assignments no later than the due date.
9. Review the objectives for each study unit to confirm that you have achieved them. If you feel unsure about any of the objectives, review the study material or consult your tutor.

10. When you are confident that you have achieved a unit's objectives, you can then start on the next unit. Proceed unit by unit through the course and try to pace your study so that you keep yourself on schedule.
11. When you have submitted an assignment to your tutor for marking do not wait for its return `before starting on the next units. Keep to your schedule. When the assignment is returned, pay particular attention to your tutor's comments, both on the tutor-marked assignment form and also written on the assignment. Consult your tutor as soon as possible if you have any questions or problems.
12. After completing the last unit, review the course and prepare yourself for the final examination. Check that you have achieved the unit objectives (listed at the beginning of each unit) and the course objectives (listed in this Course Guide).

**Tutors and Tutorials**

There are some hours of tutorials (2-hours sessions) provided in support of this course. You will be notified of the dates, times and location of these tutorials. Together with the name and phone number of your tutor, as soon as you are allocated a tutorial group.

Your tutor will mark and comment on your assignments, keep a close watch on your progress and on any difficulties, you might encounter, and provide assistance to you during the course. You must mail your tutor-marked assignments to your tutor well before the due date (at least two working days are required). They will be marked by your tutor and returned to you as soon as possible.

Do not hesitate to contact your tutor by telephone, e-mail, or discussion board if you need help. The following might be circumstances in which you would find help necessary. Contact your tutor if.

• You do not understand any part of the study units or the assigned readings
• You have difficulty with the self-assessment exercises
• You have a question or problem with an assignment, with your tutor's comments on an assignment or with the grading of an assignment.

You should try your best to attend the tutorials. This is the only chance to have face to face contact with your tutor and to ask questions which are answered instantly. You can raise any problem encountered in the course of your study. To gain the maximum benefit from course tutorials, prepare a question list before attending them. You will learn a lot from participating in discussions actively.

**Summary**

The course, International Economics (ECO 344), expose you to the field of international Economics, Economy and Global Trade, Global Economy, Supply and Production Possibilities, Goods and Factor Model, General Equilibrium in the Closed Economy etc. This course also gives you insight into the Theory of Gains from trade, Gains from trade,

Gain from exchange, Cause and consequences of trade

However, differences in technology, Model of Production Function differences, Role of Wages in the Ricardian Framework, The Heckscher-Ohlin Model, The Stolper Samuelson and Rybczynski Theorems. Conclusively it analyses the factors Model and Government Policies as Determinants of trade, The Specific Factors Model, Endowment Changes and Factor Prices, Government Policies as Determinants of trade, Gains from trade as a result of Government Policy.

On successful completion of the course, you would have developed critical thinking skills with the material necessary for efficient and effective discussion on international economics: Economy and Global trade, the theory of gains from trade, differences in technology, the factor model and Government policies as determinants of trade.
However, to gain a lot from the course please try to apply anything you learn in the course to term papers writing in other economic development courses. We wish you success with the course and hope that you will find it fascinating and handy

**MODULE ONE ECONOMY AND GLOBAL TRADE**



**Unit One: Global Economy**

**CONTENTS**



## 1.0 INTRODUCTION

Let us start this discussion with an introduction to the history of trade in recent years. However, you may be thinking about what the meaning of the economy and global trade is. In recent years international economic issues have taken centre stage in the news. For example, on January 1, 1994, the United States, Canada, and Mexico entered into a joint compact, called the North American Free Trade Area (NAFTA) that would gradually reduce trade barriers among them. As readers may recall, the negotiation of NAFTA was heavily controversial in all three nations, and its passage was anything but certain. Some people in the United States were worried about the impact of freer trade with Mexico on the living standards of lower-skilled Americans, while others had concerns about the

potential effects of NAFTA on environmental standards in the region. On the other hand, U.S. advocates of the agreement proclaimed its potential to raise incomes overall through greater trade and investment flows. Canadians had the same concerns and hope about the potential effects of NAFTA, with further worries about safeguarding the security of their supplies of oil and natural gas. For their part, many Mexicans were wary of closer competition with the United States' high productivity standards and advanced technologies, expressing particular concern about the fate of traditional Mexican agriculture and peasant cultures.

The countries of the world are also moving toward closer trade integration through acceptance of the Uruguay Round Agreement in the General Agreement on Tariffs and Trade (GATT). The GATT agreement would set out broad rules governing national policies that influence international competition, including tariffs, quotas, foreign investment regulations, agricultural subsidies, and patents and copyrights, among other practices. Because different countries have conflicting interests in these areas, negotiation of the Uruguay Round accords was also quite contentious. Nonetheless, most economists argue that its passage will represent a valuable step forward for global trading relations, bearing the potential for expanding trade and world incomes by hundreds of billions of dollars per year.

As nations have become more interdependent in recent decades through growth in international trade and investment, episodes of trade conflict have become more evident and interesting to the public. An obvious example is the continuous effort by the United States and Japan to manage their bilateral trade relationship, which involves a significant American trade deficit with Japan. Many American critics claim that the Japanese market is not effective to foreign firms, while a standard Japanese response is that foreign firms do not try hard enough to penetrate the market. Japan is hardly unique in this regard, of course. There are loud complaints from numerous countries about protectionism and arbitrary government interference with trade in the United States, Canada, South Korea, India, China, and the European Community, among other nations

and areas. Unquestionably, there are significant pressures in the world economy for nations to interfere with the free exchange of goods in order to limit the negative effects trade may have on some groups and industries.

A major component of this growing international interdependence is the phenomenal growth of multinational enterprises (MNEs), firms that have production and marketing facilities in numerous countries. Many global corporations have become absolutely huge in terms of world sales, assets, and employment, and their international operations have significant effect on both host and home nations. Accordingly, these firms are highly controversial in a number of dimensions, with some people blaming them for shifting jobs out of high-wage countries to low-wage countries and others claiming that they change locations in response to differences in environmental or business regulations. On the other hand, most economists tend to view MNEs as conduits for efficient global allocation of capital.

This brief review suggests that international economic problems will to gain prominence in debates over public policy. While hundreds of interesting questions on this subject could be posed, obviously important ones include the following: Should countries continue to work toward global free trade, or are particular nations better off with regional free trade arrangements? When might it be sensible to place quantitative restrictions on imports of particular goods? What are the connections between the need for business regulations and the operation of trade policies? Should nations interfere with the free flow of capital and labour? These kinds of questions, which are both positive and normative in nature, concern us in this international economics course material.

**2.0. Objectives**

At the end of this unit, you should be able to:

- Define and understand the meaning of the Global Economy
- Define and understand the meaning of international trade theory
- Know the importance of international trade

- Understand the Sectorial Structure of trade

## 3.0. Main Content

## 3.1 PERSPECTIVE ON THE THEORY OF INTERNATIONAL TRADE

In this unit we study international trade, which is the exchange across national borders of goods, services, and factors, and the impacts of this trade on domestic and global economies.

We will study decision-making in a national context and examine whether nations can work to maximize some measure of collective well-being. In doing so, we will consider decisions at both the individual and the governmental levels.

Within each nation is an aggregate of individuals acting in the economic arena. International trade results from the interactions among those individuals and with persons in other nations. Thus, understanding the theory of the firm and the theory of consumer behavior is important in studying this level of international economics.

Different nations arise largely because of historical, political, and geographical factors. In practical terms, however, nations are identified with their governments, which take actions that affect the domestic and global economies. This level of decision-making is one feature that distinguishes the study of international trade from the study of traditional economics. Our usual presumption is that governments act in order to maximize the overall income and welfare of the economy. As we will see, however, this presumption is often untrue.

International economics can be divided conveniently into two parts: real analysis or trade theory, and monetary analysis or international finance. Real analysis studies the reasons that trade takes place, the implications for commodity and factor price of changes in real variables (such as the stock of capital and the supply of labour), the benefits that accrue from international trade, and the effect of trade restrictions on the welfare of the

economy. Because its focus is equilibrium determination of real trade flows and welfare, trade theory generally analyzes barter exchange expressed in terms of a numeraire good. It ignores macroeconomic disequilibrium problems by assuming the existence of full employment and aggregate trade balance. Monetary analysis, on the other hand, is concerned with such issues as the determination of exchange rates and the international transmission of unemployment and inflation. Often the two branches of international economics use different methodologies, with trade theory using market-clearing microeconomic equilibrium processes and international finance using macroeconomic concepts such as single aggregate output and price level, in which there can be short-run fluctuations. However, this distinction can easily be overdrawn. In recent years economists have made great strides in integrating the two approaches by modelling aspects of international finance, such as the existence of an aggregate trade deficit, as the result of microeconomic equilibrium processes in which agents trade goods both across borders and over time.

The subject matter of this unit concerns the trade in commodities and factors that takes place among nations. One question naturally arises: why is it necessary to distinguish trade between nations from trade between regions, and even from trade between individual consumers? The basic motivations for all such exchanges are similar, including differences in tastes and factor endowments. However, there are some unique features of international trade. First, though it is reasonable to assume that labour is completely mobile within a country, labour mobility among countries is severely restricted because of government regulation and differences in such things as language, religion, and social customs. Indeed, it is usually assumed in trade theory that labour is completely immobile among countries. Much of the theory of international trade also assumes capital to be immobile among countries, though we thoroughly analyze the implications of capital mobility later in the course of discussion in this course material. Differences in the degree of factor mobility are important because they help govern the incentives for and the implications of trade in commodities.

A second distinguishing feature of international trade is the governmental regulatory power that does not exist in the individual or interregional trade. Countries impose tariffs and nontariff barriers against imports. They limit the free flow of factors of production among countries and even adjust domestic policies so as to change the pattern of international trade. Such activities are virtually unknown among regions within the same country and in many countries are actually against the law. For example, the U.S. Constitution reserves to Congress the right to regulate interstate commerce, implying that individual states cannot erect barriers against imports from other states.

This dichotomy between interregional and international trade policies is quite interesting. In part, it reflects a popular, though flawed, the view that trade among agents within a country is beneficial while international trade may be costly. People in wealthier nations often argue that trade with poorer nations is harmful because it invites competition from low-wage foreign labour, while people in poorer countries make the opposite case that trade with countries with high-level technologies is unfair. These two views are fundamentally mercantilist in nature, in that they see international trade as taking place within a fixed-sum game. The gains to one country are accompanied by losses to another country. This view is wrong because international exchange, like trade among domestic agents, tends to expand aggregate incomes in all countries. Indeed, a substantial point of inquiry will be to investigate the nature of the gains from trade; or the benefits from international commerce.

To gain a basic understanding of this question, however, note that countries would be worse off if they were precluded from trading. For example, if Canada were not able to export commodities such as wheat and other grains and natural resources, Canadians could not enjoy their present standard of living. Japan imports raw materials and exports final products; without such trade, the real incomes of workers in Japan would be significantly lower. Even large and diverse economies such as that of the United States depend on foreign trade to supply a significant proportion of essential commodities such as petroleum and automobiles. Attaining self-sufficiency at the national level is no more feasible than it would be for a single-family to produce all the goods it must consume.

**Self-Assessment Exercise**

Discuss the theory of international trade.

## 3.2. THE IMPORTANCE OF INTERNATIONAL TRADE

International trade allows countries to exchange goods and services with the use of money as a medium of exchange. The benefits of international trade have been the major drivers of growth for the last half of the 20th century. Nations with strong international trade have become prosperous and have the power to control the world economy. Global trade can become one of the major contributors to the reduction of poverty. Several benefits that can be identified with reference to international trade are as follows:

### 1) Greater Variety of Goods Available for Consumption:

International trade brings in different varieties of a particular product from different destinations. This gives consumers a wider array of choices which will not only improve their quality of life but as a whole it will help the country grow.

### 2) Efficient Allocation and Better Utilization of Resources:

Efficient allocation and better utilization of resources since countries tend to produce goods in which they have a comparative advantage. When countries produce through comparative advantage, wasteful duplication of resources is prevented. It helps save the environment from harmful gases being leaked into the atmosphere and also provides countries with better marketing power.

### 3) Promotes Efficiency in Production:

International trade promotes efficiency in production as countries will try to adopt better methods of production to keep costs down in order to remain competitive. Countries that can produce a product at me lowest possible cost will be able to gain a larger share in the market.

Therefore, an incentive to produce efficiently arises. This will help to increase the standards of the product and consumers will have a good quality product to consume.

### 4) More Employment:

More employment could be generated as the market for the countries' goods widens through trade. International trade helps generate more employment through the establishment of newer industries to cater to the demands of various countries. This will help countries bring down their unemployment rates.

**5) Consumption at Cheaper Cost:**

International trade enables a country to consume things which either cannot be produced within its borders or production may cost very high. Therefore, it becomes cost cheaper to import from other countries through foreign trade.

**6) Reduces Trade Fluctuations:**

By making the size of the market large with large supplies and extensive demand international trade reduces trade fluctuations. The prices of goods tend to remain more stable.

**7) Utilization of Surplus Produce:**

International trade enables different countries to sell their surplus products to other countries and earn foreign exchange.

**8) Fosters Peace and Goodwill:**

International trade fosters peace, goodwill, and mutual understanding among nations. Economic interdependence of countries often leads to close cultural relationship and thus avoid war between them.

### 3.3 Advantages and Disadvantages of International trade

The advantages of international trade include the following:

**(i) Optimal use of natural resources:**

International trade helps each country to make optimum use of its natural resources. Each country can concentrate on the production of those goods for which its resources are best suited. Wastage of resources is avoided.

**(ii) Availability of all types of goods:**

It enables a country to obtain goods which it cannot produce or which it is not producing due to higher costs, by importing from other countries at lower costs.

**(iii) Specialization:**

Foreign trade leads to specialization and encourages production of different goods in different countries. Goods can be produced at a comparatively low cost due to advantages of division of labour.

**(iv) Advantages of large-scale production:**

Due to international trade, goods are produced not only for home consumption but for export to other countries also. Nations of the world can dispose of goods which they have in surplus in the international markets. This leads to production at large scale and the advantages of large-scale production can be obtained by all the countries of the world.

**(v) Stability in prices:**

International trade irons out wild fluctuations in prices. It equalizes the prices of goods throughout the world (ignoring cost of transportation, etc.)

**(vi) Exchange of technical know-how and establishment of new industries:**

Underdeveloped countries can establish and develop new industries with the machinery, equipment and technical know-how imported from developed countries. This helps in the development of these countries and the economy of the world at large.

**(vii) Increase in efficiency:**

Due to international competition, the producers in a country attempt to produce better quality goods and at the minimum possible cost. This increases the efficiency and benefits to the consumers all over the world.

**(viii) Development of the means of transport and communication:**

International trade requires the best means of transport and communication. For the advantages of international trade, development in the means of transport and communication is also made possible.

**(ix) International co-operation and understanding:**

The people of different countries come in contact with each other. Commercial intercourse amongst nations of the world encourages exchange of ideas and culture. It creates co-operation, understanding, cordial relations amongst various nations.

**(x) Ability to face natural calamities:**

Natural calamities such as drought, floods, famine, earthquake etc., affect the production of a country adversely. Deficiency in the supply of goods at the time of such natural calamities can be met by imports from other countries.

**(xi) Other advantages:**

International trade helps in many other ways such as benefits to consumers, international peace and better standard of living.

The Disadvantages of International Trade include:

**(i) Impediment in the Development of Home Industries:**

International trade has an adverse effect on the development of home industries. It poses a threat to the survival of infant industries at home. Due to foreign competition and unrestricted imports, the upcoming industries in the country may collapse.

**(ii) Economic Dependence:**

he underdeveloped countries have to depend upon the developed ones for their economic development. Such reliance often leads to economic exploitation. For instance, most of the underdeveloped countries in Africa and Asia have been exploited by European countries.

**(iii) Political Dependence:**

International trade often encourages subjugation and slavery. It impairs economic independence which endangers political dependence. For example, the Britishers came to India as traders and ultimately ruled over India for a very long time.

**(iv) Mis-utilization of Natural Resources:**

Excessive exports may exhaust the natural resources of a country in a shorter span of time than it would have been otherwise. This will cause economic downfall of the country in the long run.

**(v) Import of Harmful Goods:**

Import of spurious drugs, luxury articles, etc. adversely affects the economy and well-being of the people.

**(vi) Storage of Goods:**

Sometimes the essential commodities required in a country and in short supply are also exported to earn foreign exchange. This results in shortage of these goods at home and causes inflation. For example, India has been exporting sugar to earn foreign trade exchange; hence the exalting prices of sugar in the country.

**(vii) Danger to International Peace:**

International trade gives an opportunity to foreign agents to settle down in the country which ultimately endangers its internal peace.

**(viii) World Wars:**

International trade breeds rivalries amongst nations due to competition in the foreign markets. This may eventually lead to wars and disturb world peace.

**(ix) Hardships in times of War:**

International trade promotes lopsided development of a country as only those goods which have comparative cost advantage are produced in a country. During wars or when good relations do not prevail between nations, many hardships may follow.

## 3.4 Trade, Growth, and Economic Interrelatedness

Globally, international trade has grown considerably in recent decades. For example, over the period between 1963 and 1979, the rate of expansion of real merchandise exports (that is, the value of exports deflated by changes in export prices) in the world averaged

11.8 percent per year, a remarkably high growth rate by historical standards. Indeed, this figure likely underestimates the true growth in the real volume of exports because available price data do not adequately account for the marked improvements in product quality in recent years. At the same time, global growth in real output, measured by gross domestic product (GDP) in each country, averaged 6.1 percent per year, also high by historical standards. Thus, during that period, the world experienced a rapidly rising effective integration among countries as they become more closely interrelated through

international trade in goods. This trend continued after 1979, though economic activity grew at markedly slower rates. Over the period between 1979 and 1991, real export growth averaged 4.4 percent per year, while real output expansion averaged 2.9 percent per year.

This increasing interrelatedness among countries may be observed for specific nations as well. Table 1.1 lists a selected set of countries at different levels of economic development. The first two columns of figures show per-capita gross national product (GNP) in 1990, measured in U.S. dollars, and the average annual growth rate in this variable between 1965 and 1990. Clearly there is wide variation in international living standards, as measured by per-capita GNP. While there are problems in constructing such measures, it appears that there may be as much as a one hundred-fold difference in per-capita incomes between the poorest and wealthiest countries of the world.

Looking at per-capita incomes in a particular year provides only a snapshot of the relative positions among nations. Over time, some countries tend to grow faster than others, as noted in the second column of figures. Overall, it seems that poorer countries tend to grow somewhat faster, than richer countries, though this relationship is weakly reflected in these data. Indeed, in some nations, such as Uganda, measured standards of living have actually deteriorated in the last 25 years, one clear suggestion from the data is that between 1965 and 1990 the nations of East Asia (China, Indonesia, the Republic of Korea, Singapore, and Japan) as shown in Table

**TABLE 1.1**

**Measured of national incomes and trade for selected countries**

| **GNP per Capita** | | | | **Export/GDP** | | |
|---|---|---|---|---|---|---|
| | | **Average Annual Growth 1965** | **Exports** | **Imports** | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Uganda | 236 | -2.4 | 0.2 | 0.6 | 16.7 | 7.9 |
| India | 350 | 1.9 | 17.7 | 20.4 | 3.8 | 7.8 |
| China | 370 | 5.8 | 72.1 | 63.8 | 1.8 | 19.5 |
| Indonesia | 570 | 4.5 | 29.0 | 25.9 | 12.4 | 24.9 |
| Turkey | 1630 | 2.6 | 13.6 | 21.0 | 5.3 | 14.2 |
| Mexico | 2490 | 2.8 | 27.1 | 38.2 | 3.4 | 9.6 |
| Brazil | 2680 | 3.3 | 31.6 | 23.0 | 7.6 | 7.6 |
| Rep. of Korea | 5400 | 7.1 | 71.7 | 81.3 | 9.0 | 25.3 |
| Singapore | 11160 | 6.5 | 58.9 | 66.0 | 84.2 | 147.3 |
| $EC.12^0$ | 17334 | 2.5 | 1366.0 | 1447.1 | 16.5 | 22.4 |
| Spain | 11020 | 2.4 | 60.1 | 93.1 | 6.3 | 11.4 |
| U.K. | 16100 | 2.0 | 185.1 | 210.0 | 18.2 | 21.1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Germany | 22320 | 2.4 | 401.8 | 387.9 | 18.5 | 22.4 |
| Canada | 20470 | 2.7 | 124.8 | 117.6 | 22.6 | 24.4 |
| U.S. | 21790 | 1.7 | 497.7 | 506.2 | 4.3 | 7.1 |
| Japan | 25430 | 4.1 | 314.4 | 234.1 | 9.5 | 9.4 |
| Switzerland | 32680 | 1.4 | 61.1 | 64.3 | 25.1 | 26.5 |
| World | 4010 | 1.5 | 3336.5 | 3508.2 | 10.1 | 15.4 |

Source: world development indicator

1.1) registered the strongest economic growth among regions of the world. Thus, two important questions for study is how international trade can be related to economic growth and whether trade should be considered a cause or a consequence of growth.

Suggestive evidence in answer to these questions exists. Consider the data in the final two columns of Table 1.1, which show the ratios of merchandise exports to GDP in 1970 and 1991. These ratios are often considered to be measures of a nation's "openness" to international trade, though it is more appropriate to interpret them straightforwardly as indications of the share of national production that is exported. Thus, they provide rough suggestions of the relative importance of international trade in aggregate output. In Uganda, as in some other very poor nations, this export share has fallen considerably over the last 25 years, because of a dramatic decline in Uganda's merchandise exports. On the other hand, with the exception of Japan, the East Asian economies in our table registered marked increases in the contribution of their exports to GDP. Most striking is the experience of China, whose exports rose explosively from 1.8 percent of GDP to 19.5 percent of GDP. That .Japan's share was relatively static does not mean that export growth was unimportant. To the contrary, Japan's merchandise exports rose sixteen-fold over the period, as did its GDP. No other developed nation experienced such rapid increases in economic activity. Thus, at this level it appears that rapid trade growth is positively related to rapid economic growth.

**Self-Assessment Exercise**

Discuss the importance of international trade

### 3.5. Trade and National Characteristics

Some particular features of the data are worth mentioning. Note that Singapore’s exports were almost half again as large as its GDP in 1991. This fact reflects Singapore's status as a center for entrepot trade, involving the provision of warehousing, transport facilities, and services in transshipping goods from one market to another. For example, much of Malaysia's exports are processed through Singapore to their ultimate destinations elsewhere. In principle, it is possible for any nation to have a level of exports greater than GDP, though this is unusual in practice. Note also that Canada has long had a high proportion of its GDP devoted to exports, with a slight rise to nearly one quarter by 199. Canada is an excellence example of a nation that economists regard as “open” in the sense that international transactions represent a highly significant proportion of overall activity. For example, in Canada exports now tend to comprise a larger component of national demand than investment.

The United States has slowly but steadily seen the importance of exports in GDP rise over time. Over seven percent of U.S. GDP in 1991 was produced for export, a figure that amounted to some $398 billion. While this is a substantial sum, the United States retains the lowest export-to-GDP ratio among the major industrialized nations. The primary reason for this is simply that the. United States is such a large country that relatively little of its output needs to be produced for the foreign sector. Most of its output may be sold in the huge domestic market with its diversified tastes.

The European Community (EC) provides a good example of a set of countries that are intimately interrelated through international transactions. The EC is an example of a customs union, in which the member countries erect no barriers to imports from the other members while until adopting a common set of restrictions on imports from outside the union. This structural provides a strong measure of economic integration among the participating nations. Accordingly, over 22 percent of the total GDP in these economies is exported, much of it to other countries within the Community. Over time, each of the twelve countries has become more open in the sense considered hero, in large part because of the integration of their economies through trade. Spain, for example, joined the EC in 1986 and has seen its trade with other EC members rise rapidly.

An additional factor in the strength of trade among the EC nations is simply their proximity to one another, which limits associated transport costs. This element is an equally strong consideration in the trade behavior of other Western European countries. Switzerland has long had a strong export-component in GDP, reflecting its close trading relationships with the EC and other Western European countries. Similarly, the marked growth in Turkey's export position reflects its proximity to Europe. In contrast, the relatively small ratio of exports to GDP in Japan reflects in some part the geographical isolation of that country from the other industrialized markets. Note finally that the world as a whole also experienced a marked rise in the importance of exports relative to production, with the ratio rising from 10.1 percent to 15.4 percent between 1970 and

1991. This reaffirms our earlier observation that the globe has become more economically interrelated in recent decades.

Of course, exports are only one part of this story. The middle two columns of Table 1.1 list the values of both exports and imports of merchandise in 1991 for our set of countries. Exports may not equal imports in a particular year for any country, reflecting the existence of merchandise trade deficits or surpluses. Of more interest here is that imports tend to rise along with exports over time as countries become more integrated. Thus, for example, if we were to compute for a given country the ratio of imports to GNP (a rough measure of the importance of foreign sources of consumption goods and intermediate products), we would likely find that it has risen in relationship to the risen in the exports-to-GDP ratio. In 1991 this ratio would have been 8.9 percent for the United States, 22.5 percent for Germany, and 6.4 percent for Japan.

Despite the fact that in some countries, such as the United States and Japan, trade is

relatively less important than in others, international transactions still have an extremely important influence on the overall level of economic activity. This point was clearly emphasized by the mid-1970s energy crisis in the United States. Although at the time, less than five percent of the United States consumption of petroleum products originated in the OPEC countries, those countries' restrictions on supply and the resulting increases in energy prices brought about significant disruptions in the American economy. The impact was even more dramatic in Japan, where nearly all petroleum products must be imported. The oil price increases of the 1970s hastened Japan's shift into alternative energy sources, including nuclear power.

**Self-Assessment Exercise**

Discuss the differences between import trade and export trade.

### 3.6. The Sectorial Structure of Trade

Levels of trade can be significant in particular sectors of the economy even if the overall trade ratios are modest. For instance, the United States imports all of its consumption of certain tropical products, such as cocoa. Looking at two major domestic sectors, in 1990 the United States exported over 45 percent of its agricultural production and imported over 43 percent of its consumption of motor vehicles and automobile parts. Clearly, changes in the international economy that affect these sectors bear potentially significant impacts on domestic prices, output, and employment. Further, such impacts can spill over into other portions of the economy through their effects on consumer demand and input purchases.

A fundamental concept in international trade theory is comparative advantage. As will be made clearer in our later discussion, the economic characteristics of nations and commodities combine to explain the pattern of international trade. To introduce the reader to this concept, we will describe briefly the structure of trade in major commodities for particular countries. In Table 1.2 we have classified six major trade

categories, which are really aggregations of numerous detailed commodities, into sectors in which our countries exhibit a strong excess of exports over imports, a strong excess of imports over exports, or a near balance between exports and imports. (The "+" and "– "signs after the entries in the final column indicate whether there was a small trade surplus or deficit in the sector.) This classification is based on actual trade flows in 1990, with sectorial trade balances adjusted to account for the fact that each country had an aggregate trade imbalance in that year. The calculations are designed to reveal a rough measure of comparative advantage by sector in each country.

**Table 1.2**

**Classification sign of major sectors by 1990 trade orientation for selected countries**

| Country | Strong Net Exports | Strong Net Imports | Near Balance |
|---|---|---|---|
| India | CLOTH | FUEL, CHEM, OFFTEL | FOOD( + ), AUTO(+) |
| China | FOOD, FUEL, | CHEM, OFFTEL, | |

| | | | |
|---|---|---|---|
| | CLOTH | AUTO | |
| Indonesia | FUEL, CLOTH | CHEM, OFFTEL, AUTO | FOOD(+) |
| Turkey | CLOTH | FUEL, CHEM, OFFTEL | FOOD(+), AUTO(+) |
| Mexico | FUEL | OFFTEL | FOOD(-), CHEM(-) AUTO(+), CLOTH(-) |
| Brazil | FOOD, AUTO | FUEL, CHEM, OFFTEL | CLOTH(+) |
| Korea | OFFTEL, CLOTH | FOOD, FUEL, CHEM | AUTO(+) |
| Singapore | OFFTEL, CLOTH | CHEM | FOOD(-), FUEL (+), AUTO(+) |
| EC-12 | AUTO | FUEL, CLOTH | FOOD(-), CHEM (+) OFFTEL(-) |
| Spain | AUTO | FUEL, OFFTEL, CLOTH | FOOD(+), CHEM(-) |
| Germany | CHEM, AUTO | FOOD, FUEL, CLOTH | OFFTEL (-) |
| U.K. | CHEM | FOOD, CLOTH | FUEU (+), OFFTEL (-) AUTO(+) |
| Canada | FOOD, FUEL | OFFTEL, CLOTH | CHEM(-), AUTO(+) |
| U.S. | FOOD, CHEM | FUEL, AUTO, CLOTH | OFFTEL (+) |
| Japan | OFFTEL, AUTO | FOOD, FUEL, CLOTH | CHEM(-) |
| Switzerland | CHEM | FOOD, FUEL AUTO, CLOTH | OFFTEL(-) |

Source: Calculated by the authors using General Agreement on Tariffs and Trade, international 1990-91, and United Nations, Yearbook of International Trade Statistics. Vol. 1, 1990.

*FOOD: food and live animals; FUEL: fuels and fuel products; CHEM: chemicals and chemical products; OFFTEL: office machines and telecommunications equipment; AUTO: motor vehicles find automotive parts; CLOTH: clothing.

Some brief comments about the sectors in this table are in order. It is evident that export strength in food is related to the existence of abundant supplies of agricultural land, as is found in China, Canada, and the United States. Correspondingly, countries with limited land supplies, such us Korea, Japan, and Switzerland, tend to import food. Similar statements can be made about the determination of exporters and importers of fuel. The United States is noteworthy in that although it is one of the largest petroleum producers in the world, it remains a major importer because of its huge demand for energy. In

general, however, it is clear that relatively greater supplies of natural resources area major determinant of comparative advantage.

Clothing represents a strong net-export good for nearly all the developing economies and a strong net-import good for all the developed economies. Clothing is the best example of a good that is produced cheaply with relatively abundant supplies of lower-skilled labor. Thus, it appears that the technological characteristics of production functions interact

with factor supplies to help determine comparative advantage.

The remaining three sectors-chemical, automotive products, and office machines and telecommunications equipment-all represent relatively sophisticated manufacturing products. In addition to standard inputs in production, these goods tend to require substantial scale, innovation, and product differentiation for export success. The developed countries compete among themselves in the latter dimensions, so that there is no obvious pattern of comparative advantage for these goods within that group. For example, Germany, the United Kingdom, the United States, and Switzerland are all major exporters of chemicals, while Canada and Japan tend to Import them, as do the developing countries. Germany, Japan, and Spain are successful exporters of automotive products, while the United States Mini Switzerland are major net importers. Comparative advantage in office machines and telecommunications equipment is similarly mixed, with Korea and Singapore having broken into the ranks of net exporting countries.

In truth, if we were to break up these broad categories of manufactures into small components, we would find that each of the developed countries be net exporters of some goods, such as fax machines, and net importers of other similar goods, such as computer modems. Among the industrialized countries, this trade in similar goods, which economists term intra-industry trade, is prevalent. One of our challenges will be to explain this phenomenon theoretically.

**Other international transactions.** International trade in merchandise has provided one source of significant, growth in economic interrelations among nations. Here, we briefly note that other significant forms of international transactions, including trade in services and foreign direct investment (FDI), have also risen rapidly in recent years.

In principle, trade in services should be treated no differently from trade in goods. Some countries, depending on their factor supplies, technology, and tastes, have a comparative advantage in providing certain services to international customers, just as some countries

have a comparative advantage in certain goods. Major traded services include financial or management expertise, insurance underwriting, transport, tourism, construction, and numerous other professional services. Nonetheless, some important distinctions between trade in goods and services arise. For example, sometimes foreign purchasers come to the domestic economy to consume a service, such as a medical procedure or a vacation. These transactions are properly regarded as exports for the providing country. On the other hand, to provide banking services in a foreign market typically require establishing facilities there instead of exporting some tangible commodity. Because the banking services are produced in the foreign market using primarily foreign inputs we would not count them as exports for the country undertaking the investment.

While it is clearly difficult to get a comprehensive measure of trade in services, it is possible to get rough measures from the balance-of-payments statistics of particular countries. We present data on exports and imports of services for a smaller set of countries in Table 1.3. Note that trade in services is nearly as important quantitatively as

trade in merchandise as reported in Table l.1. Indonesia and Mexico are fairly typical among devolving countries in being net importers of services. In part this reflects the need for these countries to import foreign management techniques and commercial expertise.

**TABLE 1.3**

**Trade in services, stocks of foreign direct investment, and workers' remittances in selected countries, 1991***

| **Country** | **Services exports ($b)** | **Services imports ($b)** | **Stocks of FDI ($b)** | | **Net workers' remittances and migrants** |
|---|---|---|---|---|---|
| | | | Host | Source | |

| | | | | | |
|---|---|---|---|---|---|
| Indonesia | 3.4 | 12.6 | NA | NA | NA |
| Turkey | 9.3 | 6.8 | NA | NA | 2.8 |
| Mexico | 16.4 | 20.9 | NA | NA | 1.9 |
| Rep. of Korea | 15.5 | 17.1 | 5.9 | 3.5 | -0.3 |
| EC.12 | 813.4 | 851.9 | NA | NA | NA |
| Spain | 38.2 | 30.2 | 55.8 | 20.8 | 1.5 |
| Germany | 142.5 | 149.1 | 61.1 | 148.2 | -4.2 |
| U.K. | 194.2 | 183.2 | 237.6 | 242.4 | NA |

Source: World Development indicator

It also reflects the fact that developing nations tend to pay substantial amounts of interest, dividends, and profits on the foreign investments in their economies. They also pay significant royalties for imported technological information. These payments are included in service imports because, effectively, the developing countries import the services of

foreign capital and technology. In any event, trade in services, capital, and technology are all important and growing forms of international transactions in the modern world economy.

Foreign direct investment results when multinational enterprises choose to operate facilities in different countries. We will present a rigorous analysis of this phenomenon. At present, however, note in Table 1.3 that the magnitude of such foreign investments is remarkably high, at least in the developed economies. For example, MNEs headquartered in the United States own approximately $655 billion in foreign producing facilities, while foreign MNEs own $487 billion worth of production operations in the United States. The United Kingdom is both host to and source of over $200 billion in foreign investments. Spain has rapidly expanding FDI in its economy, particularly from MNEs in other EC members, since its accession to the Community. Switzerland and Germany are also major participant in both inward and outward FDI. Japan is unique among developed countries in being the source of massive amounts of investment while relatively little FDI has found its way into that country.

This examination of FDI demonstrates that, despite the standard assumption in trade theory that factors are immobile across countries, it is possible for capital (as opposed to exchange in capital goods, which is considered merchandise trade) to move across borders. The final column of Table 1.3 shows that labor, too, can flow internationally. Like FDI, international labor migration is a complicated topic that we must treat theoretically in a chapter. However, we observe in Table 1.3 that workers and migrants transfer a portion of their incomes earned in a host country back to their home countries. For example, in 1991, Turkish citizens working abroad repatriated some $2.8 billion back to Turkey, while Mexican workers abroad sent back $1.9 billion. This finding suggests that developing countries tend to be net suppliers of labor internationally. Correspondingly, considerable sums were transferred out of Germany, the United States, and Switzerland by resident foreign workers. Spain tends to provide labor to the rest of the EC, while Canada also receives remittances on net, mainly from the United States.

**Self-Assessment Exercise**

What do you understand by the term "Sectorial Structure of Trade?"

## 4.0 Conclusion

Fundamental changes are taking place in the global trade landscape. In the process, significant transformations are underway in relation to the sources of growth of world trade, its direction of flows and patterns and, in turn, individual countries' comparative and competitive advantages. These changes are being driven mainly by such factors as the rapidly growing trade of developing countries; growing trade interconnectedness through global value chain (GVC)-led fragmentation of production processes; proliferation of regional trading arrangements (RTAs); lack of dynamism in multilateral trade negotiations; and the impending need for actions to combat climate change.

## 5.0 Summary

In this unit, we have learnt a lot on global economy and with the progress of the IT revolution, advances in transportation and communication technology, the evolution of financial techniques, and the easing of restrictions on trade and investment, there has been a geometric increase in the international movement of people, products, money and information. Under these circumstances, businesses make strategic choices such as where to establish the bases of their business activities from a global perspective, and attempt to create optimal global value chains.

## 6.0. Tutor-Marked Assignment

1. Discuss the analysis of Global Economy in the world
2. Briefly discuss the importance of international trade.
3. Discuss the sectorial structure of trade.

## 7.0. REFERENCES/FURTHER READING


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**UINIT TWO SUPPLY AND PRODUCTION POSSIBILITIES**

**CONTENTS**



## 1.0 INTRODUCTION

The production possibility frontier (PPF) represents the point at which an economy is most efficiently producing its goods and services and, therefore, allocating its resources in the best way possible. If the economy is not producing the quantities indicated by the PPF, resources are being managed inefficiently and the production of society will dwindle. The production possibility frontier shows there are limits to production, so an economy, to achieve efficiency, must decide what combination of goods and services can be produced.

## 2.0. Objectives

At the end of this unit, you should be able to:

- Define and understand the meaning of Production functions
- Define and understand the meaning of Returns to Scale
- Know the analysis of equilibrium for a single producer
- Explain the objectives of trade policy

## 3.0. Main Content

### 3.1 PRODUCTION FUNCTIONS

Many of the causes of international trade are found in countries' differing abilities to produce certain good. These varying abilities are in turn related to underlying aspects of production such as technologies, factor endowments, competitive conditions, government

taxes and subsidies, and returns to scale. An understanding of these considerations will

ultimately help explain why the United States exports aircraft and cereal grains and imports clothing. These same considerations will help us understand the consequences of trade, including overall welfare gains and the distribution of those gains among the members of a society.

An understanding of trade requires an understanding of complex and indirect relationships, such as how a country's endowments of capital and labor determine its optimal pattern of trade. Before we can grasp the whole picture, we need to establish an understanding of the individual pieces of the puzzle. In this unit, we will develop the tools of production theory and producer equilibrium. Many of you will be familiar with the basic ideas from intermediate microeconomics or principles of economics. For those of you who are relatively unfamiliar with these technical constructions, we urge you to work through them slowly and carefully. We hope that your patience in this course material and the one to come will be rewarded. The ideas developed here will he used repeatedly throughout, the course material, so your investment should pay off.

The basic building block of the supply side of our model will be the production function,

$$X = F(K,L) \qquad (2.1)$$

This equation is the algebraic representation of the fact that commodities are produced with certain primary factors and certain technical knowledge or technology. Thus, Eq. (2.1) is simply a shorthand way of saying that, given a certain technology as represented by the function F, an amount of capital represented by K and an amount of labor services represented by L can be combined to produce some quantity of output represented by X.

The production relation described by Eq. (2.1) contains three variables: the levels of input of capital and labor and the level of output. Geometrically, it could be represented by a three-dimensional surface; diagrammatically, it can be illustrated as in Fig. 2.1. The production surface can be thought of as it a hill, with the origin representing the ground level. At the origin there is neither labor input nor capital input, and therefore, there is no output. With positive amounts of both capital and labor, there will be a positive level of output of X, and as we add more of either capital or labor or both, the output of X increases.

Three-dimensional diagrams are awkward to draw and are not very useful in illustrating economic phenomena. Economists have traditionally found it more useful to convert three-dimensional diagrams, such as the one shown in Fig. 2.1. to two dimensions by considering one of the three variables as fixed. Reexamining Eq. (2.1), we see that there are three possibilities available; we could fix X, L, or K. First, suppose we fixed the level of output at some amount X and considered the combinations of K and L that are consistent with this level of output. Looking at Fig. 2.1, we can imagine taking a slice through the production hill at a height X above the plane KL. Looking down on the plane KL from above, as in Fig. 2.2, the edge of the slice could be represented by the line X.

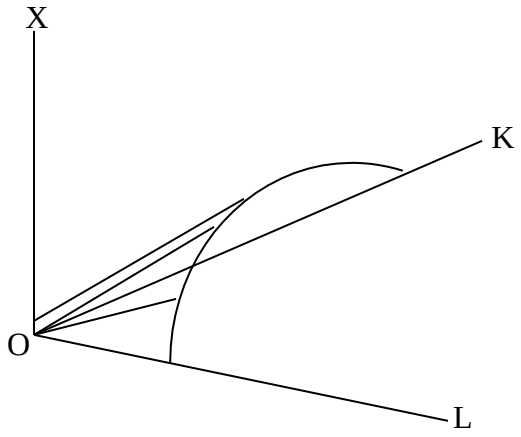


Fig. 2.1: The Production Surface

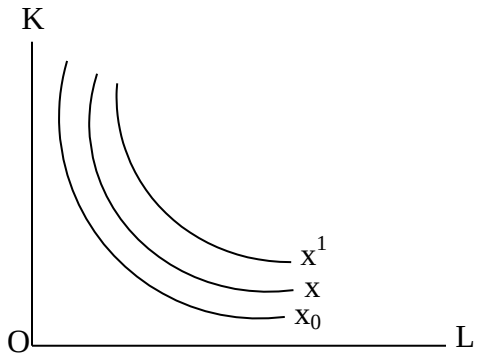


Fig. 2.2: Isoquants

Note that this line X is completely analogous to a contour line in a topographical map. It represents the locus of points of equal height above some arbitrarily chosen reference plane. In terms of our production model, it represents the locus of output, points distanced above the origin.

Loci such as X of Fig. 2.2 are called isoquants, and show all possible combinations of capital and labor that could be used to produce the level of output X. There are, of course, many such loci, and indeed, one such locus can be drawn for every possible level of output. In Fig. 2.2 the locus $X_0$ represents a level of output $X_0 < X$, while X' represents a constant level of output greater than X.

Now, suppose that rather than fixing the level of output in Eq. (2.1), we fix the level of one of the inputs. In particular, suppose we assume that the level of input of capital is fixed at the level $K_0$, and investigate the relationship between varying amounts of the input L and the output X. This would give the locus $F(K_0, L)$ shown in the upper panel of Fig. 2.3, which represents the total product curve. There are several characteristics of this curve that are of interest. Note first that we have drawn the curve starting at the origin. This implies that no output possible unless there is a positive amount of labor used as an input; although not necessary for our analysis, this assumption seems quite reasonable. It will also be noted that the total product curve of Fig. 2.3 has been drawn to curve toward the labor axis. Thus, although additional units of labor input are assumed to result in additional units of output, the rate of increase of output is assumed to diminish as more and more labor is added. This is an illustration of the law of diminishing returns, which

we define as follows:

**Definition.** Fix the inputs of all but one factor of production. Increase the amount of that factor. Do this for each factor of production in turn. If the result in every case is that output increases at a decreasing rate, the production function exhibits diminishing returns.

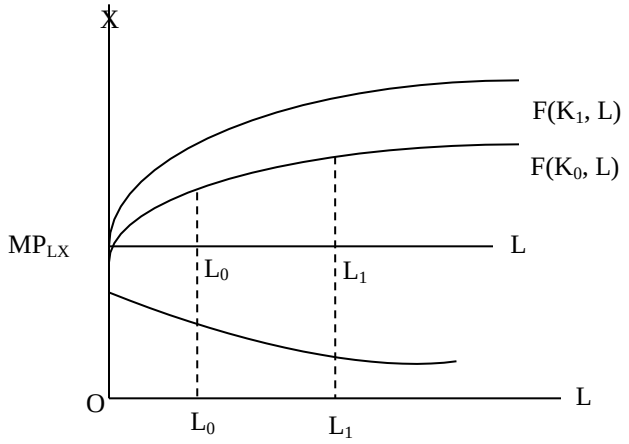


Fig. 2.3: Total and marginal product curves.

The additional unit of output associated with adding one more unit of an input (holding other inputs constant) is called the marginal product, which we will denote by MP. In Fig. 2.3, the marginal product of labor in X is the slope of the total product curve: the change in X divided by the change in L. The lower panel of Fig. 2.3 accordingly plots the marginal product of labor in X, $MP_{LX}$ against L. Another way of stating the law of diminishing returns is to say that the marginal product of labor is falling, holding other factor fixed. The fact that the $MP_{LX}$ is less at input level $L_1$ than at input level $L_0$ corresponds to the fact that the slope of the total product curve F ($K_0$, L) is less at $L_1$ than at $L_0$.

The top panel of Fig. 2.3 shows only one total product curve, but it is clear that there will be a different total product curve for every different level of capital stock that is assumed. For capital $K_1 > K_0$. the total product curve will lie everywhere above the one shown in Fig. 2.3, while for smaller capital stock the total product curve will lie everywhere below the one shown. It is also clear that rather than fixing the amount of capital, we could have fixed the labor supply and drawn the relationship between X and K. This would have given a figure completely analogous to Fig. 2.3, and again, of course, a whole family of curves could be drawn, depending on the quantity of labor assumed. Note that just as the isoquants of Fig. 2.2 can be thought of as the loci formed by taking a slice through the production hill parallel to the KL plane, so the total product curve of Fig. 2.2 can be thought of as the locus of the production bill found by taking a slice parallel to the *XL* Plane.

Although Eq. (2.1) is a convenient algebraic summary of production conditions, it is a very general expression. To make it useful for economic analysis, we must impose several restriction on it. Such restriction have been implicitly assumed in drawing Figs. 2.2 and 2.3, and before proceeding, we must state these explicitly. Specifically, it is assumed that all isoquants are smooth and that for any level of output, the set of all combinations of capital and labor that would yield at least that much output is convex. It should also be noted that the law of diminishing returns, referred to in the last section, is assumed. Although this last assumption will be made throughout most of our analysis. Although this last assumption will be made throughout most of our analysis, production functions in which this condition is not satisfied are easily constructed.

**Self-Assessment Exercise**
Discuss the relationship between the supply and production function

## 3.2 RETURNS TO SCALE

Another particularly important characteristic of production functions such as that represented by Eq. (2.1) relates to the response of output to equal-proportional changes in both of the inputs. A very common assumption in economics is that of constant returns to scale, the assumption that proportional changes in all inputs lead to the same proportional change in output. This assumption is referred to somewhat more formally as homogeneity of the first degree. It is such an important concept in economics and in the discussion of this material that a formal definition seems worthwhile.

Definition. Let $\lambda > 0$. The function $X = F(K, L)$ is said to be homogeneous of degree k if $\lambda X = F(\lambda K, \lambda L)$. If $k = 1$, the function is said to be homogeneous of degree 1, and production is characterized by constant returns to scale.

This definition is easy to interpret. Suppose, for example, we double both K and L($\lambda = 2$). If the function is, homogeneous and if k is equal to 1, then the output will also double. With k greater than 1, called increasing returns to scale, a doubling of both factors will result in more than the doubling of the output. Similarly, for $k < 1$, called decreasing returns to scale, a doubling of both inputs will result in output less than double.

The returns-to-scale assumption can be illustrated by the isoquant diagram of Fig. 2.4. Consider first the isoquant $X_0$, where it has been assumed that the level of output is equal to 10. All the points on the curve $X_0$ represent the infinite number of combinations of capital and labor that, when combined with the assumed technology, would give this level of output. One such point, A, shows that 10 units of output can be produced using 6 units of labor and 7 units of capital. Suppose we now double the inputs of both factors and move to point B. Since the capital/labor space is "full" of isoquants, there must be one that passes through point B. The question now is: What is the level of output associated with that particular isoquant? Clearly, the answer depends on the assumption we make about the degree of homogeneity of the production function. If k is equal to 1, yielding constant returns to scale, then it is clear that the level of output associated with

point B must be 20 units, twice that associated with point A. If, on the other hand, k is greater than 1, implying increasing returns to scale, then although we do not know the precise number to be attached to isoquant $X_1$, we know that it will be greater than 20. Similarly, for decreasing returns to scale, where k is less than 1, the level of output associated with $X_1$ would be less than 20. Another characteristic associated with the concept of homogeneity relates to the slopes of the isoquants as we move along a ray from the origin, as in *K/L* of Fig. 2.4. It can be shown that for any such ray, and for

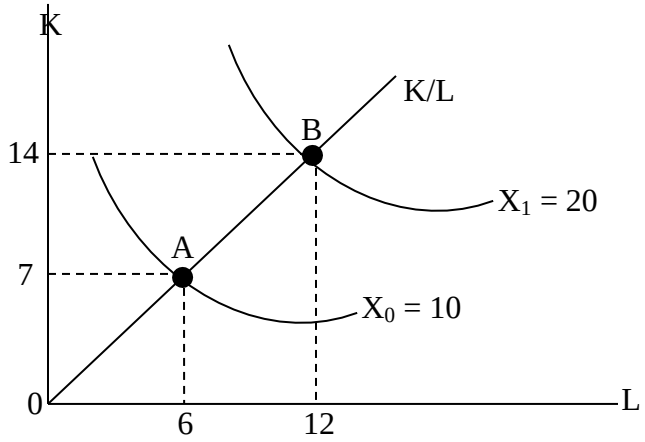


Fig. 2.4: Constant Returns to scale

Production functions that are homogeneous of any degree, the slopes of the isoquants at all points such as A and B are identical. This characteristic will be very important in the analysis for it means that once one isoquant is known, all other isoquants can be derived. In terms of Fig. 2.4, if isoquant $X_0$ is known, then at point B, where OB = 20A, there will be another isoquant with exactly the same slope. For any other ray, other points on this new isoquant can be found in the same way. Furthermore, since *OA = AB*, and since this production function has been assumed to be homogeneous of the first degree, the level of output associated with this isoquant will be equal to 20, twice that associated with $X_0$.

Note that there are two important characteristics associated with the preceding assumption of homogeneity. First, the slopes, of the isoquants along any ray from the origin are equal. This is true regardless of the degree of homogeneity. The second characteristic, regarding the degree to which the functions assumed to be homogeneous, is that the value of k determines the spacing of the isoquant in Fig. 2.4.

Note that there is an important difference between the law of diminishing returns discussed earlier and returns to scale discussed here. With the level of diminishing returns, we fixed the input of one of two factors and varied the input of the other to observe how this changes output. For returns to scale we varied both factors in the same proportion and examined how this changes output. It should be noted that there is no conflict between the assumption of constant returns to scale and the law of diminishing

returns; indeed, many of the production functions that we use in this book will be assumed to satisfy both conditions.

**Self-Assessment Exercise**
Discuss the analysis of return to scale

## 3.3 EQUILIBRIUM FOR A SINGLE PRODUCER

To this point, attention has been focused entirely on the physical characteristics of the production functions; no behavioral assumptions of any kind have been made about our producers. This unit presents a very brief summary of those parts of production theory that will be central to our discussion of competitive models. The behavioral assumptions for an individual producer can be stated in either of two entirely equivalent ways: The producer can be thought of as maximizing output subject to a cost constraint or as minimizing costs subject to a production constraint. We will employ the first approach, but the equivalence of the two will become obvious as we proceed.

It is assumed that producers, having access to technology represented by Eq. (2.1), wish to maximize output, subject to the condition that they must spend no more on inputs than an amount $C_0$. It is assumed that the wage rate, w, and the rental on capital equipment, r, are known to the producers. It is further assumed that each individual producer is too small to have any influence on the price of his or her inputs, so that w and r can be treated as constants regardless of the level of output. The first task is to describe all possible combinations of K and L that a producer could purchase with the fixed amount of money represented by $C_0$. The set of combination of K and L that can be purchased for a cost of $C_0$ is referred to as an isocost line, given by

$$C_0 = wL + rK \qquad (2.2)$$

This can also be rewritten in the conventional form for the equation of the budget line in Fig. 2.5.

$$K = C_0/r - (w/f)\ L \qquad (2.3)$$

$C_0/r$ is the intercept of the budget line on the vertical (K) axis in Fig. 2.5, a point we denote by $K_0$. - (w/r) is the slope of the budget line. In general, we will ignore the negative sign throughout the book and refer to the slope simply as (w/r).

To produce efficiently, a producer of X must maximize the output of X for any given level of cost expenditure, Co. In more formal language, the producer solved the following optimization problem:

Maximize $X = F(K,L)$ subject to $C_0 \geq wL + rK$

We can understand the solution to this optimization problem by imposing on Fig. 2.5 two

representative isoquants from Eq. (2.1). The producer could either produce a quantity of output $X_0$ by allocating expenditures between labor and capital is represented by point B or produce the same quantity by purchasing the capital and labor services associated with point C; but it is clear that neither of these allocations would be efficient. For the same expenditure, the larger output associated with $X_1$ could be achieved by producing at point A. It is thus evident that output is maximized by producing at point A, the point at which the highest isoquant is tangent to the cost constraint.

An individual firm is thus optimizing when the wage-rental ratio is equal to the slope of an isoquant. It is also possible to derive an expression for the slope of an isoquant. Consider moving between any two points in

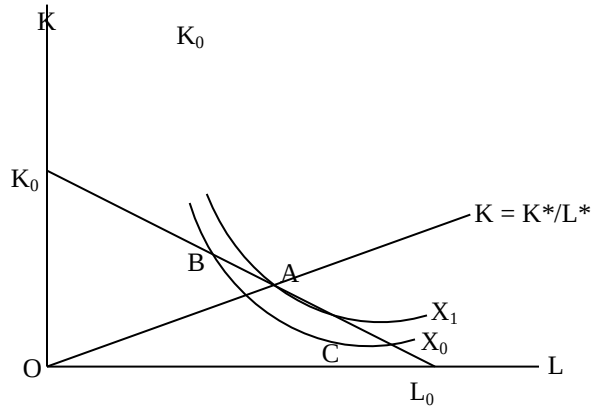


Fig. 2.5: Producer equilibrium

the (K, L) space of Fig. 2.5. We can express the change in the output of X as the additional output of X obtained from an additional unit of L times the change in L, plus the additional output of X associated with an additional unit of K times the change in K. The additional unit of output associated with adding one more unit of an input is called the marginal product, as previously noted and is written as MP. Thus, our expression for the total change in X can be more formally written as

$$\Delta X = (MP_L)\,\Delta L + (MP_K)\Delta K \qquad (2.4)$$

Where $\Delta$ is defined as the change in a variable. Now suppose that both points are on the same isoquant. From the definition of an isoquant, this means that $\Delta X = 0$, and thus, Eq. (2.2) becomes

$$0 = (MP_L)\Delta L + (MP_K)\Delta K \qquad (2.5)$$

Rearranging, we obtain

$$\frac{\Delta K}{\Delta L} = \frac{MP_L}{MP_K} \qquad (2.6)$$

Where the right-hand side is positive since $\Delta K$ and $\Delta L$ have the opposite sign. But as we consider two points on the same isoquant, and as these two points become closer and

closer together, it is clear that $\Delta K/\Delta L$ becomes a closer and closer approximation on the slope of the isoquant. Indeed, in the limit $\Delta K/\Delta L$ is the slope, and thus the slope of any isoquant is equal to $MP_L/MP_K$, the ratio of the marginal products. We showed that the slope of the isocost line is w/r, and thus the condition for output maximization, namely that the slope of the boost line be equal to the slope of the highest attainable isoquant, is given by the production efficiency condition (2.7)

$$\frac{w}{r} = \frac{MP_L}{MP_K} \qquad (2.7)$$

In our last discussion it was noted that for production functions that are homogeneous, all isoquants have the same slope along any capital-labor ratio. This implies that for a given wage-rental ratio, the optimal capital-labor ratio will be constant regardless of the level of output. Thus for any wage-rental ratio, all production points will be along a line such as OA of Fig. 2.5. The capital-labor ratio is thus a function of the wage-rental ratio only does not depend on the level of output. An even stronger condition can be derived when production functions are homogeneous of degree one; that is, when production functions exhibit constant returns to scale. Not only the ratio of marginal products but also the individual marginal products are constant for any capital-labor ratio.

### 3.4 The Objectives of Trade Policy

In theory, international trade should be based on comparative advantage and free trade. By free trade, we mean the flow of goods between countries without restrictions or special taxes. In practice, despite advice of economists, every nation protects its own domestic production to some extent from foreign competition. It is important to know that behind these barriers to trade are special interest groups whose jobs and incomes are threatened. To this effect, they cry to the government for protectionism, (Appleyard and Field, 1998). Protectionism refers to government use of embargoes, tariffs, quotas and other restrictions to protect domestic producers from foreign competitors, (Tucker, 2011). The instruments of trade policy provide an overview of the various instruments of trade policy available to government policy makers, (Appleyard and Field 1998)

Over the years, international trade has been emphasized as a strategy of fostering economic growth by both developed and developed countries. However, the large industrialized and highly developed countries tend to be less-dependent on international trade in terms of national income than the relatively small developing countries. The argument is that developing countries depend highly on international trade for their socio-economic and political development.

It is against this background that developing countries have decided to design sound trade policies that will enable them benefit from trade. The primary of trade policy is to determine the way in which a country's exports and imports are altered in relation to imports, (Obadan, 1996), The instruments of trade policy include: tariffs quantitative restrictions and quotas, state trading, cartels, commodity union arrangements and debt management, exchange controls and other exchange arrangements. From the point of view of pure theory of international trade, the principal policy instruments are tariffs, quotas and other direct trade restrictions. With reference to Nigeria, the key instruments of trade policy are tariffs, quotas and export and import prohibitions, exchange rate determination, export promotion measures, debt management as well as cartel arrangements, (Iyoha, 1996)/

**Self-Assessment Exercise**
Discuss the tests of a Good Governance.

## 4.0 Conclusion

In this unit, we can conclude that an economy can be producing on the PPF curve only in theory. In reality, economies constantly struggle to reach an optimal production capacity. And because scarcity forces an economy to forgo one choice for another, the slope of the PPF will always be negative; if production of product A increases then production of product B will have to decrease accordingly.

## 5.0 Summary

In this unit, we have learnt that a production–possibility frontier (PPF) or production possibility curve (PPC) is a graphical representation of possible combination of two goods with constant resources and technology. It is a graph representing production tradeoffs of an economy given fixed resources. In its microeconomic applications, the graph shows the various combinations of amounts of two commodities that an economy can produce per unit of time (such as number of guns vs. kilograms of butter) using a fixed amount of each of the factors of production, given the production technologies available. At the macroeconomic level, it can be used to depict other rivalries trade-offs like production of fixed capital versus production of consumer goods. Graphically bounding the production set for fixed input quantities, the PPF curve shows the maximum possible production level of one commodity for any given production level of the other, given the existing state of technology. By doing so, it defines productive efficiency in the context of that production set: a point on the frontier indicates efficient use of the

available inputs, and a point beneath the curve indicates inefficiency. The commodities compared can be goods or services. The combination represented by the point on the PPF where an efficient economy operates shows the priorities or choices of the economy, such as the choice of producing more capital goods and fewer consumer goods, or vice versa

## 6.0. Tutor-Marked Assignment

1.0. Differentiate between Good Governance and Good Policy
2.0. The civil society are the checkmate of the public servant. Discuss.

## 7.0. REFERENCES/FURTHER READING


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**UNIT THREE GOODS AND FACTOR MODEL**
**CONTENTS**



## 1.0 INTRODUCTION

The specific factor (SF) model was originally discussed by Jacob Viner and it is a variant of the Ricardian model. Hence the model is sometimes referred to as the Ricardo-Viner model. The model was later developed and formalized mathematically by Ronald Jones (1971) and Michael Mussa (1974). Jones referred to it as the 2 good-3 factor model. Mussa developed a simple graphical depiction of the equilibrium which can be used to portray some of the model results.

The model's name refers to its distinguishing feature; that one factor of production is assumed to be "specific" to a particular industry. A *specific* factor is one which is stuck in an industry or is immobile between industries in response to changes in market conditions. A factor may be immobile between industries for a number of reasons. Some factors may be specifically designed (in the case of capital) or specifically trained (in the case of labor) for use in a particular production process. In these cases it may be impossible, or at least difficult or costly, to move these factors across industries.

The specific factor model is designed to demonstrate the effects of trade in an economy in which one factor of production is specific to an industry. The most interesting results

pertain to the changes in the distribution of income that would arise as a country moves to free trade.

## 2.0. Objectives

At the end of this unit, you should be able to:

- Define and understand the meaning of two good and two factor model
- Know how to analyze the shape of the production possibility frontier
- Understand the meaning of Competitive Equilibrium
- Understand the meaning of increasing returns to scale
- Understand the basis for trade

## 3.0. Main Content

## 3.1 THE TWO-GOOD, TWO-FACTOR MODEL

Here, we will develop the simple general-equilibrium model that will be used throughout much of the course material. We assume that two commodities, X and Y, are produced using two factors, capital and labor, with technologies described by the production functions shown in Eqs. (2.8).

$$X = F_x, (K_x, L_x) \qquad (2.8)$$
$$Y = F_y, (K_y, L_y)$$

Note that subscripts are now being used to distinguish the two production functions and the inputs, used by each. These production functions are assumed to be homogeneous of the first degree and are assumed to be increasing functions of both inputs. It is further assumed that positive outputs imply positive inputs of both factors. The economy is assumed to have fixed total supplies of both capital and labor, and these two constraints are represented by Eqs. (2.9):

$$K = K_x + K_x \qquad (2.9)$$
$$L = L_y + L_y$$

As well as showing the allocation of the two factors between the two production processes, the equality sign in these two equations implies that; these two processes use all the available K and L. Full employment is, therefore, implicitly assumed. Also implicit in our analysis is the assumption that both factors of production are completely divisible and are homogeneous in the sense that the units are identical.

An assumption central to the analysis is that the commodities, X and Y, differ in the sense that the production function differs. Representative isoquants $Y_0$ and $X_0$ for the two industries are shown in Fig. 2.6. While it is clear from the diagram that these two

isoquants have been derived from different production functions, it will be useful to describe the differences in a somewhat more formal manner. Consider an arbitrary wage-

rental ratio equal to the slope of the line $K_0L_0$. With these relative factor prices, production in industry Y would take place somewhere along the line OA, and production in industry X somewhere along the line OB, these being the points where the wage-rental ratios are tangent to the respective isoquants.

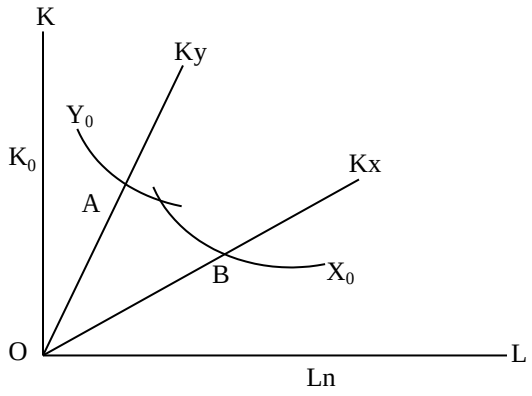



Fig. 2.6: Factor intensities

It is clear that the capital-labour ratios k = K/L for industries Y and X, represented in the figure by Ky and Kx respectively, differ. We thus have the following definition.

Definition. Consider fixed factor prices. If Ky > Kx, at those factor prices, Y is said to be capital intensive and X is said to be labour intensive.

From Fig. 2.6 it is evident that Ky is greater than Kx, and thus commodity Y is said to be capital-intensive relative to commodity X as noted in the definition. Of course, a completely equivalent statement is that commodity X is labour-intensive relative to commodity Y. For the remainder of the book, we assume that commodity Y is capital-intensive relative to commodity X for all wage-rental ratios. This is known as the strong factor intensity hypothesis.

## 3.2. THE SHAPE OF THE PRODUCTION POSSIBILITY FRONTIER

The production possibility frontier, as its name implies, is a locus that shows all possible efficient production points. It is important to note that two kinds of efficiency are being assumed here. The first, which we might call engineering efficiency, implies simply that for either of the production functions and for any bundle of inputs, output is as large as it could possibly be. In other words, we are assuming that there is no waste involved in the

production process. The second kind of efficiency, which we could call market efficiency, is concerned with the way in which factors are combined in the production processes.

The specific task now faced is to construct, from the technological information given by the production functions in Eqs. (2.8), and the constraints on factor use given by Eqs. (2.9), the production possibility frontier. This locus is also called the transformation curve. Two points on this locus are easy to find. Suppose that all the labor and all the capital were allocated to the production of commodity Y, so that in Eqs. (2.8), $K_v$ and $L_y$ are replaced by K and L. This will give us a well-defined level of output for Y, which we can call Y, as shown in Fig. 2.7. Note that since all factors are being used to produce Y, the output of X must be zero. Similarly, allocating all of the capital and all of the labor to the production of X would give a point such as X in Fig.2.7.

A slightly more difficult task is to find the various points on the production possibility frontier that allow some output of both commodities. To obtain some idea of where this curve might be, construct the straight-line joining Y and X and consider whether points on this line arc possible production points. Recalling the assumption of constant returns to scale, we see that all such points are indeed possible/suppose, for example, that one-half L and one-half K are allocated to both production functions. Because of constant returns to scale, half the inputs results in half the output, so we

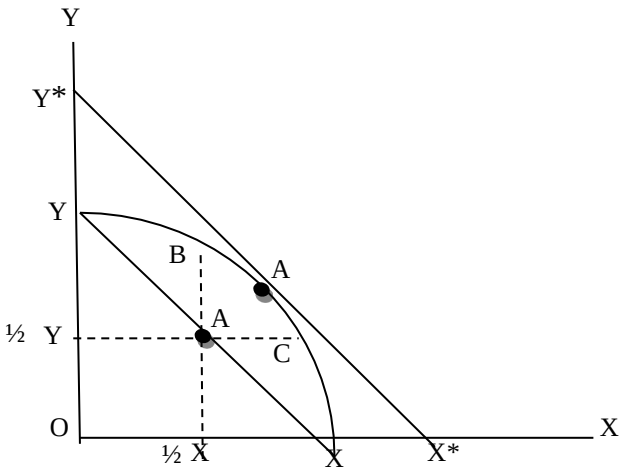



Fig. 2.7: The production frontier

have the two points $^1/_2$Y and ½X shown in Fig. 2.7. This gives point A in output space, and it is obvious that this point lies on the straight line YX. All other points on the line YX could be generated in a similar fashion, so all point on this line are feasible production points.

We have shown that points such as A in Fig. 2.7 are possible production points. The important question, however, is whether these points are efficient or, in other words,

whether there are possible production points outside the line YX yielding larger outputs of both commodities than those implied by points such as A. It is important to remember here that we have assumed different production functions for the two industries. Recall from Fig. 2.6 that for a given wage-rental ratio, the capital-labor ratios in the two industries differ, which suggests that simply dividing the two factors proportionally between the two industries will not result in the maximum output. If the two outputs were guns and butter, it would not make much sense to allocate half of the farmland to the production of guns. Thus, in Fig. 2.7, a reallocation of factors between the two industries, in particular a shift of more K to the production of Y and more L to the production of X, will result in a larger output of both commodities than that associated with points such as A on the line YX . After the reallocation of factors, a production point such as A' could be possible. The same argument will apply to appoint on the line YX, with the obvious exception of the two points Y and X, and the resulting production possibility locus would be YA'X.

The preceding argument has presented an intuitive reason for believing that the production possibility frontier lies everywhere above the equal proportions line YX. Curves having this shape are said to be concave to the origin, while the set of feasible production points is said to be convex, admittedly causing some confusion. We will need to use both terms, referring to the production frontier Fig. 2.7 as concave and to the set of feasible production points (production set for short) as convex.

A more rigorous demonstration of this curvature is required, effected by a construction known as the Edgeworth-Bowley box diagram. This construction shown in Fig. 2.8, gives a concise representation of the information obtained in Eqs. (2.8) and (2.9) and demonstrates precisely what is meant by market efficiency.

In Fig. 2.8 several representatives of the isoquants for the X industry have been plotted from origin $O_x$. The total available quantities of capital and labor, K and L, are also shown in the diagram, and it is clear that the maximum amount of X that could be produced when all factors are allocated to the production of X is X. This is the same X as shown in Fig. 2.7. The same procedure is now employed for the Y industry, except that in this case the isoquant diagram is turned upside down and plotted from $O_y$. Note that the output of Y increase as one moves from Oy toward Ox. From the point of view of the Y industry, Ox on isoquant Y represents the maximum possible amount of commodity Y that can be produced, for it represents the total allocation of K and L to the production of commodity Y. The isoquant Y thus gives the point Y of Fig. 2.7.

All possible allocations of capital and labor between the two industries are represented by the points in the production box O, KO, L. Among these possible production points we seek a locus of points that is efficient in the sense that, for a given output of one commodity, the output of the other commodity is maximized. To take a specific example, suppose an output $Y_1$ of commodity Y is chosen, and that we seek to maximize X subject to this constraint. A possible allocation of factors between the two industries is now

represented by all points along the isoquant $Y_1$ in Fig. 2.8, and we want to find the particular point along this curve that maximizes the output of X. First, suppose that production were to take place at point A, halfway between Ox and Oy. Such a production point is clearly feasible, for it exactly exhausts the total available supply of capital and labor, and such an allocation results in the outputs of $Y_1$ and $X_1$ for industries Y and X, respectively. But while this production point is possible, it is clearly not efficient. Any movement along the isoquant $Y_1$ from A toward point C, although not reducing the output of Y, will clearly increase the output of X. Point C is the tangency point for the two isoquants $Y_1$ and $X_1$, and, for a given quantity of Y, output of X is maximized at the point where the highest X isoquant is tangent to the appropriate Y isoquant.

Joining all the tangency points in Fig. 2.8 would give the locus Ox BCOy, called the efficiency locus. All points on this locus have the characteristic that output of one commodity cannot on this locus have the reducing the output of the other. It is precisely this criterion that describes the market efficiency referred to previously.

The production possibility frontier can now be derived quite easily from the information given in Fig. 2.8. With each point on the efficiency locus there is associated an output of X and an output of Y, and these points, when plotted in XY space, give us the production frontier of Fig. 2.7. Figure 2.8 allows a more rigorous demonstration of the fact that the production possibility curve has the shape shown in Fig. 2.7. Point A in Fig. 2.8, in which half the factor endowment is allocated to each industry, corresponds exactly to point A in Fig. 2.7. This follows from constant returns to scale. If half of the total factor endowment is allocated to each industry, then each industry will produce exactly half the output that it would produce if the entire factor endowment were allocated to that industry.

Furthermore, point B in Fig. 2.7 corresponds exactly to the factor allocation at point B in Fig. 2.8. Point B in Fig. 2.8 has the same output of X as point A but a greater output of Y, which corresponds to the relationship between A and B in Fig. 2.7. Similarly, point C in Fig. 2.8 has the same output of Y as point A but a higher output of X, which corresponds to the relationship between points A and C in Fig, 2.7. Thus, the efficiency locus $O_xBCO_y$ in Fig. 2.8 maps into the concave production frontier Y B C X in Fig. 2.7.

The concave production frontier shown in Fig. 2.7 is basically a result of the fact that factors of production are not equally suited to different industries; this is the fact of differences in optimal factor intensities between industries. Point A' is feasible, but as we transfer factors from Y to X, we are transferring factors that are useful in Y but much less useful in producing X. Beginning at A' and transferring factors to Y has the same effect. To put it slightly differently, we cannot produce twice as much X or twice as much Y as at A' in Fig. 2.7 because when we shut down the other industry, we are releasing the "wrong" factors. Thus, while point A' in Fig. 2.7 is feasible, Y* and X* are not.

## 3.3. COMPETITIVE EQUILIBRIUM

Now we turn to the questions of (1) whether or not production will actually take place on the production frontier and (2) if so, at what point on the transformation frontier

production will take place. It has been shown that

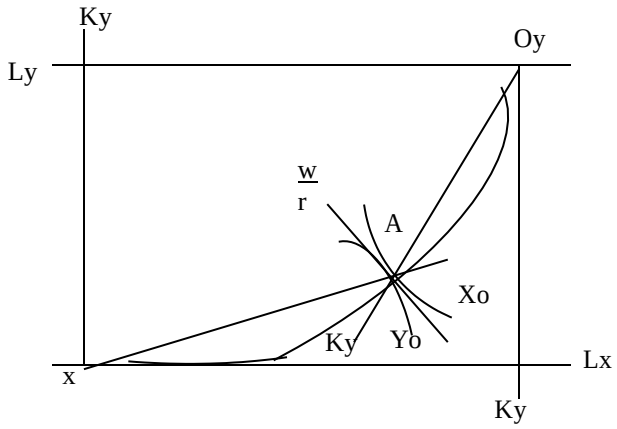



Fig. 2.9: Competitive equilibrium in input markets.

the efficient allocation of resources requires that production take place at a point where an isoquant from one industry is tangent to an isoquant from the other. It has also been shown that for the individual producer, the maximization of production subject to the cost constraint requires that the ratio of factor prices be equal to the slope of the isoquants. Since this condition is true for both industries, the isoquants for the two industries will be tangent to each other if the two industries face the same factor prices for w and r. this outcome is illustrated in Fig. 2.9. At point A, the isoquants $X_0$ and $Y_0$ are both tangent to the wage-rental w/r and hence are tangent to each other. In answer to question (1), if industries are competitive and face the same factor prices, production is efficient and will occur on the production frontier.

We are now in a position to answer the second question, concerning where on the production frontier the economy will produce for a given set of price. First, we note that a condition for profit maximization for a competitive industry is that firms hire factors up to the point where the value of the marginal product contributed by an additional unit of the factor hired equals the price of that factor. The value of the marginal product of a

factor is the price of the good times the "physical" marginal product of the factor we discussed earlier in the chapter. Competitive equilibrium involves four of these conditions, two factors for each of two industries. Let $MP_{LX}$ denote the marginal product of labor in the production of X, and define other marginal products similarly. The four value-of-marginal-product conditions by:

$$\begin{array}{ll} Px\ MP_{LX} = w & px\ MP_{KX} = r \\ Py\ MP_{LY} = w & py\ MP_{KY} = r \end{array} \qquad (2.10)$$

By dividing the top equations by the lower equations and rearranging, we can express Eqs. (2.10) as

$$\frac{Px}{Py} = \frac{MP_{LY}}{MP_{LX}} = \frac{MP_{KY}}{MP_{KX}} \qquad (2.11)$$

The marginal products in Eqs. (2.10) and (2.11) are the change in the relevant output divided by the change in the relevant input so, for example, $MP_{LX} = \Delta X/\Delta L_x$, etc. Using these relationships, we can rewrite Eqs. (2.11) as

$$\frac{Px}{Py} = \frac{\Delta Y/\Delta Ly}{\Delta X/\Delta Lx} = \frac{\Delta Y/\Delta Ky}{\Delta X/\Delta Kx} \qquad (2.12)$$

But because factors are in fixed total supply, represented by Eqs. (2.9), $\Delta Lx = -\Delta Ly$ and $\Delta K_x = -\Delta K_y$. Using these relationships to cancel denominators we can reduce Eqs. (2.12) to a simple expression:

$$\frac{Px}{Py} = \frac{-\Delta Y}{\Delta X} = MRT \qquad (2.13)$$

where MRT stands for the slope of the production frontier, the marginal rate of transformation: $-\Delta Y/\Delta X$ (note that $\Delta Y$ and $\Delta X$ must have opposite signs, so the MRT is positive). Production occurs where the price ratio is tangent to the production frontier. This result is illustrated in Fig. 2.10 where p is used as shorthand for the price ratio: p = px/py.

We now have a key result regarding the efficiency of competitive, undistorted markets which will be used many times throughout the book: if factor and commodity markets are competitive and if industries face the same factor prices, then production will occur at a point where the commodity price ratio p = px/py is tangent to the to the production frontier.

If world prices are given by p, then an economy will select production point A in Fig. 2.10. Note for future reference that this will in turn lead to factor market allocation at point A in Fig.2.9. This in turn determines factor prices as w/r in Fig. 2.9. Thus, in a trading economy, commodity prices on world markets will determine commodity supplies, which will in turn determine factor demands and hence factor prices. Some popular arguments reverse this causality and assert that the price of labor, for

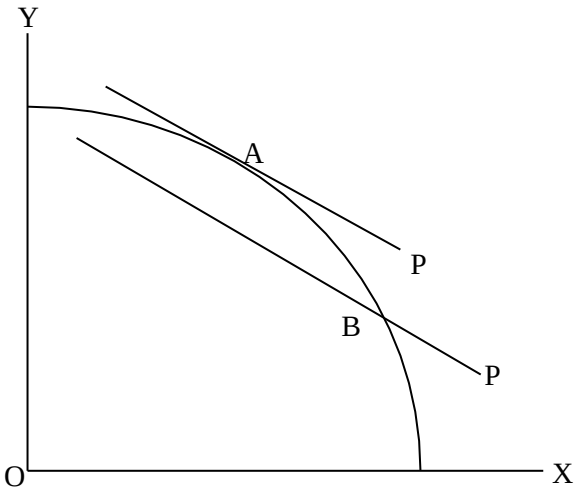



**Fig. 2.10: Competitive equilibrium in output markets.**

Examples, determines commodity supplies and prices. This is not the case if a country faces fixed world commodity prices.

The result shown in Fig. 2.10 has an implication that will be important in subsequent sections. We can think of the price line through the production point A as a "national budget line" in the sense that all points on that line have the same value of consumption. The tangency property of competitive equilibrium implies that the economy attains the highest budget line at the given price ratio p: in competitive equilibrium, the value of output is maximized at equilibrium prices. To help understand this point, consider an alternative production point B in Fig. 2.10. At price ratio p, the economy would be on a lower national budget line if it produced at B; national income would be lower.

One final point should be noted for future reference, and indeed it will come up in the next section: If there is only one factor of production and there are constant returns in both industries, then the production frontier is linear. If labor, for example, is the only factor, the marginal product of labor is constant in both industries. Each unit of labor

moved out of Y and into X generates the same negative ΔY and the same positive ΔX. Thus, the slope of the production frontier is constant. It is the addition of factor-intensity affects, which shift "inappropriate" mixes of factors from one industry to the other, that leads to the concavity in the two-factor case.

## 3.4 INCREASING RETURNS TO SCALE

Many industries are characterized by increasing return to scale. Although these scale economies may eventually diminish, they can be very important relative to the size of the market in small economies, and even in the United States' very large economy, they are important for a few industries including aircraft and mainframe computers. There are many respects in which economies of scale in an industry lead to important differences relative to the constant-returns case that we have been discussing. Therefore, this look will spend considerable time discussing technologies of both constant and increasing returns.

As we showed in the previous discussion, differences in factor intensities between industries tend to make the production frontier concave or "bowed out" (the set of feasible production points is convex). Here we will show that scale economies make the production frontier convex or "bowed in" (the production set is non-convex). An analysis including both scale economies and factor-intensity effects thus tends to get messy, with the former tugging the production frontier in and the latter tending to pull it out.

Therefore, from this unit forward we will present a simplified analysis of scale economies in which there is only a single factor of production, which we will call labor. Suppose that the production functions and labor supply constraint are given as follows:

$$Y = Ly \qquad X = L^{k}_{x} \qquad k > L$$
$$L = Lx + Ly$$

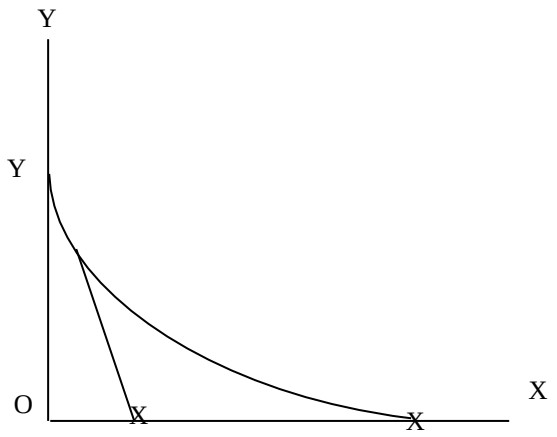



**Fig. 2.11: Increasing returns in X.**

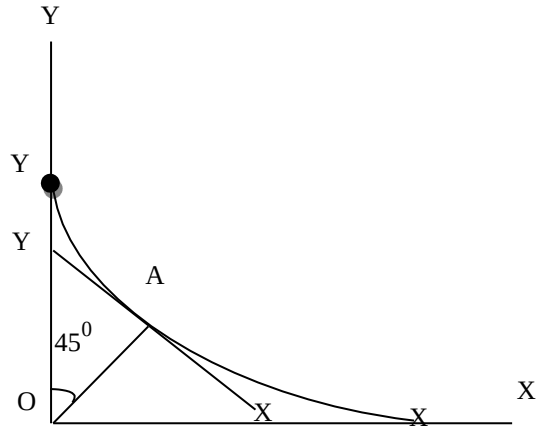


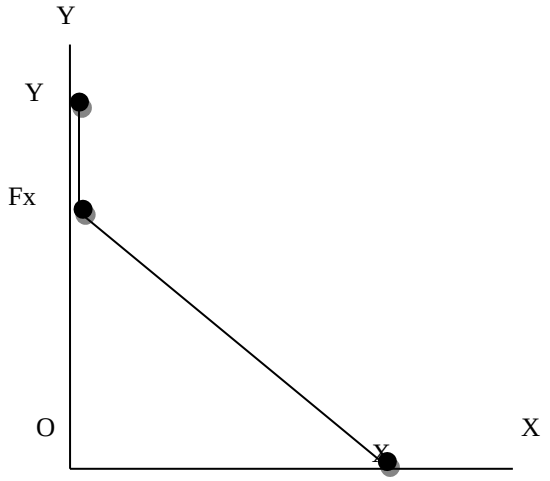

**Fig. 2.12: Increasing returns in X & Y**

The definition above can be used to show that the production function for X is homogeneous of degree k > 1. A doubling of the labor allocated to X more than doubles the output of X. The production frontier for this economy is shown in Fig. 2.11. Y can be produced by allocating all labor to Y. If X is characterized by constant returns to scale, then shifting labor from Y to X generates the linear production frontier YX in Fig. 2.11: each unit of labor transferred generates the same $\Delta Y$ and $\Delta X$ and so MRT = $-\Delta Y/\Delta Y$ is constant, as we noted in the previous section. But with increasing returns to scale in X, each additional unit of labor transferred from Y to X generates a larger $\Delta X$ than the previous unit. Thus MRT = $-\Delta Y/\Delta X$ must fall (the production frontier becomes flatter) as we move down from Y. We have drawn the production frontier corresponding to the technology in Eqs. (2.14) as YX in Fig. 2.11.

The convexity of the production frontier is reinforced if both industries have increasing returns. Suppose in Fig. 2.12 that we know that A on the 45° line (X = Y) is on the production frontier. If both industries have constant returns and there are no factor-intensity effects, then we know that the production frontier is the linear segment YX: relative to A, doubling the labor input to either industry merely doubles output. But if both industries have increasing returns, then doubling the labor allocation to either industry more than doubles the output of that industry. Thus the true production frontier will be given by Y X in Fig. 2.12.

Another type of technology is often used to represent scale economies. Suppose that production of X requires a fixed amount of labor F as an up-front fixed cost, but thereafter requires one unit of labor per unit of X. We can write the production function for X in "inverse" form, indicating the amount of labor Lx needed to produce a given amount of X. Instead of Eqs. (2.14), we now have:

$$Y = Ly \qquad Lx = X + F$$
$$L = Lx + Ly \qquad (2.15)$$



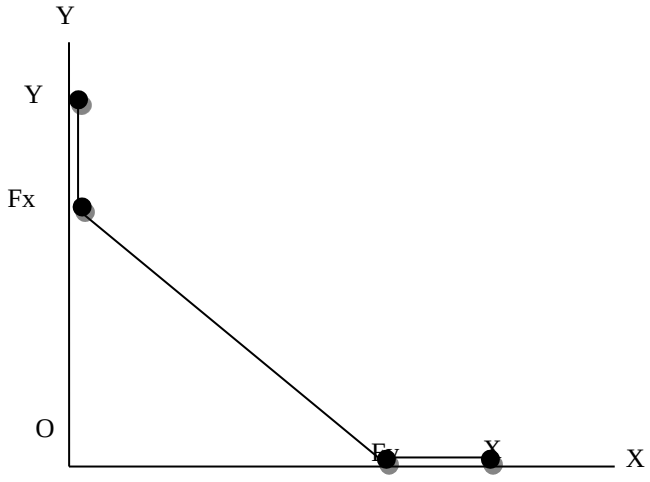



Fig. 2.13: Increasing returns due to fixed costs in X. Fig. 2.14: Fixed costs in both industries

Lx can be thought of as the real cost of X in units of labor. The technology in Eqs. (2.15) gives rise to the production frontier shown in Fig. 2.13. Y is the maximum output of Y. But before we can get any actual output of X, we must withdraw labor equal to the fixed cost F from Y. This is given by the vertical distance YF, in Fig. 2.13. Thereafter, we can move labor between Y and X so as to generate the linear segment of the production frontier Fx X. Thus the production frontier is given by Y Fx X in Fig. 2.13. When both goods have increasing returns, we get the production frontier Y Fx Fy X in Fig. 2.14, where YFx denotes the fixed cost of labor needed to begin Y production and XFy denotes the fixed cost of labor needed to begin Y production.

Although Figs. 2.13 and 2.14 have linear segments in the production, they share an important property with Figs. 2.11 and 2.12 whose frontiers have smooth curvature. In all four diagrams, the pro-wets are non-convex; that is, the sets of feasible production points are not convex sets. In all these cases, for example, points on a line joining the end points of the production frontiers are not feasible production points. You can produce two cars or two stereos, but you cannot produce one of with the same amount of labor (although with constant returns you can). While this may appear to be a minor technical point at this time, we will show in subsequent chanters that the non-convexity of the production set is of considerable importance. It can, for example, lead to gains from trade through specialization even for two absolutely identical economies.

With increasing returns to scale, prices are generally not tangent to the production frontier. The reason for this has to do with the fact that, as we increase the output of an increasing-returns good, marginal products of factors rise when production functions are of the form in Eqs. (2.14) or remain constant when they are of the form in Eqs. (2.15). In the case of Eqs. (2.14), the marginal product of labor in X is then greater than the average product of labor. The amount produced by the last worker hired is greater than the average over all workers. If the firm paid all labor the value of the marginal product produced by the last worker, it would lose money. With the technology in Eqs. (2.15), if the firm paid labor the value of its (constant) marginal product, the firm would fail to cover its fixed costs. Therefore, the analysis of Eqs. (2.10) to (2.13) is not valid with increasing returns to scale. In general, increasing returns must involve imperfect competition or externalities, and for producer equilibrium, the price line will have to cut the production frontier.

**3.5 THE BASIS OF TRADE**

In the world we live today, no single country has everything. The United States is often regarded as the wealthiest and most popular country in the world. But we live in a world of scarce resources. Most of the resources that wealthy United States does not have especially raw materials, it can get them from other countries. It will then use these raw materials to produce goods. Most of these finished goods are exported to other countries.

Every economy is essentially part of the internal economy. Thus, what one country does not have at home, it can buy them from other countries. The trade that occurs when residents of a country trade with residents of other countries is termed international trade. Therefore, the exchange of goods and services between individuals and firms in different countries is termed international trade. In the exchange of goods and services among different countries, foreign currencies are required. As a result, a more useful definition of international trade is the trade that cuts across national boundaries and involves the use of different currencies.

The intellectual insights of Adam Smith were influential in bringing the mercantile system to an end. Smith and others at the time argued that governments' mercantilist policies were influenced by special interest groups. In his famous book, "The wealth of Nations", Smith argued that if a country specialized in what it produced best and freely traded those goods, then society will be better off. To Smith, wealth was seen as the sum total of all that the people of a nation produced. In his view, free trade led to greater wealth. It does not really matter if even at sometimes you imported manufactured goods from people in other countries. Smith contended that the mercantile systems prohibited economic growth by misallocating resources. Therefore, he suggested that trade should be based on absolute advantage.

**Self-Assessment Exercise**

Discuss the analysis of two good and two factor model.

## 4.0 Conclusion

The specific factor model is used to demonstrate the effects of economic changes on labor allocation, output levels and factor returns. Many types of economic changes can be considered including a movement to free trade, the implementation of a tariff or quota, growth of the labor or capital endowment, or technological changes. This section will focus on effects that result from a change in prices. In an international trade context, prices might change when a country liberalizes trade or when it puts into place additional barriers to trade.

When the model is placed into an international trade context, differences between countries, of some sort, are needed to induce trade. The standard approach is to assume that countries differ in the amounts of the specific factors used in each industry relative to the total amount of labor. This would be sufficient to cause the PPFs in the two countries to differ and could potentially generate trade. Under this assumption the specific factor model is a simple variant of the Heckscher-Ohlin model. However, the results of the model are not sensitive to this assumption. Trade may arise due to differences in endowments, differences in technology, differences in demands or some combination. The results derive as long as there is a price change, for whatever reason.

**5.0 Summary**

In this unit, we have learnt and discuss on the two goods two-factor model, the shape of the production frontier, competitive returns to scale and final we look at the increasing returns to scale.

**6.0. Tutor-Marked Assignment**

1. Discuss on the two goods and two factor model
2. With the aid of diagram, discuss the shape of the production possibility frontier
3. Write short note on the following
   (i) Competitive Equilibrium
   (ii) Increasing Returns to Scale
4. Suppose the production functions for commodities X and Y are identical. How will this affect the shape of the efficiency locus'? What will the production possibility curve look like for the case of (a) constant returns to scale and (b) increasing returns to scale. How will the efficiency loci differ for these two cases? Suppose that the total available quantity of labor increases and that the available quantity of capital decreases. How will this affect the shape and position of the production possibility curve?

**7.0. REFERENCES/FURTHER READING**

Melvin, J. R. (1971). On the Derivation of the Production Possibility Curve. Economics 39:287-294.

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## UNIT FOUR GENERAL EQUILIBRIUM IN THE CLOSE ECONOMY

**CONTENTS**



## 1.0 INTRODUCTION

In economics, general equilibrium theory attempts to explain the behavior of supply, demand, and prices in a whole economy with several or many interacting markets, by seeking to prove that the interaction of demand and supply will result in an overall general equilibrium. General equilibrium theory contrasts to the theory of partial equilibrium, which only analyzes single markets.

General equilibrium theory studies economies using the model of equilibrium pricing and seeks to determine in which circumstances the assumptions of general equilibrium will hold. The theory dates to the 1870s, particularly the work of French economist Léon Walras in his pioneering 1874 work Elements of Pure Economics.

It is often assumed that agents are price takers, and under that assumption two common notions of equilibrium exist: Walrasian, or competitive equilibrium, and its generalization: a price equilibrium with transfers.

Broadly speaking, general equilibrium tries to give an understanding of the whole economy using a "bottom-up" approach, starting with individual markets and agents. (Macroeconomics, as developed by the Keynesian economists, focused on a "top-down" approach, where the analysis starts with larger aggregates, the "big picture".) Therefore, general equilibrium theory has traditionally been classified as part of microeconomics.

## 2.0. Objectives

At the end of this unit, you should be able to:

- Define and understand the meaning of Good Governance and Good Policy
- Define and understand the meaning of Corruption
- Know the importance of civil society
- Understand the test of Good Governance

## 3.0. Main Content

## 3.1 GENERAL EQUILIBRIUM ANALYSIS

The above discussion developed the tools of production and consumption theories. The purpose of this unit is to combine the production and demand sides of the economy to arrive at an overall or general equilibrium analysis. This section considers general equilibrium in a closed economy, one that is self-sufficient and does not trade. Such an economy is said to be in autarky.

Throughout this discussion producers and consumers are assumed to be competitive. In other units to come in this course material, we will consider many cases of imperfect competition and other distortions. Of the three conditions that determine general equilibrium in a closed economy, the first two are optimization conditions for producers and consumers: (1) Competitive, profit-maximizing producers pick outputs such that, at given commodity prices, the marginal rate of transformation is equal to the producer price ratio; this condition was given in Eqs. (2.13) as Px/Py = MRT. (2) Consumer pick commodities such that, at given commodity prices, their marginal rate of substitution 'in consumption is equal to the consumer price ratio; assuming that consumer and producer prices are the same, this condition was given in Eq. (3.4) as Px/Py = MRS. The third condition is a market clearing condition: (3) The supply and demand for each commodity must be equal; let subscript c denote consumption of a commodity and subscript p denote production of a commodity. Our three conditions for general equilibrium are summarized by

$$\frac{Px}{Py} = MRT \qquad \text{Producer optimization}$$

$$\frac{Px}{Py} = MRS \qquad \text{Consumer optimization} \qquad (4.1)$$

$$Xc = Xp \qquad Yc = Yp \qquad \text{Market clearing}$$

Figure 4.1 shows an equilibrium for a closed economy that satisfies these three conditions. Producers produce optimally at point A, where the slope of the production frontier is tangent to the price ratio, pa. Similarly, consumers consume optimally at point A, where the slope of their indifference curve is tangent to the price ratio. And finally, markets clear because the production and consumption points are the same. Note also that

the equilibrium at A is optimal in the sense that the economy consumes on the highest possible community indifference curve at which production is feasible (i.e., where the production point is on or interior to the production frontier XY). This is a. property that goes back to Adam Smith's "invisible hand", in which decentralized decision-making by optimizing, self-interested producer and consumers leads the economy to an efficient outcome.

Note for future reference that the equilibrium at point A determines a factor allocation in the Edgeworth-Bowley box in Fig.2.8 (if indeed the two-factor model is the underlying production structure). Thus, factor prices are also determined in general equilibrium. To the extent that consumers have different factor endowments, the factor prices determine the distribution of income among consumers.

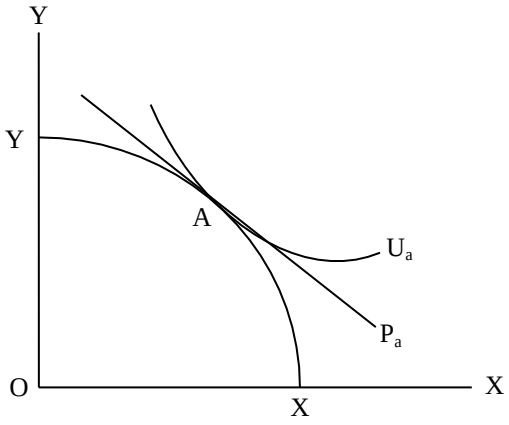


Figure 4.1: Closed-economy general equilibrium

## 3.2 GENERAL EQUILIBRIUM IN THE OPEN (TRADING) ECONOMY

Now assume that an economy can engage in trade at fixed world price ratio, which we will denote p* = P*x/P*y. The first two optimization conditions mentioned in our previous discussion remain unchanged. The only differences is that world prices will generally be different from the prices determined in autarky. Producers optimize by equating the marginal rate of transformation to whatever prices prevail, and, similarly, consumers optimize by equating their marginal rate of substitution to those prices.

The difference in equilibrium between the closed and the open economy lies in the third condition, market clearing. With international trade, an economy is no longer constrained to consume only what it can produce. The loosening of this constraint is the very source of gains from trades, as we shall see. A trading economy is able to sell some of one good at world prices and use the proceeds to buy the other commodity. Instead of market clearing, we have what we call a trade balance condition: the value of what a country sells on world markets must be equal to what it buys. We can define the excess demand for good X and Y as (Xc – Xp) and (Yc – Yp) respectively. If excess demand is positive, the economy is consuming more than it is producing, which corresponds to demand for

an import good. If excess demand is negative, an economy is consuming less than it is producing, resulting in an export good. The trade balance constraint requires that the value of all imports be equal to the value of all exports. An alternative way of saying this is that the sum of the value of the country's excess demands must equal zero: the positive excess demand for the import good must equal the negative excess demand for the export good. The trade balance condition is given by

$$P^*_x(X_c - X_p) + P^*_y(Y_c - Y_p) = 0 \qquad (4.2)$$

Note that this condition is completely general and does not depend on which good happens to be the import good and which happens to be the export good.

We can rearrange the terms in Eq. (4.2) to rewrite the equation in a different way.

$$P^*_x X_p + P^*_y Y_p = P^*_x X_c + P^*_y Y_c \qquad (4.3)$$

The left-hand side of this equation is the value of production at world prices, while the right-hand side is the value of consumption at world prices. Thus, equivalent to the trade balance condition is the requirement that the value of production must equal the value of consumption.

We can think of the value of production as the income of the country. By placing a line with the slope of the world price ratio p* through the production point, we derive the "national budget line". As we have discussed earlier, this budget line defines national income by evaluating domestic output at world prices. Consumers are then free to choose any point on this budget line, because the value of consumption will be equal to the

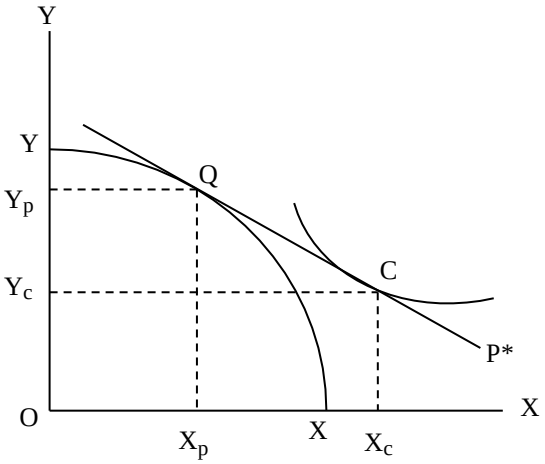


Figure 4.2: Open-economy general equilibrium

value of production. This is shown in Fig. 4.2, where the fixed world price ratio is given by p*. Producers optimize by choosing production at point Q. Consumers optimize by

choosing consumption at point C. In the particular case shown, the country imports X(Xc > Xp) and exports Y(Yc < Yp). Trade will balance insofar as the value of production at world price equals the value of consumption. To summarize, the conditions for general equilibrium are given as follows.

$$\frac{P^*_x}{P^*_y} = \text{MRT} \qquad \text{producer optimization}$$

$$\frac{P^*_x}{P^*_y} = \text{MRS} \qquad \text{consumer optimization} \qquad (4.4)$$

$$P^*_x(X_c - X_p) + P^*_y(Y_c - Y_p) = 0 \qquad \text{trade balance}$$

Note finally that the autarky market clearing condition is a special case of trade balance. It satisfies the trade balance condition in that both terms in parentheses are zero. If world prices happened to be the same as the country's autarky prices, then the trading equilibrium would be identical to the autarky equilibrium.

## 3.3 THE EXCESS DEMAND FUNCTION

We now turn to the larger question of the determination of world prices and an international general equilibrium (our world will consist of two countries). Consider Fig. 4.3. The autarky price ratio $P_a$ is shown for reference. At the price $P^*_1 < P_a$, the country produces at $Q_1$ and consumes at $C_1$. Excess demand for good X is positive; i.e., X is imported. This makes economic sense, recalling that $p^* = p^*_x/p^*_y$. If the relative price of X is lower on the world markets than on the domestic market, then buying from the low-cost source would mean importing the good. Similarly, if Y is relatively more

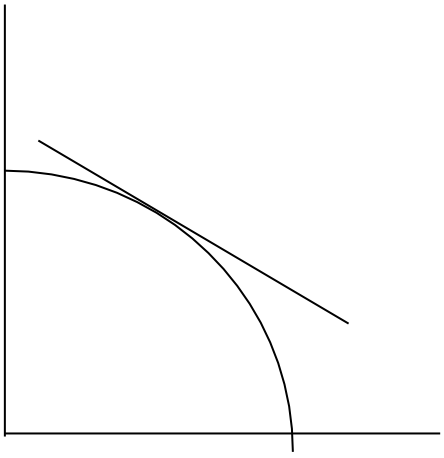

Figure 4.3

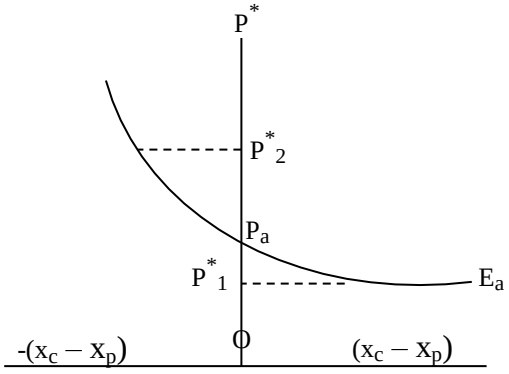


Figure 4.4

valuable on the world market than at home, then export of Y are in order. At the price ratio $p^* = P_a$ in Fig. 4.3, producers pick point $Q_2$ and consumers pick point $C_2$. With the price ratio greater than the autarky price ratio, the time country exports X (the relatively

valuable good oh the world markets) and imports Y (the relatively cheap good on the world market).

This is a general result. If the world price ratio exceeds the domestic price ratio ($p^* > p_a$), then X is exported and there is a negative excess demand for X. if the world price ratio is less than the autarky price ratio ($p^* < p_a$), then X is imported and there is a positive excess demand for X. Fig. 4.4, we construct an excess demand curve for good X for the country. At the autarky price ratio pa, there is zero excess demand. Price ratio $p^*_1$ and $p^*_2$ in Fig. 4.4 correspond to the similarly labeled price ratios in Fig. 4.3. Excess demand for X becomes increasingly negative (exports of X becomes increasingly positive) as the world price ratio increase above $p_a$. Excess demand becomes increasingly positive (imports of X become increasingly positive) as the world price ratio falls below $p_a$. The excess demand curve, except that the quantity demanded may be either positive or negative. A negative excess demand is simply a desire to supply (export) the good to the world market at that price.

## 3.4 THE SHAPE OF EXCESS DEMAND CURVES

What are the factors leading to the specific shape that an excess demand curve assumes? Essentially, the excess demand curve takes its shape from the reactions of producers and consumers to new prices. Any price movement away from $p_a$ will elicit a response from producers and consumers.

The production effect is the most straightforward. Suppose p* < pa. Producers will choose to move resources out of the production of X and into the production of Y. This will exacerbate any given excess demand for X at P* < Pa, leading to the negative slope of the excess demand curve. Similarly, p* < pa leads to a substitution effect in consumption. The falling price of X makes consumers willing and able to buy more of it, and again the excess demand for X grows as its price falls. Furthermore, the concavity of the production possibilities curve and the concavity of community indifference curves will combine to ensure that the excess demand function will itself be convex.

A subtlety in constructing the excess demand curve may arise when $p^* > p_a$. In this case, the curve may bend backward (take a positive slope) in the exporting section (negative excess demand) of the curve. As the price of the export good continues to increase, the country gets richer from the sales of that good. This leads consumers to want to devote some of their additional income to purchases of that good. At some point, this income effect, which leads consumers to demand more of the export good, may outweigh the substitution effect, which leads consumers to want less of a good when its price rises. Consequently, exports may fall with a further increase in price. We have elected not to pursue this possibility here, but it is discussed in Appendix A containing the derivation of offer curves. In any event, the position of the excess demand curve is ultimately determined by the resources the country has available to produce X even if it chooses not to consume it at all.

Finally, movement along the excess demand curve away from Pa, in either direction is

welfare-improving because any change in price leads to an increase in the consumption, choices for consumers. As prices fall from Pa, for instance, consumers who could still afford the previous combination of X and Y choose a preferred combination instead. Similarly, as the price of an export good rises, consumers can either maintain their consumption levels of the export or buy more imports as an alternative.

## 3.5 INTERNATIONAL GENERAL EQUILIBRIUM

Now let us introduce a second country, referring to it as Country F, and call the original Country H. Fig. 4.5 shows an excess demand curve for Country F, $E^*_x$, placed arbitrarily above the excess demand curve for Country H, $E_x$, The autarky price ratio in Country F is $p^*_a$, greater than Country H's autarky price ratio, $p_a$.

General equilibrium in the world economy is then determined at an international price ratio where the excess demands of the two countries are equal and opposite. In Fig. 4.5, this occurs at price ratio $p^*$. At that price, the positive excess demand (imports) of the Foreign country are equal to the negative excess demand (exports) of the Home country. The market for X clears, which is a condition for international equilibrium: $E_x + E^*_x = O_*$[2]

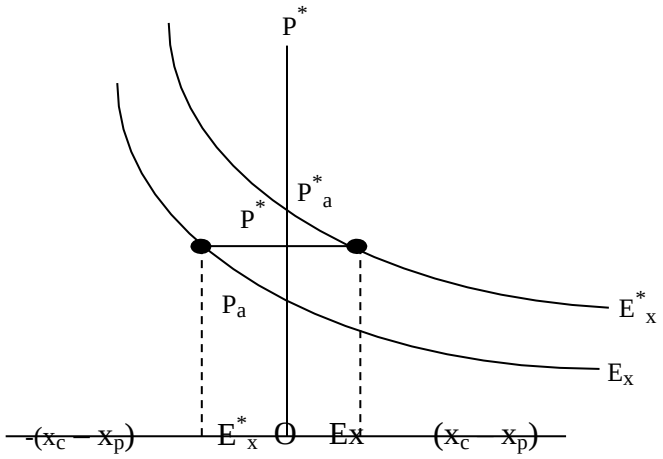


Fig. 4.3 International general equilibrium

Note for future reference that the equilibrium price lies between the autarky prices of the two countries. This is a general result, at least in competitive models, and it makes economic sense. When two countries are combined through trade, X becomes relatively less scarce in the country with the initially high price because that country can now obtain the good through trade. Producers in the country in which X has the low price initially can now find additional buyers of their good through exports.

What about the market for Y? When we have only two goods and we impose a trade balance condition, we need examine only one market to find international equilibrium. If Country H is satisfying its trade balance condition, then p*xEx = -p*yEy, where the latter

is the excess demand for Y by H. Similarly, if Country F is satisfying its trade balance, then p*xE*x = -p*yE*y. Thus, if Ex = -E, then Ev = -E*y. The need to find equilibrium in only one market is known as Walras' Law in economics.

The direction of trade at this equilibrium in Fig. 4.5 makes economic sense. With the relative autarky price of AT higher in Country F, F will import X and H will export X in international equilibrium. We will see many times in the chapters that follow that differences in autarky prices are the key to determining the direction of trade, or which countries import and export which goods. A major topic of Part II of this book is determining how underlying characteristics of economies, such as technologies and factor endowments, lead to differences in autarky prices.

**Self-Assessment Exercise**
Discuss the in details the international general equilibrium

## 4.0 Conclusion

General equilibrium theory tried to show how and why all free markets tended toward equilibrium in the long run. The important fact was that markets didn't necessarily reach equilibrium, only that they tended toward it. As Walras wrote in 1889, "The market is like a lake agitated by the wind, where the water is incessantly seeking its level without ever reaching it."

General equilibrium theory builds on the coordinating processes of a free market price system, first widely popularized by Adam Smith's "The Wealth of Nations" (1776). This system says traders, in a bidding process with other traders, create transaction by buying and selling goods. Those transaction prices act as signals to other producers and consumers to realign their resources and activities along more profitable lines. Walras, a talented mathematician, believed he proved that any individual market was necessarily in equilibrium if all other markets were also in equilibrium. This became known as Walras' Law.

## 5.0 Summary

In this unit, we have learnt and discuss on the following;

1. Equilibrium in a closed economy is determined by UN (a) producer optimization, (6) consumer optimization, and (c) market clearing.
2. If production and consumption are competitive, the closed economy equilibrium is efficient in the sense that the economy attains the highest community indifference curve subject to the feasibility of production.
3. International trade removes the constraint that an economy consumes only what it produces. It also replaces the market clearing condition for equilibrium with the much weaker condition that the value of total production must equal the value of total consumption. We show that this restriction is exactly equivalent to the

restriction that the value of imports must equal the value of exports. Open economy equilibrium determined by the producer and consumer optimization conditions plus the trade balance condition.

4. A country's willingness to trade with the rest of the world can be summarized by an excess demand function for one of the two goods (we chose X). This function gives the country's desired imports or exports at all possible price ratios. This curve slopes downward like a conventional demand curve, except that the quantity demanded can be either positive or negative. A negative excess demand simply mean that the country wishes to export at a given price. Excess demand is zero at the country's autarky price, and movement away from autarky is welfare improving.
5. A second country can be introduced and its excess demand curve derive International equilibrium is found at the price where the exports of one country match the imports of the other country. This price is between the autarky price levels of the two countries. The autarky price differences determine the direction of trade, with the low-price country exporting the good and the high-price country importing the good.
6. We noted that, because of the trade balance restrictions, we need consider only one market to determine general equilibrium. If that market clears, so does the other market.

## 6.0. Tutor-Marked Assignment

1. Discuss the analysis of General Equilibrium
2. What do you understand the term 'general equilibrium in the open (trading) economy?
3. With the aid of a diagram discuss the analysis of excess demand curve.
4. Suppose that the production frontier for a country is linear. Construct its excess demand curve.
5. Assume that a single consumer has an initial endowment of good X rather than a money income. Show the consumer's desired consumption bundles (and therefore desired trades) as the price ratio changes. Is it possible that the consumer may wish to sell less X as the relative price of X rises? (This is the "backward bending" issue.)
6. If you succeed in answering question 2, can you show that less X will be supplied as its price rises because the income effect of the price increase outweighs substitution effect?

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**MODULE TWO THE THEORY OF GAINS FROM TRADE**

**UNIT ONE Gains from Trade**
**UNIT TWO Gain from Exchange**
**UNIT THREE Cause and Consequences of trade**

**UNIT ONE Gains from Trade**

**CONTENTS**



## 1.0 INTRODUCTION

In economics, gains from trade refers to the net benefits to agents from allowing an increase in voluntary trading with each other. In technical terms, it is the increase of consumer surplus plus producer surplus from lower tariffs or otherwise liberalizing trade.

Gains from trade are commonly described as resulting from specialization in production from division of labor, economies of scale, scope, and agglomeration and relative availability of factor resources in types of output by farms, businesses, location and economies, a resulting increase in total output possibilities, trade through markets from sale of one type of output for other, more highly valued goods.

Market incentives, such as reflected in prices of outputs and inputs, are theorized to attract factors of production, including labor, into activities according to comparative advantage, that is, for which they each have a low opportunity cost. The factor owners then use their increased income from such specialization to buy more-valued goods of which they would otherwise be high-cost producers, hence their gains from trade. The

concept may be applied to an entire economy for the alternatives of autarky (no trade) or trade. A measure of total gains from trade is the sum of consumer surplus and producer profits or, more roughly, the increased output from specialization in production with resulting trade. Gains from trade may also refer to net benefits to a country from lowering barriers to trade such as tariffs on imports.

## 2.0. Objectives

At the end of this unit, you should be able to:

- Define and understand the meaning of Gains from trade
- Define and understand the meaning of gain from trade theorem
- Understand the factor affecting gain from trade

## 3.0. Main Content

### 3.1 GAINS FROM TRADE

We are now in a position to address one of the most fundamental issues in the study of international trade: the gains from trade. We will be able to show that under certain circumstances, a country's overall welfare is in some sense improved by international trade, which should thus be viewed as desirable. Yet the popular press often seems to assert that imports and trade are not beneficial for the national economy. Another popular view is that if one country gains through trade, the other country must lose. This is what economists would call a "zero sum game": the gains to one player equal the losses to the other player. We will show that there is a wide range of circumstances in which all countries gain mutually from trade, circumstances in which trade is a "positive-sum game".

However, we will also show that not all individuals within a country will necessarily benefit from trade. In other words, while a country's total income is increased by trade, these gains may be very unevenly distributed to the point where some individuals or groups are worse off. A solid academic understanding of the gains from trade will have practical applications in evaluating various anti-trade arguments put forward by business, labor, and even government groups.

Figure 5.1 shows the production frontier and indifference curves for a single country. Autarky equilibrium occurs at point A, with the economy reaching utility level $U_a$. Figure 5.1 also shows two alternative world trading price ratios, $p^*_1$ and $p^*_2$. We have deliberately constructed the diagram 80 that these two world price ratios both lead to the same free trade utility

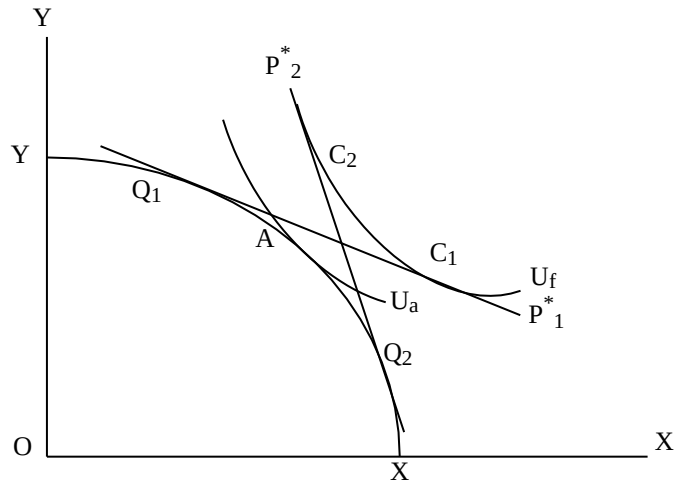


Figure 5.1: Gains from trade

Level, Uf. Figure 5.1 is not a formal proof, but it illustrates a result that can be prove more rigorously: the ability of a country to trade at any price ratio other than its autarky prices must make the country better off. Note also that if the world price ratio happens to equal the autarky price ratio, the country is no worse off. We encourage you to draw a few diagrams like Fig. 5.1 in order to convince yourself that any world price ratio other than the autarky ratio leads to gains. The result does require that the conditions of Eq. (4 4) hold; for example, the price ratio must be tangent to the production frontier.

Another thing to note in Fig. 5.1 is that the direction of trade is of no particular significance. The utility level $U_f$ can be achieved either through the export of Y in the case of world price ratio $p^*_1$ or through the export of X in the case of world price ratio $p^*_2$. The only condition is that the world price ratio must differ from the domestic autarky ratio. Given any such difference, the country gains by exporting what is more valuable on world market than at home and by importing from the rest of the world what is more costly to produce at home than abroad. This point is important in answering the many arguments that attach particular significance to what is goods a country imports or exports. For example, you will hear arguments in the United States and Canada that it is good to export computers and bad to export agricultural and forestry products. But both countries have a huge comparative advantage in such products over countries in Europe and the Far East where land and resources are scarce. Figure 5.1 emphasizes that there is significance to the direction of trade per se, and that arguments to the contrary should be greeted with great skepticism.

However, we can also follows that two countries enjoy mutual gains from trade.

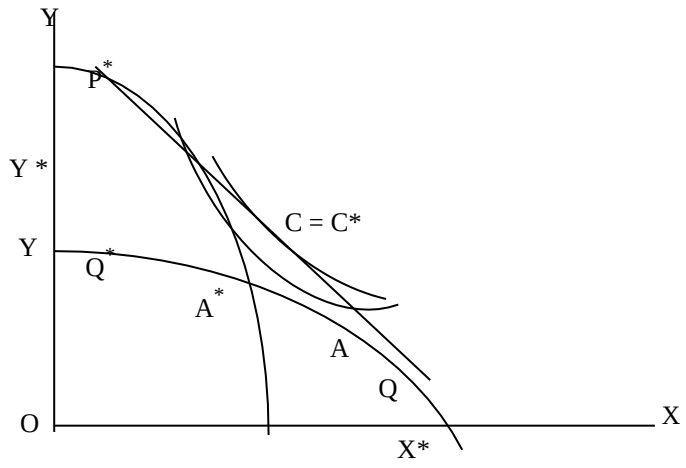


Figure 5.2: Mutual gains from trade

In equilibrium, the world price ratio at which the countries trade is different from the autarky price ratio for each of them. It follows from our analysis of Fig. 5.1 that both countries are made fatter off by trade. Each country sells the product that it produces relatively cheaply and imports the product that is relatively costly to produce at home.

By constructing a very special case, Fig. 5.2 illustrates mutual gains and also makes the point that the direction of trade is of no significance. The two countries have identical preferences but different production frontiers. The production frontiers for Home and Foreign are given by X Y and X Y, respectively. Home is relatively good at producing X, while Foreign is relatively good at producing Y. This difference is then reflected in their autarky price ratios, Home consuming at A and Foreign at A* in Fig. 5.2. Free trade- allows both of them to reach the same point C = C* at price ratio p*, with Home producing at Q and Foreign producing at Q*.

We emphasize that this is a very special case; in general there is no presumption that two countries will reach the same utility level through trade or that the gains from truth will be share equally. But the points that both countries do gain and that the direction of trade is not necessarily of any significance are general results.

## 3.2 THE GAINS-FROM-TRADE THEOREM

We will now present a somewhat more formal treatment of the gains from trade. In particular we present a simple proof of what is called the gains-from-trade theorem. This helps make clear the assumptions necessary to ensure that a country gains from trade.

The diagram that we have presented up to this point make use of the result from previous discussion above in competitive equilibrium, the economy maximizes the value of production at equilibrium prices. That is, the economy gains the highest possible national budget line at equilibrium prices. In Fig. 5.3, world price p* result in production at point Q for reasons discussed earlier. The value of production resulting from producing at any other point in net at price ratio p* must be less than or equal to the value of producing at Q. In particular, we see that the value of production at Q is greater than the value of production at A, the autarky equilibrium.

Let superscript $_f$ denote quantities produced in free trade and superscript a denoted the quantities produced in autarky. Subscript p denotes production. When the value of production is maximized at free trade prices, we have the following inequality:

$$P^*xXfp + P^*y\,Yfp > p^*xXap + p^*yYap \qquad (5.1)$$

In words, the value of free trade production at free trade prices exceeds the value of autarky production at free trade prices. This is the result shown in Fig. 5.3. In autarky we must have market clearing as noted in Eq. (4.1) above, while in free trade we must have trade balance as noted in Eq. (4.2) or Eq. (4.3). Using the latter form of the balance-of-trade equation, Eqs. (4.2) and (4.3) are rewritten here.

$$X^a_p = X^a_c, \quad Y^a_p = Y^a_c, \quad p^*_a X^f_p + p^*_y Y^f_p = p^*_x X^f_c + p^*_y Y^f_c \qquad (5.2)$$

Now substitute the market clearing conditions into the right-hand side of Eq. (5.1), changing production quantities to consumption quantities. Similarly, substitute the trade balance equation in Eq. (5.2) into the left-hand side of E.q (5.1) into the following inequality.

$$P^*xXfc + p^*yYfc \geq p^*xXac + p^*yYac \qquad (5.3)$$

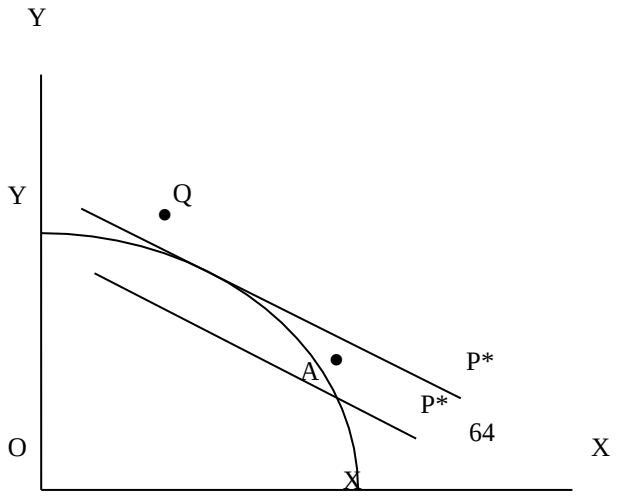

Figure 5.3: Maximization of the value of output at world prices.

This inequality states that the value of free trade consumption evaluated at free trade prices exceeds the value of autarky consumption evaluated at free trade prices. This means that in free trade, where consumers can choose the autarky consumption bundle ($X^a_c$, $Y^a_c$ ), they instead choose the free trade consumption bundle ($X^f_c$,$Y^f_c$), which costs at least as much. In Fig. 5.3 the autarky bundle lies on a lower national budget line; therefore, Eq, (5.3) holds as a strict inequality. Because the autarky bundle costs less, consumers would choose it if they preferred it to the free trade bundle. This means that the free trade consumption bundle is preferred to the autarky consumption bundle. This result is known as the Gains-from-Trade theorem.

The Gains-from-Trade theorem. Suppose that the value of production is maximized at free trade prices. Then the value of free trade consumption at free trade prices exceeds the value of autarky consumption at free trade prices. The free trade consumption bundle must thus be preferred to the autarky bundle, because if it were not, consumers would pick the cheaper autarky bundle.

It is extremely important to understand that this theorem is not trivial and also that there are many situations in which it fails to hold. In order to appreciate this, we need to examine more critically that the value of production is maximized at free trade prices. While this property may hold in ideal cases such as the simple competitive model, it need not hold in more complex cases. Figures 5.4 and 5.5 illustrate two situations in which it does not hold. In Fig. 5.4 there is some distortion in the economy such that the world price ratio is not tangent to the production frontier. In such a situation, it is possible that

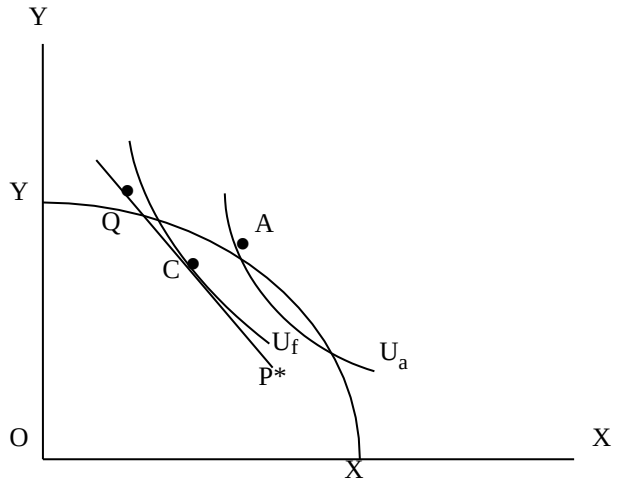


Figure 5.4

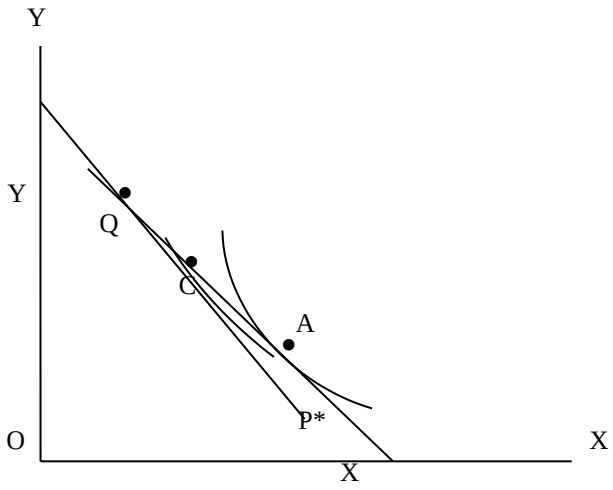


Figure 5.5

Autarky consumption at A is superior to free trade consumption at C, the inequality in

Eq. (5.1) does not hold, so neither does the one in Eq. (5.3). These inequalities thus require that the free trade price ratio be tangent to the production frontier when both goods are produced (If only one good is produced, the price ratio must not pass inside the production set). We can refer to this as the tangency condition: the free trade price ratio must be tangent to the production frontier in order to guarantee that the value of production is maximized at free trade prices.

Figure 5.5 illustrates the other key assumption, convexity of the production set. Figure 5.5 depicts free trade production at Q and consumption at C. This is inferior to autarky consumption at A. Again, the inequality in Eq. (5.1) does not hold. We can refer to this as the convexity condition: the production set must be convex in order to guarantee that the value of production is maximized at free trade prices.

We have seen that the tangency and convexity conditions are sufficient to ensure that the value of production is maximized at free trade prices. These conditions will generally hold in economies that have (1) constant returns to scale (2) perfect competition, and (3) no other distortions such as certain production or factor taxes. The production set will be convex, and prices will be tangent to the production frontier, with the corresponding restriction holding when the economy is specialized. However, we will still discuss in this course material that difficulties arise when there are production taxes or imperfect competition. These can lead to a failure of the tangency condition. With increasing returns to scale or factor market distortions, the convexity condition may fail.

In conclusion, we can strongly emphasize that the existence of distortions or increasing returns does not mean that losses from trade and likely; it means only that they are possible. Indeed, scale economies and imperfect competition are major sources of gains from trade, as we shall show later in the course of our discussion.

### 3.3. Factors affecting gains from trade

There are several factors which determine the gains from international trade:

1. Differences in cost ratio: The gains from international trade depends upon the cost ratios of differences in comparative cost ratios in the two trading countries. The smaller the difference between exchange rate and cost of production the smaller the gains from trade and vice versa.

2. Demand and supply: If a country has elastic demand and supply gains the gains from trade are higher than if demand and supply are inelastic.

3. Factor availability: International trade is based on the specialization and a country specializes depending upon the availability of factors of production. It will increase the domestic cost ratios and thereby the gains from trade.

4. Size of country: If a country is small in size it is relatively easy for them to specialize in the production of one commodity and export the surplus production to a large country and can get more gains from international trade. Whereas if a country is large in size then they have to specialize in more than one good because the excess production of only one commodity cannot be exported fully to a small sized country as the demand for good will reduce very frequently. So the smaller the size of the country, the larger the gain from trade.

5. Terms of Trade: Gains from trade will depend upon the terms of trade. If the cost ratio and terms of trade are closer to each other more will be the gains from trade of the participating countries.

6. Productive Efficiency: An increase in the productive efficiency of a country also determines its gains from trade as it lowers the cost of production and price of the goods. As a result, the country importing gains by importing cheap goods.

**Self-Assessment Exercise**
Discuss the in details the international general equilibrium

## 4.0 Conclusion

Nations exchange goods with each other when they expect to gain from the exchange. We call that gains from trade. Adam Smith, a famous economist from the 18th century, talked about this in his book, Wealth of Nations, and so did economist David Ricardo. The theory of comparative advantage teaches us that nations should specialize in the production of the goods in which they have the lowest opportunity cost, and trade with other nations. The reason is because nations tend to have different resources, and they're not equally efficient when they are producing goods, which means they have different opportunity costs. When they have different opportunity costs of producing goods, it is possible to gain from trading. When both nations trade, they both will experience an increase in output, because they don't have to switch between one task and another. They also increase their skill level because they are doing the same task over and over again. This makes them more productive, and empowers them to produce at a level that goes beyond their production possibilities curve.

## 5.0 Summary

In this unit, we have learnt and discuss on the analysis of gains from trade, the gains from trade theorem and the factors affecting gains from trade. Therefore, I belief you must have learnt a lot from this unit and understand all the rudiment of gains from trade analysis.

## 6.0. Tutor-Marked Assignment

1. Discuss the analysis of Gain from trade

2. Discuss briefly on the gains from trade theorem
3. List and explain the factors affecting gains from trade.

## 7.0. REFERENCES/FURTHER READING


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**UNIT TWO Gain from Exchange**

**CONTENTS**



## 1.0 INTRODUCTION

Modern economies, whether capitalistic or socialistic, whether fully developed or not, are characterized by specialization of the means of production and by exchange of goods and services. The earliest and most common form of specialization is that of labor. Interrelated with it, particularly in modern developed economies, is specialization of machines. In manufacturing, the advantages of both are best realized through specialization of plants and, in some cases, of enterprises. Finally, there is regional and local specialization. All of these forms of specialization imply an exchange economy.

## 2.0. Objectives

At the end of this unit, you should be able to:

- Define and understand the meaning of Gains from exchange
- Define and understand the meaning of Gain from Specialization
- Know the importance of civil society

- Understand the distribution of gains with Heterogeneous tastes and Endowments

## 3.0. Main Content

## 3.1 THE GAINS FROM EXCHANGE

The gains from trade can be conveniently broken down into gains from two distinct sources: gains from exchange and gains from specialization. The gains from exchange refer to the fact that if individuals or countries are endowed with different amounts of goods or have different preferences, they can both gain by trading with each other.

Suppose we have two individuals, Jim and Janet, and the Jim has six bottles for beer and no bags of peanuts, while Janet has five bags of peanuts but no beers. As shown in some the analysis in the previous units, Janet and Jim will both attainted utility level $U_a$ in their respective diagrams. But various possibilities exist for mutual gains. For example, Janet could give Jim three bags of peanuts for two beers. They would then move to point C in their respective diagrams, each attaining a utility level of $U_f$. An implicit trading price is established, in so far as three bags of peanuts are deemed to be equal in value to two beers. Beer is relatively more valuable; the price of beer in terms of peanuts is 3/2 = 1.5.

Other trades could have been arranged, such as two bags of peanuts for two beers, establishing a price ratio of 1. Obviously, Janet would prefer this trade, while Jim would prefer the one mentioned in the previous paragraph. Different trades affect the distribution of gains between the traders, and stronger or smarter traders will tend to move the terms of trade to their advantage. The important point here is that both individual will gain something from voluntary trade (otherwise they would not trade); that is, voluntary trade is mutually beneficial. However, this point is extremely important in countering the popular opinion that any gain from trade by one country must be another's loss. It is not true that a consumption gain by Japan or the United States in trading with Canada must mean an equivalent loss for someone in Canada. Trade results in mutual gains, as we have just shown.

This result can be demonstrated more formally with the kind of box diagram shown in Fig. 5.6. The two goods are gain X and Y, and the two individuals are 1 and 2 at this endowment point are given by $U^1_a$ and $U^2_a$, respectively. You should be able to convince yourself that moving from E to any point in the interior of the "lens" formed by $U^1_a$ and $U^2_a$, will make both individuals better off. But not of all the possible moves are Pareto optimal – that is, moves after which we could not make one individual better off without making the other one worse off. Beginning at E in Fig. 5.6, the set of Pareto optimal trades is given by the segment of the contract curve between A and $A^1$, where indifference curves are tangent. Point F illustrates one possible Pareto optimal trading equilibrium between A and $A^1$ at which gains are shared fairly equally. As discussed earlier, in other trades between A and $A^1$ the gains shift more toward one trades or the other, but both still do gain. The existence of many possible beneficial trades, differing in the distribution of gains, implies that there is some element of conflict as well as an element of cooperation in trade.

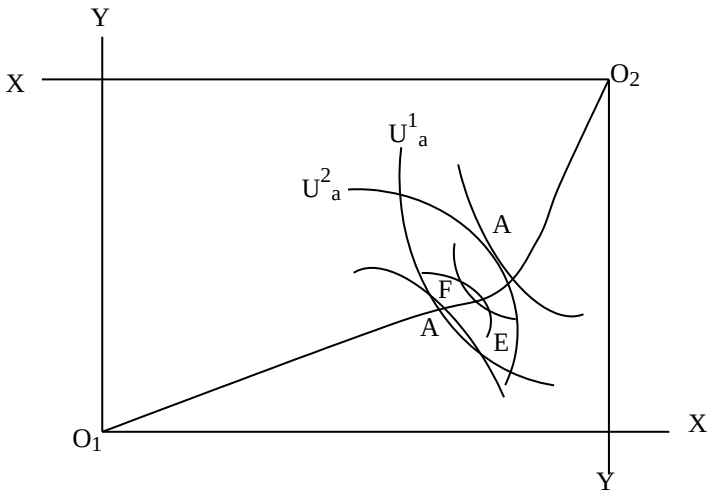


Figure 5.6: Cooperation and conflict

## 3.2 THE GAINS FROM SPECIALIZATION

The previous discussion assumed that the total quantities of all goods were fixed. In fact, individuals or countries can generally increase total production and realized additional gains by specializing in the goods they produce most efficiently. This proposition is usually fairly obvious in the case of individuals. In modern society no one is self-sufficient, and indeed, most people engage in an extremely narrow range of work activities in order to earn income to buy a wide range of goods and services. Everyone seems to grasp the idea that we would have a much lower standard of living if people all tried to grow their own food, make their own clothes, build their own houses, and so forth. Specialization in a narrow range of activities is efficient.

The same principle holds true for countries, although people seem to lose sight of this fact. One frequently hears arguments in the United States to the effect that we should be producing a certain good rather than importing it from abroad. Consider a simple example in which we have two countries, the United States and Japan that produce two goods, wheat and steel. Suppose that the number of tons of wheat or steel that one person

produce per year in each country is given in Table 5.1. One labour-year devoted to wheat production in the United States results in 30 tons of wheat, and so forth.

The United States is relatively more productive in wheat, and Japan is relatively more productive in steel. Using terminology familiar to most readers, the opportunity cost of producing one more ton of steel is three tons of wheat in the United States, but only 1 ton of wheat in Japan. Japan has an advantage in steel in the sense of being the low opportunity cost producer of steel. Suppose we now move one worker in the United States out of steel production and into wheat production. Similarly, we move one Japanese worker out of wheat production and into steel production. Changes in outputs following this reallocation are given in Table 5.2. The table shows that simply moving workers in each country into the industry in which the country has the advantage (its low opportunity-cost industry) results in an increase in the world outputs of both goods. The countries may then engage in trade that leaves both better off.

Now suppose that Japan is more productive in both goods. Do gains from specialization still exist? The answer is a definite yes, as was first pointed out by the 19-century British economist David Ricardo. Let us double the productivities of Japanese workers shown in Table 5.1. We will now have the situation in Table 5.3. In this example Japan is said to have an absolute advantage in both goods, whereas in Table 5.1 the United States had an absolute advantage in wheat and Japan an absolute advantage in steel. But in both cases the United States is said to have a comparative advantage in wheat, meaning that the American economy is relatively more productive in wheat; the United States can produce 1 ton of wheat at an opportunity cost of 1 ton of steel, whereas in Japan the opportunity cost of 1 ton of wheat is 1 ton of steel.

**Definition.** A country has an absolute advantage in good X if one unit of labour produces more X than is produced by one unit of labor in the other country. A country has a comparative advantage in X if its opportunity cost of X in terms of Y is less than in the other country.

Ricardo noted that as long as some pattern of comparative advantage exists, there will be gains from trade, regardless of whether one country has an absolute advantage in all goods. To see this, suppose we now reallocate two workers in the United States from steel to wheat and one worker in Japan from wheat to steel. The resulting changes in outputs

**TABLE 5.1**
**One labor-year of production**

| | U.S. | Japan |
|---|---|---|
| Wheat | 30 | 20 |
| Steel | 10 | 20 |

**TABLE 5.2**
**Changes in outputs due to reallocation of one worker**

| | U.S. | Japan | Total |
|---|---|---|---|
| Wheat | +30 | -20 | +10 |
| Steel | -10 | +20 | +10 |

**TABLE 5.3**
**One labor-year of production**

| | U.S. | Japan |
|---|---|---|
| Wheat | 30 | 40 |
| Steel | 10 | 40 |

**TABLE 5.4**
**Changes in outputs due to reallocation of one workers in United States, one in Japan**

| | U.S. | Japan | Total |
|---|---|---|---|
| Wheat | +60 | -40 | +20 |
| Steel | -20 | +40 | +20 |

are given in Table 5.4. Once again, we see that the total outputs of both goods can be increased if both countries specialize according to their patterns of comparative advantage. Gains from specialization will always exist if countries have different opportunity costs (i.e., if there exists some pattern of comparative advantage).

Figure 5.7 summarizes our discussion by showing how the total gains from trade can be decomposed into gains from exchange and gains from specialization. Point A gives the autarky production/consumption point, and $U_a$ give the autarky utility level. Suppose the economy can now trade at prices $p^*$, and suppose that the economy cannot change its output levels (production is fixed at A), Gains from exchange can still be realized by trading to point E. The movement from A to E and the increase in utility from $U_a$ to $U_c$ illustrate the gains from exchange. But further gain realized if we move the production point to Q, showing relatively more specialization in good X. The movement from E to C and the increase in utility from $U_c$, to $U_f$ illustrate the gains from specialization.

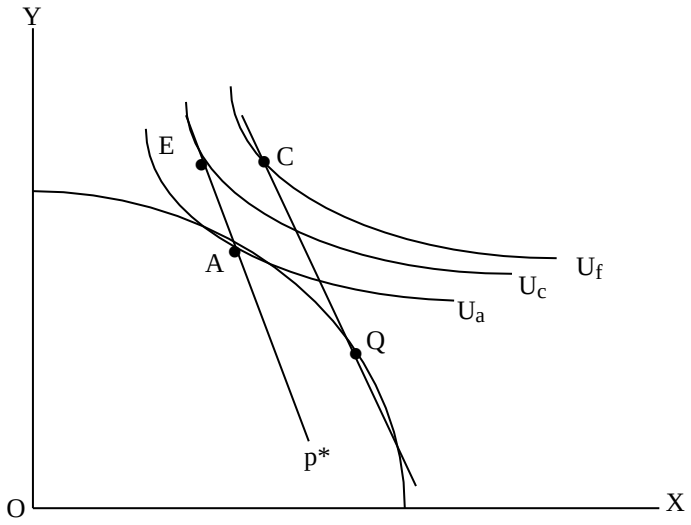


**FIGURE 5.7: Decomposition into gains from exchange and gains from specialization**

### 3.3 THE DISTRIBUTION OF GAINS WITH HETEROGENEOUS TASTES

The preceding discussion have shown that a country will gain from international trade in the sense that it can potentially consume more of both goods. The gains were illustrated with the use of community indifference curves, although the main argument can be made without them. But while trade may result in aggregate consumption gains, these gains are

not necessarily distributed evenly among the members of a society. Indeed, it is possible that certain groups will actually be worse off in a situation of free trade than in an autarky or a restricted trade situation. These possibilities must be understood when you are evaluating certain trade policy questions.

One possibility occurs when individuals in a society have very different tastes. Suppose that all individuals in the society have identical factor endowments and therefore identical incomes and budget lines. Suppose that the world price ratio exceeds the price ratio that would prevail in autarky ($p^* > pa$) so that the country exports X and imports Y (as in Fig. 5.1 with $p^* = pa$). Now consider two individuals with different tastes (but identical incomes). Let AA' in Fig. 5.8 be the identical autarky budget line for both individuals. Individual 1 has a high preference for y and so chooses autarky consumption bundle $A_1$. Individual 2 has a high preference for X and therefore chooses bundle $A_2$. Their utility levels are given by $U^1_a$ and $U^1_f$, respectively.

As was shown in Fig. 5.1 ($p^* = p^*_2$) trade has the effect of raising the relative price of X, which we illustrate in Fig. 5.8 by rotating there budget line to TT'. Individual 1 increases her consumption from $A_1$ to $T_1$ and experiences an increase in welfare from $U^1_a$ to $U^1_f$. But the increased price for X has affected individual 2 so adversely that his consumption falls from $A_2$ to $T_2$ and his welfare from $U^2_a$ to $U^2_f$. Thus, when individuals have heterogeneous tastes, the gains from trade will be distributed unevenly, and some groups may indeed become worse off.

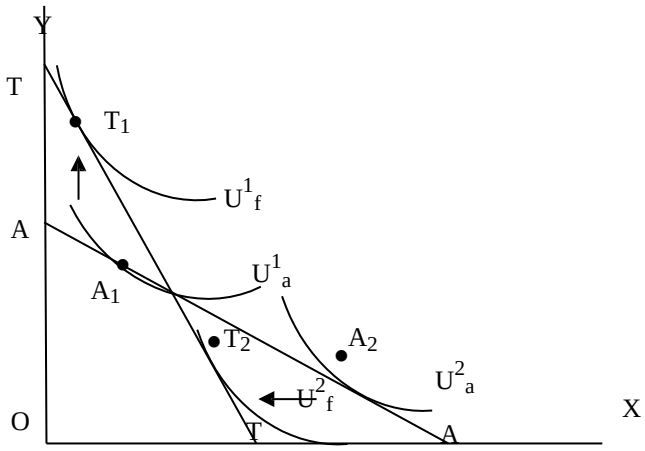


**Figure 5.8: Distribution of gains with heterogeneous preferences**

One example of this problem was the entry of Great Britain into the European Economic Community (EEC) in the early 1970s. Prior to entering, Great Britain had imported inexpensive food from countries such as New Zealand and Australia. After entering, the British were forced to pay much higher European in prices for many foods, especially meat. In exchange for this, the British were able to purchase a wider range of manufactured goods at cheaper prices. The net benefit to a household would surely depend on the household's income, number of children, and so on. It is likely that some

large families with low incomes that were spending a large fraction of family income on food were made worse off by entering the EEC.

## 3.4 THE DISTRIBUTION OF GAINS WITH HETEROGENEOUS ENDOWMENTS

A second example of uneven distribution of gains from trade occurs when individuals differ widely in their factor endowments. Suppose that society is comprised of two distinct groups, capitalists and laborers, and that laborers, own no capital and capitalists perform no labor. Assume also that X is labor-intensive and that Y is capital intensive.

Budget line for laborers and capitals are shown in Fig. 5.10, with each group's initial autarky income constraints given by AA' and each group's initial welfare level by $U_a$. Now assume that trade raises the price of X as in Fig. 5.1 from pa to $p^*_2$. The economy responds to this change by shifting resources out of Y production and into X production. The output of the economy move from point A in Fig. 5.1 to point $Q_2$.

Furthermore, we will still show in our discussion that this increase in the output of X, the labour-intensive good, leads to an increase in the demand for and price of

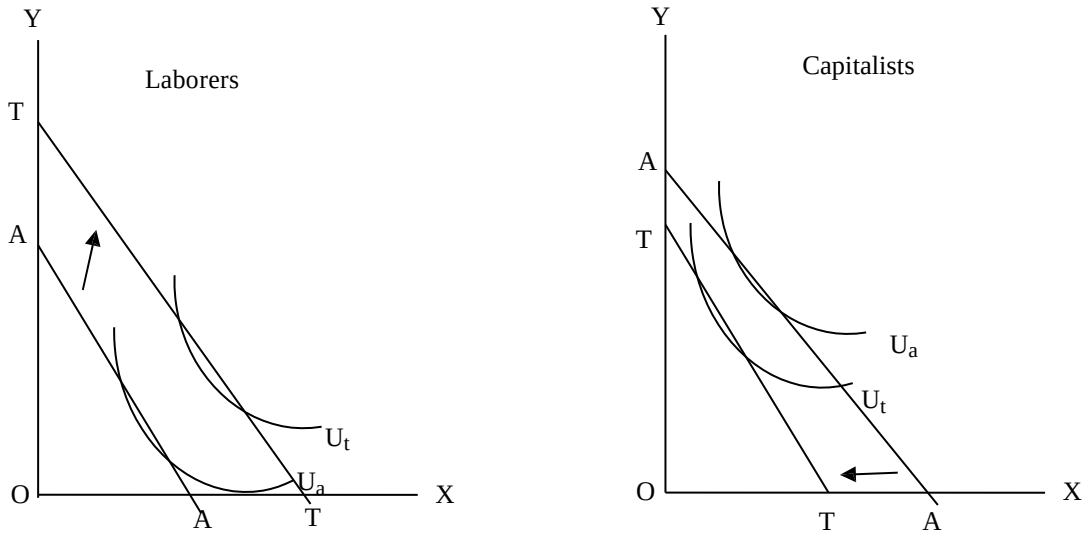


**Figure: 5.9: Distribution of gains with heterogeneous endowments.**

labour. Similarly, the decrease in the production of Y, the capital-intensive good, leads to an overall decrease in the demand for and price of capital. The commodity price changes caused by trade in turn cause factor price changes. In these circumstances the budget line of laborers will shift out everywhere as in Fig. 5.9. Laborers will be better off even if they wish to consume only X, the good whose price has risen with trade. Conversely, the budget line of capitalists may shift in everywhere because of the decrease in the price of capital and the subsequent decreases in capitalists' incomes. Capitalists thus lose from the income redistribution caused by trade.

A good example of income redistribution caused by international price changes occurred in the United States during the 1970s? The redistribution among states and among economic groups resulted from the oil price increases that occurred during that decade. The energy-producing states realized huge gains from the price changes, while the energy-consuming states were certainly much worse off.

**Self-Assessment Exercise**
Discuss the in details the international general equilibrium

## 4.0 Conclusion

In this unit, we develops one of the most important ideas of international trade theory, the proposition that countries can benefit mutually from free trade. You should now be able to counter many of the anti-trade you read in the press (which is often simply reporting the speeches of politicians and labor and business leaders). Nevertheless, some arguments may raise valid concerns about free trade. Gains from exchange can be distributed very unevenly and, in the absence of some redistribution plan, some groups within society have legitimate fears

## 5.0 Summary

In this unit, we have learnt that gain from exchange is based on what a country is deficient in producing will be exchange for what they can produce more efficiently with other countries of the world, in other to main the economy of the that country. Therefore, gain from exchange has help a lot of country in having and consuming what they are deficient in producing.

## 6.0. Tutor-Marked Assignment

1. Discuss the analysis of Gains from exchange
2. Discuss the distribution of gains with heterogeneous tastes.
3. What do understand by the term ‘Gain from specialization’?
4. Discuss the distribution of gains with heterogeneous endowments.

## 7.0. REFERENCES/FURTHER READING


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## UNIT THREE CAUSES AND CONSEQUENCES OF TRADE

**CONTENTS**



## 1.0 INTRODUCTION

International trade is trade carried on between the inhabitants of different countries and is due to the same causes as domestic trade; that is, trade carried on within a country. Exchanges may be carried on between two localities in the same country because the two localities are differently endowed by nature. One locality may contain mineral deposits, for instance, and the other locality may be especially adapted for agricultural production. It will, therefore, be to the interest of both localities to exchange, inasmuch as both localities may need the minerals and the agricultural produce, whereas the agricultural community cannot produce the minerals at all, and the mining community can perhaps produce the agricultural produce only with great difficulty.

The situation is not changed if the mining community happens to be in one country and the agricultural community in another. Thus, for example, tin is mined in Wales and not in the United States. On the other hand, the United States can produce wheat at much less cost than can the Welsh. For this reason an exchange of wheat and tin between Wales and the United States may be found desirable. An exchange of tropical products for those of

the temperate zone will be found advantageous for the same reason. Bananas might be produced in the United States under glass covers, but such production would be at a great disadvantage. On the other hand, many products of the United States cannot be conveniently produced in the tropics. It will, therefore, often be found convenient and desirable to carry on an exchange of goods between the United States and tropical countries.

The exchanges already referred to rest on natural differences in two localities but in a second class of instances exchanges may be carried on profitably where nature has not made a distinction in its endowment of the two localities. Thus, for instance, the manufacture of cotton goods may have grown up in one city, and the manufacture of woolen goods in another, and an exchange of the two commodities may be carried on between the two communities. The exchange here rests not on any natural advantage but on the fact that the industries have grown up in the respective places and that each place produces it's kind of goods more cheaply. Exchange may be carried on advantageously between these two places whether they are both in the same country and in different countries. The exchange rests on the fact that each type of goods is produced more cheaply in its own place. In a third instance, it may be that both goods are produced more cheaply in one of the localities than in the other and yet that an exchange may take place between the two localities. Suppose, for example, that the goods A and B are both produced more cheaply in country X than in country Y but that the difference in the cost of producing the two goods is greater in one country than in the other, so that while country X produces A more cheaply than country Y can produce it, country X produces B very much more cheaply than country Y can produce it. In this case, country X will produce B and country Y will produce A and a satisfactory exchange of the two articles will take place between the two countries. Although X can produce A absolutely more cheaply than Y can, it has such a relative advantage in producing B that it will pay it to expend all of L its energies upon the production of B and to secure its supply of A from country Y.

## 2.0. Objectives

At the end of this unit, you should be able to:

- Define and understand the meaning of No-trade model
- Define and understand the meaning Methodological Considerations
- Know the Consequences/Effect of international trade

## 3.0. Main Content

### 3.1 THE NO-TRADE MODEL

In our previous discussion, you recall that we make emphasizes that a countries gain from trade by importing what is relatively costly to produce at home and by exporting what is

produced relatively cheaply (efficiently) at home. But what are the underlying characteristics of an economy that give it its pattern of comparative advantage?

In fact, the trade of any country is a complex outcome of many causes all operating at the same time. There is generally no single cause of trade, but in order to understand the overall picture, we need to study how each possible cause of trade operates in isolation.

A convenient method of examining the causes of trade is to first imagine a world in which there is no trade. In terms of our simple model, this would be true if all autarky price ratios were identical and there were no scale economies. Thus, we begin by imagining a situation in which all countries have identical, convex production sets and in which the same set of community indifference curves prevails in all countries. We are assuming that any two countries can be represented by the situation shown in Fig. 5.9.

What assumptions are necessary to ensure that the demand and supply situation in all countries are identical? This question is easily answered by recalling from our previous units discussion underlying assumptions that were made in deriving the production possibility curve and the community indifference curve. On the demand side it is sufficient to assume that identical and homogeneous tastes exist throughout the world. On the production side three conditions determine the position and shape of the production possibility curve: degree of homogeneity, factor endowments, and production functions. Thus, to achieve identical production possibility curves in all countries, it is sufficient to assume that all countries have the same constant-returns production functions and that all countries have the same factor endowments. These assumptions will give the same aggregate demand and supply relationships in all countries, but there is one further restriction that we must impose. We are seeking conditions that will make commodity price ratios the same in all countries, and this will be the case only if commodity prices are determined by aggregate demand and supply. We must, in other words, ensure that equilibrium prices are determined by the tangency between the highest community indifference curve and the production possibility curves as shown Fig. 5.9, and to ensure this we assume that there are no distortion in the model. Distortion include taxes, subsidies, and imperfect competition. We can write down a set of five conditions that together guarantee the no-trade situation. These are

Identical production functions among countries
The same relative endowments in all countries

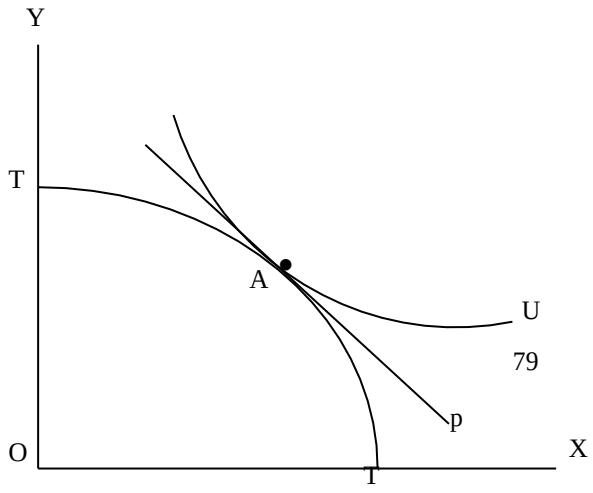

**FIGURE 5.9: Two Identical**

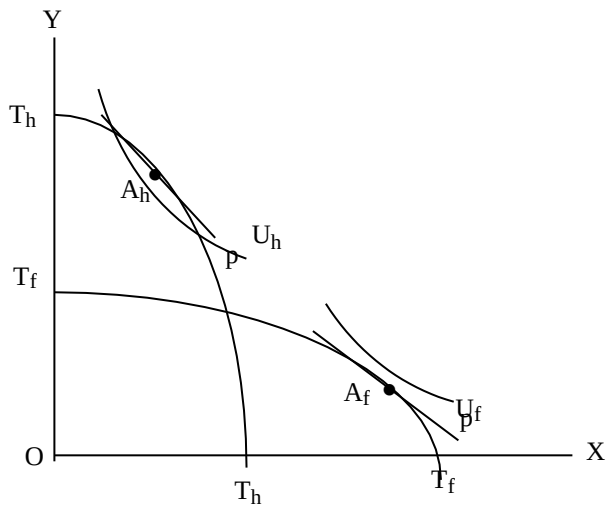


Figure 6.1: Offsetting bases for trade

3. Constant returns to scale
4. Identical and homogenous taste in all countries
5. The absence of distortions (e.g., taxes, subsidies, imperfect competition)

While these five conditions are sufficient to imply that there will be no trade, there are obviously many other models that could be invented in which autarky prices would be identical so that no trade would take place. In other words, while this set of assumptions will guarantee no trade, it is not the only set of assumptions that will do so. This is illustrated in Fig. 6.1, where subscripts *h* and *f* refer to the countries H and F, respectively. Production conditions are clearly different in the two countries, with H producing relatively more Y and F relatively more X at any common price ratio. Demand conditions also differ, however, and in the situation shown, these differences are just

enough to offset the production conditions, leaving autarky prices identical.

The real importance of these live conditions is not that they describe a world in which there will be no trade, for such a situation is not of much interest, but that they summarize the various things that can cause trade. If any one of the five conditions is relaxed, a situation will arise in which trade will be possible. These five conditions can therefore be thought of as the five broadly defined determents of, or bases for, trade.

## 3.2 METHODOLOGICAL CONSIDERATIONS

In the last unit it was argued that the relaxation of any one of five will give rise a situation in which international trade can take place. To illustrate this, we will relax each of the assumptions in turn, maintaining all four of the others, and examine the implications for international trade. This approach is sometimes criticized as being unrealistic in the sense that the models generated do not accurately describe the real. To assess the relevance of this criticism, we must understand why this approach is being employed and what kinds of conclusions we expect to draw from the analysis.

It is clear that no conclusions about a specific cause of trade can be derived unless we can be sure that no other things are causing trade at the time. For example, we could not identify the effects of demand differences in a model in which endowments were also different, for it would generally be impossible to separate the effects of these two variables. This is the situation of Fig. 6.1, where the two conditions are offsetting, resulting in identical autarky prices. Our analysis can be thought of as a kind of theoretical experiment in which, in order to study the effects of one variable, all other variables are neutralized.

At this stage of the analysis, then, the question of whether the model is "realistic" is not a relevant one, for no claim has been made about its predictive powers. In each of the models developed in subsequent units, the strict assumptions made are necessary in order to isolate the effects of the particular determinant being examined. The assumptions of no distortions, identical production functions, and so on, are made not to describe the real world but to allow individual determinants to be considered in isolation.

While developing realistic models is not necessary for the kind of theoretical experiments that we have just described, it is the principal focus of empirical analysis. If we were interested in empirical tests of trade models, we would be faced with determining a set of assumptions appropriate for model used to explain real-world trade flows. If the implications of the various determinants of trade models are different, then we would ideally include any variable that can cause trade. In practice, of course, some simplification is necessary, and each investigator has to decide which variables are important and how the model should be constructed.

To strengthen this last point, consider the fact that none of the five conditions holds between any two countries in the world (although in some cases, a condition can be "close" to holding). In comparing the characteristics America, the European Union, and

Africa, for example, we would find that the United States and Canada have a higher ratio of land endowment to labor endowment relative to Europe. North America and Europe have superior technology and higher endowments of physical and human capital relative to unskilled labor when compared to Africa. We would find that many important industries such as aircraft, autos, and chemicals have strong scale economies. We would find that tastes differ across countries and are from homogeneous in any one country. (For example, the share of income spent on food declines steadily with per capita income.) Countries have tax systems that differ significantly from one another, and many industries (generally those with strong scale economies) are characterized by small numbers of firms and significant imperfect competition.

The assumption that two countries have only one basis for trade (only one of the five conditions fails to hold) is made for the purposes of understanding that basis' individual contributions to determining trade. It is the job of empirical analysis to determine the quantitative importance of the five bases for trade.

## 3.3. CONSEQUENCES/EFFECT OF INTERNATIONAL TRADE

The following five points will highlight the five harmful effects of International Trade. They are: 1. Dual Economies 2. Not Much Beneficial for Poor Countries 3. Limited Possibility of Gain 4. Adverse Effect on 'Demonstration Effect' and 5. Secular Deterioration in the Terms of Trade.

### 1. When there is Dual Economies:

International trade has resulted in creating 'dual economies' in underdeveloped countries as a result of which the export sector became an island of development while the rest of the economy remained backward. The effects of foreign factor movements have been that of creating a highly unbalanced structure of production of these countries. No doubt, the opening up of the export markets gave a fillip to their export sector which led to the development of this sector while ignoring other sectors of the economy.

Although export increased but they did not contribute much to the development of the rest of the economy. Moreover, excessive dependence on exports leads to cyclical fluctuations in the advanced countries. During depression, terms of trade become adverse and their foreign exchange earnings fall steeply.

They are also not able to take advantage of world boom because any improvement in their balance of payment does not lead to increased output and employment due to market imperfections and non-availability of capital goods.

### 2. When the Poor Countries Benefit Nothing:

The foreign trade has also not been entirely beneficial to poor countries because of the adverse effects of foreign investments on their economy. It has been maintained that the inflow of foreign capital and developed a country's natural resources only for export purposes, to the neglect of production in the domestic sector. In these countries the export sector remains an island of development surrounded by a backward low-productivity sector. Thus, the inflow of foreign capital in underdeveloped countries has not resulted either in the development of the domestic sector or of the people in these countries. Despite huge foreign investments, the people have remained backward in their countries.

Prof. H.W. Singer is also of the opinion that the benefits of technological progress have gone disproportionately to the advanced countries. According to him, "Benefits of foreign trade and investment have not been equally shared between the two groups of countries.

The capital exporting countries have received their repayment many times. Thus foreign investment of the traditional type has formed part of a system of 'economic imperialism' and 'exploitation.'

**3. When there is Limited Possibility of Gain:**

According to Prof. Nurkse the possibility of gain from foreign trade to underdeveloped countries is restricted or limited. It is simply due to the reason that underdeveloped countries export mainly primary goods. These exports suffer losses on account of:

(i) Fall in the demand due to the tendency on the part of developed countries to establish heavy industries,

(ii) Contribution of services in the aggregate production of developed countries has been increasing,

(iii) Income elasticity of demand for agricultural production is less in developed countries,

(iv) Many developed countries have been adopting policy of protection in respect of agricultural products,

(v) Use of synthetic goods in place of agricultural products has been on the increase.

On account of these reasons, income of underdeveloped countries from the export of primary products has been diminishing constantly. Under these circumstances, it is totally wrong to call trade as 'an Engine of Growth'.

**4. When there is an Adverse Effect on 'Demonstration Effect':**

Another harmful effect is that the international operation of the 'demonstration effect' has been a handicap for the poor countries. It has been responsible for reducing the capacity for capital formation. The desire for luxury, show-off for higher standard of living and patterns of consumption of advanced countries has been an important factor responsible for low level of domestic savings in underdeveloped countries.

Higher income groups in these countries are trying to adopt the consumption standards of advanced countries which have pushed up their propensity to consume and thereby limited capital accumulation and economic growth. This leads to corruption and black marketing. Thus, these evils have adverse effect on the economy.

**5. When there is Secular Deterioration in the Terms of Trade:**

Another important criticism of foreign trade has been that it has resulted in an international transfer of income from the poor to the rich countries through a secular deterioration in the commodity terms of trade of the poor countries. In the opinion of Prof. Raul Prebisch, there has been a secular deterioration in the terms of trade of underdeveloped countries. How maintains that underdeveloped countries have suffered with fatal effects of a continuous weakening in their capacity to import. It has lead to the weakening of the capacity of their existing primary producing industries to support their growing population. It has resulted in a failure to transmit to them the benefits of technical progress.

This deterioration in terms of trade for underdeveloped countries has been the result of differences in the distribution of gains from increased productivity, diverse cyclical movements of primary product and industrial prices, and disparities in the rates of increase in demand for imports between the industrial and primary producing countries.

As a result, their secular terms of trade have deteriorated, unemployment increased and balance of payments turned adverse.

## 3.4 THEORETICAL ISSUES IN INTERNATIONAL FACTOR MOVEMENTS

Movement of goods and services is not the only form of international migration. There is another form of international migration known as factor movements. Factor movements include labour migration, transfer of capital through international borrowing and lending and the stable international linkages involved in the formation of multinational corporations. The principles of international factor movements do not differ from those underlying international trade in goods. But international borrowing and lending, and international labour migration are similar in their causes and effects to the movement of goods. Therefore, when we turn from trade in goods and services to factor movements, we do not make a radical shift in analysis. There is a fundamental economic similarity between trade and factor movements. Nevertheless, there are major differences in the political context, (Krugman and Obstfeld, 2007).

A labour abundant country may under some circumstances import capital intensive goods. Under other circumstances, it may acquire capital by borrowing from abroad. Similarly, the capital abundant country may import labour intensive goods or begin employing migrant

workers. A country that is too small to support firms of efficient size may import goods where large firms have an advantage to allow those goods to be produced locally by subsidiaries of foreign firms. In each of these cases, the alternative strategies may be similar in their purely economic consequences but radically different in their political acceptability.

On the whole, international factor movements may arise even more from political difficulties than international trade. Factor movements are subject to more restrictions than on trade in goods. Immigration restrictions are universal. Until the 1980s, several European countries such as

France, maintained controls on capital movements. This the case even though they had virtually freed trade in goods with their neighbours. Investments by foreign-based multinational corporations are regarded with suspicion and highly regulated throughout most of the world. The result is that factor movements are probably less important than trade in goods. Factor movements are very important and we have to spend some time on their analysis

**Self-Assessment Exercise**

Briefly discuss the consequences of international trade

## 4.0 Conclusion

Causes of international trade can been seen as dual economies, in underdeveloped countries as a result of which the export sector became an island of development while the rest of the economy remained backward. Also it also not been entirely beneficial to poor countries because of the adverse effects of foreign investments on their economy and limited possible gain etc.

## 5.0 Summary

In this unit, we have learnt and discuss on the no trade model, the methodological considerations and the consequences/effect of international trade. Therefore, we can say that the consequences of international is sometimes harmful to the developing countries rather than gain, making them worse off in the international trade business in the world.

## 6.0. Tutor-Marked Assignment

1. Discuss on the term "No Trade Model"
2. List and explain the consequences/effect of international trade to the underdeveloped countries in the world.
3. Do you think Nigeria has gain so much in the trade of crude oil with other developed countries in the world?

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## MODULE THREE DIFFERENCES IN TECHNOLOGY

**UNIT ONE** **Model of Production Function Differences**
**UNIT TWO** **Role of Wages in the Ricardian Framework**
**UNIT THREE** **The Heckscher-Ohlin Model**
**UNIT FOUR** **The Stolper-Samuelson and Rybczynski Theorems**

## UNIT ONE MODEL OF PRODUCTION FUNCTION DIFERENCES

**CONTENTS**

## 1.0 INTRODUCTION

In economics, a production function relates physical output of a production process to physical inputs or factors of production. The production function is one of the key concepts of mainstream neoclassical theories, used to define marginal product and to distinguish allocative efficiency, the defining focus of economics. The primary purpose of the production function is to address allocative efficiency in the use of factor inputs in production and the resulting distribution of income to those factors, while abstracting away from the technological problems of achieving technical efficiency, as an engineer or professional manager might understand it. Production function denotes an efficient combination of inputs and outputs.

## 2.0. Objectives

At the end of this unit, you should be able to:

- Understand the meaning of Model of Production Function Differences
- Understand the meaning of Absolute and Comparative Advantage
- Know the meaning of Production Possibility Frontier
- Understand the meaning of excess Demand and international equilibrium

## 3.0. Main Content

## 3.1 MODEL OF PRODUCTION FUNCTION DIFFERENCES

The determinants-of-trade will be analyzed by relaxing and examining the implications for international trade. The first model we consider is one m which production functions (technologies) differ across countries. This model is often associated with 19th-century British economist David Ricardo, In order to keep the model simple and the focus as clear as possible, we will assume that labor is the only factor of production. By differences in technology, we mean that the amount of output that can be obtained from one unit of labour differs across countries. The one-factor model can be thought of as a special case with one factor, the issue of differences in relative endowments does not arise.

Constant returns to scale are assumed. In terms of this production functions of one-factor model with constant returns will have a linear production possibility frontier. As we will see later, this assumption significantly simplifies the analysis. We can also impose condition that; there are no distortions such as imperfect competition or taxes, and tastes are identical and homogeneous the last assumption is not actually needed for any of the principal results).

## 3.2 ABSOLUTE AND COMPARATIVE ADVANTAGE

The Ricardian model assumes that labor is the only constraint on the production process. Thus, assuming that two goods, *X* and *Y*, are produced, the production functions and the

labor constraint can be written as

$$X = F_x(L_x) \quad (7.1)$$

$$y = F_v(L_y) \quad (7.2)$$

$$L = L_s + L_y \quad (7.3)$$

We assume that the production functions are characterized by constant returns to scale, and this implies that Esq. (7.1) and (7.2) take the simple forms

$$X = \alpha L_x \quad (7.4)$$

$$Y = \beta L_y \quad (7.5)$$

Where α and β are some positive constants. The assumption that production functions differ between countries implies that the values of α and β will be different in the two countries. Note that α and β are the marginal products of labor in industries X and Y respectively: α and β give the additional outputs obtained from one unit of- labor.

The Ricardian approach is illustrated in Table 7.1 (similar to Table 5.1), where we show the outputs of X and Y produced from one unit of labor in two countries, H and F. It is assumed that in Country II, 20 units of X are produced from one unit of labor, whereas 30 X can be produced in Country F with one unit of labor. Home produces 20 *Y* from one unit of labor, while Foreign produces 10 Y from one unit of labor.
It can be shown that in this situation, profitable production specialization is possible for both countries. Country F has an advantage in the production of X, while Country H has an advantage in the production of Y. We can imagine a situation in which Country F specializes in X and Country H specializes in Y and in which consumers, in both countries maximize their welfare through international trade. However, F is said to have an absolute advantage in the production of *X:* αh < αf. H is said to have an absolute advantage in the production of *Y:* βh > βf.

**Table 7.1**
**Marginal products of labor**

| Home | | foreign |
|---|---|---|
| *X* | αh = 20 | αf = 30 |
| *Y* | βh = 20 | βf = 10 |

**TABLE 7.2**
**Changes in outputs due to labor reallocation of one worker from *X* to F in Country H and one worker from *Y to X in* Country F**

| | Home | Foreign | Total |
|---|---|---|---|
| *X* | -20 | +30 | + 10 |
| *Y* | + 20 | -10 | + 10 |

Table 7.2 shows the possibility of increasing world production of both commodities through specialization. If we move one worker from X to Y in Home and one worker

from Y to X in Foreign, the total world production of each commodity rises by 10 units.

Now consider Table 7.3, where we again show the outputs of *X* and V produced from one unit of labor in two countries, but where we have changed the marginal products of labor in *X* and *Y* in Country H from 20 to 5. Now Country F is more efficient in the production of both Commodities so it is said to have an absolute advantage in the production of both X and *Y*. The question that now arises is whether profitable trade is still possible in this situation. For example, let us take an observation that where Country H has an absolute disadvantage in the production of both commodities (X and Y), there is a comparative advantage for H in the production of commodity Y : βh/αf. In Country F, three units of X must be sacrificed to produce one unit of Y, but in Country H, only one unit of X must be sacrificed to produce a unit of Y. The opportunity cost to Country F of producing a unit of Y is three times as much as in Country H.

Table 7.4 illustrates that there are still production efficiency gains to be captured by the two countries. In Table 7.4, we perform an experiment similar to that in Table 7.2, except that two move four workers from AT to *Y* in Country H and one worker from *Y to X* in Country F. The total world outputs of both goods rise, demonstrating that there are still gains from specialization to be captured even if one country is more efficient at producing both goods. Table 7,4 illustrates the principle of comparative advantage. What is needed to ensure- gains from specialization is

**TABLE 7.3**

Marginal products of labor

| Home | | foreign |
|---|---|---|
| *X* | αh = 5 | αf = 30 |
| *Y* | βh = 5 | βf = 10 |

Table 7.4 Changes 1H outputs due to labor reallocation Of four workers from *X* to *Y* in Country H and one worker from y to X in Country F

| | Home | Foreign | Total |
|---|---|---|---|
| X | -20 | + 30 | + 10 |
| *Y* | + 20 | -10 | + 10 |

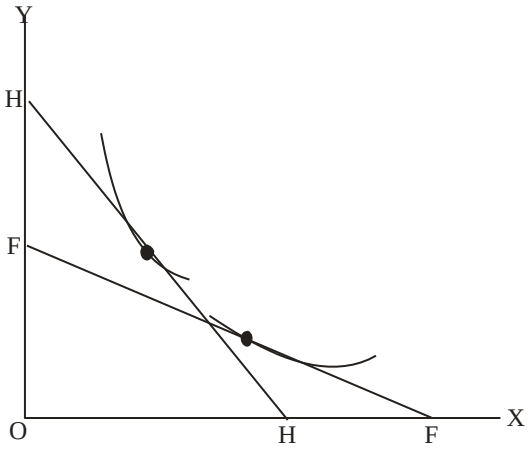
a pattern of comparative advantage, by which we mean that the *ratios* of the marginal products of labor differ in the two countries.

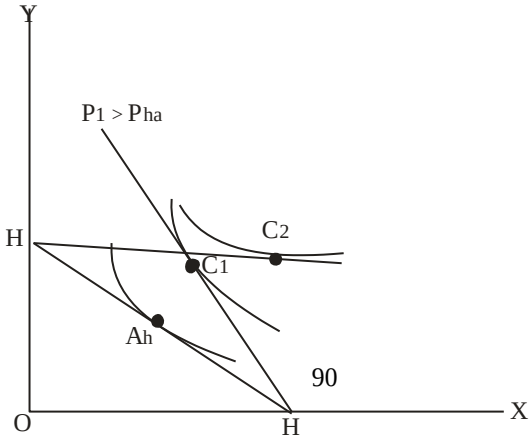
## 3.3 THE PRODUCTION POSSIBILITY FRONTIER

Figure 7.1 illustrates the production frontiers for countries H and F based on the pattern of comparative advantage indicated in Table 7.1. Let $L_h$ and $L_f$ denote the labor endowments of countries H and F. respectively. The production frontier for Country H, H H, has maximum X output of $\alpha\ L_h$ and a maximum X $\alpha_f L_f$ output of The production frontier for country F, F F, has a maximum X output of $\alpha_f L_f$ and a maximum of Y output of $6_f L_f$. The distance of a country's production frontier from the origin depends the

absolute levels of its labor production coefficients (α, β) its labor endowment (L).

The slope of a country's production frontier is simply the ratio of that country's labor productivity coefficients: - $\Delta Y/\Delta X = \beta/\alpha$. In autarky, Home and Foreign are in equilibrium not points $A_h$, and $A_f$, respectively. This simple Ricardian model with linear production frontiers has the property that a country's autarky price ratio is given by the slope of its production frontier.-Because the slope of the production frontier reflects a country's comparative



advantage, autarky prices reflect comparative advantage. Absolute advantage is reflected in the distance of the production frontier from the origin, as just noted.
Figure 7.2 considers how Country II will respond to the possibility of trade. The first important point is that if the world price ratio happens to equal the domestic autarky prices ratio $P^a_h$, then H will wish to consume at $A_h$, but will he indifferent to producing at any point between and including H and H on the production frontier. For example H could specialize in Y and produce at H in Fig. 72. Exporting V and importing X to reach consumption point A/,. Or it could just as well specialize in X at point H' in Fig. 7.2, exporting X and importing Y.

What about trade at world price ratios that differ from the autarky price ratios? At any price ratio p' that differs from the slope of the production frontier, a country will specialize completely. At the world price ratio pi < $P^a_h$ in Fig. 7.2, H will specialize in X at point H', exporting X and importing Y to reach consumption point $C_1$. At the world price ratio $p_2$ < $p^a_h$ H will specialize in Y at point $C_2$ in Fig. 7.2, exporting Y and importing X to reach consumption point C-i. In order to see that specialization is an equilibrium when p' differs from $p^a_h$, recall from Eq. (2.12) that the slope of the production frontier is the ratio of the marginal products of labor in the two industries: $MRT = MP_{LY}/MP_{LX} = \beta/\alpha$. Thus, if the price ratio is steeper than the production frontier, as it is in the case of pi in Fig. 7.2. Then we must have

$$\frac{P_X}{P_Y} > MRT = \frac{\beta}{\alpha} \qquad P_x \alpha > P_y \beta \qquad (7.6)$$

The value of the marginal product of labor in X is greater than the value of the marginal product of labor in Y. The only way to ensure equilibrium is to produce X with the equilibrium wage w equal to the value of labor's marginal product in X. Y is then unprofitable and is not produced. It can lot be other way around, because if w were equal to $P_{y\beta}$, then $P_{x\alpha}$ would exceed w , and it would be profitable for a firm to enter the X industry. Equilibrium with P*>Pα is thus given by

$$p^*\alpha = w > py\beta \qquad X = X, = \qquad Y = 0 \qquad (7.7)$$

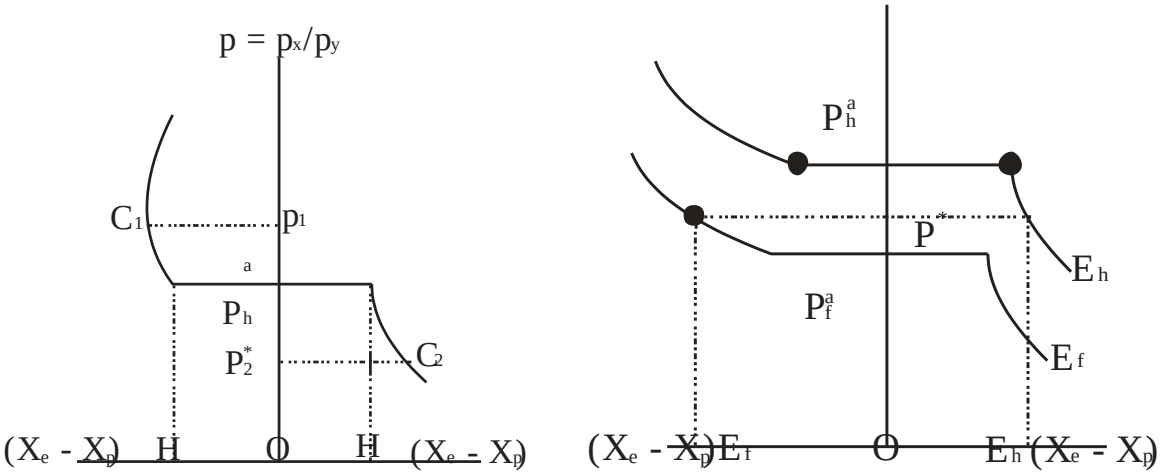
where X is the economy's maximum output of X (H’ in Fig. 7.2).

## 3.4 EXCESS DEMAND AND INTERNATIONAL EQUILIBRIUM

The fact that countries ran potentially gain from trade does not necessarily ensure that they will in fact capture these gains. The purpose of this discussion is to examine a competitive equilibrium between two countries and show that in general, both gain. As we will show in the next section, the worst outcome for one country is for it to capture zero gains, but it cannot be made worse oil through trade in a competitive, distortion-free world.

Results from our previous discussion are transferred to an excess demand diagram in Fig. 7.3. The "Hat" part of Country H's excess demand curve at its autarky price ratio $P^a_h$ corresponds to the results discussed in connection with Fig. 7.2: at the autarky price ratio, H will consume at AH but will be indifferent to producing any point on it product frontier H H'. The distant OH in Fig. 7.2 thus to responds to' the distance H 'H in Fig. 7.3. This horizontal section of the excess demand curve is of some interest, as we shall see shortly.

At world price ratios p* greater that $P^a_h$, H will wish to export X . Pi* in Fig. 7.3 corresponds to pi in Fig. 7.2. At world price ratios p' less than $p^a_h$ , II will wish to import A, p* in Fig. 7.3 corresponds to P2 in Fig. 7.2.
Figure 7.4 presents the excess demand curves for both countries based on their production frontiers in Fig. 7.1. Each excess demand curve has a flat




part at that country's autarky price. In the situation shown in Fig. 7.4, international equilibrium occurs at price ratio p' at which the import demand of H ($E_h$, > 0) matches the expert supply ($E_f$ < 0) of Country F.
As we discussed earlier in this course material, the equilibrium world price ratio falls between the autarky prices ratios of the two countries. If this were not the case, then both countries would want either to import or export the same good. For example, if p* > $p^a_h$

then both countries would wish to export X which cannot result in an equilibrium.
However, the gains from trade are not necessarily distributed "evenly" (whatever that might mean), and the country that trades farther away from its autarky price ratio gains more than the other.

**Self-Assessment Exercise**

Briefly discuss the consequences of international trade

## 4.0 Conclusion

In this unit we have talk about model of production function differences and we concludes that Production function relates physical output of a production process to physical inputs or factors of production and the theory of absolute and comparative advantage are two important concepts in international trade that largely influence how and why nations devote limited resources to the production of particular goods. Though the global economy is highly complex, the economics of food production offer a straightforward illustration of both of these key concepts.

## 5.0 Summary

In this unit, we have learnt and discuss on the model of Production function differences, Absolute and Comparative Advantage, the production possibility frontier and excess demand and international equilibrium. We can conclude here that you must have understand the rudimentary of model of production function differences.

## 6.0. Tutor-Marked Assignment

1. Discuss the model of Production function differences
2. Make a clear distinction between Absolute and Comparative Advantage
3. Explain the term “The Production Possibility Frontier”.
4. Differentiate between excess demand and international equilibrium
5. Can the notion of comparative 'advantage apply to trade between individuals? Suppose a lawyer is a better typist than his or her secretary. Who should do the typing? Why?

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## UNIT TWO ROLE OF WAGES IN THE RICARDIAN FRAMEWORK.

**CONTENTS**



## 1.0 INTRODUCTION

Wages is the income derived from human labour. Technically, wages and salaries cover

all compensation made to employees for either physical or mental work, but they do not represent the income of the self-employed. Labour costs are not identical to wage and salary costs, because total labour costs may include such items as cafeterias or meeting rooms maintained for the convenience of employees. Wages and salaries usually include remuneration such as paid vacations, holidays, and sick leave, as well as fringe benefits and supplements in the form of pensions or health insurance sponsored by the employer. Additional compensation can be paid in the form of bonuses or stock options, many of which are linked to individual or group performance. However, the role of wages in the Ricardian framework is a very important discussion because the rate of wages paid to labour in the comparative advantage theory has a lot to contribute to the analysis. So we will start this unit by looking at the wage theory analysis and later discuss on the role of wages in the theory of comparative advantage.

## 2.0. Objectives

At the end of this unit, you should be able to:

- Define and understand the meaning of Wage theory
- Know the Role of Wages
- Understand the model of Wage in Ricardian framework

## 3.0. Main Content

## 3.1. WAGE THEORY

Theories of wage determination and speculations on what share the labour force contributes to the gross domestic product have varied from time to time, changing as the economic environment itself has changed. Contemporary wage theory could not have developed until the feudal system had been replaced by the modern economy with its modern institutions (such as corporations).

### 3.1.1. Classical theories

The Scottish economist and philosopher Adam Smith, in The Wealth of Nations (1776), failed to propose a definitive theory of wages, but he anticipated several theories that were developed by others. Smith thought that wages were determined in the marketplace through the law of supply and demand. Workers and employers would naturally follow their own self-interest; labour would be attracted to the jobs where labour was needed most, and the resulting employment conditions would ultimately benefit the whole of society.

Although Smith discussed many elements central to employment, he gave no precise analysis of the supply of and demand for labour, nor did he weave them into a consistent theoretical pattern. He did, however, prefigure important developments in modern theory by arguing that the quality of worker skill was the central determinant of economic progress. Moreover, he noted that workers would need to be compensated by increased wages if they were to bear the cost of acquiring new skills—an assumption that still applies in contemporary human-capital theory. Smith also believed that in the case of an advancing nation, the wage level would have to be higher than the subsistence level in order to spur population growth, because more people would be needed to fill the extra jobs created by the expanding economy.

### 3.1.2. Subsistence theory

Subsistence theories emphasize the supply aspects of the labour market while neglecting the demand aspects. They hold that change in the supply of workers is the basic force that drives real wages to the minimum required for subsistence (that is, for basic needs such as food and shelter). Elements of a subsistence theory appear in The Wealth of Nations, where Smith wrote that the wages paid to workers had to be enough to allow them to live and to support their families. The English classical economists who succeeded Smith, such as David Ricardo and Thomas Malthus, held a more pessimistic outlook. Ricardo wrote that the "natural price" of labour was simply the price necessary to enable the labourers to subsist and to perpetuate the race. Ricardo's statement was consistent with the Malthusian theory of population, which held that population adjusts to the means of supporting it.

Subsistence theorists argued that the market price of labour would not vary from the natural price for long: if wages rose above subsistence, the number of workers would increase and bring the wage rates down; if wages fell below subsistence, the number of workers would decrease and push the wage rates up. At the time that these economists wrote, most workers were actually living near the subsistence level, and population appeared to be trying to outrun the means of subsistence. Thus, the subsistence theory seemed to fit the facts. Although Ricardo said that the natural price of labour was not fixed (it could change if population levels moderated in relation to the food supply and other items necessary to maintain labour), later writers were more pessimistic about the prospects for wage earners. Their inflexible conclusion that wages would always be driven down earned the subsistence theory the name "iron law of wages."

### 3.1.3. Wages-fund theory

Smith said that the demand for labour could not increase except in proportion to the increase of the funds destined for the payment of wages. Ricardo maintained that an increase in capital would result in an increase in the demand for labour. Statements such as these foreshadowed the wages-fund theory, which held that a predetermined "fund" of

wealth existed for the payment of wages. Smith defined this theoretical fund as the surplus or disposable income that could be used by the wealthy to employ others. Ricardo thought of it in terms of the capital—such as food, clothing, tools, raw materials, or machinery—needed for conditions of employment. The size of the fund could fluctuate over periods of time, but at any given moment the amount was fixed, and the average wage could be determined simply by dividing the value of this fund by the number of workers.

Regardless of the makeup of the fund, the obvious conclusion was that when the fund was large in relation to the number of workers, wages would be high. When it was relatively small, wages would be low. If population increased too rapidly in relation to food and other necessities (as outlined by Malthus), wages would be driven to the subsistence level. Therefore, went the speculation, labourers would be at an advantage if they contributed to the accumulation of capital to enlarge the fund; if they made exorbitant demands on employers or formed labour organizations that diminished capital, they would be reducing the size of the fund, thereby forcing wages down. It followed that legislation designed to raise wages would not be successful, for, with only a fixed fund to draw upon, higher wages for some workers could be won only at the expense of other workers.

This theory was generally accepted for 50 years by economists such as Nassau William Senior and John Stuart Mill. After 1865 the wages-fund theory was discredited by W.T. Thornton, F.D. Longe, and Francis A. Walker, all of whom argued that the demand for labour was not determined by a fund but by the consumer demand for products. Furthermore, the proponents of the wages-fund doctrine had been unable to prove the existence of any kind of fund that maintained a predetermined relationship with capital, and they also failed to identify what portion of the labour force’s contribution to a product was actually paid out in wages. Indeed, the total amount paid in wages depended upon a number of factors, including the bargaining power of labourers. Despite these telling criticisms, however, the wages-fund theory remained influential until the end of the 19th century.

### 3.1.4. Marxian surplus-value theory

Karl Marx accepted Ricardo’s labour theory of value (that the value of a product is based on the quantity of labour that went into producing it), but he subscribed to a subsistence theory of wages for a different reason than that given by the classical economists. In Marx’s estimation, it was not the pressure of population that drove wages to the subsistence level but rather the existence of large numbers of unemployed workers. Marx blamed unemployment on capitalists. He renewed Ricardo’s belief that the exchange value of any product was determined by the hours of labour necessary to create it. Furthermore, Marx held that, in capitalism, labour was merely a commodity: in exchange for work, a labourer would receive a subsistence wage. Marx speculated, however, that

the owner of capital could force the worker to spend more time on the job than was necessary for earning this subsistence income, and the excess product—or surplus value—thus created would be claimed by the owner. This argument was eventually disproved, and the labour theory of value and the subsistence theory of wages were also found to be invalid. Without them, the surplus-value theory collapsed.

### 3.1.5 Residual-claimant theory

The residual-claimant theory holds that, after all other factors of production have received compensation for their contribution to the process, the amount of capital left over will go to the remaining factor. Smith implied such a theory for wages, since he said that rent would be deducted first and profits next. In 1875 Walker worked out a residual theory of wages in which the shares of the landlord, capital owner, and entrepreneur were determined independently and subtracted, thus leaving the remainder for labour in the form of wages. It should be noted, however, that any of the factors of production may be selected as the residual claimant—assuming that independent determinations may be made for the shares of the other factors. It is doubtful, therefore, that such a theory has much value as an explanation of wage phenomena.

### 3.1.6 Bargaining theory

The bargaining theory of wages holds that wages, hours, and working conditions are determined by the relative bargaining strength of the parties to the agreement. Smith hinted at such a theory when he noted that employers had greater bargaining strength than employees. Employers were in a better position to unify their opposition to employee demands, and employers were also able to withstand the loss of income for a longer period than could the employees. This idea was developed to a considerable extent by John Davidson, who proposed in The Bargain Theory of Wages (1898) that the determination of wages is an extremely complicated process involving numerous influences that interact to establish the relative bargaining strength of the parties.

This theory argues that no one factor or single combination of factors determines wages and that no one rate of pay necessarily prevails. Instead, there is a range of rates, any of which may exist simultaneously. The upper limit of the range represents the rate beyond which the employer refuses to hire certain workers. This rate can be influenced by many factors, including the productivity of the workers, the competitive situation, the size of the investment, and the employer's estimate of future business conditions. The lower limit of the range defines the rate below which the workers will not offer their services to the employer. Influences on this rate include minimum wage legislation, the workers' standard of living, their appraisal of the employment situation, and their knowledge of rates paid to others. Neither the upper nor the lower limit is fixed, and either may move upward or downward. The rate or rates within the range are determined by relative bargaining power.

The bargaining theory is very attractive to labour organizations, for, contrary to the subsistence and wages-fund theories, it provides a very cogent reason for the existence of unions: simply put, the bargaining strength of a union is much greater than that of individuals. It should be observed, however, that historically labourers were capable of improving their situations without the help of labour organizations. This indicates that factors other than the relative bargaining strength of the parties must have been at work. Although the bargaining theory can explain wage rates in short-run situations (such as the existence of certain wage differentials), over the long run it has failed to explain the changes that are observed in the average levels of wages.

Having discuss in detail on theories of wages, let us now discuss the role of wages in the Ricardian framework.

## 3.2 THE ROLE OF WAGES

We have shown that in the Ricardian model, comparative advantage is determined simply by the relative productivity of labor in producing commodities, or, equivalently, by international differences in production functions. It may seem surprising wage rates did not enter the discussion. After all there has been much concern expressed in high-income economies about the possible effects of competition from low-wage workers in developing countries. In his unit we examine the role of wages in the Ricardian framework.

We will show that in this model, international differences must adjust to reflect underlying real productivity differences, but that all workers gain -real income in moving from autarky to free trade. However, more productive economies do enjoy higher real wages in equilibrium.
Begin with a simple observation about wages in autarky in the Home country, for example. Because of perfect competition, the value of the marginal product of labor must equal the wage rate in each sector, as we have discussed in the previous unit.

## 3.3. MODEL OF WAGE IN RICARDIAN FRAMEWORK

$$P^a_x \alpha h = wh \qquad P^a_y \beta h = wh \tag{7.8}$$

Here, *a* and β are the marginal products of labor in goods *X* and *Y*. It immediately follows that the *relative* price in autarky is independent of the wage fate:

$$P^a_h = \beta_h/\alpha_h \tag{7.9}$$

This equation reflects what Ricardo referred to as the Labor Theory of Value. Relative prices must equal relative real costs in terms of labor inputs. Here, if sector Y has a relatively low marginal product and sector X has a relatively high marginal product, the home country is likely to have its comparative advantage in good X. The wage rate,

which is the nominal price of labor, has no effect on relative commodity prices as long as it is the same in both sectors.

The wage rate is relevant for determining real wages, or the living standards of laborers. Note from Kqs. (7.8) that real wage rates equal marginal labor productivities:

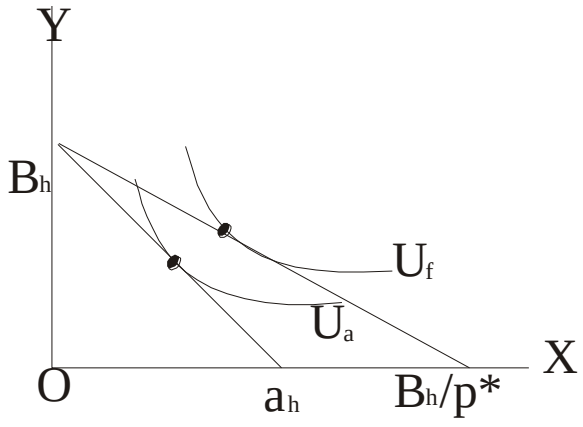
$$w_h / p^a_x = a_h \qquad wh/p^a_y = \beta_h \tag{7.10}$$

These "real wages" can be interpreted graphically as the end points on the budget line of an individual worker. Assume that 1 worker owns 1 unit of labor. & is the maximum amount of Y that can be purchased if all income is spent on Y; similarly, a is the maximum amount of X that can be purchased if all income is spent on X. An individual worker's budget line is given in Fig. 7.5.

Consider again the movement from autarky to free trade. This change will alter nominal wages in both countries, generating wage rates Wh and Wf. To determine the impacts on rear wages, note that in free trade the home country exports good Y and the foreign country exports good X. Since the free trade prices of each good must equal the average cost of producing them, we know that real wages for a home laborer are constant in terms of good Y. However, the worker can now purchase good X at price ratio $p < \beta_h/\alpha_h$. Because the price ratio p" is the vector intercept of the budget line (β) over the horizontal distance, the horizontal intercept (i.e., the wage $wh/P^*_x$) must be $\beta h/p^* > \alpha h$. The intercepts of the consumer's line free trade are now given by

$$w_h / p^a_x = \beta_h/p^* > \alpha h \qquad w_h/p^*_y = \beta_h \tag{7.11}$$

Thus, trade does not alter the home country's real wage in terms of its export good, but it does change the real wage in terms of its import good. The free trade budget line is shown in Fig, 7.5, where we see that the welfare of an individual worker rises from Uα,, to $U_f$. A corresponding argument can be made about the welfare of an individual worker in Country F' whose income is fixed in terms of good X but rises in terms of Y .



There is an important final point to make. It is quite possible that in free trade, real wages are higher in one country than in the other. We can show that if the home country, for example, has an absolute advantage in both goods, it will necessarily have a higher real wage than does the foreign country. In such a situation, we have $\alpha_h > \alpha_f$, where $\alpha_f$ is a worker in Country F's real wage in terms of X. Using $\alpha_h > \alpha_f$ together with Eqs. (7.11), we have

$$w_h / P^*_x > \alpha h > \alpha f = w_f / P^*_x \qquad (7.12)$$

We can similarly show that a worker in Country H earns a higher wage in terms of good Y when H has this absolute advantage in both goods. In summary, absolute advantage is important for determining diligences in real wages (per capita incomes) across countries, but comparative advantage determines the direction of trade.

**Self-Assessment Exercise**

Briefly discuss the role of wages in the Ricardian Framework

**4.0 Conclusion**

Causes of international trade can been seen as dual economies, in underdeveloped countries as a result of which the export sector became an island of development while the rest of the economy remained backward. Also it also not been entirely beneficial to poor countries because of the adverse effects of foreign investments on their economy and limited possible gain etc.

**5.0 Summary**

In this unit, we have learnt and discuss on the no trade model, the methodological considerations and the consequences/effect of international trade. Therefore, we can say that the consequences of international is sometimes harmful to the developing countries rather than gain, making them worse off in the international trade business in the world.

**6.0. Tutor-Marked Assignment**

1. Discuss in details the theory of wages
2. Discuss the role of wages in the Ricardian Framework.
3. Show mathematically, the model of wages in the Ricardian framework

**7.0. REFERENCES/FURTHER READING**

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**UNIT THREE THE HECKSCHER-OHLIN MODEL**

**CONTENTS**



## 1.0 INTRODUCTION

In the previous unit we analyzed the effects of international differences in technologies on trade and welfare. A number of powerful conclusions were drawn about the concepts of comparative advantage and the gains from trade. However, the Ricardian theory employed present a highly stylized model of technology differences. It assumes the existence of a single factor of production, labor, that exhibits constant productivities in generating commodity outputs. This simple specification led our analysis to some sharp theoretical predictions, including constant opportunity costs, the likelihood of complete specialization in trade, and the existence of positive income gains from trade for all workers in both countries (unless our country is much larger than the other and does not specialize completely). -In practice, of course, we rarely observe such outcomes from trade. As a simple example, it surely cannot be true that all workers are made better off by engaging in international trade, for we observe that representatives of labor interests tend to oppose freer trade in the United States and other high-wage economies. Thus, we need to move beyond the Ricardian theory to develop models that make more realistic predictions about trade.

In this unit we make a substantial move in that direction by presenting the famous Heckscher-Ohlin model, which has served as the pre-eminent trade theory in the 20th century. The Heckscher-Ohlin model, which was named for the two Swedish economists who developed its essentials, departs from the Ricardian model in two fundamental ways. First, it assumes the existence of a second factor, which we will call capital, allowing for a much richer specification of production functions. Second, rather than assuming different technologies, the model rests on the notion of identical production functions in both nations. This assumption is made explicitly to neutralize the important possibility that trade is based on international technological variations in favor of the possibility that trade is based solely on difference in supplies of capital and labor.

As we will show, adding a second factor to the analysis yields richer and more realistic explanations of trade and its effects. First, the production frontier becomes concave, reflecting rising opportunity costs, as discussed in the previous discussion. This means that countries will tend to produce both goods in free trade rather than specializing completely. Rarely do we see a country devote most of its resources to the production of a particular commodity. Rather, countries tend to be diversified in production across a broad range of goods, even though they do not typically produce all possible goods. Second, even though countries enjoy aggregate gains from trade in this model, free trade causes a redistribution of real income between capital and labor in comparison with autarky. This redistribution effect will help explain some of the reasons that certain factors oppose free trade.

In the Heckscher-Ohlin model, comparative advantage and trade are determined by national differences in factor endowments. Upon even casual consideration, this observation makes sense. Countries that have abundant supplies of agricultural land, for example, tend to be net exporters of grains and food. Developing nations with abundant endowments of low-skilled labor tend to export labor-intensive goods such as clothing, footwear, and consumer electronics. While there are certain technical difficulties in achieving unambiguous evidence on this model in the real world, the consensus among trade economists is that factor endowments provide one of the most important explanations for observed international trade patterns. Thus, the evident empirical relevance of the model provides a strong motivation for its study as well.

## 2.0. Objectives

At the end of this unit, you should be able to:

- Define and understand the meaning of factor endowments and factor intensities
- Know the effect of endowment differences
- Understand the Heckscher-Ohlin theorem

## 3.0. Main Content

### 3.1 THE EFFECTS OF ENDOWMENT DIFFERENCES

The Heckscher-Ohlin trade model builds on the neoclassical supply-side theories. It adopts and maintains three assumptions about production characteristics in each country. First, the production functions for goods X and Y exhibit constant returns to scale. These production functions, which are the same in both countries, differ in relative usage of capital and labor. Specifically, we will always take good X to be labor-intensive and good Y to be capital-intensive. Second, there are fixed total supplies of the two factors, labor and capital, which are homogeneous and perfectly mobile between industries within each country. Thus, a single wage rate and a single rental rate on capital prevail within each economy. However, labor and capital arc assumed to be perfectly immobile between countries. Third, there are no market distortions such as imperfect competition, labor unions, or taxes that would influence production or consumption decisions. Note that

these assumptions guarantee that factors are fully employed.
When expanding the model to allow for trade, two additional assumptions are required. First, preferences in both countries are taken to be identical and homogeneous. This assumption eliminates the possibility that comparative advantage can be based on differences in demand behavior.

The last assumption is the defining characteristic of the Heckscher-Ohlin model. Countries are assumed to differ in their relative factor endowments. Because the model assumes identical technologies, constant returns to scale, and common tastes, this is the only meaningful difference between the countries.

### 3.2. FACTOR ENDOWMENTS

We need to be clear on the meaning of factor abundance and factor scarcity in this relative sense. We define factor endowments specifically in terms of the ratios between capital stocks and labor forces in the two countries. Thus, if the capital-labor ratio in Country H is greater than it is in Country F, we say that Country H is relatively capital-abundant (and labor-scarce) while Country F is relatively labor-abundant (and capital-scarce), This physical definition gives Eq. (8.1):

$$(K/L)_h > (K/L)_f \qquad (8.1)$$

To understand the concept of relative factor endowments, consider the estimates of real capital endowments and labor forces presented in Table 8.1, Capital stocks wore computed as the cumulative sum of gross fixed capita! formation in the 15-year period through 1984, corrected for depreciation and inflation, and converted to U.S. dollars using a consistent set of international price and exchange rate comparisons." Thus, capital stocks are in billions of 1984 dollars. The labor force in each country is defined to be the economically active population (that is, those employed and those looking for work) in

TABLE 8.1
**Capital and labor endowments for selected** countries, 1984

| Country | Capital stock ($b) | Labor force (m) | Capital per Worker {$) |
|---|---|---|---|
| India | 482 | 254 | 1,898 |
| Brazil | 507 | 53 | 9,566 |
| Rep. of Korea | 204 | 14 | 14.571 |
| Mexico | 353 | 23 | 15,348 |
| U.S. | 3,696 | 116 | 112,421 |
| Canada | 119 | 12 | 34,917 |
| Germany" | 1,018 | 26 | 39,154 |
| Japan | 2,336 | 59 | 39,593 |
| Switzerland | 120 | 3 | 40,000 |

Source: World Development indicator

Millions of workers the final column shows the ratios of capital to labor. Several features

of these data are worth discussing. First, note that it is relative endowments that affect the measurement of factor abundance for example, although the United States has a larger labor force than either Brazil or Mexico, it is capital-abundant and labor-scarce because it has a comparatively larger capital supply. Switzerland has the smallest absolute capital stock, hut it is the most capital-abundant country in the group. Second, while the Heckscher-Ohlin theory assumes these factor endowments to be fixed, it should be clear that capital and labor supplies depend to some degree on economic conditions. For example, the size of the aggregate labor force may well depend on the wage rate and on the attractiveness not working conditions. This explains why different countries have different participation rates by workers in the labor force, ranging from 34 percent in India to 50 percent in the United States. Third, endowments data for a particular year present only a snapshot in the evolution of factor supplies over Lime. Japan and Korea, for example, have invested m capital at very high rates in recent decades, with a consequent rise in their capital-labor ratios.

We note an important implication of differences in physical endowments for autarky factor prices. For two countries with identical demand patterns would expect relative factor prices to reflect factor endowments. Thus, in autarky, Country F would have relatively inexpensive labor and Country H would have relatively inexpensive capital.

### 3.3. Factor Intensities

It is useful Lo reintroduce the concept of factor intensities discussed in our previous discussion, because they also play a central role in the Heckscher-Ohhn theory. Good Y is relatively capital-intensive and good X is relatively labor-intensive if the capital-labor ratio used in production is higher in the former sector:

$$(K/L)_y > (K/L)_x \qquad (8.2)$$

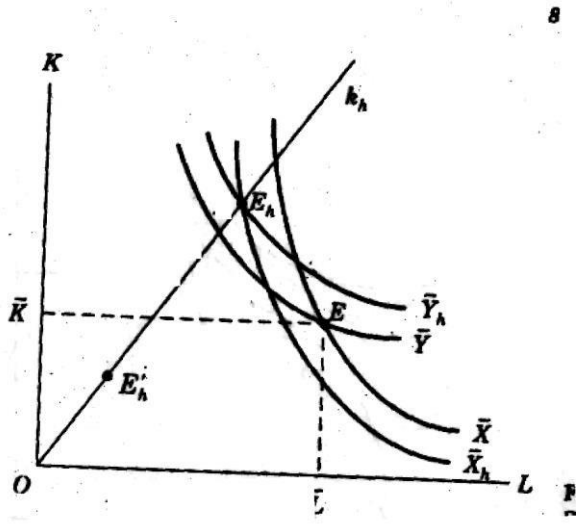
Recall that in equilibrium both sectors choose capital-labor ratios that minimize costs for the prevailing relative factor price, w = w/r, where w is the wage rate and r is the rental rate on a unit of capital. In principle, it is possible that at different relative factor prices, the rankings in Eq, (8.2) can be reversed if one industry finds it technically easier to substitute capital for labour along an isoquant than does the other. This possibility, termed a factor-intensity reversal (FIR), poses certain problems for the Heckricher-Ohlin trade theory, which we will note briefly as we proceed

The model must therefore make the further assumption that there are no factor- intensity reversals,

**Table 8.2** presents estimates of capital-labor ratios in certain U.S. manufacturing industries in 1984. Again, capital stocks were computed as the real value of accumulated capital, accounting for depreciation. Our selected industries represent wide disparities in factor intensities, ranging from the most capital-intensive industries (petroleum refining and paper products) to the most -labor-intensive industries (footwear and wearing apparel).

**Implications**

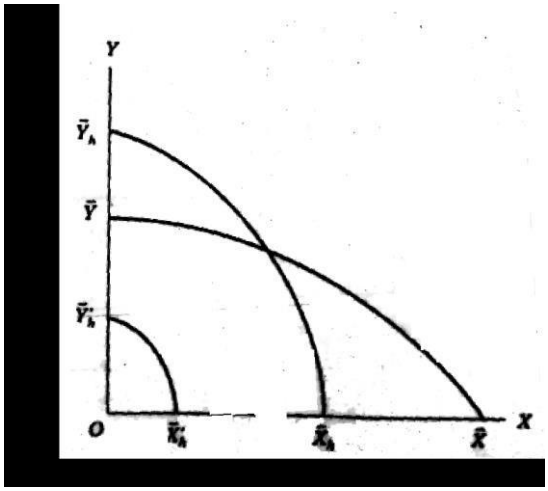
To illustrate the effect of endowment differences we begin by considering the case in which endowments are the same for two countries, H and F, This level of endowment is represented by point E of Fig. H.I, with endowments L and K . For this point, the maximum producible quantities of X and Y are X and Y. These two maximum output points are shown In Fig. 8,2, where the corresponding production possibility curve is YX. Now consider the effect of changing the endowment point for one of the, two countries. Specifically, assume that the endowment point for country H is $E_h$. Note that, because we have increased the capital endowment and reduced the labor endowment for country H, point $E_h$ and $E = E_f$ satisfy Eq. (8.1). The isoquants passing through point $E_h$ give the maximum level of output of the two commodities in H. The diagram is drawn so that the isoquant through $E_h$, for commodity Y lies above $Y_t$ whereas the isoquant for commodity A" lies below A'. These new isoquants are represented by $Y_h$/, and Xf,, respectively**,** and produce the two endpoints $Y_h$ and X , of Fig. 8.2. Here, the increase' in the endowment of capital and the reduction in the endowment of labor result in a rise in the maximum output of Y, the capital-intensive commodity, and a reduction in the maximum output of X, the labor-intensive commodity. As one would expect, the production frontier




for the labor-abundant Country F is biased toward the X"-axis, and the production frontier for the capital-abundant Country H is biased toward the Y axis.

This result hold regardless of the sizes if the two economies. Note that the endowment point tor Country H, Eh, lies on the ray Okh, along which relative endowments are the same at any points. Because of constant returns to scale, isoquants goods X and r art homogeneous. Thus, for any endowment point on the ray, a corresponding pair of maximum-output isoquants intersect at that point, meaning that the production frontier for Country H shrinks in or grows out in a parallel fashion. For example, if endowments at point $K_h$ are one-third those of the original point, the new production frontier will be precisely one-third as far from the origin as the original frontier. For any ray from the

origin in Fig, 8.2, the marginal rates of transformation along production frontiers $Y_h$ $X_h$ and $Y_h$,$X_h$, are the same.
In Fig. 8.3 we have reproduced the original production possibility curves for the two countries (now placing subscripts on F's curve).




The equality of relative prices in the two countries does not, by itself, imply that a new equilibrium position has been reached. Also required is the condition that world excess demands and supplies of the two countries be zero, or in other words, that the amount that one country wants to export will be exactly equal to the amount the other country wants to import. This situation is illustrated in Fig. 8.4, where we have depicted an equilibrium with equal trade triangles. Notice that both nations now consume on community indifference curves that lie outside their production frontiers. We therefore conclude that free trade in the Heckscher-Ohlin model provides aggregate gains from trade for each country.

We also show the free trade situation in Fig. 8.5, which demonstrates equilibrium using excess-demand curves. Free trade establishes relative price ratio p'', with Country H importing quantity $OX_h$(= $B_hC_h$, in Fig. 8.4) of good X and Country F exporting the same quantity. This trade pattern is consistent with comparative advantage. The labor-abundant Country F exports the labor-intensive commodity X, and the capital-abundant Country H exports the capital-intensive good Y. This is an illustration of the Heckscher-Ohlin theorem, which is discussed below;

### 3.4. The Heckscher-Ohlin theorem

Given the assumption of the model, a country will export the commodity that intensively uses its relatively abundant factor.

Note carefully the implication of this theorem. The important characteristics distinguishing each country the its relative supplies of capital and labor, By virtue of exporting the capital-intensive good and importing the labor-intensive good, Country H implicitly exports the services of capital, its abundant factor and imports the services of labour its scarce factor. Thus, international trade in commodities accomplishes the task of

exchanging surplus factor services between countries. This is an important phenomenon for understanding the effects of trade on factor incomes.

An interesting question regarding the Heckscher-Ohlin theorem relates to how far we can relax the underlying assumption find still ensure that the result holds. Non-constant returns to scale would clearly invalid air the notion that country size is irrelevant for trade patterns, and allowing arbitrary international differences in technology would also render the theorem generally invalid. If factors were not homogeneous, meaning that labor was distinguished by skills and that capital came in different types, the simple two-factor theorem would no longer be relevant. However, as we discuss in point 8.6, an important variant of the fundamental message of the model that countries export the services of their abundant factors is still valid. If factors are not mobile between industries but instead must remain lived in employment for some period of time, the model must depart from the long-run nature of the Heckscher-Ohlin theorem in favor of a short-run view.

A further assumption is that labor and capital are immobile internationally. This assumptions made to affect commodity trade without also worrying about trade in factors. However, if factors could migrate internationally, they would do so to take advantage of differences in factor returns. Such trade in factors would tend to supplant trade in goods, inasmuch as both flows would exist to compensate for differences in relative endowments. In an extreme situation, factor movements could eliminate the need for commodity trade, though we would generally expect both kinds, of trade to occur simultaneously the Heckscher-Ohlin theorem would remain valid.

The existence of some market distortions, such as monopoly and export subsidies, can overturn the Heckscher-Ohlin theorem if their effects are powerful enough to offset the influence of endowments. However, the most common distortions we consider in trade models are import restrictions such as tariffs, quotas, and transport costs, which we analyze in later chapters. These barriers can reduce or even eliminate trade in goods, but any remaining trade would obey the pattern generated by the Heckscher-Ohlin model. Thus, the theorem is still applicable when trade restrictions are allowed.

It is also possible to allow moderate differences in demand patterns between countries, provided these differences are not so great as to overcome the effects of endowments. Finally, it is theoretically possible for a factor-intensity reversal to occur between countries. That is, given the differences in relative factor prices between nations, product *Y* could be capital-intensive in capital-abundant Country. H and yet be labor-intensive in labor-abundant Country F in autarky. In ' this case, the Heckscher-Ohlin theorem would predict that both countries would export the same good, a practical impossibility.

It might appear from this review that the Heckscher-Ohlin model is fairly fragile in the sense that it may not survive departures from its underlying assumptions. Of course, this is a feature of any theoretical model embodying simplifying assumptions. The important question relates to the practical importance of the model's insights. In this regard, the notion that differences in factor endowments provide a significant explanation for

comparative advantage and global trade patterns is undeniable. It is clear that a substantial portion of world trade involves the implicit exchange of factor services through trade in natural resource-intensive items such as raw materials, labor-intensive items such as clothing, and capital-intensive items such as machinery. It is important to point out that international exchange of this type is likely to the most prevalent between nations with widely differing factor endowments. Thus, we would expect endowments-based trade to be most evident between developed countries, such as the United Scales, and developing countries, such as Mexico. Note also that such trade involves exchanging the products of one distinct industry, such as agriculture, for those of another, such as clothing. Thus Heckscher-Ohlin-based exchange is often termed inter-industry trade.

**Self-Assessment Exercise**

Briefly discuss the Heckscher Ohlin Model

## 4.0 Conclusion

In this unit, we can conclude that the exports of a capital-abundant country will be from capital-intensive industries, and labour-abundant countries will import such goods, exporting labour-intensive goods in return. Competitive pressures within the H–O model produce this prediction fairly straightforwardly. Conveniently, this is an easily testable hypothesis.

## 5.0 Summary

In this unit, it is possible to extend the Heckscher-Ohlin theory to the case of large numbers of goods and factors. The factor-con tent theorem predicts that the implicit trade in factor services depends on rankings of factors, even if the trade patterns for particular commodities are not determinate.

## 6.0. Tutor-Marked Assignment

1. Discuss on the effects of endowment Differences
2. Briefly make a clear distinction between factor endowments and factor intensities.
3. Discuss the Heckscher Ohlin Model in details.

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**UNIT FOUR THE STOLPER-SAMUELSON AND RYBCZYNSKI THEOREMS**

**CONTENTS**



## 1.0 INTRODUCTION

We now analyze the effects of changes in commodity prices on real factor prices and the effects of changes in factor endowments on commodity outputs. Note that because these theories relate to the inner workings of the economy, the analysis will focus on a single country. We will then relate the theories to certain trade issues.

Two fundamental observations about relationships in the economy should be kept in mind. First, factors are fully employed in producing outputs in sectors X and Y. It follows that any change in the available supply of factors will affect commodity outputs. Second, the presence of perfect competition means that the price of a product is comprised strictly of payments to labor and capital. Changes in commodity prices must influence factor prices accordingly. These are the relationships we wish to study.

## 2.0. Objectives

At the end of this unit, you should be able to:

- Understand the meaning of Stolper Samuelson and Rybesynski theorem
- Define and understand the meaning of trade theory with many goods and factors.
- Understand the factor-content theorem.

- Understand the  International Product Cycle Theory

## 3.0. Main Content

### 3.1 The Stolper Samuelson theorem

The first fundamental theorem about the internal functioning of the economy pertains to that relationship between commodity and real factor incomes. We demonstrated previously that there is a unique relationship between changes in relative commodity prices and relative factor returns and that this relationship depends on technology. However, there is an even stronger theorem, which was first proven by two American economists, Wolfgang Stolper and Paul Samuelson. The principal purpose of their theorem is to show that changes in commodity prices have determinate effects on real factor rewards. That is, movements in the prices of goods change the distribution of real incomes between capital and labor, which is an extremely important element in the economy.

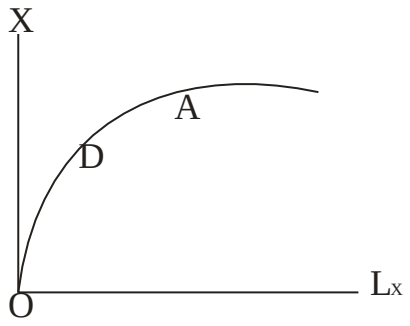
In particular, a relative increase in the price of the labor-intensive good X causes the real wage rate, measured in terms of the price of either X or y, to rise, whereas the real return on capital, measured in terms of either commodity price, must fall, in other words, a rise in the price of the labor-intensive good leads to an increase in real wages and a decrease in real returns to capital. To demonstrate this, we must show that both r/py and w/p-f increase and that both rip, and rip, decrease when $p_f/p_v$ increases.
Thus, for labor and capital in the X industry we must have, respectively, that $p_xMP_{LX} = w$ and $p_xMP_{KX} = r$. A similar pair of conditions hold for the Y industry. We reproduce these equations below by stating them in terms of marginal products:

$$MP_{LX} = w/p_x \qquad MP_{KX} = r/p_x$$
$$MP_{LY} = w/p_y \qquad MP_{Ky} = r/p_y$$

Since these equations must hold in equilibrium, it is clear that if the marginal products of labor in both industries rise, both w/p., and $w/p_y$ increase as well. Similarly, $r/p_x$ and $r/p_y$ will both decrease if, and only if, the marginal products of capital fall in both sectors. That marginal products behave in this fashion follows from two additional properties of our production functions. First, consider again Fig. 8.7. The slopes of the rays emanating from origins O, and $O_v$ through point A represent the capital-labor ratios chosen in sectors X and Y in the initial equilibrium. At point B both of these rays are steeper than at point A. demonstrating that the rise in the wage-rental ratio induces both goods to be produced with relatively more capital and relatively less labor than before. Of course, given fixed factor endowments, this is possible only because output of X rises and output of y falls.

Second, the higher capital-labor ratios raise the marginal products of labor and reduce the marginal products of capital in both industries.
Consider the movement from A to B in Fig 8.7. how does this change affect the marginal

product of labour in X and Y? Because the marginal product are constant along the line $O_x$,CB, any point on this line can be used to find the answer. Consider point D, where the line AD is parallel to the L, axis. The movement from A to D involves a reduction in the amount of labor used in the production of X. while the input of capital remains constant. Recall that the law of diminishing returns applies to this kind of movement, in which the shift from A to *D* corresponds to a movement down the total-product curve for labor. We reproduce a typical total-product curve in Fig. 8.9, with points A and *D* corresponding to those in Fig. 8.7. The slope of this curve is, of course, the marginal product of labor in sector *X* , and thus we see that the MPx at *O* is higher than the MP/,x at A, But from the point of view of the marginal products, the movement from A to D is equivalent to a movement from A




to B. Thus, we have demonstrated that the relative increase in the price of -V (A to B in Figs. 8.6 and 8.7) has increased the marginal product of labour. It follows from Equation (8.6) that w/px, has risen as well.

Now consider the vertical movement from ,A to E in Fig. 8.7, which represents an increase in the use of capita) in industry X with an unchanged labor input. This would imply a movement to the right along a total-product curve for capital (which we do not draw), implying, by the law of diminishing returns, a reduction in the $MP_{KX}$ and, in turn from Eq. (8.6), a fall in r/px This result is equally true at any point along ray 0,R, including the new equilibrium at point B. Thus, we have demonstrated the desired results for both factors in the X industry.

We could reconstruct all the steps in the previous demonstration for factors in the Y industry, but fortunately, a shortcut to this proof is available. Our proof for sector X relied on the increase in the capital-labor ratio associated with the movement from point A to point B. Indeed, it can be shown that any increase in the capital-labor ratio must reduce the real return to capital and raise the real wage of labor. But this same movement from A to B also implied a rise in the capital-Libor ratio in industry Y. thus, there result a rise in the marginal product, of labor ;md a fall in tin-marginal product of capital in Y, with corresponding changes in the real returns to those factors.

Note that these results are true only as long as the economy remains incompletely specialized, for as soon as all capital and labor re allocated to a particular good, no

increase in its price can change marginal products in producing that good. We have thus established the Stolper-Samuelson theorem.

### 3.1.1. The Stolper-Samuelson theorem.

The Stolper–Samuelson theorem is a basic theorem in Heckscher–Ohlin trade theory. It describes the relationship between relative prices of output and relative factor rewards specifically, real wages and real returns to capital.

The theorem states that under specific economic assumptions (constant returns to scale, perfect competition, equality of the number of factors to the number of products) a rise in the relative price of a good will lead to a rise in the return to that factor which is used most intensively in the production of the good, and conversely, to a fall in the return to the other factor.

However, it is also the proposition of the Heckscher-Ohlin Model that a rise in the relative price of a good raises the real wage of the factor used intensively in that industry and lowers the real wage of the other factor.

More so, the further proposition (requiring addition assumptions) that protection raises the real wage of a country's scarce factor and lowers the real wage of its abundant factor.

It was derived in 1941 from within the framework of the Heckscher–Ohlin model by Wolfgang Stolper and Paul Samuelson, but has subsequently been derived in less restricted models. As a term, it is applied to all cases where the effect is seen. Ronald W. Jones and José Scheinkman (1977) show that under very general conditions the factor returns change with output prices as predicted by the theorem. If considering the change in real returns under increased international trade a robust finding of the theorem is that returns to the scarce factor will go down, ceteris paribus. An additional robust corollary of the theorem is that a compensation to the scarce factor exists which will overcome this effect and make increased trade Pareto optimal. The original Heckscher–Ohlin model was a two-factor model with a labour market specified by a single number. Therefore, the early versions of the theorem could make no predictions about the effect on the unskilled labour force in a high-income country under trade liberalization. However, more sophisticated models with multiple classes of worker productivity have been shown to produce the Stolper–Samuelson effect within each class of labour: Unskilled workers producing traded goods in a high-skill country will be worse off as international trade increases, because, relative to the world market in the good they produce, an unskilled first world production-line worker is a less abundant factor of production than capital.

The Stolper–Samuelson theorem is closely linked to the factor price equalization theorem, which states that, regardless of international factor mobility, factor prices will tend to equalize across countries that do not differ in technology.

It is important to examine this result further. The Stolper-Samuelson model holds factor endowments fixed while allowing commodity prices to change, which shifts the demands for factors, thereby changing real factor incomes. This is not overly restrictive, for it seems reasonable to suppose that factor supplies arc exogenously given. However, as we suggested earlier, there may be some question about this if, for example, laborers are able to clause between work and leisure.

The Stolper-Samuelson theorem embodies an interesting implication. An increase in the relative price of good X may be equivalently stated as a larger percentage increase in the price of X than of Y when both nominal prices are subject to change. The theorem assures us that this change will result in a percentage rise in the wage that is larger still than the higher price increase (because w/p, must increase) and a percentage rise in the nominal price of capital that is smaller than the lower price increase (because r/py must fall; of course, it is possible that/- could actually decline).

Thus, in relative terms, factor prices change more than commodity prices in order to get determinate effects on real factor incomes. This outcome is called the magnification effect id trade theory. We know that an increase in the relative price of good X raises the wage rate and reduces the return to capital compared to the prices of both goods. This effect can be written as follows:

$$\%\Delta r < \%\Delta py < \%\Delta px < \%\Delta w \qquad (8.7)$$

The Stolper-Samuelson theorem as presented here is not really a theorem about international trade, for no mention has been made of trade flows or other nations. Although changes in domestic commodity prices could result from shifts in world prices in an open economy, they could just as likely result from internal changes in a closed economy. Changes in commodity taxes or fundamental shifts in consumer preferences, for example, could cause movements in commodity prices, thereby affecting the distribution of real incomes between capital and labor.

However, we can use the Stolper-samuelson theorem to investigate our primary interest in the effects of international trade on factor incomes. Suppose that labor-abundant Country F enters free trade with capital-abundant Country H. we know that this will raise the relative price of X in, F and lower it in H as the countries import the relatively cheaper good. It follows immediately that labour is made better off and capital worse tiffin Country F, the reverse being trade in country H. Put differently, the abundant factor in each nation is made better off by free trade, and the scarce factor is made worse off. The reason for this outcome is that trade in goods compensates for national scarcities in factor supplies. In general, each country exports the services of us abundant factor, resulting in a higher demand for that factor, while it imports the services of its scarce factor, generating a fail m demand for that factor.

Each country must make aggregate games in welfare, as we demonstrated in Fig. 8.4 However, there is now a redistribution effect from free trade: the abundant factor earns more than the total gains from trade, making the scarce factor worse off. In principle, "an appropriate compensation uses some oft.be gains to nullity any losses.

It should be noted that our statement of the theorem is not exactly the same as its originated. Stolper and Samuelson were concerned with the effect on real factor rewards. A tariff, which is a tax on imports will be expected to raise the domestic relative price of the input and thereby the real income of the scare factor, which is used intensively in that good. Put differently, a tariff moves a country back toward autarky and helps protect the incomes of scarce factors from import competition. We now have an explanation for why different factors of production lobby for import protection while others lobby for free trade. Representatives of labor interests, such as labor unions, may therefore be expected.to argue against reductions in American tariffs; this was certainly the case in the political discussions surrounding the recent negotiation of the North American Free Trade Agreement with Mexico and Canada. Similarly, Japan is quite scarce in agricultural land, and the owners of this land, rice farmers for example, argue vehemently for the continuation of strict controls on food imports.

**Self-Assessment Exercise**

Briefly discuss the theory of Stolper Samuelson

### 3.2. The Rybezynski Theorem

The Rybczynski theorem was developed in 1955 by the Polish-born English economist Tadeusz Rybczynski (1923–1998). It states that at constant relative goods prices, a rise in the endowment of one factor will lead to a more than proportional expansion of the output in the sector which uses that factor intensively, and an absolute decline of the output of the other good.

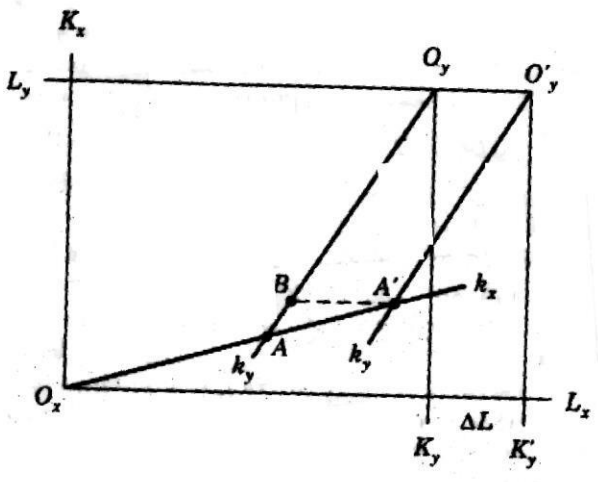
In the context of the Heckscher–Ohlin model of international trade, open trade between two regions often leads to changes in relative factor supplies between the regions. This can lead to an adjustment in the quantities and types of outputs between the two regions. The Rybczynski theorem explains the outcome from an increase in one of these factor's supply as well as the effect on the output of a good which depends on an opposing factor.

Eventually, across both countries, market forces would return the system toward equality of production in regard to input prices such as wages (the state of factor price equalization).

The Rybezynski theorem describes the second fundamental relationship in the economy. Named for the British economist who developed it, the theorem is concerned with the relationship between changes in factor endowments and changes in the outputs of the two commodities when commodity prices are assumed to be given. Suppose that an economy experiences a rise in its labor endowment through labor immigration. We might expect this change to raise the outputs of both X and f because it would expand the production possibility frontier. Holding prices fixed, however, this turns out to be false, because the expansion of the labor-intensive good A draws capital and additional labor from good Y, causing Y to contract. The theorem states that, given unchanged relative commodity prices and assuming that both commodities continue to be produced, an increase in the endowment of one factor will increase the output of the commodity that uses that factor intensively and will reduce the output of the other commodity.

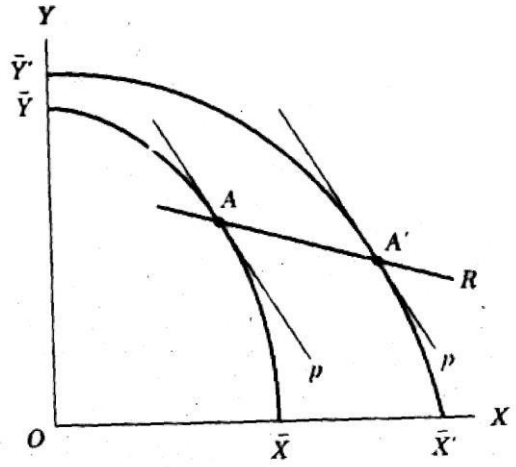
This theorem is most easily demonstrated through the use of the Edgeworth-Bowley box diagram of Fig, 8.10. With origins 0x, and 0y it reproduces Fig, 2.9, except that the efficiency locus has been omitted. Recall that point A represents the common tangency between isoquants from both industries. The factor-intensity rays $k_v$ and kx, represent the capital-labor ratios for industries Y and X, respectively. Note that good Y is capital-intensive and good Y is labor-intensive.

Now assume that the endowment of labor is increased by the amount ΔL. We represent this change by shifting the origin for commodity Y from $O_y$ to $O_y$. We are interested in bow this change in endowments will affect the outputs of the two commodities, holding relative commodity prices constant. Recall again that as long as both goods are produced, relative commodity prices and relative factor prices bear a one-to-one relationship with each other. Thus, because commodity prices are unchanged, factor prices are unchanged; therefore, the capital-labor ratios in the two industries remain unaffected. In terms of Fig, 8.10, this result implies that, even though the endowment of labor has increased, the ray if, is unaltered and the



ray $k_v$ shifts in a, parallel fashion as the origin O, shifts to $O'_v$. Thus, line $AO_V$ is parallel to line A'O^, Note that point A' must be the new equilibrium position along a new efficiency locus $0_X A'0'_y$ (not shown).
The effects of the increase in the labor supply on outputs art easily seen. Because point A' is farther from origin O, than is point A, it follows" that the output of commodity .f increases. Further, output of commodity must decrease, which may be seen by drawing a horizontal line from A' to B, because the length of B $0_T$ is equal to the length of $A'O_y$, we know that AO, is longer than $A'0'_v$. This fact implies that point A' is on a lower Y isoquant than is point A and the output of Y Is lower. We can thus state the theorem:

The Rybczynski theorem, if relative commodity prices are constant and if both commodities continue to be produced, an increase in the supply of a Factor will lend to an increase in the output of the commodity using that factor intensively and a decrease in the output of the other commodity. The Rybczynski theorem has important implications for the effects of changes in endowments on production possibility curves. Consider the production frontier YX in Fig, 8.11. An increase in the endowment of labor will shift this curve out to Y X. Because good X is labor-intensive, we would expect that the maximum producible quantity of X would increase more than the maximum producible quantity of V, or that the curve would experience a shift biased toward the X axis. The Rybczynski theorem may be used to demonstrate this result, holding prices fixed at ratio p. The equilibrium production point in the initial situation is A, the point where the price line p is tangent to the production possibility curve. After the increase in the labor supply, the new equilibrium position will be A', where there is a larger output of X but a smaller output of Y. This is true for any price ratio involving incomplete specialization, so that the new frontier is




biased toward good X throughout its length. The locus R through points A and A' is called the Rybezynski line. It shows how output changes as one factor endowment changes with given commodity prices. A similar line for increases in the capital endowment could be constructed that would show increases in Y output and reductions in X output as the production frontier in tier grows in a direction biased toward good Y. The

Rybezynski lines are it; fact linear if constant returns to scale exist in both industries.

The Rybezynski theorem allows one factor endowment to change while the other is held constant. This model is easily generalized by allowing both factor endowments to change. Suppose, for example, that the capital stock rises by 10 percent and the labor force by 15 percent. We may decompose this change into an identical 10-percent rise in both factors-find the additional 5-percent rise in labor. With constant, returns to scale, the joint increase simply shifts out the production frontier in a parallel fashion. The Rybczynski theorem then ensures that the additional labor force causes a further biased shift in the production possibility curve. Thus, if both factor endowments are changing, the PPF shifts in a biased direction toward the good that is intensive in the faster-growing factor. An immediate implication is that countries with different relative factor endowments will have production frontiers with biased shapes as discussed in Fig. 8.2. Therefore, the Rybczynski theorem is an important building block for proving the Heckscher-Ohlin theorem.

An additional implication of this decomposition relates to output changes. Holding relative prices fixed, a balanced 10-percent increase in labor and capital would expand output of both goods A' and Y by ten percent. Adding further growth of 5 percent in the labor force then reduces output of y and raises output of X from that point. The additional expansion in A' must exceed 5 percent, because further labor and capit.al are absorbed from sector Y. The overall result is that production of Y rises by less than 10 percent 101 even falls) and output of X rises by more than 15 percent. We have demonstrated a generalized version of the Rybezynski theorem which is also a magnification effect: at given commodity prices, changes in relative factor endowments result in magnified shifts in outputs, in that the" percentage changes in commodities lie outside the percentage changes in endowments. In this example, we would write:

XY (8,8)

Notice that, the Rybezynski theorem itself is a special case of this result. In -our example, the percentage change m the capital stock was zero (capital was held fixed}, implying that the percentage change in output of good Y must be negative, that is, its output must fall.

We make some final observations about the Rybezynski theorem. Because the theorem holds relative commodity prices constant it is only a partial exercise in comparative-static analysis. In a full general-equilibrium analysis, we would expect prices to change within an economy as outputs of goods X and Y shift, though the precise effects would depend on demand characteristics. However, this simple theorem is most useful for understanding the effects of endowments on production frontiers, as we have seen. Moreover, it is directly applicable in one important scenario. Consider a small economy that is open to international trade, implying that its relative goods prices are determined by international markets. If those relative price are stable over lime, changes in endowments in the small economy will dictate growth in its outputs and trade patterns. It is quite possible for example, for an initially labor-abundant economy that experiences comparatively rapid accumulation in its capital stock to find its trade pattern shifting

toward exports of capital goods and imports of labor-intensive goods. That is, differential rates of growth m factor supplies-are consistent with changing comparative advantage, which lends an added dynamic to the Heckscher-Oblin theory. In the early 1960s, Japan was a labor abundant, net exporter of labor-intensive goods, such as textiles and simple consumer electronics. Today it is a capital-abundant net exporter of sophisticated capital-intensive goods, such as machinery and transport equipment. Japanese savings and investment rates over the last three decades were substantially higher than those in most other industrialized nations. A similar process is currently happening in the rapidly industrializing nations of Asia, including Singapore, Hong Kong, and Korea, where investment rates are also very high.

## 3.3 TRADE THEORY WITH MANY GOODS AND FACTORS

Throughout our analysis we have assumed that there are only two goods and two factors. The question naturally arises as to whether and to what extent the model can be generalized to higher dimensions. One possible, assumes that products A and Y are groups of products, such as all manufactures or all agricultural produces. If in then assumed that relative commodity prices within the two groups are unchanged at all times, all the preceding conclusions will hold as relative prices and outputs of the two groups change.

If there are more than two distinct commodities, however, difficulties arise even with only two factors of production. In simplest terms, this is because the factor-intensity ratios employed earlier need not produce unique results in this scenario. Suppose a third good, Z, is added to the model and that $Ky/Ly > K_x/L_x > K_z/L_z$. What would be the pattern of trade in a two-country world? One might expect that the country well-endowed with capital would export Y, the country well-endowed with labor would export Z , and some indeterminacy could exist about good X . However, this is not necessarily true. It is possible for either country to export both Y and Z and import X. What can be shown is that the bundle of commodities exported by the capital-abundant country will be capital-intensive in the sense of embodying a higher ratio of capital in labor than it import bundle: the corresponding situation will hold for the labor-abundant nation. However, the capital-abundant country's export bundle could consist either of some of both Y and Z, the two extreme goods, or of good X, the good of intermediate capital intensity.

With more than two factors, additional problems arise if we insist on ranking pairs of factor intensities. For example, with a third factor of natural resources, called, it is possible to have $K/L > K_v/L_r$ hut $K/R_x < Ky/R_y$. Which good it capital-intensive a cast like this? It obviously depends on how the comparison is made. Bilateral comparisons do not have much meaning in a world with[1] more than two factors. Results such as those given by the Stolper-Samuelson theorem and the Rybczynski theorem, which make use of bilateral comparisons, do not easily generalize to higher dimensions.

The Heckscher-Ohlin theorem does generalize in an important way, however, if we

modify our definition of relative factor endowments. Suppose we on define products and factors so that there is an equal number of each, as in the two-by-two model, though the number can be anything larger than one. There can be any number of countries. We retain the assumptions of identical constant-returns technologies, identical homogeneous preferences, and the absence of distortions. It is possible to rank the endowments of any country by computing its share of each endowment in the global supply, with the most abundant factor being the one with the highest relative share and the most scarce factor the one with the lowest relative share.[1] In general, any factor in which a country's share of the global supply exceeds that country's share of global income is ranked now abundant, and others arc ranked as scarce. If we then compute the amounts of each factor that are used to produce the bundle of exports, imports, and gross national product, we can derive a theorem shout the factor content of each nation's trade:

### 3.4. The factor-content theorem

For an arbitrary but equal number of goods and factors, a ranking of the content of any factor in net exports (that is, exports minus imports) divided by its content in total output will duplicate the ranking of relative factor endowments.

This theorem is often called the Heckscher-Ohlin-Vanek theorem because of the contribution of Jaroslev Vanek to the basic trade theory. Its practical importance is in showing that, under reasonably general circumstances, differences in relative endowments still determine comparative advantage. However, comparative advantage in this sense refers to the pattern of trade in factor services rather than in goods. Indeed, it does not really matter that we cannot predict whether a country will export or import a particular commodity, because commodity trade is merely the means for implicitly trading factors.

The factor-price-equalization theorem also generalizes for any number of factors and goods as long as the number of goods is equal to the number of factors and all countries produce all these goods (that is, they are incompletely specialized"). More generally, both the factor-price-equalization theorem and the factor-content theorem hold if there are more goods than factors, so long as the number of goods produced in common by each nation is at least as large as the number of factors. For example, it can easily be shown to hold for three commodities and two factors.

### 3.5 International Product Cycle Theory

The international product theory was developed by Harvard Professor Raymond Verron in 1966. This theory tried to explain international trade based on the evolutionary process that occurs in the development diffusion of production around the world (Verron, 1966). He contended that technical innovations usually originate from the advanced countries. These countries possess abundant capital and research and development (R & D) capabilities. Here, each product and its associated manufacturing technologies go through three stages. The new product is produced at home. It then enjoys a temporary monopoly power. The product’s investors later produced the good and exports it to foreign markets. As the producer’s manufacturing becomes more standardized, foreign competitors enter

the market place and the monopoly powers of the investors dissipates. At this stage, the investor may earn a narrow profit margin. Companies from other countries will begin to produce the standardized product. In fact, foreign competitors may enjoy a comparative advantage in producing the matured product. This will have the effect to fulfill the needs of exports markets as well

Product standardization will eventually progress. Consequently, input requirement for production will evolve. For instance, early in the product's evolution manufacturing requires highly-skilled knowledge of workers in R&D. As the product becomes standardized, mass production then becomes the dominant activity. This will require access to less expensive raw materials and low cost of labour. The product then goes through its life cycle. Then, comparative advantage and its production will then shift from country to country.

Firms around the world are constantly innovating new product. Others are continually maintaining them and the product cycle is constantly beginning and evolving. More importantly in the contemporary interconnected economy, the cycle from innovation growth maturity is much shorter than in the 1960s and 1980s. But new products with universal appeal are likely to be diffused across different countries much faster. This is attributed to global media and the internet, potential customers in different parts of the world who are likely to hear about the product and demand for the product. Also, buyers in emerging markets are particularly eager to adopt new technologies as soon as they become available. This trend explains the rather rapid spread of new consumer electronics around the world, (Cavusgil, Knight and Risenberger, 2008)

**Self-Assessment Exercise**

Differentiate between Rybezynski theorem and Factor content theorem

## 4.0 Conclusion

The factor-price-equalization theorem makes the powerful prediction that free trade in goods actually equalizes the relative and absolute prices of homogeneous factors

internationally. The essential reason for this is that trade in goods can substitute for trade in factors. There are numerous reasons why we do hot observe such equalization in practice, but there are important tendencies in that direction to the extent that international trade is the result of variations in factor endowments. However, the Stolper-Samuelson theorem, which relates changes in commodity prices to changes in real factor prices, provides a fundamental prediction about the effects of trade (or impediments to trade) on the distribution of real incomes between capital and labor. Because free trade causes exports and imports to rise, it follows that the relatively abundant factor

**5.0 Summary**

However, we conclude here that the gains-from-trade theorem is relevant here, in that the economy enjoys an overall rise in welfare by moving from autarky to free trade and the Rybczynski theorem, which relates changes in factor endowments to changes in commodity outputs, assuming constant commodity and factor prices, provides the theoretical basis for the Heckscher-Ohlin model. This theorem is also important for understanding the effects of factor growth on the evolution of comparative advantage.

**6.0. Tutor-Marked Assignment**

1. Discuss in details the Stolper Samuelson and Rybezynski theorem.
2. Discuss the analysis of trade theory
3. Write briefly on the factor content theorem.

4. Show that an increase in the labor supply of a small country could either increase or decrease the volume of trade.
5. How will an increase in the supply of labor affect the terms of trade in the two-country Model.
6. The factor-price-equalization theorem makes no assumption about demand". Nevertheless, demand conditions may well determine whether or not factor prices are equalized. Explain this seemingly paradoxical result.

**7.0. REFERENCES/FURTHER READING**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**MODULE FOUR THE FACTORS MODEL AND GOVERNMENT POLICIES AS DETERMINANTS OF TRADE**

**UNIT ONE The Specific Factors Model**
**UNIT TWO Endowment Changes and Factor Prices**
**UNIT THREE Government Policies as Determinants of Trade**
**UNIT FOUR Gains from Trade as a Result of Government Policy**

## UNIT ONE THE SPECIFIC FACTORS MODEL

**CONTENTS**



## 1.0 INTRODUCTION

To talk about the specific factors model, we will start by looking this model and recently, however, international trade economists have become interested in models that go beyond the assumptions of the Heckscher-Ohlin model. The remaining chapters in this part of the text will consider a variety of models that relax central assumptions of that framework. In the present chapter we remove the assumptions of that framework. In the present chapter we remove the assumption that both factors are perfectly mobile between the two

industries.

It is important to understand that the Heckscher-Ohlin assumption of free (actor mobility between industries describes a state at which an economy can arrive only in the long run. The assumption of perfect mobility of capital implies an economy in which industries can convert one kind of capital into another. In many circumstances, this process may require a considerable time period. For example, the capital used to produce automobiles is much different from that required to produce wheat or textiles. Capital mobility between such diverse industries requires time for physical capital to depreciate in some uses and for new investment to take place in others.

## 2.0. Objectives

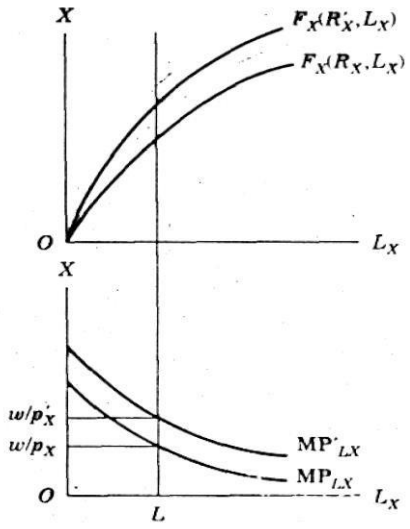
At the end of this unit, you should be able to:

- Understand the meaning of Productivity of labour
- Know how to determine the Marginal Productivity, commodity prices and factor prices.
- Define and understand the meaning of trade theory with many goods and factors.
- Understand the factor-content theorem.
- Explain the various types of exchange rates

## 3.0. Main Content

### 3.1 Productivity of Labour

It is perhaps most natural to consider, capital to be fixed in its sectorial usage for some time, and this is the basic approach we adopt. However, we note that labor could also be characterized similarly to the extent that skills


X
$F'_X(R'_X, L_X)$
$F_X(R_X, L_X)$
O
$L_X$
X
$w/p'_X$
$w/p_X$
$MP'_{LX}$
$MP_{LX}$
O
L
$L_X$

stock of $R_r$, but it does so at a diminishing rate in if LXI, -u some point, the total product, could fail?. In the bottorr panel wo depict, the marginal product of labor in industry X, which is the slope of the total product curve. Because of diminishing returns, the marginal product declines as employment in X rises. A similar construction applies to good Y, given the fixed stuck of $S_y$.

These results hold in a more general sense. The marginal product of labor in either sector is an increasing function of the capital – labor ratio used in that sector. Consider, for example, an increase in usages of 10 percent and an increase in labor usage of 5 percent in industry X. We may decompose this change into, first, an identical 5 percent rise in R and L and, second, an additional rise in R. With constant returns to scale, the first component has no impact on the marginal product of labor. However, the second component raises the marginal product of labor for any given level of employment. Indeed, as depicted in Fig. 9.1, an increase in the endorsement of $R_x$ will shift up both the total product and marginal product curves for labor.

### 3.2. Determination of Marginal Productivity

Analogous conclusions hold for the determination of the marginal products of capital, which are declining functions of the capital-labor ratios in each industry. Finally, under constant returns to scale, the marginal products of each factor depend only on these capital-labor ratios and not on the level of production.

We retain the assumption that factor markets are perfectly competitive, implying that firms pay each factor the value of its marginal product. Thus, in the X industry we have:

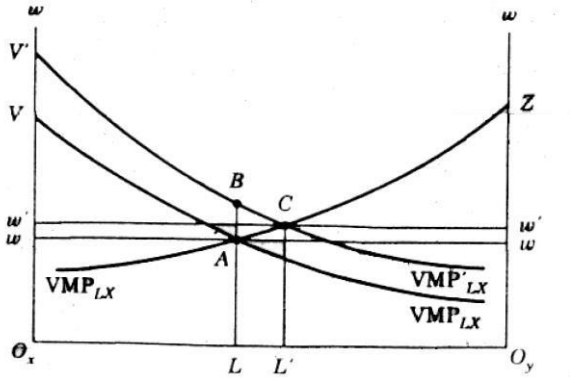
$$VMP_{LX} = MP_{LX}p_X = w$$
$$VMP_{KX} = MP_{KX}p_x = r$$

Similar equations characterize factor-market equilibrium conditions with respect to industry Y. Note that from these conditions we can specify that the real returns to labor and capital in terms of commodity X are equivalent to their marginal products: $wfp_x$ = MP/jf and $r/p_x$ = MPx, respectively. This result means that changes in real returns to factors are known as soon as changes in capital-labor ratios are determined. For example, in Fig. 9.1, a rise in the capital stock for a given level of employment generates a higher real wage. Moreover, because marginal products are functions of only the capital-labor ratios, if we know how one marginal product changes, we immediately know that the other marginal product has changed in the opposite direction. Thus, an increase in the marginal product of labor implies a decrease in the marginal product of capital in the same sector. In other words, if we find that wlp, rise? We know that $r/p_x$ must necessarily fall. These relationships hold regardless of what is happening to outputs or endowments in the economy.

Completing the model requires linking sectors X and Y together in a. short-run general equilibrium framework. This is done by noting that inter-industry labour mobility common wigs in both industries, generating an equal value of marginal product of labour

in equilibrium. Thus feature allows and help to determine the allocation of labor between X and Y in each equilibrium depicted in Fig. 9.2.

Employment in sector X is indicated from left to right, relative to origin O. Suppose that $p_f$ is given and that the capital stock in industry X is held fixed. As more labor is employed in this sector, the marginal product of labor declines, causing the value of labor's marginal product, or $VMP_{LX}$, to tie a down ward-sloping curve. Because equilibrium requires the equality of




$VMP_{LX}$ and w, it is possible to interpret this schedule as the demand curve for labor in industry X Note that a rise in either $p_x$ or $R_t$ would shift the $VMP_{LX}$ curve upward.

The demand for labor in sector Vis represented by the VMP/,y schedule, which is drawn from right Lo left relative to origin $O_v$. Thus, movements to the left represent larger employment in V and correspond to declines in the marginal product and in tin- value of the marginal product of labor for a given endowment ot $S_v$ and a fixed pj.
Suppose point A represents autarky equilibrium in this economy. Accordingly, the distance $0_x$L measures employment in industry X, the distance $0_y$L measures employment in industry Y, and labor is fully utilized. It is convenient to characterize income distribution in this equilibrium. There is a common wage w paid in both industries. Total labor income paid to workers in sector X is the area $wO_xLA$, while that in sector Vis $wO_yLA$. The remaining income generated in each sector represents nominal total returns to each capital stock. Thus, in autarky, factor R earns the area VwA and factor S earns the area ZwA.

## 3.3 COMMODITY PRICES AND FACTOR PRICES

We are now in a position to consider how price changes will affect factor prices and income distribution in this model. Because only relative price changes matter in general

equilibrium, let us suppose that $p_y$ remains fixed at tome arbitrary level and consider the effects of a change in $p_t$. A natural supposition in this scenario is that our cloyed economy is small and that, upon entering into free trade, it faces a higher world price for good A'. Thus, the economy would choose to export good X as its price rises to the world level.

In Fig. 9.2, the higher $p_x$ would shift up the value of marginal product schedule for good X as shown. Note that, the ratio of distances, HAIAL, measures the proportional increase in the price of A' by virtue of the fact that $VMP_{LX}$; is the product of the marginal product of labor and the commodity price. For example, a 20 percent rise in p* results in a 20 percent shift upwards in the value of marginal product curve throughout its length.

Consider the adjustment to the new equilibrium under free trade. Point 8 cannot be an equilibrium because it corresponds to a higher wage in sector X than in sector Y. Thus, labor moves from Y to X, which provides the additional resources to expand output of the latter commodity and allow for its export. This labor mobility lowers the marginal product of labor in industry X and raises it in industry Y, moving the economy along the relevant $VMP_{LX}$ curves to the free trade equilibrium at point C. There is a higher allocation of labor to good X and a higher nominal wage rate in both industries.
Our primary interest is in the effect of the higher price of good X on real factor returns. Inspection of Fig. 9.2 demonstrates that both the total paid in the economy are larger in free trade. Total income for S, the specific capital stock in Y, is smaller. Thus, the nominal factor prices r and w are higher, but is lower. We conclude that laborers and owners of the capital stock in industry X enjoy higher real returns measured in terms of their ability to purchase good Y, the price of which has remained constant, while owners of the capital stock in industry Y receive a lower real return.

The latter capital owners also suffer a lower real return in terms of good X, the price of which is now higher. It follows that owners of the specific capital stock in the declining industry are made worse off by the price change induced by the entry into free trade.
To reach precise conclusions about the real returns to owners cf R and" to laborers relative to tin- higher-priced good, we consider the changes in marginal products. The labor influx lowers the capital labor ratio in, use in industry X, thereby raising the marginal productivity of the fixed capital stock as well as its real price, rfp,. Thus, owners of the specific capital stock in the expanding industry unambiguously gain real income from the price change.
Finally, the fact that the capital-labor ratio falls in sector Y and rises in sector V as a result of the inter industry employment shift from point A to point implies that the real wage falls in the expanding sector and rises in the demining sector. Indeed, it is this decline in the real wages that supports the expansion of output in industry X. Each laborer is better off m terms of ability to consume good Y but worse off in terms of ability ;o consume good X. whether her workers gain or lose welfare depends on their preferences for the two commodities. This result has been termed the neoclassical ambiguity in trade theory. We have proven the following proposition.

Commodity prices and factor prices: A relative price increase of a good benefits the

specific factor used in that industry, reduces the real income of the other specific factor, and has an ambiguous numbers of the mobile factor.

It is useful to provide further perspective on this result. This proposition is in sharp contrast to the Stolper-Samuelson theorem discussed in the other units. The Stolper-Samuelson theorem, which is based on the long-run supposition that both factors are causelessly mobile between industries, predicts that the effect of a relative change in commodity prices on real factor prices depends on the factor intensities of the commodities. Thus, a rise in the price of the labor-intensive good, for example, draws both labor and capital from the capital-intensive good and results in both goods being produced with higher capital-labor ratios. As a result, real wages rise in terms of both goods, while real capital incomes fall in terms of both goods. In Fig. 9.2, a long-run equilibrium would exist at a point to the right of Ci because the induced capital (low would further raise output of XL and higher than B (because the nominal wage must rise in comparison with the price of X). Note carefully the implication that in the "long run, output responses in the economy are more elastic with respect to price changes than in the short, run. This fact merely reflects the inability of capital to move in a specific model.

In the specific-factors model on the other hand, the relevant characteristic in the short run is not factor intensities but the identity of mobile factors and specific factors. Our description of the movement from autarky to free trade made no mention of factor intensities. This is hardly surprising because the notion of factor intensities makes little sense in the specific-factors model. It would be meaningless to compare the ratios of capital to labor in sectors X and Y because the capital stocks are not comparable. Mobility is important, however. Indeed, had we constructed our model economy with mobile capital and fixed labor forces, the impact of trade on capital real income would have been ambiguous, while the laborers would have gained or lost, depending on the sector of employment.

Returning to the short-run model, the economic intuition behind the impacts of commodity price changes on the prices of specific factors is straightforward. The rise in induces firms to wish to produce more X, raising the demand for the services of ft. Because no additional supplies of R are available to satisfy this demand, the factor experiences a substantial rise in its real price. In effect, capital owners in this industry gain both from the influx of labor and from receiving a share of the higher price of X. Indeed, because the wage rises by proportionally less than the price increase, the price of capital must rise by proportionally more. To return to our example, a 20 percent rise in the price of good emanating from free trade results in an increase in the return to R of more than 20 percent. The opposite effects occur for owners of its cutout of good Y declines in the short ran. That is, there is a decline in demand for S-capital, reducing price. Notice that this logic implies a variant of the long-run magnification effect in the present case we would write

$$\%\Delta r < \%\Delta py < \%\Delta px < \%\Delta w \qquad (9.4)$$

Again, keep in mind that the ranking here depends on factor mobility (or homogeneity) and not on factor intensities.

It is also interesting to note the difference between this model and the Ricardian model for the implications of free trade and incomes. In the Ricardian model each worker is identical and each gains equally from the entry into free trade by virtue of speculation at improved terms of trade. Here there are three distinct factors, and trade him ambiguous impacts on workers' real incomes.

The specific-factors model provides a powerful basis for understanding the interests of different factor owners in supporting or opposing government policy changes, such as trade protection, that influence relative prices. Factors employed solely in sectors that will enjoy a price increase would strongly support such measures, while factors employed in other sectors would oppose them. Mobile factors may be relatively unaffected by such policy changes and may avoid expressing opinions through voting or lobbying. Accordingly, the model helps explain the observed phenomenon that lobbying for and against protective barriers against imports tends to be done by coalitions of specific factors in particular sectors (Magee, 1978). In contrast, the Stolper-Samuelson theorem would frame such behavior as a conflict between abundant and scarce factors.

## 3.4 EXCHANGE RATE POLICIES

Exchange rate (also known as a foreign exchange rate, forex rate, or rate) between two currencies is the rate at which one currency will be exchanged for another. It is also regarded as the value of one country's currency in terms of another currency. For example, an inter-bank exchange rate of #360 to the United States dollar ($) means that #360will be exchanged for each US$1 or that US$1 will be exchanged for each#360. Exchange rates are determined in the foreign exchange market (demand and supply), which is open to a wide range of buyers and sellers where currency trading is continuous. But governments can influence those exchange rates in various ways. The extent and nature of government involvement in currency markets define alternative systems of exchange rates.

### Types of Exchange Rate Systems

There are three broad categories of exchange rate systems. In one system, exchange rates are set purely by private market forces with no government involvement. Values change constantly as the demand for and supply of currencies fluctuate. In another system, currency values are allowed to change, but governments participate in currency markets in an effort to influence those values. Finally, governments may seek to fix the values of their currencies, either through participation in the market or through regulatory policy.

### 1. Free-Floating System

In a free-floating exchange rate system, governments and central banks do not participate in the market for foreign exchange. The relationship between governments and central banks on the one hand and currency markets on the other is much the same as the typical relationship between these institutions and stock markets.

Governments may regulate stock markets to prevent fraud, but stock values themselves are left to float in the market. The U.S. government, for example, does not intervene in the stock market to influence stock prices. The concept of a completely free-floating exchange rate system is a theoretical one. In practice, all governments or central banks intervene in currency markets in an effort to influence exchange rates. Some countries, such as the United States, intervene to only a small degree, so that the notion of a free-floating exchange rate system comes close to what actually exists in the United States

A free-floating system has the advantage of being self-regulating. There is no need for government intervention if the exchange rate is left to the market. Market forces also restrain large swings in demand or supply. Suppose, for example, that a dramatic shift in world preferences led to a sharply increased demand for goods and services produced in Canada. This would increase the demand for Canadian dollars, raise Canada's exchange rate, and make Canadian goods and services more expensive for foreigners to buy. Some of the impact of the swing in foreign demand would thus be absorbed in a rising exchange rate. In effect, a free-floating exchange rate acts as a buffer to insulate an economy from the impact of international events. The primary difficulty with free-floating exchange rates lies in their unpredictability. Contracts between buyers and sellers in different countries must not only reckon with possible changes in prices and other factors during the lives of those contracts, they must also consider the possibility of exchange rate changes. An agreement by a U.S. distributor to purchase a certain quantity of Canadian lumber each year, for example, will be affected by the possibility that the exchange rate between the Canadian dollar and the U.S. dollar will change while the contract is in effect. Fluctuating exchange rates make international transactions riskier and thus increase the cost of doing business with other countries.

**2. Managed Float/ Dirty Float System**

Governments and central banks often seek to increase or decrease their exchange rates by buying or selling their own currencies. Exchange rates are still free to float, but governments try to influence their values. Government or central bank participation in a floating exchange rate system is called a managed float. Countries that have a floating exchange rate system intervene from time to time in the currency market in an effort to raise or lower the price of their own currency. Typically, the purpose of such intervention is to prevent sudden large swings in the value of a nation's currency. Such intervention is likely to have only a small impact, if any, on exchange rates. Roughly $1.5 trillion worth of currencies changes hands every day in the world market; it is difficult for any one agency—even an agency the size of the U.S. government or the Federal Reserve—to force significant changes in exchange rates. Still, governments or central banks can sometimes influence their exchange rates. Suppose the price of a country's currency is rising very rapidly. The country's government or central bank might seek to hold off further increases in order to prevent a major reduction in net exports. An announcement that a further increase in its exchange rate is unacceptable, followed by sales of that country's currency by the central bank in order to bring its exchange rate down, can sometimes convince other

participants in the currency market that the exchange rate will not rise further. That change in expectations could reduce demand for and increase supply of the currency, thus achieving the goal of holding the exchange rate down.

**Advantages of Flexible Exchange Rate System**

1. It permits quicker adjustments in the exchange rate to changes in macro-economic factors such as changes in inflation rate, growth rate, and interest rates.
2. There is less likelihood of currency overvaluation. So, the country's growth prospects are brighter

**Disadvantages of Flexible Exchange Rate System**

1. Exchange rate risk is high due to greater volatility in the short- and long-term. This makes exchange rate forecasting extremely important as well as extremely difficult.
2. There is a tendency for capital inflows through foreign portfolio investment, or 'hot money'.
3. Imports and overseas debt repayment are adversely affected by depreciation of domestic currency

**3. Fixed Exchange/Pegged Exchange Rate System**

In a fixed exchange rate system, the exchange rate between two currencies is set by government policy. There are several mechanisms through which fixed exchange rates may be maintained. Whatever the system for maintaining these rates, however, all fixed exchange rate systems share some important features.

**a. Commodity Standard**

In a commodity standard system, countries fix the value of their respective currencies relative to a certain commodity or group of commodities. With each currency's value fixed in terms of the commodity, currencies are fixed relative to one another.

For centuries, the values of many currencies were fixed relative to gold. Suppose, for example, that the price of gold was fixed at $20 per ounce in the United States. This would mean that the government of the United States was committed to exchanging 1 ounce of gold to anyone who handed over $20. (That was the case in the United States—and $20 was roughly the price—up to 1933.) Now suppose that the exchange rate between the British pound and gold was £5 per ounce of gold. With £5 and $20 both trading for 1 ounce of gold, £1 would exchange for $4. No one would pay more than $4 for £1, because $4 could always be exchanged for 1/5 ounce of gold, and that gold could be exchanged for £1. And no, one would sell £1 for less than $4, because the owner of £1 could always exchange it for 1/5 ounce of gold, which could be exchanged for $4. In practice, actual currency values could vary slightly from the levels implied by their commodity values because of the costs involved in exchanging currencies for gold, but these variations are slight

Under the gold standard, the quantity of money was regulated by the quantity of gold in a country. If, for example, the United States guaranteed to exchange dollars for gold at the rate of $20 per ounce, it could not issue more money than it could back up with the gold it owned.

b. **Currency Board Arrangements** - which are a kind of commodity standard-fixed exchange rate system in which there is explicit legislative commitment to exchange domestic currency for a specified foreign currency at a fixed rate and a currency board to ensure fulfillment of the legal obligations this arrangement entails.
In its simplest form, this type of arrangement implies that domestic currency can be issued only when the currency board has an equivalent amount of the foreign currency to which the domestic currency is pegged. With a currency board arrangement, the country's ability to conduct independent monetary policy is severely limited. It can create reserves only when the currency board has an excess of foreign currency. If the currency board is short of foreign currency, it must cut back on reserves.
Argentina established a currency board in 1991 and fixed its currency to the U.S. dollar. For an economy plagued in the 1980s with falling real GDP and rising inflation, the currency board served to restore confidence in the government's commitment to stabilization policies and to a restoration of economic growth. The currency board seemed to work well for Argentina for most of the 1990s, as inflation subsided and growth of real GDP picked up
The drawbacks of a currency board are essentially the same as those associated with the gold standard. Faced with a decrease in consumption, investment, and net exports in 1999, Argentina could not use monetary and fiscal policies to try to shift its aggregate demand curve to the right. It abandoned the system in 2002

**Advantages of Fixed Exchange Rate System**

1. There is stability in exchange rate and exchange rate risk is nil.
2. Capital inflows through foreign direct investment are higher because there is no exchange rate volatility. FDI is a 'desirable' capital inflow due to its stable and long- term nature.
3. Inflation rates tend to be lower and therefore real interest rates (nominal interest rates adjusted for inflation) are higher.

**Disadvantages of Fixed Exchange Rate System**

1. The exchange rate does not reflect macro-economic changes. The entire foreign exchange entering and leaving the country has to be converted at the fixed exchange rate.
2. Punitive action for contravening rules. In a fixed exchange rate regime, the entire institutional infrastructure is geared towards identifying evasion of foreign exchange controls and imposing penal punishments. A fixed exchange rate creates a flourishing parallel market for foreign exchange in which the 'true' value of the domestic currency is determined by market forces. This is because the par value of the domestic currency is very often at variance with what the exchange rate would be if left to the vagaries of supply and demand.
Very often countries fix a separate par value for exports and a separate one for imports. This is done to boost its exports and deter imports. This merely increase the draconian system needed to monitor foreign currency inflows and outflows

**Process of Settling International Bill: Methods of Payment in International Trade**

To succeed in today's global marketplace and win sales against foreign competitors, exporters must offer their customers attractive sales terms supported by the appropriate payment methods. Because getting paid in full and on time is the ultimate goal for each export sale, an appropriate payment method must be chosen carefully to minimize the payment risk while also accommodating the needs of the buyer.

As shown below, there are five primary methods of payment for international transactions. During or before contract negotiations, you should consider which method in the figure is mutually desirable for you and your customer

**Payment Risk Diagram**

| | Least Secure | Less Secure | | More Secure | Most Secure |
|---|---|---|---|---|---|
| Exporter | Consignment | Open Account | Documentary Collections | Letters of Credit | Cash-in-Advance |
| Importer | Cash-in-Advance | Letters of Credit | Documentary Collections | Open Account | Consignment |

Key Points

- International trade presents a spectrum of risk, which causes uncertainty over the timing of payments between the exporter (seller) and importer (foreign buyer).
- For exporters, any sale is a gift until payment is received.
- Therefore, exporters want to receive payment as soon as possible, preferably as soon as an order is placed or before the goods are sent to the importer.
- For importers, any payment is a donation until the goods are received.
- Therefore, importers want to receive the goods as soon as possible but to delay payment as long as possible, preferably until after the goods are resold to generate enough income to pay the exporter.

**i. Cash-in-Advance**

With cash-in-advance payment terms, an exporter can avoid credit risk because payment is received before the ownership of the goods is transferred. For international sales, wire transfers and credit cards are the most commonly used cash-in-advance options available to exporters. With the advancement of the Internet, escrow services are becoming another cash-in-advance option for small export transactions. However, requiring payment in advance is the least attractive option for the buyer, because it creates unfavourable cashflow. Foreign buyers are also concerned that the goods may not be sent if payment is made in advance. Thus, exporters who insist on this payment method as their sole manner of doing business may lose to competitors who offer more attractive payment terms

**ii. Letters of Credit**

Letters of credit (LCs) are one of the most secure instruments available to international traders. A LC is a commitment by a bank on behalf of the buyer that payment will be made to the exporter, provided that the terms and conditions stated in the LC have been met, as

verified through the presentation of all required documents. The buyer establishes credit and pays his or her bank to render this service. A LC is useful when reliable credit information about a foreign buyer is difficult to obtain, but the exporter is satisfied with the creditworthiness of the buyer's foreign bank. A LC also protects the buyer since no payment obligation arises until the goods have been shipped as promised

**iii. Documentary Collections**

A documentary collection (D/C) is a transaction whereby the exporter entrusts the collection of the payment for a sale to its bank (remitting bank), which sends the documents that its buyer needs to the importer's bank (collecting bank), with instructions to release the documents to the buyer for payment. Funds are received from the importer and remitted to the exporter through the banks involved in the collection in exchange for those documents. D/Cs involve using a draft that requires the importer to pay the face amount either at sight (document against payment) or on a specified date (document against acceptance). The collection letter gives instructions that specify the documents required for the transfer of title to the goods. Although banks do act as facilitators for their clients, D/Cs offer no verification process and limited recourse in the event of non-payment. D/Cs are generally less expensive than LCs

**iv. Open Account**

An open account transaction is a sale where the goods are shipped and delivered before payment is due, which in international sales is typically in 30, 60 or 90 days. Obviously, this is one of the most advantageous options to the importer in terms of cash flow and cost, but it is consequently one of the highest risk options for an exporter. Because of intense competition in export markets, foreign buyers often press exporters for open account terms since the extension of credit by the seller to the buyer is more common abroad. Therefore, exporters who are reluctant to extend credit may lose a sale to their competitors. Exporters can offer competitive open account terms while substantially mitigating the risk of non-payment by using one or more of the appropriate trade finance techniques covered later in this Guide. When offering open account terms, the exporter can seek extra protection using export credit insurance.

**v. Consignment**

Consignment in international trade is a variation of open account in which payment is sent to the exporter only after the goods have been sold by the foreign distributor to the end customer. An international consignment transaction is based on a contractual arrangement in which the foreign distributor receives, manages, and sells the goods for the exporter who retains title to the goods until they are sold. Clearly, exporting on consignment is very risky as the exporter is not guaranteed any payment and its goods are in a foreign country in the hands of an independent distributor or agent. Consignment helps exporters become more competitive on the basis of better availability and faster delivery of goods. Selling on consignment can also help exporters reduce the direct costs of storing and managing inventory. The key to success in exporting on consignment is to partner with a reputable and trustworthy foreign distributor or a third-

party logistics provider. Appropriate insurance should be in place to cover consigned goods in transit or in possession of a foreign distributor as well as to mitigate the risk of non-payment

**Self-Assessment Exercise**

Differentiate between Rybezynski theorem and Factor content theorem

**4.0 Conclusion**

The factor-price-equalization theorem makes the powerful prediction that free trade in goods actually equalizes the relative and absolute prices of homogeneous factors internationally. The essential reason for this is that trade in goods can substitute for trade in factors. There are numerous reasons why we do hot observe such equalization in practice, but there are important tendencies in that direction to the extent that international trade is the result of variations in factor endowments.

The Stolper-Samuelson theorem, which relates changes in commodity prices to changes in real factor prices, provides a fundamental prediction about the effects of trade (or impediments to trade) on the distribution of real incomes between capital and labor. Because free trade causes exports and imports to rise, it follows that the relatively abundant factor

**5.0 Summary**

However, we conclude here that the gains-from-trade theorem is relevant here, in that the economy enjoys an overall rise in welfare by moving from autarky to free trade and the Rybczynski theorem, which relates changes in factor endowments to changes in commodity outputs, assuming constant commodity and factor prices, provides the theoretical basis for the Heckscher-Ohlin model. This theorem is also important for understanding the effects of factor growth on the evolution of comparative advantage. Exchange rate policies was also discussed.

**6.0. Tutor-Marked Assignment**

1. Discuss in details the Stolper Samuelson and Rybezynski theorem.
2. Discuss the analysis of trade theory
3. Write briefly on the factor content theorem.

4. Show that an increase in the labor supply of a small country could either increase or decrease the volume of trade.
5. How will an increase in the supply of labor affect the terms of trade in the two-country Model.
6. The factor-price-equalization theorem makes no assumption about demand". Nevertheless, demand conditions may well determine whether or not factor prices are equalized. Explain this seemingly paradoxical result.

## 7.0. REFERENCES/FURTHER READING

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## UNIT TWO ENDOWMENT CHANGES AND FACTOR PRICES

**CONTENTS**



### 1.0 INTRODUCTION

In economics a country's factor endowment is commonly understood as the amount of land, labor, capital, and entrepreneurship that a country possesses and can exploit for manufacturing. Countries with a large endowment of resources tend to be more prosperous than those with a small endowment, all other things being equal. The development of sound institutions to access and equitably distribute these resources,

however, is necessary in order for a country to obtain the greatest benefit from its factor endowment.

Nonetheless, the New World economies inherited attractive endowments such as conducive soils, ideal weather conditions, and suitable size and sparse populations that eventually came under the control of institutionalizing European colonists who had a marginal economic interest to exploit and benefit from these new discoveries. Colonists were driven to yield high profits and power by reproducing such economies' vulnerable .legal and political framework, which ultimately led them towards the paths of economic developments with various degrees of inequality in human capital, wealth, and political power.

## 2.0. Objectives

At the end of this unit, you should be able to:

- Understand the meaning of endowments changes, factor endowments and factor prices
- Define and understand the meaning of endowment changes and outputs.
- Understand the Pattern of trade.

## 3.0. Main Content

## 3.1 ENDOWMENT CHANGES, FACTOR PRICES, AND OUTPUTS

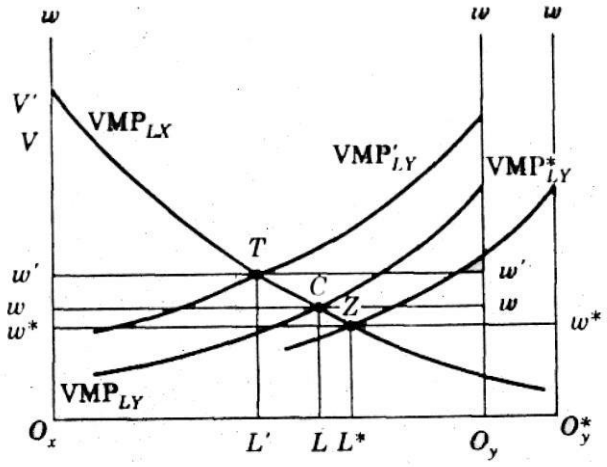
Two central features of the endowment model earlier discuss were the factor-price-equalization theorem and the Rybczynski theorem. We now show that the predictions of these models do not generally hold in the specific-factors model.

### 3.1.1 Factor Price Equalization

The factor-price-equalization theorem stated that in free trade with equalized commodity prices, if two countries produce both goods in common, real factor prices will become identical as well. The existence of different factor endowments does not change this result as long as countries are incompletely specialized. The theory relies on the assumption that there are at least as many goods as factors so that equalized goods prices would be sufficient to determine equalized factor prices. In this context it is no surprise that factor price equalization, ice; lot hold in the specific-factors model, because it embodies three factors and only two goods. To make the point more concede simply imagine countries H and F moving from autarky to free trade. If exports good X, then the real income of capital will rise and that of S-capital will fall, as we demonstrated. In F the real income of-S'-capital will rise and that of R-capital will fall as that country exports good Y, Labor will have a higher real wage with respect to good Y in H but a lower real wage with respect to good F in F (and the opposite effects would manifest with respect to good X}. There is clearly no presumption toward equalization of real factor prices in the short run.

We provide a more formal demonstration by showing that in free trade, countries will experience different real factor incomes. Consider the effects of endowment changes on real incomes, as depicted in Fig. 9.3, where we take as the initial situation the free trade equilibrium at point C. To simplify matters, we suppose that the diagram refers to a small open economy that continually faces fixed international prices, thereby holding both domestic prices fixed throughout.

Consider first an increase in the endowment of 5, the specific capital stock in sector Y. Clearly, all of the new capital stock must be employed in industry Y, and this infusion of capital increases the marginal product of labor in that industry. In Fig. 9.3, this outcome is represented by the upward shift in the VMP/.C schedule. The higher wage induces labor to flow from sector X to sector Y until the wage is again equalized at point T. Output of good Y goes up, drawing labor from good X, the output of which declines.
Implications for factor incomes are clear. With a higher wage and fixed commodity prices, all laborers enjoy higher real earnings. This is a result of the rising capital-labor ratio in both industries (recall that good X loses lab




to good Y) and the consequent increases in marginal products of labor. We also conclude immediately that the real returns to both specific factors are reduced by virtue of the higher capital-labor ratios. Again, with uncharged goods prices but a higher wage, the nominal returns to both capital stocks must be lower, causing an unambiguous, decline in the real incomes of their owners. Thus, an increase in the endowment of S reduces the return to both specific factors and increases labor's real income. It is easily seen that the same result will hold for a rise in the supply of/i, for the effects of increases in the specific factors are symmetrical. In general, then, any expansion of the endowment of a

specific factor at constant commodity prices will lower the real return to both specific lectors and raise the real return to the mobile factor.

Next consider the effects of an increase in the endowment of labor. This change is represented in fig. 9.3 by an enlargement of the labor force, shifting the origin for sector Y to $0"_v$. In turn, the $VMP_{LY}$ schedule is displaced to the right by the same amount. Throw, the curve $VMP_{LY}$ contains information equivalent to that in curve VMP/.y, but with reference to the new origin.

The rise in the labor endowment causes the economy to move from the initial free trade equilibrium at point C to a new equilibrium at point Z. The immediate implication is that the additional labor supply reduces the nominal wage rate from w to u. With fixed commodity prices, laborers are made worse off. It is also clear that total capital income in sector X is higher, implying higher nominal and real returns for owners of R. Implications for owners of S are unclear from Fig. 9.3. To reach precise conclusions, note that the increase in the labor endowment is divided between sectors X and Y, causing both outputs to rise in the short-hort run. This fallows from the fact.

That distance $0_xL^*$ exceeds distance $0_xL^*$ while distance $0_yL^*$similarly exceeds distance $0_yL^*$Thus, the increased labor force results in a lower capital-labor ratio in both sectors, raising the real returns to both specific factors and lowering the real wages of labor. We have proven the following proposition.

### 3.2. Factor endowments and factor prices

At constant commodity prices, any increase in the endowment of a specific factor will increase the real returns to the mobile factor and lower the real returns u, both specific factors. An increase in the endowment of (mobile factor will reduce its own real income and increase the real income of both specific factors.

Again, to make the contrast to the factor-price-equalization theorem, recall that, in that model, any endowment change resulted in no impacts on the real returns to any factor as long as the economy remained incompletely specialized. In the specific-factors model, however, endowment shifts have sharp impacts on real factor incomes, whether or not the economy is specialized.

To make the comparison to the factor-price-equalization theorem fully explicit, the rise in the endowment of the specific factor S in the small open economy of Fig. 9.3 cannot have an impact on commodity prices or factor prices in the rest of the world. Thus, this economy would have higher real wages and lower real returns to its specific factors than would exist elsewhere in the short-run equilibrium. This absent e of factor price equalization carries over to the case of two large countries who trade with each other. Suppose, for example, that Fig. 9.3 represents Country H and that in the initial equilibrium at point C, H is exporting good Y, The expansion in Y output after the rise in the endowment of .S should, under most circumstances, result in greater exports of good Y and a fail in its relative price. In the foreign country this change would tend to raise the

relative return to the specific factor in section X and lower the relative return to the specific factor in sector Y with an ambiguous impact on the real wage. While these effects would pertain also to the home country, they only partially offset the initial impacts of the endowment change. Thus, there is no presumption toward factor price equalization in the short run. We can, therefore, add the following theorem.

### 3.2.1. Trade mid factor prices

In the specific-factors model, the equalization of commodity prices by international trade; does not equalize factor prices,

An important implication of ibis finding is that free trade in goods does not fully exhaust the available gains from trade, in the sense that, productive factors have an incentive to migrate in such an equilibrium. Even in the absence of any impediments to trade, if factors are intersect orally immobile, there will be international differences in their real returns. Factors may be too impatient to wait for the long-run equalization of their returns (assuming such equalization were even possible in practical terms) and may prefer to find employment in their sections.

## 3.3. Endowment Changes and Outputs

Turning to the Rybezynski theorem, our earlier discuss on it in the previous units demonstrated that under constant commodity prices, an increase in the endowment of a particular factor raises the output of the good intensive in that factor and lowers the output of the other good. In the specific-factors model, where factor intensity is less important than factor specificity, the predictions about endowment changes and outputs are again quite different, as we have already demonstrated.

Specifically, we have shown that an increase in the endowment of a specific factor increases the output of the good that uses that factor and must lower the output of the other good by pulling labor from it. This is similar to the Rybczynski prediction, but it depends on the sectorial specificity of the expanding factor rather than on factor intensities in-production. We have also demonstrated that a rise in the labor endowment expands both outputs as the new-labor force is divided between the sectors. Again, this is due to the mobility of labor rather than to the intensity of production. Thus, we can state the following proposition.

### 3.3.1. Factor endowments and outputs

An increase in one specific factor increases the output of the commodity that uses that factor and reduces the output of the other industry. Increases in the supply of the mobile factor will expand both outputs.

We note in passing that the impacts of endowment changes in the specific-factors model suggest that different groups of factors will have different incentives to lobby for or against international factor migration. It is clear from our discussion that mobile factors would oppose policies allowing freer immigration of competing mobile factors, while owners of specific factors would favor them. Again, this is a result of factor mobility

rather than factor scarcity, as in the Heckscher-Ohlin model.

## 3.4 THE PATTERN OF TRADE

One of the principal results of the Heckscher-Ohlin theorem described in our previous units is that we can predict trade patterns from the knowledge of technology and factor endowments In particular, we found that a country will export the commodity that uses its abundant factor most intensively. We now want to investigate whether a similar property holds for the specific-factors model. To facilitate comparison, we depart from the small open economy notion and assume, as before, that there are two countries, H rind F. We begin by assuming that H and F have identical endowments of labor and total capital in the long run. As we know, in this case, with preferences assumed to be identical in both countries, the two economics will be identical in every respect and there will be no possibility of international trade.

While there are identical long-run endowments, suppose that in the short run the capital in the two countries is allocated differently between the two industries. Specifically, assume that in Country H there is more capital in the Y industry and that in Country F there is more capital in the X" industry. In economic terms this would mean that Country H has a greater stock of specific factor 8 and a lower stock of specific factor R than does Country F. As we have seen in Fig. 9.3, this structure of capital endowments would generate a higher output of good Y and a lower output of good-V in H than in F for any common relative commodity prices.

The economies are no longer identical and will find it advantageous to trade. With identical preferences,-it follows that the home country will export good Y and the foreign country will export good X. Thus, in the short run, each country will export the commodity that is produced with the relatively abundant specific factor. While this outcome sounds much like the Heckscher-Ohlin theorem, it relies on the existence of specific factors and not on relative factor intensities. Had we assumed that Country PI had a larger initial stock of TJ-capital, then we would have expected K to export good X.

Now suppose we return to the situation of identical long-run factor supplies and no trade initially. Allow country F to experiences a rise in its labor endowment. In the Heckscher-Ohlin model, country F necessarily would export X, the long-run labor-intensive commodity. However, in the specifics factors model, the rise in the labor supply would generate an increase in the output of both goods X and Y in Country F. In general it is impossible to predict which of these commodities will the exported without more information on production technologies. Referring back to Fig. 9.3, the relative increases in outputs depend on the slopes of the $VMP_{LX}$ and $VMP_{LY}$ schedules, which depend on the underlying production functions and on how capital is allocated between the two industries. Surpassed, for example, that, the $VMP_{LX}$ curve is quite flat but the VMP/,y curve is quite steep.[2] This configuration would mean that the short-run changes in outputs would favor a larger rise in X, suggesting that it would the exported. These relative slopes could be different, however. We thus have the following proposition.

The pattern of trade in the specific-factor model, each country will export the good with

the absolutely abundant stock of specific capital, assuming identical endowments of labor, the mobile factor. With differences in labor endowments, trade patterns will depend on the nature of the production functions and on the[1] allocation of capital (that is, on the stocks of specific factors

**Self-Assessment Exercise**

Discuss the factor endowments and factor prices.

**4.0 Conclusion**

The conclusions we have reached in terms of the relationship between commodity prices and factor prices and between endowments and outputs would remain unaffected, and these- alternative models could be constructed simply by renaming the variables. In any case, many trade economists agree that the effects of specific factors have a powerful impact on global trade.

**5.0 Summary**

Differences in factor endowments also have somewhat different effects in the specific-factors model. Increases in a specific factor will necessarily increase the output of the commodity using this factor. However, an increase in the mobile factor will raise the output of both commodities; the nature of production functions and the endowments of specific factors will determine which output increases by more.

**6.0. Tutor-Marked Assignment**

1. Discuss in details the Factor endowments and factor prices
2. What do you understand by the term 'The pattern of trade?'
3. Write briefly on the endowment changes and outputs.
4. Shows that if the real return to labor in free trade is relatively higher in country H. then the real return to both specific factors must be relatively higher in country F.

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**UNIT THREE GOVERNMENT POLICIES AS DETERMINANTS OF TRADE**

**CONTENTS**



## 1.0 INTRODUCTION

In this unit we will discuss domestic distortions as a determinant of trade, focusing in particular on taxes arid subsidies. The examination of taxes and subsidies is intended as an example of the effects that a wide range of government policies can have on trade. For example, environmental policies and regulations impact on firms' costs, therefore having effects on outputs and trade similar to those produced by taxes.

We are not asserting that commodity and factor taxes rank with factor endowments as a cause of trade, but we do believe that collectively, government policies have a much more profound impact on trade than is suggested in moat international trade textbooks. One theme of this chapter is that government policies can generate trade but that this trade is not necessarily beneficial.

As before, the approach will be to neutralize other factors so that a clear understanding of the specific effects of each can be obtained. Throughout the chapter we will assume either a single country facing fixed world prices, or two countries that are identical in all respects (technologies, factor endowments, homogeneous utility functions), with constant returns and perfect competition in production. In the absence of the distortions we will introduce, the two countries would have no incentive to trade; the free trade equilibrium would be identical to autarky.

## 2.0. Objectives

At the end of this unit, you should be able to:

- Understand the meaning of Stolper Samuelson and Rybesynski theorem
- Define and understand the meaning of trade theory with many goods and factors.

- Understand the factor-content theorem.

## 3.0. Main Content

## 3.1 CONSUMER, PRODUCER, AND WORLD PRICES

When we introduce taxes and subsidies into the analysis, it becomes important to distinguish prices gain by consumers from prices received by producers. Once we introduce trade, consumer and producer prices must be distinguished from world prices, the prices at which the country can trade. Throughout this chapter, we will use the notation q to represent consumer prices, p to represent producer prices, and p' to represent world prices. This notation will also be used in later chapters, particularly the chapter on tariffs.

In order to focus on trade issues, we will also make the assumption throughout this unit that there is no government sector per se; the government returns all tax collections to consumers in lump-sum fashion and/or raises all subsidies by lump-sum taxation. We implicitly assume a very large number of consumers, with each consumer getting a check or a bill which give to (or takes from) the consumer his or her share of taxes subsidies). Consigners regard their bub or checks as being unaffected by their own purchases. For example, if a consumer pays $1 in sales tax, the consumer gets a refund of only $1/N of that amount where .Vis the number of consumers (consider the refund if there are 100 million consumers). Thus each consumer does indeed regard the tax as raising prices, even though the tax is returned to all consumers collectively. Similar comments apply to subsidies.

Throughout the chapter we will specify taxes and subsidies in an ad valorem (percentage of value) form rather than in specific form, t will denote a tax and a subsidy. Ad valorem taxes are quoted as rates. A sales tax of 5 percent, for example, would mean a tax rate of; = .05 in this context. (Specific taxes, on the other hand, are quoted in monetary units per unit of the good: the US gasoline tax is quoted in cents per gallon.).

## 3.2. Relationship between Consumer and Producer with a Tax or Subsidy

Thus the relationship between consumer and producer prices with a tax or subsidy is given as follows.

$$q = p(1+t) > p \quad \text{tax}$$
$$q = p(1-s) < p \quad \text{subsidy} \qquad (10.1)$$

A tax raises the consumer price above the producer price, while a subsidy lowers the consumer price below the producer price. A tax rate t = .05 raises the consumer price 5 percent above the producer price: q = p (1.05). When there are only two goods, the effects of a tax on one good are equivalent to a subsidy on the other good. In order to see this, consider the commodity price ratios resulting from a tax on Y versus a subsidy to X.

$$\frac{q_x}{q_y} = \frac{P_x}{P_y(1+t)} < \frac{P_x}{P_y} \quad \text{tax on Y}$$

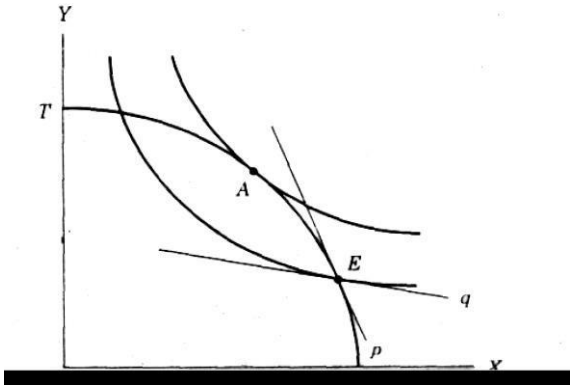
$$\frac{q_x}{q_y} = \frac{P_x(1-s)}{P_y} < \frac{P_x}{P_y}$$ subsidy on X

We see from Esq. (10.2) that a subsidy to X and a tax on Y induce the same "wedge" between the consumer and producer price ratios.
Figure 10.1 gives autarky equilibrium at point E when there is either a tax on Y or a subsidy un X, assuming that the tax revenue is redistributed in lump sum fashion and the subsidy is raised by a lump sum tax. These latter assumptions are reflected in the fact the consumption and production bundles are the same even though, in the case of a tax, for example, the consumption bundle costs more than the value of those goods at producer prices. The consumers pay more than the producers receive because of the tax, but then they receive an income in excess of the value of production because they receive the tax refund. Lei subscripts c and p denote consumption and production quantities, respectively. For a tux on Y,

$$q_xX_c + q_yY_c = p_xX_c + p_y(1 + t)Y_c = /p_xX_c + p_yY_c/ + /P_y^tY_c/$$

The left-hand side of Eq. (10.31) is consumer expenditure at consumer price. The first bracketed term on the right-hand side is income received from production (payments of factors of production), while the second term on the right-hand side is redistributed tax revenue. Thus, consumer expenditure equals consumer income. A similar analysis of a subsidy requires only that we change the sign of t.

Figure 10.1 illustrates the distortionary effect of the Lax on Y or the subsidy on X. Welfare is lower at E than at the undistorted competitive equilibrium at A. The producer price ratio p is tangent to the production



frontier TT' , while the consumer price ratio q is tangent to the indifference curve through E. The tax causes the consumers to perceive Y as more expensive than its actual production cost, or a subsidy to X causes consumers to perceive as relatively cheaper than its actual production cost.

The previous paragraph should not be taken to suggest that all taxes or subsidies are b.id. First, governments usually raise revenues in order to provide public goods (hat, are not or cannot be provided by markets. This analysis takes no account of public goods. Second, not all taxes are distortionary or as distortionary as the commodity tax shown here. For example, in the present model, an equal ad valorem tax on both goods would leave the relative consumer and producer prices equal. Such a set of taxes is non-distortionary. We will return to this point in discussing factor taxes later in the chapter.

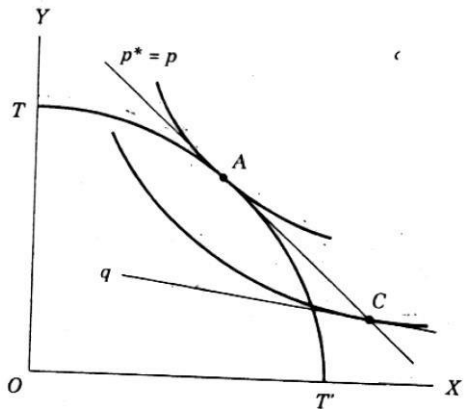
Finally, some government policies are imposed to correct an existing distortion in the economy, much as ;m environmental externality, in such a situation, Fig. 10.1 might accurately depict the effects of a pollution tax (on Yi on production and trade, hut the indifference curves no longer accurately indicate welfare changes. Welfare may be improving due to lower pollution (i.e., there is actually a third good, environmental quality, not shown in the diagram). More will be said about tuxes in the presence of existing

## 3.3 TAXES AND SUBSIDIES AS DETERMINANTS OF TRADE

Suppose that Country II faces fixed world prices. Assume also that these prices happen to be equal to I 1's Autarky price ratio so that H does not choose to trade at these prices. The situation is shown in Figs. 10,2 and 10.3, where the autarky equilibrium A is also the free trade equilibrium at price ratio p.

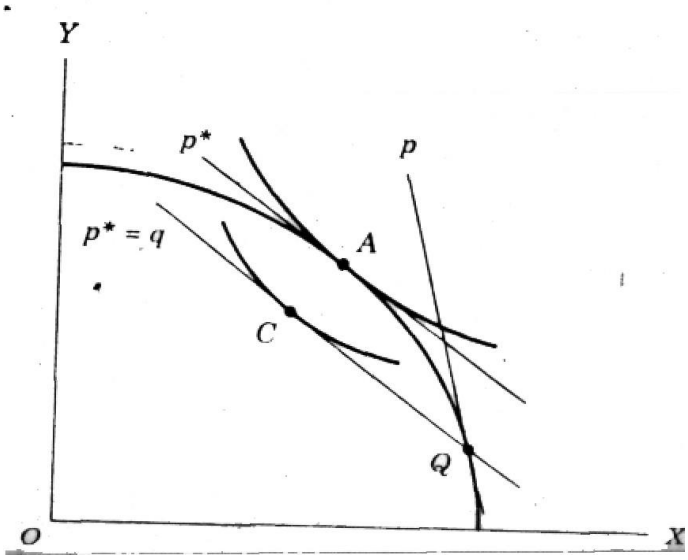
Once we introduce trade, we have to keep track of not only consumer and producer prices, but also world prices. This in turn means that we have to specify whether a Lax or subsidy is assessed on consumption or production. In the closed economy it does not matter, because production and consumption of each good are equal. But with trade, consumption and production are generally not equal, so it matters which one we are taxing. With a consumption Lax, consumers pay a tax on both domestic and imported goods. Alternatively, if the good is exported, then the tax is paid only on the part of domestic production that stays in the country. Producers can trade at world prices. The relationships among consumer, producer and world prices with a consumption tax on Y are given by

$$\frac{q_x}{q_y} = \frac{P_x}{p_y(1+t} = \frac{P_x}{p_y(1+t)} \quad \text{or} \quad (1+t)\frac{q_x}{q_y} = \frac{p_x}{p_y} = \frac{p_x}{p_y}$$




The second equation emphasizes that producers in H face world prices. The consumption tax on Y (consumption subsidy on X) shown in Fig 10.2. When the tax is levied. Producers will continue to produce at A where the world price ratio, equal to the producer price ratio, is tangent to the production frontier. The balance-of-trade constraint requires trade to balance at world prices, so we know that the consumption point must be on p' through A. The consumption point is given by the point on that "national budget line" through A where the slope of an indifference curve is equal to the consumer price ratio. We show this in Fig, 10.2 as point C and label the consumer price ratio as q.

Economic intuition would lead to the result shown for the consumption tax in Fig. 10.2 even without the formal analysis. We see that, given fixed



world prices, the tax has no effect on production but that consumption of) is discouraged. Consumers substitute away from the expens.ve commodity and in favor of the relatively cheaper commodity, X.

Welfare is reduced by this distortion, because consumers make efficient choice, when they do not face the true costs of producing cnmnnodit.es. But again, we should separate this welfare result from suits concerning consumption and trade, because not all consumption tax, must be welfare-reducing. Most countries have gasoline (petrol) example, which have the beneficial effects of reducing pollution and traffic congestion.

Now consider a tax on the production of Y or a subsidy on the production of X. In this case, consumers, not producers, face world prices. The relationships among the three price ratios are given by

$$\frac{P_x}{p_y(1+t)} \quad \text{or} \quad \frac{q_x}{q_y} = \frac{p_x}{p_y} \qquad (10.51$$

The relationship, in Eq. (10.5) are shown in Fig. 103. The Producer price ratio is now greater than the consumer and world price ratios, so p due on is show,, as taking place at point Q in Fig. 10.3. Consumption must take place along world price ratio through Q, and consumers now face world prices. Thus, the consumption point is given by the tangency between an indifference curve and the price line p* through point Q. we show the consumption point as C in fig. 10.3. The production tax discourage production of Y and leads to a substitution in production towards good X.

Several important results are shown in Figs. 10.2 and 10-3. First, they, clearly demonstrate that government policies such as taxes and subsidies will generate trade. However, they show equally clearly that, trade induced by the introduction of distortions is not beneficial trade. In both Fig. 10.2 and 10.3, H receives a welfare loss as a consequence of distortion-induced trade this is a very important result insofar as governments decide that it would be a good thing if the country produced and exported more of a certain good (e.g., "high tech" goods). We could think of F-g. 10.3 as a situation generated by a government's decision that it must be go. Produce and export X. By subsidizing the products of X we do indeed be exports of .Y, and the government congratulates itself on the success of its project. However, exports generated by distortions are welfare-reducing (put differently, the initial level of exports, zero, is optimal).

The "second thing that Figs. 10.2 and 10.3 help to emphasize .s that production and consumption taxes/subsidies are very different from each other in the open economy. For example, they have opposite effect the direction of trade. A consumption tax on Y discourages consumption and therefore tends to lead to exports of Y (production minus consumption). A production tax on Y discourages production and therefore tend, lead to imports of Y (consumption on minus production). Governments must therefore be careful about where they levy a tax when assessing its likely effects.

**Self-Assessment Exercise**

Discuss the analysis of Consumer, Producer and World Prices

## 4.0 Conclusion

We can conclude that we have taken our attention away from underlying production differences between countries, principally differences in technologies and factor endowments. Governments have taken active and major roles in most economies. Our discussion of tax and subsidy distortions is intended to provide some insight as to how various government policies can affect trade and the gains from trade, even if their intended purpose is unrelated to trade (e.g., the corporate income tax is not instituted to affect trade). One important general lesson from our analysis is that exports should never be confused with welfare.

## 5.0 Summary

In this unit we have learnt a lot of consumer, producer and the world prices, however, we can concludes that commodity tax or subsidy induces a distortion in the economy that prevents welfare maximization in competitive equilibrium, even if the tax revenue is returned (or subsidy costs are raised! by lump-sum redistribution (or taxation). Because consumers and producers do not face the same prices, consumers do not face the "true" costs of goods in making their consumption decisions. This certainly does not imply that all taxes are bat. Governments must use taxes to pay for public goods, which have no role if our analysis there. In some cases, taxes or regulations are introduced to counteract existing distortions, such as pollution. In such cases Instead of being a distortion, the taxis correcting a distortion. More will be said about this later in the book

## 6.0. Tutor-Marked Assignment

1. Discuss the relationship between Consumer and a Producer with a tax or subsidy.
2. Discuss the analysis of taxes and subsidies as determinant of trade.
3. Write briefly on the following:
(i) Taxes
(ii) Subsidies
4. Is it true or false that, in a small open economy, a consumption subsidy cannot affect the production of a good? Explain your answer.
5. Is it true or false that, in a small open economy, a production subsidy cannot affect the production of a good? Explain your answer.
6. Suggest how our analysis of commodity taxes would change if the tax were collected by tax collectors who would have been producing X or Y in the absences of the tax (i.e. the institution of the tax reduces the effective labor supply to X and Y production) Do you have a guess as to what an economist might mean by cost of revenue-raising.

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**UNIT FOUR GAINS FROM TRADE AS A RESULT OF GOVERNMENT POLICY**

**CONTENTS**



## 1.0 INTRODUCTION

Gains from trade, as a result of Government Policy which means government policy has a lot to do with the benefit of trade among countries. However, it can be described as a result of specialization in production from division of labor, economies of scale, scope, and agglomeration and relative availability of factor resources in types of output by farms, businesses, location and economies, a resulting increase in total output possibilities, trade through markets from sale of one type of output for other, more highly valued goods.

Market incentives, such as reflected in prices of outputs and inputs, are theorized to attract factors of production, including labor, into activities according to comparative advantage, that is, for which they each have a low opportunity cost. The factor owners then use their increased income from such specialization to buy more-valued goods of which they would otherwise be high-cost producers, hence their gains from trade. The concept may be applied to an entire economy for the alternatives of autarky (no trade) or trade. A measure of total gains from trade is the sum of consumer surplus and producer profits or, more roughly, the increased output from specialization in production with resulting trade. Gains from trade may also refer to net benefits to a country from lowering barriers to trade such as tariffs on imports.

## 2.0. Objectives

At the end of this unit, you should be able to:

- Understand the meaning of gain from trade
- Know the meaning of Factor Market Distortion
- Understand the analysis of Competitive Equilibrium.

## 3.0. Main Content

## 3.1 GAINS FROM TRADE: A FORMAL ANALYSIS

We will use the formal analysis developed in our earlier discussion in order to fully understand the problem of introducing trade into a distorted economy. Let superscripts "and a denote quantities evaluated in free trade and in autarky, respectively, A subscript p denotes production quantities, and a subscript c denotes consumption quantities.
In the consumption tax case. Fig. 10.4 shows that the value of free-trade production (Q) at free-trade prices is higher than the value of any other feasible production point at those prices.

Now substitute the balance-of-trade constraint into the left-hand side of Eq. (10.6) and the autarky market clearing conditions into the right-hand side as we did in Chapter 5, section 5,2. This has the effect of converting all production quantities in Eq. (10.6) into consumption quantities.

But in order to evaluate welfare, we need to have consumption at consumer prices, not producer prices. This can he accomplished by adding several terms to both sides of the inequality in Eq. (10.7) such that the inequality must continue to hold.

The inequality in Eq. ( 10.8) can be rearranged to yield

$$p_x X^f_c + py\,(1 + t), Y^f_t / > \backslash p_y X^a_c + p_y{}^t \backslash + {}_{Py*} t(Y^f_c - Y^a_c)/$$

Using our definition of consumer prices, this simplifies to

$$q_x X^f_c + q, Yt_t / > \backslash_{qi} Xt + q_y Y^a_c \backslash + {}_{Py*} t(Y^f_c - Y^a_e)/ \qquad (10.10)$$

The term to the left of the inequality sign of Eq 10. 10) is the value of free trade consumption at free trade prices, while the first term to the right of the inequality sign is autarky consumption at free trade prices. The rightmost term is positive if trade increases the value of Y consumption. Thus we see that free trade consumption is preferred to autarky consumption if Y consumption increases. A sufficient condition for gains from trade is that consumption of the tax-distorted good increases. To put the matter the other way around, a country may fail to gain from trade when trade further reduces the consumption of a taxed good (or increases consumption of a subsidized good).

Comparing the undistorted autarky equilibrium A in Fig, 10.2 to distorted free trade consignation at C. the sufficient condition fails. Consumption of the taxed good Y is lower in, free time. Comparing the distorted autarky equilibrium E in Fig. 10.4 to the distorted free trade equilibrium $C_h$ the comparison is uncertain. The diagram is drawn to show consumption of Y increasing with trade, but this is entirely arbitrary.
The same type of analysis can be applied to the production tax or subsidy. In Fig, 10.5 we see that the value of free trade production evaluated at the producer price ratio p. is greater than the value of any other feasible production bundle evaluated at these prices.

Recalling that $P_y(1 + t) = P_{y*}$, we can write the producer price of Y as $P_y = P_y - P_yt$. The consumer price of X equals the world price of X. The inequality in Eq. (10.11) becomes

Rearranging terms, this becomes

As before, use the balance-of-trade constraint lo replace the left-hand side of Eq. (10.13) with the value of consumption, and use the autarky market clearing renditions to replace the production quantities on the right-hand side with consumption quantities. Eq. (10,13) then becomes

The left-hand side of Eq. (10.14) is the value of free trade consumption at free trade prices, while the first term on the right-hand side of-Eq. (10.14) is the value of autarky consumption at free trade prices. A sufficient condition for free trade consumption to the preferred over autarky consumption is that the second term on the right-hand side of Kq. (10,14) be positive. This term is positive if trade expands the production of Y, the tax-distorted- production sector.

Comparing the undistorted autarky equilibrium A in Fig. 10.3 to the distorted free-trade production point at Q, we see that the sufficient condition fails: trade reduces production of the taxed good Y. Comparing the distorted autarky equilibrium at E in Fig, 10.;i to the free trade production point, we do get a stronger result than in the consumption tax case. When trade is opened up, the relative consumer price a(X is lower in Country H than in Country F; $q_h < q_t$- (see Fig. 10.1). The consumer price ratio </,, = p" must rise in H, so the producer price of A' rises as well. Production of X is increased, and point K must lie above point R in Fig. 10.5. The sufficient condition for gains from trade fails, so Country H may be worse off opening up to trade.

## 3.2 FACTOR MARKET DISTORTION

In this unit we consider the effects on international trade and welfare of a factor market distortion. The particular distortion we choose is motivated by the corpora's e income tax. The effects of this tax are significantly different from those of a commodity tax, for the corporate income tax applies to factor returns, which introduces a distortion into the production side of the model as well as changing relative commodity prices. In the following discussion we assume a two-good, two-factor, Heckaeher-Ohlin-type model, and we assume that the tax is imposed on one of the factors (capital) in one of the two

industries (the corporate sector).

Three main effects of the corporate income tax are of interest. First, the corporate income tax, by creating a divergence between the factor-price ratios faced by producers in the two sectors, will result in production inside the production possibilities frontier. Second, the new distorted production "frontier" no longer must be concave to the origin but could he convex or could alternate between being concave and convex. Third, equilibrium price lines will generally not be tangent to the distorted production frontier. This third effect is familiar from the production tax, case discussed in the previous section.

Suppose the tax on capital is in the Y industry. X producers pay r for capital, while Y producers pay r(1 + t) for capital where t is the tax. The factor-price ratios faced by the X and Y industries will then hear the relationship

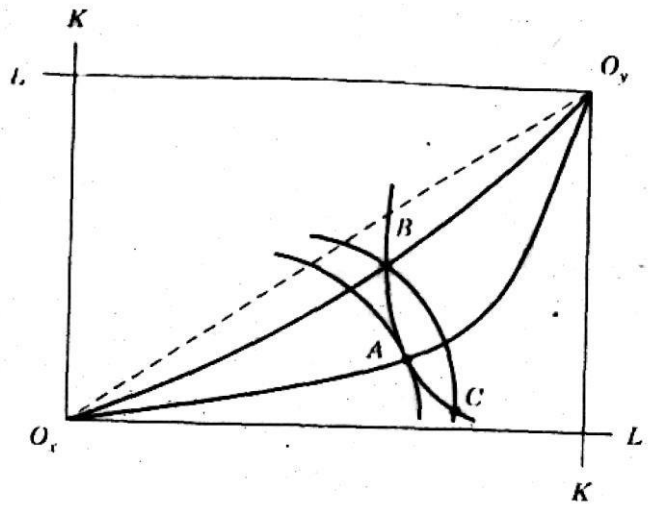


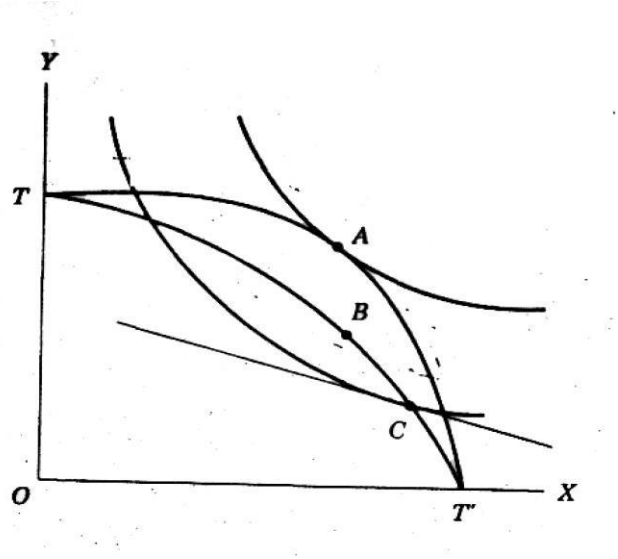

Figure 10.6 shows the factor market allocation in an Edgeworth-Bowley box. A is an initial equilibrium on the contract curve OxAOy. When the tax is introduced, the two industries will face different factor-price ratio in the Y industry (Eq. (10. 15), A new equilibrium point must be a point like in Fig. 10.6 where the X isoquant are steeper than the Y isoquants. But note that it is not an efficient production point. At H the same amount of X is produced, hut less Vis produced than at A. B must, therefore-, correspond to a point that is interior to the efficient production frontier.

We can find all of tin; points in Fig. 10.6 where the difference in the slopes of the "AT and V isoquants is the same as at point. Linking these distorted allocations, we have a distorted contract curve given by 0,80., in Fig. 10.6. (A larger tax could mean that the distorted contract curve lies on the other side of the diagonal, hut the distorted contract curve cannot intersect the diagonal, though it can lie exactly on it; these issues are not important for our purposes.)

Figure 10,7 shows the- corresponding output diagram with TAT' giving the efficient

production frontier. TBT' in Fig. 10.7 is the distorted production frontier corresponding to the distorted contract curve in Fig. 10.6. The distorted frontier need not be strictly concave as shown, but this in not particularly relevant for our purposes. The corporate income tax thus leads to production interior to the efficient production frontier. Note that point/J in Fig. 10.7 corresponds to H in Fig. 10.6

The movement from A to a point on TBT' in Fig, 10.7 does not complete the analyst, for the final equilibrium will not be a tangency solution. The proof is difficult, but, the rationale is as follows. The slope of the disturbed production frontier at a point such as B in equal In the ratio




of the "true" or "social" marginal costs of producing X versus Y. But the "private" marginal cost of producing Y is greater than the true marginal cost, because Y producers must pay the 13: in capita,. The private and so al marginal costs of producing X are the same because there is no tax in that industry. Let $MRT_d$ be the marginal rate of transformation along the distorted production frontier $^{T}BT$ in Fig. 10.7. Let MC* denote the true or social marginal cost and MC denote the private marginal cost of producing a good. The tax on capital in Y leads to the relationship

### 3.3. Competitive Equilibrium

In competitive equilibrium, the ratio of private marginal costs is equal to the competitive price ratio. The inequality in Eq. (10.16) therefore implies that $MRT_d > p$ where p is the producer price ratio. This price ratio is equal to the consumer price ratio if there are no taxes on outputs. The distorted autarky equilibrium must be at a point like C in Fig. 10.7, where the indifference curve is flatter than the distorted production frontier. This non-tangency is very much like the result obtained from the production tax case considered in the previous section. The difference here is that the non-'tangency is along the distorted production frontier. The factor market distortion thus involves two distortions: One distortion can be thought of as the movement inside the efficient production frontier and the other as the movement along the distorted frontier.

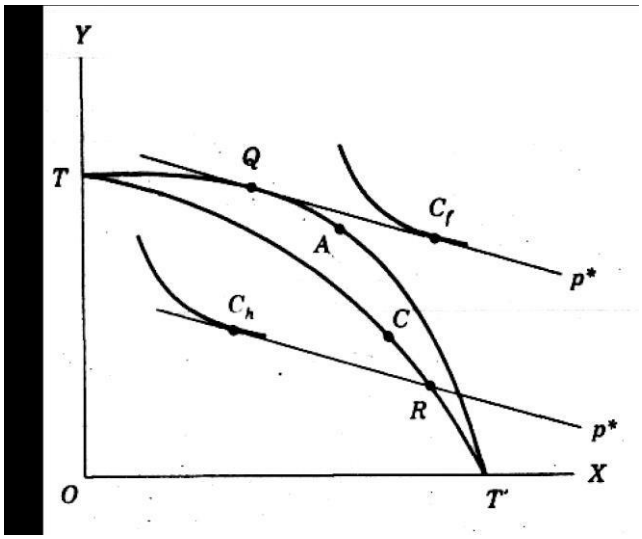



Figure 10.8 shows the implications of the corporate income tax for the international trading equilibrium, and under the assumption that we begin with two identical countries. The initial production frontiers are given by TAT' with autarky equilibrium at A for each of the two countries. Country K imposes the corporate income with the consequences described in Fig. 10.7 and in autarky consumes and produces at C'. The tax discourages production of Fin Country H, thus raising its price. Country F benefits from this price change, moving production to Q and exporting Y to H, Country H shifts production to K and imports Y to reach the consumption point C*. H clearly loses relative to the undistorted autarky (and free trade) equilibrium at A. H may either gain or lose from trade relative to the distorted autarky equilibrium at C, depending on whether the indifference curve through C, passes above or below point C in Fig. 10.8, Note that this diagram looks very similar to the production tax diagram in Fig. 10.5, except for the addition of the distorted production frontier. These diagrams are indeed conceptually similar in that both taxes discourage production of F in Country H. And as before, the effect of the distortion is to create trade, but this trade is not necessarily beneficial for the country with the distortion.

Factor market distortions are a complex topic; their various types have very different effects. Other factor market distortions include the effects of unions and minimum wage laws. The preceding analysis of the corporate income tax is only one of many interesting situations. But some of the specific results we have obtained can be generalized to cases involving other distortions. First, factor market distortions generally result in production

interior to the efficient production frontier. Second, the production of dis-advantaged goods 'e.g., goods bearing taxes] is reduced. Third, the trade generated by the distortion is not necessarily beneficial for the country with the distortion.

## 3.4 BALANCE OF PAYMENTS

Balance Of Payments (BOP) is a statement that records all the monetary transactions made between residents of a country and the rest of the world during any given period. This statement includes all the transactions made by/to individuals, corporates and the government and helps in monitoring the flow of funds to develop the economy.

When all the elements are correctly included in the BOP, it should be zero in a perfect scenario. This means the inflows and outflows of funds should balance out. However, this does not ideally happen in most cases.

A BOP statement of a country indicates whether the country has a surplus or a deficit of funds, i.e. when a country's export is more than its import, its BOP is said to be in surplus. On the other hand, the BOP deficit indicates that its imports are more than its exports.

Tracking the transactions under BOP is similar to the double-entry accounting system. All transactions will have a debit entry and a corresponding credit entry.

For example:
Funds entering a country from a foreign source are booked as credit and recorded in the BOP. Outflows from a country are recorded as debits in the BOP. Let's say Japan exports 100 cars to the U.S. Japan books the export of the 100 cars as a debit in the BOP, while the U.S. books the imports as a credit in the BOP.

**What is the Formula for Balance of Payments?**
The formula for calculating the balance of payments is current account + capital account + financial account + balancing item = 0.

**Why is the Balance of Payments (BOP) vital for a country?**
A country's BOP is vital for the following reasons:

- The BOP of a country reveals its financial and economic status.
- A BOP statement can be used to determine whether the country's currency value is appreciating or depreciating.
- The BOP statement helps the government to decide on fiscal and trade policies.
- It provides important information to analyse and understand the economic dealings with other countries.
- By studying its BOP statement and its components closely, one would be able to identify trends that may be beneficial or harmful to the county's economy and, thus, then take appropriate measures.

**Elements of a Balance of Payments**

There are three components of the balance of payments viz current account, capital account, and financial account. The total of the current account must balance with the total of capital and financial accounts in ideal situations.

**Current Account**

The current account monitors the inflow and outflow of goods and services between countries. This account covers all the receipts and payments made with respect to raw materials and manufactured goods.

It also includes receipts from engineering, tourism, transportation, business services, stocks, and royalties from patents and copyrights. When all the goods and services are combined, they make up a country's Balance of Trade (BOT).

There are various categories of trade and transfers which happen across countries. It could be visible or invisible trading, unilateral transfers or other payments/receipts. Trading in goods between countries is referred to as visible items, and import/export of services (banking, information technology etc.) are referred to as invisible items.

Unilateral transfers refer to money sent as gifts or donations to residents of foreign countries. This can also be personal transfers like – money sent by relatives to their family located in another country.

**Capital Account**

All capital transactions between the countries are monitored through the capital account. Capital transactions include purchasing and selling assets (non-financial) like land and properties.

The capital account also includes the flow of taxes, purchase and sale of fixed assets etc., by migrants moving out/into a different country. The deficit or surplus in the current account is managed through the finance from the capital account and vice versa. There are three major elements of a capital account:

Loans and borrowings – It include all types of loans from the private and public sectors located in foreign countries.
Investments – These are funds invested in corporate stocks by non-residents.
Foreign exchange reserves – Foreign exchange reserves held by the country's central bank to monitor and control the exchange rate do impact the capital account.

**Financial Account**

The flow of funds from and to foreign countries through various investments in real estate, business ventures, foreign direct investments etc., is monitored through the financial account. This account measures the changes in the foreign ownership of domestic assets and domestic ownership of foreign assets. Analysing these changes can be understood if the country is selling or acquiring more assets (like gold, stocks, equity, etc.).

**Self-Assessment Exercise**

Discuss the effect of Government policy from gain from trade analysis.

## 4.0 Conclusion

Trade induced by the introduction of a distortion such as a commodity tax or subsidy is welfare-reducing trade. Governments must be careful not to confuse exports with welfare. Government policies can induce the export of a good, but such exports are welfare-reducing in an initially competitive, distortion-free economy. However, the consumption and production taxes or subsidies are quite different from each other in an open economy. In particular, they have opposite effects on the direction of trade. A consumption tax decreases the consumption of a good, leading to increased exports or decreased imports. A production tax decreases the production of the good, leading to decreased exports or increased imports.

## 5.0 Summary

However, we conclude here that an economy with an existing distortion is opened to trade, the resulting trade might not improve welfare. The possibility of welfare-reducing trade occurs when the distortion is made "worse" by the introduction of trade. For example, if the economy initially has a production tax on V, then the economy is under producing Y in autarky. If trade leads to a further reduction in the production of Y, then trade may reduce welfare. A sufficient but not necessary condition for gains from trade is that trade lead to an increase in the production (consumption) of a good that is initially being under produced (under consumed). The preceding point is an example of the theory of the second best. If one distortion (barriers to trade) is removed when other distortions exist (domestic taxes and subsidies), then welfare may fall. Note that this is not an argument against free trade; it is better interpreted as an argument against domestic distortions.

## 6.0. Tutor-Marked Assignment

1. Discuss in details the Factor Market distortion theory.
2. Discuss the analysis of gain from trade.
4. Use the gains-from trade argument to show that country F will always be made better off by a tax in H (when the two countries are initially identical), regardless of whether the tax in H is a consumption or a production tax
5. What is Balance of Payments?

## 7.0. REFERENCES/FURTHER READING

Bhagwati, J. Srinivasan, T.N (1983). Lectures on International Trade. Cambridge: MIT Press, chapter 20 – 23

Brecher R.A (1971). Optimal Commercial Policy for a minimum wage Economy, Journal of International Economics 4, 139 - 149