



對外經濟貿易大學
UNIVERSITY OF INTERNATIONAL BUSINESS AND ECONOMICS

Part III

Neoclassical Trade Theory

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Chapter 4

- Introduction to Neoclassical Trade Theory, Tools to Be Employed

Introduction to Neoclassical Trade Theory, Tools to Be Employed

- The classical theory is limited in their analysis by the labor theory of value and the assumption of constant costs.
- The neoclassical trade theory provides tools of analysis and studies the impact of trade in a more rigorous and less restrictive manner.

Introduction to Neoclassical Trade Theory, Tools to Be Employed

- The application of neoclassical theory and later refinements of these ideas constitute the basis of modern theory of international trade.

Introduction to Neoclassical Trade Theory, Tools to Be Employed

- The principal changes in trade theory since Ricardo's time have centered on a fuller development of the demand side of analysis and on the production side of the economy that does not rely on the labor theory of value.

Chapter 5

- Gains from Trade in Neoclassical Theory

Preview

- Autarky equilibrium
- Introduction of International Trade
- Minimum conditions for trade

Introduction

- The analysis of the neoclassical theory is essentially an updating of the Ricardian analysis to include increasing costs, factors of production besides labor, and explicit demand considerations.

Autarky equilibrium

- The slope of the PPF is called the marginal rate of transformation (MRT).
- It is also known that the slope of the PPF is equal to relative marginal costs.

Autarky equilibrium

- So at E:

$$(P_x/P_y) = (MC_x/MC_y)$$

Autarky equilibrium

- We also introduce the indifference curve that is tangent to the budget constraint and the PPF. So we have the condition:

$$\text{MRT}=(MC_x/MC_y)= (P_x/P_y)=(MU_x/MU_y)=\text{MRS}$$

Introduction of International Trade

- When the economy opens up to trade it would face a different set relative prices.
- Consequently, domestic producers and consumers would adjust by reallocating their production and consumption patterns.
- Such reallocation would lead to gains from trade.

Introduction of International Trade

- When trade takes place, the new relative price is steeper than the price in autarky.
 - $(Px/Py)_2 > (Px/Py)$

Introduction of International Trade

- The new steeper relative price means that for the home country before trade, the price of X is lower and the price of Y is higher than in international trade.
- So the home country has a comparative advantage in X and comparative disadvantage in Y.

Introduction of International Trade

- The consumer optimum occurs at the highest indifference tangent to the new budget constraint at C' .

Introduction of International Trade

Consumption and production gains

- The home country's total gain is divided into consumption gain (gains from exchange) and production gain (gains from specialization).
- The consumption gain from trade refers to the fact that the exposure to new relative price, even without changes in production, enhances the welfare of the country.

Introduction of International Trade

Consumption and production gains

- With the new relative price there is an incentive to move the production in accordance with the comparative advantage.
- This is referred to as the production gain.

Introduction of International Trade

Trade in partner country

- If we assume a two-country world the analysis for the trading partner is analogous to that employed for the home country.

Introduction of International Trade

Trade in partner country

- With trade the new relative price is $(P_x/P_y)_2$ and it is flatter than $(P_x/P_y)_3$.
- The partner country has a comparative advantage in Y and comparative disadvantage in X. It should produce more of Y and less of X

Introduction of International Trade

Trade in partner country

- The partner country can also gain from trade.
- With the trade it is able to reach a higher indifference curve.

Minimum conditions for trade

- The discussion above has demonstrated that there is a basis for trade whenever the relative price of goods in autarky of the two trading partners is different. It is important to address the conditions under which this could come about.

Minimum conditions for trade

- Theoretically, the relative price differences could be generated by two sources: differences in supply conditions and differences in demand conditions.

Trade between countries with identical PPFs

- This case could be handled in the Classical analysis.
- In Ricardian analysis, if the production for the trading partners in all commodities were the same (identical PPFs), the pre-trade price ratios in the two countries would be the same.
- There would be no incentive for trade and of course no gains from trade.

Trade between countries with identical PPFs

- According to neoclassical theory, two countries with identical production conditions benefit from trade.
- Different demand conditions in the two countries and presence of increasing costs are the two principle conditions.
- But the classical economists were not particular concerned with either.

Trade between countries with identical PPFs

- The latter condition-increasing costs play a more important role, but the recognition of different demand conditions influence trade is also necessary to update the Classical analysis.

Trade between countries with identical PPFs

- We turn to the situation in which two countries have the same demand conditions but different production conditions.
- This may be caused by different technologies, factors of production in the two countries so that their production possibilities are different.

Chapter 6

- Offer Curve and the Terms of Trade

Preview

- Derivations of Offer Curve
- Trading equilibrium
- Shifts of offer curves
- Elasticity and the offer curve

Derivations of Offer Curve

- The previous discussions of trade theory was based on the simplification the world prices after trade were assumed to be at certain level.

Derivations of Offer Curve

- For example, in Ricardo model, we assumed that 1 barrel of wine would exchange for 1 yard of cloth in international trade and not investigate the factors that determine this relative price ratio.
- Similarly, in later discussion related to PPF-indifference curve diagram, a given price was drawn and no attention was paid to the reason for this price ratio.

Derivations of Offer Curve

- In the following, we explore how these international prices are determined.
- The important analytical tool is the offer curve (reciprocal demand)

Derivations of Offer Curve

- The offer curve can be used to demonstrate how equilibrium prices are attained in international trade.
- It curve can also be used to explain the price and trade volume effects phenomena such as economic growth and changes in consumer tastes.

Derivations of Offer Curve

- **Definition:** An offer curve of a country indicates the quantity of imports and exports the country is willing to buy or sell on world markets at all possible terms of trade

Derivations of Offer Curve

- In fact, an offer curve is a combination of an import demand curve and export supply curve.
- the construction of the offer curve is completed by connecting all possible points at which a country is willing to trade, with resulting curve labeled OC_1

Derivations of Offer Curve

- $(P_x/P_y)_1$ is the same as in the previous diagram;
- $(P_x/P_y)_2$ is the same as in the previous diagram.
- Angle $\angle OVC$ in the first diagram is the same size as in the angle formed at origin in the offer curve figure above between say $(P_x/P_y)_1$.
- The levels of imports and exports are the same as in the two previous diagrams.

Trading equilibrium

- With two countries' offer curve brought together we can have the trading equilibrium and the equilibrium terms of trade.

Trading equilibrium

- At equilibrium, the quantity of exports that country I wishes to sell exactly equals the quantity of imports that country II wishes to buy.
- In addition, the quantity of imports that country I wishes to buy equals exactly the quantity of exports that country I wishes to sell.

Trading equilibrium

- The equilibrium relative price $(P_x/P_y)_E$ are market-clearing prices, since the demand for and supply of good X on the world market are equal, as are the demand for and supply of good Y.

Shifts of offer curves

- Suppose the consumers of country I change their tastes and decide that they would like to purchase more of good Y.
- Since Y is the import, this means an increase in demand for imports.

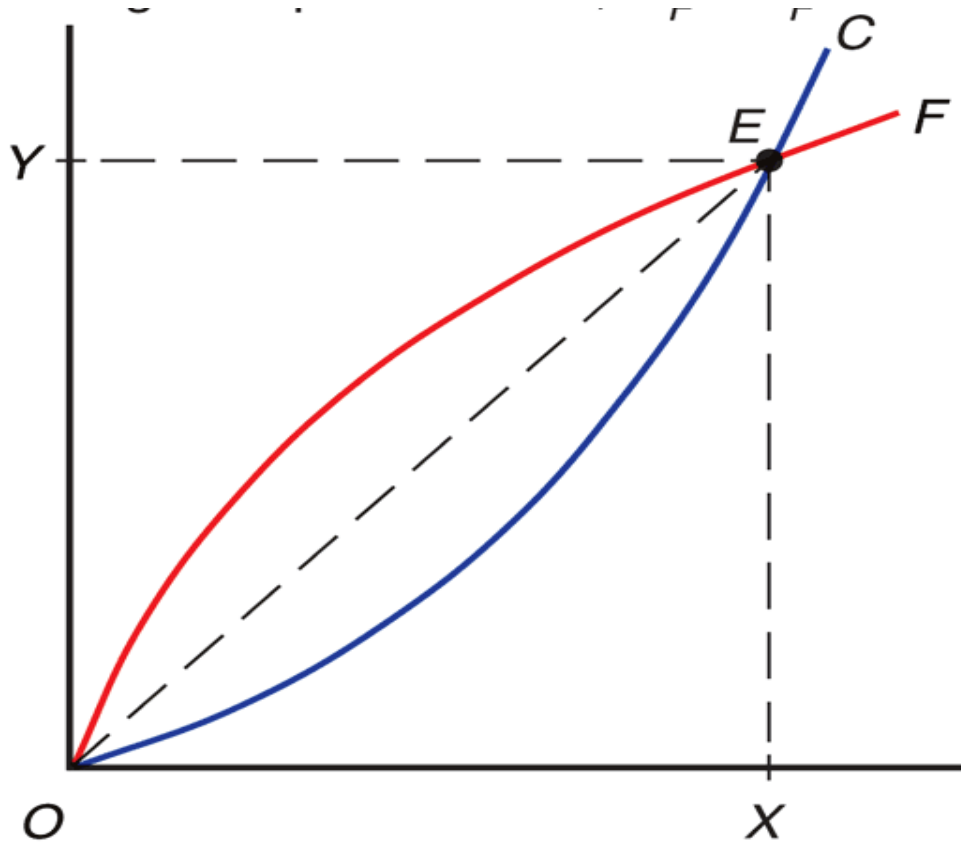
Shifts of offer curves

- Similarly, a decrease in willingness to trade will shift the offer curve .
- When offer curve shift, the equilibrium terms of trade and volume of trade change.

Shifts of offer curves

- There is an exception with the shifts in offer curve. In case of a small country, the shifts in offer curve can not affect the terms of trade.

Offer curve equilibrium



Chapter 7

- The Basis for Trade:
Factor Endowments and the Heckscher-Ohlin Model

The position of H-O Theorem in Modern Trade Theory

- Let's first look at again where we stand.
- The framework of the theories explaining trade in goods is broadly divided into two categories:

The position of H-O Theorem in Modern Trade Theory

- First, in a perfect competition, constant returns to scale framework, trade flows are induced by comparative advantage from:
 - (1) International difference in technologies (Ricardian model);
 - (2) International difference in relative factor endowments (H-O);
 - (3) International differences in tastes and preferences (Linder hypothesis);

The position of H-O Theorem in Modern Trade Theory

- Second, trade can also arise when countries are identical, but only when comparative advantage is due to a context of IRS and imperfect competition.

The H-O Theorem has four major components:

- (1) the Heckscher-Olin,
- (2) Stolper-Samuelson,
- (3) Rybczynsky and
- (4) the factor price equalization theorems.

- In the previous discussions, we have shown that:
- A country will benefit from trade whenever the terms of trade differ from its own relative prices in autarky.
- The underlying basis for the relative price differences could be traced to difference in supply and demand conditions in the two countries (offer curve).

- Next, we will examine in greater detail the factors that influence pre-trade relative prices focusing on differences in supply conditions.
- That is, countries have different factor endowments.

What are the effects of factor endowments on international trade?

- The issue was first studied by two Swedish economists, Eli Heckscher (in 1919) and Bertil Olin (in 1933). The result of their study is the so called Heckscher-Olin Theorem:

-
- **The Table shows the difference in endowments in selected economies.**
 - **The wide variety of relative factor endowments supports the idea that underlying factor supply conditions continue to vary across economies.**

Relative factor endowments in selected economies

economy	Capital/labor (\$/worker)	Capital/land (\$/sq. kilometer)	Labor/land Worker/sq. kilometer
Australia	38729	40162	1.08
Canada	44970	62958	1.40
Finland	47498	421782	8.88
France	37460	1764366	47.10
Germany	41115	4491403	109.24

Relative factor endowments in selected economies

economy	Capital/labor (\$/worker)	Capital/land (\$/sq. kilometer)	Labor/land Worker/sq. kilometer
H.K	14039	42117000	3000.00
India	1977	204073	102.19
Italy	33775	2580748	76.41
Japan	41286	6881138	166.67
U.S.	35993	476187	13.23

Heckscher-Olin theorem:

- A country will export the commodity that uses relatively intensively its relatively abundant factors of production, and will import the good that uses relatively intensively its scarce factors of production.

- **Compare Hong Kong and India as in the Table.**
- **Hong Kong is more capital abundant than India, so Hong Kong should export capital-intensive products to India.**
- **India is more land abundant, so India should export land-intensive goods to Hong Kong.**
- **Hong Kong is labor abundant relative to land, so Hong Kong should export labor-intensive products that use very little land to India.**
- **Maybe services?!**

Model assumptions:

- There two countries, two homogenous goods and two homogenous factors of production (2 x 2 x 2 model) whose initial levels are fixed and assumed to be relatively different in each country.
- Technology is identical in both countries: that is, production functions are the same in the two countries.

Model assumptions:

- **Production is characterized by constant returns to scale for both commodities in both countries.**
- **The two commodities have different factor intensities, and the respective commodity factor intensities are the same for all factor price ratios.**

Model assumptions:

- Tastes and preferences are the same in both countries. Further, for any given set of product prices, the two products are consumed in the same relative quantities at all level of income; that is, there are homothetic tastes and preferences.

Model assumptions:

- Perfect competition exists in both countries.
- Factors are perfectly mobile within each country and not mobile between countries.
- There are no transport costs.
- There are no policies restricting the movement of goods between countries or interfering with the market determination of prices and output.

Aside: shallow integration and deep integration

- With full participation in the global economy China may face two issues:
- Shallow integration: refers to the elimination of tariffs and quotas, integration at the border.
- Deep integration: refers to the elimination or reduction of trade barriers that stem from domestic policies.

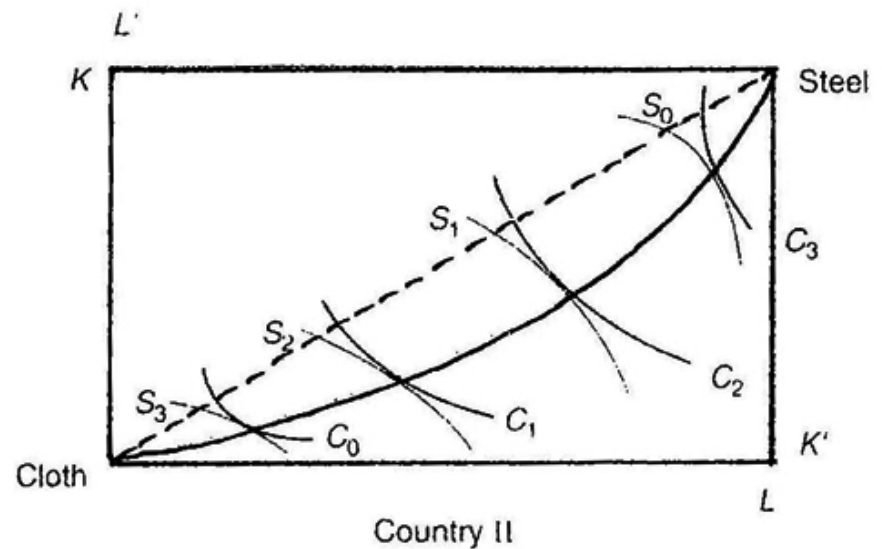
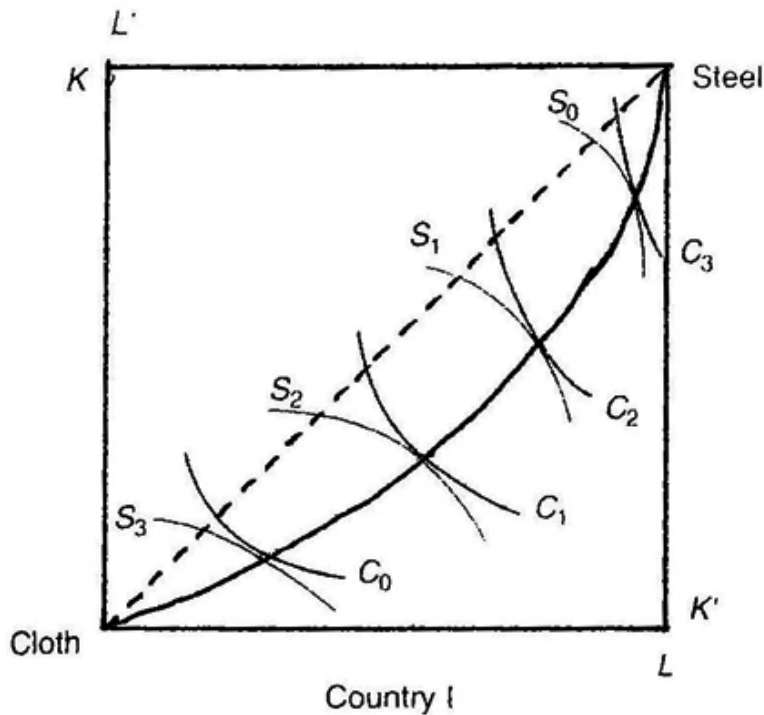
- The current thinking is that with market failures or market distortions, trade barriers may help improve the welfare.
- The deep integration is a relatively new issue in international dialogue.

- In general, modification of these assumptions has led to the development of alternative trade theories.
- See: Henryk Kiezkoski, “Recent advances in international trade theory: a selective survey.” *Oxford Review of Economics*.

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- According to H-O Theorem, the country with abundant capital will be able to produce relatively more of the capital intensive good, while the country with abundant labor will be able to produce relatively more of the labor intensive good.

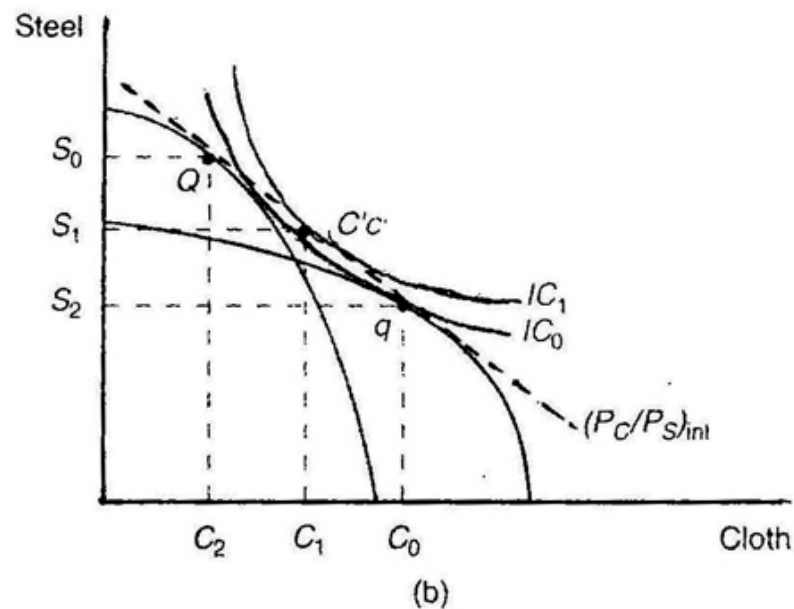
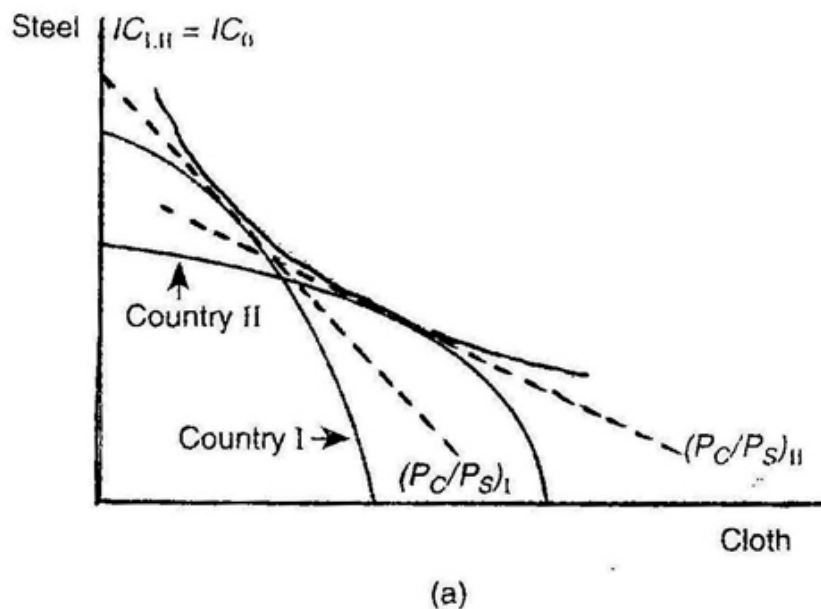
- The Edgeworth boxes diagram can be employed to demonstrate the capital intensities.
- Country I is the capital-abundant country.
- Country II is the labor abundant country.
- This is evidenced by the height of the box (amount of capital) is greater whereas the length of the box (amount of labor) is greater for Country II.

Different relative factor endowments and the nature of the Edgeworth box



- The slope of the diagonal reflects the K/L ratio and therefore, the relative endowment of the country.
- Based on the above box diagrams, we can draw the production possibility curves;

Gains from trade in two countries with identical technology and demands but different factor endowments



- **Country I is the capital abundant country as reflected by steeper autarky price line.**
- **Country II is labor abundant country as evidenced by a flatter autarky price line.**

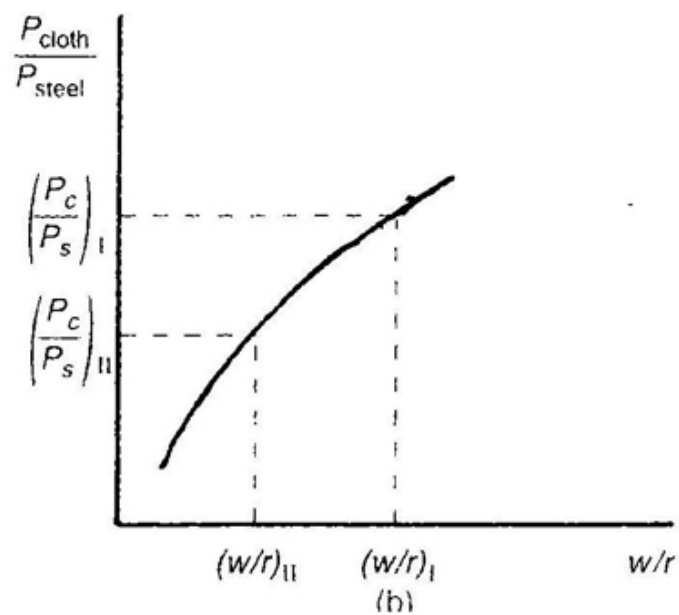
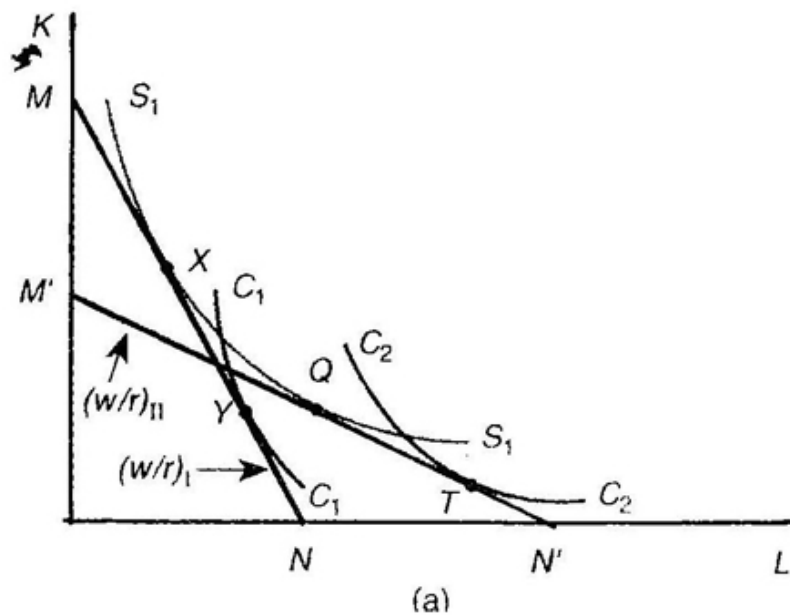
- Since relative prices in autarky are different between the two countries, a clear basis for trade results from different factor endowments.
- The implication of this can be seen in the second diagram.

- **The International terms of trade must lie between the two internal price ratios, being flatter than the autarky price line in country I and steeper than the autarky price in country II.**

- With the trade, a single terms of trade is $(P_c/P_m)_{int}$, tangent to both PPFs.
- For equilibrium to occur, country I exports steel (S_0S_1) and imports cloth (C_2C_1).
- Country II would export cloth (C_0C_1) and import steel (S_2S_1).
- When this occurs, both countries find themselves on a higher indifference curve IC_1 .

-
- We can also demonstrate the relationship between relative factor prices and relative product prices with isoquant and isocost analysis.

Relative factor prices and relative product prices



- The conclusion is that a higher (w/r) leads to higher relative price of cloth, as illustrated in the second graph.
- An increase in wage rate relative to the price capital will lead to an increase in the price of labor-intensive good, cloth, relative to the price of capital intensive good, steel.

- It is clear that different relative factor prices will generate different relative commodity prices in autarky.
- Consequently, there is a basis for trade and each country will export the good that it can produce less expensively: steel for country I and cloth for country II.

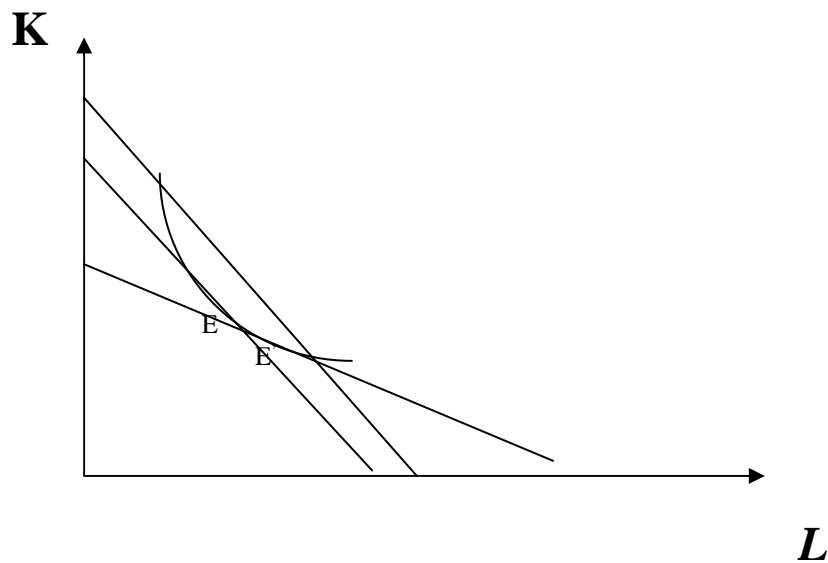
To 10 Chinese exports to the US, 1999

item	million \$
Toys and supporting goods	11639
Footwear	8434
Automatic data processing machines	4116
Telecommunications equipment	3434
Furniture, bedding accessories	3262
Parts for office and ADP machines	3208
Radiobroadcast receivers	2189
Women/girls coats, not nit	2158
Articles of apparel of textile fabrics	2126
Articles of plastics	2111

- For most of the products, design, research or industrial engineering have not taken place in China.
- The Chinese are basically producing the standardized products.
- In sum, the successful drive has come from (1) shift toward its comparative advantage and (2) product cycle.

Aside:

- **Extension: Appropriate technology with isocost-isoquant analysis**



Factor price equalization

- The discussion of H-O demonstrated that the convergence of product prices take place as the price of the product using the relatively abundant factor increases and the price of the product using the country's scarce factor prices falls.

Factor price equalization

- Let us again consider two countries producing cloth and steel. with cloth the labor-intensive good and steel the capital-intensive good.
- Country I is the capital abundant country and country II the labor abundant country.

Factor price equalization

- With the opening of trade, the price of cloth rises and the price of steel falls in country II. This indicates that producers in country II will produce more cloth and less steel.
- Assuming perfect competition, production will shift along the along the PPF toward more output of cloth and less of steel.
- For this to happen, resources must be shifted from steel production to cloth.

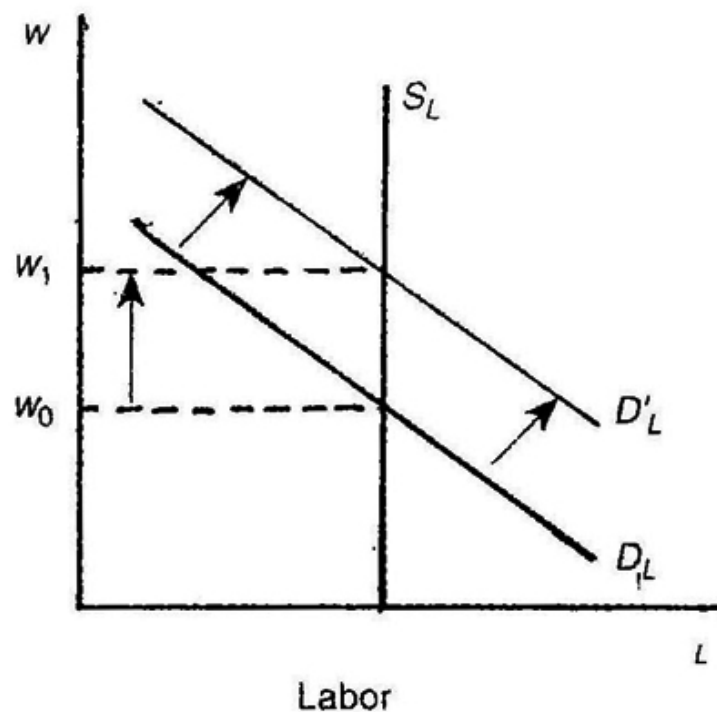
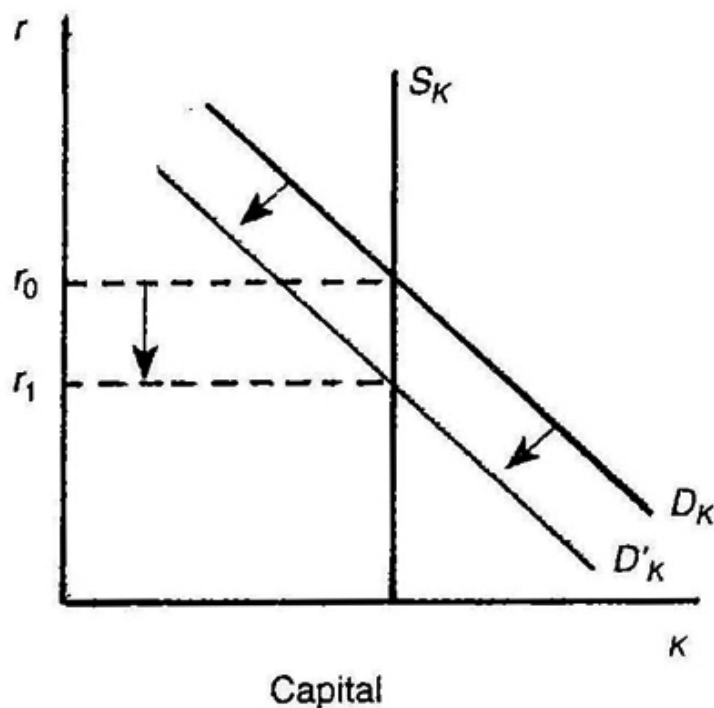
Factor price equalization

- However, the bundle of resources released from steel production is different from the bundle absorbed by increased cloth production because the relative factor intensities of the goods differ.

Factor price equalization

- As the production of labor-intensive cloth expands and the production of capital-intensive steel declines in country II, the overall demand for labor rises and the overall demand for capital falls.
- So the price of labor would rise and the price of capital would fall.

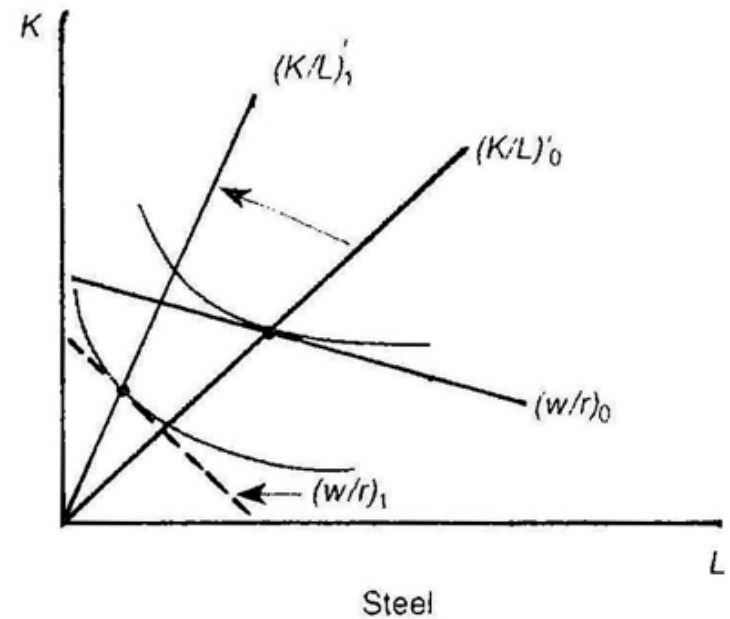
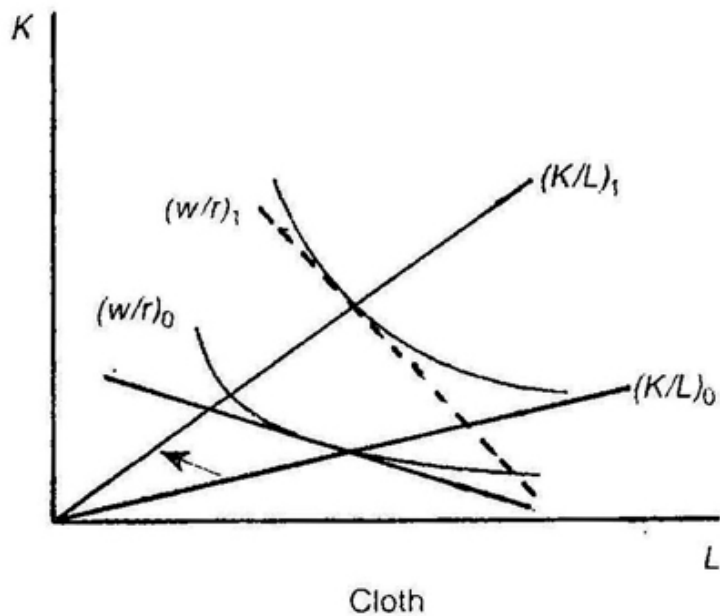
Factor price adjustments with trade in country II



- This change in price is depicted by as the change from $(w/r)_0$ to $(w/r)_1$.
- The relative increase in the cost of labor leads producers to substitute some capital for labor, that is, to move along the production isoquant in both industries.

- This factor substitution results in a rise in the K/L ratio from $(K/L)_0$ to $(K/L)_1$ in cloth production and from $(K/L)'_0$ to $(K/L)'_1$ in steel production.
- Because of the increase in cloth production, this factor-use adjustment takes place along a higher isoquant, while the reduction in steel production causes this adjustment to take place along a lower isoqaunt.

Producer adjustment to changing relative factor prices accompanying international trade



- In country I, a similar adjustment takes place.

-
- Combining the general equilibrium results of country I and country II reveals an interesting phenomenon:

- Prior to trade, $(w/r)_I > (w/r)_{II}$.
- However, with trade, the factor price ratio in country I falls while in country II rises. Trade will expand until the two countries face the same set of relative factor prices.
- This result is known as the factor equalization theorem, often referred to as the next important contribution of the H-O analysis.

- Despite the limitations, the H-O model provides some helpful insights into the likely impact of trade on relative factor prices.
- Trade based on comparative advantage should tend to increase the demand for abundant factor and ultimately exert some upward pressure on its price, assuming the presence of unemployed resources does not entirely absorb the price pressure.

- Thus, for labor abundant country, trade can offer a way to employ more fully the abundant factor and/or to increase its wage and at same time, earn scarce foreign exchange necessary to import needed capital goods.
- The experience of Taiwan supported this view and demonstrated that in a general way, the factor price movements described above do occur.

The case for China's trade expansion

- **China is a labor abundant country.**
- **Trade expansion will increase the labor costs and wage rate will converge to the level in developed economies.**

The case for China's trade expansion

- There are now several possibilities.
 - (1) The wage rate may rise in labor-intensive exports.
 - (2) It may not rise due to large pool of unemployed labor force.
- Globally labor force has doubled. The Chinese wage rate may not increase?

The Stolper-Samuelson Theorem

- The Stolper-Samuelson Theorem was developed in 1941.
- The initial article focused on the income distribution effect of tariffs, but later on was employed to explain the income distribution effects of international trade in general in the literature.

The Stolper-Samuelson Theorem

- Assume that a labor-abundant country initiates trade.
- This will lead to an increase in the price of the abundant factor labor and decrease in the price of the scarce factor capital.

The Stolper-Samuelson Theorem

- Assuming also that full-employment takes place both before and after trade, it is clear that labor's total income has increased, since the wage has increased and the labor employed remains the same.
- Similarly, the nominal income share of capital will fall since the price of capital has fallen and the capital employed remains the same level.

The Stolper-Samuelson Theorem

- **Question:** It is important to note that the ability to obtain goods and services, that is real income, depends not only on changes in income but also on the changes in product prices.
- So productivity change is essential.

The Stolper-Samuelson Theorem

- In equilibrium, labor's wage is equal to its marginal product of labor (MPL) times the price of the export good (called the marginal value of product of labor).

$$w = P \cdot MPL$$

The Stolper-Samuelson Theorem

- In the above analysis, we know that w and P (price of the export good) are increasing, the question is which is rising relatively more? It really depends on the change in MPL .

The Stolper-Samuelson Theorem

- We can also show that MPL will increase.
- Why?
- With trade, the labor abundant country will find price capital falling and wage rate rising.
- Producers will respond by using more capital.

The Stolper-Samuelson Theorem

- So capital/labor ratio will rise.
- This will increase the marginal product of labor or productivity of labor.
- So, labor income will unambiguously rise!

The Stolper-Samuelson Theorem

- Thus, the third aspect of the H-O analysis regarding the income distribution effects of trade is explained in the more formal way by Stolper-Samuelson:

The Stolper-Samuelson Theorem

- With full employment before and after trade takes place, the increase in the price of abundant factor and the fall in the price of the scarce factor because of trade imply that the owners of the abundant factor will find their real incomes rising and the owners of the scarce factor will find their real income falling.



Part III

Core Theory-Neoclassical Trade Theory

Other Additional Theories

Preview

- Chapter 8
- The Imitation Lag Hypothesis
- The product cycle theory
- The Linder theory
- Economies of scale
- The Krugman model
- The reciprocal demand model
- The gravity model

The Imitation Lag Hypothesis

- The Imitation lag hypothesis international trade theory was introduced in 1961 by Michael V. Posner. To some extent, this theory has paved the way for the product cycle theory.

The Imitation Lag Hypothesis

- Feature 1: Technology is not the same everywhere.
- Feature 2: Imitation lag defined as the length of time between the product's introduction in country I and appearance of the version of the product produced by firms in country II.
- Feature 3: Demand lag-the length of time between the product's appearance in country I and its acceptance by consumers in country II as a good substitute for the product they are currently consuming.

The Imitation Lag Hypothesis

- The point of importance in the imitation hypothesis is that trade focuses on new products.
- How can a country become a continually successful exporter?
- By continually innovating.

The product cycle theory

- The product cycle theory builds on the imitation lag hypothesis in its treatment of delay in the diffusion of technology.
- Vernon focused on the development of a new product.

The product cycle theory

- The new product would have two principle characteristics:
- (1) it will cater high-income demands because the US is a high income country, and
- (2) it promises, in the production process, to be labor-saving and capital-using in nature. It is because the US is widely regarded as a labor-scarce country.

The product cycle theory

- The theory divided the life cycle of the product into three stages.
- The first stage is the new product stage.
- In this stage, the product is produced and consumed only in the US. Firms produce the product in the US because demand is located there.

The product cycle theory

- The second stage is called maturing product stage.
- In this stage, some general standards for the product and its characteristics begin to emerge and mass production techniques begin to be adopted.
- There is, thus economies of scale.

The product cycle theory

- In addition, foreign demand for the product grows.
- The US begins to export the product to other high-income countries.
- Over time, the production will move from the US to other high-income countries.
- The exports of the US will fall and its production will drop. The other high-income countries will start to export to the US.

The product cycle theory

- The final stage of the cycle is called the standardized stage.
- The developing countries will take over the production and begin to export.

The product cycle theory

- In summary the theory postulates a dynamic comparative advantage because the country source of exports shifts throughout the life cycle of the product.
- First, the innovating country exports the product, but then displaced by other developing countries, which in turn ultimately displaced by developing countries.

The Linder theory

- The theory was a dramatic departure from the H-O in that it is exclusively demand oriented.
- The H-O approach was primarily supply oriented.
- Linder theory focuses on the manufactured goods.

The Linder theory

- The tastes of consumers are determined by their income levels.
- The pattern of tastes will determine the demand for the manufactured products.
- The demand will generate a production response of that country.
- So the production pattern of country would reflect the income levels.

The Linder theory

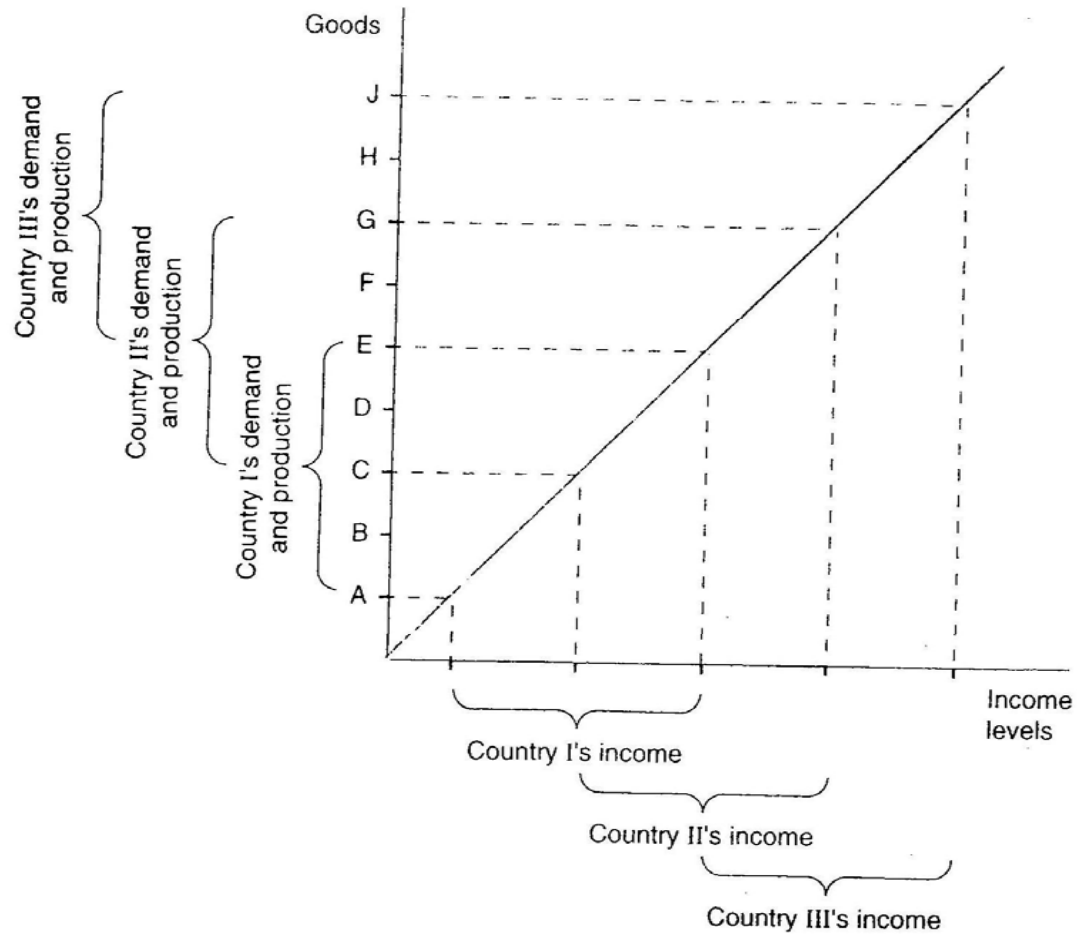
- Which goods will be traded?
- Trade will occur in goods that have overlapping demand.

The Linder theory

- **The theory implication:** International trade in manufactured good will be more intense between countries with similar income levels than between countries with dissimilar income levels.

The Linder theory

- The Linder theory did not specify the direction of the trade.
- This could alternatively be explained by product differentiation or intra-industry trade.



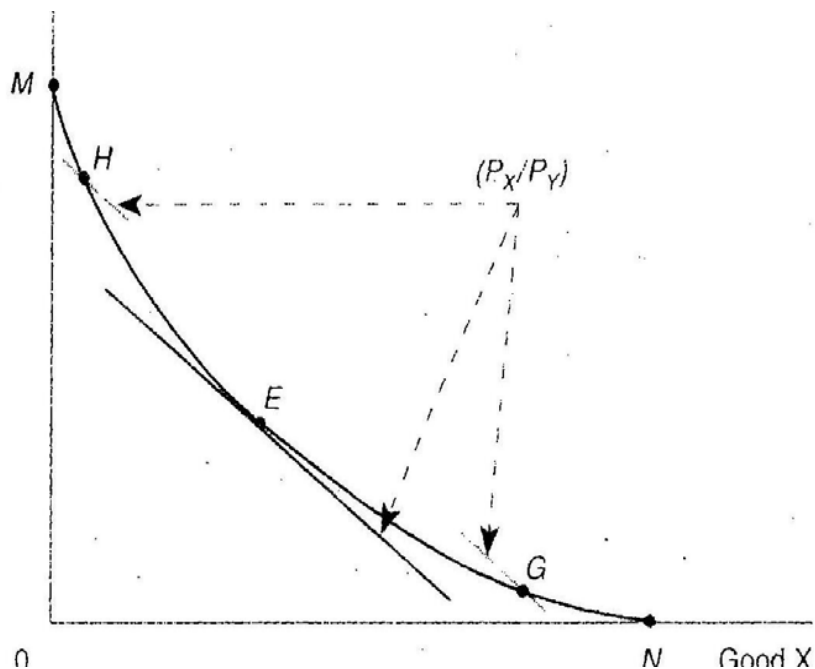
Economies of scale

- **Assume a two-commodity world where both industries experience economies of scale.**
- **Further, the economies of scale are such that the PPF is convex to the origin.**

Economies of scale

- The autarky equilibrium is unstable.
- In the case of classical world and H-O framework, trade could not take place.
- But with economies of scale, there is possibility of trade!

A Convex-to-the-Origin Production-possibilities Frontier (PPF)



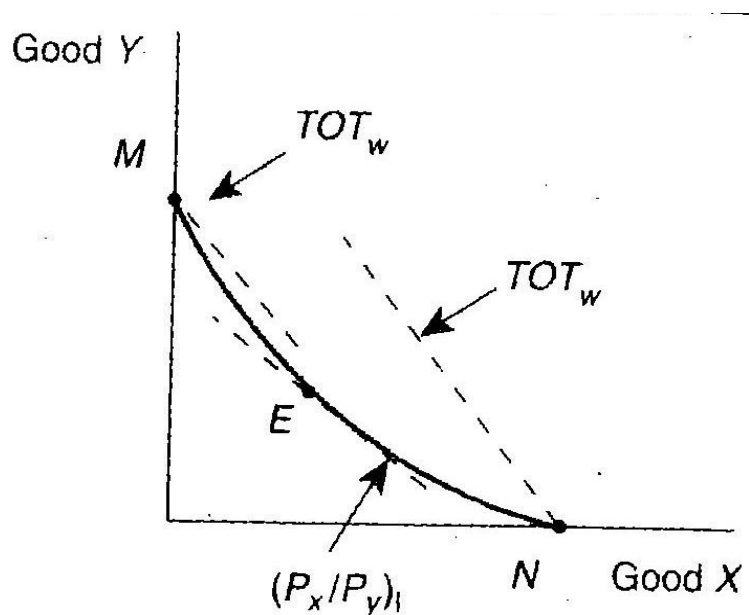
Economies of scale

- Assume that country I has reached its autarky equilibrium at E.
- The internal price ratio is (P_x/P_y) .
- With the trade the price ratio is TOT_w .
- The country will specialize in the production of X at N and trade along the price line represented by TOT_w to obtain a higher indifference curve.

Economies of scale

- For country II, it has identical PPF and identical demand.
- The relative price ratio is also TOT_w .
- This country can completely specialize in producing Y at M .
- Then trade along TOT_w to obtain a higher indifference curve.

The Convex PPF and Gains From Trade



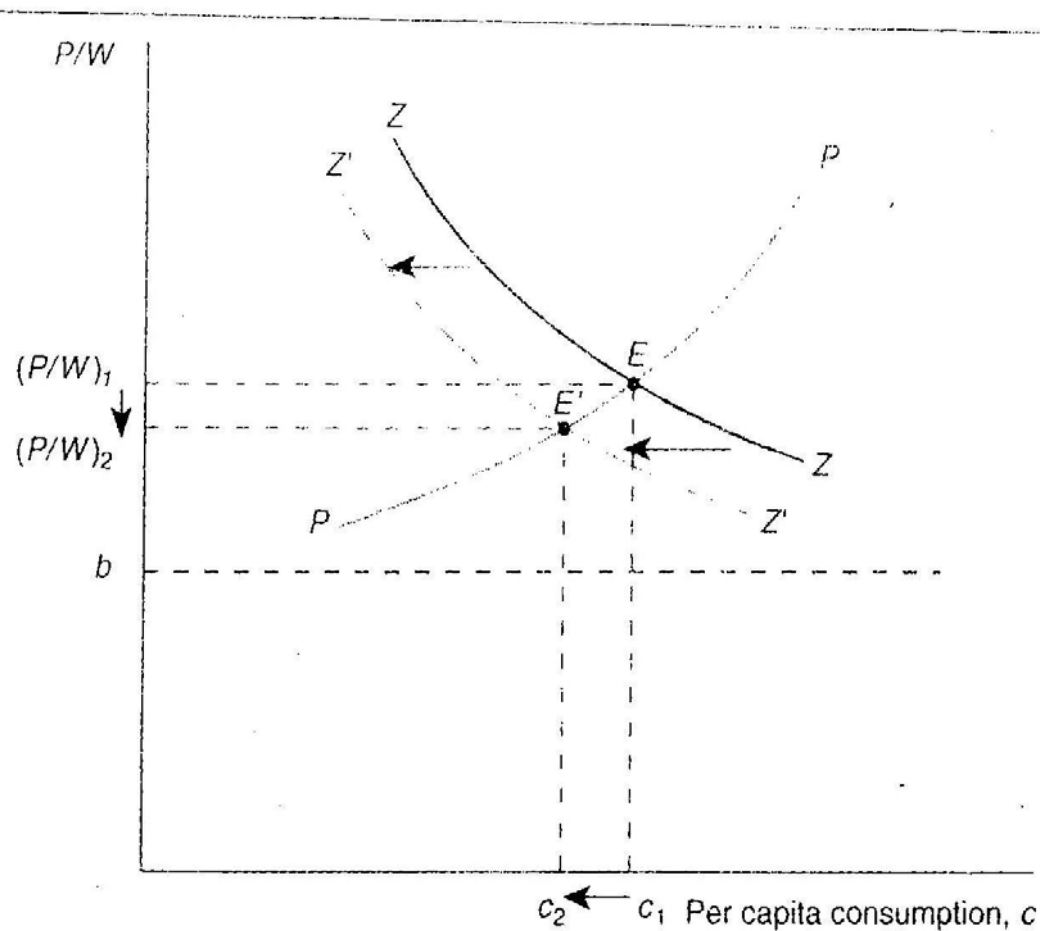
The Krugman model

- This theory represents a family of newer models that has emerged since H-O.
- The Krugman model rests on his paper: “Increasing returns, monopolistic competition and international trade”, Journal of International Economics 9, no. 4, November 1979, pp-469-79 .

The Krugman model

- This model rests on two features that are sharply distinct from those traditional models:
- economies of scale and monopolistic competition.

The Krugman model



The Krugman model

- The upward sloping PP curve represents the relationship of the price of the good to marginal cost.
- As consumption increases, the demand becomes less elastic.
- With constant marginal cost, profit maximization indicates higher price.
- Thus, (P/W) rises as c increases, and the PP curve is upward sloping.

The Krugman model

- The ZZ curve reflects the phenomenon in monopolistic competition that economic profit for the firm is zero in the long-run equilibrium.
- To arrive at the downward slope, remember that zero profit means that in equilibrium price is equal to average cost at all points on the ZZ curve.

The Krugman model

- If per capita consumption (c) increases, average cost is reduced because of the economies of scale phenomenon specified in the model.
- Hence, to maintain the zero profit and to move back to the ZZ curve, price must be reduced.
- This yields a downward slope for the curve.

The Krugman model

- At E, the representative monopolistically competitive firm is in equilibrium because it is charging its profit-maximizing price and this is long-run equilibrium position because economic profit is zero.

The Krugman model

- Suppose we designate the home country of this representative firm as country I.
- Another country called country II would have identical tastes, technology and characteristics of factors of production as country I.
- Traditional theory would conclude that there is no incentive to trade in this case.
- However, Krugman and Linder would disagree.

The Krugman model

- With international trade, the size of the market has increased.
- The consequence is per capita consumption would decrease but the total consumption of each good would increase.
- In addition, the fall in (P/W) means the real wage has increased.

The reciprocal demand model

- A monopoly may charge a different (lower) price in the export market than in the home market. Such price discrimination is called dumping.

The reciprocal demand model

- There are two countries and two firms producing a homogenous product.
- An important feature of the model is that there is transportation cost.
- If the transportation cost is sufficiently each firm will only sell in the domestic market.

The reciprocal demand model

- However, if the transportation cost is not very high, and the home firm notes that the price charged by the foreign firm in the foreign market exceeds the home firm's marginal cost plus the cost of transportation, the home firm would want to sell the product in the foreign market.

The reciprocal demand model

- Similarly, if the foreign firm notices that the price charged in the home market exceeds its marginal cost it would want to sell in the home market.
- Clearly, there are possibilities to trade for both countries.

The reciprocal demand model

- Once the firms in the two countries start to sell in each other's market we enter a market structure of duopoly.

The reciprocal demand model

- The main point of the model is: **International trade in a homogenous product is occurring with each country both exporting and importing the product.**

The reciprocal demand model

- For welfare implications, Brander and Krugman noted that with the rival the market price will fall and consumers will benefit.
- However there is a waste of sending identical products to each other. So the outcome is uncertain.

The gravity model

- The model differs from other theories in that it tries to explain the volume of trade and does not focus on the composition of trade.

The gravity model

- **The model uses an equation framework to predict the volume of trade on a bilateral basis between the two countries.**
- **The form of the equation framework has some similarity to the law of gravity in physics.**

The gravity model

- The model usually considers the following variable to explain the volume of exports from country I to country II.
 - GNP or GDP for country II.
 - GNP or GDP for country I for capacity of supply.
 - Some measure of distance between I and II as a proxy for transportation cost.

The gravity model

- Sometimes other variables are also included.
- Population size in the exporting and importing country.
- A variable reflecting economic integration arrangement.

The gravity model

- Empirical tests have shown that the gravity equation works best for similar countries that have considerable intra-industry trade with each other, better than it did for countries with different factor endowments.

The gravity model

- At the minimum, these findings suggest that product differentiation is indeed a phenomenon to be considered above and beyond factor endowments.