

ДЕРЖАВНИЙ ВИЩИЙ НАВЧАЛЬНИЙ ЗАКЛАД  
«ЗАПОРІЗЬКИЙ НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ»  
МІНІСТЕРСТВА ОСВІТИ І НАУКИ УКРАЇНИ

## Topic 3. Demand and supply in the external trade.

## 1. Standard Model of a Trading Economy

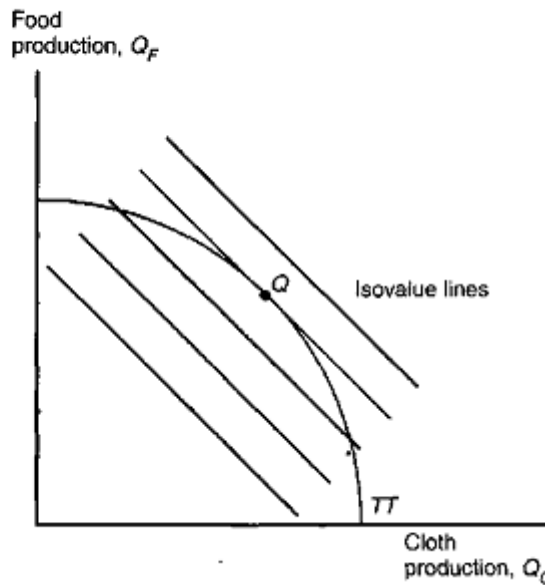
The standard trade model is built on four key relationships:

- (1) the relationship between the production possibility frontier and the relative supply curve;
- (2) the relationship between relative prices and relative demand;
- (3) the determination of world equilibrium by world relative supply and world relative demand;
- (4) the effect of the terms of trade — the price of a country's exports divided by the price of its imports—on a nation's welfare.

# 1.1 Production Possibilities and Relative Supply

**Figure 5-1** Relative Prices Determine the Economy's Output

An economy whose production possibility frontier is  $TT$  will produce at  $Q$ , which is on the highest possible iso-value line.



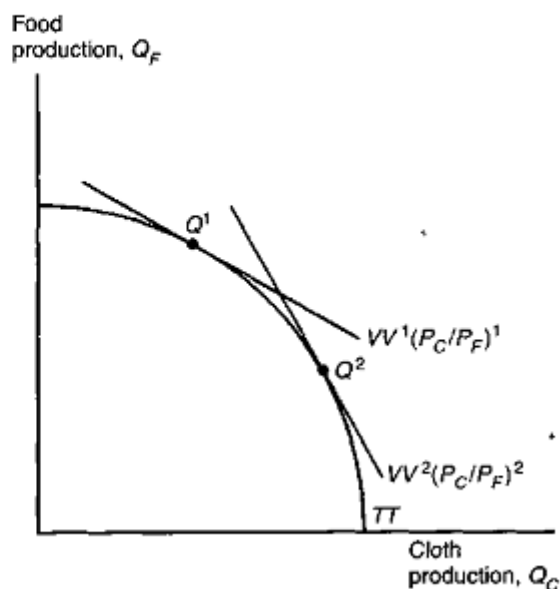
For the purposes of our standard model we assume that each country produces two goods, food (F) and cloth (C), and that each country's production possibility frontier is a smooth curve like that illustrated by  $TT$  in Figure 1.

The point on its production possibility frontier at which an economy actually produces depends on the price of cloth relative to food,  $P_c/P_f$ . It is a basic proposition of microeconomics that a market economy that is not distorted by monopoly or other market failures is efficient in production, that is, maximizes the value of output at given market prices,  $P_cQ_c + P_fQ_f$ .

We can indicate the market value of output by drawing a number of isovalue lines линии одинаковой стоимости —that is, lines along which the value of output is constant. Each of these lines is defined by an equation of the form  $P_c Q_c + P_f Q_f = V$  or by rearranging,  $Q_f = V/P_f - (P_c/P_f)Q_c$ , where  $V$  is the value of output. The higher  $V$  is, the farther out an isovalue line lies; thus isovalue lines farther from the origin correspond to higher values of output. The slope of an isovalue line is minus the relative price of cloth. The economy will produce the highest value of output it can, which can be achieved by producing at point  $Q$ , where  $TT$  is just tangent касательная to an isovalue line.

**Figure 5-2** How an Increase in the Relative Price of Cloth Affects Relative Supply

The iso-value lines become steeper when the relative price of cloth rises from  $(P_c/P_f)^1$  to  $(P_c/P_f)^2$  (shown by the rotation from  $VV^1$  to  $VV^2$ ). As a result, the economy produces more cloth and less food and the equilibrium output shifts from  $Q^1$  to  $Q^2$ .



Now suppose that  $P_c/P_f$  were to rise. Then the iso-value lines would be steeper *большой наклон* than before. In Figure 2 the highest iso-value line the economy could reach before the change in  $P_c/P_f$  is shown as  $VV^1$ .

The highest line after the price change is  $VV^2$ , the point at which the economy produces  $Q_2$ .

Thus, as we might expect, a rise in the relative price of cloth leads the economy to produce more cloth and less food. The relative supply of cloth will therefore rise when the relative price of cloth rises.

## 1.2 Relative Prices and Demand

**Figure 5-3** Production, Consumption, and Trade in the Standard Model

The economy produces at point  $Q$ , where the production possibility frontier is tangent to the highest possible isovalue line. It consumes at point  $D$ , where that isovalue line is tangent to the highest possible indifference curve. The economy produces more cloth than it consumes and therefore exports cloth; correspondingly, it consumes more food than it produces and therefore imports food.

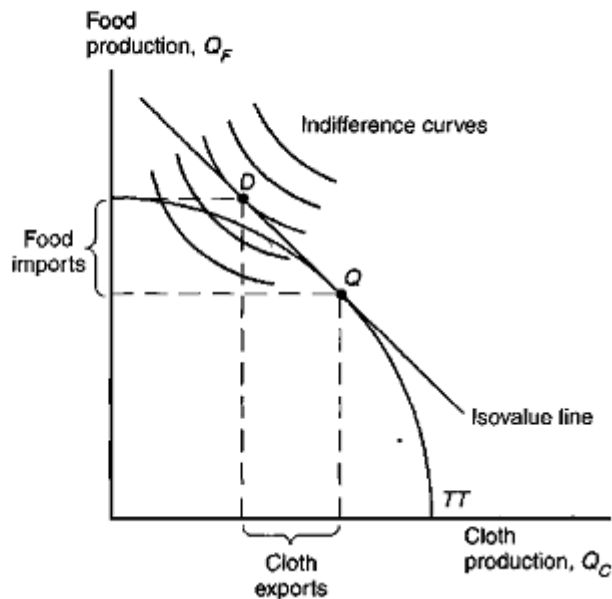


Figure 3 shows the relationship among production, consumption, and trade in the standard model. As we pointed out earlier, the value of an economy's consumption equals the value of its production:

$$P_c D_c + P_f D_f = P_c Q_c + P_f Q_f,$$

where  $D_c$  and  $D_f$  are the consumption of cloth and food, respectively. The equation above says that production and consumption must lie on the same isovalue line.

The economy's choice of a point on the isovalue line depends on the tastes of its consumers. For our standard model, we make the useful simplifying assumption that the economy's consumption decisions may be represented as if they were based on the tastes of a single representative individual.

The tastes of an individual can be represented graphically by a series of indifference curves. An indifference curve traces отображают a set of combinations of cloth (C) and food (F) consumption that leave the individual equally well off.

**Indifference curves have three properties:**

1. They are downward sloping: If an individual is offered less F, then to be made equally well off she must be given more C.
2. The farther up and to the right an indifference curve lies, the higher the level of welfare to which it corresponds: An individual will prefer more of both goods to less.
3. Each indifference curve gets flatter as we move to the right: The more C and the less F an individual consumes, the more valuable a unit of F is at the margin compared with a unit of C, so more C will have to be provided to compensate for any further reduction in F.

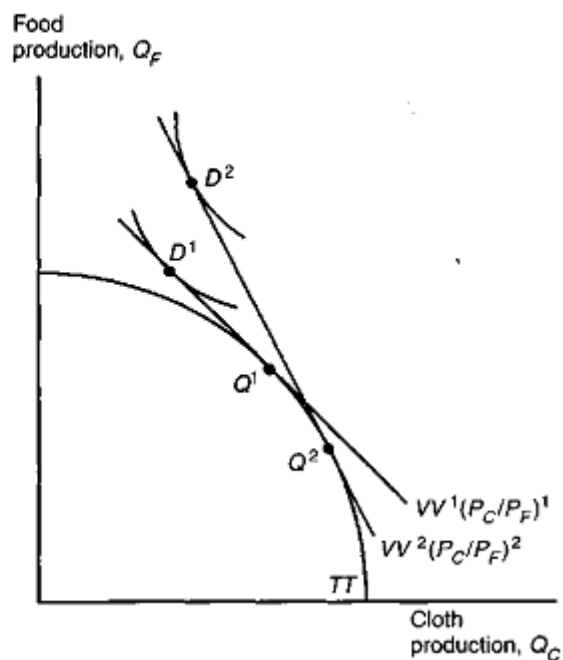


In Figure 3 we show a set of indifference curves for the economy that have these three properties. The economy will choose to consume at the point on the isovalue line that yields the highest possible welfare. This point is where the isovalue line is tangent to the highest reachable indifference curve, shown here as point D.

Notice that at this point the economy exports cloth (the quantity of cloth produced exceeds the quantity of cloth consumed) and imports food.

**Figure 5-4** Effects of a Rise in the Relative Price of Cloth

The slope of the isovalue lines is equal to minus the relative price of cloth  $P_C/P_F$ , so when that relative price rises all isovalue lines become steeper. In particular, the maximum-value line rotates from  $VV^1$  to  $VV^2$ . Production shifts from  $Q^1$  to  $Q^2$ ; consumption shifts from  $D^1$  to  $D^2$ .



Now consider what happens when  $P_C/P_F$  is increased. In Figure 4 we show the effects.

**First,** the economy produces more C and less F, shifting production from  $Q_1$  to  $Q_2$ . This shifts the isovalue line on which consumption must lie, from  $VV^1$  to  $VV^2$ .

The economy's consumption choice therefore also shifts, from  $D^1$  to  $D^2$ .

The move from  $D^1$  to  $D^2$  reflects two effects of the rise in  $P_c/P_f$ .

**First,** the economy has moved to a higher indifference curve: It is better off. The reason is that this economy is an exporter of cloth. When the relative price of cloth rises, the economy can afford to import more food for any given volume of exports. Thus the higher relative price of its export good represents an advantage.

**Second,** the change in relative prices leads to a shift along the indifference curve, toward food and away from cloth.

**These two effects are familiar from basic economic theory.** The rise in welfare is an income effect; the shift in consumption at any given level of welfare is a substitution effect. The income effect tends to increase consumption of both goods, while the substitution effect acts to make the economy consume less C and more F.

### 1.3 The Welfare Effect of Changes in the Terms of Trade

When  $P_c/P_f$  increases, a country that initially exports cloth is made better off, as illustrated by the movement from  $D^1$  to  $D^2$  in Figure 4. Conversely, if  $P_c/P_f$  were to decline, the country would be made worse off; for example, consumption might move back from  $D^2$  to  $D^1$ .

If the country were initially an exporter of food instead of cloth, the direction of this effect would of course be reversed. An increase in  $P_c/P_f$  would mean a fall in  $P_f/P_c$ , and the country would be worse off; a fall in  $P_c/P_f$  would make it better off.

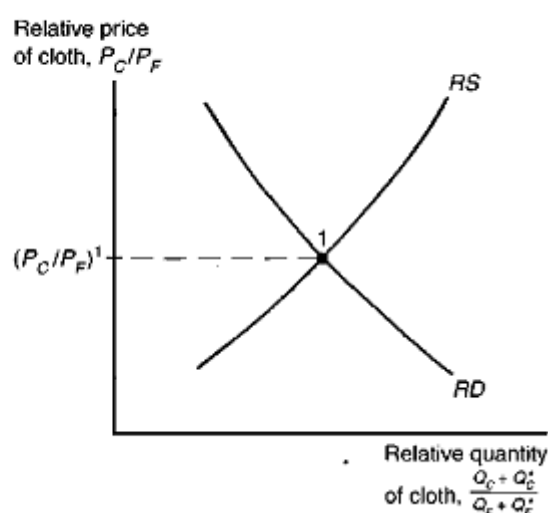
We cover all cases by defining the terms of trade as the price of the good a country initially exports divided by the price of the good it initially imports. The general statement, then, is that a rise in the terms of trade increases a country's welfare, while a decline in the terms of trade reduces its welfare.

## 1.4 Determining Relative Prices

Let's now suppose that the world economy consists of two countries, once again named Home (which exports cloth) and Foreign (which exports food). Home's terms of trade are measured by  $P_c/P_f$ , while Foreign's are measured by  $P_f/P_c$ .  $Q_c$  and  $Q_f$  are the quantities of cloth and food produced by Home:  $Q_c^*$  and  $Q_f^*$  are the quantities produced by Foreign.

Figure 5-5 | World Relative Supply and Demand

The higher  $P_c/P_f$  is, the larger the world supply of cloth relative to food (RS) and the lower the world demand for cloth relative to food (RD). Equilibrium relative price (here,  $(P_c/P_f)^1$ ) is determined by the intersection of the world relative supply and demand curves.



To determine  $P_c/P_f$  we find the intersection of world relative supply of cloth and world relative demand. The world relative supply curve (RS in Figure 5) is upward sloping because an increase in  $P_c/P_f$  leads both countries to produce more cloth and less food. The world relative demand curve (RD) is downward sloping because an increase in  $P_c/P_f$  leads both countries to shift their consumption mix away from

cloth toward food. The intersection of the curves (point 1) determines the equilibrium relative price  $(P_c/P_f)^1$ .

## **CONCLUSION:**

Now that we know how relative supply, relative demand, the terms of trade, and welfare are determined in the standard model, we can use it to understand a number of important issues in international economics.

## 2. Economic Growth: A Shift of the RS Curve

The effects of economic growth in a trading world economy are a perennial source of concern and controversy. The debate revolves around two questions.

**First,** is economic growth in other countries good or bad for our nation?

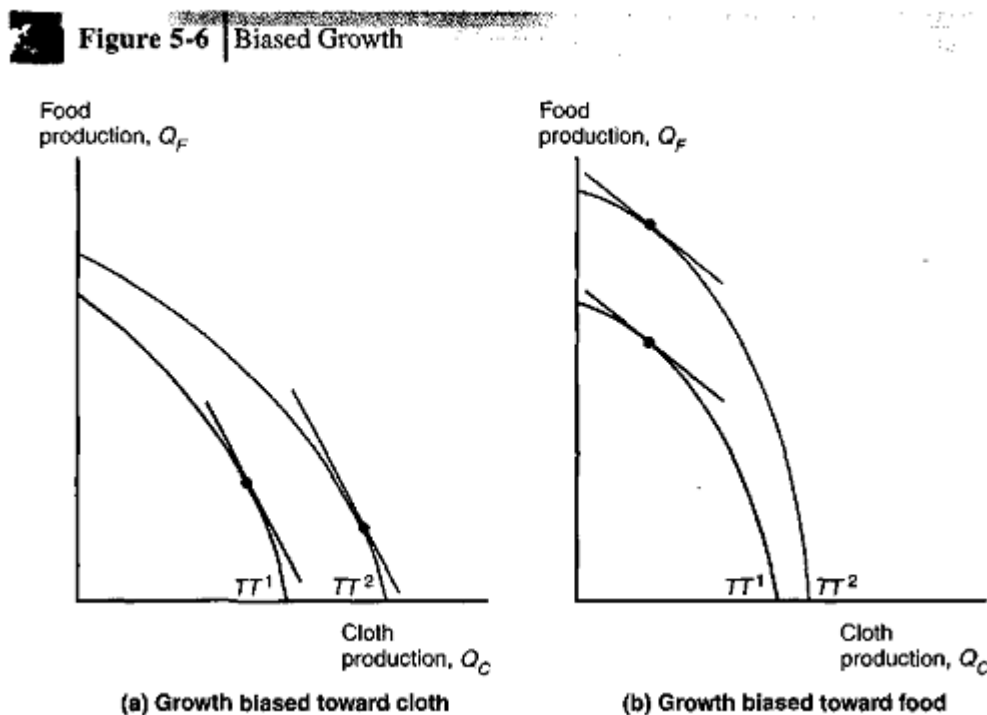
**Second,** is growth in a country more or less valuable when that nation is part of a closely integrated world economy?

In assessing the effects of growth in other countries, commonsense arguments can be made on either side. On one side, economic growth in the rest of the world may be good for our economy because it means larger markets for our exports. On the other side, growth in other countries may mean increased competition for our exporters. Similar ambiguities seem present when we look at the effects of growth at home. On one hand, growth in an economy's production capacity should be more valuable when that country can sell some of its increased production to the world market. On the other hand, the benefits of growth may be passed on to

foreigners in the form of lower prices for the country's exports rather than retained at home.

## 2.1 Growth and the Production Possibility Frontier

Economic growth means an outward shift of a country's production possibility frontier. This growth can result either from increases in a country's resources or from improvements in the efficiency with which these resources are used.



The international trade effects of growth result from the fact that such growth typically has a bias рост носит неравномерный характер. Biased growth takes place when the production possibility frontier shifts out more in one direction than in the other. Figure 6a illustrates



growth biased toward cloth, and Figure 6b shows growth biased toward food. In each case the production possibility frontier shifts from  $TT^1$  to  $TT^2$ .

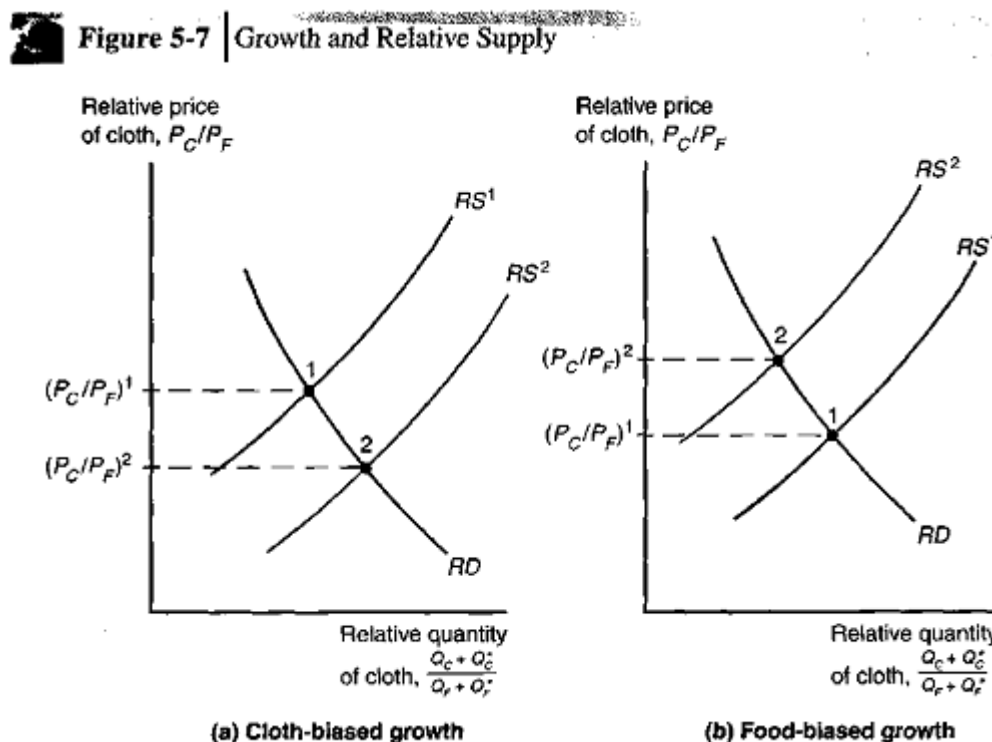
### Growth may be biased for two main reasons:

1. The Ricardian model shows that technological progress in one sector of the economy will expand the economy's production possibilities more in the direction of that sector's output than in the direction of the other sector's output.
2. The specific factors model and the factor proportions model both showed that an increase in a country's supply of a factor of production—say, an increase in the capital stock resulting from saving and investment—will produce biased expansion of production possibilities. The bias will be in the direction of either the good to which the factor is specific or the good whose production is intensive in the factor whose supply has increased. Thus the same considerations that give rise to international trade will also lead to biased growth in a trading economy.

The biases of growth in Figure 6a and 6b are strong. In each case the economy is able to produce more of both goods, but at an unchanged relative price of cloth the output of food actually falls in Figure 6a, while the output of cloth actually falls in Figure 6b.

Although growth is not always as strongly biased as it is in these examples, even growth that is more mildly biased toward cloth will lead, for any given relative price of cloth, to a rise in the output of cloth relative to that of food. The reverse is true for growth biased toward food.

## 2.2 Relative Supply and the Terms of Trade



Suppose now that Home experiences growth strongly biased toward cloth, so that its output of cloth rises at any given relative price of cloth, while its output of food declines. Then for the world as a whole the output of cloth relative to food will rise at any given price and the world relative supply curve will shift to the right from  $RS^1$  to  $RS^2$  (Figure 7a). This shift results in a decrease in the relative price of cloth from  $(P_C/P_F)^1$  to  $(P_C/P_F)^2$ , a worsening of Home's terms of trade and an improvement in Foreign's terms of trade.

Notice that the important consideration here is not which economy grows but the bias of the growth. If Foreign had experienced growth biased toward cloth, the effect on the relative supply curve and thus on the terms of trade would have been the same. On the other hand, either Home or Foreign growth biased toward food (Figure 7b) leads to a leftward shift of the RS curve ( $RS^1$  to  $RS^2$ ) and thus to a rise in the relative price of cloth from  $(P_c/P_f)^1$  to  $(P_c/P_f)^2$ . This increase is an improvement in Home's terms of trade, a worsening of Foreign's.

Growth that disproportionately expands a country's production possibilities in the direction of the good it exports (cloth in Home, food in Foreign) is export-biased growth экспортноориентированный рост. Similarly, growth biased toward the good a country imports is import-biased growth импортозамещающий рост.

**Our analysis leads to the following general principle:**

Export-biased growth tends to worsen a growing country's terms of trade, to the benefit of the rest of the world; import-biased growth tends to improve a growing country's terms of trade at the rest of the world's expense.