

## The No-Trade Model

1. Identical production functions in all countries
2. Same relative factor endowments in all countries
3. Constant returns to scale
4. Identical, Homogeneous preferences in all countries
5. No Distortions (imperfect competition, externalities, taxes).

In this world, there would be no trade and no gains from trade.

1. A one-factor model of technology differences
2. Comparative versus absolute advantage

Existence of trading opportunities depends only on comparative Advantage.

3. Production frontier, closed-economy equilibrium
4. Comparative advantage and autarky price ratios

Pattern of comparative advantage reflected in autarky prices

6. Excess demand and international equilibrium

Constructing the excess demand curve  
Specialization

## 8. The distribution of gains between countries

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Big versus small countries

More productive versus less productive countries

## 7. Real wage comparisons across countries

The role of equilibrium prices

The role of absolute advantage

The following is sometimes referred to as the “Ricardian model” of trade, where the basis for trade is differences in technology across countries. It is generally assumed that:

1. There is only one factor of production so as to separate technology from relative factor-endowment effects.
2. There are constant returns to scale and perfect competition in production so as to separate technology from industrial-organization effects.

This is essentially the model we looked at before in talking about gains from specialization and comparative and absolute advantage.

$$X = F_x(L_x) \quad Y = F_y(L_y)$$

$$\bar{L} = L_x + L_y$$

Assume constant returns to scale

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$$X = \alpha L_x$$

$$Y = \beta L_y$$

where  $\alpha$  and  $\beta$  are some positive constants.

Absolute versus comparative advantage

Country  $F$  has an *absolute advantage* in the production of  $X$ :  $\alpha_h < \alpha_f$ .

Country  $H$  has an *absolute advantage* in the production of  $Y$ :  $\beta_h > \beta_f$ .

Country  $F$  has a *comparative advantage* in the production of  $X$ :

$$\alpha_h/\beta_h < \alpha_f/\beta_f.$$

Proposition: a pattern of comparative advantage (inequality of the productivity ratios is a *necessary* and a *sufficient* condition for gains from specialization.

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### Marginal Products of Labor

	Home	Foreign
X	$\alpha_h = 20$	$\alpha_f = 30$
Y	$\beta_h = 20$	$\beta_f = 10$

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Country *F* has a *comparative advantage* in the production of *X*:

$$\alpha_h/\beta_h < \alpha_f/\beta_f.$$

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## Changes in Outputs due to Labor Reallocation

Move 1 Worker from X to Y in Country h, and 1 from Y to X in Country F

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

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There exist gains from specialization

This will always be true if and only if the  $\beta/\alpha$  are different in the two countries.

But what if one country has an absolute advantage in all goods?

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### Marginal Products of Labor

	Home	Foreign
X	$\alpha_h = 5$	$\alpha_f = 30$
Y	$\beta_h = 5$	$\beta_f = 10$

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Move 4 workers from  $X$  to  $Y$  in Country H and 1 from  $Y$  to  $X$  in Country F.

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### Changes in Outputs due to Labor Reallocation

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

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Gains from specialization and trade are still possible even if one country has an absolute advantage in the production of all goods.

What is needed for the existence of gains from specialization is a pattern of *comparative advantage*.

The  $\alpha$ 's and  $\beta$ 's show up as the slopes of their “production possibilities” curves.

$$\Delta X = \alpha \Delta L_x \qquad \Delta Y = \beta \Delta L_y = -\beta \Delta L_x$$

$$\frac{\Delta Y}{\Delta X} = -\frac{\beta}{\alpha}$$

For two countries, h and f, the slopes of their production frontiers are 10

$$\frac{\Delta Y_h}{\Delta X_h} = - \frac{\beta_h}{\alpha_h} \qquad \frac{\Delta Y_f}{\Delta X_f} = - \frac{\beta_f}{\alpha_f}$$

These ratios are the slopes of production frontier, but are also measures of comparative advantage.

Country h is said to have a comparative advantage in Y and country f a comparative advantage in X if

$$\frac{\beta_h}{\alpha_h} \geq \frac{\beta_f}{\alpha_f} \qquad \textbf{Figure 1}$$

As we will see shortly, *comparative advantage* predicts the *direction of trade and specialization*. The equilibrium autarky price ratio will be the slope of the production frontier = the comparative advantage ratio

Assertion: in competitive equilibrium, each country will specialize in the good in which it has a comparative advantage (although one country might produce both goods).

This is saying that specialization goes “the right way” in a competitive, distortion-free economy.

The fact that specialization and trade go the “right way” is another Smithian “invisible hand” result.

The proof is by contradiction. Suppose that country  $h$  (comparative advantage in  $Y$ ) specializes in  $X$ : the “wrong way”.

The price ratio is either

- (a) steeper than  $h$ 's production frontier or
- (b) flatter than  $h$ 's production frontier.

Suppose that case (b) is true. Then

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$$\frac{\beta_h}{\alpha_h} > \frac{p_x}{p_y}$$

**Figure 2**

$$p_y \beta_h > p_x \alpha_h = w_h$$

where the last equation is the condition for competitive equilibrium: the value of the marginal product of labor in X (the good that is produced) is equal to the wage rate.

But that in turn implies that the value of the marginal production of labor in Y (the good that is not produced) is greater than the wage rates.

Therefore, there are profits to be earned in Y production and entry will occur. Thus (b) cannot be an equilibrium.

Thus presumably case (a) is true. That is consistent with equilibrium for country h.

$$\frac{\beta_h}{\alpha_h} < \frac{p_x}{p_y} \quad p_y \beta_h < p_x \alpha_h = w_h$$

The value of the marginal production of labor in the good that is produced (X) equals the wage rate and this is greater than the marginal product of labor in the good that is not produced (Y) so there are no profits to be earned in Y and no entry occurs.

Conclusion: specialization must be consistent with comparative advantage in a competitive, distortion free environment.

**Figure 3    Figure 4**

“World” equilibrium

- (1) The world price ratio must lie between the autarky price ratios of the two countries (but could equal the autarky price ratio of one country), otherwise both countries would want to export the same good, and this cannot be an equilibrium.
- (2) Thus each country will export the good for which it has a relatively low export price, its comparative-advantage good.

**Figure 5        Figure 6**

Note that one country, but only one country, may produce both goods; that is, one country may be non-specialized.

- (1) A country's gains from trade are proportional to the difference between its autarky price ratio and the equilibrium world price ratio.

## Figure 8

- (2) The smaller and/or less productive country will trade further from its autarky price ratio than the larger and/or more productive country. Hence the former gets a larger share of the total gains.

## Figure 9

Think of this as a comparative statics problem in which one country grows. Its excess demand at any price increases, which must force down the equilibrium price if the other country is not growing

- (3) In the special case where the world price ratio is the large country's autarky price ratio, the small country gets *all* the gains.

The equilibrium price ratio is called the terms of trade. The equilibrium terms of trade is closely linked to the *distribution* of gains from trade.

Trade and wages: what role then does absolute advantage play?

Absolute advantage does not determine the pattern of trade or the existence of gains from trade, but it does determine real income comparisons between countries.

We have established that the existence of mutual gains from trade depends only on comparative advantage, not absolute advantage.

One country may have an absolute advantage in everything, but it can still gain from specializing in what it does relatively well.

Use our example in which country h has the comparative advantage in Y, so h specializes in Y and country f specializes in X

the price ratio must lie in between the two comparative-advantage ratios (slopes of the two production frontiers).

$$\frac{\beta_h}{\alpha_h} \geq \frac{p_x^*}{p_y^*} \geq \frac{\beta_f}{\alpha_f}$$

The wage rate in each country is equal to the value of the marginal product of labor in the good that is produced.

$$w_h = p_y^* \beta_h \quad w_f = p_x^* \alpha_f \quad \frac{w_h}{w_f} = \frac{p_y^* \beta_h}{p_x^* \alpha_f}$$

Assume that country h is has an absolute advantage in both goods.

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$$\alpha_h > \alpha_f \quad \frac{\beta_h}{\alpha_f} > \frac{\beta_h}{\alpha_h}$$

$$\frac{\beta_h}{\alpha_f} > \frac{\beta_h}{\alpha_h} \geq \frac{p_x^*}{p_y^*} \geq \frac{\beta_f}{\alpha_f} \Rightarrow \frac{\beta_h}{\alpha_f} \frac{p_y^*}{p_x^*} = \frac{w_h}{w_f} > 1$$

(the first inequality is the assumption that country h has absolute advantage in both goods, and the others are the assumed pattern of comparative advantage.)

Absolute advantage shows up in *real wage comparisons* between countries.

The more productive country will have the higher real wage.

Should having a higher real wage deter the country from trading?

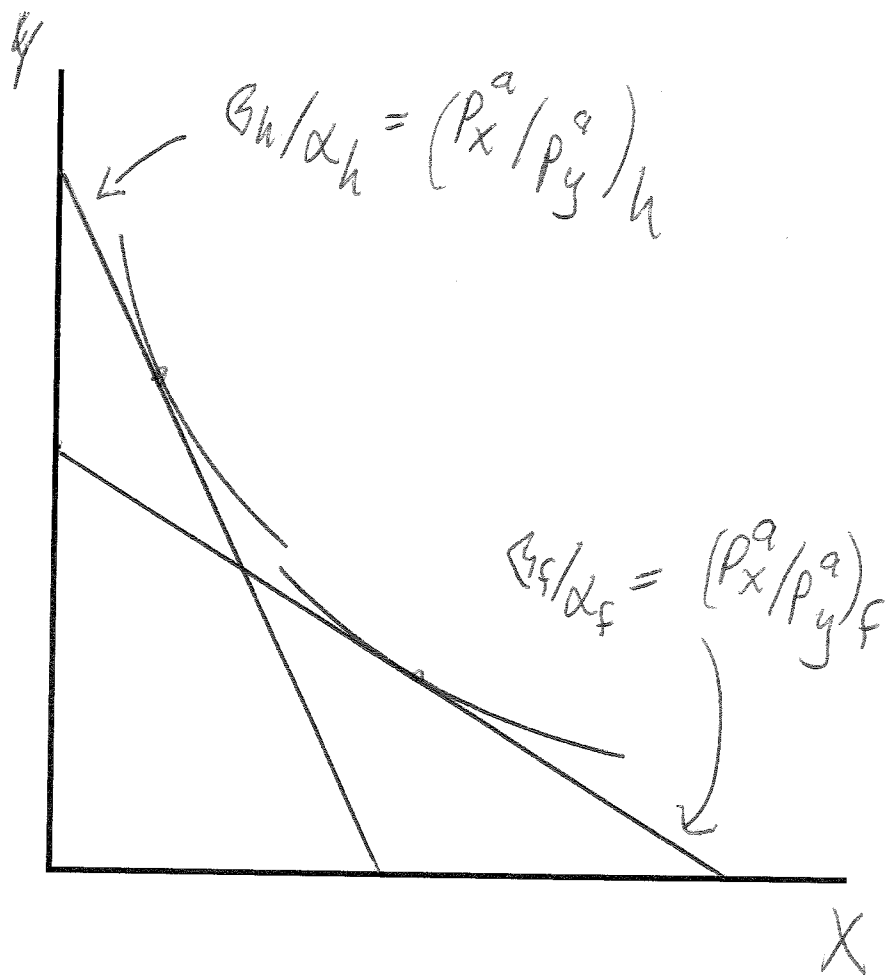
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No. We have argued that gains from trade depend only on comparative advantage.

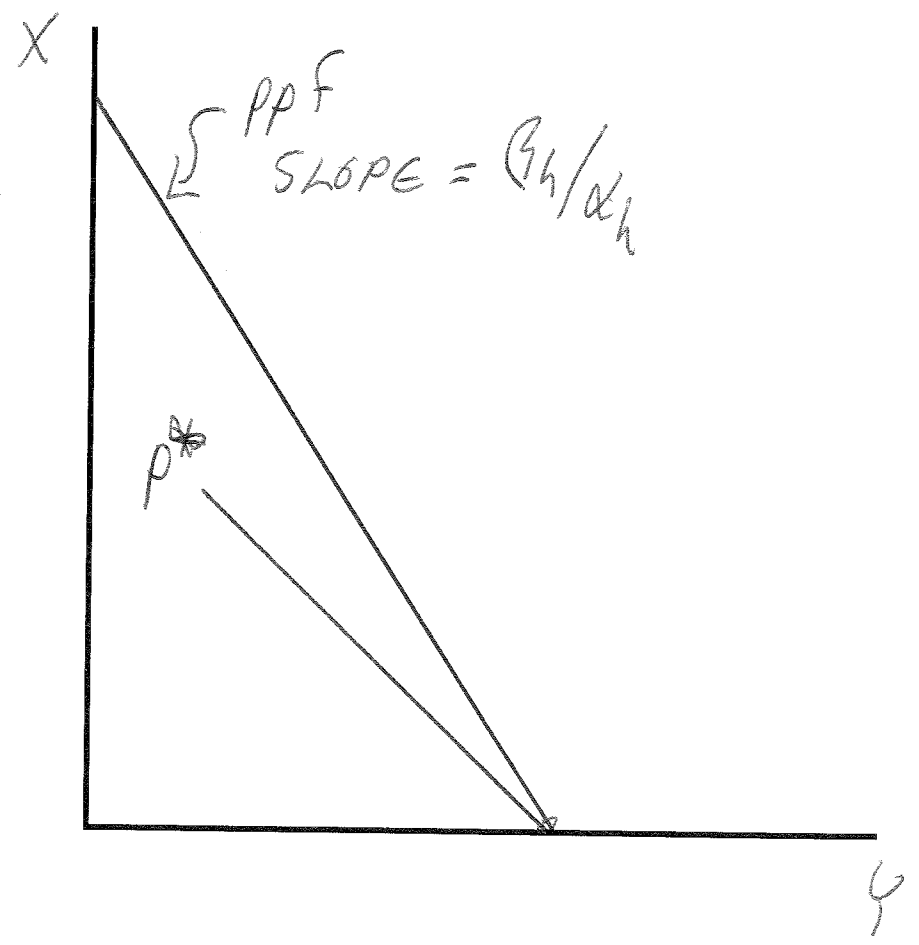
If wages are market determined, a high wage is the result of high productivity, and is not a deterrent to gains from trade.

- (a) With international differences in production technology, there will exist gains from trade.
- (b) Countries should specialize according to comparative advantage, their relative ability to produce different goods.
- (c) If prices are determined in a competitive market, then the market ensures the correct pattern of specialization. Government intervention is not needed or helpful.
- (d) Theory suggest that small countries are major gainers from trade: technically, they trade further away from their autarky prices than large countries.

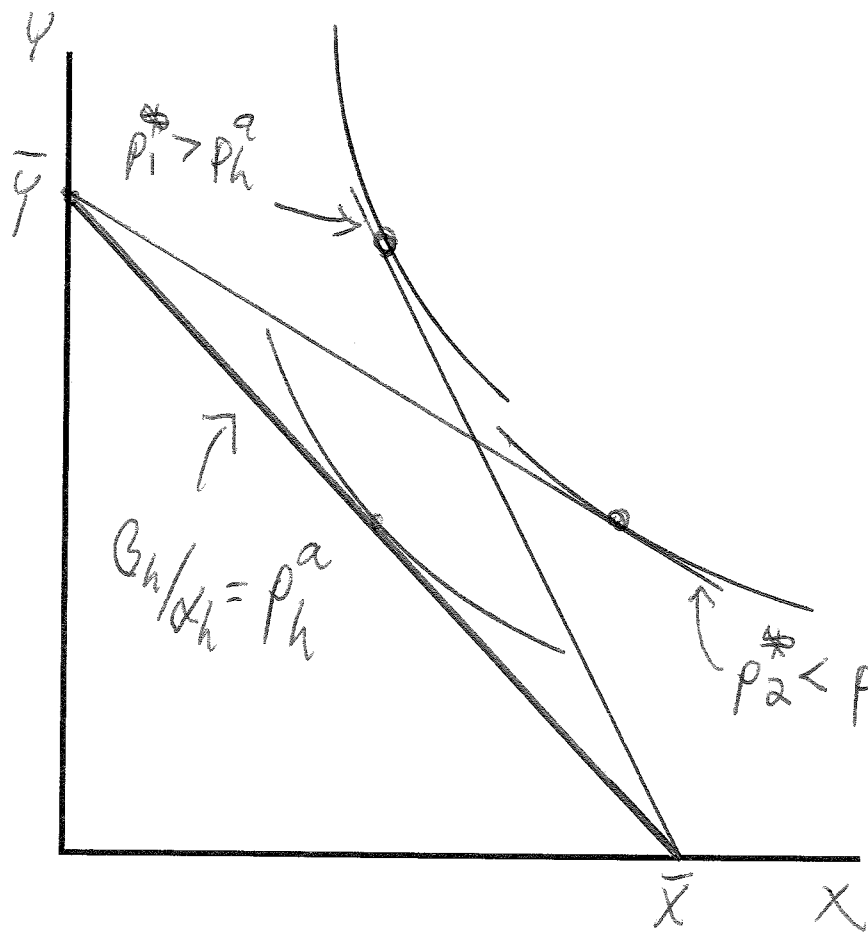
- (e) If a country is uniformly more productive (e.g., has an absolute advantage in everything), then it must have a higher real wage. Provided that wages are market determined, having a high wage should not be a deterrent to trade, is it just reflecting high productivity.
- (f) It is important to note that in a competitive market economy, the real wage is *endogenous*. A high wage reflects high productivity. A high wage is not a reason not to trade.



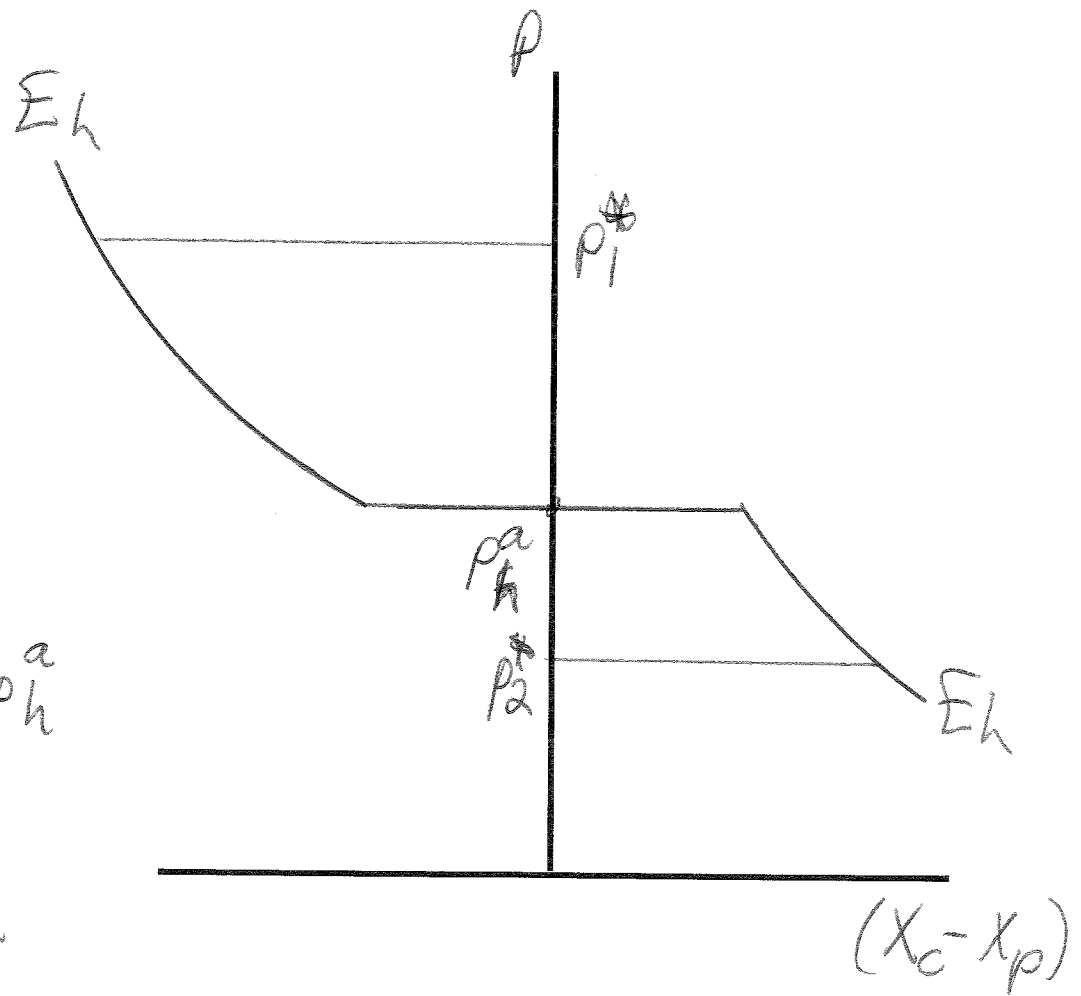
Unotes 4 Figure 1



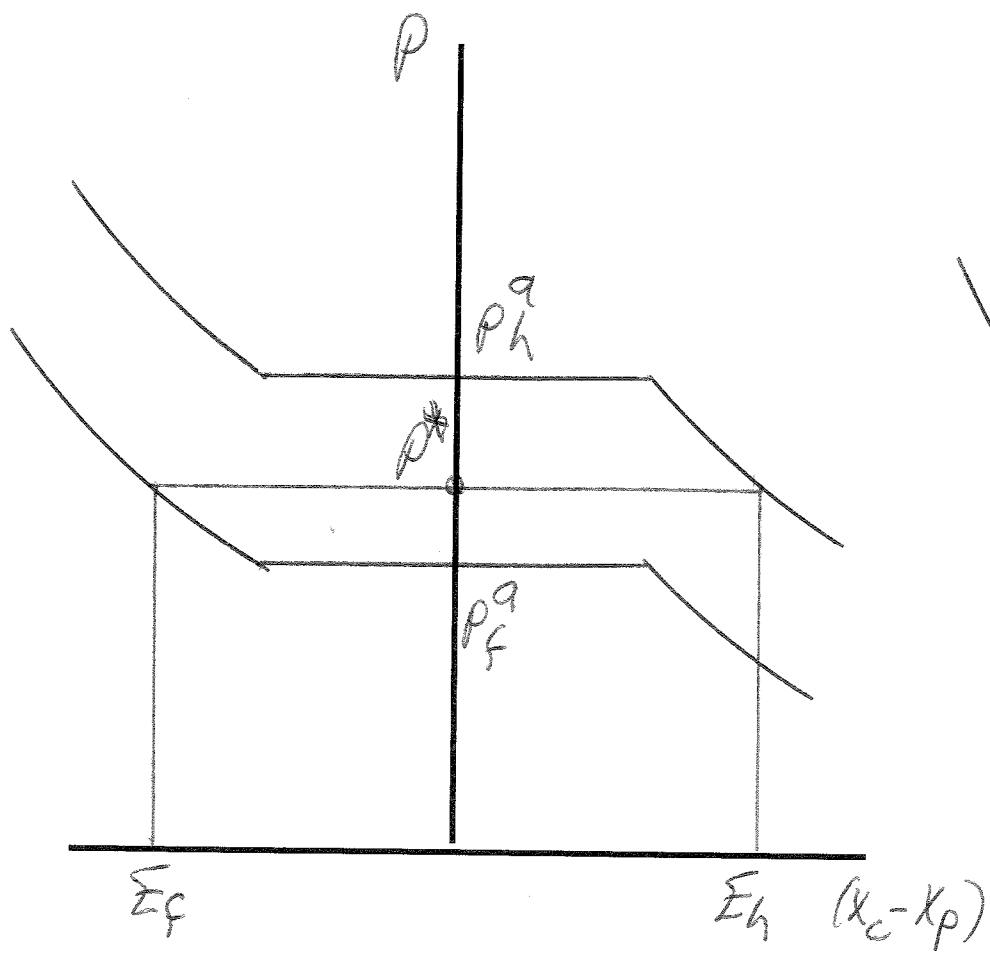
Unotes 4 Figure 2



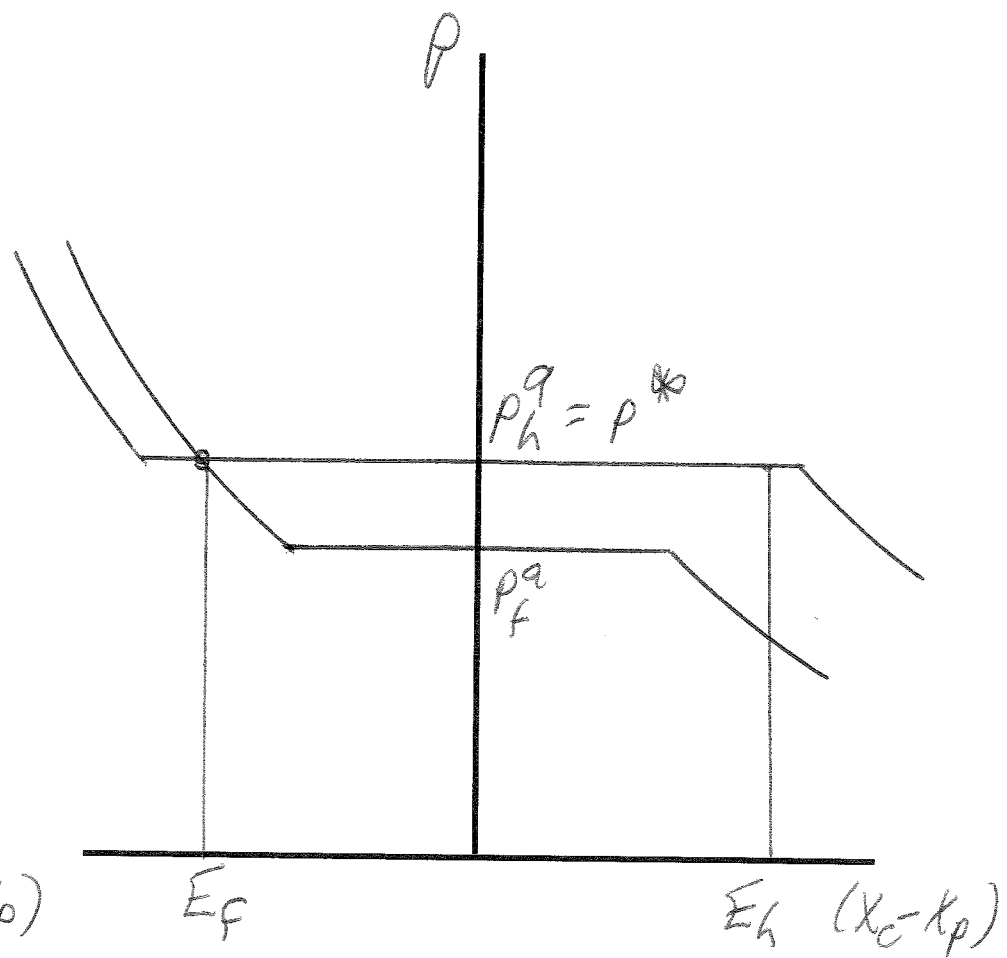
Unotes 4 Figure 3



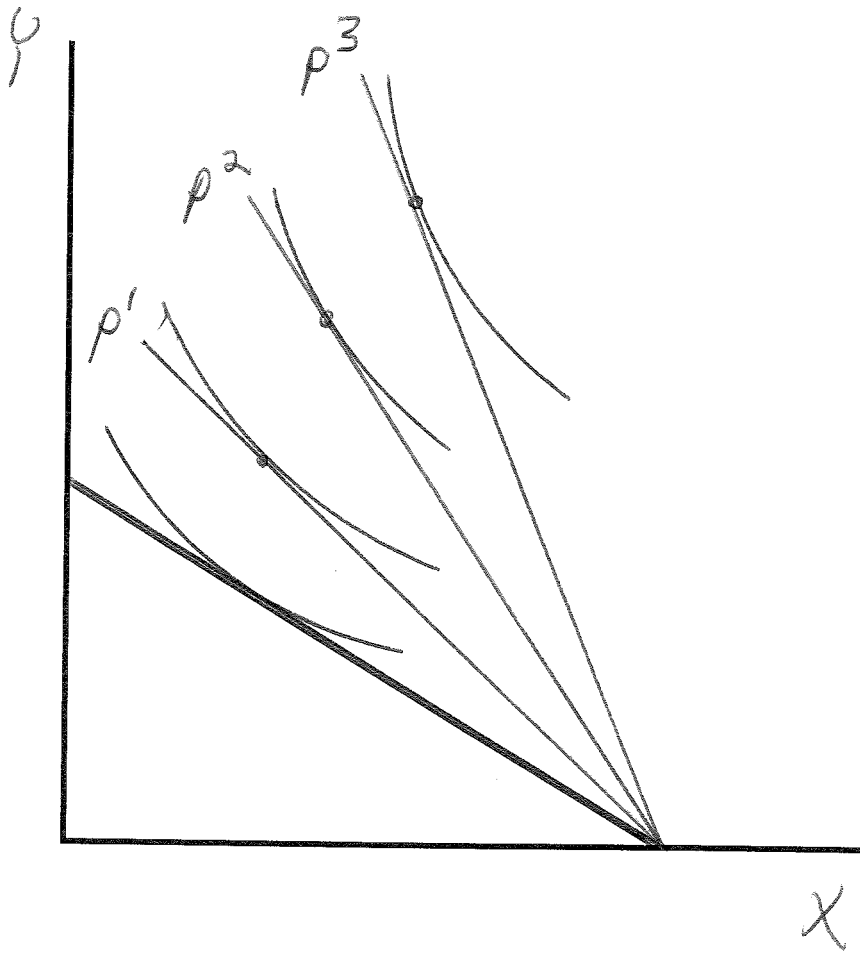
Unotes 4 Figure 4



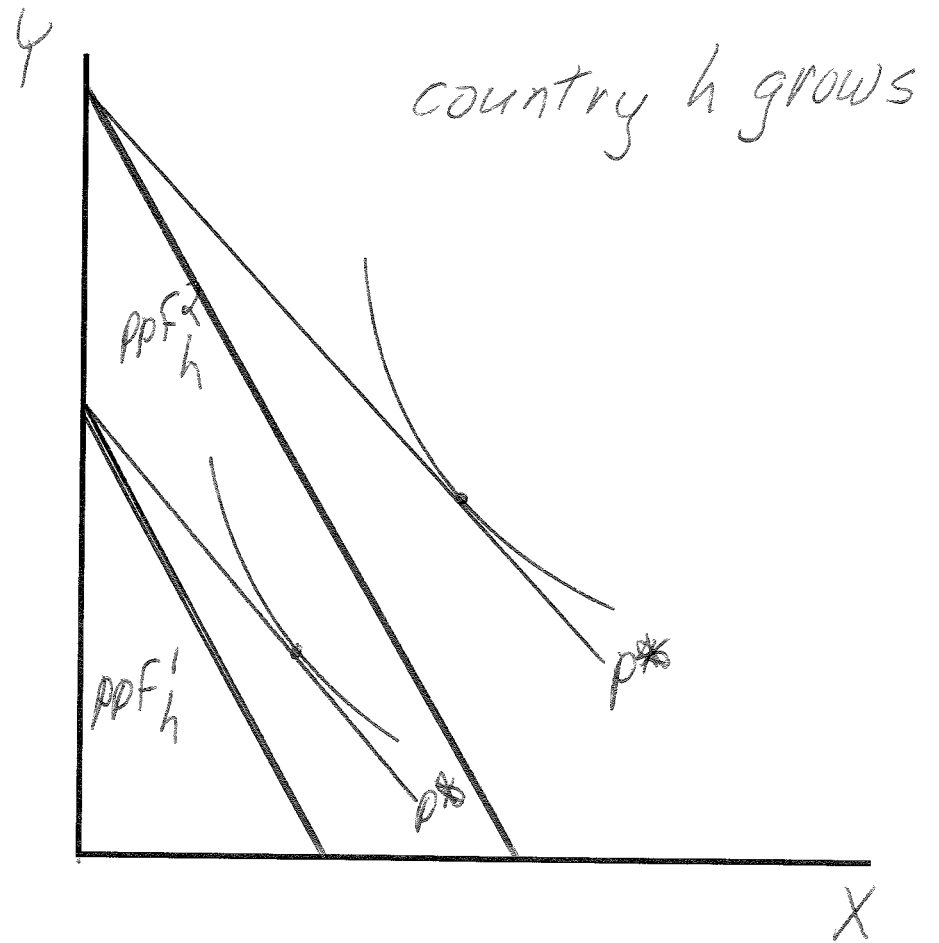
Unotes 4 Figure 5



Unotes 4 Figure 6



Unotes 4 Figure 7



Unotes 4 Figure 8