

国际经济学

贸易与收入分配：特定要素模型

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亚当斯密的诘问

如果一件东西在购买时所费的代价比在家生产时所费的小，就永远不会想要在家生产，这是每一个精明的家长都知道的格言……在每一个私人家庭的行为中是精明的事情，在一个大国的行为中就很少是荒唐的了。如果外国能以比我们自己制造还便宜的商品供应我们，我们最好就用我们自己有优势的产业，生产出来的一部分物品向他们购买，
——亚当 · 斯密，《国民财富的性质和原因的研究》，1776 年

Motivation

- If trade is so good for the economy, why is there such opposition?
- Two main reasons why international trade has strong effects on the distribution of income within a country:
 - Resources cannot move immediately or costlessly from one industry to another
 - Industries differ in the factors of production they demand
- The Specific Factors model introduces these features and allows trade to affect income distribution

Historical Example: Corn Laws

- 《Economist》这本杂志怎么样？谁知道它何时创办，因何创办
- Britain had been historically a net importer of corn
- Napoleon' s Continental System constrained imports and raised the price of corn
 - Landowners increased domestic production and enjoyed higher profits (price was up to 126 shilling a quarter)
- At the end of Napoleonic War, landowners pushed to pass legislation to maintain high prices by taxing imports as long as the price was lower than 80 shillings a quarter
- Importation Act of 1815

Historical Example: Corn Laws

- Some **workers** opposed the Act because it made bread less affordable
- Others argued that by increasing employment in farming, workers were actually made better off

THE CORN LAWS.

Repealers say "the Corn Law is a Tax on Bread---a law for the advantage of the few---a cruel and unjust act of oppression," &c. Now, so far from this being the case, it is a tax *not on*, but *for*, Bread,---not *against*, but *for*, the poor---not to render Bread dearer, but *virtually cheaper*, by securing for the poor man permanent employment and a just remuneration for his labour. And lastly, not a law for the few, but for the advantage of ALL! *Attend to a few facts---incontrovertible stubborn facts!*

Supposed advantages of a "Repeal of the Corn Laws."	Real results from the Repeal.	THE PROOF.
HIGH WAGES.	LOW WAGES, OR NO WAGES.	If the Corn Laws be repealed, there will be little or no demand for the products of the land; consequently Farmers will not cultivate it, and therefore must discharge their workmen; these will flock in thousands into the Towns for work, and will be compelled to take <i>any</i> wages, rather than <i>no</i> wages! thus depriving thousands of work, and REDUCING THE WAGES OF ALL.
CHEAP BREAD.	DEAR BREAD, OR NO BREAD AT ALL.	Although Bread may be, for a time, a little <i>cheaper</i> , yet it will always be <i>virtually</i> dearer: for this simple reason; wages being lowered, as just proved, the poor man has much less in his pocket, after purchasing his "cheap" loaf, than he has <i>now</i> after purchasing his "dear" loaf! For example; suppose a day's wages now to be 2s. 6d. and the loaf 9d. after paying for his loaf he has now 1s. 9d. in his pocket! On the other hand, suppose the loaf to be reduced to 6d. and his wages to 1s. 6d. then after purchasing his <i>cheap</i> (!) loaf, he finds only 1s. left! losing by his cheap (!) bread 9d. on each day's wages! Thus stands his balance sheet:
		With the Corn Without the Corn

Historical Example: Corn Laws

- Efforts to overturn the Importation Act were championed by industrialists and entrepreneurs
 - Anti -Corn Law League
 - James Wilson
- In their view, higher corn prices increased wages paid to industrial workers and decreased their profits
- And tariff retaliation from abroad hurt them too (since Britain exported manufactures)
- Corn Laws were finally repealed in 1846 due to a large extent to the Irish Potato Famine

Derived Questions

- Why were landowners so eager to maintain import protection for corn?
- Why were industrialists so opposed to it?
- Was the effect of the Corn Laws negative for workers (as some claim) or was it actually positive?
- What was the effect of the Corn Laws for aggregate welfare in Britain?
- Why did it take so long to repeal the Corn Laws?

Specific Factor Model 的 Mission

- 对于以上问题,SFM 有着极强的解释力
- So far, 我们已经通过 Ricardian Model 理解了 “Trade is Great”
- The remaining questions:(1) 谁会从贸易中获益;(2) 谁会从贸易中受损;(3) 在什么情况下收益或受损?

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Intellectual History

- Specific Factors Model is sometimes referred to as the Ricardo- Viner
- Was independently formalized by Ronald W. Jones (1931 -) and Paul Samuelson (1915 -2009) in 1971





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Assumptions of the Model

- Two - country world with a Home country and a Foreign one
- Only two goods are relevant for production and consumption (cloth and food)
- Three factors of production: labor (L), capital (K) and land (T for terrain) all in fixed supply
- Cloth is produced with labor and capital, but not land
- Food is produced with labor and land, but not capital
- Labor can move freely across sectors
- All markets are perfectly competitive

Technology

- The production function for cloth gives the quantity of cloth that can be produced given any input of capital and labor:

$$Q_C = Q_C(K, L_C)$$

- Q_C is the output of cloth
 - K is the capital stock
 - L_C is the labor force employed in cloth
- We will assume that it features constant returns to scale and diminishing marginal products

Technology (cont.)

- Similarly, the production function for food gives the quantity of food that can be produced given any input of land and labor:

$$Q_F = Q_F(T, L_F)$$

- Q_F is the output of food
- T is the supply of land
- L_F is the labor force employed in food
- And again, it features constant returns to scale and diminishing marginal products

Constant Returns to Scale

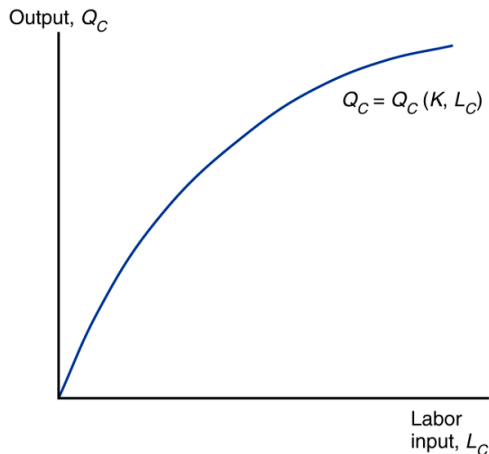
- If one increases all factors by the same proportion, output increases by the same proportion, or

$$Q_C(aK, aL_C) = aQ_C(K, L_C)$$

- Mathematically, Q_C is homogenous of degree one in K and L_C
- Note that the technology in the Ricardian model also featured constant returns to scale, though in that case there was only one factor of production

Diminishing Marginal Product of Labor

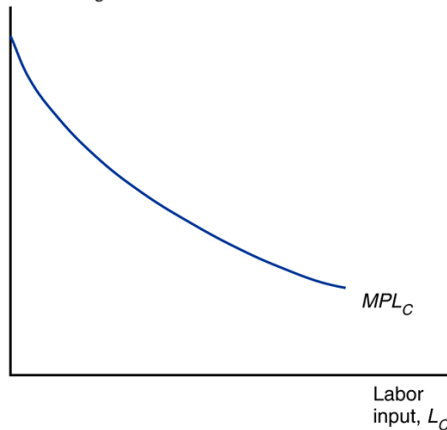
- The larger is the amount of labor used in cloth, the lower the increase in output from an increase in labor
- So the marginal product of labor is decreasing in L_C or $\partial(\partial F_C / \partial L_C) / \partial L_C < 0$



Diminishing Marginal Product of Labor

- Why are returns diminishing?
- When L_C increases (for a given K), each worker has less and less capital to work with
- The same is true with labor and land in food production

Marginal product
of labor, MPL_C



Discussion of Assumptions

- The model captures that, in the short - run, some factors are more flexible than others
 - They can move from employment in one sector to another more quickly or at a lower cost
- Example of labor and capital:
 - In the U.S., a displaced worker (relative to a non -displaced one) has a lower probability of being employed for the next 4 years following displacement
 - In comparison, capital depreciates over 15 -20 years and structures over 30-50 years

Discussion of Assumptions (cont.)

- In the short/medium- run, labor thus appears to be more flexible than capital across sectors
- The Specific Factors model captures the effects of trade in this short/medium- run time frame (5-15 years) where capital is fixed in each sector but labor is flexible (can move between sectors)
- Specific factors in the model will be capital and land, but you might find it more useful to think of these as representing different types of physical or human capital

Production Possibility Frontier

- Formally, we want to characterize the combinations of $Q_C = Q_C(K, L_C)$ and $Q_F = Q_F(T, L_F)$ that satisfy

$$L_C + L_F = L$$

- It is clear that $(0, Q_F(T, L))$ and $(Q_C(K, L), 0)$ are two points in the PPF
- What shape does the PPF take? Is it linear as in the Ricardian model?

Shape of the PPF: Heuristic Derivation

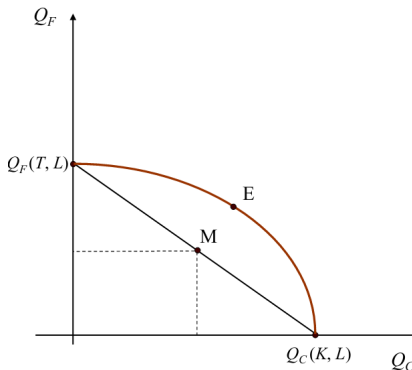
- Suppose PPF was linear Then the point M given by $(\frac{1}{2}Q_C(K, L), \frac{1}{2}Q_F(T, L))$ would be on the PPF too

- But note that (why?)

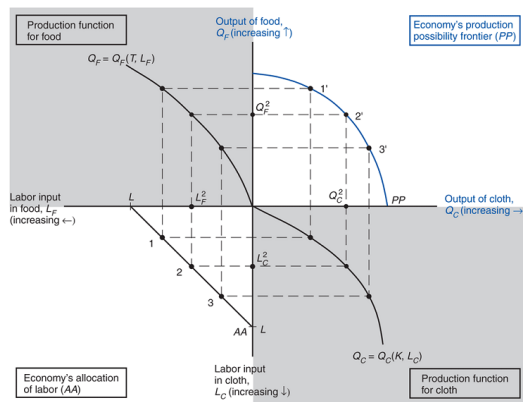
$$Q_C(K, \frac{1}{2}L) > \frac{1}{2}Q_C(K, L)$$

$$Q_F(T, \frac{1}{2}L) > \frac{1}{2}Q_F(T, L)$$

- So we can produce strictly more by allocating $\frac{1}{2}$ of labor to each sector



Graphical Derivation



Opportunity Costs and the PPF

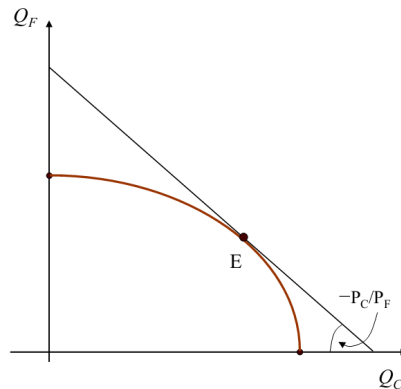
- Notice an important difference from the Ricardian model
- The opportunity cost of producing cloth in terms of food is not constant in this model:
 - it is **low** when the economy produces very little cloth and a lot of food
 - But it is **high** when the economy produces a lot of cloth and little food
- Opportunity cost of producing a unit of cloth is MPL_F/MPL_C units of food (since only labor input is moving along the PPF)
- Remember that the slope of the PPF measures this opportunity cost (we' ll come back to this)

Sketch of Supply Side Equilibrium

- Perfect competition and profit maximization will imply that the economy will produce at the point that maximizes the value of production, V :

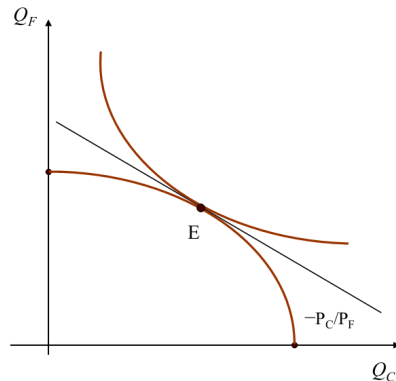
$$V = P_C Q_C + P_F Q_F$$

- P_C is the price of cloth and P_F is the price of food
- But this implies that the production point will be such that the slope of the PPF ($-dQ_F/dQ_C$) equals the relative price ratio P_C/P_F



Sketch of General Equilibrium

- Suppose that preferences are such that they can be represented by those of a representative consumer
- Then optimality on the demand side requires the marginal rate of substitution (i.e, the slope of the “social” indifference curve) to equal the relative price P_C/P_F
- So both supply-side factors and demand -side factors affect relative prices
- We will focus on supply-side differences across countries



Map the Equilibrium

- Having described the PPF, we will next discuss how the general equilibrium is actually determined
- First, we will study the allocation of labor across sectors
- Then we will trace its implications for the relative supply schedule
- And finally we will determine relative prices as the intersection of the relative supply and relative demand schedules (as in the Ricardian model)

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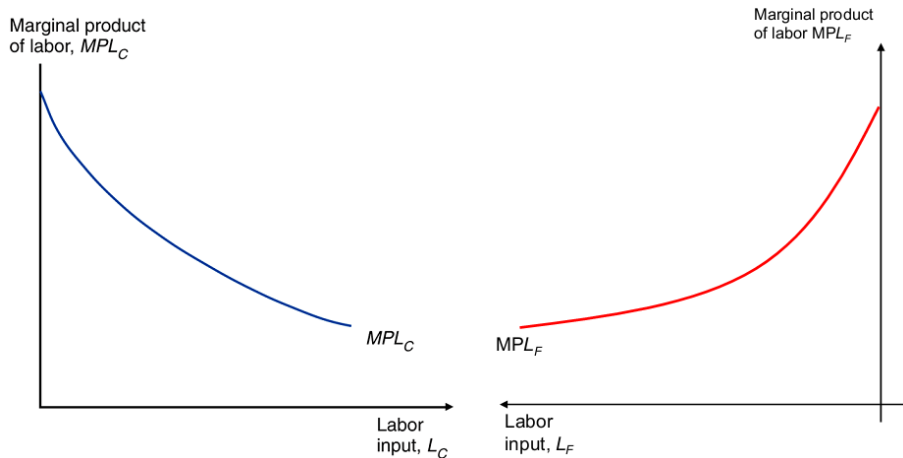
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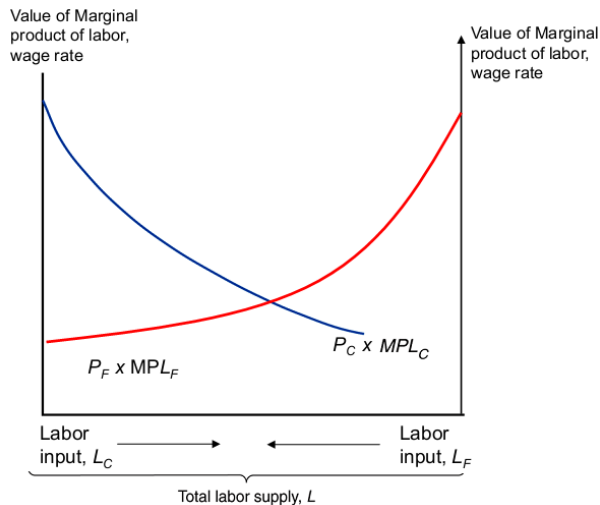
Allocation of Labor

- How much labor is employed in each sector?
 - Results from equilibrium between supply and demand in the labor market
- Demand for labor:
 - In each sector, employers will maximize profits by demanding labor up to the point where the value produced by an additional hour equals the marginal cost of employing a worker for that hour
 - Demand curve for labor in the cloth sector: $MPL_C \times P_C = w$
 - Demand curve for labor in the food sector: $MPL_F \times P_F = w$

Remember Diminishing MPL

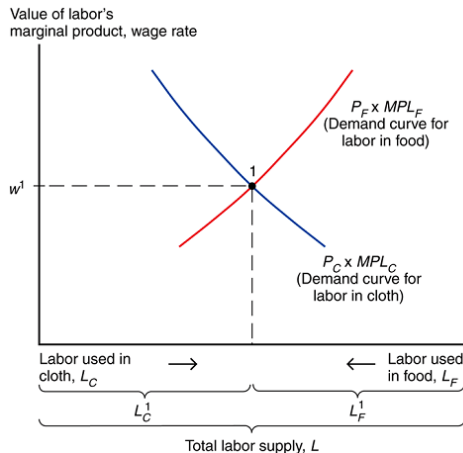


Combining Them!



Equilibrium in Labor Market

- The two sectors must pay the same wage because labor can move between sectors
- Where the labor demand curves intersect gives the equilibrium wage and allocation of labor between the two sectors

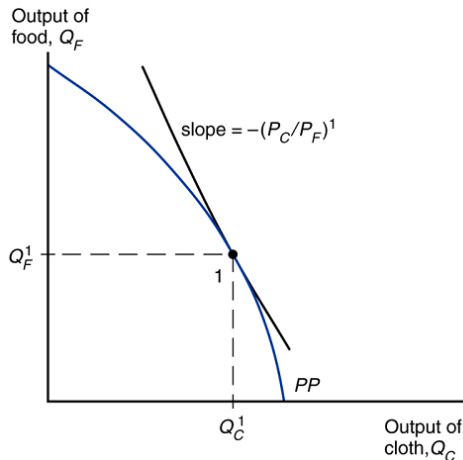


Equilibrium

- Notice that in equilibrium

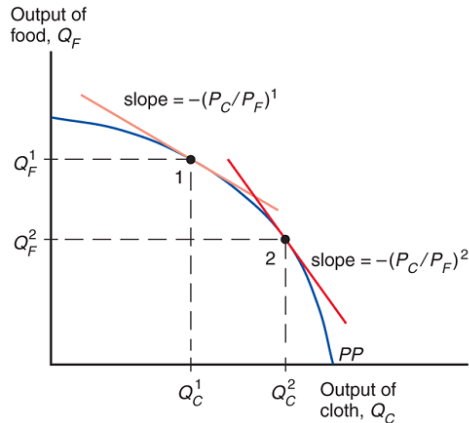
$$-MPL_F/MPL_C = -P_C/P_F$$

- So the allocation of labor is such that the production possibility frontier must be tangent to a line whose slope is minus the price of cloth divided by that of food, as anticipated earlier

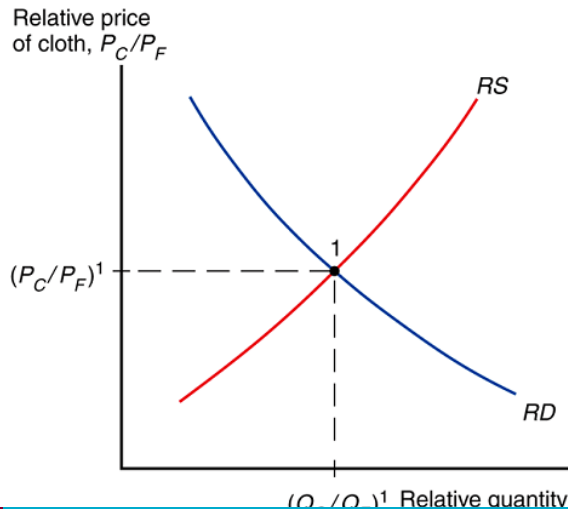


Deriving the Relative Supply Schedule

- Suppose that P_C/P_F rises
- This will increase the production of cloth and decrease the production of food (more on this later)
- The effect is smooth



General Equilibrium



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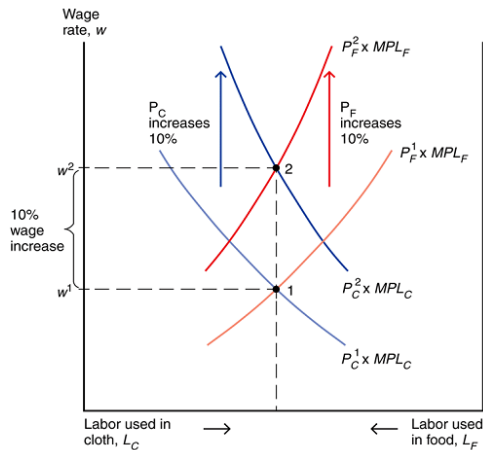


Prices, Wages and Labor Allocation

- What happens to the allocation of labor and the distribution of income when the prices of food and cloth change?
- Two cases:
 - 1 An equal proportional change in prices
 - 2 A change in relative prices

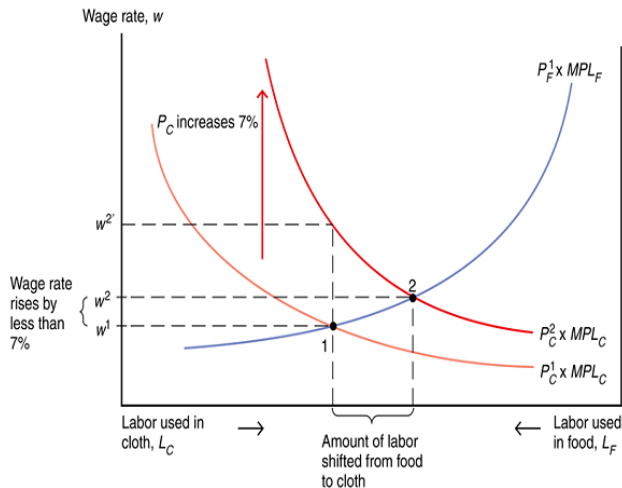
A Proportional Change in Prices

- No real changes occur
- The wage rate (w) rises in the same proportion as the prices, so **real wages** are unaffected
- The real incomes of capital owners and landowners also remain the same



An Increase in Relative Price of Cloth

- When only P_C rises, labor shifts from the food sector to the cloth sector and output of cloth rises while that of food falls
- Relative supply of cloth and food is thus (smoothly) increasing in the relative price P_C/P_F





Effect on Income Distribution

- Note that the wage rate (w) does not rise as much as P_C because cloth employment increases and thus the marginal product of labor in that sector falls (MPL_C falls)
- On the other hand, the wage rate (w) rises relative to the price of food P_F (since MPL_F rises)
- The effect on the purchasing power of wages (or real wages) is thus **ambiguous** and depends on the relative importance of cloth and food in workers' consumption



Effect on Income Distribution

- Owners of capital are definitely better off
- P_C/w rises and so does their volume of production
- Landowners are definitely worse off
- P_F/w falls and so does their volume of production
- **General principle:** changes in relative prices lead to distributional conflict between the owners of different specific factors



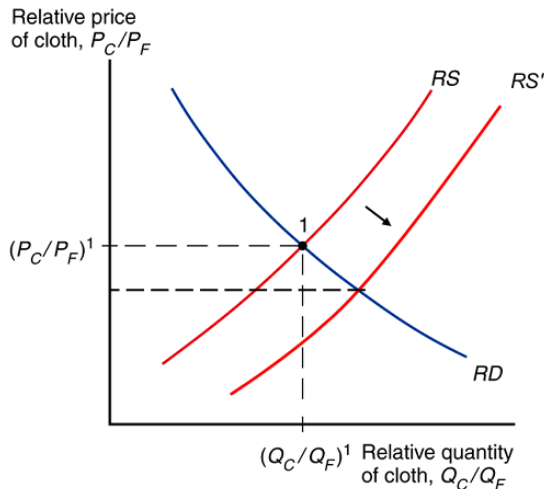
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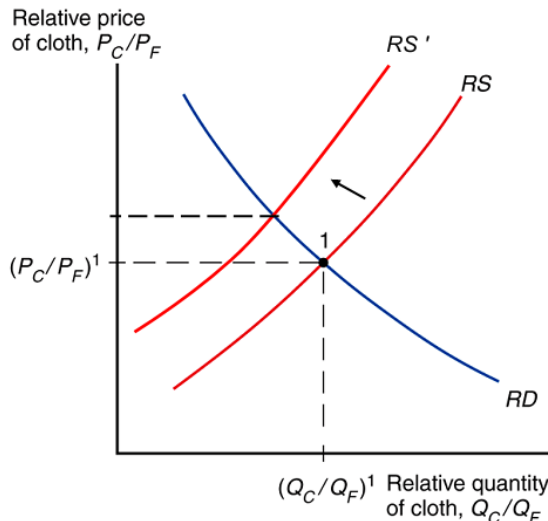
Changes in the Specific Factors

- Suppose the endowment of capital increases
- Labor moves from food production to cloth production
- Relative output of cloth goes up and relative price P_C/P_F goes down



Changes in the Specific Factors

- Suppose the endowment of land increases
- Labor moves from cloth production to food production
- Relative output of cloth goes down and relative price P_C/P_F goes up



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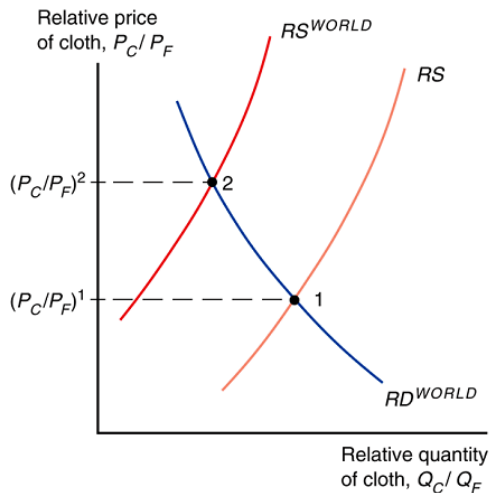
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International Trade

- Suppose Home has more capital but less land than Foreign
- For simplicity assume that both countries have the same labor force In which country will the relative price of cloth P_C/P_F under autarky be higher?
- Which country has comparative advantage in the production of cloth?

International Trade

- From the point of view of Home, trade opening is analogous to an increase in the relative price P_C/P_F
- This is because the world relative price will need to settle somewhere between the two autarky relative prices

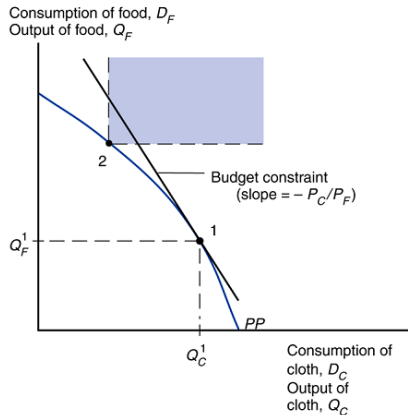


Pattern of Trade

- Because $(P_C/P_F)^W > P_C/P_F$, with trade, **Home'** s relative supply of cloth is higher than its relative demand
 - Hence, it will export cloth and import food
- Conversely, because $(P_C/P_F)^* > (P_C/P_F)^W$, **Foreign'** s relative supply of cloth is lower than its relative demand
 - Hence, it will export food and import cloth
- **In general**, the pattern of trade depends in a complicated manner on the endowments of all factors
 - but holding constant L and one of the specific factors, the good in the other sector will be exported by the country with the largest endowment of the factor specific to that sector

Gains from Trade

- The economy as a whole gains from trade
- Trade allows the mix of cloth and food consumed to differ from the mix produced
- Home is able to afford amounts of cloth and food that the country is not able to produce itself



Trade and Income Distribution

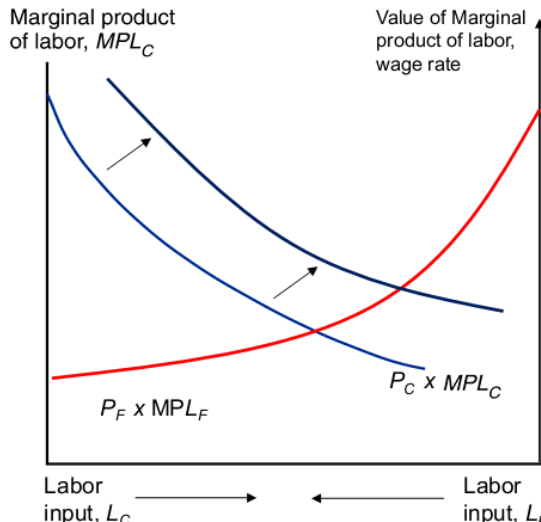
- From our previous discussion, trade opening:
 - benefits Home capitalists
 - hurts Home landowners
 - has an ambiguous effect on Home workers
- **General principle:** trade benefits the factor that is specific to the export sector of each country, but hurts the factor that is specific to the import-competing sectors
- But with appropriate redistribution, everybody could be made better off

Terms of Trade Effects

- The ratio of the price of the exported good to the price of the imported good is referred to as a country's **terms of trade**
 - For the home, it is P_C/P_F . Conversely for the foreign.
- As in the Ricardian model, improvements in the terms of trade (due for instance to proportional or import - biased growth in Foreign) will enhance aggregate welfare
- But now they will also lead to distributional conflict
- Owners of the specific factor in the import- sector will be hurt by improvements in the terms of trade

Domestic Growth

- Holding constant the terms of trade, domestic increases in the endowments of specific factors will hurt both specific factors but will benefit labor



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Effects of Tariff Protection

- We have argued that a move to free trade will move relative prices from their autarky level to the level in world markets
- If a country sets a tariff on its imports, then this will be analogous to a move of its relative prices back to a level closer to its autarky level
- Two caveats:
 - This will also generate tariff revenue, so effects are more involved
 - If a country is large enough, its tariffs might affect world prices
 - We will come back to these issues later in the course

Back to Corn Laws

- Because Britain was a net exporter of manufactures and a net importer of cereal products, it is not surprising that:
 - Landowners favored import protection of cereal products
 - Capitalists or industrialists opposed it
 - Workers had ambivalent views
- Yet, it seems that industrial workers tended to oppose it, while land laborers tended to favored it
 - Why?

The Short -Run

- Suppose that workers could not relocate across sectors immediately after trade opening
- What would be the impact of trade on their welfare?
- Depends on the sector in which the worker is employed
- Then welfare of **both factors** in the comparative advantage sector rises, and the welfare of **both factors** in the other sector falls
 - Same as in an endowment economy where each factor's endowment is entirely composed of the good in the sector where that factor is

The Long -Run

- Think of land now as a type of physical capital that is specific to food production, but that with time can be converted into the type of physical capital used in the production of cloth
- The equilibrium in the long - run is thus analogous to that in a two - factor model in which both factors are freely mobile across sectors
 - Do we then go back to the predictions of the Ricardian model?
 - Do distributional effects of trade vanish?

Agenda for Next Week

■ Trade and Resources: The Heckscher-Ohlin Model

- Heckscher-Ohlin Model (I). Motivation. Model Assumptions and Autarky Equilibrium
- Heckscher-Ohlin Model (II). Trade Equilibrium, Comparative Statics and Empirical Evidence
- Heckscher-Ohlin Model (III). An Application: The Trade and Wages Debate.

■ Readings:

- K-O-M Chapter 4 and 5
- F-T Chapter 4