

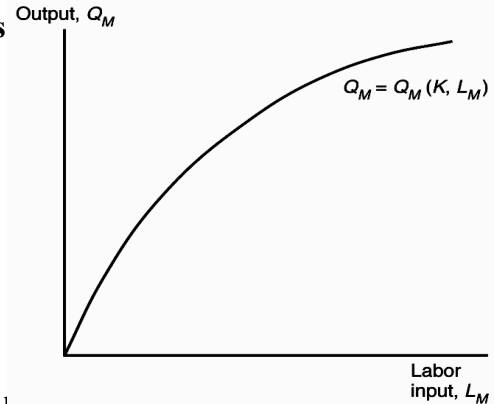
## Lecture #4 Economics C181, EEP C181 International Trade

### Finishing Up Ricardo and introducing Specific Factors

#### I. Many goods

#### II. Shortcomings of Ricardian Framework:

- One factor of production
- No distributional conflicts
- Trade not affected by endowments like land or capital
- Factor moves costlessly from producing one good to another
- No possibility for dynamic comparative advantage



#### III. Specific Factor Model

New model overcomes some of these limitations: the Specific Factors (land, capital) are specific to certain goods (ie only used to produce those goods)

Assumptions:

- 2 goods. Example below: manufactures M and food F
- 3 factors of production: 1 mobile, two specific.  
Example below: labor (L), capital (K), and land (T)
- mobile factor is used to produce both goods. Example below: labor is mobile factor used for manufactures or food
- Specific factors can only be used for producing 1 good and can't move. Example below: land is a specific factor used only for food and capital is a specific factor used only for manufactures.
- production functions as follows:
 
$$Q_m = Q_m(K, L_m)$$

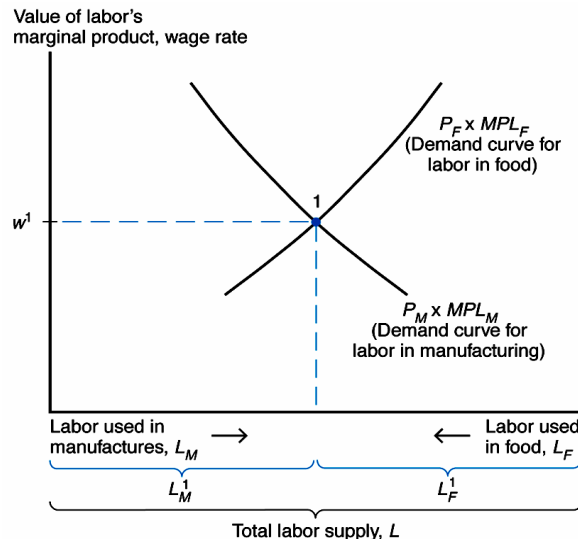
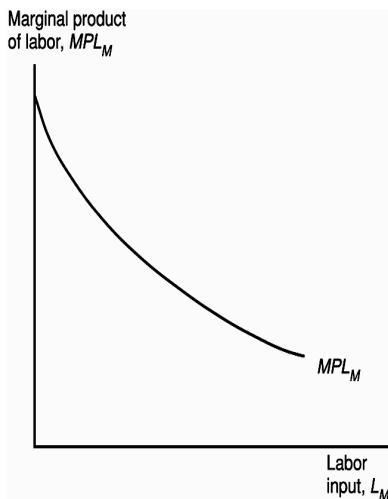
$$Q_f = Q_f(T, L_f)$$
- $L_m + L_f = L$
- Diminishing returns. As increase labor input, get less additional output of M or F.

**Point #1:** Diminishing returns leads to a production function that looks like the diagram above (“concave”).  
Production function slopes upwards because as increase labor, output rises. But slope gets flatter as add more labor.

Slope of production function = change in Q/change in L = marginal production of labor = MPL

**Point #2:** MPL falls as L rises, leading to the downward-sloping MPL curve below on the left.

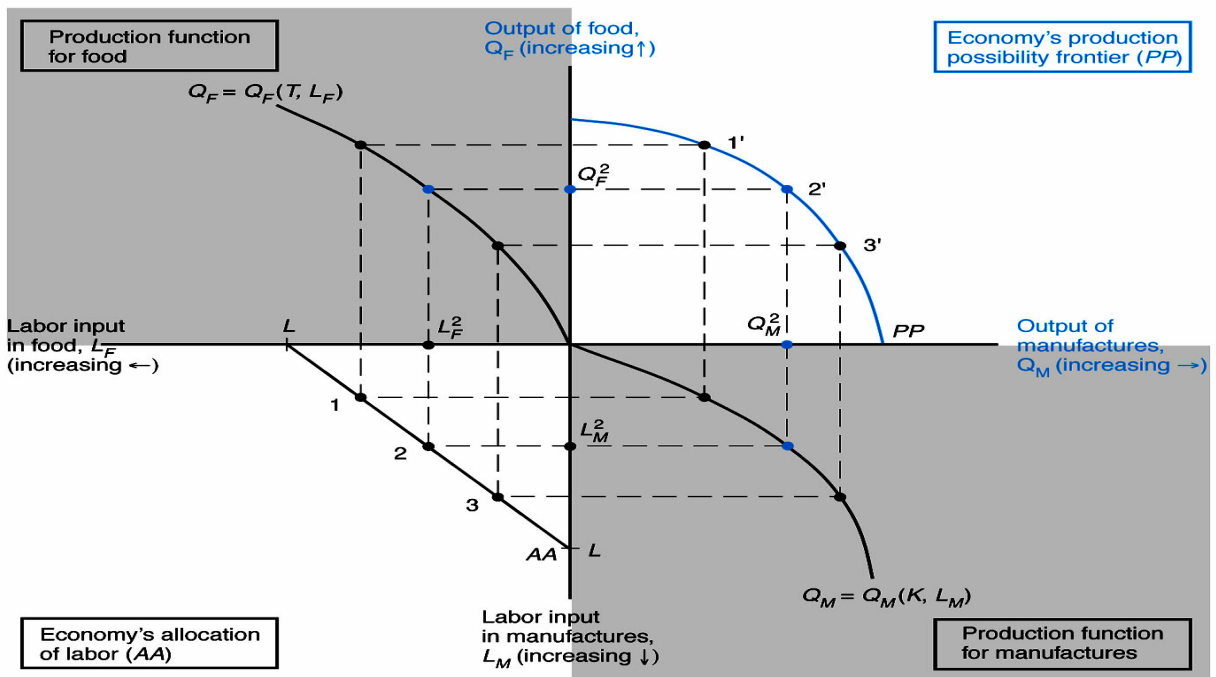
**Point #3:** The MPL curves for both Food and Manufactures can be transformed into labor demand curves by multiplying them by the prices of food and manufactures. In equilibrium,  $P_m \times MPL_m = w = P_f \times MPL_f$   
This can be rewritten as  $MPL_f/MPL_m = P_m/P_f$



Our goal now is to show what the production possibilities frontier looks like with this framework (recall that a production possibilities frontier, or PPF shows all possible combinations of the two goods that the economy can produce). In the Ricardian model, the PPF is a straight line.

We begin by redrawing the production functions for manufactures and food. If these are rotated, they end up looking like the graphs in the upper left and lower right quadrants below. Now, recall that  $L_m + L_f = L$  is the amount of labor allocated to each sector must not exceed the total amount of labor in the economy. So if we used all labor in food, then we would be at point L on the left-hand side horizontal axis, with  $Q_m = 0$ . If we allocated all labor to manufactures, we are at point L on the vertical axis and  $Q_f = 0$ . If we connect the LL line we have all possible combinations of labor allocation between food and manufactures, with a slope of  $-1$ .

Finally, you can derive the production possibility frontier (PPF) by tracing the implications for food and manufactures production if you begin with a labor allocation at 1. Then you end up at 1' on the PPF. If you begin with an allocation at 3, you end up at 3' on the PPF. If labor is split evenly between food and manufactures (point 2), then you end up at point 2' on the PPF, split between producing food and manufactures.



**Point #4:** The production possibility frontier (PPF) is bowed in (concave), due to the shape of the production functions. The intuition is as follows: at 1', the economy is hitting diminishing returns in food production so a small fall in food production leads to a big increase in manufactures. At 3', the opposite is true: there are diminishing returns to manufactures production so a small decline leads to a big increase in food production.

**Point #5:** Slope of PPF =  $-MPL_f/MPL_m = -P_m/P_f$

Can you show how maximizing the a simple profit function allows us to show  $P_m/P_f = MPL_f/MPL_m$ ?

