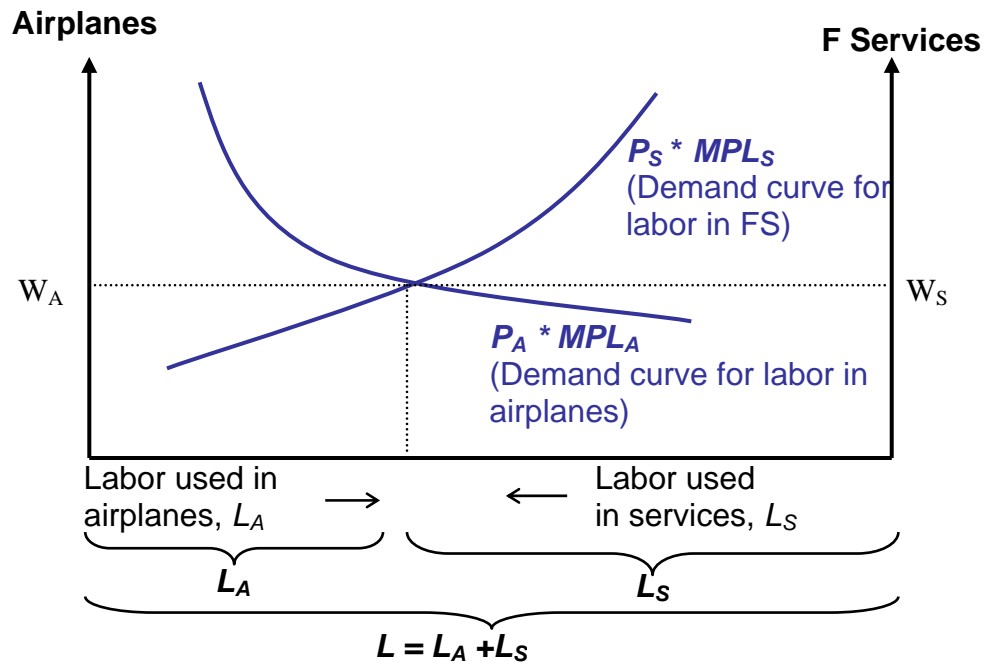


Setup: France can produce 2 goods (airplanes and financial services) using labor (L) that is mobile between the 2 sectors. Capital machinery (K) is specific to producing airplanes. Executives with MBA's in finance (MBA) are specific to producing financial services.

1. Draw a bucket diagram

a. Show how French labor (L) is allocated between airplanes and financial services.



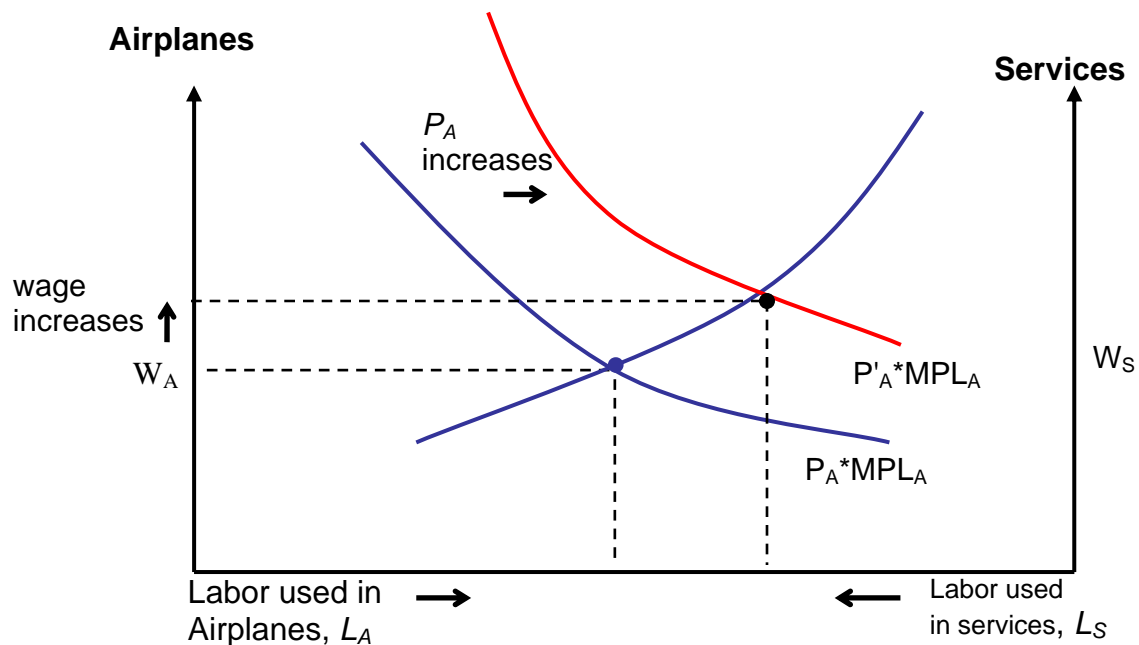
b. What conditions must be met for this to be an equilibrium?

i. Labor is used up between both sectors

ii. Firms in both sectors are paying workers a wage (marginal cost) equal to the marginal benefit of hiring them.

ii. At equilibrium, $W_A = W_S \Rightarrow P_S * MPL_S = P_A * MPL_A$ because firms hire workers until marginal cost (wage) equals marginal benefit $P * MPL$.

2. Redraw the bucket diagram, and let the price of airplanes rise.



a. What happens to the labor demand curve in the airplane sector?
Shifts to the right.

b. What happens to the allocation of labor and why?

$$P_A \uparrow \Rightarrow P_A * MPL_A \uparrow$$

The marginal benefit of hiring labor in airplanes has gone up.

=> Airplane firms wages go up ($w_A \uparrow$)

=> Labor moves into airplanes and out of financial services.

c. What happens to the real and nominal labor wage?

The nominal wage has risen (see diagram) by less than the increase in the price of airplanes. Whether the real wage has gone up is ambiguous (it depends on the importance of airplanes and financial services in the consumption bundle.)

d. What happens to the return on airplane capital (hint: there are two effects)?

$$r_A = P_A * MPK_A$$

$$\uparrow \quad \uparrow \quad \uparrow$$

P_A is given, and MPK_A is rising because you are given the same K more L to work with. So the return on airplane capital rises.

e. What happens to the return to an MBA degree?

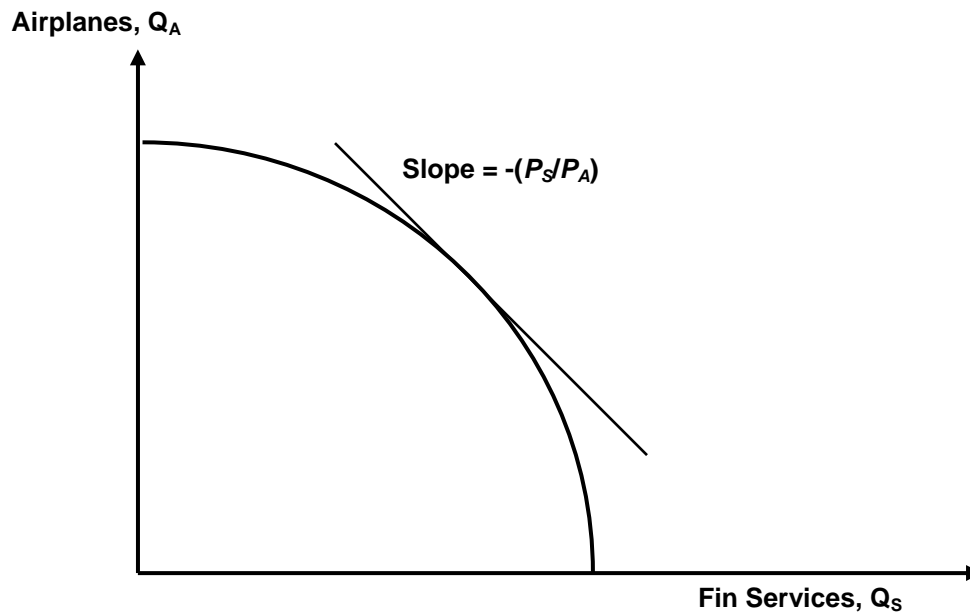
$$r_s = p_s * MPK_s$$

↓ ↓

No changes in P_s , but $L_s \downarrow \Rightarrow MPK_s \downarrow$. The return to an MBA degree declines.

3. Draw a PPF for France.

c. Increase the output ratio (airplanes/financial services) to 2. How has the slope of the French PPF changed and why?



a. Explain why it is shaped this way, making a specific comparison to the PPF in the Ricardian model.

The PPF is curved, while in the Ricardian model it is a straight line. The slope of the PPF reflects the opportunity costs of production, which are constant in the Ricardian model. In the SF model the opportunity costs of production are increasing the more you produce in a particular good.

The PPF tells me tradeoffs between airplanes and financial services. As I move a laborer from FS to airplanes I raise airplane output by the $MPL(a)$ at that point and lower FS output by $MPL(fs)$ at that point. Since $MPLs$ are decreasing in L , there is curvature in the PPF.

In other words, at very low levels of airplane output the $MPL(a)$ is big and the $MPL(fs)$ is very small. By moving one workers I get a lot more airplane output while reducing FS output by a small amount. So, the slope is steep. As I get closer to an even mix of the two, additional movements of labor get me a smaller increase in airplane output and a larger decrease in FS output, so the slope flattens out.

RICARDIAN MODEL: the PPF is also given by the ratio of MPL 's, but in the Ricardian model these are a constant. As a result the PPF is a straight line, no curvature.

b. Pick an output ratio (airplanes/financial services) = 1. What is the slope of the French PPF at this output ratio equal to and why? (I want an equation here, not a number.)

The ratio of the MPL 's is equal to the relative prices. To see why, note that we hire workers until

$$W_a = P_a MPL_a$$

$$W_{fs} = P_{fs} MPL_{fs}$$

Since wages are equal across sectors (labor market arbitrage)

$$P_a MPL_a = P_{fs} MPL_{fs}$$

so

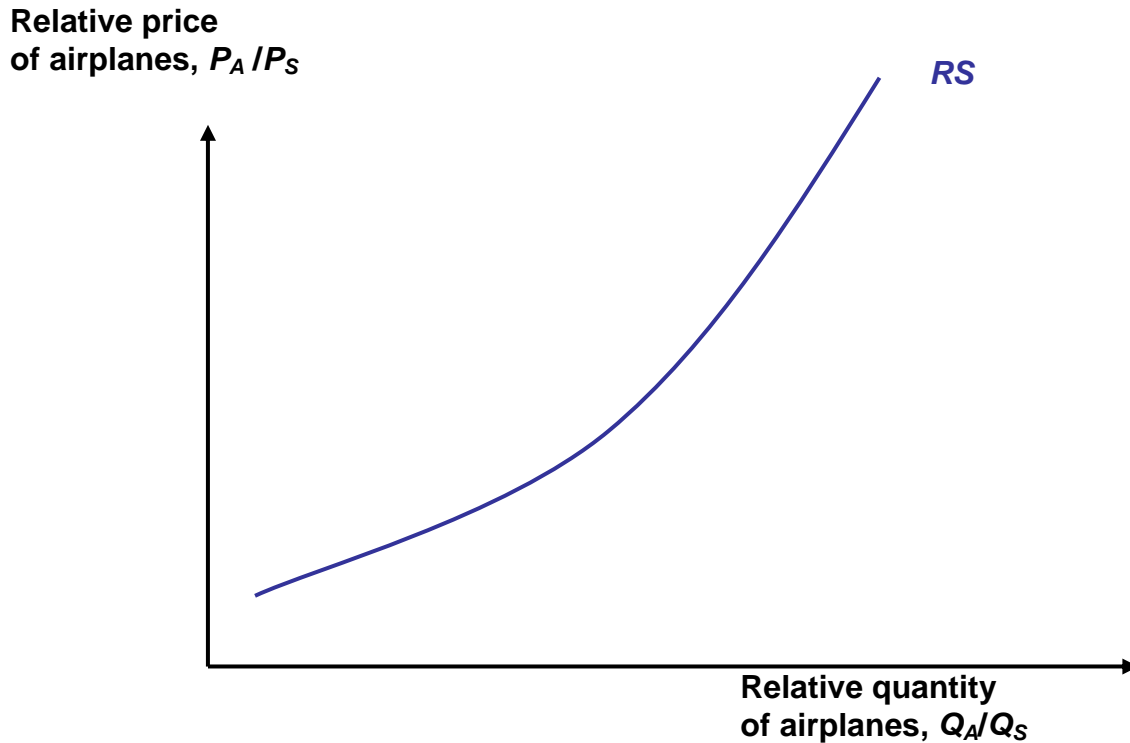
$$\frac{P_{fs}}{P_a} = \frac{MPL_a}{MPL_{fs}}$$

Note that in the Ricardian model these MPL 's were a constant and equal to $1/a$.

c. Increase the output ratio (airplanes/financial services) to 2. How has the slope of the French PPF changed and why?

To increase the output ratio (airplanes/financial services) from 1 to 2 we have to move workers out of FS and into airplanes. This lowers $MPL(a)$ and raises $MPL(fs)$, flattening the slope.

4. Use what you have learned from questions 2 and 3 to draw a relative supply (RS) curve showing how the relative output of airplane/financial services changes as the relative price of airplanes/financial services changes.

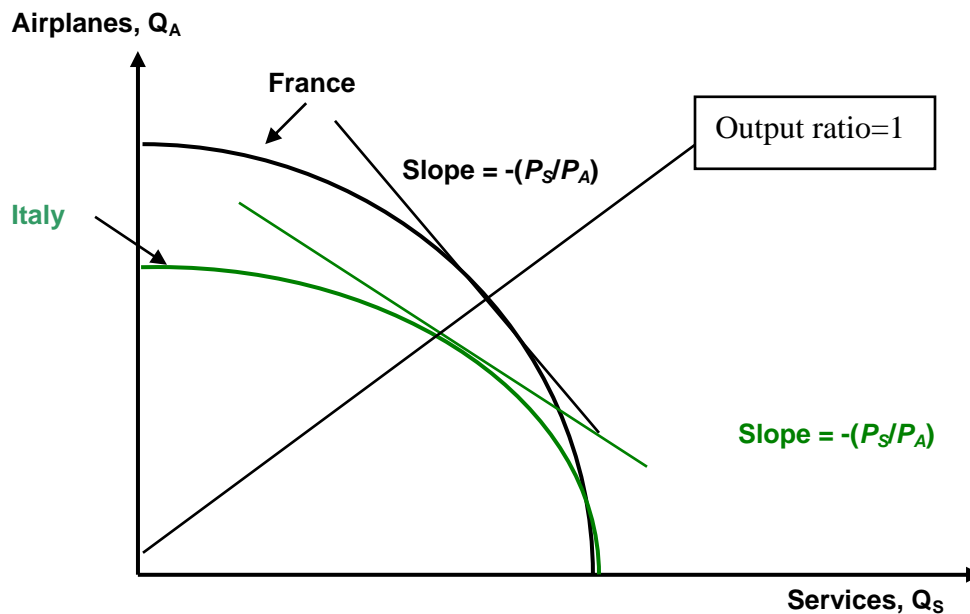


An increase of airplanes' relative price ($\frac{P_A}{P_S} \uparrow$) leads to an increase of labor used in airplanes ($L_A \uparrow$) and a decrease of labor in services ($L_S \downarrow$).

$$\begin{aligned} \frac{P_A}{P_S} \uparrow &\Rightarrow L_A \uparrow \text{ and } L_S \downarrow \\ &\Rightarrow Q_A \uparrow \text{ and } Q_S \downarrow \\ &\Rightarrow \frac{Q_A}{Q_S} \uparrow \end{aligned}$$

Consider a second country, Italy. Italy has the same size labor force, the same number of persons with MBAs, the same demand for and the same technology for producing airplanes and financial services as France. However, France has more airplane capital, $K^F > K^I$.

5. Recopy the French PPF from question 3.
a. On the same graph, draw the Italian PPF.



Note that if they have the same amount of labor and MBAs, then if all labor is making financial services they can produce the same amount.

However, France has more airplane capital, meaning that a shift of labor toward airplanes generates more airplane output in France than in Italy.

b. Pick an output ratio (airplanes/financial services) = 1. Compare the slopes of the Italian and French PPF's at this output ratio.

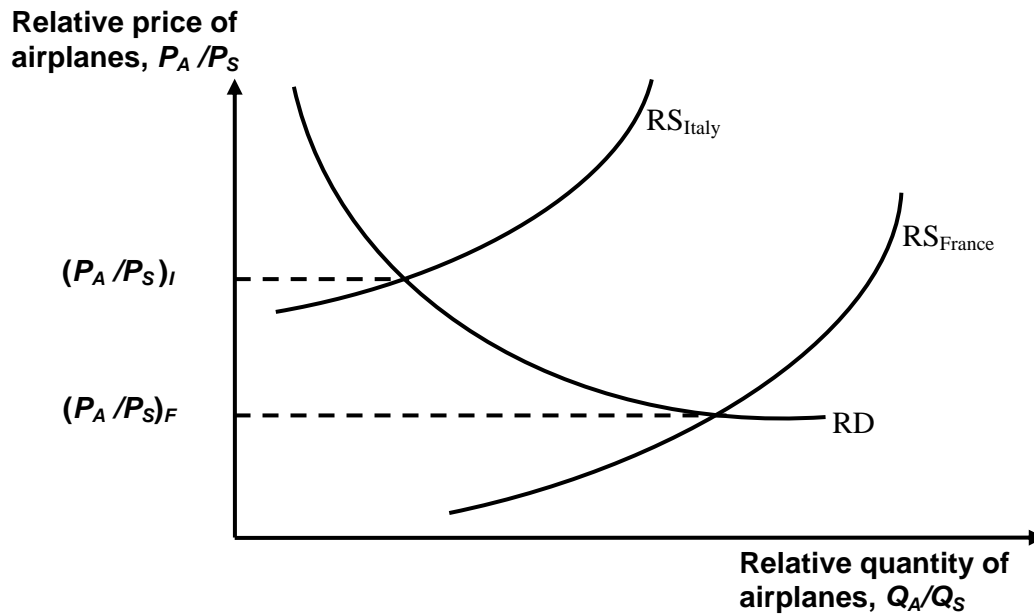
To pick a constant output ratio, draw a straight line running through the origin. At all points on this line the output ratio is a constant.

The French PPF is shifted toward airplane production. At any relative $\frac{Q_A}{Q_S}$ the slope of

France's PPF is steeper. $(\frac{P_S^F}{P_A^F} > \frac{P_S^I}{P_A^I})$, meaning that the opportunity costs of producing

financial services is higher for France than for Italy. Or, at any relative $\frac{Q_A}{Q_S}$, $\frac{P_A^I}{P_S^I} > \frac{P_A^F}{P_S^F}$.

6. Recopy the French relative supply curve airplanes/financial services from question 4.
a. On the same graph, draw the Italian RS curve.



Why are they different?

At any $\frac{Q_A}{Q_S}$ France has a lower opportunity cost of producing airplanes. At any $\frac{P_A}{P_S}$

France can produce a higher $\frac{Q_A}{Q_S}$ than Italy.

b. Combine this with a relative demand curve to show how relative prices of the two goods differ across the two countries in autarky.

As shown in the diagram, the relative price of airplanes ($\frac{P_A}{P_S}$) is higher in Italy than in France.

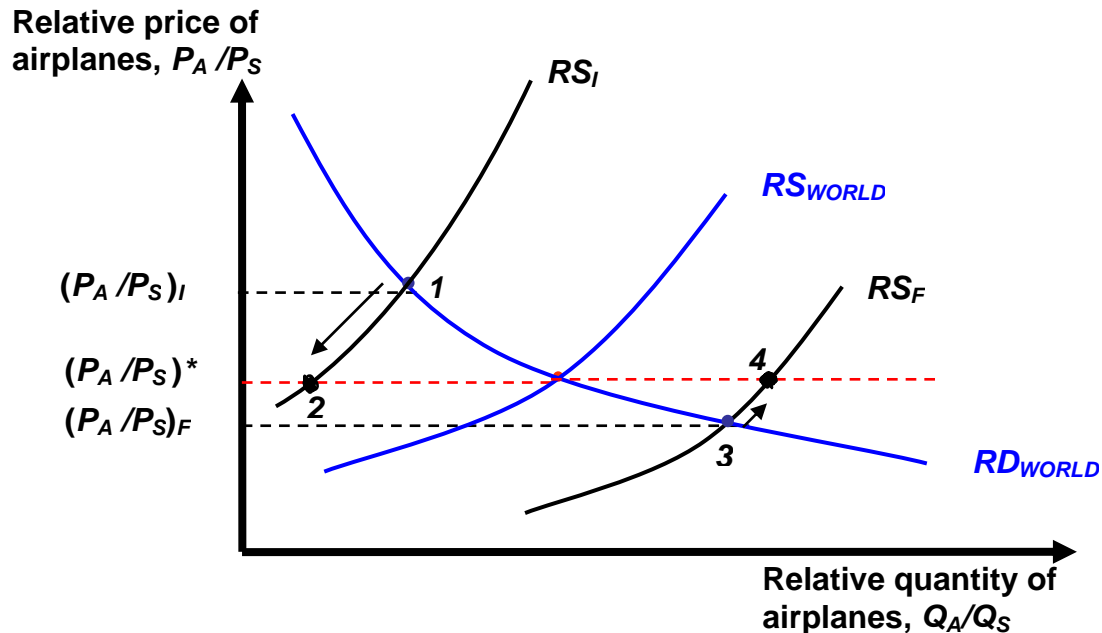
7. Now that you know autarky prices (comparative advantage), we can analyze trade and its effects on each economy.

- Describe the pattern of trade and changes in the pattern of output in each country.
- Copy the RS curves from question 6 and show how each country moves along their RS curve as a result of trade. Show the point at which these countries stop specializing (hint: check the arbitrage conditions).

- c. Compare autarky relative prices (airplanes/financial services) to free trade prices in each country.
- d. How do these goods price changes affect the return to airplane capital and the returns to an MBA degree in France? In Italy?

a. Since France has a lower $\frac{P_A}{P_S}$ in autarky, it exports airplanes. Italy has a lower $\frac{P_S}{P_A}$ in autarky, and it exports financial services. French airplane output rises and services output falls; and vice versa for Italy.

b. Copy the RS curves from question 6 and show how each country moves along their RS curve as a result of trade. Show the point at which these countries stop specializing (hint: check the arbitrage conditions).



$(P_A/P_S)^*$ is the free trade price.

Specialization;

Italy: $Q_S \uparrow, Q_A \downarrow \Rightarrow$ move along RS_I from 1 to 2

France: $Q_A \uparrow, Q_S \downarrow \Rightarrow$ move along RS_F from 3 to 4

Note: These moves cause prices to converge at red line.

- c. Compare autarky relative prices (airplanes/services) to free trade prices in each country.

France: compared to autarky the relative price of airplanes rises.

Italy: compared to autarky the relative price of airplanes falls.

d. How do these goods price changes affect the return to airplane capital and MBA degrees in France? In Italy?

In France;

$$\frac{r_A}{r_S} = \left(\frac{P_A}{P_S} \right) * \left(\frac{MPK_A}{MPK_S} \right)$$

$\uparrow \quad \uparrow \quad \uparrow$

Relative prices move due to arbitrage. As France specializes, $L_A \uparrow, L_S \downarrow \Rightarrow MPK_A \uparrow, MPK_S \downarrow$. The return to airplane capital increases while the return to MBA's decreases.

In Italy;

$$\frac{r_A}{r_S} = \left(\frac{P_A}{P_S} \right) * \left(\frac{MPK_A}{MPK_S} \right)$$

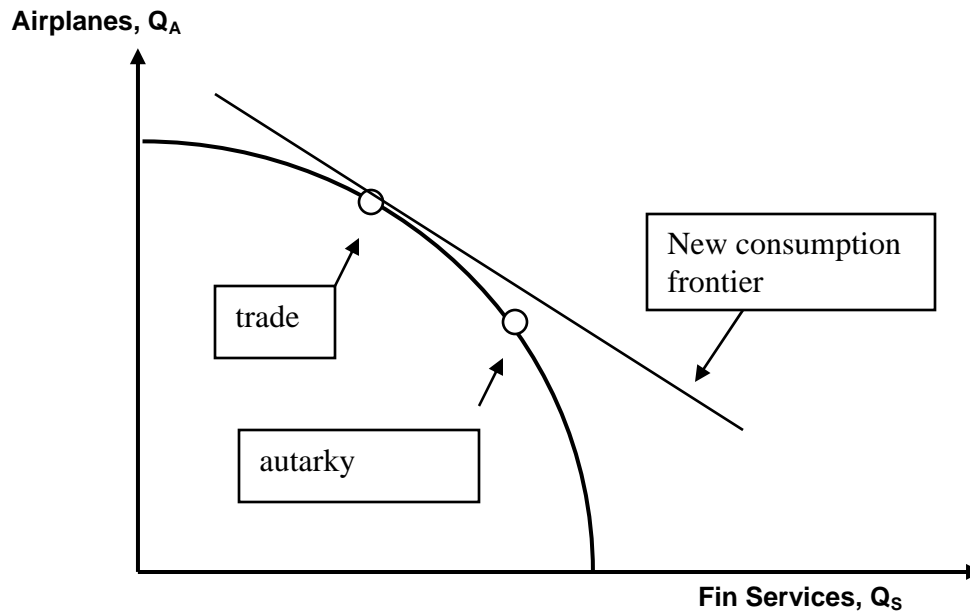
$\downarrow \quad \downarrow \quad \downarrow$

Relative airplane price moves down due to arbitrage. As Italy specializes, $L_A \downarrow, L_S \uparrow \Rightarrow MPK_A \downarrow, MPK_S \uparrow$. The return to airplane capital falls while the return to an MBA degree increases.

Point: trade benefits the factor that is specific to the export sector of each country but hurts the factor specific to the import-competing sector.

8. Welfare gains.

- a. Redraw the French PPF and show movement along the PPF as a result of the move from autarky to free trade.
- b. Show the new consumption frontier.
- c. Look at the French economy in the aggregate. Has it gained or lost from trade? Has Italy?
- d. Is there anyone in France who might, on pure economic grounds, oppose the move to freer trade? In Italy?



Trade causes France to shift output along the PPF toward airplanes.

The free trade price of airplanes relative to financial services rises, or inverting that P_s/P_a falls.

The economy takes its production bundle at the new output point and can sell it at the new set of prices along the new price line P_s/P_a . That's the new consumption frontier.

c. Because the consumption frontier is higher than the old CPF (same as PPF) this economy has gained from trade.

A similar procedure can be used to show that Italy also gains – both countries have improvements in their terms of trade relative to autarky.

d. While there are aggregate gains to France, people with MBA degrees are worse off because demand for their services has gone away. They might oppose the move to freer trade. Similarly, owners of airplane capital in Italy might oppose moves to freer trade because they are worse off.