

14.54 International Trade

—Lecture 11: Specific Factors Model—

Today's Plan

- ① Setup
- ② Autarky and Trade Equilibrium
- ③ Impact of Trade

Graphs on slides 10, 11, and 13-17 are
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Basic Motivation

- In the short-run, some factors are more 'flexible' than others
- Recall the example of labor and capital:
 - After a U.S. state is hit with a regional shock, unemployment rate falls back to national average within 6 years (most inter-regional employment reallocations also involve worker reallocations across sectors)
 - In comparison, capital depreciates over 15-20 years and structures over 30-50 years
 - In the short-run, labor is more 'flexible' than capital across sectors
- We will study the effects of trade in this short-run time frame (5-15 years) where capital is fixed in each sector but labor is flexible (can move between sectors)

Who Wins and Who Loses from Trade?

Textile Owners, Roubaix France, XIXth century



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Who Wins and Who Loses from Trade?

Textile Workers, Roubaix France, XIXth century



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Who Wins and Who Loses from Trade?

Wine Makers, Bordeaux France, XIXth century



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Who Wins and Who Loses from Trade?

Rural Workers, Macon France, XIXth century



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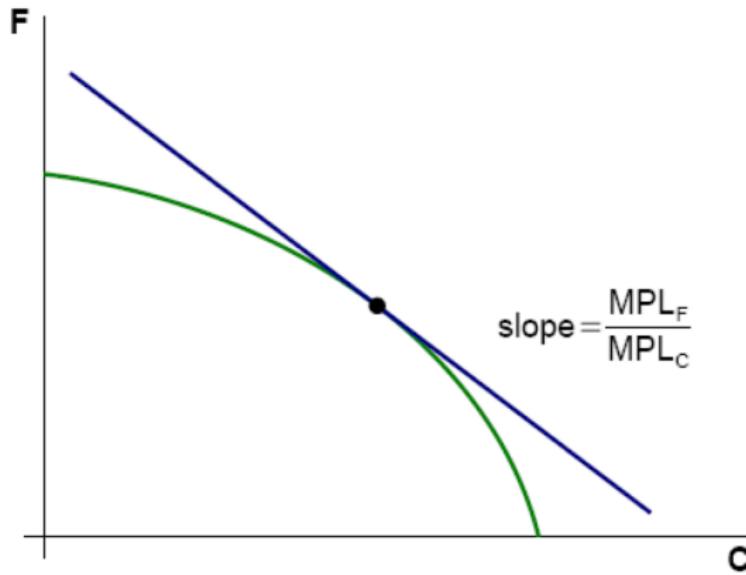
Main Assumptions

- The technologies for producing C and F are now represented by two production functions: $Q_C = F_C(K_C, L_C)$ and $Q_F = F_F(K_F, L_F)$
- The capital allocated to each sector (K_C and K_F) is fixed
 - K_C and K_F can also represent different types of capital (machines versus land)
 - ... in which case capital cannot be reallocated across sectors even in the long run
- The labor allocated to each sector (L_C and L_F) can change in response to outside shocks
 - ... such as opening to trade or changes in terms of trade
 - Subject to an aggregate endowment constraint: $L = L_C + L_F$ where L is fixed

Production Possibilities Frontier

- Technologies F_C , F_F and endowments K_C , K_F , L determine the aggregate PPF
- A movement along the PPF represents a shift of labor across sectors
- What is shape of PPF?
- Think of relative marginal cost of C :
 - If one unit of labor is moved from F to C ($L_F \searrow$ and $L_C \nearrow$) Then $Q_C \nearrow$ by MPL_C and $Q_F \searrow$ by MPL_F
- In order to produce one more unit of C , country must produce MPL_F / MPL_C less units of F
- This is the relative marginal cost of C
- Note that this relative marginal cost is increasing in C
 - As $C \nearrow$ ($F \searrow$), $L_C \nearrow$ ($L_F \searrow$) and thus $MPL_C \searrow$ and $MPL_F \nearrow$ so $MPL_F / MPL_C \nearrow$

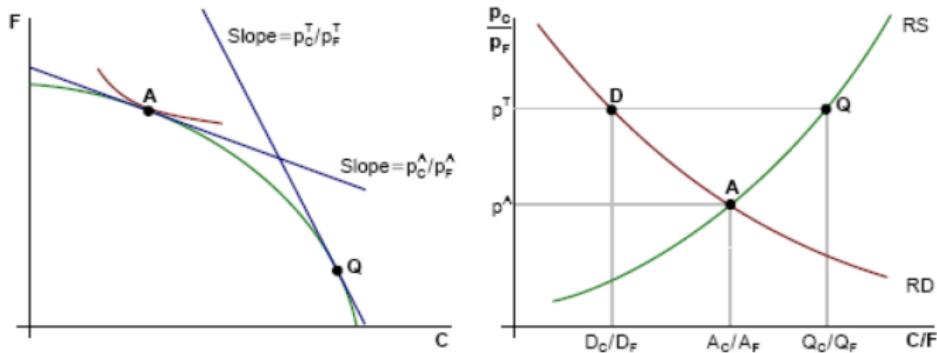
Production Possibilities Frontier (Cont.)



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Autarky and Trade Equilibrium

- Given consumer preferences for C and F :
 - How is autarky price determined?
 - What is trading equilibrium given a world trade price p_C^T / p_F^T ?



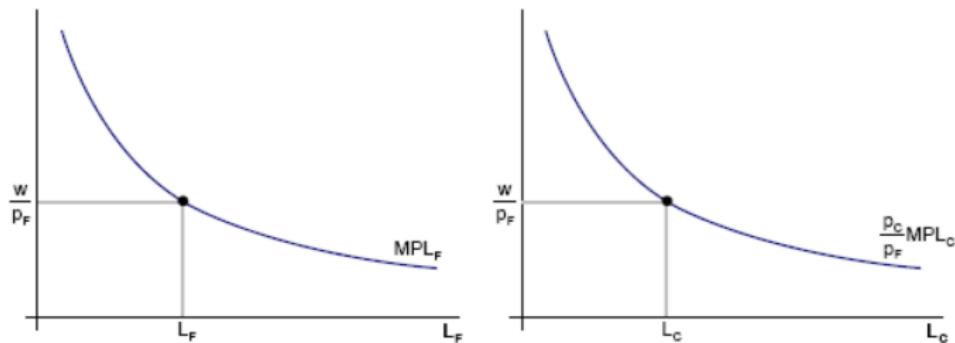
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Determination of Factor Prices

- Factors (labor and capital) are paid the value of their marginal products
 - Capital: $r_C = p_C MPK_C$ and $r_F = p_F MPK_F$
 - Labor: $w_C = p_C MPL_C$ and $w_F = p_F MPL_F$
- Since labor is flexible, labor moves to sector with higher wage until wage in both sectors are equalized: $w = p_C MPL_C = p_F MPL_F$
 - Note that this automatically implies revenue maximization at given p_C / p_F (equal to slope of PPF, MPL_C / MPL_F)
- Note important consequences of diminishing returns to a single factor:
 - As labor leaves a sector, this raises the marginal product of the remaining workers (and diminishes the marginal product of workers in the other sector)
 - This generates a substantial cost to increasing specialization in any given sector
 - ... and will most often lead to incomplete specialization (even under arbitrary trade prices)
- This contrasts with Ricardian model where MPL_F / MPL_C is fixed

Determination of Wages and Labor Allocation

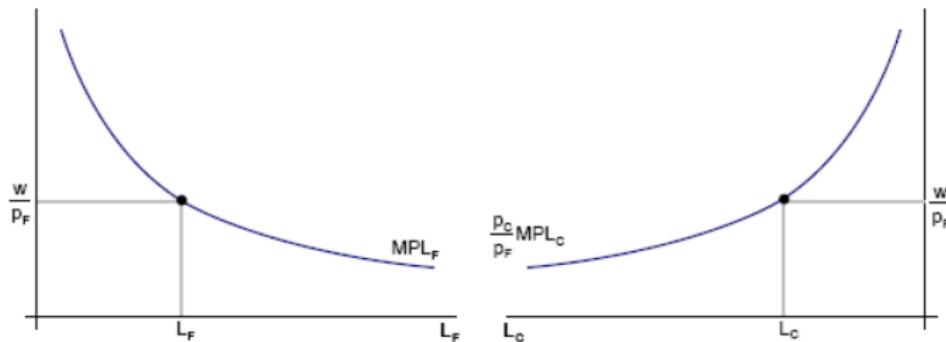
- Fix p_C / p_F
- Recall that $w = p_C MPL_C = p_F MPL_F$
- Think of wage in terms of purchasing power in units of F :
 $w / p_F = MPL_F = (p_C / p_F) MPL_C$



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Determination of Wages and Labor Allocation

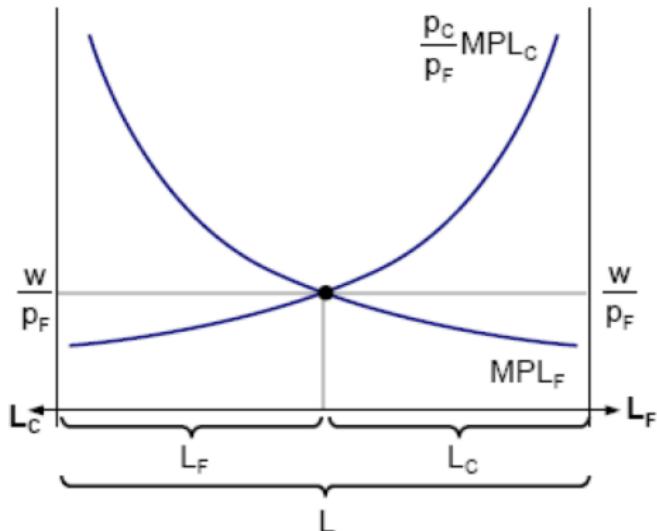
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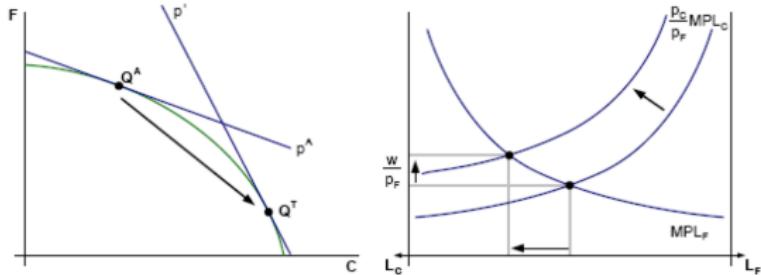


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- Note the effects of proportional changes in p_C and p_F

Impact of Trade on Labor Reallocation and Wages

- Consider the transition from autarky to trade for a country with a comparative advantage in C
- So p_C/p_F increases from p^A to p^T

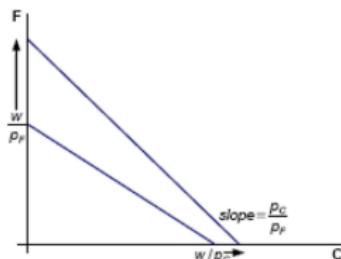


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- Graph shows reallocation of labor from F to C ($L_C \nearrow$ and $L_F \searrow$)
 - (If labor did not move, then wages would be higher in C than in F)
- $w/p_F = MPL_F \nearrow$ (since $L_F \searrow$) but $w/p_C = MPL_C \searrow$ (since $L_C \nearrow$)
- Workers' buying power in terms of F increases but decreases in terms of C

Evaluating Changes in Welfare from Price Changes

- Although exact changes in welfare will depend on preferences (the utility function), some comparisons can be made by examining relative factor price changes
- If w/p_C and w/p_F both increase, then the welfare of workers must increase (for any preferences)
 - ... and conversely if w/p_C and w/p_F both decrease



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- Welfare of capital owners in C and in F can be evaluated in similar ways
- Relative factor welfare changes can be evaluated using w/r_C , w/r_F , r_C/r_F so long as all factors have the same preferences

Impact of Trade on Welfare

- Workers
 - Recall that $w/p_F = MPL_F \nearrow$ (since $L_F \searrow$) but $w/p_C = MPL_C \searrow$ (since $L_C \nearrow$)
 - Thus, the welfare change is ambiguous (will depend on preferences)
- Capital owners in comparative advantage (export) sector (C)
 - $r_C = p_C MPK_C$ so $r_C/p_C = MPK_C \nearrow$ since $L_C \nearrow$
 - $r_C/p_F = (p_C/p_F)MPK_C \nearrow$ since $L_C \nearrow$ and $p_C/p_F \nearrow$ (so r_C/p_F increases by more than r_C/p_C)
 - Thus, the welfare of capital owners in C unambiguously rises
- Capital owners in import sector (F)
 - $r_F = p_F MPK_F$ so $r_F/p_F = MPK_F \searrow$ since $L_F \searrow$
 - $r_F/p_C = (p_F/p_C)MPK_F \searrow$ since $L_F \searrow$ and $p_F/p_C \searrow$ (so r_F/p_C decreases by more than r_F/p_F)
- Thus, the welfare of capital owners in F unambiguously falls

Impact of Trade on Welfare (Cont.)

- Note that, even if labor did not move from F to C , the welfare of capital owners in C would still rise and the welfare of capital owners in F would still fall
- In the very short run (if neither labor nor capital can be reallocated across sectors), then welfare of both factors in comparative advantage sector rises, and the welfare of both factors in other sector falls
 - This is identical to an endowment economy where each factor's endowment is entirely composed of the good in the sector where that factor is employed
- By moving from F to C , workers can essentially change the composition of their endowments towards C
- This reallocation of workers further benefits capital owners in C and generates additional losses for capital owners in F
- Assume that there are the same number of workers and capital owners (of each type) in the economy
 - What happens to $(w + r_C + r_F)/p_C$ and $(w + r_C + r_F)/p_F$?

Impact of Trade on Relative Welfare Changes Among Factors

- Workers relative to capital owners in sector C :
 - $w/r_C = MPL_C / MPK_C \searrow$ since $MPK_C \nearrow$ and $MPL_C \searrow$
- Workers relative to capital owners in sector F :
 - $w/r_F = MPL_F / MPK_F \nearrow$ since $MPK_F \searrow$ and $MPL_F \nearrow$
- Capital owners in C gain more than workers, but workers gain more than capital owners in F

Welfare Changes from Changes in the Terms of Trade

- What are the effects of changes in the terms of trade once an economy is open to trade?
- Note that the previous analysis holds for any improvement in the terms of trade for a country:
 - The specific factor in the export sector unambiguously gains
 - ... while the specific factor in the import sector unambiguously loses
 - Workers' welfare falls relative to the welfare of the specific factor in the export sector but increases relative to the welfare of the specific factor in the import sector
- These welfare changes are reversed when the terms of trade deteriorate

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