

Specific Factors Model

ECON 171 - Spring 2026

Week 3: April 7th

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Specific Factors Model

Today's Agenda

1. Mobile vs. immobile (specific) factors
2. Average vs. marginal product of labor
3. Deriving the concave PPF
4. Winners and losers from trade
5. Incomplete specialization
6. Case study: The “China shock” in the United States

Motivation for Specific Factors Model

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- What is insufficient about Ricardian model?
- Ricardian model cannot explain:
 - Incomplete specialization of real economies
 - Both US and China produce both manufactured goods and services
 - High income inequality within countries
 - Bachelor degree yields around a 40-50% premium in real wage compared to no finished degree (in US, 2012)

Structure of the Economy (Autarky)

Capital Owners

K units of capital

SPECIFIC

Workers

L workers, wage w

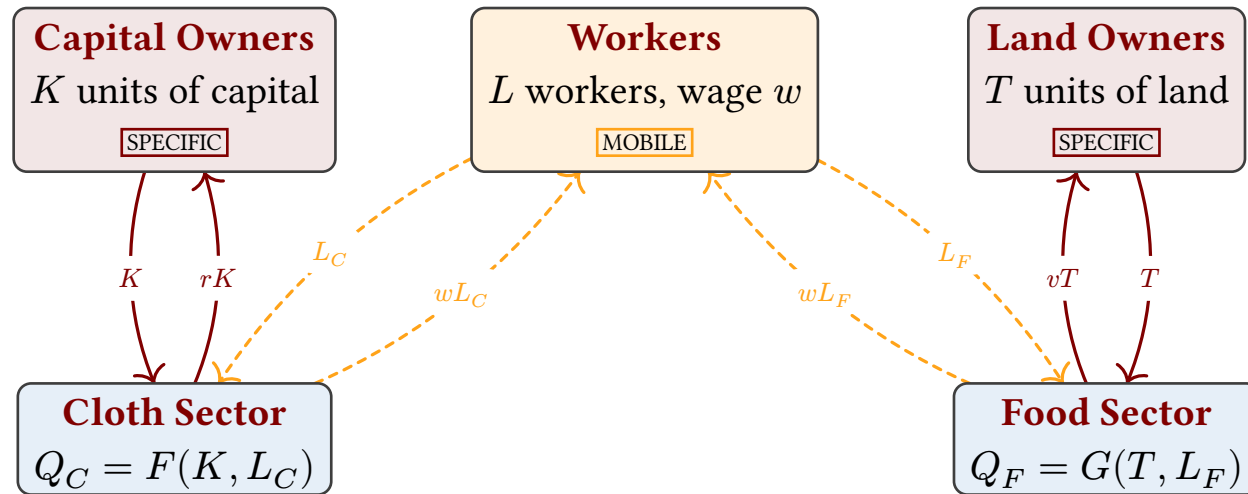
MOBILE

Land Owners

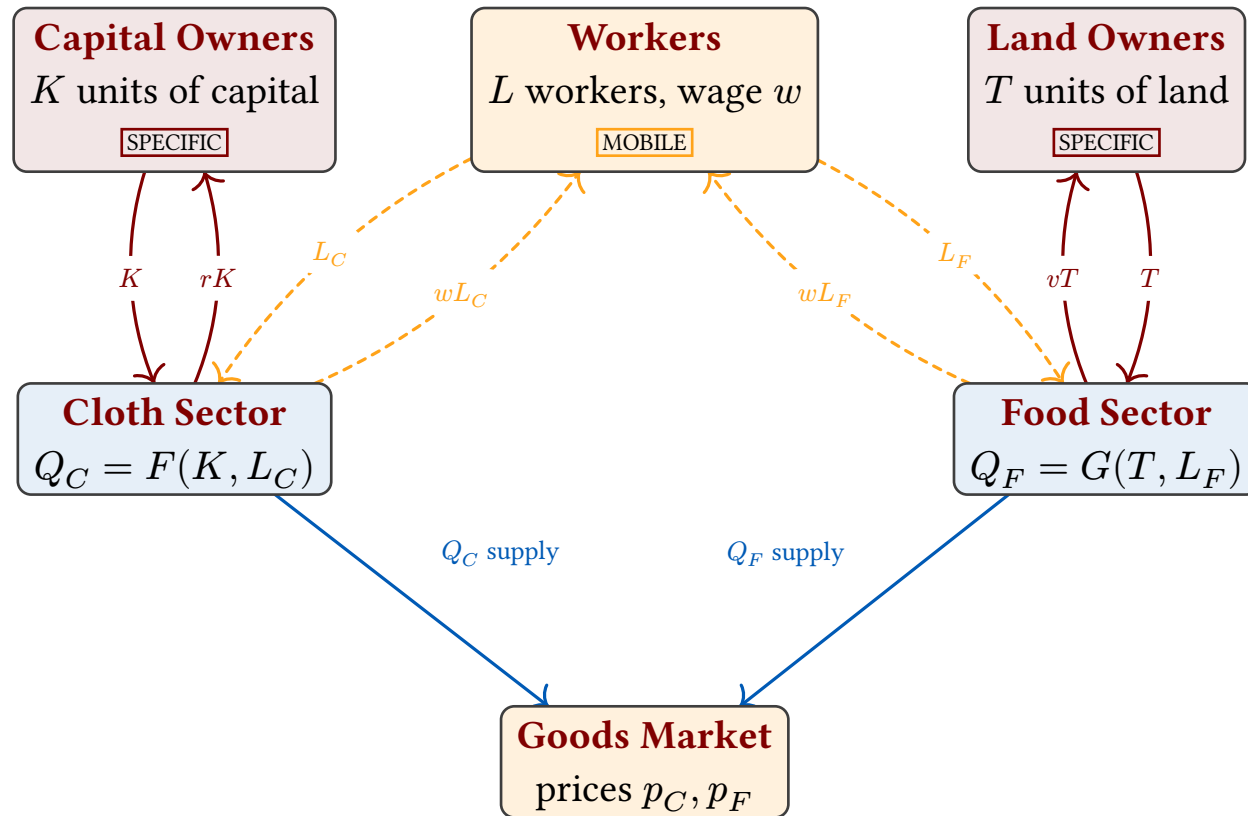
T units of land

SPECIFIC

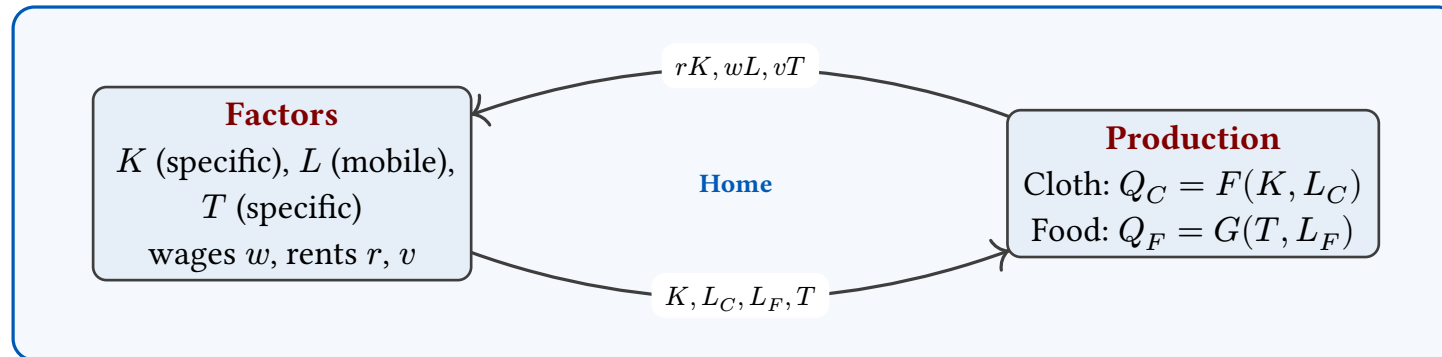
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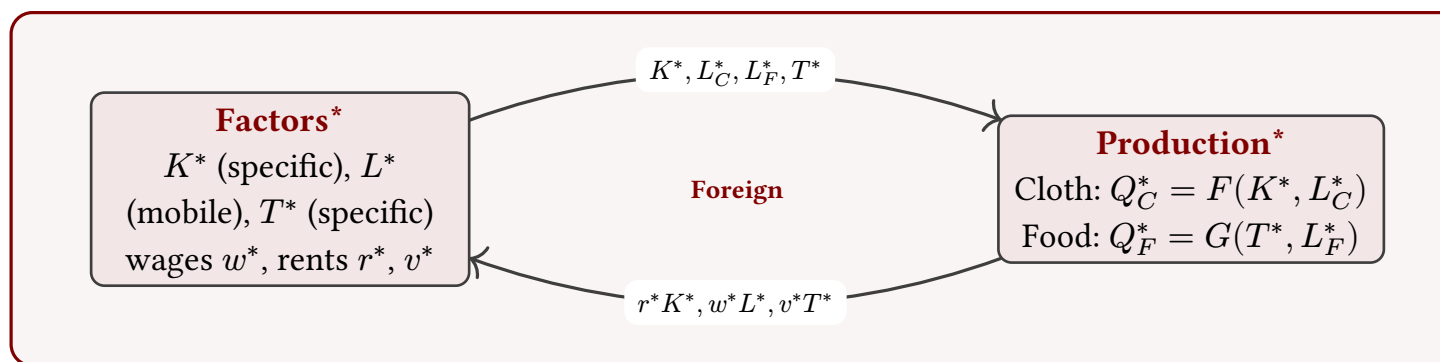
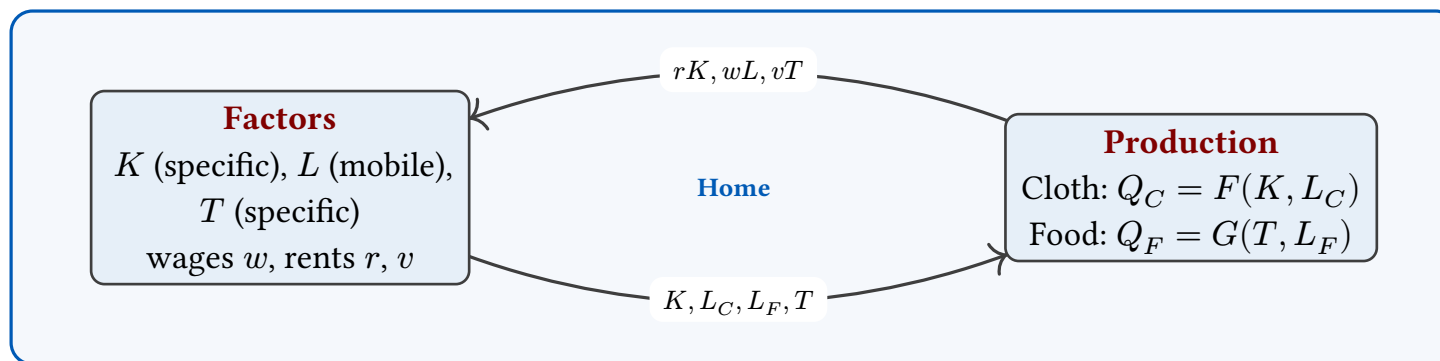
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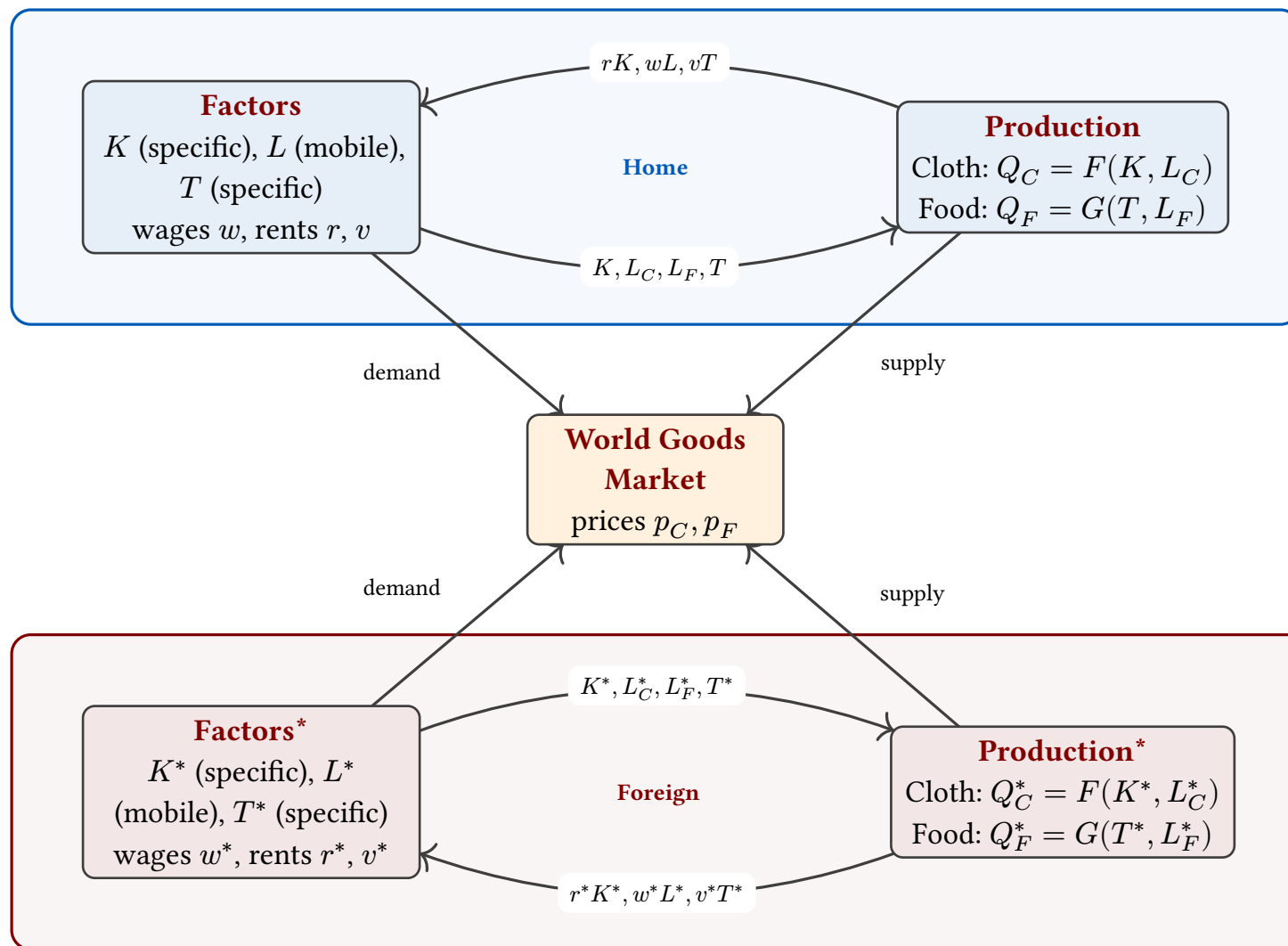
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Consumers/Workers

The economy has **three types of factor owners**:

- **Workers** ($L = 100$): supply labor inelastically, **mobile** across sectors, earn wage w
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Key difference from Ricardo :

- Multiple factors of production → **different income sources**
- Factor owners may be affected differently by trade

Technology

Each sector uses labor **and** a sector-specific factor:

$$Q_C = \sqrt{K} \cdot \sqrt{L_C} = 10\sqrt{L_C} \qquad Q_F = \sqrt{T} \cdot \sqrt{L_F} = 10\sqrt{L_F}$$

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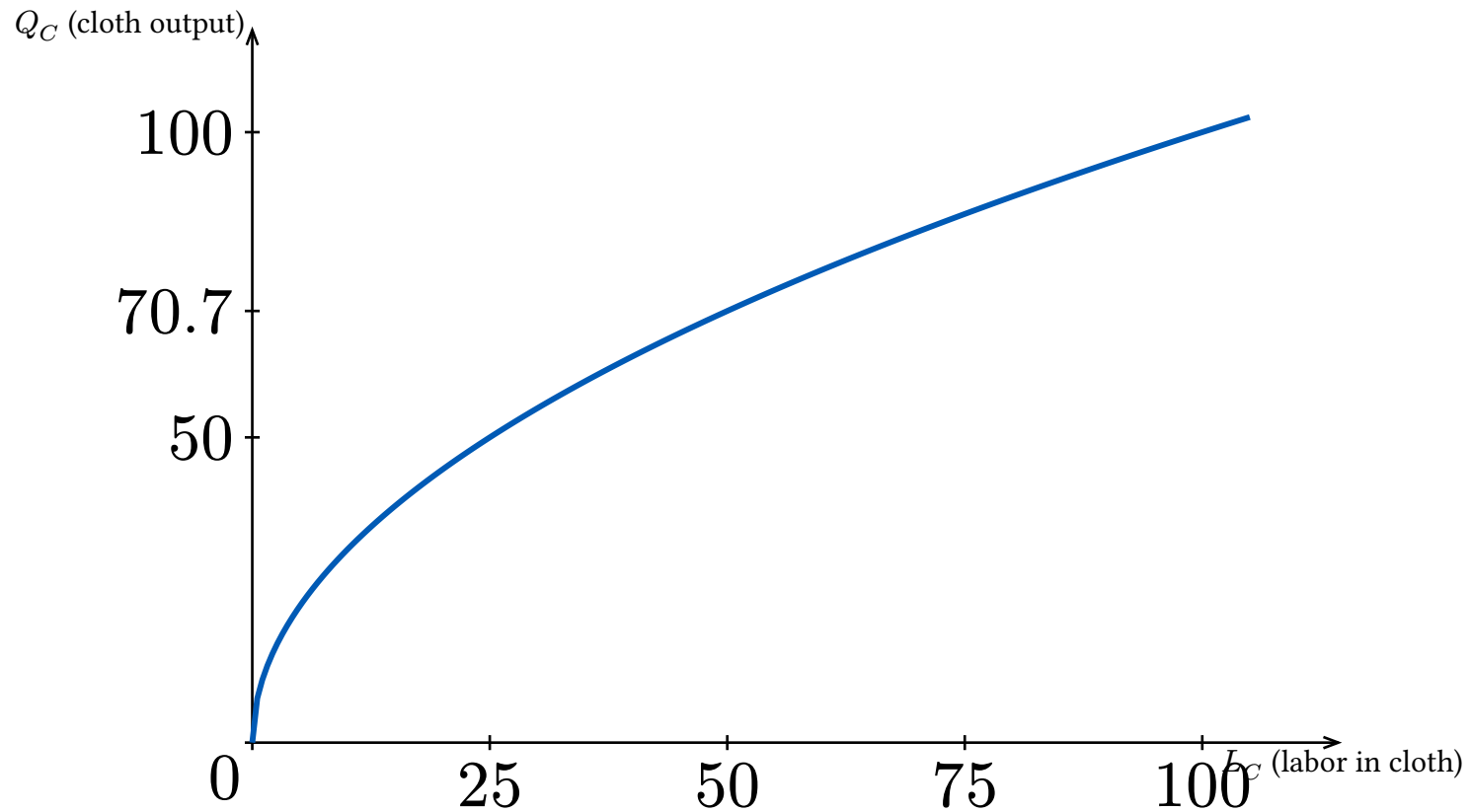
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Diminishing returns to labor: with the specific factor fixed, each additional worker has less of the specific factor to work with → produces less additional output.

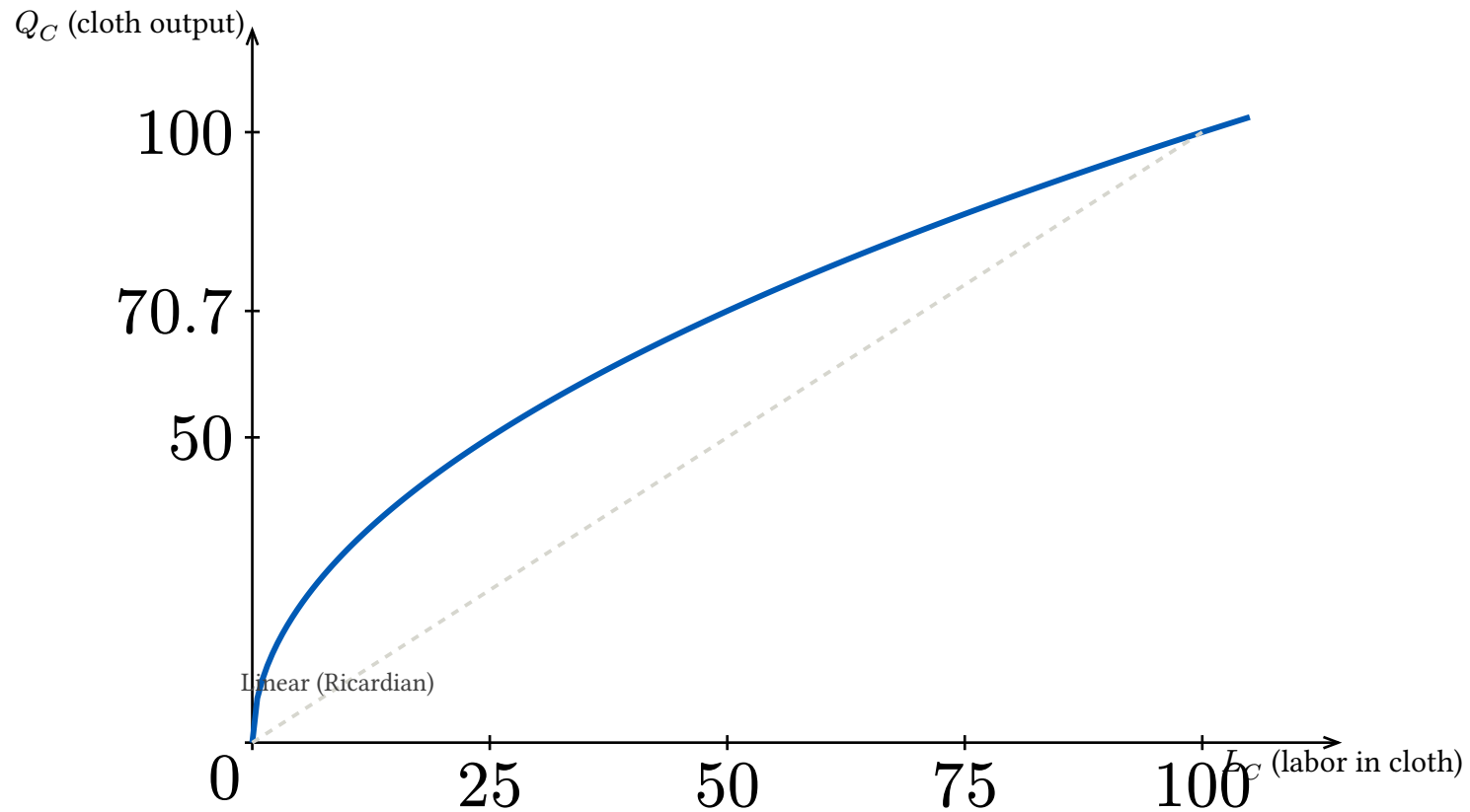
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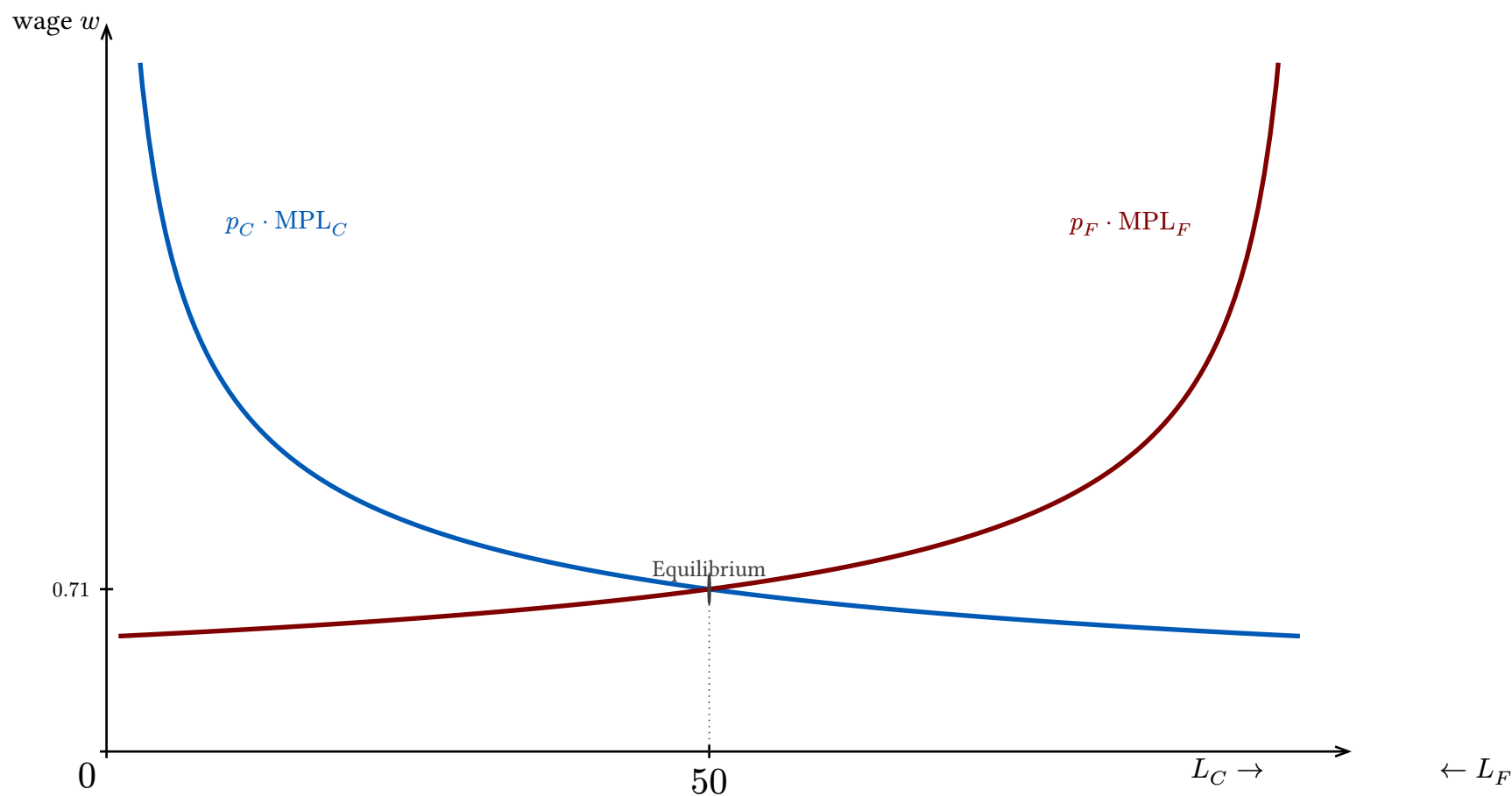
Contrast with Ricardo: Ricardian: $\text{MPL} = A$ (constant) $\rightarrow$ labor demand is **perfectly elastic** at $w = pA$.

Specific factors: MPL declines $\rightarrow$ labor demand slopes **downward**.

Labor Market Equilibrium

Workers move to the sector paying the higher wage. In equilibrium:

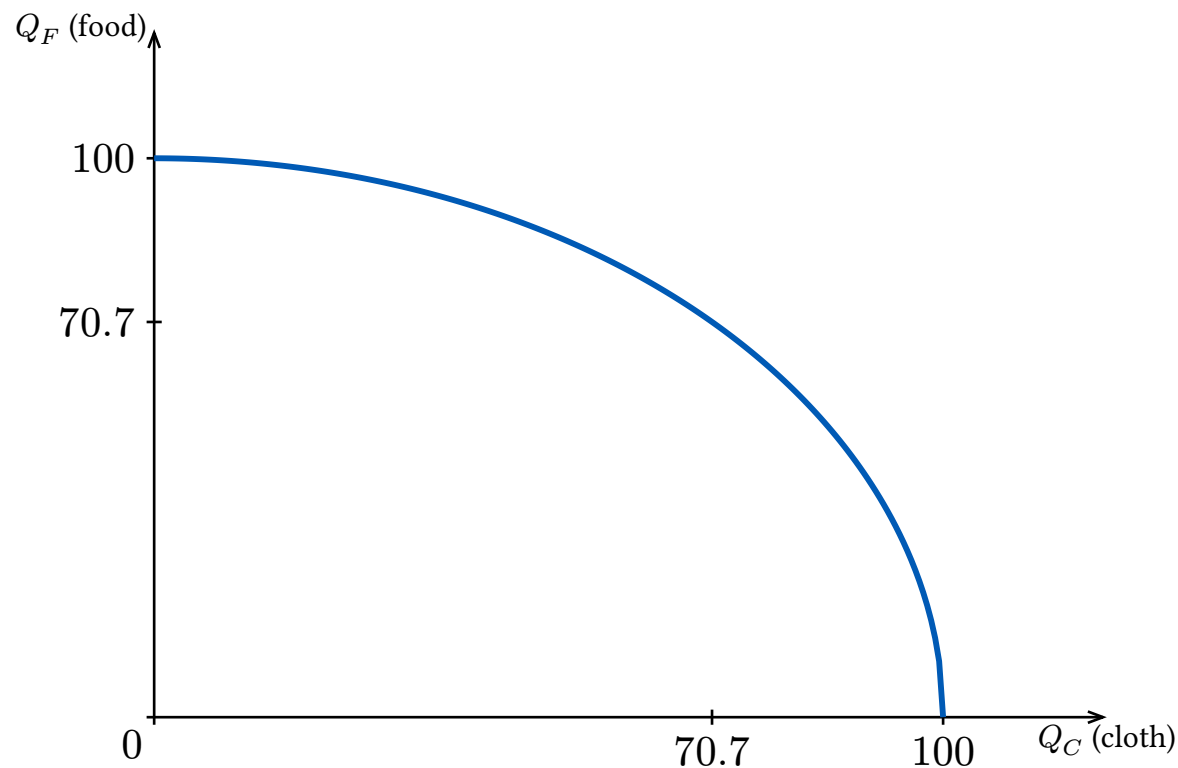
$$p_C \cdot \text{MPL}_C(L_C) = w = p_F \cdot \text{MPL}_F(L_F), \quad L_C + L_F = 100$$



Deriving the Concave PPF

From $L_C = Q_C^2/K$ and $L_F = Q_F^2/T$, the constraint $L_C + L_F = L$ gives:

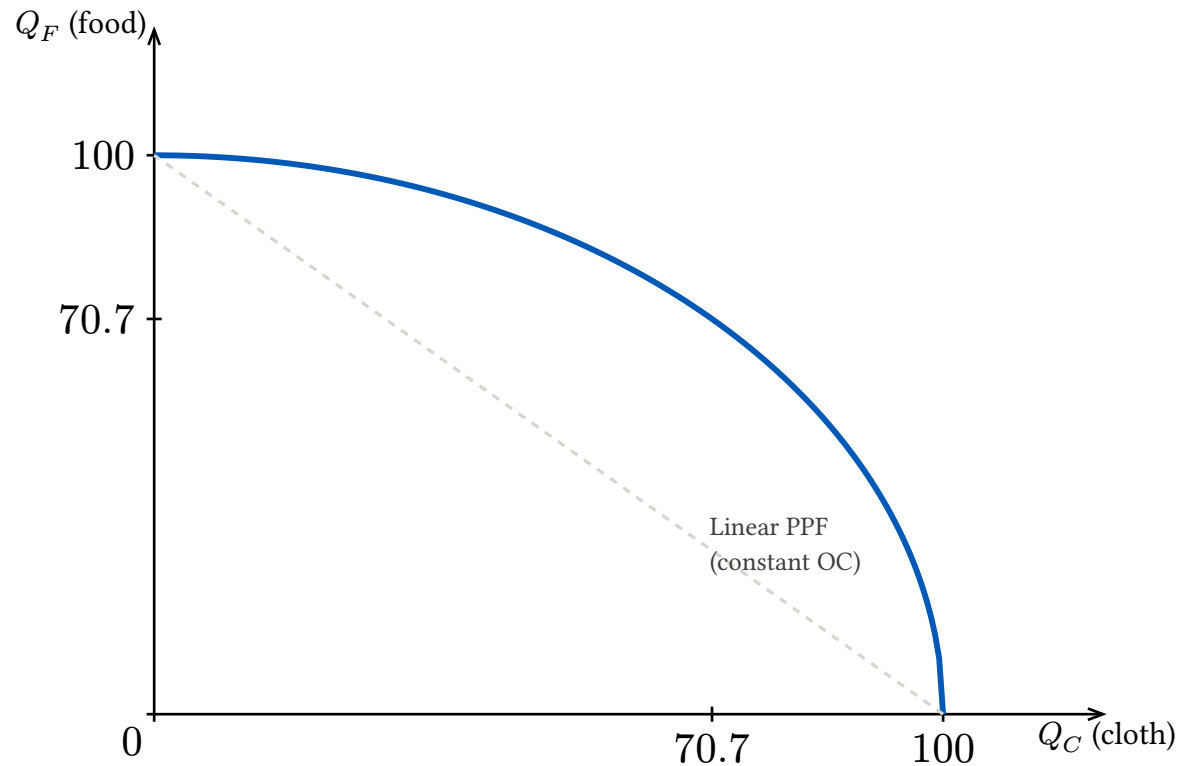
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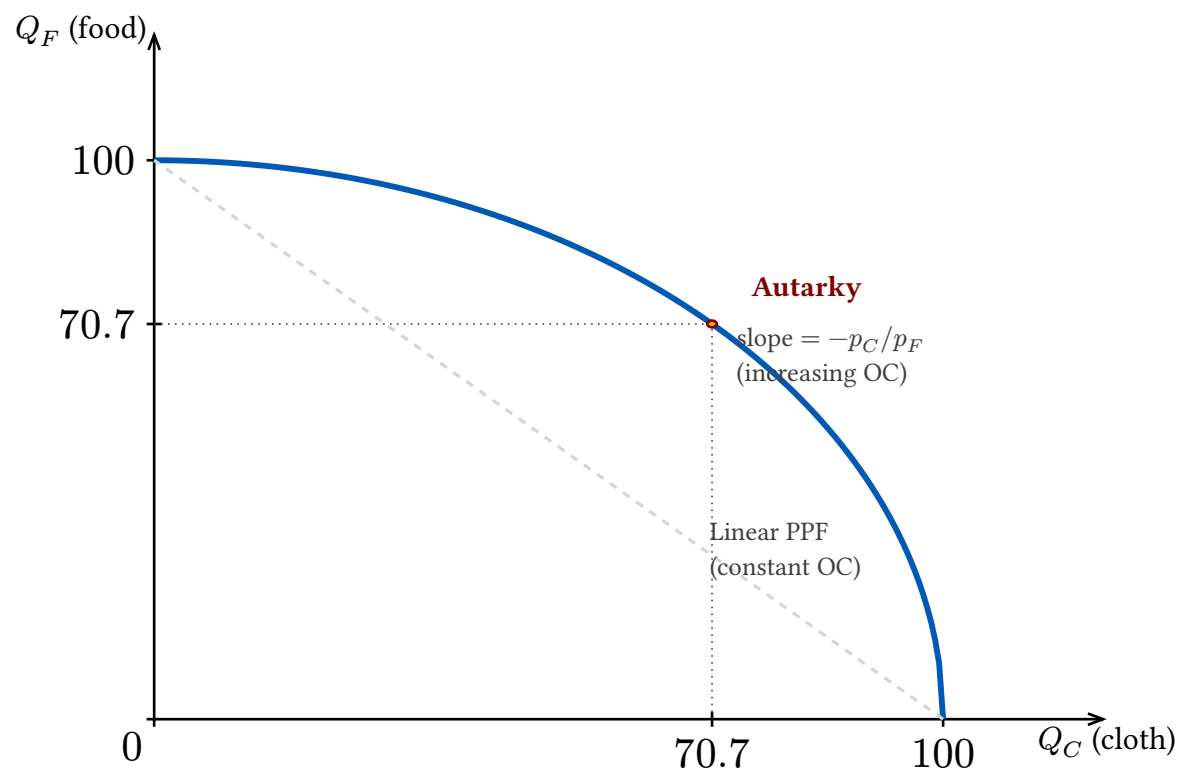
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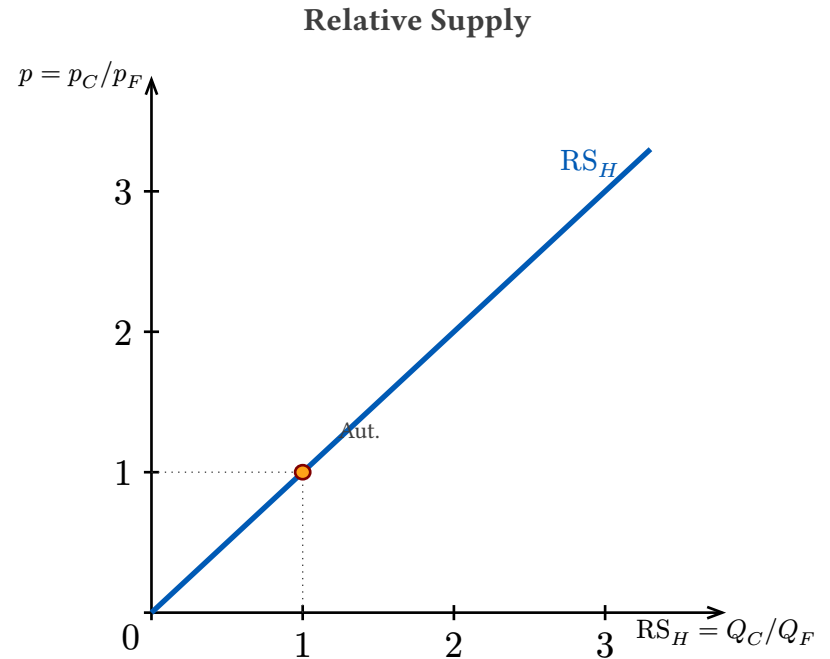
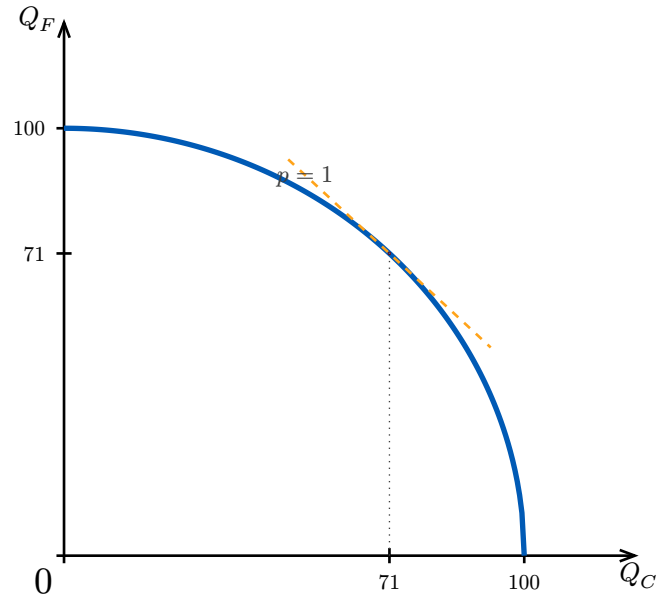
Ricardian: constant MPL $\rightarrow$ linear PPF, constant opportunity cost

Specific factors: diminishing MPL $\rightarrow$ concave PPF, **increasing** opportunity cost

Relative Supply in Home

Home: $K = T = 100, L = 100$. $RS_H = (K/T) \cdot p = p$. Autarky: $p = 1$.

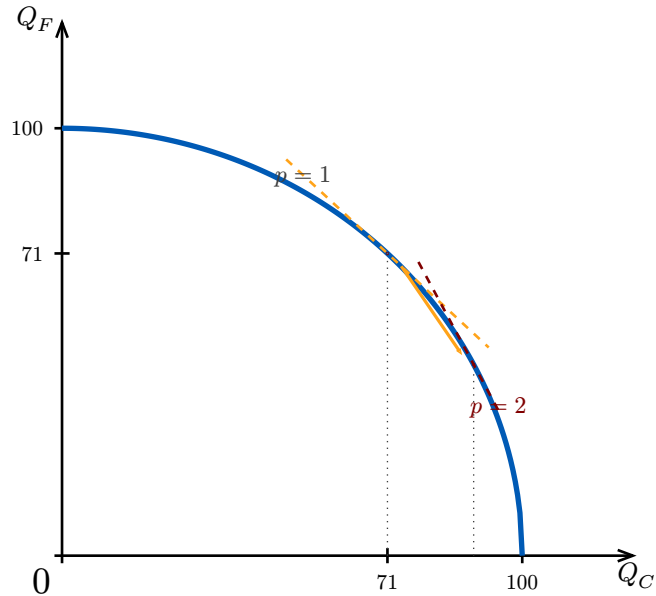
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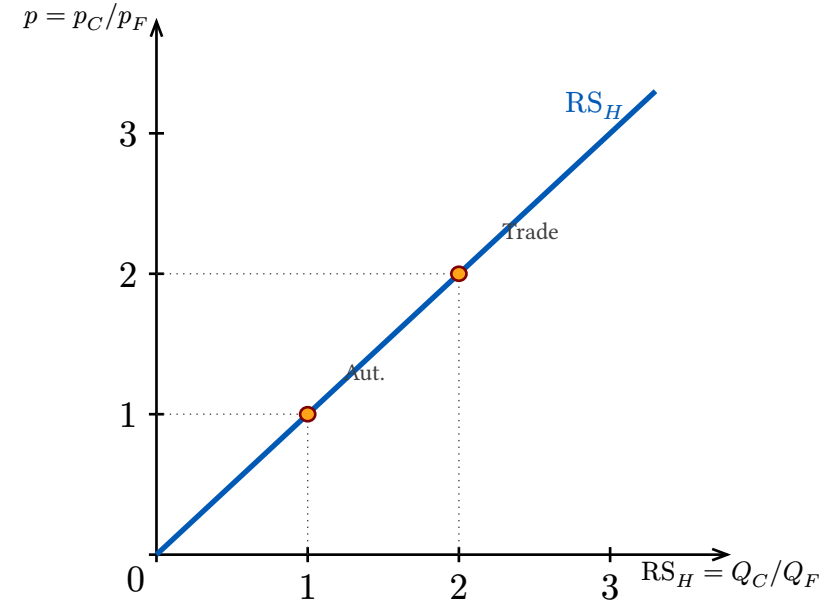
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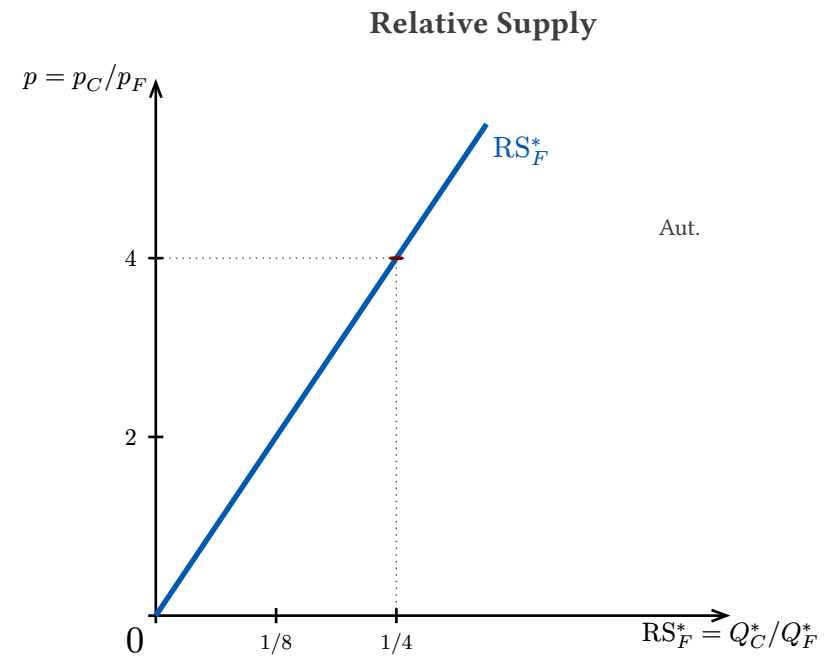
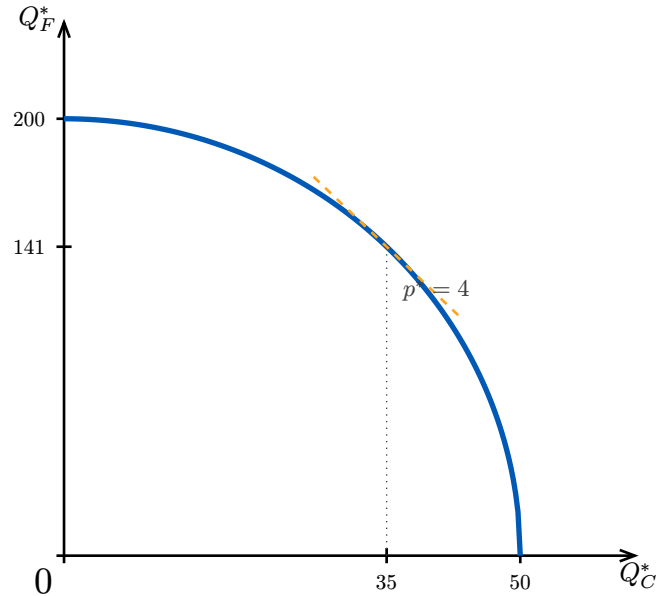
Relative Supply



Relative Supply in Foreign

Foreign: $K^* = 25, T^* = 400, L^* = 100$. $RS_F^* = (K^*/T^*) \cdot p = p/16$. Autarky: $p^* = 4$.

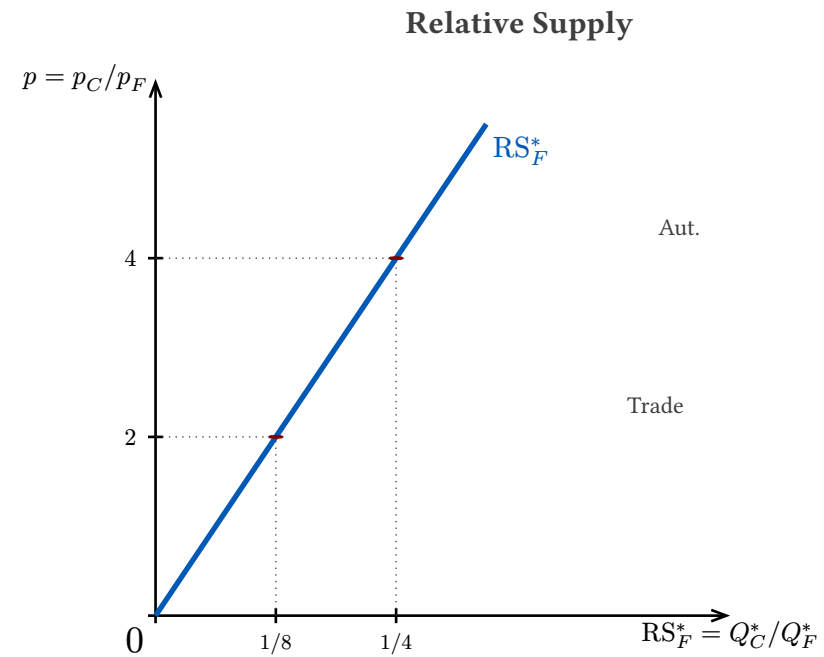
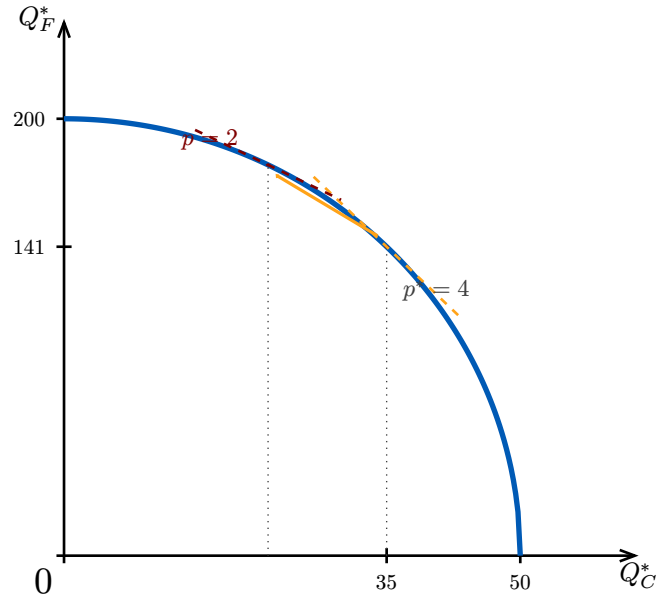
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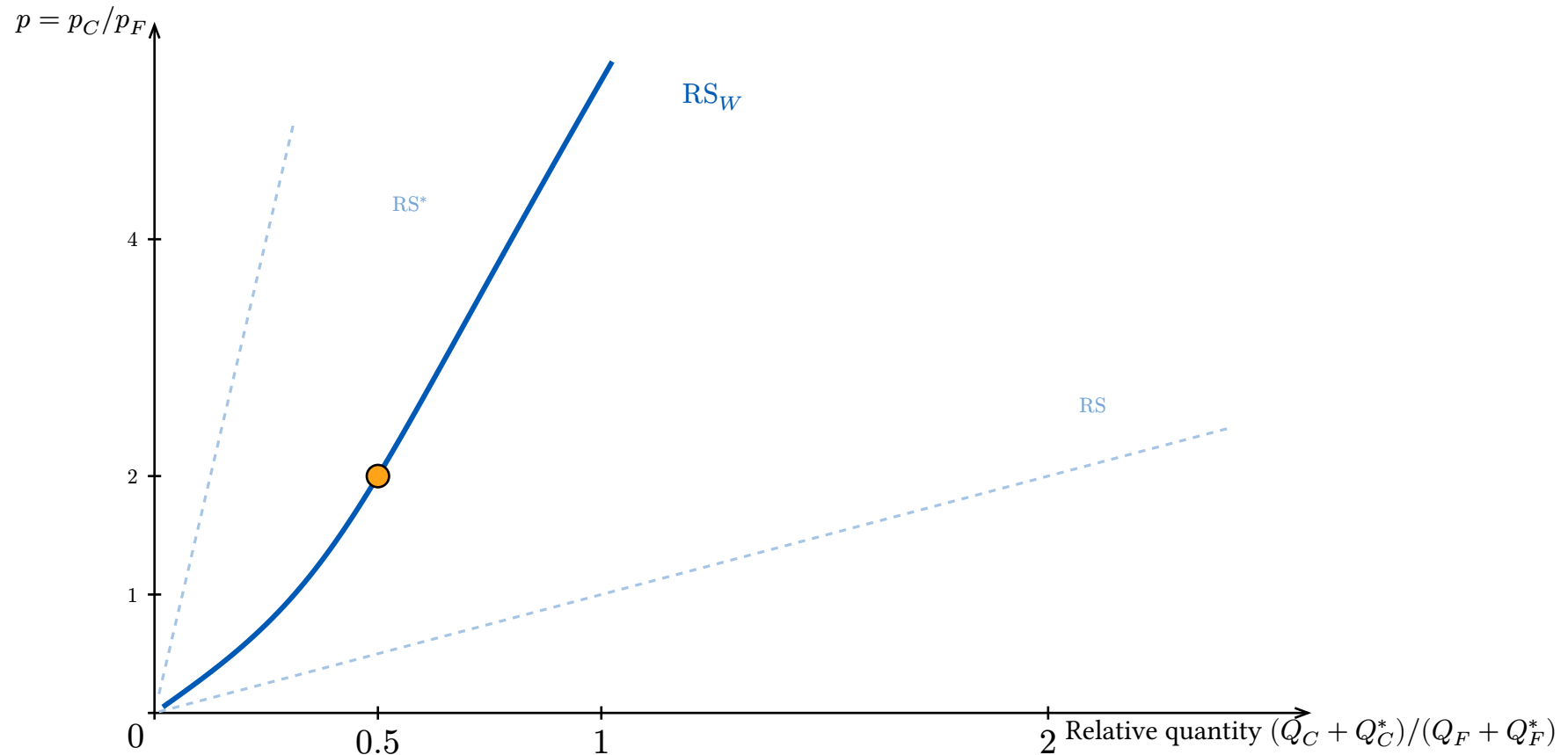


World Relative Supply

Per-country RS: $RS_i = (K_i/T_i) \cdot p$. **Home** ($K = T$): $RS = p$. **Foreign** ($K^* = 25, T^* = 400$): $RS^* = p/16$.

$$RS_W(p) = \frac{Q_{C(p)} + Q_C^*(p)}{Q_F(p) + Q_F^*(p)} \quad RD_W = 1/p \quad \left(U = C_C^{1/2} C_F^{1/2} \right)$$

$RS_W = \frac{Q_F}{Q_F + Q_F^*} \cdot RS + \frac{Q_F^*}{Q_F + Q_F^*} \cdot RS^*$: weighted average $\Rightarrow$ between RS and RS^* at every p .

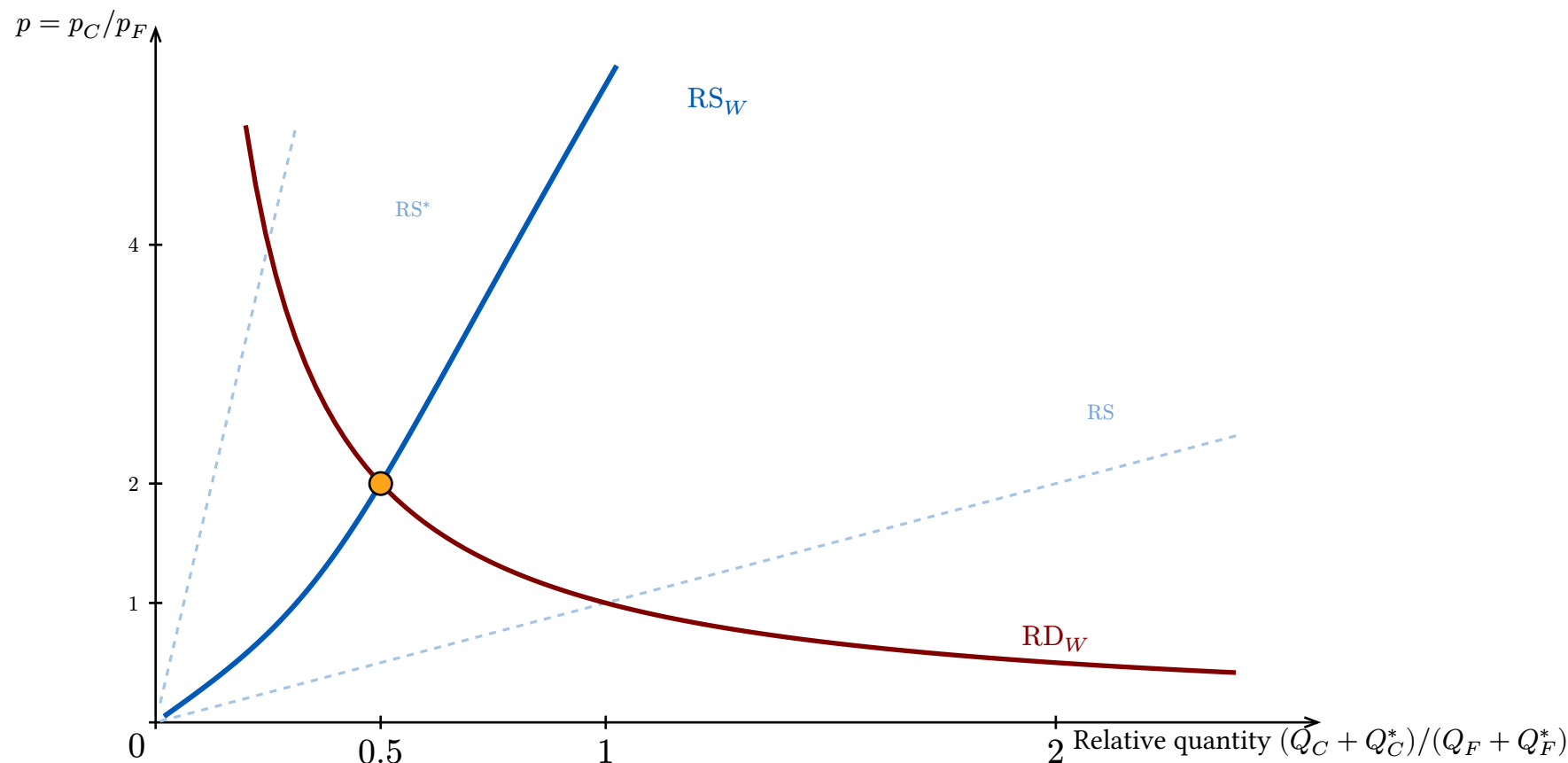


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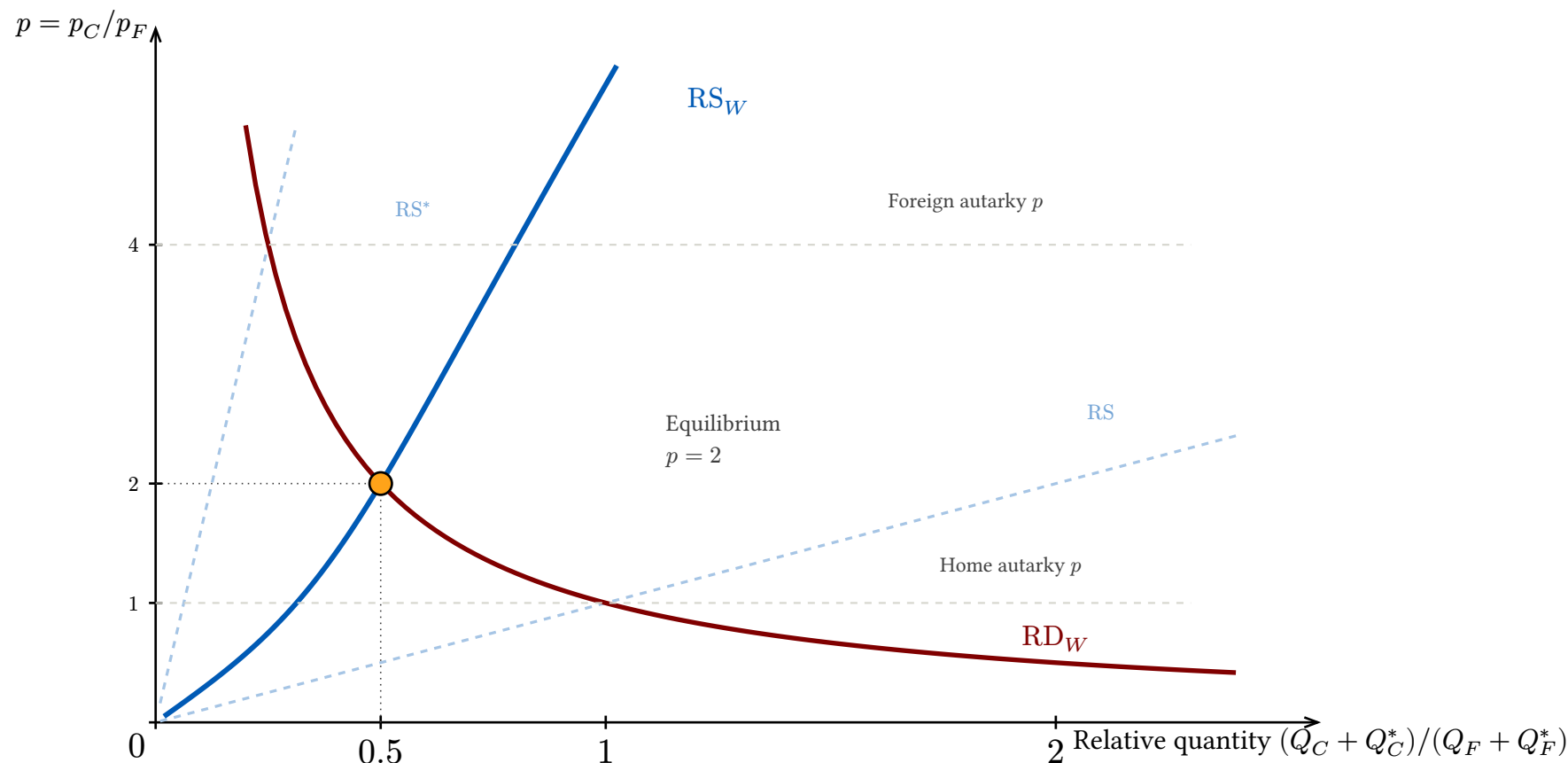


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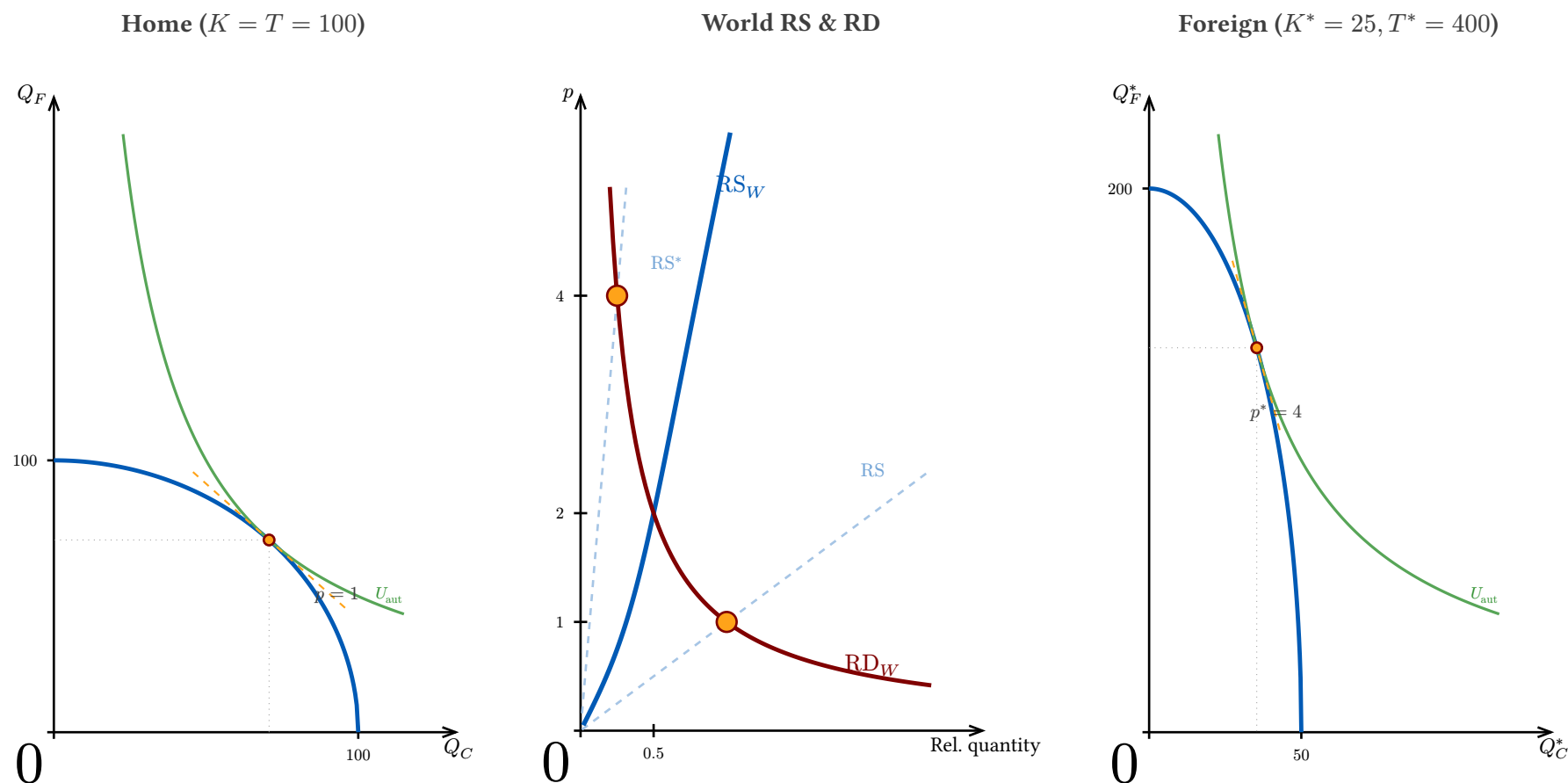
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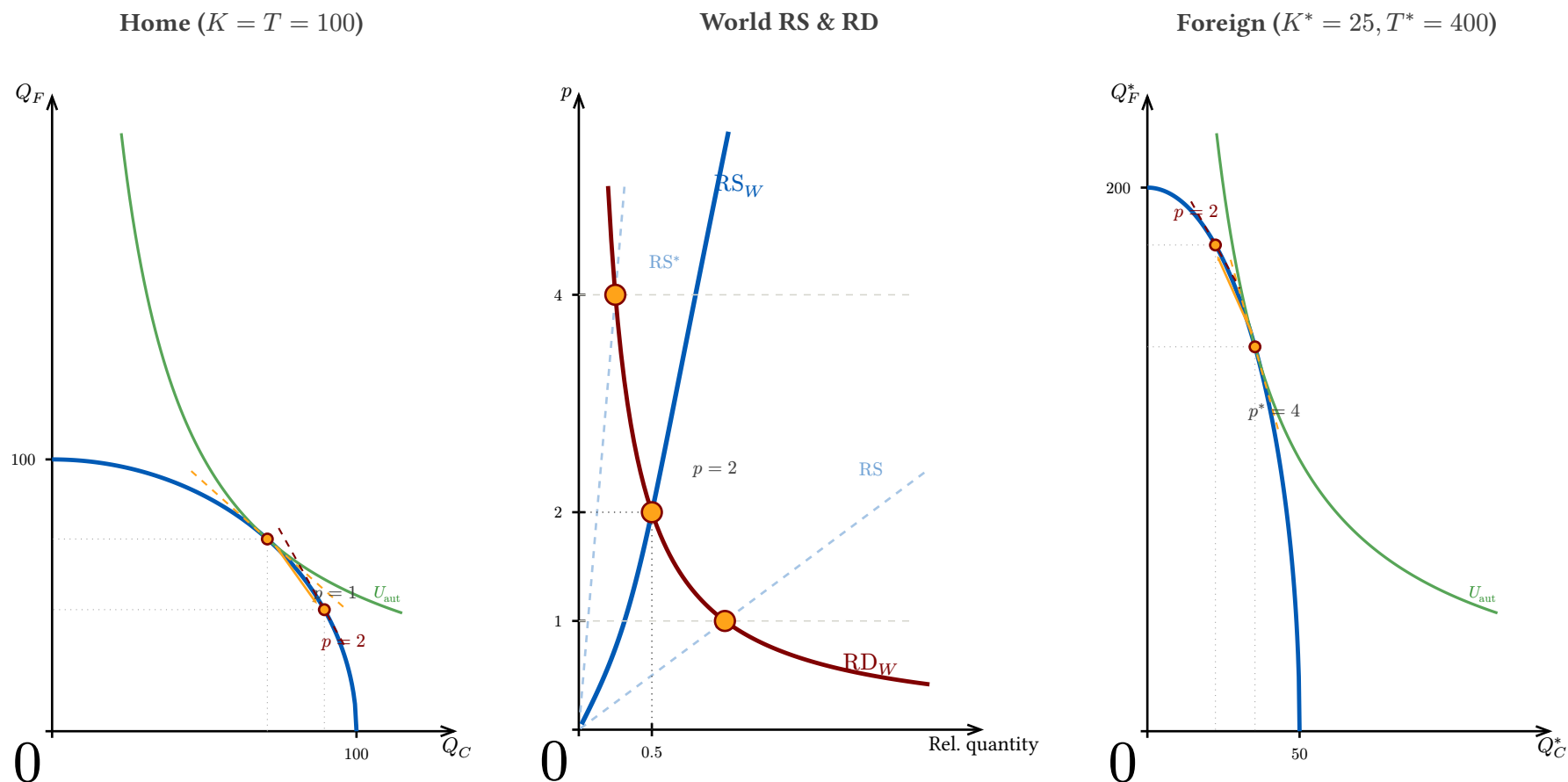


Trade Equilibrium Overview



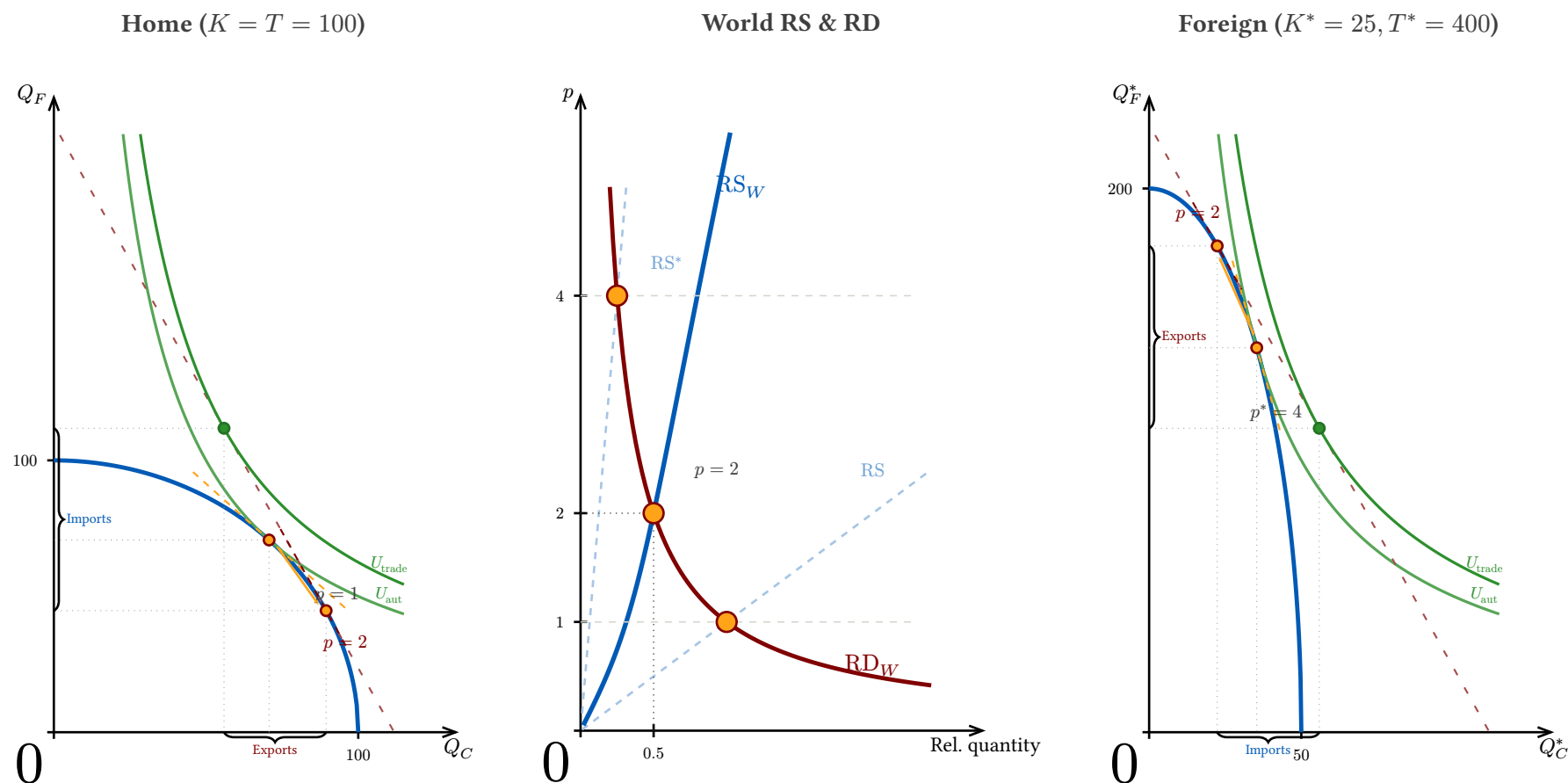
In *autarky*, each country produces and consumes where the PPF is tangent to the highest IC

Trade Equilibrium Overview



At world price $p = 2$, production shifts along each PPF to the new price tangency

Trade Equilibrium Overview



Countries *trade* to consume beyond their PPF, reaching a higher indifference curve

Determination of Incomes

From $Q_C = \sqrt{K} \sqrt{L_C}$: $MPL_C = Q_C/(2L_C)$, $MPK = Q_C/(2K)$.

Firms pay each factor its **value of marginal product**:

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Specific factor income depends **only** on own sector's revenue.

⇒ A rise in p_C directly benefits capital owners, directly hurts land owners.

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4. **Workers (mobile) – ambiguous**
 - Nominal wage w rises (but less than p_C)
 - w/p_F rises, w/p_C falls
 - Real wage effect depends on consumption pattern

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Specific factors: diminishing MPL $\rightarrow$ wage equalizes at an **interior**
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- This matches reality: even strongly trade-oriented economies produce a wide range of goods

Case Study: The “China Shock”

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- Decline in p_C for US import-competing sectors
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Key findings:

- US regions more exposed to Chinese imports experienced:
 - Higher unemployment and lower labor force participation
 - Lower wages, especially in manufacturing
 - Increased government transfer payments
- Losses were **concentrated** — not spread evenly across workers