IV - Specific Factors: The Ricardo-Viner Model

- **How important is the assumption of perfect factor mobility between sectors in the HO model?**

- **The specific-factors model takes the polar opposite assumption: some factors are** sector-specific

- **Interpretation: factor adjustments take time**
  - **in the short run, some factors are mobile across sectors, others not: capital vs labor, skilled labor vs unskilled**
  - **HO model: all factors are mobile ⇔ long-run**
  Specific factors model ⇔ short-run

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- **Can we still predict the trade content?**

- **What are the welfare gains?**

- **Even if the RV setting is close to the HO model, all results will depend on factor mobility or immobility and not on relative endowments**

⇒ **factor mobility is a critical assumption**

- **1. The Closed Economy**

- **2 goods, X and Y**

- **But 3 inputs: labor, L, and 2 types of capital, R and S**
  - **labor is perfectly mobile across sectors**
  - **R and S are specific to sector X and Y, respectively**
  - **Factor endowments: $\overline{L}$, $\overline{R}$ and $\overline{S}$**

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- **Technology: constant returns to scale**

$$\begin{cases} X = F_X(L_X, R) \\ Y = F_Y(L_Y, S) \end{cases} \quad \textbf{subject to} \quad \begin{cases} L_X + L_Y \leq \overline{L} \\ R \leq \overline{R} \\ S \leq \overline{S} \end{cases}$$
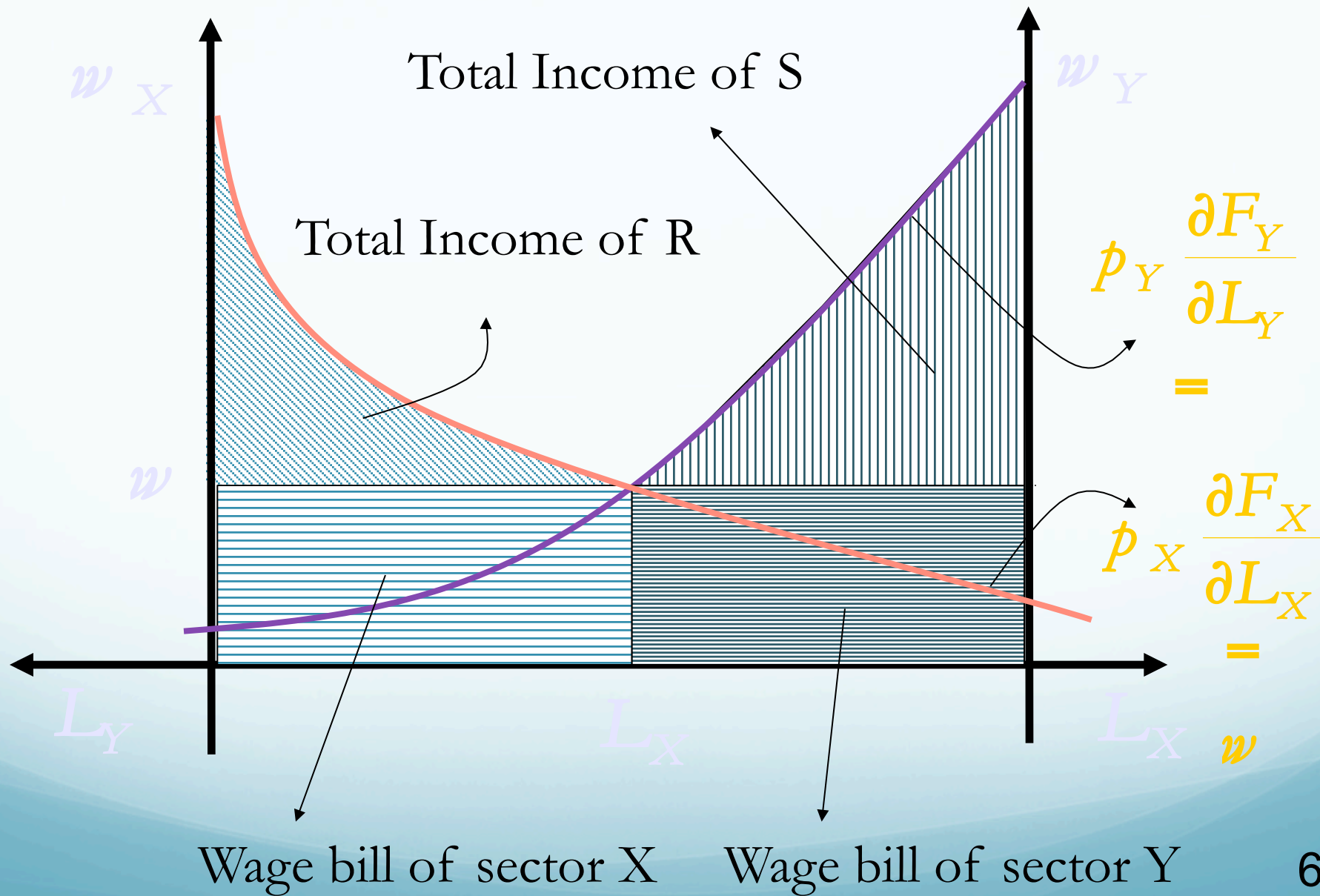
- **Competitive equilibrium**

$$\begin{cases} p_X \dfrac{\partial F_X}{\partial L_X} = w \\ p_Y \dfrac{\partial F_Y}{\partial L_Y} = w \end{cases} \quad \begin{cases} p_X \dfrac{\partial F_X}{\partial R} = r \\ p_Y \dfrac{\partial F_Y}{\partial S} = s \end{cases} \quad \begin{cases} R = \overline{R} \\ S = \overline{S} \\ L_X + L_Y = \overline{L} \end{cases}$$

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- **Recall: decreasing marginal productivities**

$$\frac{\partial F_X}{\partial L_X}(\underset{-}{L_X}, \underset{+}{R}) \qquad \frac{\partial F_X}{\partial R}(\underset{+}{L_X}, \underset{-}{R})$$

- **Closed economy labor market equilibrium for given commodity prices and specific factor endowments: see next figure**

- **2. The Impact of the Trade Liberalization**

- **Same kind of production frontiers as in the HO model (labor marginal productivity is not constant)**

⇒ **a country exports the good whose price increases and imports the other one**

⇒ **gains from trade for the country as whole or for a consumer that owns factors in the same proportions as the country**

- **More intricate problem: to determine in which country the price is lower under autarky (to determine trade patterns)**

- **Assume:** p_Y **constant and** p_X **increases**

  $\Rightarrow$ **the country exports good X**

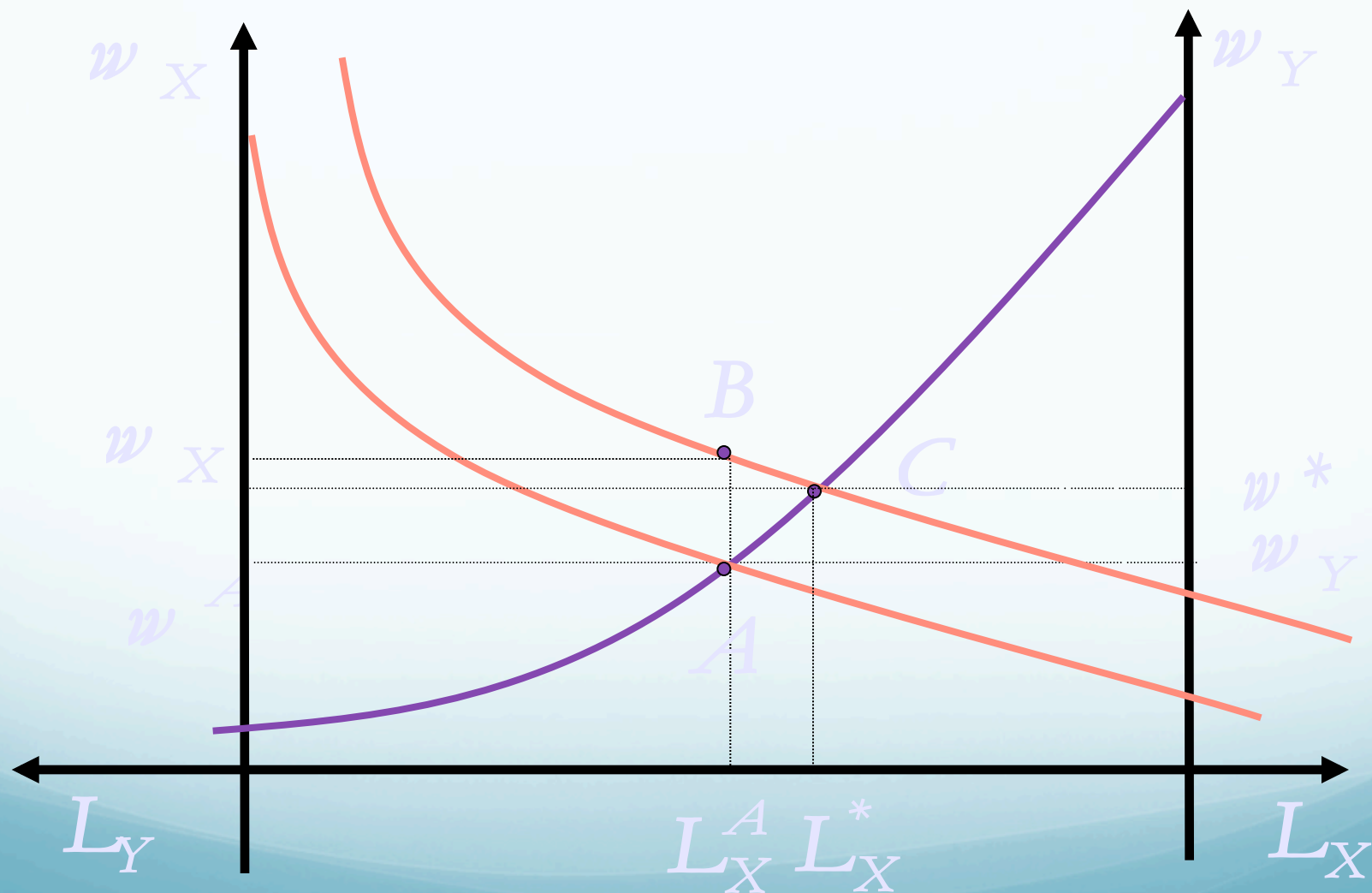 $\Rightarrow \quad p_X \dfrac{\partial F_X}{\partial L_X}$ **shifts uniformly upward**

  $\Rightarrow \quad p_Y \dfrac{\partial F_Y}{\partial L_Y}$ **is left unchanged**

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Increase in p_X
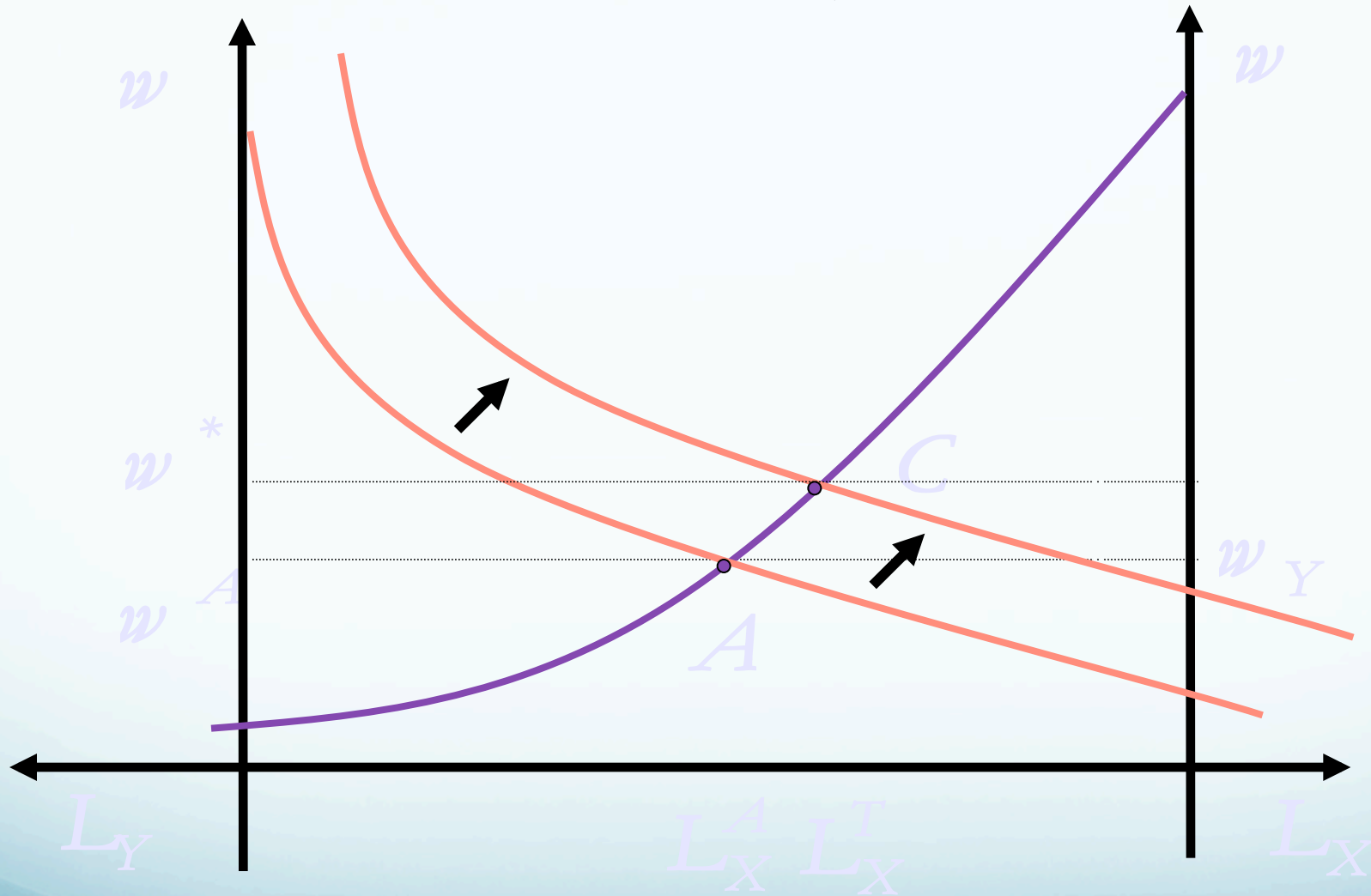
A → B: no Labor mobility
B → C: Labor mobility

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- **Trade liberalization implies A → C, which can be decomposed in:**
  - **A → B: no labor mobility between sectors**

    ⇒ **the wage increases in the sector whose price increases ⇒** w_X **increases**

    ⇒ **no change in sector** Y ⇒ w_Y **constant**
  - **B → C: labor mobility**

    ⇒ **labor moves towards sector** X **in which wages are higher**

    ⇒ L_X **increases,** L_Y **decreases**

    ⇒ **labor productivity decreases in sector** X **and increases in sector** Y

    ⇒ **new equilibrium wage**

- **Changes in nominal returns**

  (s, r : nominal returns to S and R, respectively)
  - w **increases**

  - r **increases**

    (as L_X and p_X increases $\Rightarrow$ marginal productivity in value of R
    $$p_X \frac{\partial F_X}{\partial R}(L_X, R) \qquad \text{increases)}$$

  - s **decreases**

    as L_Y decreases $\Rightarrow$ decreases marginal productivity of S)

- **Grains from trade: p_Y constant, p_X increases**
  - **in terms of Y, real gains = nominal gains**
    - ✓ *S* **owners lose**
    - ✓ *R* **owners gain**
    - ✓ **labor owners gain**
  - **in terms of X:**
    - ✓ *S* **owners lose**

    (nominal return decreases and price increases)
    - ✓ *R* **owners gain**

    (L_X increases $\Rightarrow$ capital intensity decreases $\Rightarrow$ productivity that is equal to the real return of R in sector X increases)
    - ✓ **labor owners lose with the same reasoning**

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$\Rightarrow$ S owners lose from free trade

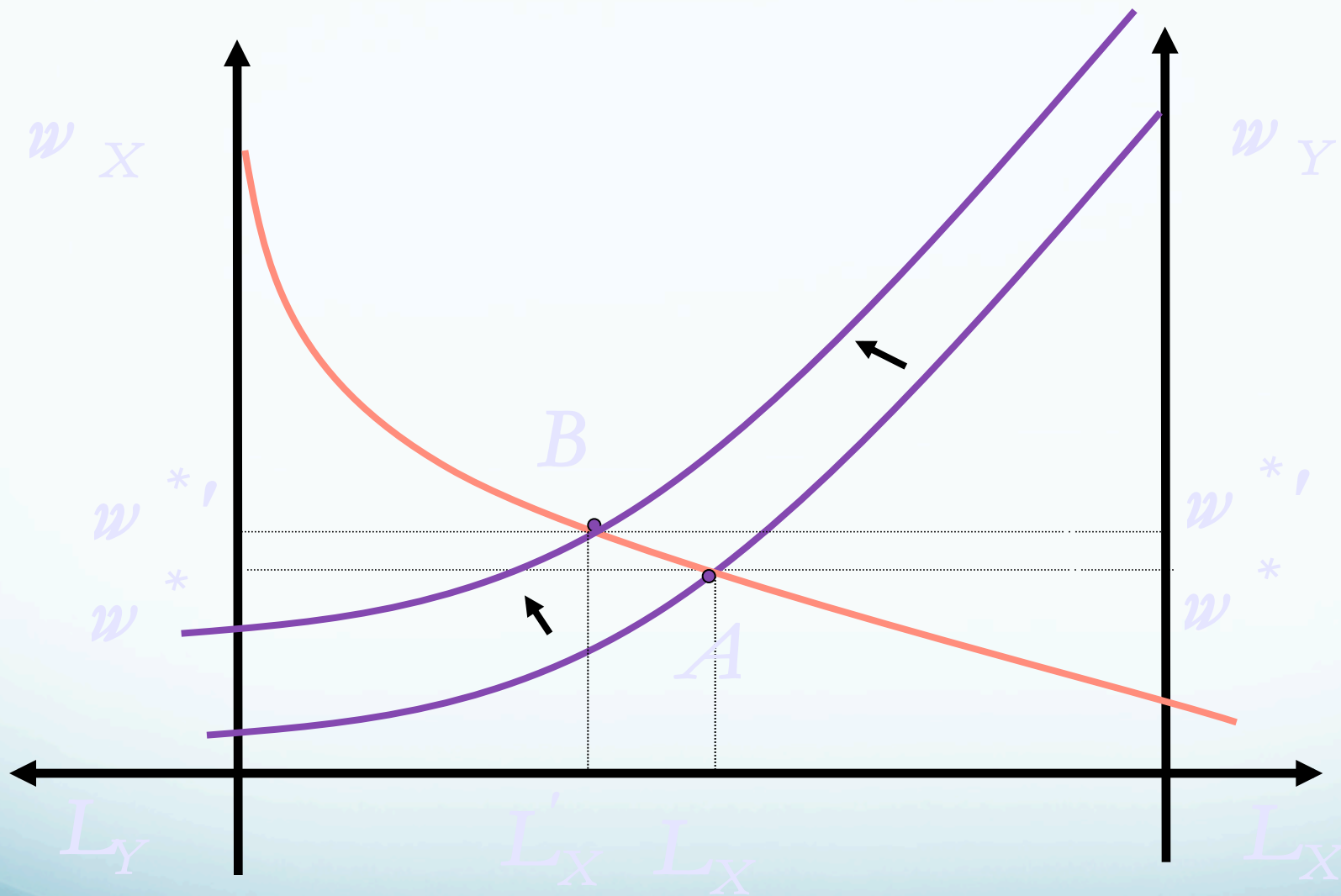$\Rightarrow$ R owners gain from free trade

$\Rightarrow$ ambiguous effect for labor owners:

gain in term of good **Y** and lose in terms of good **X**

$\Rightarrow$ the total effect depends on preferences

- **3. What About the Free Trade Theorems of the HO Model?**

- **3.1 "Lemmas": Impact of the increase in a factor endowment at fixed commodity prices**

Expansion of sector Y, increase of w and decrease of r and s

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- **Decrease in s:**
  - when $\bar{S}$ increases, the marginal productivity of labor for a given L increases and the marginal productivity of S decreases

    $\Rightarrow$ given L, $w_X < w_Y$, which induces a reallocation of labor to equate wages in both sectors

    $\Rightarrow$ the reallocation of labor increases the marginal productivity of S but up to a lower level than before the increase of S as w increased

s decreases

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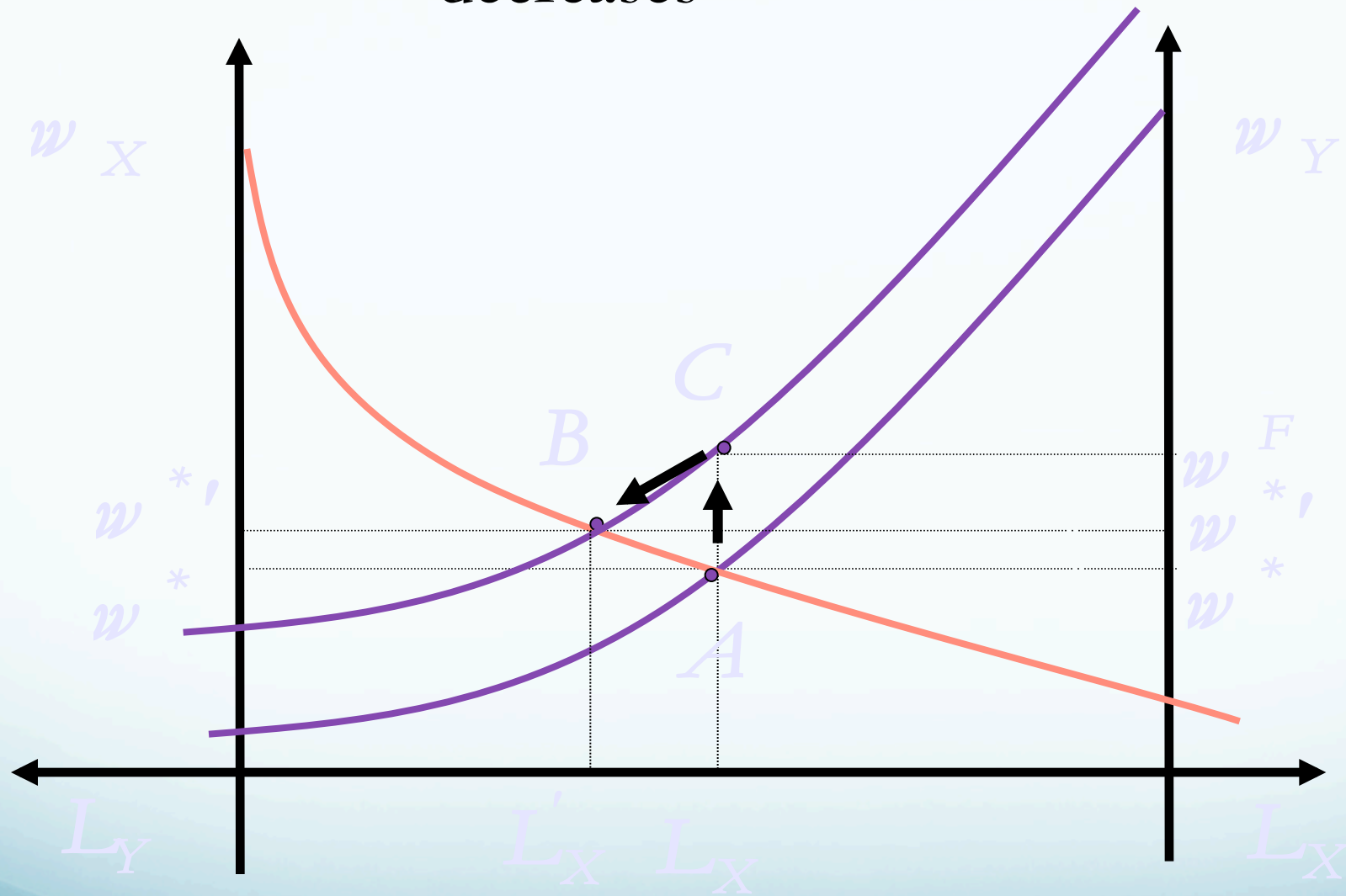
- **Formally**

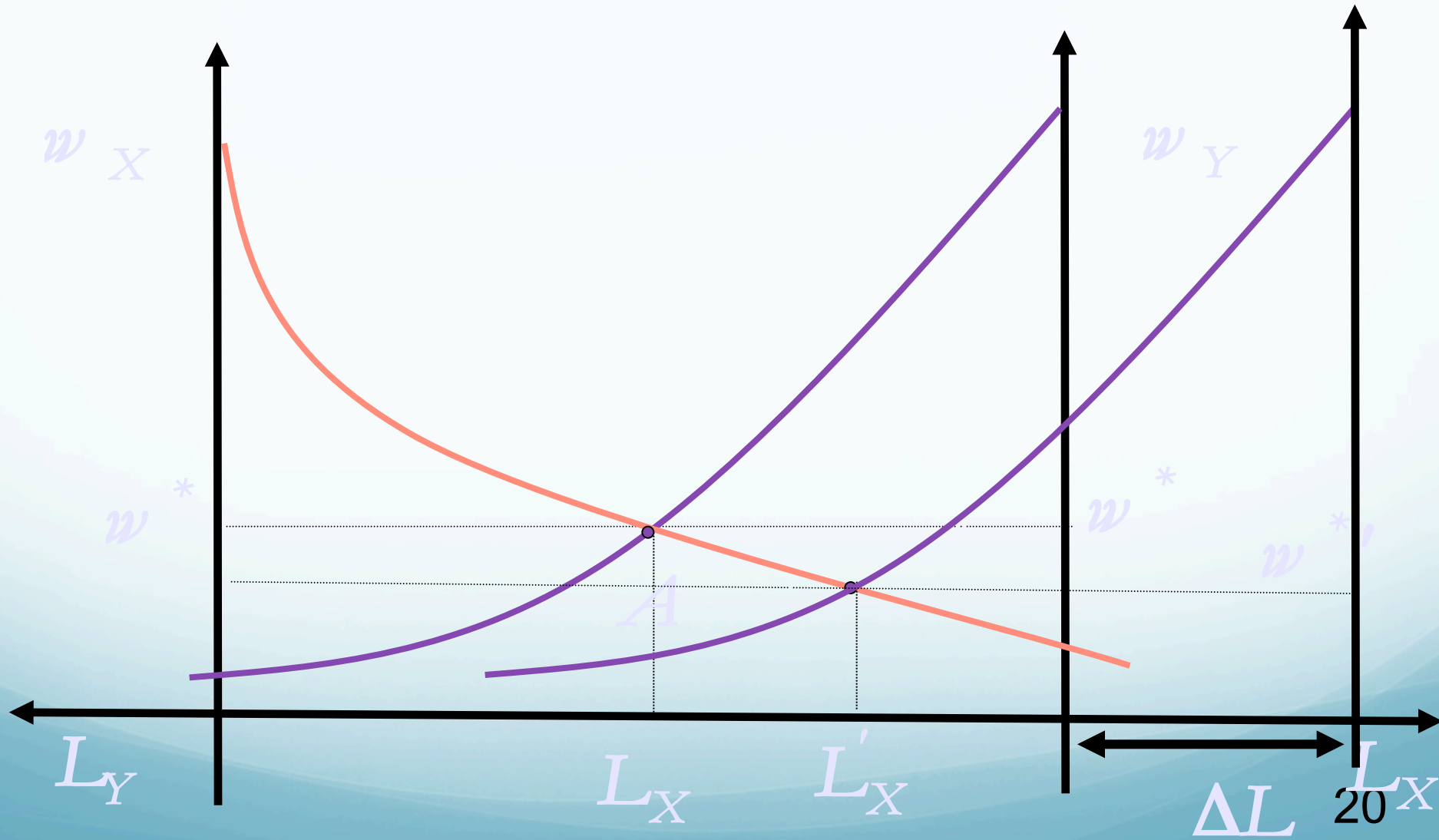 in equilibrium, w, L_Y, and Y increase

  $$\Rightarrow \frac{w}{p_X} \text{ and } \frac{w}{p_Y} \text{ increase (prices are held constant)}$$

  $$\Rightarrow \frac{\partial F_Y}{\partial L_Y} = \frac{w}{p_Y} \text{ increases} \Rightarrow \frac{S}{L_Y} \text{ increases}$$

  $$\Rightarrow \frac{s}{p_Y} \text{ decreases}$$

3.1.2. Impact of an increase in labor endowment ($\overline{S}$ and $\overline{R}$ constant)

$\Delta X > 0 \quad and \quad \Delta Y > 0$

w_X

w_Y

Imagine all the increase in labor supply goes to X => $\Delta Y = 0$

It implies $w_Y > w_X$, therefore it induces a reallocation of labor to the Y sector

A

w_Y

w_X

w

L_Y

L_X

$L_X + \Delta L_X$

ΔL

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L_X

■ **As L increases in both sectors, the marginal productivity of fixed factors increases**

⇔ **r and s increase**

- **3.2 Trade Patterns (HO Theorem?)**

- If labor endowments are the same in both countries, each country exports the good in which its relative endowment in a specific factor is greater, and imports the other one.

- Sketch of the proof: starting from identical countries, if one of the specific factor increases in this country, section 3.1 shows that the production of the good that uses this factor increases ($\Rightarrow$ is exported) and the production of the other good decreases ($\Rightarrow$ is imported)

- If there are differences in the mobile factor endowments, trade patterns cannot be predicted without specifying further technologies, preferences…

- **3.3 No Factor Price Equalization**

- 3.1 shows that even if commodity prices are held constant, if factor endowment changes, factor prices change also

  ⇒ this is due to the immobility of the specific factors whose returns do not equalize across sectors, since they are not mobile

  ⇒ there would be some further gains arising from trade in factors, contrary to the HO model (as well as gains from factor mobility across sectors)

- **3.4 Factor Endowment Variations (Rybczinski Theorem?)**

- The increase of a specific factor endowment increases the production of the good that uses this factor and decreases the production of the other good

- The increase of the mobile factor endowment increases both productions

- **4. Conclusions**

- **Trade content may be not predictable**

- **Predictions in terms of who gains or loses from free trade differ from the HO model**

- **Less interesting setting since more variables are exogenously fixed?**

- **Real cases: low factor mobility between some sectors**
  - **capital: manufacturing vs agriculture**
  - **labor: unskilled (manufacturing) vs skilled (high-technology sectors)**

References

- **Markusen, J., J. Melvin, W. Kaempfer, and K. Maskus, 1995.** *International Trade - Theory and Evidence*, Mc Graw-Hill. Chapter 9.