The Ricardo-Viner Model

Summary:

- trade with production
- sector-specific factors also called the "Specific Factors" model
- distributional effects of trade and tariffs are sector specific

The Ricardo-Viner Model

Assumptions:

- two commodities *X1* and *X2*
- three factors of production:
  L, K_1, K_2
- linear homothetic production functions

The Algebra of the Model

$$(1)\; X_1 = f_1(K_1, L_1)$$

$$(2)\; X_2 = f_2(K_2, L_2)$$

$$(3)\; w = P_i \frac{\partial f_i}{\partial L_i} = P_i \left(F_i(k_i) - k_i \frac{\partial f_i}{\partial k_i} \right)$$

$$(4)\; r_i = P_i \frac{\partial f_i}{\partial K_i}$$

$$(5)\; \overline{L} = L_1 + L_2$$

Only labor is mobile between sectors
Technologies are linear homothetic.

Hat Algebra

$$X_1 = f_1(K_1, L_1)$$

$$dX_1 = \frac{\partial f_1}{\partial L_1} dL_1 + \frac{\partial f_1}{\partial K_1} dK_1$$

$$\frac{dX_1}{X_1} = \frac{\partial f_1}{\partial L_1} \frac{dL_1}{L_1} \frac{L_1}{X_1} + \frac{\partial f_1}{\partial K_1} \frac{dK_1}{K_1} \frac{K_1}{X_1}$$

$$\hat{X}_1 = \frac{L_1 P_1 \frac{\partial f_1}{\partial L_1}}{P_1 X_1} \hat{L}_1 + \frac{K_1 P_1 \frac{\partial f_1}{\partial K_1}}{P_1 X_1} \hat{K}_1$$

$$\hat{X}_1 = \theta_{L,1} \hat{L}_1 + \theta_{K,1} \hat{K}_1$$

The R-V Model in % changes

$$(1)\, \hat{P}_i = \theta_{Li}\hat{w} + \theta_{Ki}\hat{r}$$

$$(2)\, \hat{X}_i = \theta_{Li}\hat{L}_i + \theta_{Ki}\hat{K}_i$$

$$(3)\, \hat{L} = \lambda_{L1}\hat{L}_1 + \lambda_{L2}\hat{L}_2$$

$$(4)\, \sigma_i(\hat{w} - \hat{r}_i) = (\hat{K}_i - \hat{L}_i)$$

The R-V Model in % changes

$$\hat{w} = \frac{1}{\Delta}\left([\hat{S} - \hat{L}] + \sum_i \lambda_{Li} e_{Li} \hat{P}_i \right)$$

$$\hat{r}_i = \frac{1}{\theta_{Ki}\Delta}\begin{bmatrix} (e_{Li}\lambda_{Li} + e_{Lj}\lambda_{Lj} - \theta_{Li} e_{Li}\lambda_{Li})\hat{P}_i \\ -\theta_{Li}\lambda_{Lj} e_{Lj}\hat{P}_j + \theta_{Li}(\hat{L} - \hat{S}) \end{bmatrix}$$

$$where\,\hat{S} = \sum_j \lambda_{Lj}\hat{K}_j \quad e_{Lj} = \frac{\sigma_j}{\theta_{Kj}} \qquad \frac{\hat{r}_i}{\hat{P}_i} > 1$$

$$and\,\Delta = \lambda_{L1} e_{L1} + \lambda_{L2} e_{L2}$$

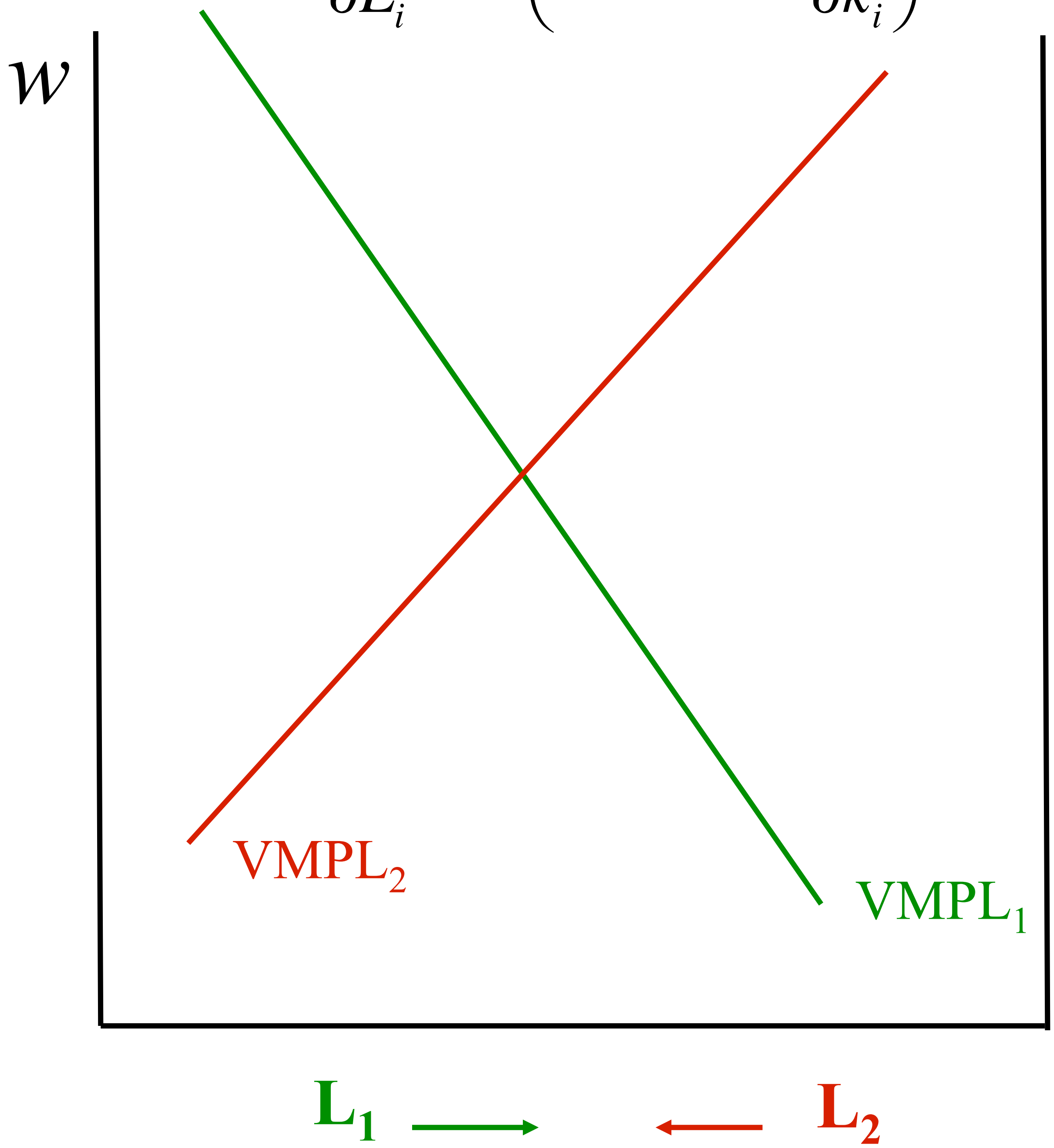
$$if\ \hat{P}_1 > 0 > \hat{P}_2 = 0\ then\,\hat{P}_1 > \hat{w} > \hat{P}_2 = 0$$

The R-V Model in & change terms

- The effect on sector-specific capital is direct, and is magnified. An increase in P1 is good for K1, bad for K2.
- The effect on labor is ambiguous. This is easier to see graphically.
- Graphically, the labor market is the easiest way to illustrate price linkages.

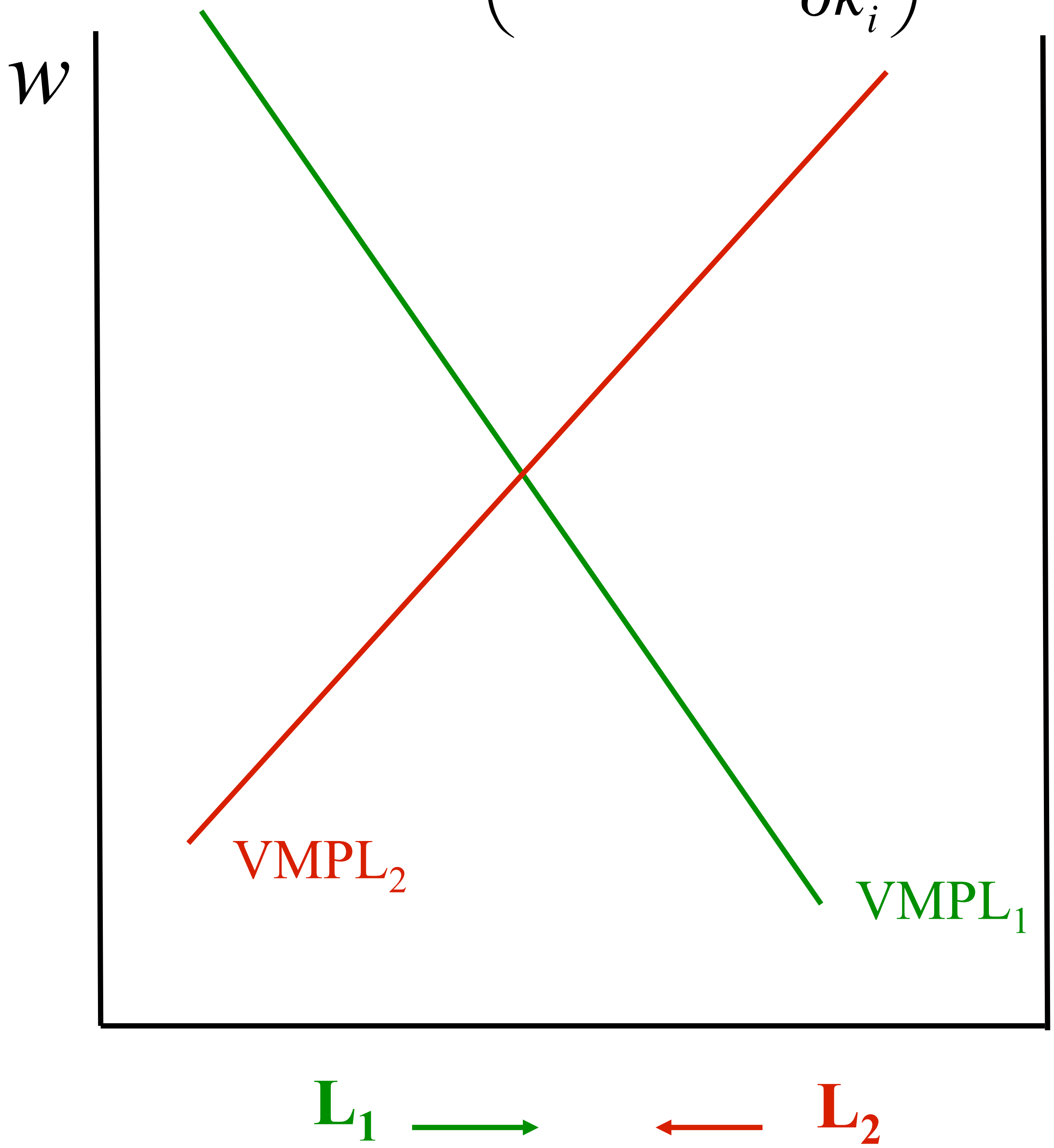
The R-V Labor market

$$(3)\, w = P_i \frac{\partial f_i}{\partial L_i} = P_i \left(F_i(k_i) - k_i \frac{\partial f_i}{\partial k_i} \right)$$

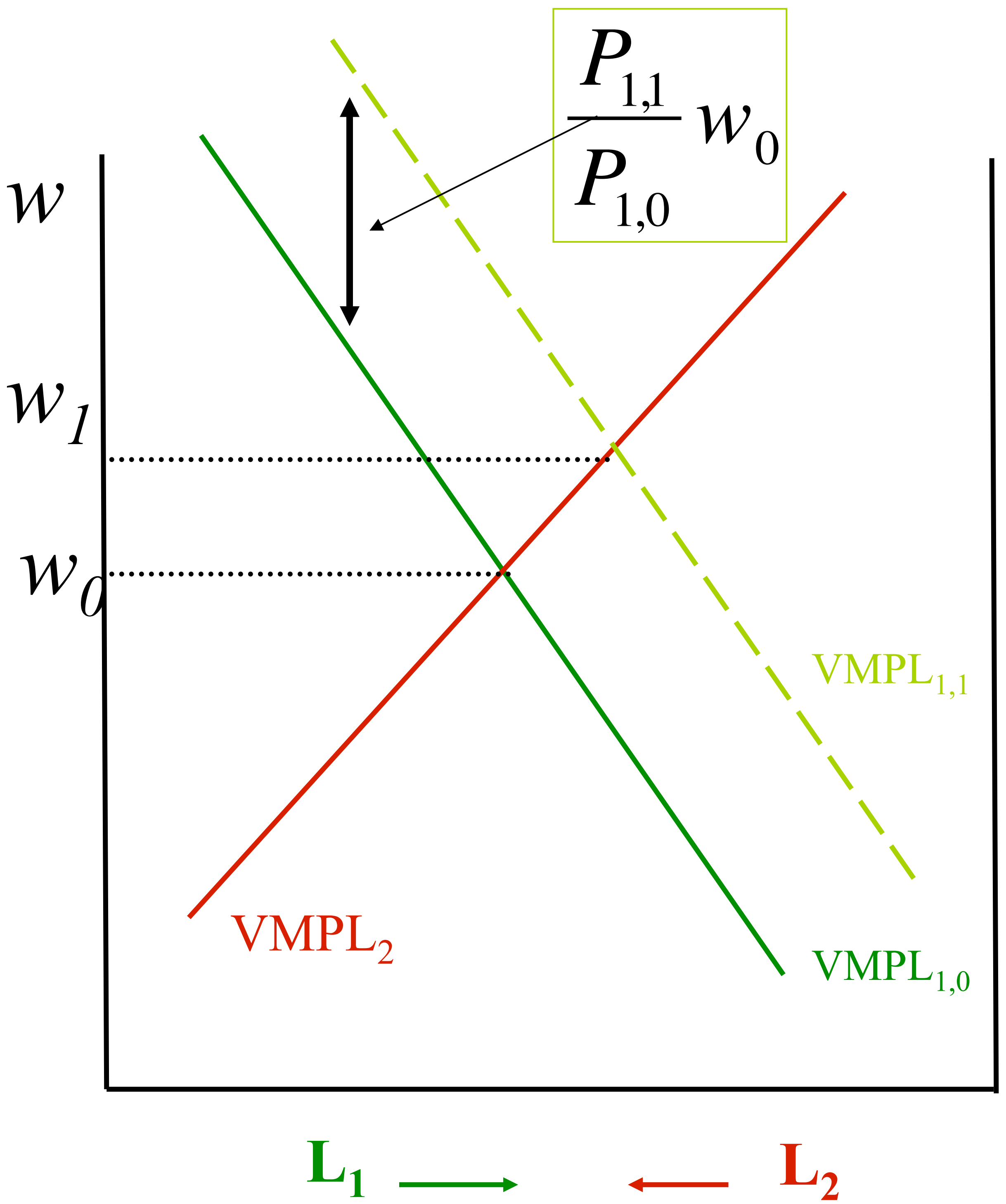


A Price Increase for X1

$$(3)\, w = P_i \left(F_i(k_i) - k_i \frac{\partial f_i}{\partial k_i} \right)$$

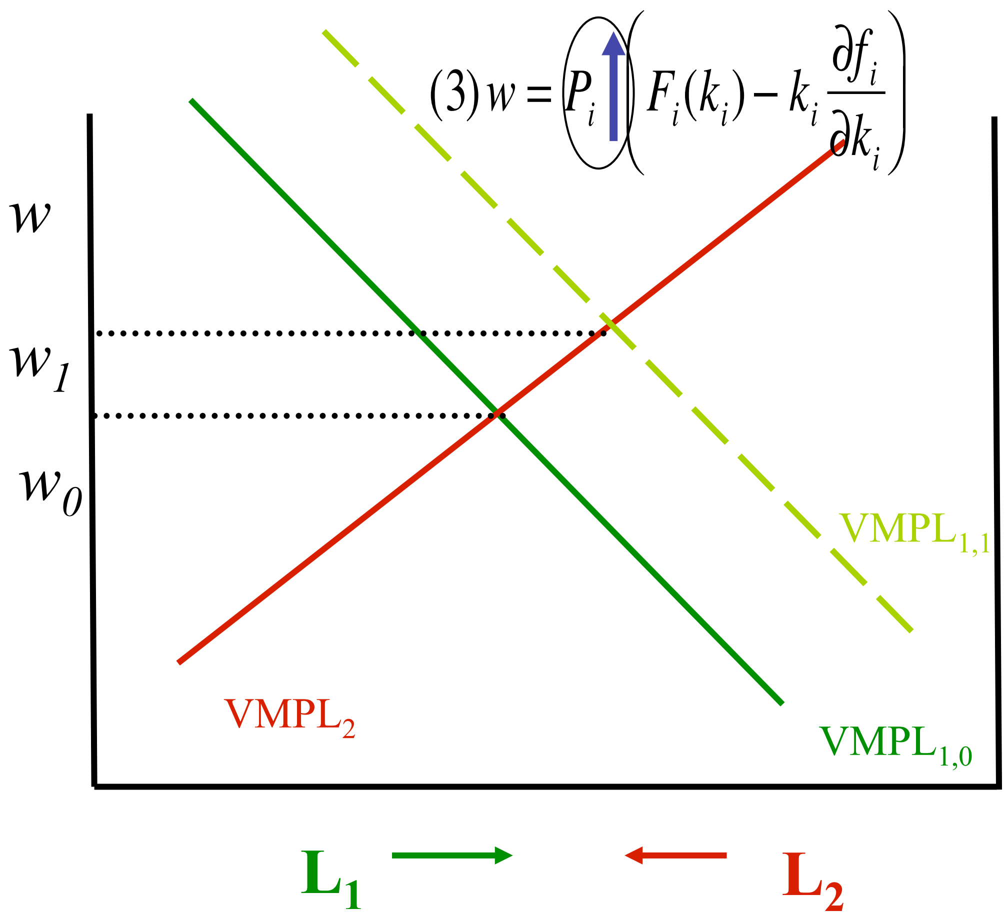


A Price Increase for X1



A Price Increase for X1

- The impact on labor is ambiguous. Wage goes up, but not by the full amount of the increase in P1.



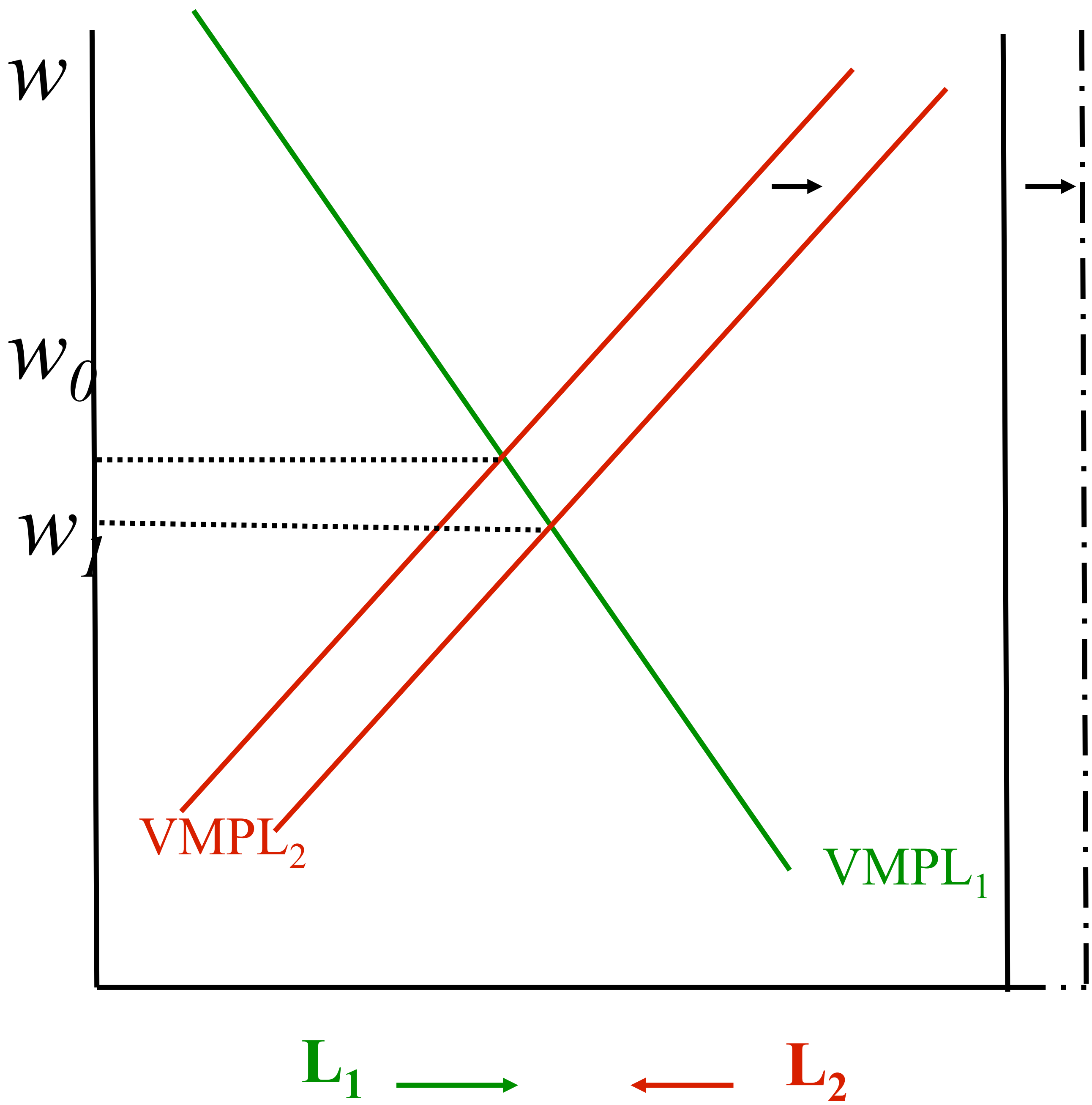
A Price Increase for X1

- The implications for politics here are different from the HO model.
- In the HO model, factors would vote for price changes (like tariffs) along factor intensity lines.
- In the R-V model, we have sector-specific factors that would lobby for price changes.

Migration or Labor Supply Increase

- Recall that in the HO model, factor supply changes had no impact on factor incomes as long as we were in the diversification cone.
- This will not be the case in the R-V model.

Migration or Labor Supply Increase



Migration or Labor Supply Increase

- Wages fall for workers.
- Output must go up in both sectors, as labor in both sectors increases.

$$\hat{w} = \frac{1}{\Delta}\left([\hat{S} - \hat{L}] + \sum_i \lambda_{Li} e_{Li} \hat{P}_i\right)$$

$$= -\frac{1}{\Delta}\hat{L}$$

Migration or Labor Supply Increase

- What happens to capital owners?

Migration or Labor Supply Increase

- Employment goes up, and goods prices are unchanged.

$$\hat{r}_i = \frac{1}{\theta_{Ki}\Delta}\begin{bmatrix}(e_{Li}\lambda_{Li} + e_{Lj}\lambda_{Lj} - \theta_{Li}e_{Li}\lambda_{Li})\hat{P}_i \\ -\theta_{Li}\lambda_{Lj}e_{Lj}\hat{P}_j + \theta_{Li}(\hat{L} - \hat{S})\end{bmatrix}$$

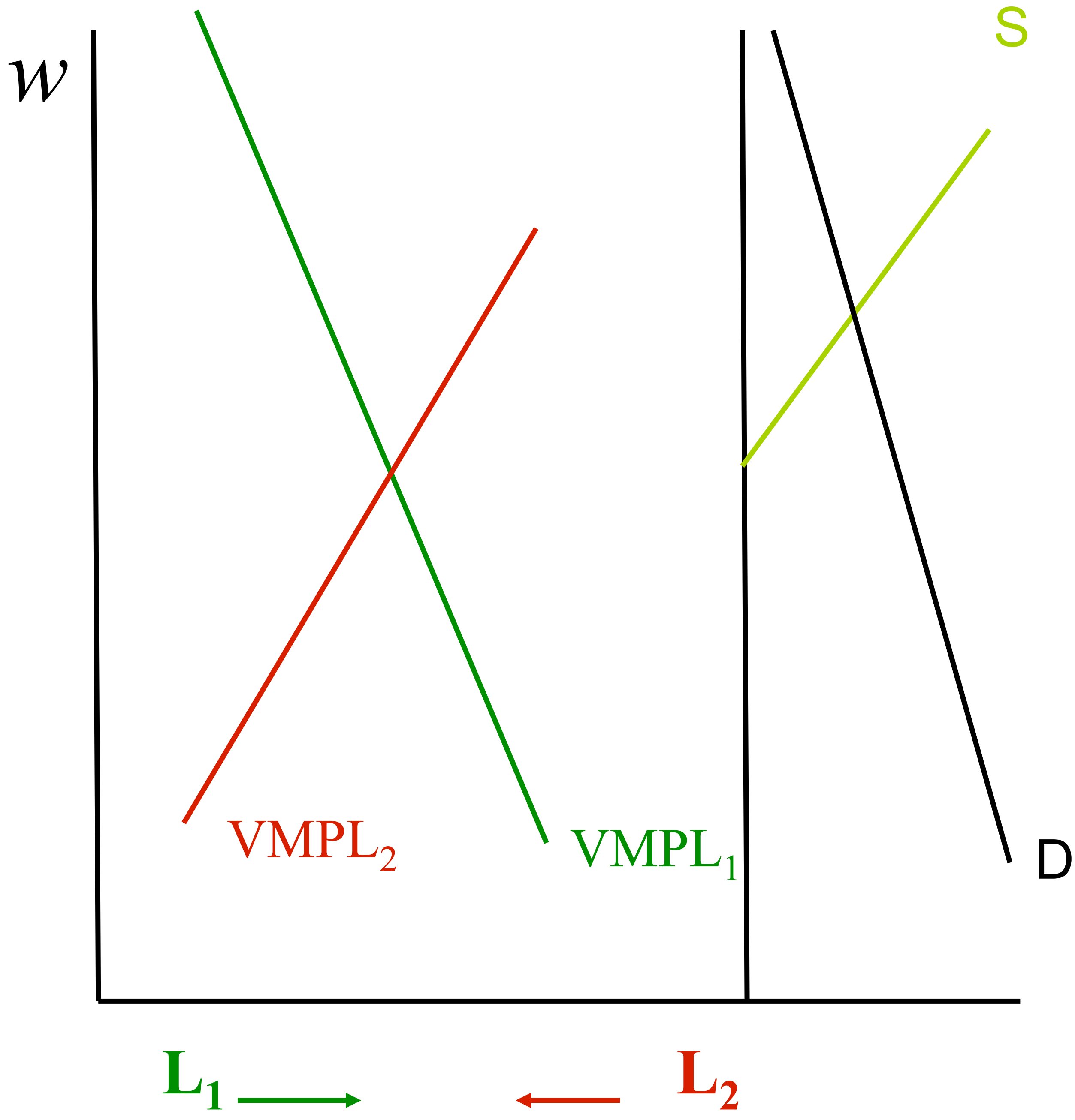
$$\hat{r}_i = \frac{1}{\theta_{Ki}\Delta}\left[\theta_{Li}\hat{L}\right]$$

- Capital wins.

HO vs. RV models

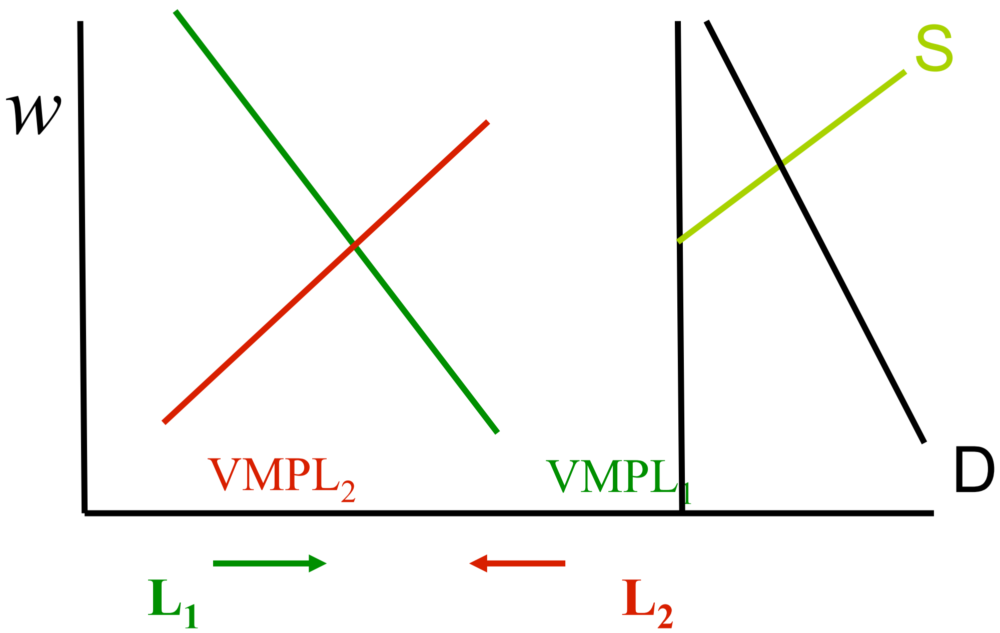
- In the HO model, factors are indifferent to migration or foreign investment.
- In the RV model, capital will oppose foreign investment, labor will favor it.
- Labor will oppose migration, capital will support it.
- There are papers linking the RV and HO models as short- and long-run parts of the same story.

The R-V Model With Services

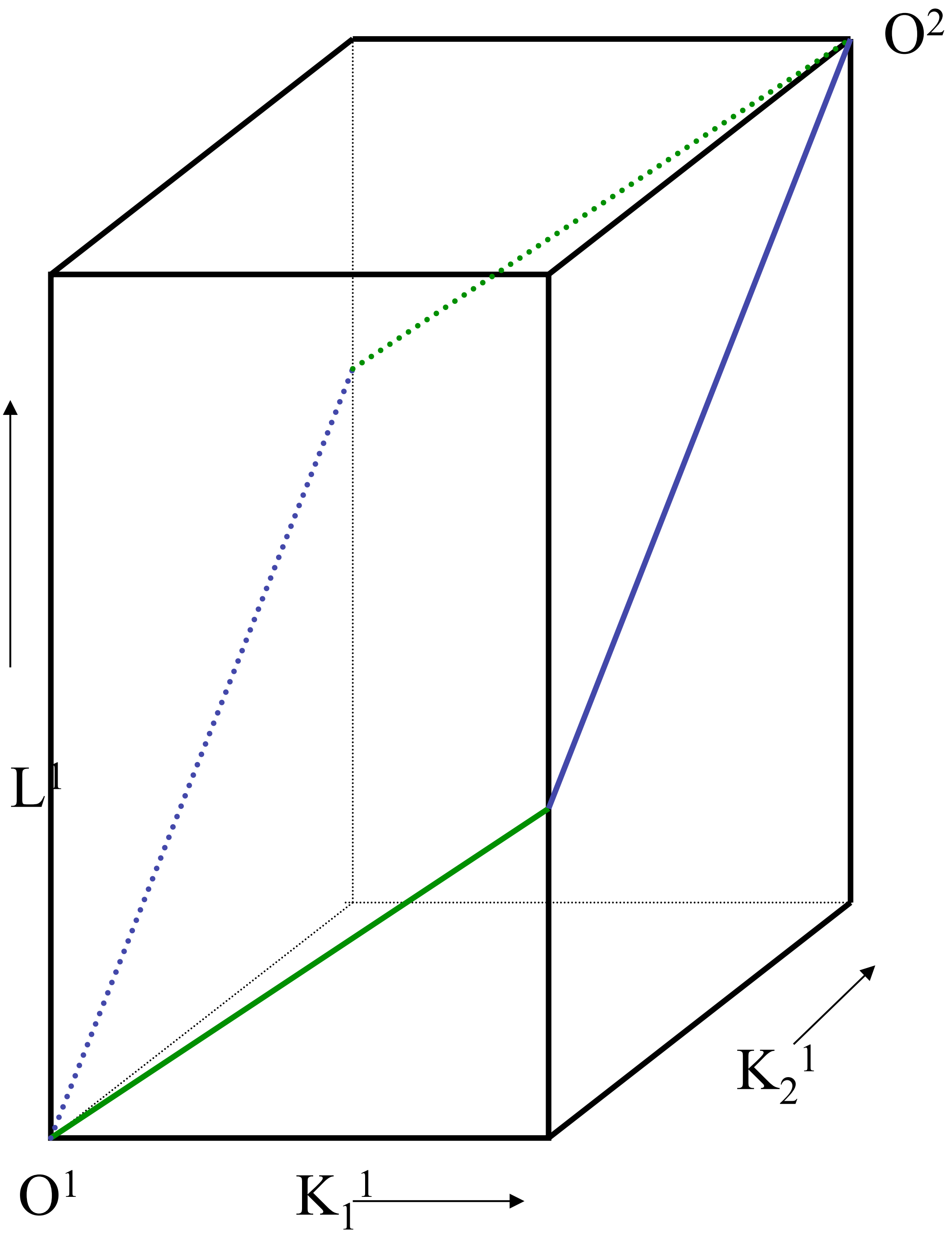


Trading Nontradables

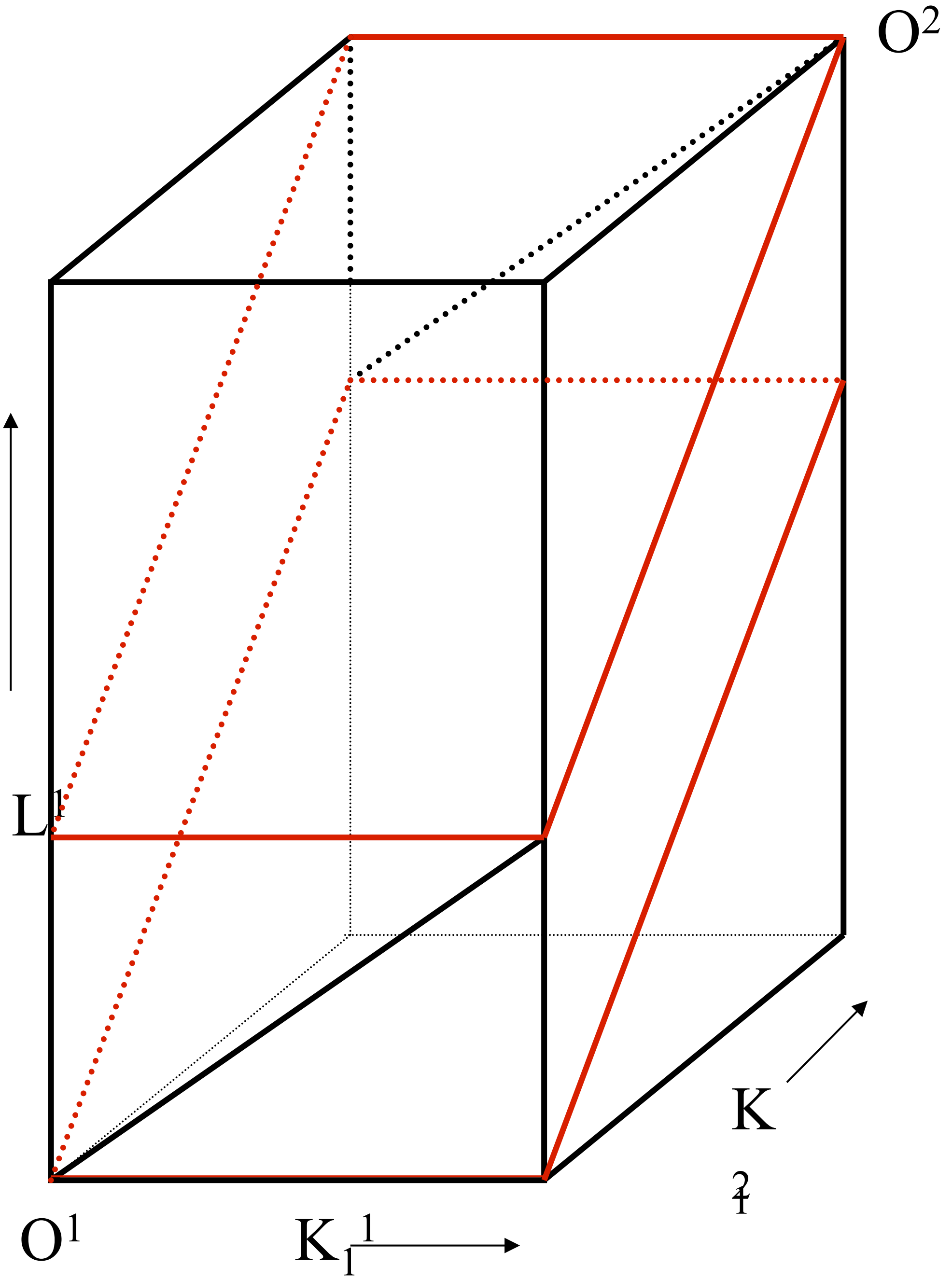
- Supply of labor to the services sector will depend on tradable prices and capital endowments.
- Capital-rich countries will have higher prices for services, and higher wages.
- If we then let services be traded, this will drive down the wage (like a labor supply increase).



The FPE set for the R-V model



The FPE when K1 is Mobile



(see Dixit and Norman)

Summary

- Given goods prices, relative endowments determine the pattern of production for a small, or a large country.
- Goods prices fix factor prices.
- Factors can have sector-and specific interests.
- Labor is indifferent about trade (or at least ambiguous)
- Capital wants sector-based protection
- Capital wants migration, opposes FDI
- Labor wants FDI, opposes migration