Macro II/Aussenwirtschaft
Lecture Slides No 4

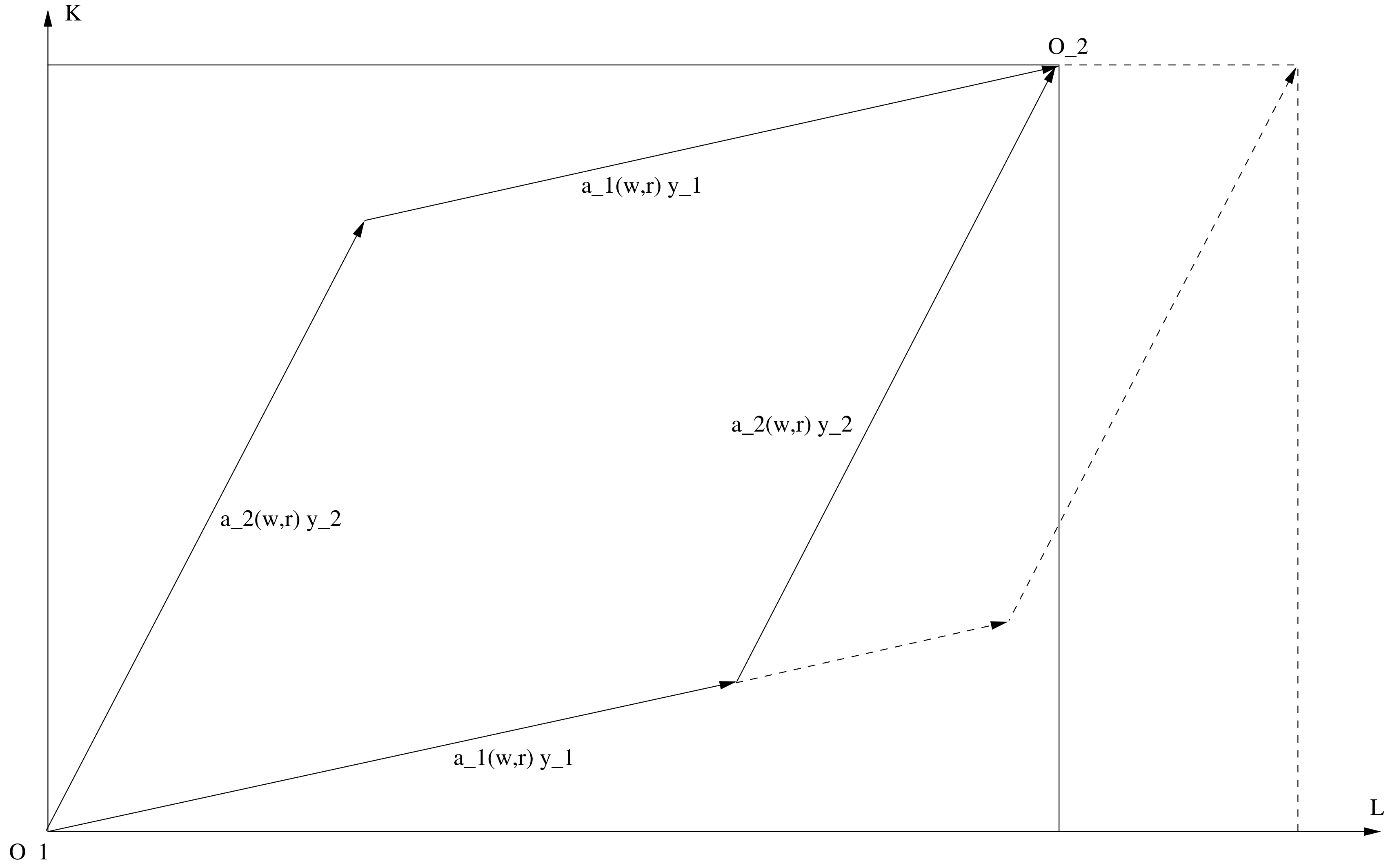
Gerald Willmann
May 2020

©Gerald Willmann, Bielefeld University

Result No 3: Rybczynski

- turning to quantities
- what happens to output as endowments change
- suppose labor force changes (migration, ageing)
- or the capital endowment (investment, desaster)
- how does change in K/L affect y_1 and y_2

©Gerald Willmann, Bielefeld University



©Gerald Willmann, Bielefeld University

Mathematically — Rybczynski

$$
\begin{aligned}
a_{1L}y_1 + a_{2L}y_2 &= L \\
a_{1K}y_1 + a_{2K}y_2 &= K
\end{aligned}
$$

$$
\begin{aligned}
a_{1L}dy_1 + a_{2L}dy_2 &= dL \\
a_{1K}dy_1 + a_{2K}dy_2 &= dK
\end{aligned}
$$

$$
\begin{aligned}
\frac{a_{1L}y_1}{L}\frac{dy_1}{y_1} + \frac{a_{2L}y_2}{L}\frac{dy_2}{y_2} &= \frac{dL}{L} \\
\frac{a_{1K}y_1}{K}\frac{dy_1}{y_1} + \frac{a_{2K}y_2}{K}\frac{dy_2}{y_2} &= \frac{dK}{K}
\end{aligned}
$$

©Gerald Willmann, Bielefeld University

$$\begin{aligned} \lambda_{1L}\hat{y}_1 + \lambda_{2L}\hat{y}_2 &= \hat{L} \\ \lambda_{1K}\hat{y}_1 + \lambda_{2K}\hat{y}_2 &= \hat{K} \end{aligned}$$

$$\begin{pmatrix} \lambda_{1L} & \lambda_{2L} \\ \lambda_{1K} & \lambda_{2K} \end{pmatrix} \begin{pmatrix} \hat{y}_1 \\ \hat{y}_2 \end{pmatrix} = \begin{pmatrix} \hat{L} \\ \hat{K} \end{pmatrix}$$

$$\begin{pmatrix} \hat{y}_1 \\ \hat{y}_2 \end{pmatrix} = \begin{pmatrix} \lambda_{1L} & \lambda_{2L} \\ \lambda_{1K} & \lambda_{2K} \end{pmatrix}^{-1} \begin{pmatrix} \hat{L} \\ \hat{K} \end{pmatrix}$$

©Gerald Willmann, Bielefeld University

$$\begin{pmatrix} \hat{y}_1 \\ \hat{y}_2 \end{pmatrix} = \frac{1}{|\Lambda|} \begin{pmatrix} \lambda_{2K} & -\lambda_{2L} \\ -\lambda_{1K} & \lambda_{1L} \end{pmatrix} \begin{pmatrix} \hat{L} \\ \hat{K} \end{pmatrix}$$

determinant:

$$\begin{aligned} |\Lambda| &= \lambda_{1L}\lambda_{2K} - \lambda_{2L}\lambda_{1K} \\ &= \lambda_{1L}(1-\lambda_{1K}) - (1-\lambda_{1L})\lambda_{1K} \\ &= \lambda_{1L} - \lambda_{1K} = \lambda_{2K} - \lambda_{2L} > 0 \end{aligned}$$

©Gerald Willmann, Bielefeld University

$$\hat{y}_1 = \frac{\lambda_{2K}\hat{L} - \lambda_{2L}\hat{K}}{\lambda_{2K} - \lambda_{2L}} > \hat{L} \qquad \text{for} \qquad \hat{L} > \hat{K}$$

$$\hat{y}_2 = \frac{-\lambda_{1K}\hat{L} + \lambda_{1L}\hat{K}}{\lambda_{1L} - \lambda_{1K}} < \hat{K} \qquad \text{for} \qquad \hat{L} > \hat{K}$$

note: inequalities reverse for $\hat{L} < \hat{K}$

Magnification in quantities: $\hat{y}_1 > \hat{L} > \hat{K} > \hat{y}_2$

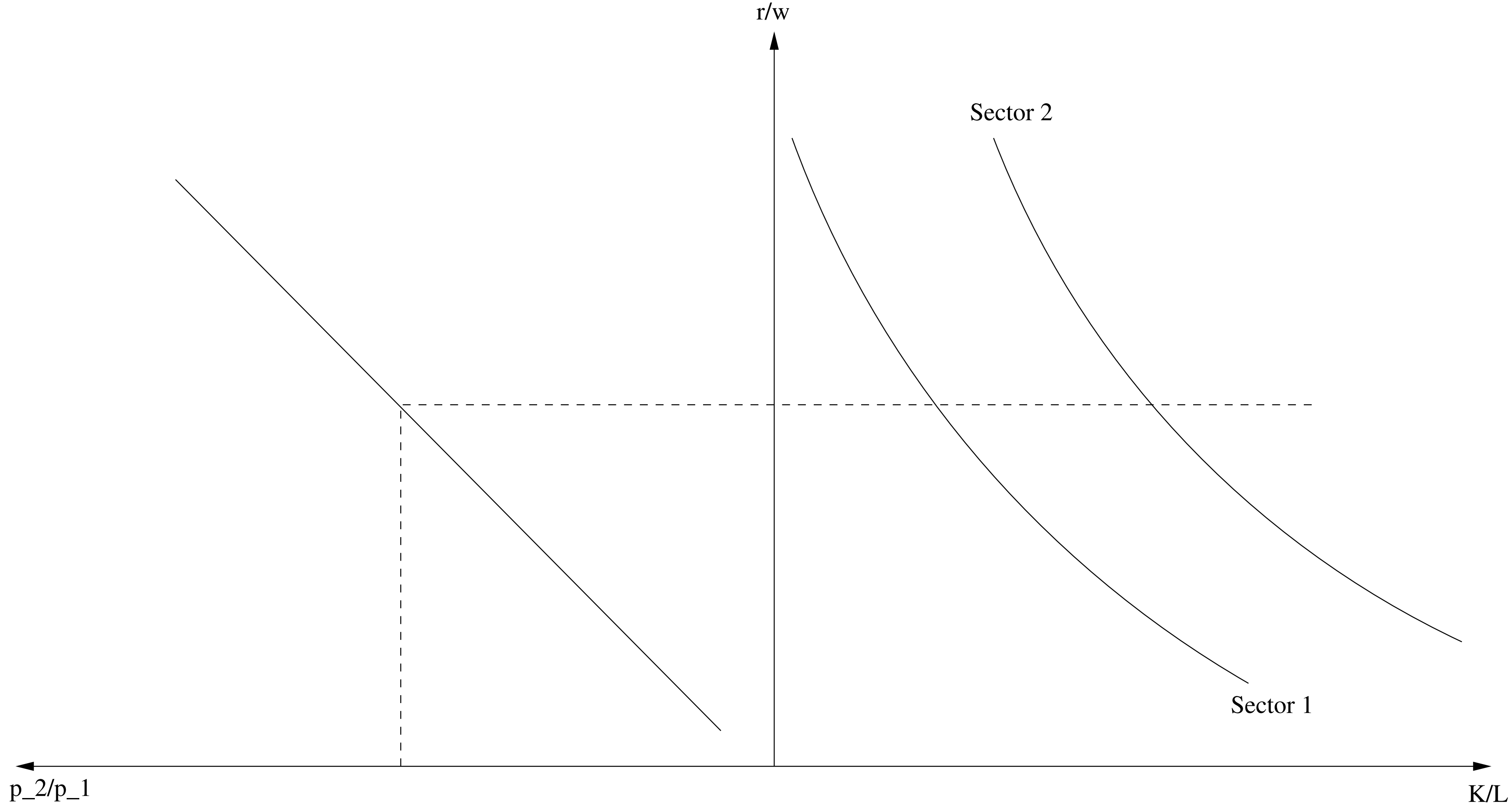
or $\hat{y}_1 < \hat{L} < \hat{K} < \hat{y}_2$

©Gerald Willmann, Bielefeld University

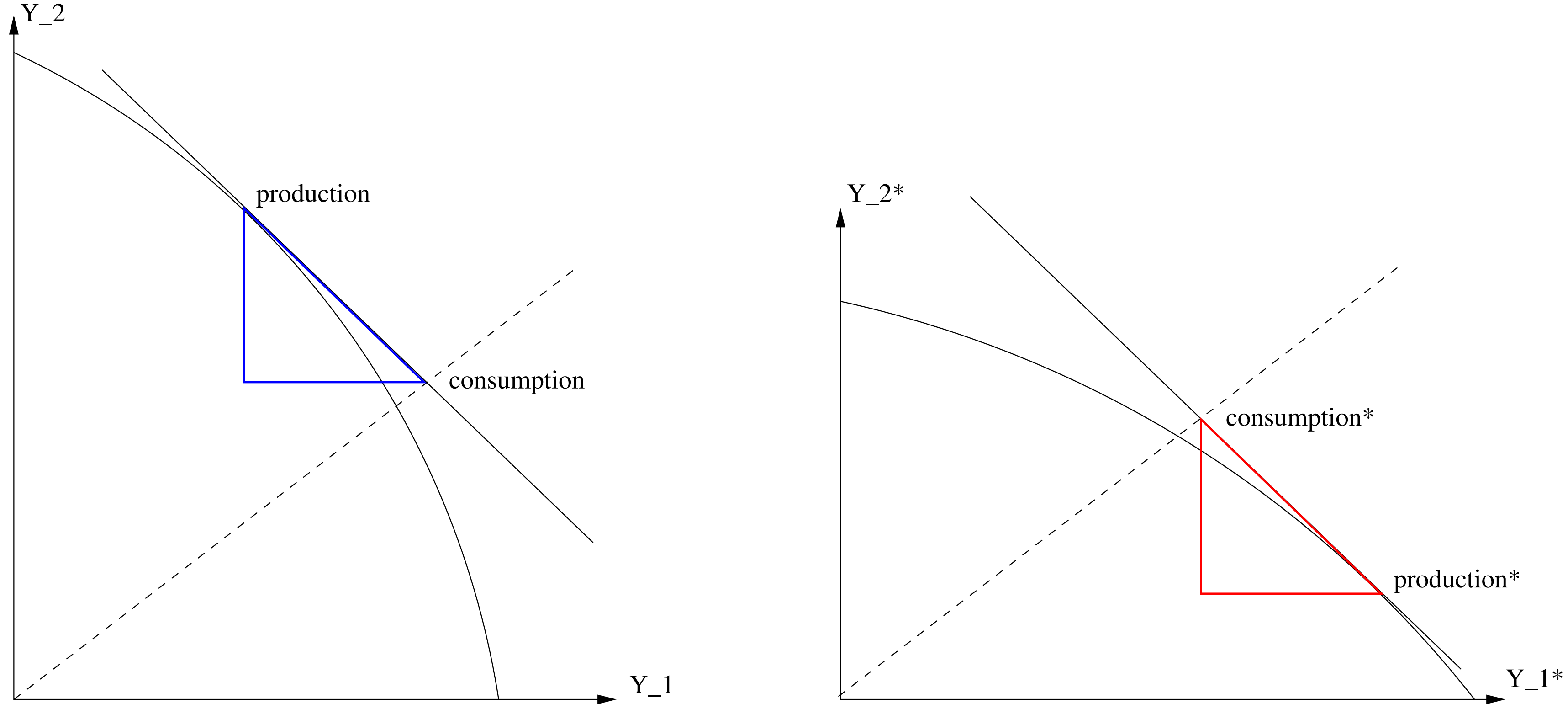
Final result: Heckscher–Ohlin proper

- which country exports/imports which commodity
- each country exports the good whose production uses intensively the factor with which the country is abundantly endowed
- that's where it has comparative advantage
- this is know as the HO theorem or result
- it is called the factor abundance theory
- we will look at this from different angles

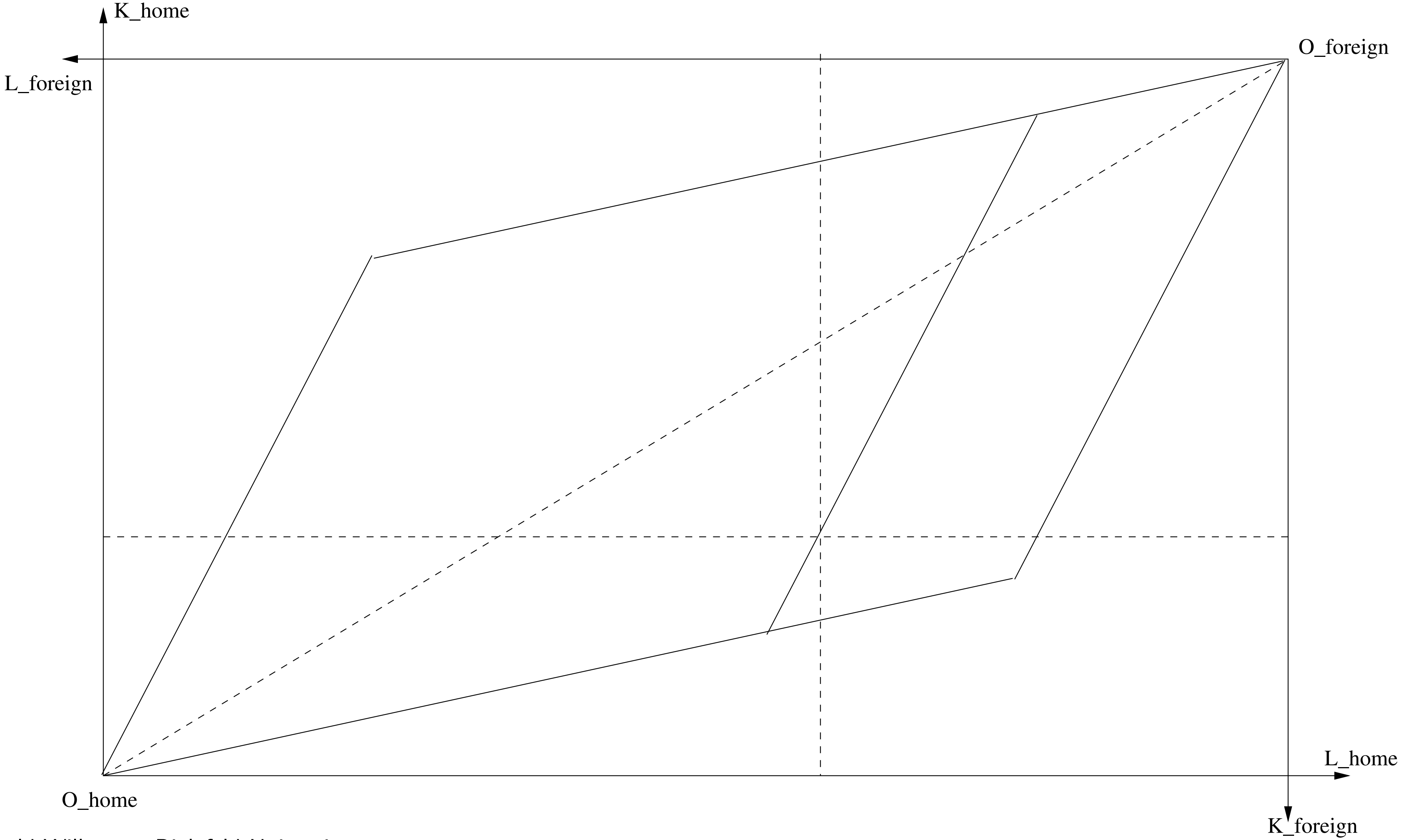
©Gerald Willmann, Bielefeld University



©Gerald Willmann, Bielefeld University



©Gerald Willmann, Bielefeld University



©Gerald Willmann, Bielefeld University