Intermediate Goods and Weak Links: A Theory of Economic Development

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Central Idea

- Intermediates $\longrightarrow$ productivity multiplier

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- Intermediates $\rightarrow$ productivity multiplier
- Complementarities (in intermediates) $\rightarrow$ strengthens interdependence

The Mechanics – Intermediates

$$
\begin{aligned}
Y_t &= A\left(K_t^{\alpha} L_t^{1-\alpha}\right)^{1-\sigma} X_t^{\sigma} \\
K_{t+1} &= sY_t + (1-\delta)K_t \\
X_{t+1} &= xY_t
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$$\alpha = \frac{1}{3} \quad \text{and} \quad \sigma = \frac{1}{2}$$

The Mechanics – Complementarities

$$Y = \left(\int z_i^{\eta} \mathrm{d}i \right)^{\frac{1}{\eta}}$$

For intermediates: $\eta < 0$.

The Model

$$Y_i = A_i \left(K_i^{\alpha} H_i^{1-\alpha}\right)^{1-\sigma} X_i^{\sigma}$$

$$Y_i = c_i + z_i$$

$$Y = \left(\int c_i^{\theta} \mathrm{d}i\right)^{\frac{1}{\theta}}, \quad 0 < \theta < 1$$

$$X = \left(\int z_i^{\rho} \mathrm{d}i\right)^{\frac{1}{\rho}}, \quad \rho < 0$$

$$X \geq \int X_i \mathrm{d}i$$

$$Y \geq C + I$$

A Symmetric Allocation

$$Y = \phi(\bar{z}) \left(S_\theta^{1-\sigma} S_\rho^{\sigma} \right)^{\frac{1}{1-\sigma}} K^\alpha H^{1-\alpha}$$

$$\text{where} \quad S_\xi = \left(\int A_i^\xi \mathrm{d}i \right)^{\frac{1}{\xi}} \quad \text{for } \xi = \theta, \rho$$

$$\phi(\bar{z}) = \left((1 - \bar{z})^{1-\sigma} \bar{z}^{\sigma} \right)^{\frac{1}{1-\sigma}}$$

$$z_i = \bar{z} Y$$

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$$\text{Assume}: \quad \theta = 1 \wedge \rho \to -\infty$$

$$\text{TFP} = \overline{A} \min_i \{A_i\}$$

A Competitive Equilibrium with Wedges

$$Y = \psi(\tau)\left(Q_\theta^{1-\sigma} Q_\rho^{\sigma}\right)^{\frac{1}{1-\sigma}} K^{\alpha} H^{1-\alpha}$$

$$\text{where} \quad Q_\xi = \left(\int (A_i(1-\tau_i))^{\frac{\xi}{1-\xi}} \mathrm{d}i\right)^{\frac{1-\xi}{\xi}} \quad \text{for } \xi = \theta, \rho$$

$$\psi(\tau) = \frac{1-\sigma(1-\tau)}{1-\tau}\sigma^{\frac{\sigma}{1-\sigma}}$$

$$\tau = \frac{T}{Y + qX}$$

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$$\text{Assume}: \quad \theta = 1 \wedge \rho \to -\infty \wedge \tau_i = 0$$

$$\text{TFP} = \max_i\{A_i\}\left(\int A_i^{-1}\mathrm{d}i\right)^{-1}$$

Empirical Results

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- Model generates output per capita ratios of up to 150 (Data: 50)