



## CEE Growth & Development

Technology: Innovation and imitation

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# Technological growth

Solow model with

$$Y = K^\alpha (AL)^{1-\alpha}$$

$$\dot{K} = sY - \delta K$$

$$\frac{\dot{L}}{L} = n$$

$$\frac{\dot{A}}{A} = g$$

# Technological growth

$$\tilde{y} = \frac{Y}{AL} \left[ = \frac{y}{A} \right] = \tilde{k}^\alpha$$

$$\dot{\tilde{k}} = s\tilde{y} - (n + g + d)\tilde{k}$$

$$\text{SS} : \dot{\tilde{k}} = 0 \implies \frac{\dot{y}}{y} = g$$

# Innovation and imitation

$$A_{t+1} - A_t = u_n (\gamma - 1) A_t + u_m (\check{A}_t - A_t)$$
$$g_t = \frac{A_{t+1} - A_t}{A_t} = u_n (\gamma - 1) + u_m (a_t - 1)$$

- innovation frequency,  $u_n$
- innovation jump,  $\gamma$
- imitation frequency,  $u_m$
- technological frontier,  $\check{A}_t$
- measure of 'backwardness',  $a_t$

# Technology and Knowledge

- Non-excludability
  - impossibility (or high costs) of preventing non-paying consumption
  - No private interest in knowledge generation
    - Accidental innovation, public R&D, private R&D
    - Investment vs. uncertainty, market size, and 'duration of monopoly'
- Intellectual property rights
  - trade secrets
  - trademarks
  - patent
  - other
- Imitation
  - Trickle up and down, Catching up & Leapfrogging

# Innovation and Imitation: Environment

- Innovation:
  - Intellectual property rights
  - financial development
  - education (tertiary)
  - (macroeconomic) stability
  - product market competition
  - high labour market mobility
  
- Imitation:
  - long-term banking
  - limited competition and entry
  - limited labour mobility