Economic Growth

Seminar 3: The Role of Technology in Growth

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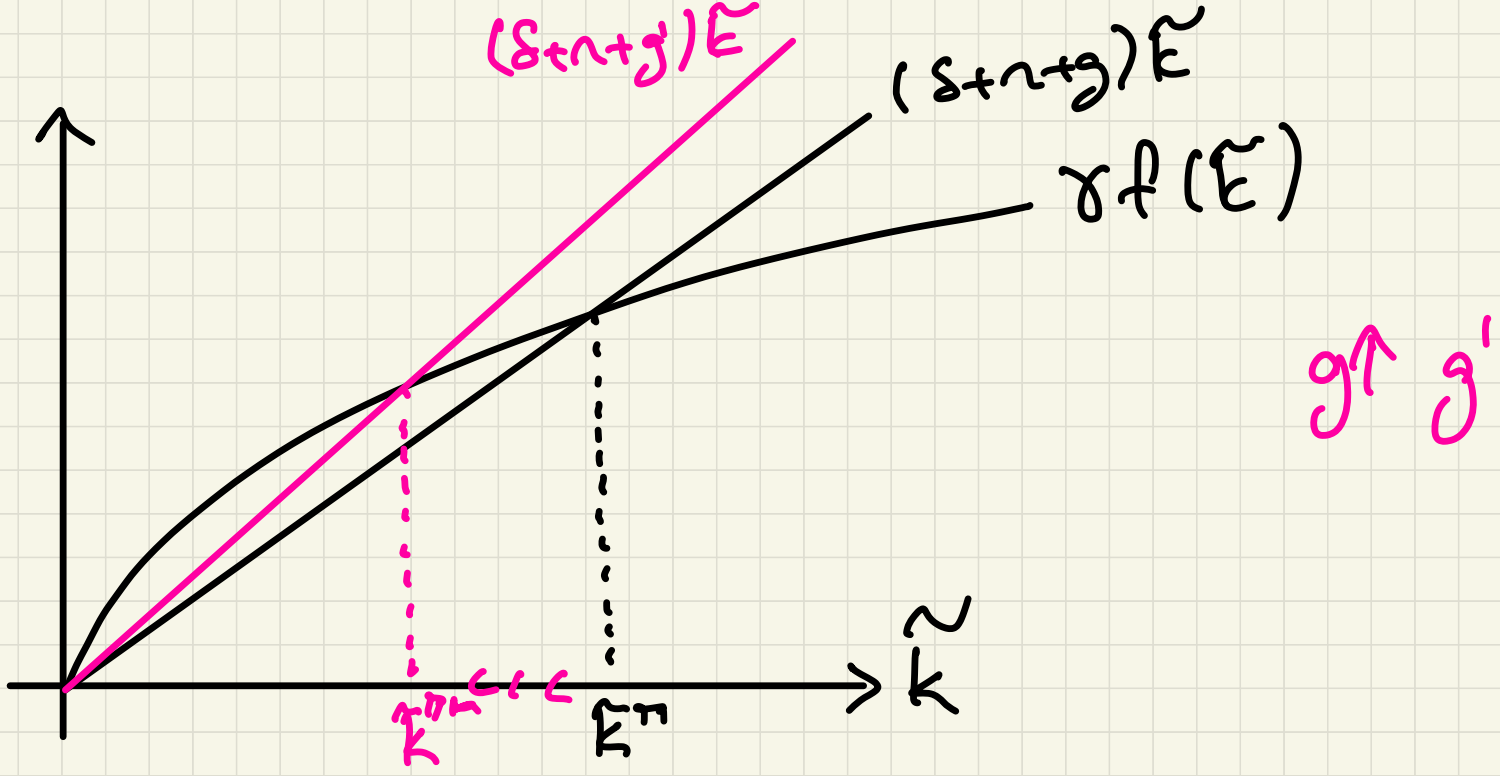
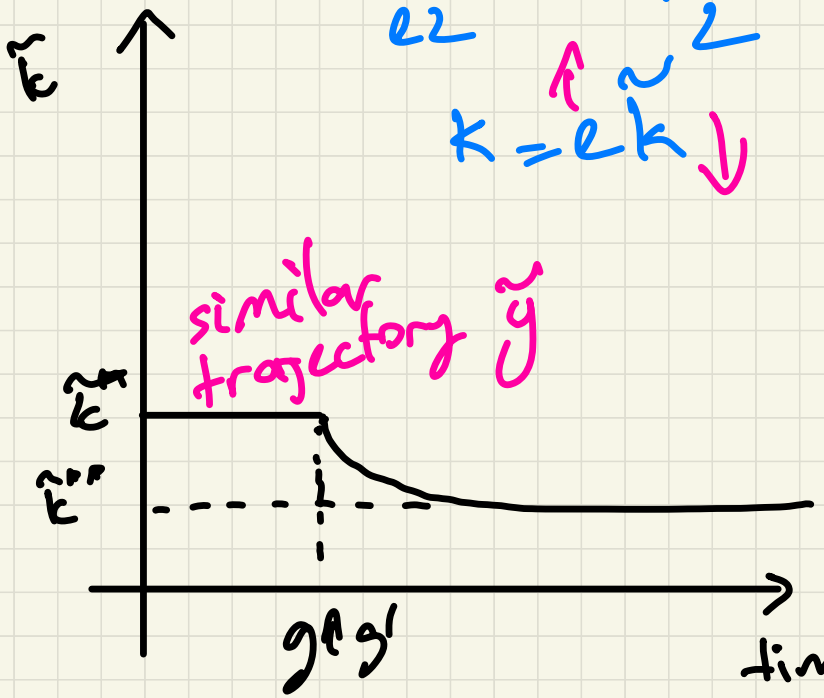
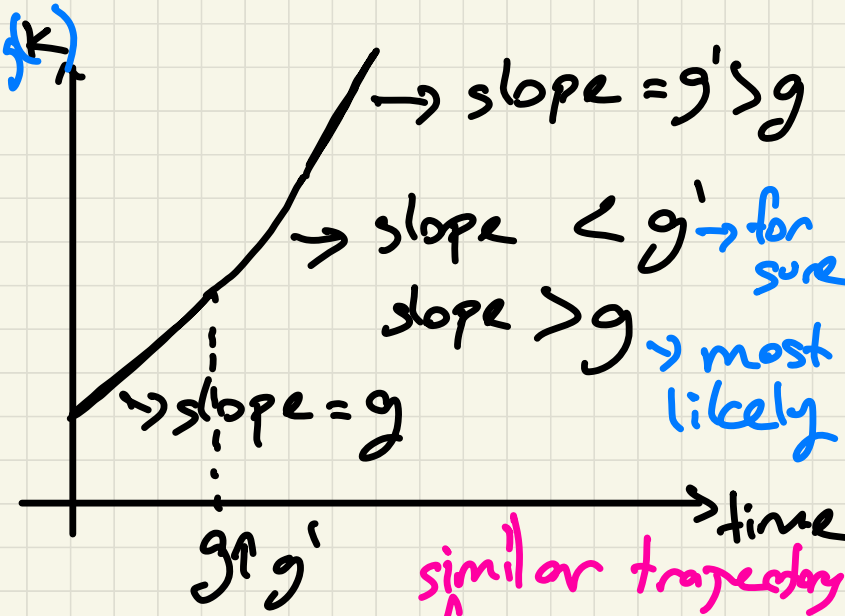


g↑ g'

$\tilde{k} = \frac{K}{\ell 2}$ $\quad k = \frac{K}{2}$

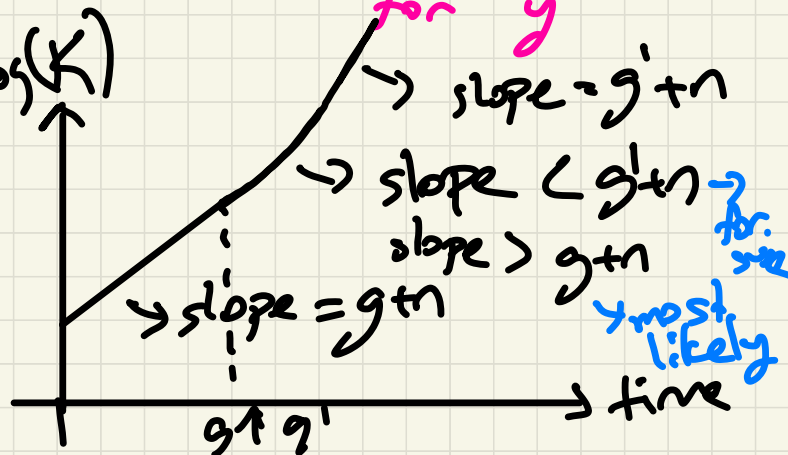
$k = \ell \tilde{k}$

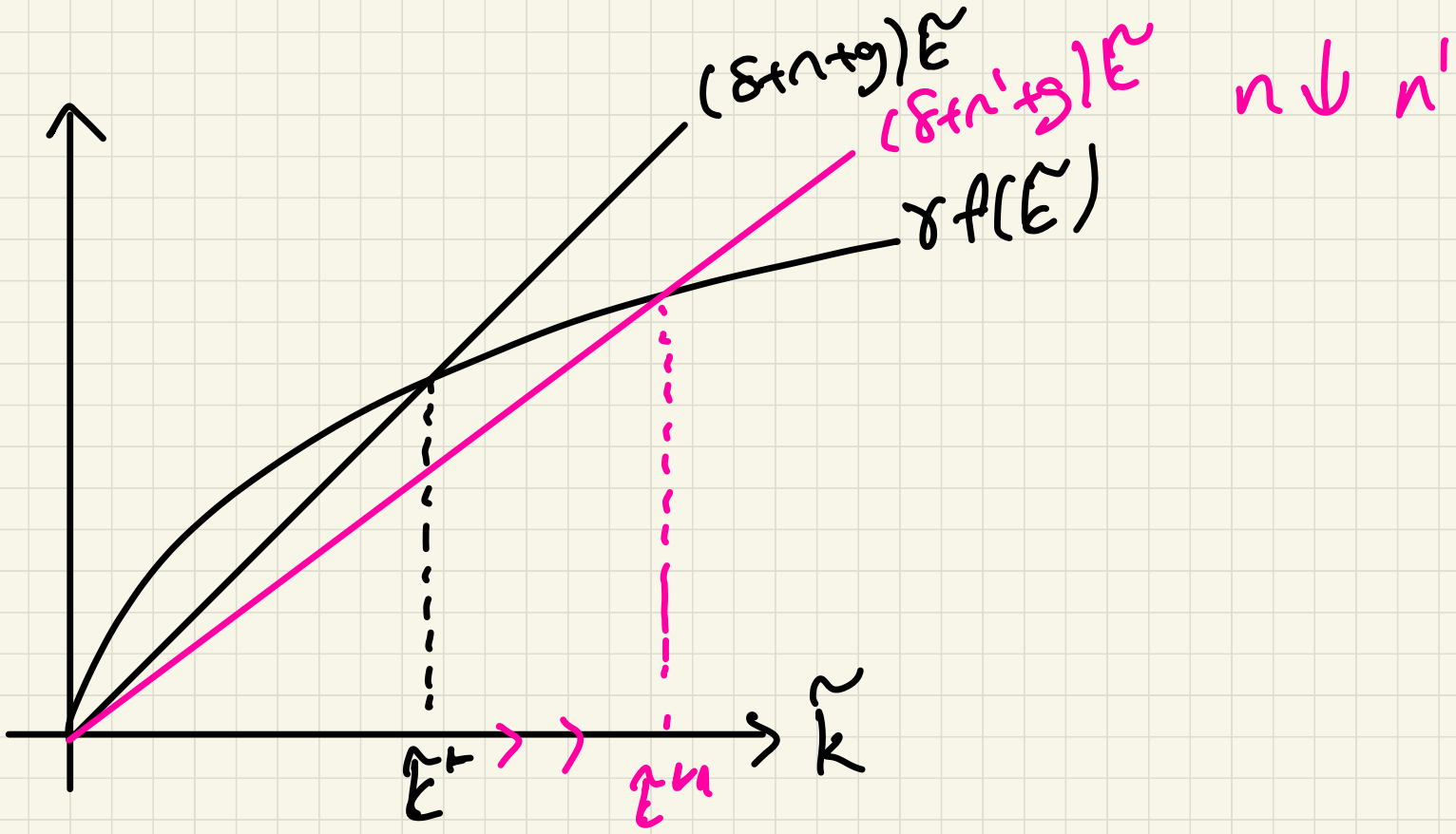


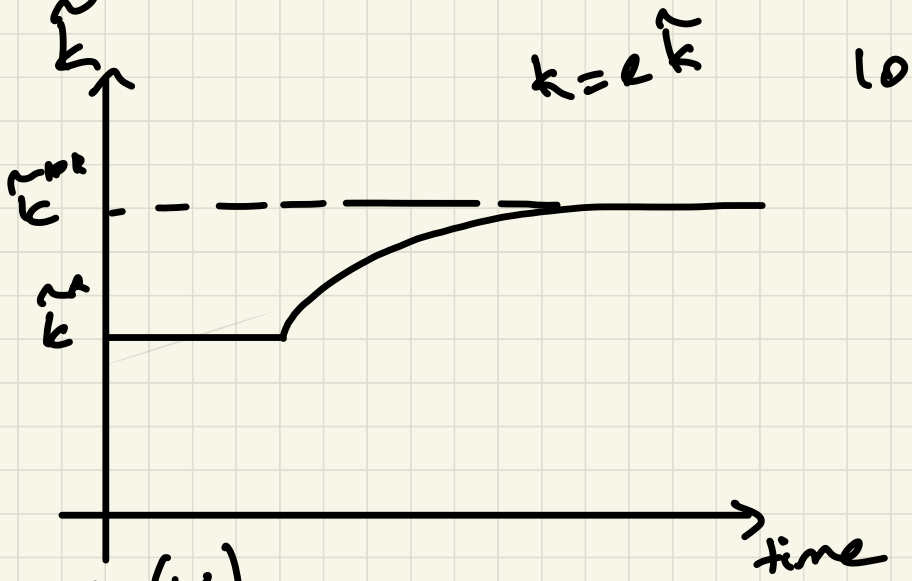


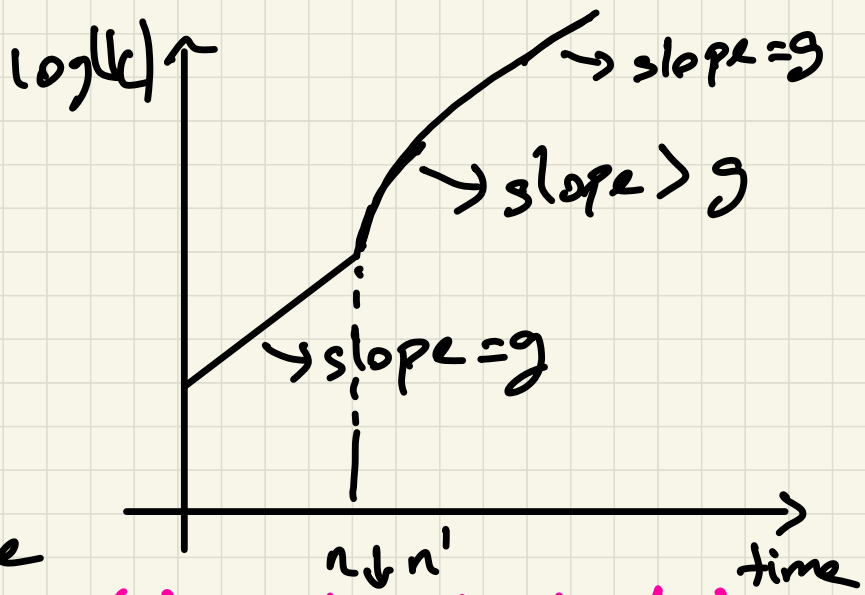
$K = \ell 2 \tilde{k}$ $\quad y = 2y$

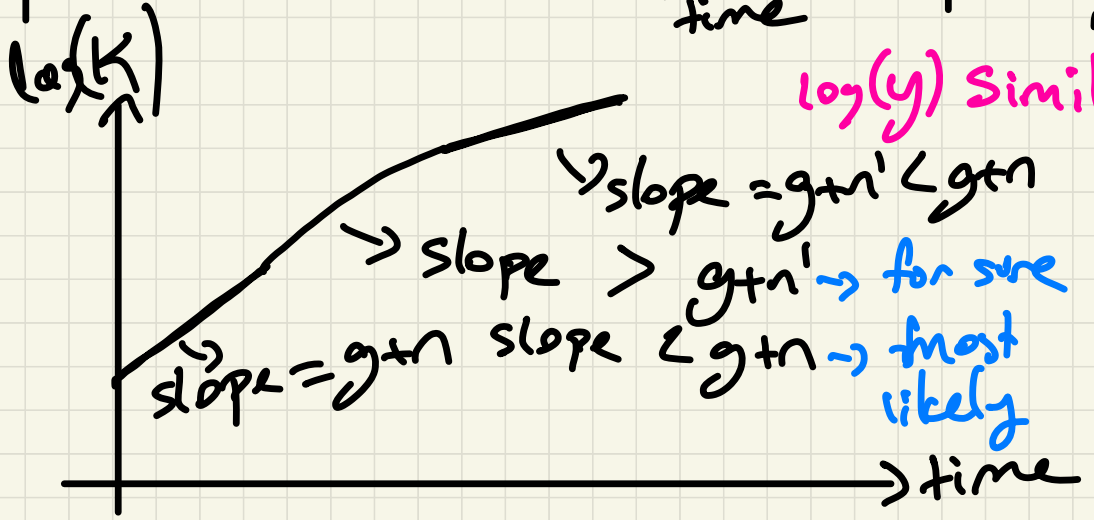
$K = 2k$




$(\delta+n+g)\tilde{E}$
$(\delta+n'+g)\tilde{E}$
$n \downarrow n'$
$\gamma f(\tilde{E})$
$\tilde{k}$
$\tilde{E}^*$
$\tilde{E}^{**}$







log(y) similar to log(k)

$\tilde{k} = \frac{K}{eL} \Rightarrow K = e \cdot L \cdot \tilde{k}$

$\tilde{k}$ ↓ ↑ $\tilde{}$

→ for sure

→ most likely

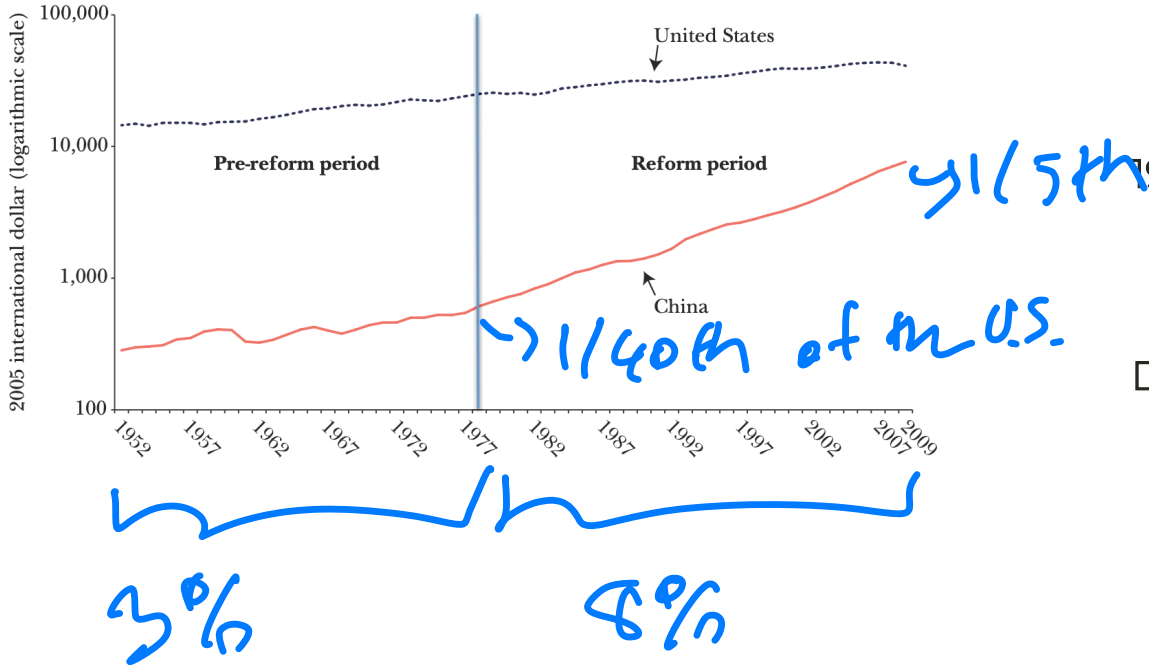
⇐ log Y similar to log(K)

Understanding China's Growth: Past, Present, and Future

Xiaodong Zhu

Summary

Figure 2
GDP per capita of China and US: 1952–2009



1952 - 1978

- Per capita GDP growth rate: 3%
- Growth due to government investment, and increase in education
- Productivity regressed

1978 - 2007

- Productivity growth

Data Sources

- Historical: Madison (2007)
- PPP data: Penn World Table (7.0)
- Growth accounting exercise data: Brandt and Zhu (2010)

Growth accounting, alternative

Start with Cobb-Douglas $Y = AK^{\alpha}(hL)^{1-\alpha}$

Divide both sides with Y^{α}

$$\frac{Y}{Y^{\alpha}} = Y^{1-\alpha} = A\left(\frac{K}{Y}\right)^{\alpha}(hL)^{1-\alpha}$$

Raise both sides to the power $1/(1-\alpha)$

$$Y = A^{1/(1-\alpha)}\left(\frac{K}{Y}\right)^{\alpha/(1-\alpha)}hL$$

Divide both sides with population, N

$$\frac{Y}{N} = A^{1/(1-\alpha)}\left(\frac{K}{Y}\right)^{\alpha/(1-\alpha)}h\frac{L}{N}$$

Why this way: K/Y is independent of productivity

$$\begin{aligned}\text{Growth in GDP per capita} = \\ \frac{1}{1-\alpha}\text{growth rate of total factor productivity} \\ +\frac{\alpha}{1-\alpha}\text{growth rate of capital/output ratio} \\ +\text{growth rate of average human capital} \\ +\text{growth rate of employment to population ratio}\end{aligned}$$

Assume $\alpha = 1/2$

Table 1

Decomposing China's Growth: 1952–2007

Period	GDP per capita	Labor partication rate	Capital/output ratio	Average human capital	TFP
	Average annual growth rates (%)				
1952–1978	2.97	0.11	3.45	1.55	–1.07
1978–2007	8.12	0.57	0.04	1.18	3.16
	Contributions to per capita GDP growth				
1952–1978	100	3.63	116.15	52.25	–72.03
1978–2007	100	7.05	0.51	14.55	77.89

Source: Authors calculations. The data on GDP per capita, GDP per worker, and labor participation rate are taken from the Penn World Table (PWT7.0). The average level of human capital is constructed using the average schooling years reported in the Barro and Lee (2010) dataset. See footnote 2 for details.

Notes: Table 1 presents a decomposition of China's per capita GDP growth into contributions from growth of labor participation rate, capital/output ratio, average human capital, and total factor productivity. "TFP" is total factor productivity. See text for details.