02-03: Solow Growth Model

- Framework to understand why countries are rich:
    - $y^* = \bar{A}\bar{k}^{1/3}$
        - capital per person
        - $\bar{A}$: total factor productivity
            - institutions: property rights, rule of law, democratic government, civil liberties
            - education
            - technology
- institutions aren't all that matter, but they do matter a lot
- What other factors matter?
    - geography
        - disease burden (what types, curability)
        - agricultural output

Solow Growth Model

- models how changes in capital stock affect output per person
    - physical capital is all that is modeled here

Eqn 1: production function at time t

$$Y_t = \bar{A} K_t^{1/3} L_t^{2/3} \rightarrow \text{hold } \bar{A} \text{ constant}$$

Eqn 2: Resource constraint: where does money go?

$$Y_t = C_t + I_t$$

consumption   investment

Eqn 3: capital accumulation

$$K_{t+1} = K_t + I_t - \bar{d} K_t$$

current capital stock — new capital stock — depreciation

$$\Delta K_t = I_t - \bar{d} K_t$$

Eqn 4: Labor Force

$$L_t = \bar{L}$$

Eqn 5: allocation of resource

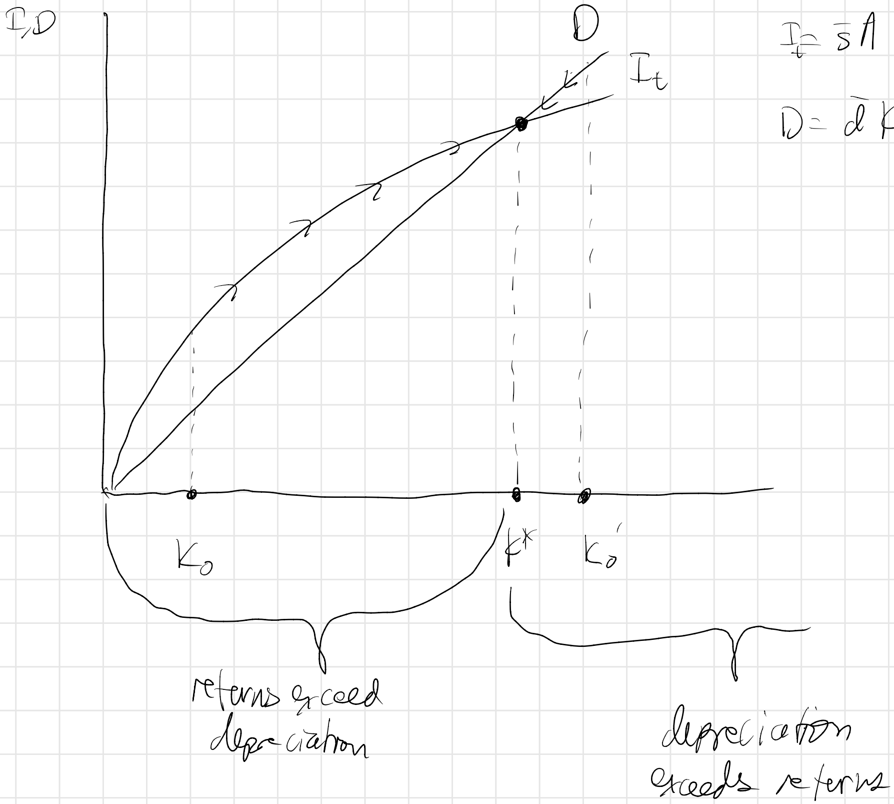
$$I_t = \bar{s} Y_t$$

$$C_t = (1-\bar{s}) Y_t$$

Bring ms all together:

$$\left.\begin{aligned} \Delta K_t &= \bar{s} Y_t - \bar{d} K_t \\ Y_t &= \bar{A} K_t^{1/3} \bar{L}^{2/3} \end{aligned}\right\}$$ we cannot use these to solve for Y at any time t, but we can find the steady state

Solow Diagram:



$I_t = \bar{s}\bar{A}K_t^{1/3}\bar{L}^{2/3}$

$D = \bar{d}K_t$