Feb 17

Where we have been:
- frameworks:
  - production model
  - solar model
- focused on capital/person, but mostly A

- AJR focus on differences in A

Romer growth model

- give penny from one square to the next doubles
  $92,000,000,000,000,000

- ppl not good at estimating effects of compounding

What sustains growth → technological progress

Coffee cup lids: one size for all coffees
  - small ideas free up resources, reduce input costs

Big technology attracts attention, but all these small ones matter too!

Why countries are richer poor: institutions & ideas

Taiwan: few resources and capital goods, but rich now

Institutions → trade and foreign investment → knowledge

At growth frontier, must develop ideas to sustain growth

- Patents
- R & D
- industrial policy ?
- education

Meta - idea: ideas to support new ideas

- Technological progress → better allocation of scarce resources.

- Objects: tangible goods (cell phones)

- Ideas: instructions / recipes (management, solar electricity)

Ideas rearrange raw materials into higher and better uses

Solow Model doesn't deliver, Romer model can

Rivalry:
    Rivalrous goods: using something reduces its usefulness to
    someone else: objects are rivalrous

    Non-rivalrous: one person uses idea → ↓ its ability to use it:
        ideas are rivalrous

Excludability: property rights over ideas do exist (patents)

Govt policies:
- patents
- R&D
- prizes
- education

Variables:
- Y_t: output
- A_t: TFP over time
- $\bar{A}_0$: TFP at start
- $\bar{L} = L_{yt} + L_{at}$

output workers   idea workers

Equations:

output: $Y_t = A_t L_{yt}$
- no K, simplified model

Ideas: $\Delta A_t = \bar{Z} A_t L_{at}$

Labor constraint: $\bar{L} = L_{yt} + L_{at}$

Allocation of resources: $L_{at} = \bar{\ell} \bar{L}$, $L_{yt} = (1 - \bar{\ell}) \bar{L}$

fraction focused on new ideas

Unknowns:

$Y_t, \ A_t, \ L_{yt}, \ L_{at}$

Exo vars: $\bar{z}, \ \bar{L}, \ \bar{\ell}, \ \bar{A}_0$

$Y_t =$