References: Weil, Chapter 11.3

Lucas, R.E., 1990, Why Doesn't Capital Flow from Rich to Poor Countries?, *American Economic Review* 80, 92-96.

Idea:

- Nowadays we have almost perfect international capital mobility.

- Poor countries have less capital per capita than rich ones.

- Real interest rates (capital productivity should be higher).

- Then why do capitalist do not shift their investment to poor countries?

- This would – in world equilibrium – balance interest rates and thus per capita capital stocks and income across countries.

Recall from the standard Solow model.

- $y = Ak^{\alpha}$

- net real return of capital: $r = \alpha A k^{\alpha-1}$

Suppose perfect international capital mobility (and no arbitrage) equalizes national interest rates and the world interest rate $r_w$ everywhere

$$r_w = r = \alpha A k^{\alpha-1}$$

Observe: national capital stocks become endogenous:

$$k = \left(\frac{\alpha A}{r_w}\right)^{1/(1-\alpha)} \tag{1}$$

everywhere irrespective of national savings rates.

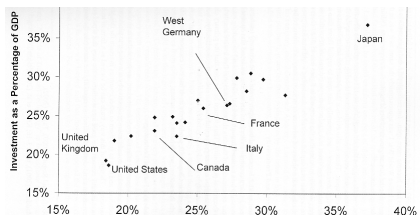Implication for income:

$$y = A k^\alpha = A^{1/(1-\alpha)} \left(\frac{\alpha}{r_w}\right)^{\alpha/(1-\alpha)} \tag{2}$$

i.e. the same everywhere.

- Intuition: capital needed but not supplied locally flows in from other countries.
- Thus, national savings and investment rates should be quite uncorrelated.

Yet, this is not true:



Savings and investment across developed countries, 1960– 1980

$\rightarrow$  the famous Feldstein and Horioka Puzzle.

Nowadays the correlation has become less strong. Regression line

- $I = 0.89 \cdot S$ in Feldstein and Horioka (1980)
- $I = 0.6 \cdot S$ today.

But still, it's much stronger than expected.

2 ways to state the same question:

- Why are national $I$ and $S$ correlated in open economies? (F and H)
- Why doesn't capital flow from rich to poor countries? (Lucas)

As an exercise Lucas compares the U.S. and India. Recall:

$$r = \alpha A k^{\alpha - 1} \qquad \Rightarrow \qquad r = \alpha A^{1/\alpha} y^{\frac{\alpha - 1}{\alpha}} \qquad (3)$$

Lucas uses $\alpha = 0.4$.

Assume, both countries operate the same technology $A$ and insert $y_{US}/y_{India} = 15$, i.e.

$$\frac{r_{India}}{r_{US}} = \left( \frac{y_{US}}{y_{India}} \right)^{(1-\alpha)/\alpha} = 15^{0.6/0.4} \approx 58. \qquad (4)$$

Now, even acknowledging imperfect capital mobility, a 58 fold interest rate differential has never been observed in world history.  $\rightarrow$  something is missing.

Suppose

$$y = k^{\alpha} X \qquad \Rightarrow \qquad k = \left( \frac{y}{X} \right)^{1/\alpha} \qquad (5)$$

where $X$ is something. For instance, it could be

- technology: $X = A$
- human capital: $X = h^{1-\alpha}$ (without external effects).

Thus

$$r = \alpha k^{\alpha-1} X = \alpha y^{\frac{\alpha-1}{\alpha}} X^{1/\alpha}$$

Now suppose $r_{India}/r_{US} = 1$:

$$\frac{r_{India}}{r_{US}} = \left(\frac{y_{US}}{y_{India}}\right)^{(1-\alpha)/\alpha} \left(\frac{X_{India}}{X_{US}}\right)^{1/\alpha} = 1$$

or

$$\frac{X_{US}}{X_{India}} = \left(\frac{y_{US}}{y_{India}}\right)^{1-\alpha} = 15^{0.6} \approx 5.$$

Implying that the US has to be 5-fold richer than India in "something" international immobile for interest parity to hold

- Lucas manages to motivate $X$ almost entirely by national human capital levels (including external effects).
- Conclusion: $K$ does not flow to poor countries because of the $H-$ differential.
- Controlling for (immobile) education, real interest rates can be the same in US and India.
- Yet this is not entirely plausible. Countries differ also in $A$.
- Why is productivity (technology) not internationally mobile? $\rightarrow$ Part II