MODELING CAPITAL FLOWS INTO MEXICO

$$Y_j = A N_j^{1-\alpha} K_j^{\alpha}$$

$$y_j = A k_j^{\alpha}$$

$$y_{mex} = 16{,}373, \; y_{us} = 36{,}859 \qquad (1989)$$

$$r_j = \alpha A k_j^{\alpha-1} - \delta$$

$$r_{mex} = 0.13, \; r_{us} = 0.05 \qquad (1989 - 1990)$$

$$\frac{y_{mex}}{y_{us}} = \left(\frac{k_{mex}}{k_{us}}\right)^{\alpha} = \left(\frac{r_{us} + \delta}{r_{mex} + \delta}\right)^{\alpha/(1-\alpha)}$$

Let $\alpha = 0.35, \; \delta = 0.05$

$$\frac{y_{mex}}{y_{us}} = \left(\frac{0.10}{0.18}\right)^{0.35/0.65} = 0.7287$$

while, in the data,

$$\frac{y_{mex}}{y_{us}} = 0.4442$$

Difference in capital per worker explains 49 percent of difference in output per worker.

We can calibrate different productivity parameters A_{mex} and A_{us}:

$$
\begin{aligned}
k_j &= \frac{\alpha y_j}{r_j + \delta} \\
A_j &= \frac{y_j}{k_j^{\alpha}}
\end{aligned}
$$

$$
\begin{aligned}
k_{mex} &= 31,836, \ A_{mex} = 434.62 \\
k_{us} &= 129,007, \ A_{us} = 599.55
\end{aligned}
$$

Productivity in the United States is 38 percent higher than in Mexico.

Notice that

$$\frac{k_{mex}}{k_{us}} = \frac{31,836}{129,007} = 0.2468$$

while, in the Summers-Heston data set,

$$\frac{k_{mex}}{k_{us}} = \frac{21,985}{59,011} = 0.3726$$

This would imply a much smaller difference in real interest rates:

$$\frac{r_{mex}+\delta}{r_{us}+\delta} = \frac{k_{us}/y_{us}}{k_{mex}/y_{mex}} = \frac{1.6001}{1.3428} = 1.1916$$

$r_{us} = 0.05,\ \delta = 0.05$ imply $r_{mex} = 0.07$

HOW LARGE SHOULD CAPITAL FLOWS BE?

Equate returns on capital marginal products

$$\alpha A_{mex} k_{mex}^{\alpha-1} - \delta = \alpha A_{us} k_{us}^{\alpha-1} - \delta$$

$$k_{mex} = \left(\frac{A_{mex}}{A_{us}}\right)^{1/(1-\alpha)} k_{us}$$

$k_{us} = 129,007$ implies $k_{mex} = 78,644$

Mexican capital stock would have to increase by 46,808, which is 286 percent of Mexican GDP, 147 percent of Mexican capital stock.

There are two ways to think about capital flows.

1. Capital flows from the rest of the world to the poor company. That is, the capital in the rich country, and its rate of return, stay fixed.

In this case we solve

$$\alpha A_{mex} k_{mex}^{\alpha-1} - \delta = \alpha A_{us} k_{us}^{\alpha-1} - \delta,$$

keeping $k_{us} = 129{,}007$. The answer, as we have seen, is

$$k_{mex} = \left(\frac{A_{mex}}{A_{us}}\right)^{\frac{1}{1-\alpha}} k_{us} = \left(\frac{434.62}{599.55}\right)^{\frac{1}{1-0.35}} 129{,}007 = 78{,}644.$$

2. Capital flows from the rich country to the poor country.

In this case, we solve

$$\alpha A_{mex} k_{mex}^{\alpha-1} - \delta = \alpha A_{us} k_{us}^{\alpha-1} - \delta$$
$$N_{mex} k_{mex} + N_{us} k_{us} = N_{mex} \bar{k}_{mex} + N_{us} \bar{k}_{us},$$

where $N_{mex} = 30{,}191$ and $N_{us} = 127{,}206$. We solve

$$k_{us} = \frac{N_{mex}\bar{k}_{mex} + N_{us}\bar{k}_{us}}{N_{mex}\left(\frac{A_{mex}}{A_{us}}\right)^{\frac{1}{1-\alpha}} + N_{us}} = \frac{30{,}191(31{,}836) + 127{,}206(129{,}007)}{30{,}191\left(\frac{434.62}{599.55}\right)^{\frac{1}{1-0.35}} + 127{,}206}$$
$$k_{us} = 119{,}032,$$

which implies that $k_{mex} = 72{,}728$.

Notice that, in this case, the capital stock in Mexico-United States stays fixed, and the real return on capital rises in the United States, although it falls in Mexico, just not as much:

$$\alpha A_{us} 119{,}302^{\alpha-1} - \delta > \alpha A_{us} 129{,}007^{\alpha-1} - \delta$$
$$0.0552 > 0.0500$$

$$\alpha A_{mex} 31{,}836^{\alpha-1} - \delta > \alpha A_{mex} 72{,}728^{\alpha-1} - \delta > \alpha A_{mex} 78{,}644^{\alpha-1} - \delta$$
$$0.1300 > 0.0552 > 0.0500.$$