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Feldstein-Horioka

In a closed economy, savings equals investment so in data the correlation between them would be one. But in an open economy, a country can run a current account deficit/surplus so that savings need not equal investment. A country can run a CA deficit so that investment is relatively high or can run a CA surplus so that savings is relatively high.

Feldstein and Horioka (1980, EJ), argue that even for industrialized countries international capital mobility is low and that domestics savings and investment rates in fact move close to one-for-one. They document this claim with cross-sectional regressions of the form

$$\left(\frac{I_i}{Y_i}\right) = \underset{(0.02)}{0.04} + \underset{(0.07)}{0.89}\left(\frac{S_i}{Y_i}\right)$$

where, for example

$$\left(\frac{I_i}{Y_i}\right) = \frac{1}{T}\sum_{t=1}^{T}\left(\frac{I_{it}}{Y_{it}}\right)$$

for the years 1960-1974 and where i indexes 16 OECD countries.

Why is this a puzzle? Well for one thing, nominal returns on similar assets are highly arbitraged. How can this be the case if capital mobility is low? Feldstein and Horioka argue that slope coefficients near 1 are a puzzle because if capital markets are perfect, savings should flow to the countries with high rates of return. Moreover, if one looks at savings/investment correlations for different regions within a given country, one does not get a slope coefficient near one.

There are a few issues with this kind of analysis. For example, the slope coefficient falls if poorer (i.e., non-OECD) countries are included in the regression. The slope coefficient also falls if one looks at more recent data (perhaps this suggests capital is becoming more mobile). For example, Obstfeld and Rogoff report

$$\left(\frac{I_i}{Y_i}\right) = \underset{(0.02)}{0.08} + \underset{(0.09)}{0.60}\left(\frac{S_i}{Y_i}\right)$$

for 1990-1997 using OECD countries.

A number of possible resolutions have been offered in the literature: (i) maybe governments target the current account to avoid large or protracted deficits, or (ii) long-run demographic and/or technological changes move both savings and investment for all countries irrespective of capital mobility.

A. Obstfeld and Rogoff's answer

Again, the focus is on trade costs. The mechanism will be that costs in international goods market trade create a "kink" in a country's effective real interest rate even if there are no asset market frictions. The presence of a kink makes it optimal for a country to behave in a fairly autarkic manner, suppressing the desire to run large CA deficits/surpluses.

The exposition here follows Olivier Jeanne's discussion at the NBER macro annual conference. Obstfeld and Rogoff's version of is a two-date two-country two-good endowment economy where the home country has preferences

$$U(C_1) + \beta U(C_2), \qquad 0 < \beta < 1 \tag{1}$$

where consumption at each date $t = 1, 2$ is the familiar CES aggregate

$$C = \left[C_H^{\frac{\theta-1}{\theta}} + C_F^{\frac{\theta-1}{\theta}} \right]^{\frac{\theta}{\theta-1}}, \qquad \theta > 0$$

Jeanne's version of this model is the limit as $\theta \to \infty$ so that the home and foreign goods are **perfect substitutes**. This eliminates the need to worry about relative prices across home and foreign goods and allows us to focus on intertemporal relative prices (i.e., real interest rates).

In Jeanne's version, there is effectively just a single good. Assume that this single good has the global price P^* which is constant over the two dates and which the home country takes as given. As usual we have iceberg transportation costs with a proportion τ evaporating in transit. No-arbitrage in the goods market then implies the following relationship between the home price P_t and the foreign price P^*

$$P_t = \begin{cases} \frac{1}{(1-\tau)} P^* & \text{if home country imports, has trade deficit } (C_t > Y_t) \\ (1-\tau) P^* & \text{if home country exports, has trade surplus } (C_t < Y_t) \end{cases}$$

Finally, if the home country is **autarkic** so that $C_t = Y_t$ then the home price is bracketed by

$$P_t \in \left[(1-\tau) P^*, \frac{1}{(1-\tau)} P^* \right]$$

The home price is a discontinuous function of domestic consumption and **jumps down** when the trade balance switches from deficit to surplus.

In this two period model, if the home country runs a trade deficit in the first period it must run a trade surplus in the second period. Similarly, if it runs a surplus in the first period it must run a deficit in the second. And if the home country is autarkic in the first period it is necessarily autarkic in the second period as well. Hence, if the home country engages in trade, it pays the trade cost **twice**, once when it imports goods from abroad and once when it exports. This creates a relatively large incentive not to trade.

Consider the period budget constraints for the home country

$$\begin{aligned} P_1(C_1 - Y_1) &= D \\ P_2(Y_2 - C_2) &= (1 + r^*)D \end{aligned}$$

where "borrowing" D may be positive or negative and r^* is the constant world interest rate. The corresponding intertemporal budget constraint is

$$C_1 + \frac{1}{1 + r^*} \frac{P_2}{P_1} C_2 = Y_1 + \frac{1}{1 + r^*} \frac{P_2}{P_1} Y_2 \tag{2}$$

This has a kink at the autarky point (where $C_t = Y_t$). Put differently, trade costs generate a wedge between the world interest rate r^* and the effective domestic real interest rate r, given by

$$(1 + r) \equiv (1 + r^*) \frac{P_1}{P_2}$$

For example, if $C_1 > Y_1$ such that the home country imports in the first period, then $P_1 = \frac{1}{(1-\tau)} P^*$ and $P_2 = (1 - \tau)P^*$ so the domestic real interest rate is given by

$$1 + r_M = (1 + r^*) \frac{P_1}{P_2} = \frac{(1 + r^*)}{(1 - \tau)^2} > (1 + r^*)$$

Similarly, if $C_1 < Y_1$ such that the home country exports in the first period, then $P_1 = (1 - \tau)P^*$ and $P_2 = \frac{1}{(1-\tau)} P^*$ so that

$$1 + r_X = (1 + r^*) \frac{P_1}{P_2} = (1 + r^*)(1 - \tau)^2 < (1 + r^*)$$

The slope of the intertemporal budget line is different, depending on whether consumption C_1 is to the left or to the right of the initial endowment Y_1.

The domestic real interest rate is therefore bracketed by

$$r \in \left[(1+r^*)(1-\tau)^2, (1+r^*)\frac{1}{(1-\tau)^2}\right]$$

For example, if $r^* = 0.05$ and $\tau = 0.1$, this range is

$$r \in [0.85, 1.30]$$

Potentially, this is a big friction. It may well induce a country to opt for international autarky.

To see when autarky might be optimal, consider the first order conditions that would obtain from maximizing home utility (1) subject to the intertemporal budget constraint (2) by choice of C_1 and C_2. We get

$$\begin{aligned} U'(C_1) &= \lambda \\ \beta U'(C_2) &= \lambda \frac{1}{1+r^*}\frac{P_2}{P_1} \end{aligned}$$

Eliminating the Lagrange multiplier λ gives the consumption Euler equation

$$U'(C_1) = \beta(1+r^*)\frac{P_1}{P_2}U'(C_2)$$

Now let's make some customary assumptions. Suppose that $\beta(1+r^*) = 1$ so that the home country's rate of time preference and the world real interest rate coincide. Also, suppose that period utility is

$$U(C) = \frac{C^{1-\sigma}}{1-\sigma}$$

Then the Euler equation simplifies to

$$\left(\frac{C_2}{C_1}\right)^{\sigma} = \left(\frac{P_1}{P_2}\right)$$

Now notice that if there is autarky, $C_t = Y_t$ each period and

$$P_t \in \left[(1-\tau)P^*, (1-\tau)^{-1}P^*\right] = \left[(1-\tau), (1-\tau)^{-1}\right] P^*$$

This implies that

$$\left(\frac{P_1}{P_2}\right) \in \left[(1-\tau)^2, (1-\tau)^{-2}\right]$$

Hence there is autarky so long as

$$\left(\frac{C_2}{C_1}\right)^{\sigma} = \left(\frac{Y_2}{Y_1}\right)^{\sigma} = \left(\frac{P_1}{P_2}\right) \in \left[(1-\tau)^2, (1-\tau)^{-2}\right]$$

which is equivalent to

$$\left(\frac{Y_2}{Y_1}\right) \in \left[(1-\tau)^{2/\sigma}, (1-\tau)^{-2/\sigma}\right]$$

To get some quantitative feel for this condition, notice that if $\sigma = 1$ so that period utility is log and $\tau = 0.25$, then the zone of relative endowments that leads to autarky is

$$\left(\frac{Y_2}{Y_1}\right) \in [0.56, 1.78]$$

This is quite large. If we interpret $\left(\frac{Y_2}{Y_1}\right)$ as output growth, then a typical annual number would be something like 1.04 or so.

In short, a trade cost can drive a wedge between the effective domestic real interest rate and the world real interest rate. This wedge or "kink" in the intertemporal budget constraint can induce the home country not to trade for quite a big interval of endowments. So long as the home country does not trade, it appears to be less well integrated into the world economy and Feldstein-Horioka regressions will pick up long periods of small current account balances.

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