Lecture for Sept 16

Using a thought experiment to explore models of relative prices and trade balance:

1. suppose the United States were forced to eliminate most or all of its trade deficit
2. suppose that the Fed and its counterparts stabilize price level

How much fall in the dollar?

Reasons for dollar fall? TB adjustment requires fall in US spending, rise in ROW spending

Transfer problem: marginal dollar in US not spent the same as marginal dollar abroad, thx to nontraded goods, transport costs

Two variations from Obstfeld-Rogoff, then something completely different

OR model I:

Consumption index:

$$\left[\gamma C_T^{\frac{\theta-1}{\theta}} + (1-\gamma) C_N^{\frac{\theta-1}{\theta}}\right]^{\frac{\theta}{\theta-1}}$$

If θ=1, becomes

$$\gamma \log C_T + (1-\gamma) \log C_N .$$

Relative price of nontradeables:

$$p = \left(\frac{1-\gamma}{\gamma}\right)^{1/\theta} \left(\frac{C_T}{Y_N}\right)^{1/\theta} .$$

Exact consumer price index:

$$P = \left[\gamma + (1-\gamma) p^{1-\theta}\right]^{\frac{1}{1-\theta}} .$$

Or $p^{1-\gamma}$ if θ=1

So, suppose γ=.25, trade deficit is 5% of GDP. Eliminating the deficit means that C_T must fall from 25 to 20.

O-R assumption: price of tradeables fixed in foreign currency, Fed keeps domestic price level fixed in dollars. So XR moves inversely to P.

Change in ln P = 0.75*ln(20/25) = -.167. So roughly 17% depreciation …

Whoops. Not quite right, hence O-R II.

O-R II: They realized that ROW won't keep price of tradeables fixed – it would keep price level fixed, just like US. If US = ¼ of the world, this raises depreciation by 1/3.

Plus, they now introduce distinction between domestic and foreign-produced tradables

Interlude: Armington and its problems

The problem: world trade doesn't look like a linear programming solution with each good produced at lowest-cost location. Instead, it's fuzzy – goods produced at variety of locations, traded in both directions, etc.

Possibly just an aggregation problem – but how to do CGE modeling?

Armington 1969: assume products differentiated by country of origin, typically modeled as CES aggregate. "Armington elasticity" becomes a key parameter.

ORII:

Nested consumption index

$$C = \left[\gamma^{\frac{1}{\theta}} C_T^{\frac{\theta-1}{\theta}} + (1-\gamma)^{\frac{1}{\theta}} C_N^{\frac{\theta-1}{\theta}}\right]^{\frac{\theta}{\theta-1}}$$

Where

$$C_T = \left[\alpha^{\frac{1}{\eta}} C_H^{\frac{\eta-1}{\eta}} + (1-\alpha)^{\frac{1}{\eta}} C_F^{\frac{\eta-1}{\eta}}\right]^{\frac{\eta}{\eta-1}}$$

Here α>1, so home bias in consumption of traded goods too.

Much algebra follows. But the essence is this:

Let κ be a place-holder for some constant term, ε be a place-holder for some elasticity.

We have a price index for tradables:

$$P_T = P_T(P_H, P_F)$$

(prices of home and foreign tradables)

$$\frac{C_T}{C_N} = \kappa(\frac{P_T}{P_N})^{-\epsilon}$$

Or

$$C_T = \kappa C_N(\frac{P_T}{P_N})^{-\epsilon}$$

C_N = N (nontraded production), so import demand can be written as a function of prices …

Four prices, three relative prices; market-clearing conditions:

Market clearing for Home tradeable:

$C_H + C_H^* = H$

Market clearing for Foreign tradeable:

$C_F + C_F^* = F$

Trade balance:

$C_H^* P_H - C_F P_F = B$

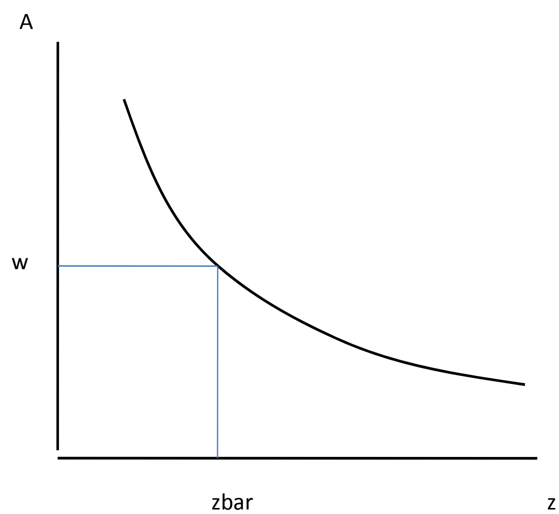
It looks like an elasticity approach, but it's actually full GE, except that the determinants of C, C* are left in the background

And now for something not completely different …

Dornbusch, Fischer, Samuelson (1977): 160 years of international economics in one paper

One factor, labor. 2 countries.

Continuum of goods, ranked in order of Home comparative advantage; relative productivity A(z):



Given relative wage *w*, all goods with relative productivity >zbar produced in Home, <zbar in Foreign

Cobb-Douglas demand: each good receives share b(z) of spending. Let

$$\Gamma(zbar) = \int_0^{zbar} b(z)dz$$

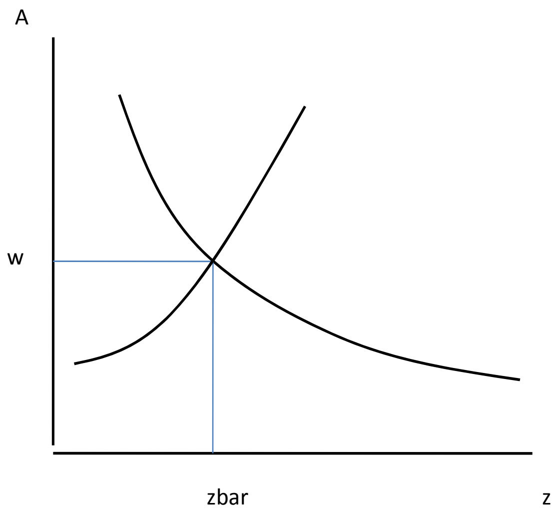
That's the share of spending on Home goods.

Market clearing:

$$wL = \Gamma(zbar)[wL + L^*]$$

Hence

$$w = \frac{L^*}{L}\frac{\Gamma(zbar)}{(1 - \Gamma(zbar))}$$



Now do transfer problem. Suppose Home gets transfer D

$$wL = \Gamma(zbar)(wL + D + L^{*} - D)$$

Hmm. That's not going anywhere (Ohlin position)

But now suppose that Home and Foreign both spend a share ν of income on nontraded goods; then

$$wL = [\nu + \Gamma(zbar)](wL + D) + \Gamma(zbar)(L^{*} - D)$$

So now we're getting somewhere:

$$w = \frac{L^{*}}{L}\frac{\Gamma}{1 - \upsilon - \Gamma} + \frac{\upsilon D}{1 - \upsilon - \Gamma}$$

An inward transfer (a trade deficit) shifts B(z) up, so that equilibrium w rises.

But how big is the effect? Eaton-Kortum

They think of A() as coming from a random process of allocating technologies to countries, with a specific pdf that happens to work. T is an index of a country's overall technology level. It turns out that

$$A(z) = \left(\frac{T}{T^*}\right)^{1/\theta} \left(\frac{1-z}{z}\right)^{1/\theta}.$$

in their formulation, while all goods are symmetric in demand, so that Γ(z) = z.

But how can you estimate θ?

Geography!

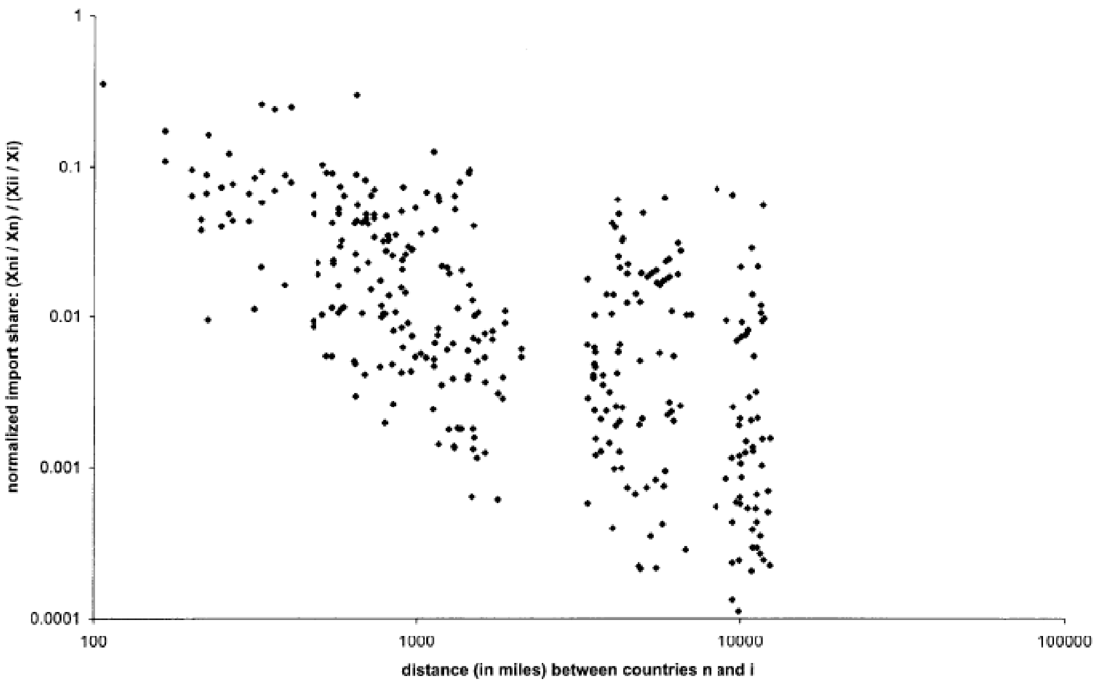


FIGURE 1.—Trade and geography.

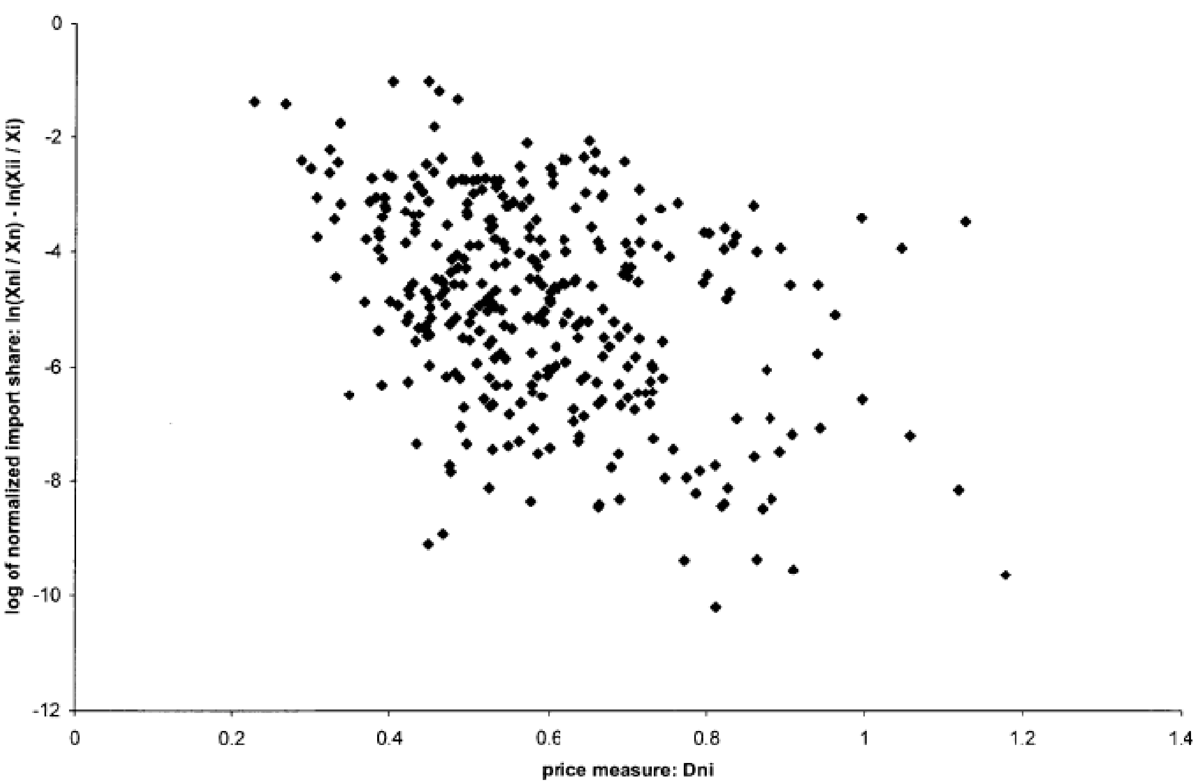


FIGURE 2.—Trade and prices.

They use retail prices – kind of funny.

But basic point is that strong distance-trade relationship suggests fairly high elasticity of substitution – in effect, high Armington elasticity

Their estimates:

Preferred:

US relative wage down 6.8%, real wage down 0.5%

Low elasticity case:

Relative wage down 13.5%, real wage down 1.1%

Why are Eaton-Kortum so different from Obstfeld-Rogoff (and conventional wisdom)?

1. High Armington elasticity
2. But also, different assumption on intersectoral mobility! OR say fixed production of N, EK have labor perfectly mobile among sectors

Bottom line of all this: relative prices play key role in trade adjustment. How close are we to a one-good world? Not very, except possibly in the long run.