International Relative Prices

A simple model

- Consider a simple model
- 1 period, 2 countries, 2 goods Y_1, Y_2
- Country 1 produces good 1
- Country 2 produces good 2
- Home country has the utility function $u(c_{11}, c_{12})$ and faces the budget constraint: $p_1 c_{11} + p_2 c_{12} = p_1 Y_1 \Rightarrow c_{11} + q c_{12} = Y_1$

where $q = p_2/p_1$ is the relative price of good 2 in terms of good 1.

- Similarly, the foreign country has the utility function and the budget constraint $u(c_{21}, c_{22})$ $\quad c_{21} + q c_{22} = q Y_2$

- Given $\{Y_1, Y_2\}$ we want to determine $\{c_{11}, c_{12}, c_{21}, c_{22}, q\}$
- $c_{11} : Uc_{11} = \lambda_1$
- $c_{12} : Uc_{12} = \lambda_1 q$
- $c_{21} : Uc_{21} = \lambda_2$
- $c_{22} : Uc_{22} = \lambda_2 q$
- q=Uc_{12}/Uc_{11}
- q= Uc_{22}/Uc_{21}

- Example 1 with particular specifications of utility:
- $u_1 = \ln c_{11} + \theta \ln c_{12}$
- $u_2 = \ln c_{21} + \theta \ln c_{22}$
- If $\theta > 1$ then both countries like good 2 better.

- The first order conditions are:
- q=θc_{11} /c_{12}
- q=θc_{21} /c_{22}
- One can use these equations to derive:
- θ(c_{11}+c_{21})=q(c_{12}+c_{22})
- Or: θY_1=qY_2
- The relative price is then: q=θY_1/Y_2

- We have the optimality conditions. $q=\theta c_{11}/c_{12}$ $q=\theta c_{21}/c_{22}$
- The relative price (which is the terms of trade) $q=\theta Y_1/Y_2$
- The two budget constraints. $c_{11} + qc_{12} = Y_1$ and $c_{21} + qc_{22} = qY_2$
- The two market clearing conditions: $c_{11} + c_{21} = Y_1$ and $c_{12} + c_{22} = Y_2$

The distribution of consumption across countries

- Combining $\theta c_{11} = qc_{12}$ with $c_{11} + qc_{12} = Y_1$ gives $c_{11} = Y_1 / (1+ \theta)$
- Using the market clearing condition $c_{11} + c_{21} = Y_1$ gives $c_{21} = \theta Y_1 / (1+ \theta)$
- We can also derive $c_{12} = Y_2 / (1+ \theta)$ *and* $c_{22} = \theta Y_2 / (1+ \theta)$.

- If $\theta > 1$ and if $Y_1 = Y_2$ $\Rightarrow$ $q > 1$. Then country 2 is richer.
- As a result: $c_{21} > c_{11}$ and $c_{22} > c_{12}$

The real exchange rate with non-traded goods

- Real exchange rate: P/P^*
- P is the domestic price level. P^* is the foreign price level.

Balassa-Samuelson (B-S)

- Real appreciation and growth
- Fast growing countries experience a real exchange rate appreciation,
  → Rich countries have higher price levels
- But there are no implications for international competitiveness

- Demonstrate the B-S result using the Ricardian model assumptions:
- 2 sectors
- 1 factor of production (L)
- perfect L mobility across sectors
- linear production technology (AP=MP=constant)
- $L = L_T + L_N$
- $\alpha_T Y_T = L_T$
- $\alpha_N Y_N = L_N$
- where *T* = traded good and *N* = non-traded good
- Consumption of tradable goods and non-tradable goods:

$C = C_T^{(1-\theta)} C_N^{\theta} / ((1-\theta)^{(1-\theta)} \theta^{\theta})$

- Perfect competition means $P = MC \Rightarrow P_T = \alpha_T w$ and $P_N = \alpha_N w$ where α_T = number of units of labor needed to produce 1 unit of the traded good (inverse of labor productivity)
- The price index is (will be derived in class)

$$P = P_T^{(1-\theta)} P_N^{\ \theta}$$

The real exchange rate can then be expressed as:

- $P/P^* = P_T/P_T^*(\alpha_N/\alpha_N^*)^{\theta}(\alpha_T^*/\alpha_T)^{\theta}$

- Rich countries are more productive (have lower α_T) ⇒ will have higher price levels
- Source of price differences: difference in prices of NON traded goods
- $P_T = \alpha_T w \qquad P_N = \alpha_N w$
- Similarly, if a country experiences fast productivity growth (typically in manufacturing goods which tend to be traded) then it will experience an appreciation in its real exchange rate.
- Possible to add capital to the model.