Economics 4905: Lecture 3

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Quantity Theory of Money (QTM)

Suppose the endowment is given as $(20, 15, 10, 5)$
Let $\tau = (5, 2, -2, -5)$ and $\tau' = 2\tau$

- $x_1 = 20 - 5P^m > 0 \Rightarrow P^m < 4$
- $x_2 = 15 - 2P^m > 0 \Rightarrow P^m < \frac{15}{2}$
- $0 < P^m < 4 < \frac{15}{2}$
- $\bar{P}^m = 4$
- $\tau' = 2(5, 2, -2, -5) = (10, 4, -4, -10)$
- $x_1' = 20 - 10P^{m'} > 0 \Rightarrow P^{m'} < 2$
- $x_2' = 15 - 4P^{m'} > 0 \Rightarrow P^{m'} < \frac{15}{4}$
- $0 < P^{m'} < 2 < \frac{15}{4}$
- $\bar{P}^{m'} = 2$

QTM Continued

$P^m \in [0,4), \mathcal{P}^m = [0,4), P^{m'} \in [0,2), \mathcal{P}^{m'} = [0,2)$

- This is a statement about sets, not price levels
- If everyone believes QTM, then QTM is REE
- If not, not

Take-Away

- Indeterminacy of the price level
- Beliefs about P^m and fundamentals ω jointly determine outcomes
- Beliefs matter
- The quantity theory of money is (too) subtle. Doubling τ will affect $\mathcal{P}^m$ but not necessarily according to QTM.

Two Currencies, R and B:

- Bi-metalism in the US
- "Cross of Gold" speech
- Borrowers hurt by deflation

Two Currencies, R and B:

- $l = 1, n = 5, \omega = (25, 20, 15, 10, 5)$
- $\tau^B = (1, 1, 1, -1, -1), \tau^R = (1, 1, -1, -1, -1)$
- $\sum \tau_h^B = 1, \sum \tau_h^R = -1$
  - $P^B \sum \tau_h^B + P^R \sum \tau_h^R = 0$
  - $P^B - P^R = 0 \Rightarrow P^B = P^R$

Two Currencies, R and B:

- $x_1 = 25 - P^B - P^R = 25 - 2P^B > 0 \Rightarrow P^B < \frac{25}{2}$
- $x_2 = 20 - P^B - P^R \Rightarrow P^B < 10$
- $x_3 = 15 - P^B + P^R = 15$
- $0 \leq P^B < 10 < \frac{25}{2}$

Solving for exchange rate:

- $\frac{P^R}{P^B} = -\frac{\sum \tau_h^B}{\sum \tau_h^R} = -\frac{1+1+1+(-1)+(-1)}{1+1+(-1)+(-1)+(-1)} = 1$

- $\mathcal{P}^m = \{P^B, P^R | P^B = P^R, P^B \in [0, 10)\}$

$$\begin{aligned}\{(x_1, x_2, x_3, x_4, x_5) | x_1 &= 25 - 2P^B, x_2 = 20 - 2P^B, \\ x_3 &= 15, x_4 = 10 + 2P^B, \\ x_5 &= 5 + 2P^B, P^B \in [0, 10)\}\end{aligned}$$

- The elements of x are not independent. They are constrained by $\mathcal{P}^m$.

In General

- If $\sum \tau_h^B$ and $\sum \tau_h^R$ agree in sign, then $P^B = P^R = 0$.
- If $\sum \tau_h^B$ and $\sum \tau_h^R$ disagree in sign, then either the exchange rate is

  $$\frac{P^B}{P^R} = -\frac{\sum \tau_h^R}{\sum \tau_h^B}$$

  or

  $$P^B = P^R = 0$$

- Why?
- If $\sum \tau_h^B = \sum \tau_h^R = 0$, then $\frac{P^B}{P^R}$ is indeterminate.
- Why?

Some Take-aways:

- Surpluses in both "countries" lead to de-monetization. Deficits in both "countries" lead to de-monetization.
- In this simple economy, (real) fundamentals such as endowments do not affect exchange rates. They are purely financial.