

# Economics 4905: Lecture 3

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## Quantity Theory of Money (QTM)

Let  $\tau = (5, 2, -2, 5)$  and  $\tau' = 2\tau$

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

## QTM Continued

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

- ▶ 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  $\omega$  jointly determine outcomes
- ▶ Beliefs matter
- ▶ The quantity theory of money is (too) subtle. Doubling  $\tau$  will affect  $P^m$  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:

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

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

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

- ▶ 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.