Economics 4905: Lecture 4

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Problem Set #1

- Due before class on Monday, September 17.
- Posted at www.karlshell.com
  Click COURSES > CURRENT > ECON 4905 FALL 2018

Review

- Quantity Theory of Money (QTM)
- Absence of Money Illusion (AMI)

Example

$$n = 4$$
$$\omega = (20, 15, 10, 5)$$
$$\tau = (5, 2, -2, -5)$$
$$x_1 = 20 - 5P^m > 0 \Rightarrow P^m < 4$$
$$x_2 = 15 - 2P^m > 0 \Rightarrow P^m < \frac{15}{2} = 7\frac{1}{2}$$
$$P^m \in [0, 4)$$
$$\bar{P}^m = 4$$
$$\mathcal{P}^m = [0, 4)$$

$$\lambda = 2$$
$$\tau' = 2(5, 2, -2, -5) = (10, 4, -4, -10)$$
$$x_1' = 20 - 10P^{m'} > 0 \Rightarrow P^{m'} < 2$$
$$x_2' = 15 - 4P^{m'} > 0 \Rightarrow P^{m'} < \frac{15}{4} = 3\frac{3}{4}$$
$$P^{m'} \in [0, 2)$$
$$\bar{P}^{m'} = 2$$
$$\mathcal{P}^{m'} = [0, 2)$$

$$P^m \in [0,4) \begin{cases} x_1 = 20 - 5P^m \\ x_2 = 15 - 2P^m \\ x_3 = 10 + 2P^m \\ x_4 = 5 + 5P^m \end{cases}$$

$$P^{m'} \in [0,2) \begin{cases} x_1' = 20 - 10P^{m'} \\ x_2' = 15 - 4P^{m'} \\ x_3' = 10 + 4P^{m'} \\ x_4' = 5 + 10P^{m'} \end{cases}$$

$$\bar{P}^{m'} = \frac{\bar{P}^m}{\lambda}$$

Absence of Money Illusion

If $\tau' = \lambda\tau$ when $\lambda > 0$,

$$P^{m'} \in [0, \bar{P}^m/\lambda)$$

This is a statement about sets of price levels, not price levels.
It is: AMI, Absence of Money Illusion.

Quantity Theory of Money (QTM)

- If $\tau' = \lambda\tau$, then $P^{m'} = P^m/\lambda$
- Doubling τ, doubles price level.
- If people believe QTM, it is a REE. Otherwise, not.

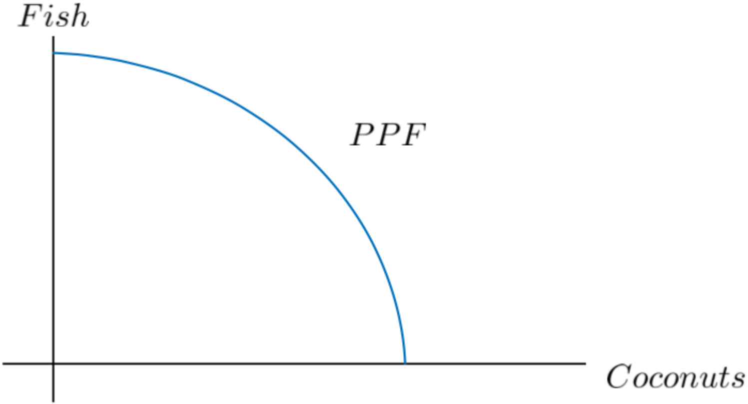
Take-Away

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

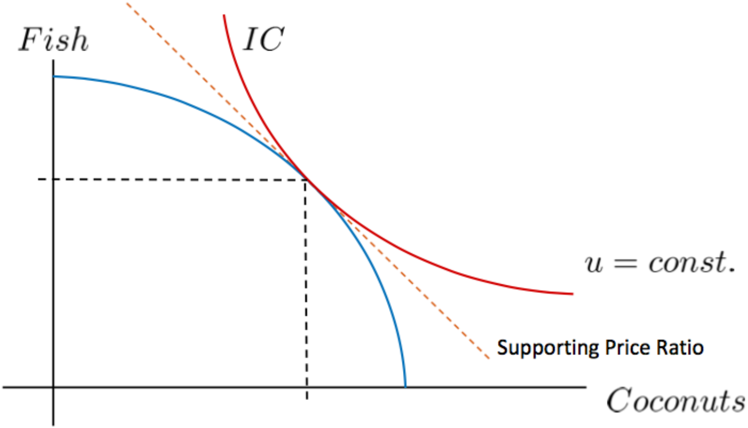
Choice

- Static
- Across time
- Across states of nature

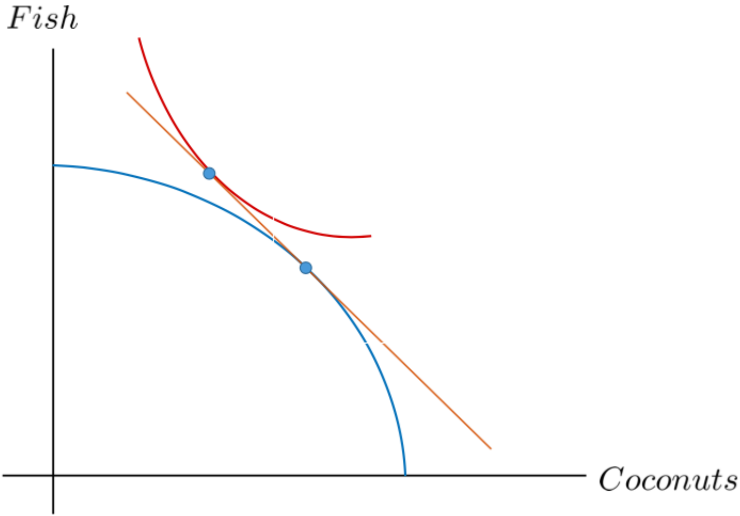
Robinson Crusoe



Robinson Crusoe



Crusoe Trades



- Produces to market. Profit max
  - In order to max utility
- Dynamic extension
  - Max PDV
  - If borrowing and lending are perfect
- Uncertainty extension
  - Max contingent-claim profit
  - If insurance is perfect

Intertemporal

- Present prices: $p(t)$ and $p(t+1)$
- $p(t) = R(t)p(t+1)$, where $R(t)$ is the interest factor
- $r(t) = R(t) - 1$ is the interest rate
- Profit max becomes PDV max:

$$\begin{aligned} PDV &= p(t)y(t) + p(t+1)y(t+1) \\ &= p(t)\left[y(t) + \frac{y(t+1)}{1+r(t)}\right] \end{aligned}$$

The Economics of Uncertainty

- The state of nature: s
- Realizations: $s_1, s_2, \ldots$
- Intrinsic Uncertainty
  - Random fundamentals
  - Examples

$$s_1 = rain \quad s_2 = drought$$
$$s_1 = hot \quad s_2 = cold$$

- Extrinsic Uncertainty
  - Randomness that does not affect the fundamentals, but does affect outcomes.
  - Examples

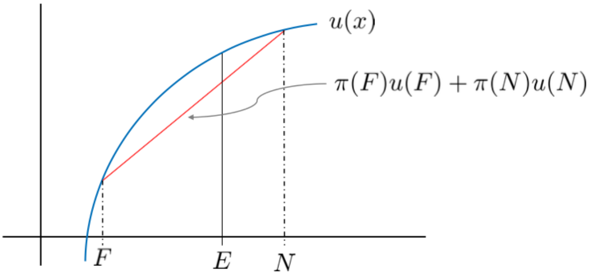
$$s_1 = no\ run \quad s_2 = run$$
$$s_1 = sunspots \quad s_2 = no\ sunspots$$

Expected Utility

- von Neumann and Morgenstern
  - Expected Utility
  - $V = \pi(s_1)u(x(s_1)) + \pi(s_2)u(x(s_2))$
  - $\pi(s_1) = 1 - \pi(s_2)$
  - $V = \int u(x(s))\pi(s)ds$
- Risk aversion:
  - $u(x)$
  - $u'(x) > 0$
  - $u''(x) < 0$ Risk-averse
- Risk-neutral
  - $u''(x) = 0$
- Risk-loving
  - $u''(x) > 0$

Arrow-Debreu

- Isomorphism
  - Contingent-claims
  - Securities



F – Fire, N – no fire, E – expected value