Rental Prices, Capital Markets, and Investment

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Overview
Today we will consider market dynamics for a durable good such as housing.

This is a classic example from the graduate Price Theory sequence taught by Prof. Kevin Murphy (also taught in the MBA sequence).

Combines many important economic concepts (dynamics, forward looking behavior, market-clearing behavior determining prices).

Links market prices to asset prices.
1 Stock adjustment: capital today depends on capital yesterday, depreciation, and new investment

2 Asset pricing equilibrium: The rental price must eliminate arbitrage opportunities.

3 Rental market equilibrium: The rental price must clear the market for rental houses (assumes demand is downward sloping in rental prices).

4 Investment market equilibrium: The price of new capital clears the capital market (assumes supply of capital is upward sloping).
Interest Rates

- Nominal Interest Rate: Assume I can put money in the bank and get the interest rate \( r \).
- Real Interest Rate: \( r^* \) is in terms of goods rather than dollars. “How many carrots can I get tomorrow for a carrot today.”

\[
1 + r^* = (1 + r) \frac{P_t}{P_{t+1}}
\]
Durable Goods

- Durable goods carry value across periods, thus they are capital assets.
- How durable they are determined by depreciation rate $\delta$ (will generally assume we have a constant proportion depreciating each period).
- Durables have two sets of prices and quantities:
  - $K$ is the stock of capital
  - $R$ is the price of renting capital for one period
  - $I$ is the newly produced capital
  - $P$ is the price paid for the newly produced capital (purchase price).
No arbitrage:

\[ R_t = P_t - \frac{1 - \delta}{1 + r} P_{t+1} \]

Price is its discounted flow of future revenue (ignoring risk here)

\[ P_t = R_t + \frac{1 - \delta}{1 + r} R_{t+1} + \frac{(1 - \delta)^2}{(1 + r)^2} R_{t+2} + \ldots \]
1. Stock adjustment:

\[ K_t = (1 - \delta)K_{t-1} + I_t \]

2. Asset pricing equilibrium:

\[ R_t = P_t - \frac{1}{1 + r}P_{t+1} \]

3. Rental market equilibrium:

\[ K_t = D(R_t) \]

4. Investment market equilibrium:

\[ I_t = I(P_t) \]
Steady State

1. Stock adjustment:

\[ \bar{K} = (1 - \delta)\bar{K} + \bar{I} \]

2. Asset pricing equilibrium:

\[ \bar{R} = \bar{P} - \frac{1 - \delta}{1 + r}\bar{P} \]

3. Rental market equilibrium:

\[ \bar{K} = D(\bar{R}) \]

4. Investment market equilibrium:

\[ \bar{I} = I(\bar{P}) \]
A simple example would be to assume $D(R) = 1000 - 2R$

$I(P) = P$
This lecture drew from material from:

1. Econ 301 and 302 at the University of Chicago taught by Kevin Murphy
2. Business 33002 at the Booth School of Business taught by Owen Zidar