Money in the RBC Model

- How can we build a macro model without money?
  - "Classical dichotomy" says that real side operates independently of monetary forces: "money is a veil"
- How would we add money?
  - Need a reason to hold it
  - Balancing cost of making transactions with less money against forgone interest
- Definition of money
  - Means of payment or medium of exchange
  - M1 = narrow money (checking accounts and currency)
  - M2 = broader money (savings accounts, small CDs, etc.)
- Supply of money
  - Central bank controls issue of "monetary base"
  - Ratio of money supply to monetary base is money multiplier that depends on public's propensity to hold currency and banks' propensity to hold reserves
  - Central bank controls B and thus attempts to control M
- Demand for money
  - Balancing benefits (cheaper transactions) against costs (forgone interest)
  - $M^d = P \cdot L(Y, i, TC) = PY^{\eta} i^{\varepsilon} TC^{\xi}$
- Monetary equilibrium in a growth model
  - Suppose that Y grows at $n+g$
  - Central bank increases money supply at rate μ
  - In equilibrium: $\mu = \frac{\dot{M}^s}{M^s} = \frac{\dot{M}^d}{M^d} = \frac{\dot{P}}{P} + \eta\frac{\dot{Y}}{Y} + \varepsilon\frac{\dot{i}}{i} + \xi\frac{\dot{TC}}{TC}$
    - In steady state:
      - $\frac{\dot{P}}{P} = \pi$
      - $\frac{\dot{Y}}{Y} = n + g$
      - i and TC are unchanging
    - $\mu = \pi + \eta(g+n)$
    - Some evidence that η = 1, so $\pi = \mu - (n+g)$
    - If growth of money supply exceeds growth of money demand, inflation makes up the difference
  - Steady-state properties:
    - $\frac{\partial \pi}{\partial \mu} = 1$

        - $\frac{\partial \pi}{\partial (g+n)} = -\eta \approx -1$
    - Note that we assume that the real economy affects monetary conditions (inflation) but not vice versa
- Change in interest rate?
    - If $r\uparrow$ then (given π) $i\uparrow$, so $M^d\downarrow$, $M^d < M^s$, $P\uparrow$ and $W\uparrow$
    - Similar kind of adjustment occurs to raise or lower prices and wages after change in Y or M^s
    - Note that $Y\uparrow$ implies $P\downarrow$, which means that prices are countercyclical in RBC framework
- Roles of price in economy
    - Monetary role: aggregate P balances M^s and M^d
    - Resource allocation role: relative prices signal scarcity
        - This role is masked in RBC because there is only one good, but it is crucially important in microeconomics
- Can all prices adjust at once?
    - Our model suggests that it is a simple matter for P to move up or down
    - In a world with perfect information and perfect coordination, all prices could instantly adjust upward or downward
    - In the real world, there is no such coordination
        - Prices and wages may be sticky
        - Some may be stickier than others
        - This can lead to relative prices changes that alter resource allocation and cause inefficiency
- Keynesian models: stickiness of P and/or W
    - Prices in different markets adjust at different speeds
        - Stock market: very fast
        - Goods market: much slower
        - Labor market: probably very slow
    - If P cannot establish $M^s = M^d$ quickly, then other variables are likely to respond to this imbalance in the short run
    - For example, a change the interest rate could re-establish equilibrium between M^s and M^d immediately, whereas a change in P and W could take months or years
    - This is the essence of Keynesian model
- **Modeling strategy:**
    - Start by examining behavior of economy with fixed prices/wages
    - Examine microeconomic basis for price/wage stickiness