ECON 522

Sept. 18, 2017

Money and Inflation

- From Chapter 4, can skip parts on:
  - *"Bank Capital, Leverage, and Capital Requirements"* in Section 4.2
  - *"A Model of the Money Supply"* in Section 4.3 (start with *"The Instruments of Monetary Policy"* for that section)
- Today: Chapter 5, long-run theory of inflation. From the book, can skip:
  - *Sections 5.4 to 5.6*

Velocity

- Velocity of money = the number of times the average dollar bill changes hands in a given time period; (the rate at which money circulates)
  - *Example:* If in 2015 there were $500 billion in transactions and the money supply was $100 billion, then the average dollar was used in 5 transactions. Each dollar would have had to been used on average that many times.
  - Equation:

    Velocity (V) = Value of all Transactions (T) / Money Supply (M)
  - Use nominal GDP as a proxy for total transactions (T ~= P x Y)

    V = (P x Y) / M
  - Difference between nominal GDP and total value of transactions?

Quantity Equation

- Rearranging the velocity equation from the prior slide gives:

  $M \times V = P \times Y$
- Associated w the *Quantity Theory of Money* (idea that changes in quantity of money lead to changes in nominal expenditure)

Money Demand

- M/P = real money balances = the purchasing power of the money supply
  - *Note*, this is similar to other cases where we divide by P to look at variables in "real" terms
- Money Demand Function: $(M/P)^d = L(i, Y)$
- Ignoring i for the moment: we can write money demand as $(M/P)^d = \mathbf{k\,Y}$
  - Where k is how much money people wish to hold for each dollar of income
  - This connects money demand to the quantity equation: $k = 1 / V$
  - When k is large, people hold lots of money relative to their incomes, and V is small, meaning money changes hands infrequently

Quantity Theory of Money

- From the Quantity Equation, assume V is exogenously determined and constant (not changing)
- Then, money supply (M) determines nominal GDP (P x Y) ….
  - Real GDP (Y) is still determined by K, L and technology … Introducing more money into the economy shouldnt change how much people are able to produce
  - *Price level (P) = nominal GDP (P x Y) / real GDP (Y)*
    - Similar to the way we define the GDP deflator

Quantity Theory in Growth Rates

- Math Rule: the growth rate of a product (a x b) equals the sum of the growth rates:
  - *Growth rate (a x b) = growth rate (a) + growth rate (b)*
- Write out the quantity equation in terms of growth rates
  - Growth rate of V is 0 by assumption (we assumed V is not changing)
  - Growth rate of P = inflation rate
  - Solve for inflation rate, and you get that the inflation rate equals the difference in the growth rate of the money supply and the growth rate of real GDP
- *Interpretation*: Normal economic growth requires a certain amount of money supply growth to facilitate growth in transactions. Money growth in excess of that amount leads to inflation.

Example

- If real GDP is growing by 3% per year over the long run, what rate of money supply growth would the central bank need to target to achieve zero inflation (on average over the long run)?

QTM Prediction

- Growth in Y (real GDP) depends on factors of production and technological progress. We take those as fixed (given outside the model) for now.
- The QTM predicts a one-for-one relation between changes in the money growth rate and changes in the inflation rate. A change in this money growth rate, under this theory, should cause an equal change in the inflation rate.
- In data, countries with higher money growth rates do tend to have higher inflation rates.

Interest Rates

- Nominal interest rate (i) = not adjusted for inflation
- Real interest rate (r) = adjusted for inflation

  r = i – inflation rate

Fisher Effect: changing the inflation rate changes the nominal interest rate

i = r + inflation rate

- From Ch. 3, S = I (loanable funds market equilibrium) determines r
- Here, and increase in the inflation rate causes an equal increase in the nominal interest rate

Example

Suppose V is constant, M is growing at 5% per year, Y is growing at 2% per year, and r = 4.

- Solve for i.
- If the Fed increases the money growth rate by 2 percentage points, what is the change in i.
- If the growth rate of Y falls to 1% per year, what happens to the inflation rate? What would the Fed need to do to keep the inflation rate constant?

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