The Asset Market, Money, and Prices, Part 2

Agenda
• Asset Market Equilibrium
• Money Growth and Inflation

Asset Market Equilibrium

• Asset market equilibrium:
  ➢ Assume that all assets can be grouped into two categories, money and non-monetary assets.
  ➢ Money \((M)\) includes currency and checking accounts
    – Pays interest rate \(r\) (which we will assume is zero).
    – Supply is fixed at \(M\).
  ➢ Non-monetary assets \((NM)\) include stocks, bonds, etc.
    – Pays interest rate \(i = r + \pi\)
    – Supply is fixed at \(NM\).

Asset Market Equilibrium

• Asset market equilibrium:
  ➢ The nominal demand for assets:
    • Let \(m^d + nm^d\) be an individual’s nominal demand for assets, and
    • Let \(M^d + NM^d\) is the aggregate nominal demand for assets.
      – Which is also aggregate nominal wealth.
Asset Market Equilibrium

- **Asset market equilibrium:**
  - The nominal supply of assets:
    - Let $M + NM$ be the aggregate nominal supply of assets. Which is also aggregate nominal wealth.
  - Equilibrium in the asset market requires:
    $$(M^d - M) + (NM^d - NM) = 0$$
  - The excess demand for money $(M^d - M)$ plus the excess demand for nonmonetary assets $(NM^d - NM)$ must equal 0.

- Equilibrium in the asset market requires:
  $$(M^d - M) + (NM^d - NM) = 0$$
  - If money supply equals money demand, $(M^d = M)$, then non-monetary asset supply **MUST** equal non-monetary asset demand, $(NM^d = NM)$.
  - Consequently, when the money market is in equilibrium, the entire asset market is in equilibrium.

- **Asset market equilibrium:**
  - Real money supply = Real money demand
    - $M / P = L(Y, r + \pi_e)$
    - $M$ is determined by the central bank,
    - $\pi_e$ is fixed (for now),
    - The labor market determines $N$; given $N$ the production function determines $Y$, and
    - Given $Y$, goods market equilibrium determines $r$. 

Asset Market Equilibrium

- **Asset market equilibrium:**
  
  ➢ Because all of the other variables are predetermined, the asset market equilibrium condition determines the price level.
  
  \[ P = \frac{M}{L(Y, r + \pi_e)} \]
  
  ➢ The price level is the ratio of nominal money supply to real money demand.

Money Growth and Inflation

- **Determining inflation:**
  
  ➢ Start with the price equation:
  
  \[ P = \frac{M}{L(Y, r + \pi_e)} \]
  
  ➢ Rewrite in growth rate terms:
  
  \[ \frac{\Delta P}{P} = \frac{\Delta M}{M} - \frac{\Delta L(Y, r + \pi_e)}{L(Y, r + \pi_e)} \]
  
  ➢ If the asset market is in equilibrium, the inflation rate equals the growth rate of the nominal money supply minus the growth rate of real money demand.
  
  ➢ Thus, the inflation rate is closely related to the growth rate of the money supply.

- **Determining inflation:**
  
  ➢ Inflation depends on both money supply growth and real money demand growth.
  
  ➢ In long-run equilibrium, \( i \) will be constant.
    - So money demand depends on real output.
  
  ➢ Let \( \eta_Y \) be the elasticity of money demand with respect to income. Then
  
  \[ \pi = \frac{\Delta M}{M} - \eta_Y \Delta Y / Y \]
Money Growth and Inflation

• Determining inflation:

\[ \pi = \frac{\Delta M}{M} - \eta_Y \frac{\Delta Y}{Y} \]

➢ Both money demand growth and money supply growth affect inflation.

➢ In cases of high inflation, nominal money supply growth is usually the more important factor.

Money Growth and Inflation

• Determining inflation:

\[ \pi = \frac{\Delta M}{M} - \eta_Y \frac{\Delta Y}{Y} \]

➢ Money demand does not vary dramatically, no matter how well or poorly an economy is doing.

• For example, suppose that \( \eta_Y = 2/3 \).
  - If \( \frac{\Delta Y}{Y} = 15\% \), then \( \frac{\Delta L}{L} = 10\% \).
  - If \( \frac{\Delta Y}{Y} = -15\% \), then \( \frac{\Delta L}{L} = -10\% \).

Money Growth and Inflation

• Determining inflation:

\[ \pi = \frac{\Delta M}{M} - \eta_Y \frac{\Delta Y}{Y} \]

➢ Nominal money supply growth has differed across countries by hundreds of percentage points.

➢ So large inflation differences must be due to money supply, not money demand.
Money Growth and Inflation: Application

• The European transition economies:
  ➢ Though the countries of Eastern Europe are becoming more market-oriented, Russia and some others have very high inflation because of rapid money growth.

Money Growth and Inflation

• Expected inflation & nominal interest rates:
  ➢ For a given real interest rate ($r$), expected inflation ($\pi_e$) determines the nominal interest rate ($i = r + \pi_e$).
Money Growth and Inflation

• Expected inflation & nominal interest rates:

  ➢ What factors determine expected inflation?

  • People could use the inflation equation.
    – If people expect an increase in money growth, then they would expect a commensurate increase in the inflation rate.
    – The expected inflation rate would equal the current inflation rate if money growth and income growth were stable.

Money Growth and Inflation

• Expected inflation & nominal interest rates:

  ➢ What factors determine expected inflation?

  • However, expectations can’t be observed directly.
  • But if real interest rates are stable, then expected inflation can be inferred from nominal interest rates.

Inflation and the nominal interest rate

• Expected inflation and nominal interest rates:

  ➢ Observations:

    • Inflation and nominal interest rates tend to move together.
    • So real interest rates are clearly not constant.
      – The real interest rate was negative in the mid-1970s, then became much higher and positive in the late-1970s to early-1980s
Money Growth and Inflation: Application

- Measuring inflation expectations:
  - Two ways to measure inflation expectations.
    - Derive implicit expectations from bond interest rates.
    - Surveys of inflation expectations.

Money Growth and Inflation: Application

- Measuring inflation expectations:
  - The U.S. government issues two types of bonds.
    - Nominal bonds, and
    - Treasury Inflation Indexed Securities (TIIS).
      - TIIS bonds make real interest payments by adjusting interest payments and principal for inflation.

Interest rates on nominal and TIIS 10-year notes

Money Growth and Inflation: Application

- Measuring inflation expectations:
  - The interest rate differential—the interest rate on nominal bonds minus real interest rate on TIIS bonds—is rough measure of expected inflation.
    - TIIS bonds have lower inflation risk, so the measure of expected inflation may be too high.
    - TIIS bonds do not have as liquid of a market, so the measure of expected inflation may be too low.
    - The net effect of the two effects is likely to be small, so the measure of expected inflation may be about right.
Money Growth and Inflation: Application

• Measuring inflation expectations:
  ➢ The data show large fluctuations in the expected inflation rate based on the interest rate differential.
  • In contrast, the rate of expected inflation measured in surveys has been fairly constant.
  • Either bond market participants have very different inflation expectations than forecasters, or else the degree of inflation risk and liquidity on TIIS bonds varied substantially from 1998 to 2006.

Alternative measures of expected inflation