A key simplifying assumption

Interest rate - price that is determined in asset markets

To simplify analysis, we assume:

- There are only two financial assets
  - money
  - bonds
- At a given point in time, asset holders need to decide how to allocate their fin. wealth between these two assets
  - this means, that when one of these asset markets is in equilibrium, then so is the other

3.2 Supply and demand in the bond market

Bonds are an **asset** to the holder and a form of **borrowing** by the issuer

Therefore, a higher **supply** of bonds $\implies$ a higher **demand** (by bond issuers) for credit → greater **supply** of credit (i.e. increased willingness to purchase bonds by investors)

Equilibrium in the bond market can be described either in terms of the **bond price** or the **interest rate**

"The supply of bonds is a positive function of the bond price" is equivalent to the statement that "the demand for borrowing [by issuing—that is, supplying—a bond] is a negative function of the interest rate."

RECALL: the **price** and **yield** (interest rate) of a bond are ***inversely related***

- When the yield increases, existing coupon payments on existing bonds are relatively lower compared to market returns (yield), thus, the existing bond is less attractive and faces a lower price
- When the yield decreases, existing coupon payments on existing bonds are relatively higher compared to market returns (yield), thus, the existing bond is more attractive and faces a higher price

At lower bond prices, Q_D of bonds is higher: inverse relationship

- you are more willing to buy bonds (lend money) when the interest rate is higher

At lower bond prices, Q_S of bonds is lower: a positive relationship

- you are more likely to issue or sell bonds (borrow money) when the interest rate is lower

So, d/s curves for bonds slope the same way as or g+s

Equilibrium in the bond market

Occurs when amount of bonds people are willing to buy (demand) = amount that people are willing to sell (supply) at a given price

$B^d = B^s$ defines the equilibrium (or market-clearing) price and interest rate

When $B^d > B^s$, there is exists ***excess demand***, so price will price and IR will fall to eliminate the excess

When $B^d < B^s$, there is ***excess supply***, so price will fall and IR will rise to eliminate the excess

These adjustments occur ***rapidly in highly liquid asset markets*** like those for bonds. Adjustment to changing conditions is almost instantaneous

📌 Supply and demand markets are always described in terms of ***stocks***
The ***asset market approach*** for understanding behavior in financial markets— which emphasises stocks of assets, rather than flows, in determining asset prices—is the dominant methodology used by economists, because correctly conducting analyses in terms of flows is very tricky, especially when we encounter inflation.

3.3 Changes in equilibrium interest rates

Shifts in demand for bonds - i.e. quantity demand changes at each given level of price (or interest rates)

Wealth: growing wealth → supply of savings rises → demand curve for bonds shifts right

- wealth accumulation is affected by mps

Expected returns: higher expected future IR (than previously anticipated) → lowers the expected return on LT bonds → shifting demand leftwards

- equivalently: if the market expects the bond price to be lower tomorrow, it will demand less bonds today
- an increase in expected return on alternative assets lowers the demand for bonds and shifts the demand curve to the left
- for a one-year discount bond and a one-year holding period, the expected return and the interest rate are identical, so nothing other than today's interest rate affects the expected return

Expected inflation: an increase in expected rate of inflation → lowers the expected real return for bonds → demand curve shifts left

Risk: an increase in riskiness of bond → demand shifts left

Liquidity: increased liquidity of bonds → demand shifts right

- some bonds are more liquid than others

Shift in the supply of bonds

Expected profitability of investment opportunities: expansion → supply shifts right

Expected inflation: increase in expected inflation → supply curve for bonds shift right

- the real IR is lower for any given nominal IR, boosting desire to borrow and therefore to issue bonds

Fiscal policy (i.e. gov budget policy): increased budget deficits → shift supply right

- treasury bonds are used to finance government budgets
- Deficit → issue more bonds
- Surplus → issue less bonds

3.4 Liquidity preference framework

Supply and demand in the market for money

Thus far, we have considered IR as being determined in the bond market

The economist Keynes postulated that IR are determined in the market for money

In a simplified two-asset framework we can show that these two approaches are equivalent

Two-asset model of equilibrium in money and bond markets

Simplifying assumptions:

- At a given point in time, there is a fixed amount of nominal wealth (that is, assets that have fixed face value) in the economy in the form of money and bonds

Total supply and demand for the two assets has to equal nominal wealth, so:

$$B^s + M^s = B^d + M^d$$

$$B^s - B^d = M^d - M^s$$

Rearranging:

- Excess supply of bonds = excess demand for money
- When one market is in equilibrium, so is the other
- $B^s = B^d$ implies $M^d = M^s$

The approaches (IR determines in bond market vs market for money) differ because, by assuming there are only two kinds of assets, money and bonds, the liquidity preference approach ***implicitly ignores any effects on interest rates that arise from changes in the expected returns on real assets.***

Why use both approaches?

- bond s/d framework easier to use when analysing effects caused by changes in ***expected inflation***
- liquidity preference framework easier to use when analysing effects caused by changes in ***income, price level and money supply***

Demand for money in the liquidity preference framework:

- As the IR increases (with money either ***non-interest bearing*** or bearing IR that are not linked to market rates):
  - the opportunity cost of holding money increases...
  - the relative expected return on holding money decreases...
- ... and therefore, the Q_d of money decreases

Thus, ***negative relation between quantity of money demanded and interest rates***

Changes in equilibrium IR in the liquidity preference framework

Shifts in the demand for money

- ***Income effect:*** higher level of income → demand for money at each IR to increase → demand curve shifts right
  1. wealth increases → people want to hold money as a store of value
  2. people want to carry out more cash transactions
- ***Price-level effect:*** rise in price level → demand for money at each IR to increase → demand curve shifts right
  - to restore purchasing power of money - requires greater holdings of nominal quantity of money

Shifts in the supply of money

- Assume that the supply of money is controlled by the central bank

- Increase in the money supply engineered by the central bank → shift supply curve for money to the right

3.5 Money and interest rates

All of the diagrams (end of section 5.4) represent analysis at a point in time (ceteris paribus.)

Over time, however other effects will follow

Example: a one-time increase in the money supply lowers the IR at that point in time

However, this will eventually lead to higher prices for g+s

- lower IR → higher spending, higher incomes, higher prices
- this may add to inflation expectations

Demand for money thus, increases

Over time, this will work to offset the initial effect of the increase in money supply

Response over time

Time path of overall response depends on relative strength of four factors:

- ***liquidity effect*** *- an increase in money supply lowers IR*
  - has an immediate effect - rising M^S leads to immediate $\downarrow IR$
- ***price level effect*** *- increase in price level, increases IR*
  - takes times for increase of money supply to affect price level and income
- ***real income effect*** *- increase in income, increases IR*
  - takes times for increase of money supply to affect price level and income
- ***inflation expectations effect*** *- higher inflation expectations increases IR*
  - can be slow or fast, depending on how slowly/quickly people adjust their expectations when money growth rate is increased

📌 **Difference** between price-level effect and inflation expectations effect

- the ***price-level effect remains even after prices have stopped rising***, whereas the expected-inflation effect disappears
- expected inflation effect ***persists only*** as price level continues to rise
  - a one-time increase in the money supply will not produce a continually rising price level; only a higher rate of money supply growth will
  - requires higher rate of money supply growth for expected inflation effect

The lack of short selling (causing over-priced stocks) may be explained by loss aversion *(people are more unhappy about losses than they are happy about gains)*

The large trading volume may be explained by investor overconfidence.

Stock market bubbles may be explained by overconfidence and social contagion.

Part 2: Monetary policy and the stock market

9.4 Monetary policy and the stock market

A controversial question: should central banks respond to asset bubbles?

Asset bubble: *sustained rise in price of an asset class, fueled by expectations that the price will rise further*

- e.g. real estate prices, tech-stock bubble
- Has a destabilising impact when the bubble bursts
- May be associated with rising leverage (borrowing to buy assets) which increases the risk

Two types:

1. credit-driven bubbles
    - can lead to a feedback loop where credit boom boosts asset prices and further fuels credit the credit boom which again boosts asset prices and so on
    - when the bubble bursts, the collapse in asset prices leads to a reversal of the feedback loop
        - typically ***more dangerous*** for this reason
    - e.g. GFC driven by credit boom in subprime lending
2. bubbled driven solely by irrational exuberance (i.e. optimistic expectations)
    - much less risk to financial system
    - e.g. 1990s tech-stock boom
        - not fueled by credit
        - bursting of bubbled did not have severe impacts - only a mild recession

The 'lean vs clean' debate

Alan Greenspan argued: CB should not take actions to pop bubbles (i.e. the ***Greenspan doctrine***) because:

- bubbles are hard to identify
- while eco analysis suggests that ↑IR can ↓asset price increases, raising IR may be ineffective in restraining bubbles since market participants expect such high rates of return from buying bubbled-driven assets
    - raising IR has been found to cause bubbled to burst more severely
- many different asset prices exist, and at any one time a bubbled may be present in only a fraction of asset markets
- monetary policy should react to fluctuations in asset prices to the extent that they affect inflation and economy activity

- as long as policymakers respond in timely manner, by easing monetary policy aggressively after an asset bubble bursts, the harmful effects of a bursting bubbled can be kept at a manageable level
    - Greenspan Fed acted in this way following stock market crash of 1987 and bursting of tech bubbled market in 2000
    - aggressively eased monetary policy during these times
    - eco did not face recession in 1987 after stock market crash
    - eco faced a very mild recession following tech bubble burst in 2000

Asset bubbles and associated leverage may be encouraged by easy monetary policy (low IR)

This is a possible argument for monetary policy to **'lean** against' a perceived bubble (i.e. be preventative of asset bubbles)

BUT,

- Bubbles are hard to identify when they are happening
- Due to uncertainty of impact, a rise in IR might just amplify the downside
- Hence it may be more effective to take no action during bubble expansion but use MP to '**clean** up' the damage after it collapses
- This was the Greenspan view during tech bubble (1990s), and tends to be consensus CB view today, though a matter of debate
- Other instruments may be available to deal with assets bubbles and leverage (**macroprudential** policies)

Why central banks should try to pop bubbles?

Bursting of credit driven bubbles are not only extremely costly but hard to clean up

Rather than leaning against potential asset price bubbles (including both types)

- case is much stronger for leaning against credit booms - credit driven asset bubbles
- easier to identify credit booms

Monetary policy goals – Bernanke 2003

Goals of monetary policy are price stability and full employment (for dual mandate central banks like the Fed)

Impact of i on P, Y, is indirect (and it operates with lags).

But impact of i on financial markets is direct and effects are immediate

Understanding how policy affects the broader economy requires understanding how it affects key financial markets and how changes in asset prices and returns affect behaviour

Why changes in monetary policy affect stock prices?

Bernanke and Kuttner find that ***unanticipated changes in monetary policy*** affect the ***perceived riskiness*** of stocks, rather than expected dividends or the risk-free real interest rate

$$k_e = i + rp$$

Tightening monetary policy leads investors to view stocks as riskier investments and demand a higher return, resulting in a fall in the current stock price

As we will see this finding has implications for the role of stock prices in transmitting the effects of monetary policy and the potential effectiveness of monetary policy in "pricking" stock market bubbles.

The stock price multiplier

Impact on stock market of a change in interest rates

Consider Nov 6: Policy rate had a 19-basis point downward surprise and a broad measure of the stock market rose by 0.96 percentage points (or 96 basis points)

- Stock price multiplier for Nov 6 is $96/19 = 5.05$

Using all observations, Bernanke and Kutter found a multiplier of 4.7

This value means that 25 basis points *(surprise)* cut would increase the stock market index by about 1.25 percentage points

But *anticipated* changes in the IR have small and statistically insignificant effects on stock prices

A stock price multiplier of 5 is no negligible, but notice that:

- a 20 basis point surprise is rate
- stock market moves by more than 1% on about 40% of all trading days
- conclusion: news about monetary policy contributes very little to the day-to-day fluctuations in stock prices

Why does monetary policy affect stock prices?

A share of stock is a claim on current and future dividends

News that current or future dividends are likely to be higher than previously expected should raise current stock price

IR higher than previously expected should depress stock price

- make a given future dividend less valuable in today's dollars (discounting)
- make bonds more attractive, raising the required return on stocks
- news that affects ***risk premium*** on stock also affects stock prices

3 key factors that should affect stock prices: ***dividends, interest rates and risk premium***

$$\frac{ECF_n}{(1+i+rp)^n}$$

Most powerful effect of an unanticipated monetary tightening is to increase the perceived *risk premium on stocks*

Tighter monetary policy raise the riskiness of shares by raising the interest costs and weakening the balance sheets of firms and households (see Bernanke and Gertler, 1995)

Implications for monetary policy

Two issues: