180.101 Elements of Macro - TA Section - Week 12

Qingyuan Fang

qfang6@jh.edu

Slides on https://github.com/QingyuanFang/TA_ElementsOfMacro
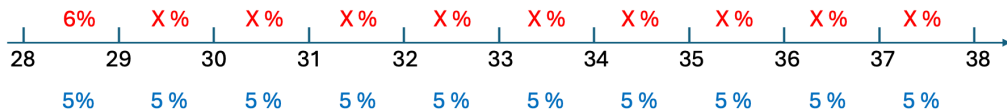
Nov 11, 2024

Infer Market Expectations

- **Real yield = Nominal yield - Expected Inflation**
- TIPS yield = T-bond yield - Expected inflation
- **Expected interest rate** is based on the term structure of Treasuries.
  Key: match the muturity + no arbitrage
  1-year U.S. treasury and rollover every year v.s. v.s. 10-year U.S. treasury

- What is the expected 1-year treasury rates over 2029 through 2033?
- What is the expected 1-year treasury rates over 2033 through 2038?

Quantity Theory of Money

$$\underbrace{P}_{\text{Price Level}} * \underbrace{Y}_{\text{Output}} = \underbrace{V}_{\text{Velocity}} * \underbrace{M}_{\text{Money Supply}} \Rightarrow \%\Delta P + \%\Delta Y = \%\Delta M + {\color{blue}\%\Delta V}$$

Milton Friedman: If V is constant ($\%\Delta V = 0$), we can target $\%\Delta M = \pi^* + LTSG$

Q: Problems with this Theory

Quantity Theory of Money

$$\underbrace{P}_{\text{Price Level}} * \underbrace{Y}_{\text{Output}} = \underbrace{V}_{\text{Velocity}} * \underbrace{M}_{\text{Money Supply}} \Rightarrow \%\Delta P + \%\Delta Y = \%\Delta M + \%\Delta V$$

Milton Friedman: If V is constant ($\%\Delta V = 0$), we can target $\%\Delta M = \pi^* + LTSG$

Q: Problems with this Theory

1. Assumption that velocity (V) is not stable
   This is not true. We see from the data that velocity is extremely volatile.

2. How to control money supply (M)?
   By changing the interest rate or required reserves of the commercial bank, the central bank can somehow change the money supply, BUT this is only indirect.

3. The definition of M we should target is not clear.

Taylor Rule

Fed's dual mandate: maximum employment + stable prices

$$i_f = \pi + \alpha\left(\pi - \pi^*\right) + \beta\left(U^* - U\right) + r_f^*$$

- i_f : Nominal Fed Funds rate
- π : Inflation
- U : Unemployment rate
- π^* : Inflation target
- U^* : Natural rate of unemployment
- r_f^* : Neutral Real Fed Funds rate
- α, β : Loading factors: Importance of inflation vs unemployment rate deviation

Additional Notes on Taylor Rule

- It is a summarized pattern based on historical data and Feds practices.
- But it is not necessarily the right rule Fed should follow.
- Therefore, in its nature, it is positive, not normative.
  - Positive means descriptive and empirical. It concerns what "is", "was", or "will be", and contains no indication of approval or disapproval.
  - Normative is about what is good and what is bad, what should be(have been) done, etc.
- Q: Why do we need a rule in the first place?

Additional Notes on Taylor Rule

- It is a summarized pattern based on historical data and Feds practices.
- But it is not necessarily the right rule Fed should follow.
- Therefore, in its nature, it is positive, not normative.
  - Positive means descriptive and empirical. It concerns what "is", "was", or "will be", and contains no indication of approval or disapproval.
  - Normative is about what is good and what is bad, what should be(have been) done, etc.
- Q: Why do we need a rule in the first place?
  - **Commitment-based policy** leads to predictability, helps stabilize expectations, builds credibility and discipline policymakers from making arbitrary decisions
  - **Discretionary policy** involves more contingent decisions based on specic considerations of the circumstances. It has more flexibility but subjects the policy to arbitrary judgments

Extended Loanable Funds Model
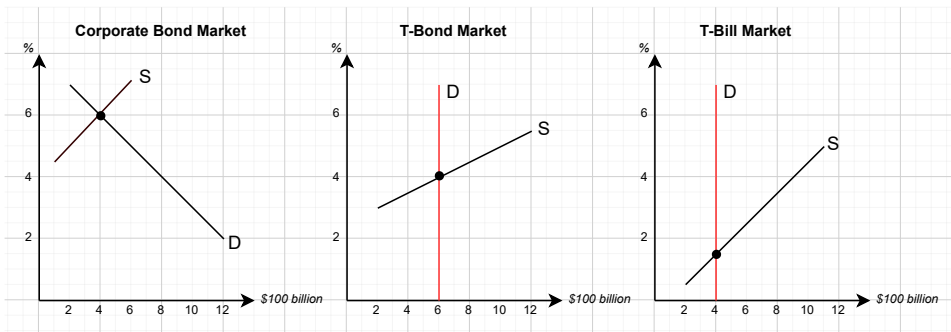
REAL interest rate on the vertical axis!

Step 1: Identify the three markets
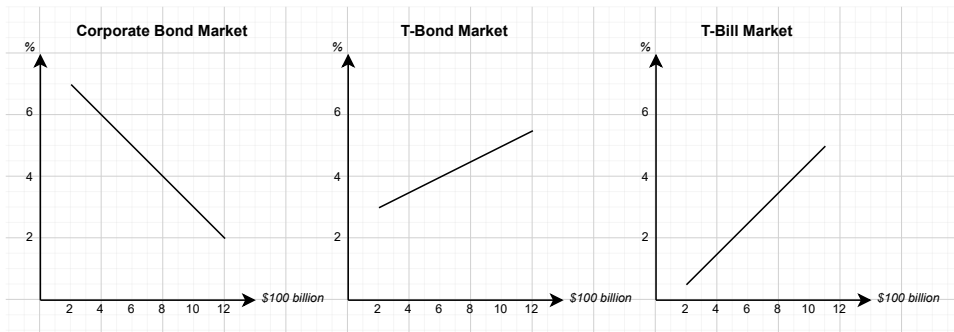
Extended Loanable Funds Model
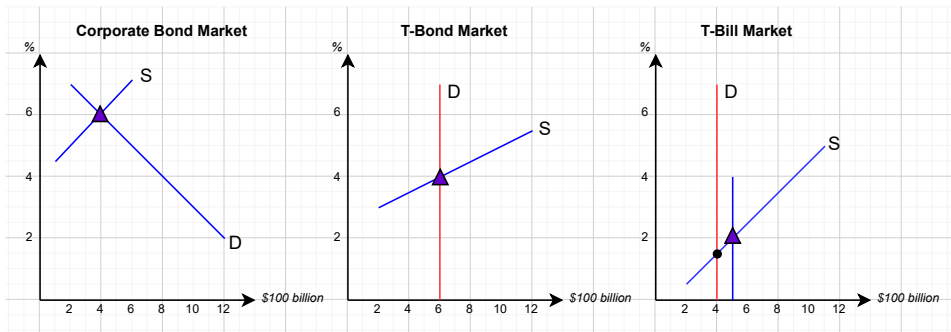
REAL interest rate on the vertical axis!

Step 2: Deficit financing, risky/risk free bond spread

Extended Loanable Funds Model

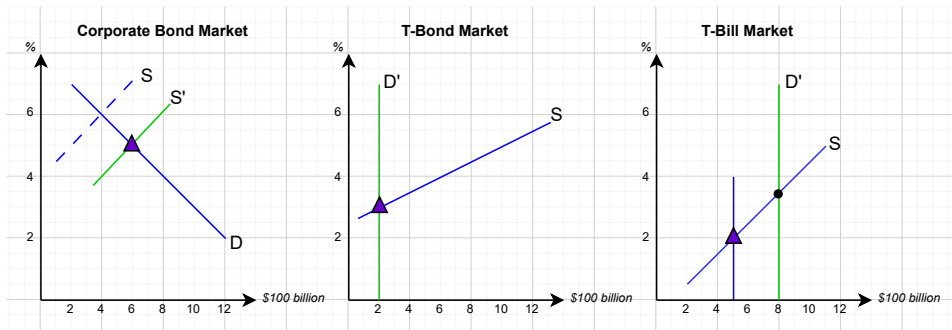**REAL interest rate on the vertical axis!**

Step 3: Fed's target rate

Extended Loanable Funds Model

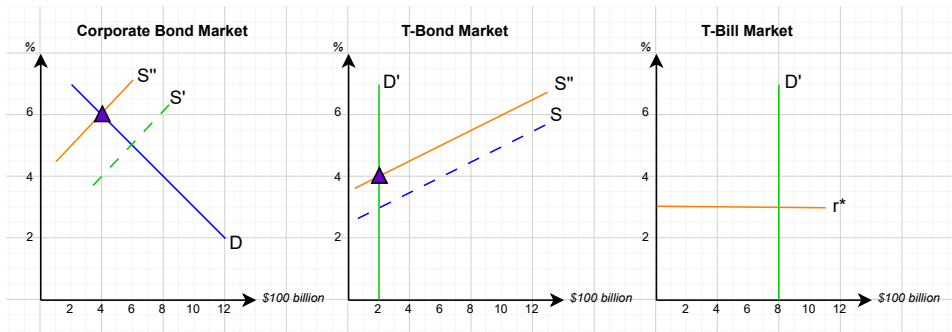**REAL interest rate on the vertical axis!**

Step 4: Change of deficit financing plans

Extended Loanable Funds Model

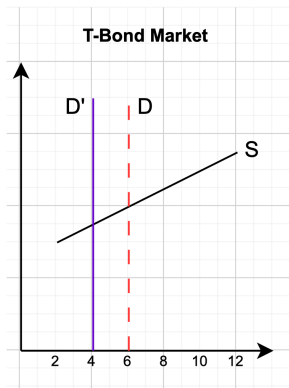**REAL interest rate on the vertical axis!**
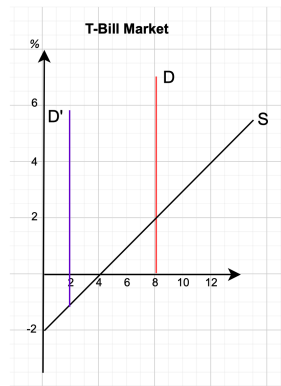
Step 5: Adjustment of monetary policy

Q: How to explain QE and ZLB using the diagrams?

Q: How to explain QE and ZLB using the diagrams?

Quantitative Easing

ZLB

Default Risk

- In terms of **the amount of money**

$$1000000 \times (1 + 3\% + 2\%) = (1000 - D) \times 1000 \times (1 + 8\%) + D \times 1000 \times 33\%$$

- In terms of **gross return**. Denote the default rate as $\lambda = \frac{D}{\#Firms}$

$$1 + \text{T-bond yield} + \text{risk premium} = (1 - \lambda) \cdot (1 + i^{\text{Repay}}) + \lambda \cdot (1 - \text{Default Loss})$$

- Given the targeted i^{Repay}, the Fed adjusts T-bond yield in response to changes in risk premium, λ, and Default loss.

Appendix

Money Multiplier

- Open market operations: the Central bank buys/sells treasuries from **Commercial banks**
- An expansionary monetary policy move (the Fed buys T-bills)
  $\rightarrow$ commercial banks have an increase in **reserve**, decrease in T-bill assets.
- What is the **reserve**? Basically the cash
  - **Required reserve**. The bank regulators require the commercial banks to hold some cash in hands in case there is a bank run.
  - The rest, **excessive reserve**. The commercial banks can lend it out.
  - The lower the required reserve ratio (RRR) is, the bigger the proportion of reserves that can be lent out, which determines how much money is created in the economy.
- Imagine a commercial bank has \$1 total reserves, 20% of which is required to be held by itself. It lends the rest \$0.8 (the excessive reserve) out to the first person, which can be used by the next person, the next person, etc. The total amount of money it can create is:

$$0.8 + 0.8^2 + 0.8^3 + \ldots = \frac{0.8}{1 - 0.8} = 4 = \frac{1 - RRR}{RRR}$$