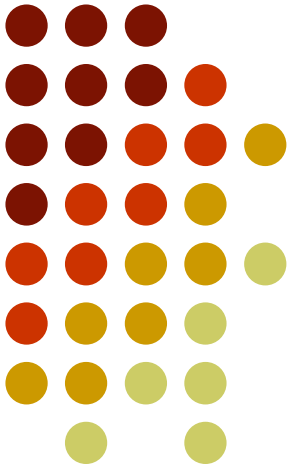
The Cost of Money (Interest Rates)

Chapter 3



Outline

- Cost of money
- Interest rates
- Yield curve
- References: BF Chap 2; PF Chap 5

Measures of Money Supply

- M-1
  - Sum of coins, currency and demand deposits
- M-2
  - M-1 plus savings account and small certificates of deposit (CD)

The Cost of Money

- In a free economy, the excess funds of lenders are allocated to borrowers in the financial markets through a pricing system that is based on the supply of, and the demand for, funds.
- This system is represented by interest rates, or the cost of money; that is, the prices paid to borrow funds.

Realized Returns (Yields)

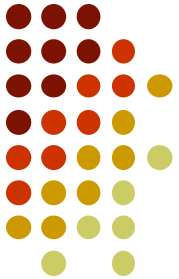
$$\text{Yield (\% return)} = \frac{\text{Total dollar return}}{\text{Beginning value}} = \frac{\text{Dollar income + Capital gains}}{\text{Beginning value}}$$

$$= \frac{\text{Dollar income + (Ending value - Beginning value)}}{\text{Beginning value}}$$

Factors that Affect the Cost of Money

1. Production opportunities
   - Returns available within an economy from investment in productive assets
2. Time preferences for consumption
   - The preferences of consumers for current consumption as opposed to saving for future consumption

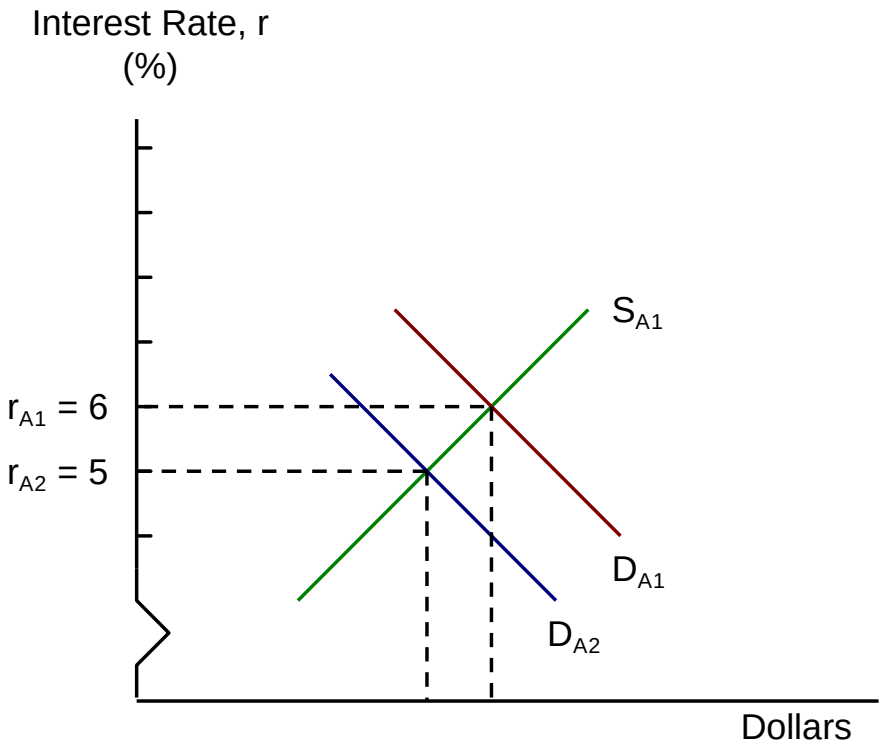
Factors that Affect the Cost of Money



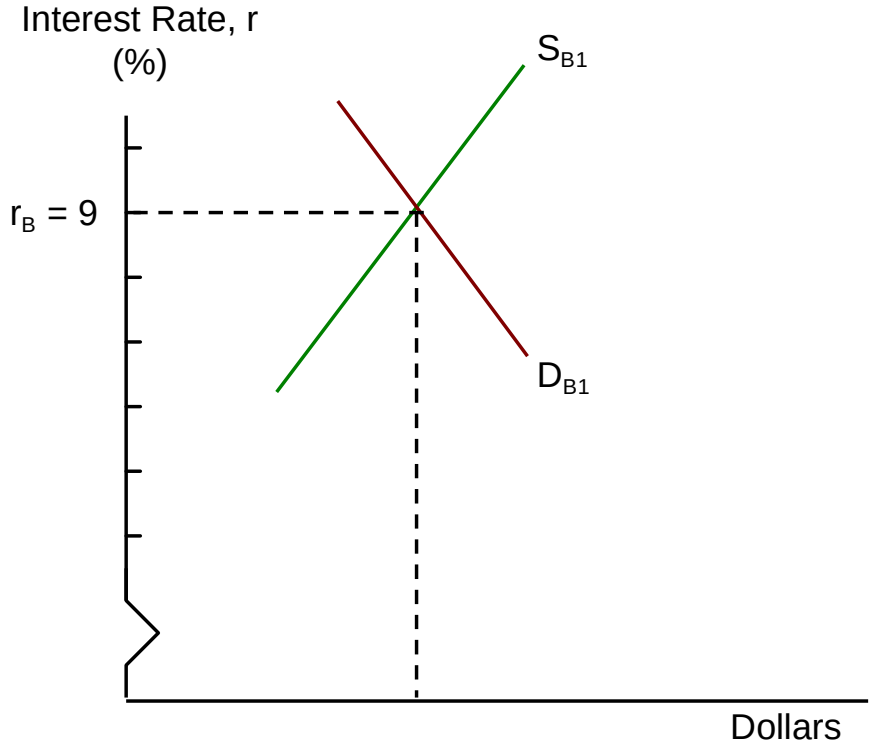
3. Risk
   - The chance that a financial asset will not earn the return promised
4. Inflation
   - The tendency of prices to increase over time

Interest Rates - Supply & Demand for Funds

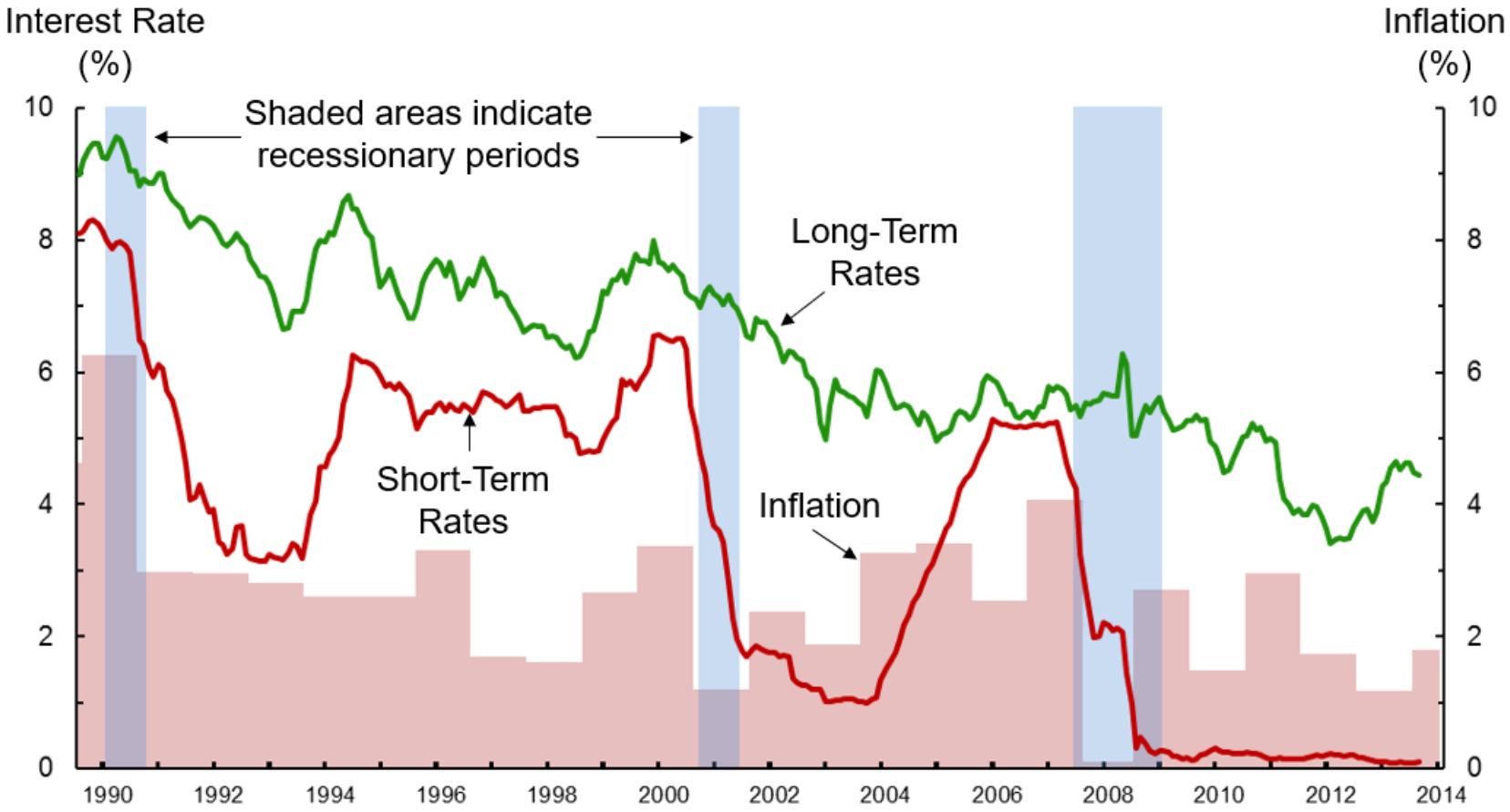
Market A: Low-Risk Securities



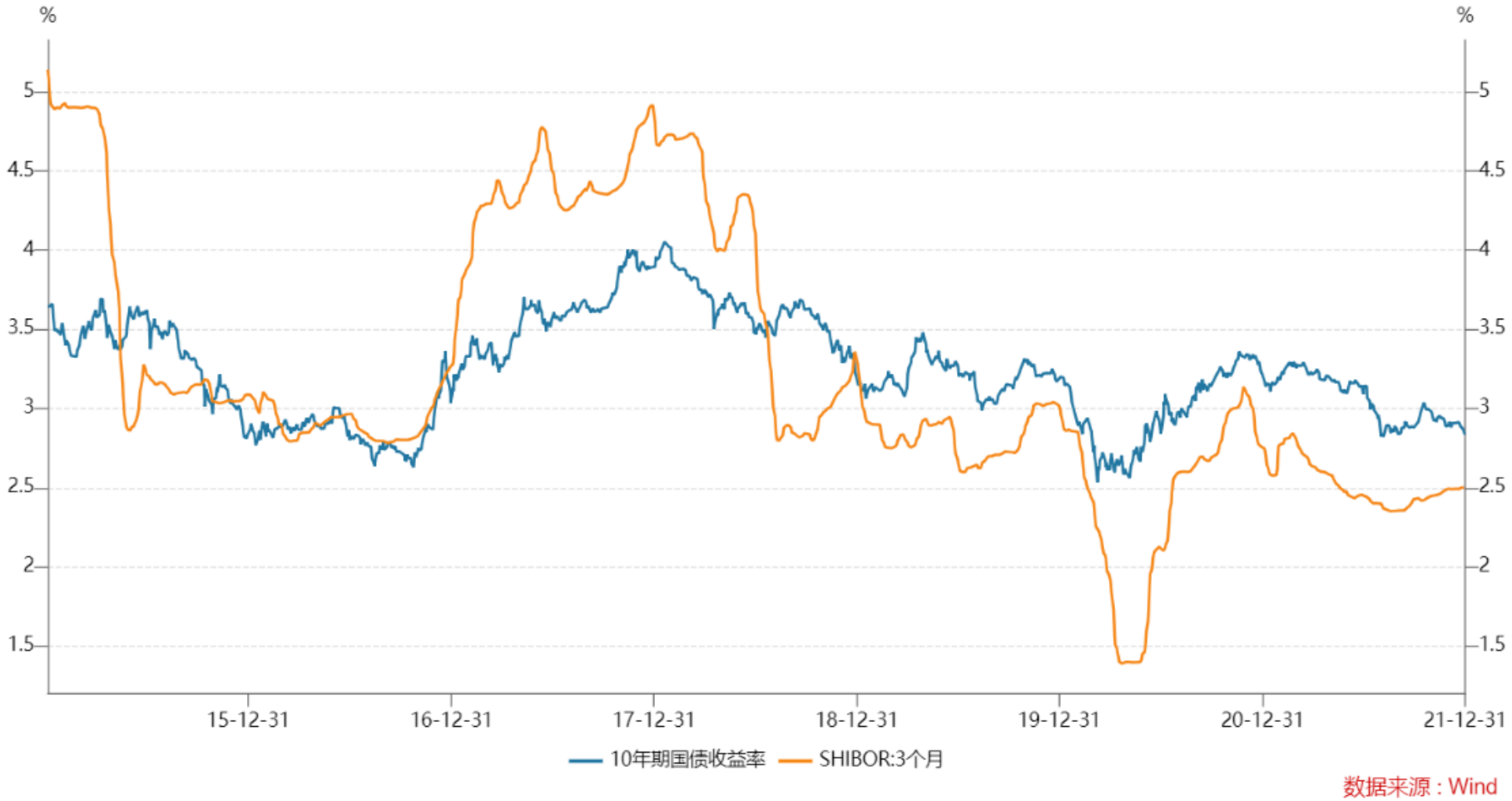
Market B: High-Risk Securities



Long- and Short-Term Interest Rates of the U.S.



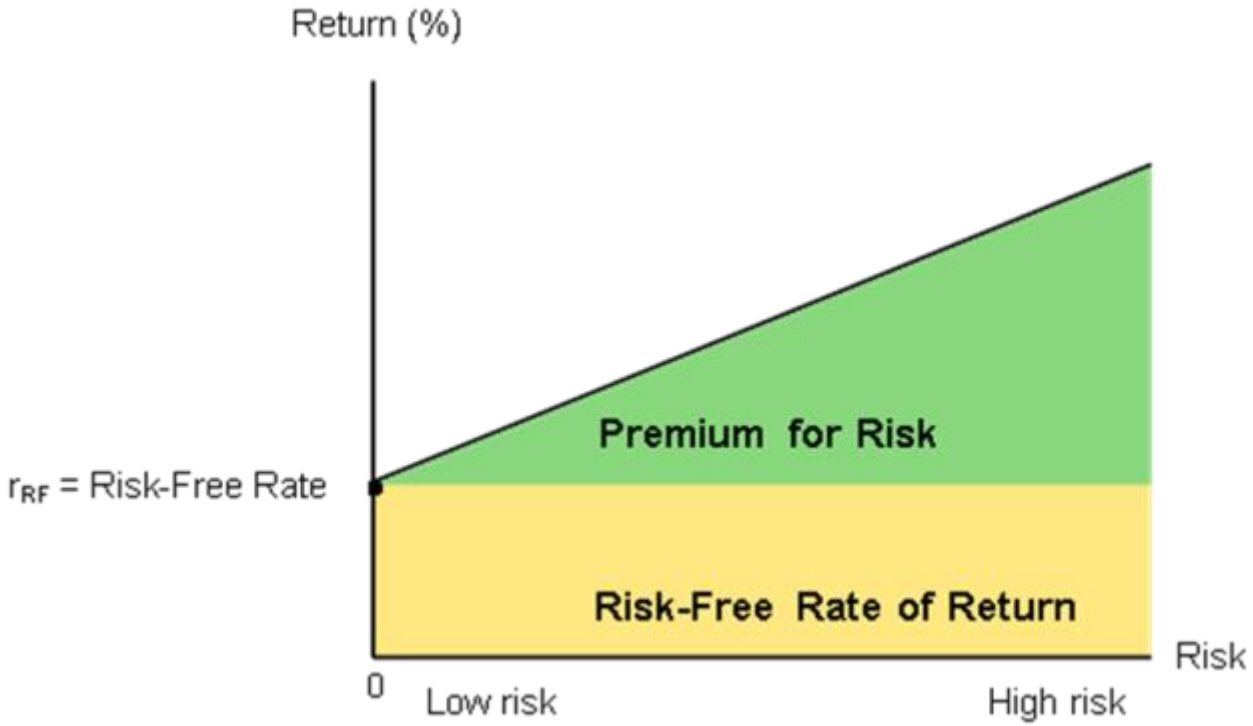
Long- and Short-Term Interest Rates of China



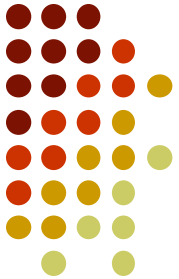
数据来源：Wind

Determinants of Market Interest Rates

Rate of return = r = Risk-free rate + Risk premium



Determinants of Market Interest Rates



$$\text{Rate of return} = r = \text{Risk-free rate} + \text{Risk premium}$$
$$= r_{RF} + RP$$
$$= r_{RF} + [DRP + LP + MRP]$$

r	=	the quoted or nominal rate
r_{RF}	=	quoted risk-free rate
RP	=	risk premium
DRP	=	default risk premium
LP	=	liquidity, or marketability, premium
MRP	=	maturity risk premium

Nominal Risk-Free Rate of Interest

- $r_{RF} = r^* + IP$
- The rate of interest on a security that is free of all risk, except inflation
- Proxied by the T-bill rate or T-bond rate
- r_{RF} includes an inflation premium
- r*: real risk-free rate of interest
- IP: inflation premium
  - A premium for expected inflation that investors add to the real risk-free rate of return

Risk Premium

- Default risk premium (DRP)
  - Difference between the interest rate on a treasury bond and a corporate bond of equal maturity and marketability
  - Compensates for risk that a borrower will default on a loan
- Liquidity premium (LP)
  - Premium added to the rate on a security if the security cannot be converted to cash on short notice at a “reasonable price”

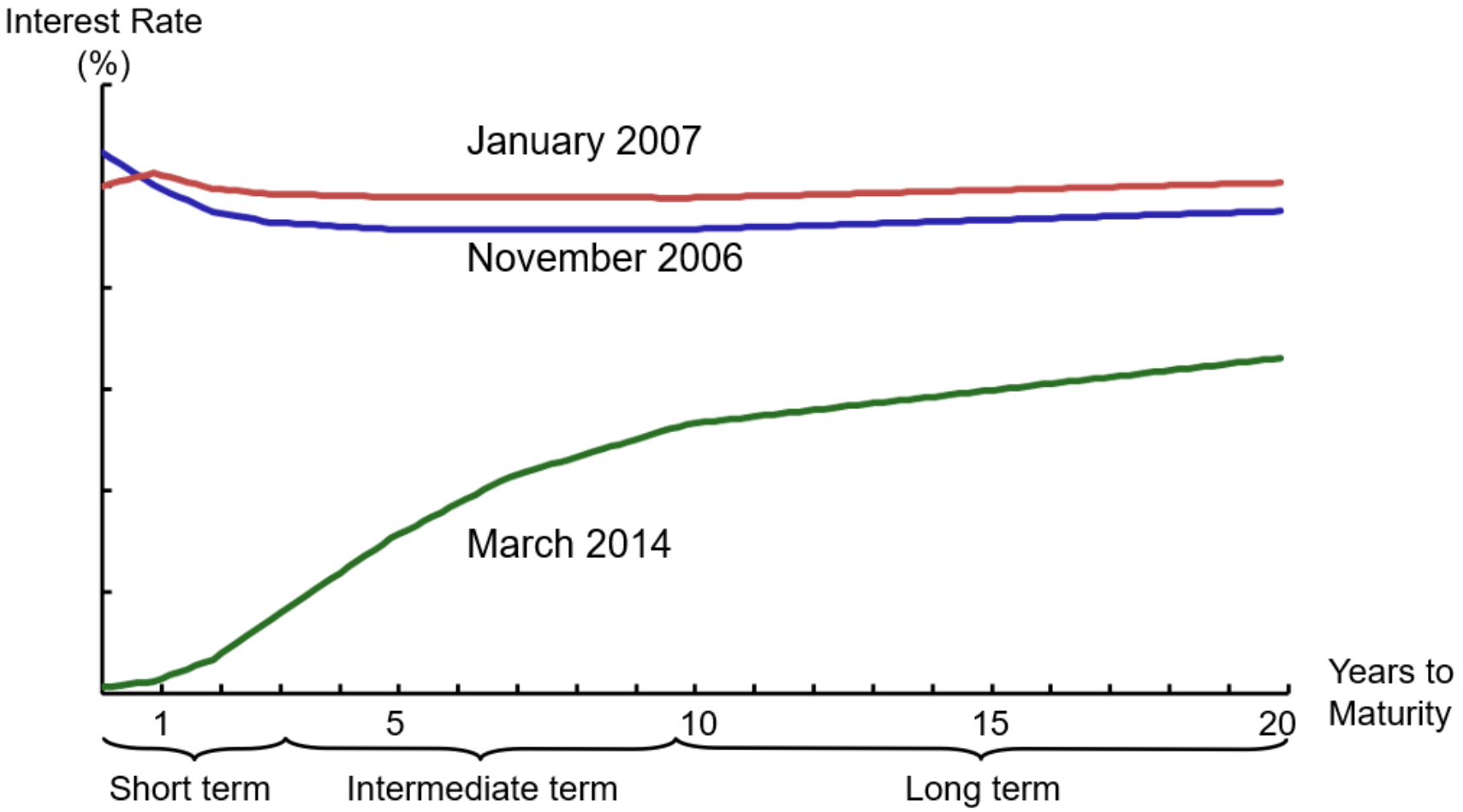
Risk Premium

- Maturity risk premium (MRP)
  - Premium that reflects the interest rate risk
    - Risk of capital losses to which investors are exposed because of changing interest rates
  - Bonds with longer maturities have greater interest rate risk, thus greater MRPs.

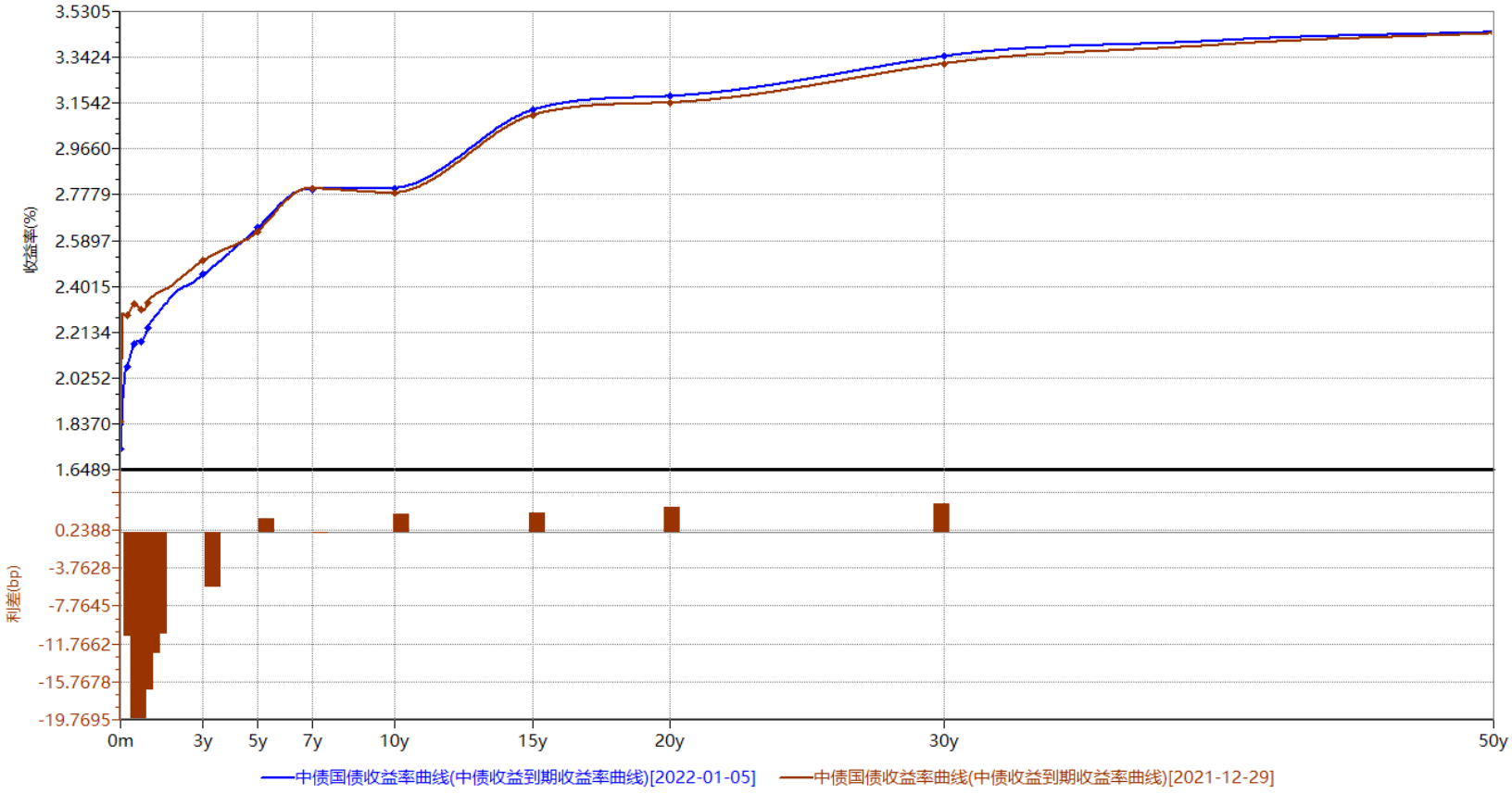
Term Structure of Interest Rates

- Relationship between yields and maturities of securities
- A graph of the term structure of interest rates is called a yield curve

Yield Curves – U.S. Treasure Bonds



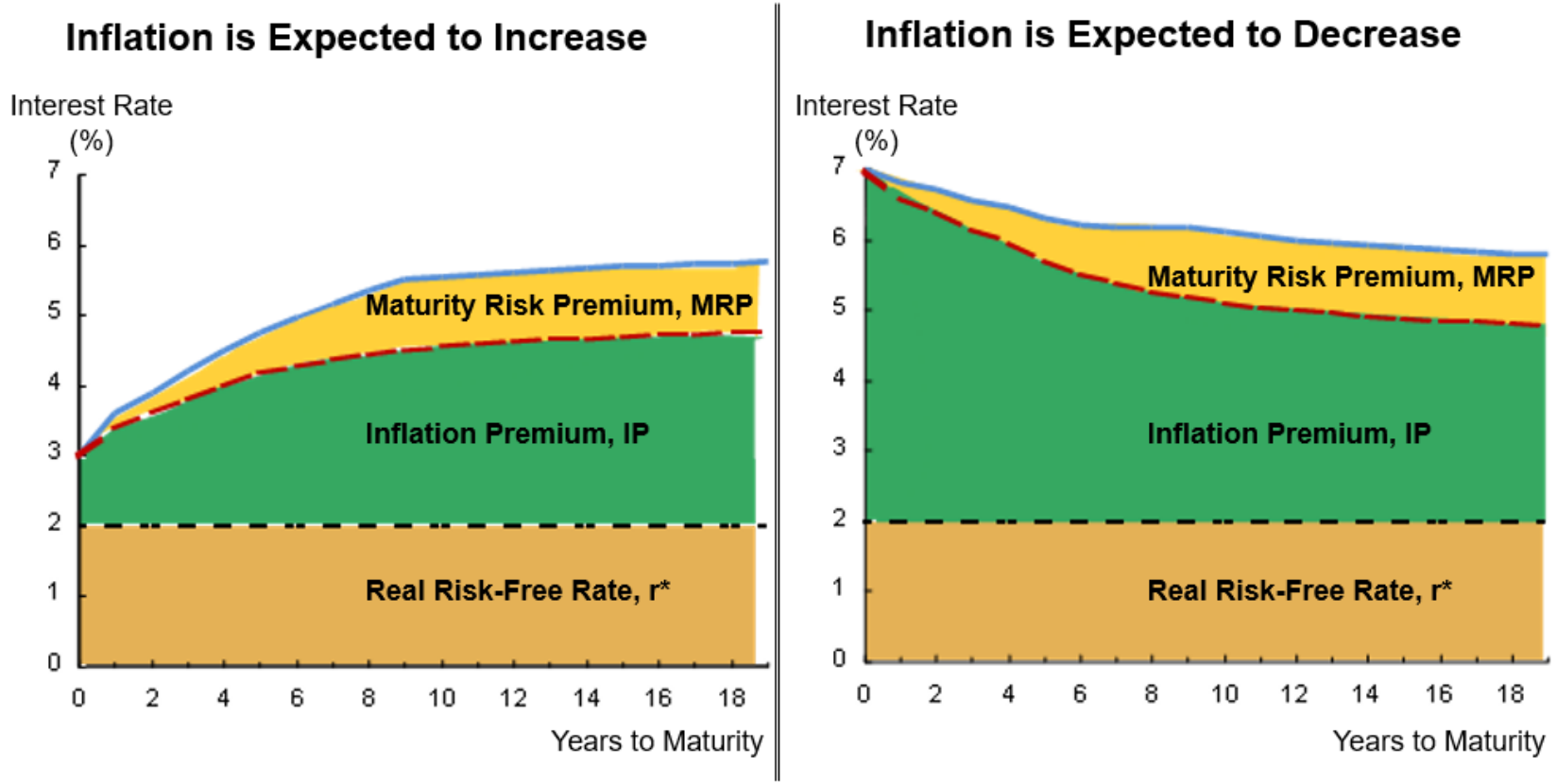
Yield Curves - Chinese Government Security



数据来源:Wind

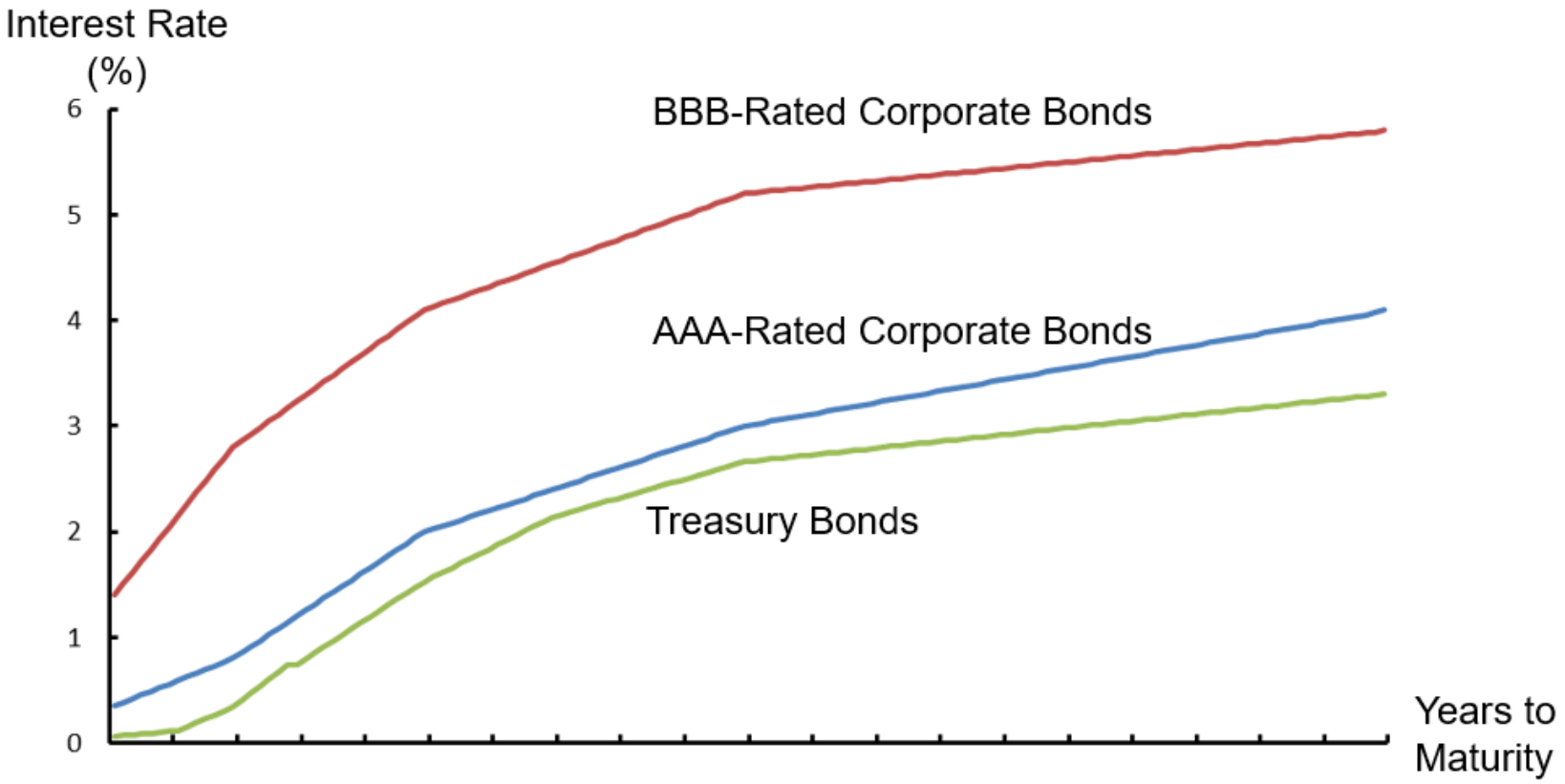
Illustrative Yield Curves for Treasury Securities

$$r_{Treasury} = r_{RF} + MRP = [r^* + IP] + MRP$$



Interest & Risk: Various Yield Curves

r = Risk-free rate + Risk premium



Yield Curve

- “Normal” yield curve
  - Upward sloping yield curve
- Inverted (“Abnormal”) yield curve
  - Downward sloping yield curve

Why Do Yield Curves Differ?

- Expectations theory
  - Shape of the yield curve depends on investors' expectations about future inflation rates
- Liquidity preference theory
  - Lenders prefer to make short-term loans; borrowers prefer long-term debt

Why Do Yield Curves Differ?

- Market segmentation theory
  - Each borrower has a preferred maturity and the slope of the yield curve depends on the supply of and demand for funds in the long-term market relative to the short-term market
  - The yield curve could at any given time be flat, upward sloping, or downward sloping and have humps or dips.
  - Interest rates would be high in a particular segment compared to other segments when there is a low supply of funds in that segment relative to demand.

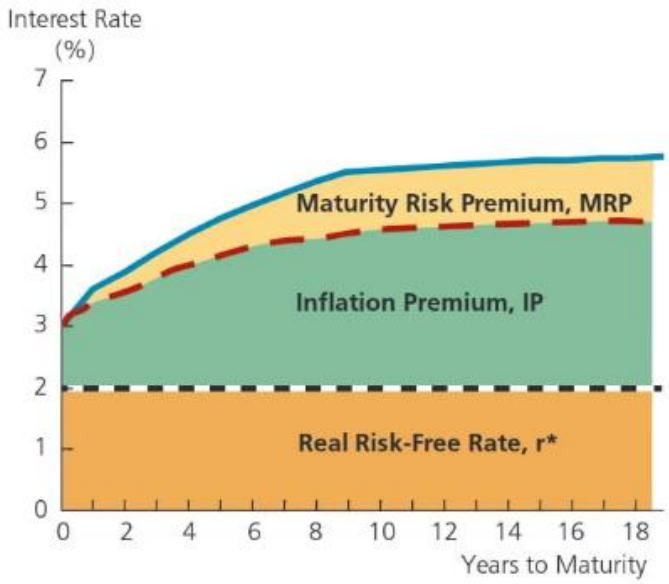
Illustrative Yield Curves: Expectations Theory

- Assume $r^* = 2\%$ and that investors demand a 0.1% maturity risk premium for each year remaining until maturity with a term to maturity greater than one year, with a maximum value of 1%
- Suppose that inflation expectations are as follows

Year	Increasing Inflation	Decreasing Inflation
1	1.0%	5.0%
2	1.8	4.2
3	2.0	4.0
4	2.4	3.4
5	2.8	3.2
After Year 5	3.0	2.4

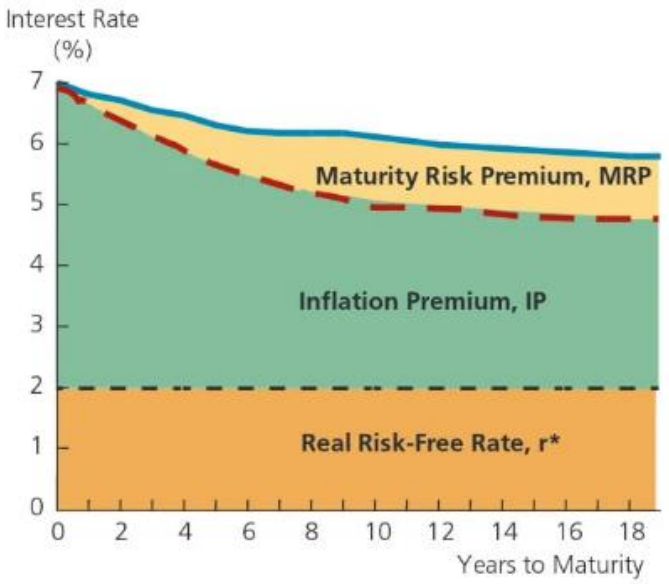
Illustrative Yield Curves: Expectations Theory

a. Inflation Is Expected to Increase



	Inflation Is Expected to Increase			
Maturity	r*	IP	MRP	Yield
1 year	2.0%	1.0%	0.0%	3.0%
5 years	2.0	2.0	0.5	4.5
10 years	2.0	2.5	1.0	5.5
20 years	2.0	2.8	1.0	5.8

b. Inflation Is Expected to Decrease



	Inflation Is Expected to Decrease			
Maturity	r*	IP	MRP	Yield
1 year	2.0%	5.0%	0.0%	7.0%
5 years	2.0	4.0	0.5	6.5
10 years	2.0	3.2	1.0	6.2
20 years	2.0	2.8	1.0	5.8

Note: The inflation premium is the average of the expected inflation rates during the life of the security. Therefore, in the case where inflation is expected to *increase*, IP_{10} is computed as follows:

$$IP_{10} = \frac{1.0\% + 1.8\% + 2.0\% + 2.4\% + 2.8\% + 3.0\% + 3.0\% + 3.0\% + 3.0\% + 3.0\%}{10} = \frac{25\%}{10} = 2.5\%$$

Other Factors That Influence Interest Rate Levels

- Government policy
- Level of the government budget deficit
- Foreign trade balance
- Level of business activity

Interest Rates and Stock Prices

- Higher interest rates increase costs and thus lower a firm’s profits
- Interest rates affect the level of economic activity and corporate profits
- Interest rates affect investment competition between stocks and bonds

Summary

- What is the cost of money and how it determined?
  - The interest rate that lenders charge borrowers
  - Determined by the supply of funds and the demand for those funds
- What factors affect interest rates?
  - The rate of return that borrowers expect to earn on their investments
  - Savers' preferences to spend income in the current period rather than delay consumption until some future period
  - The risks associated with investments/loans
  - Expected inflation

Summary

- How are interest rates determined?

$$\text{Rate of return} = r = \text{Risk-free rate} + \text{Risk premium}$$
$$= r_{RF} + RP$$
$$= r_{RF} + [DRP + LP + MRP]$$

- Yield curve
  - The yield curve is a snapshot of the relationship between short- and long-term interest rates on a particular date
  - Why do yield curves differ?
    - Expectations theory; Liquidity preference theory; Market segmentation theory