Lecture 6

Bond Valuation

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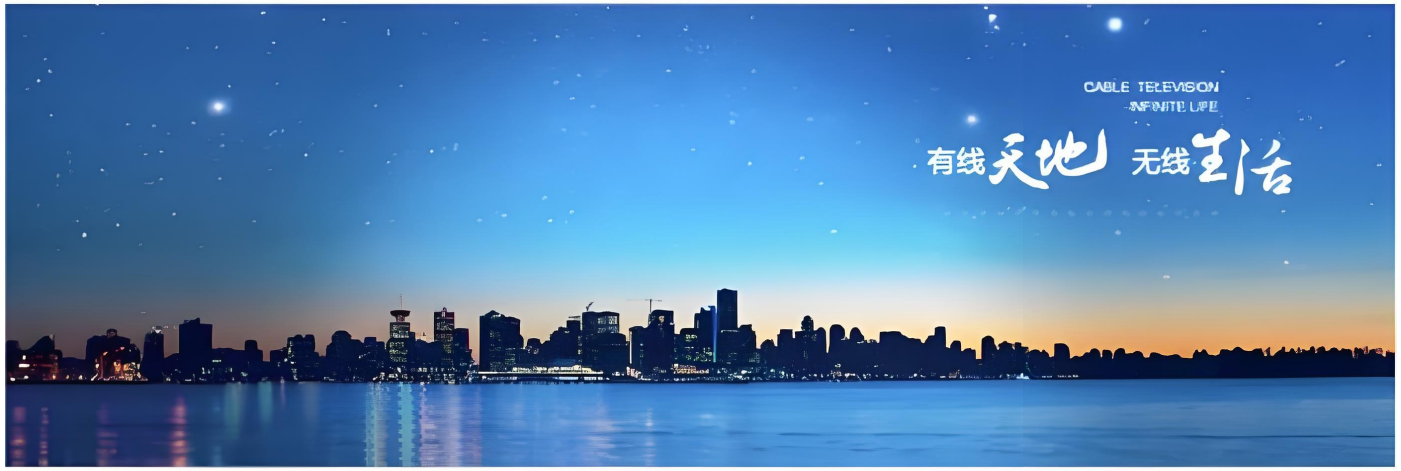
Bond Issuance

热 烈 庆 祝

江苏省广电有线信息网络股份有限公司

2024年公开发行科技创新公司债券（第一期）成功发行！

创2024年江苏省AAA主体3年期债券最低利率！



债券简称	发行规模	发行期限	主体	票面利率
24苏广K1	5亿元	3年	AAA	2.77%

发行人：JSCN 江苏有线

独家主承销商/簿记管理人/受托管理人：华泰联合证券 HUATAI UNITED SECURITIES

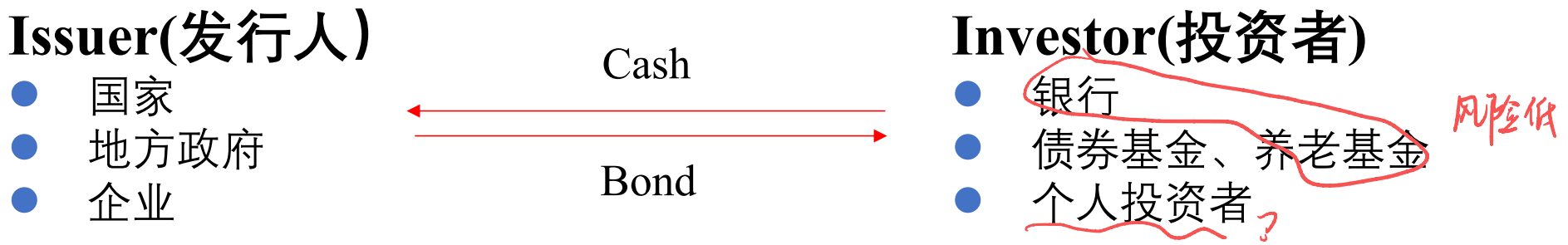
评级机构：中诚信国际 CCXI

会计师事务所：

律师事务所：ALLBRIGHT 锦天城

Bond Basics（债券）

- The firm raises money by issuing a bond to investors. Investors buy it and in return get periodic coupon payment and the principle at maturity.

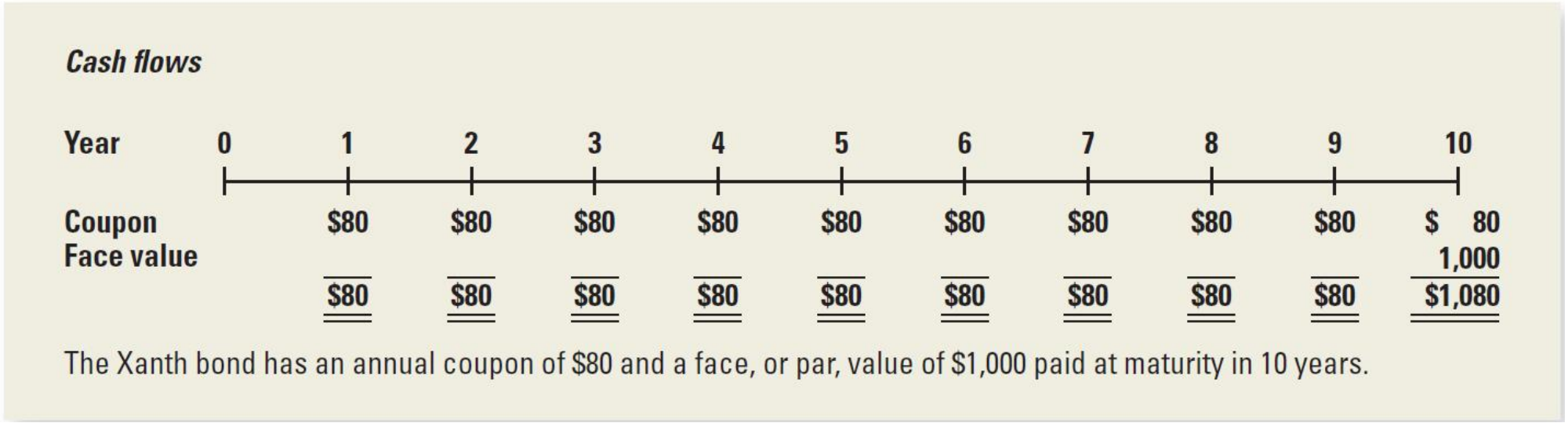


Basic Terminologies:

- **Par (face) value** （面值）**:** the amount paid at maturity
- **Coupon payment**（票面利息）**:** regular interest payment
- **Coupon rate**（票息率）: annual coupon divided by par value
- **Maturity Date**（到期日）**:** the number of years until the face value is paid
- **Yield to maturity**（YTM 到期收益率）: the required return in the market.

Cash Flow of Bond

Figure 8.1 Cash Flows for Xanth Co. Bond



The Xanth bond has an annual coupon of $80 and a face, or par, value of $1,000 paid at maturity in 10 years.

- **Par (face) value:** 1,000
- **Coupon payment:** 80
- **Coupon rate**: 8%
- **Maturity:** 10 years
- **Yield to maturity** (YTM): determined by the market equilibrium

Bond Basics

- Issuing bond increases a firm's liability, when a company issues bond, accounting items change as follow:
  - Balance sheet: Cash +, Debt + 资产负债
  - Income statement: Interest expense + 损益

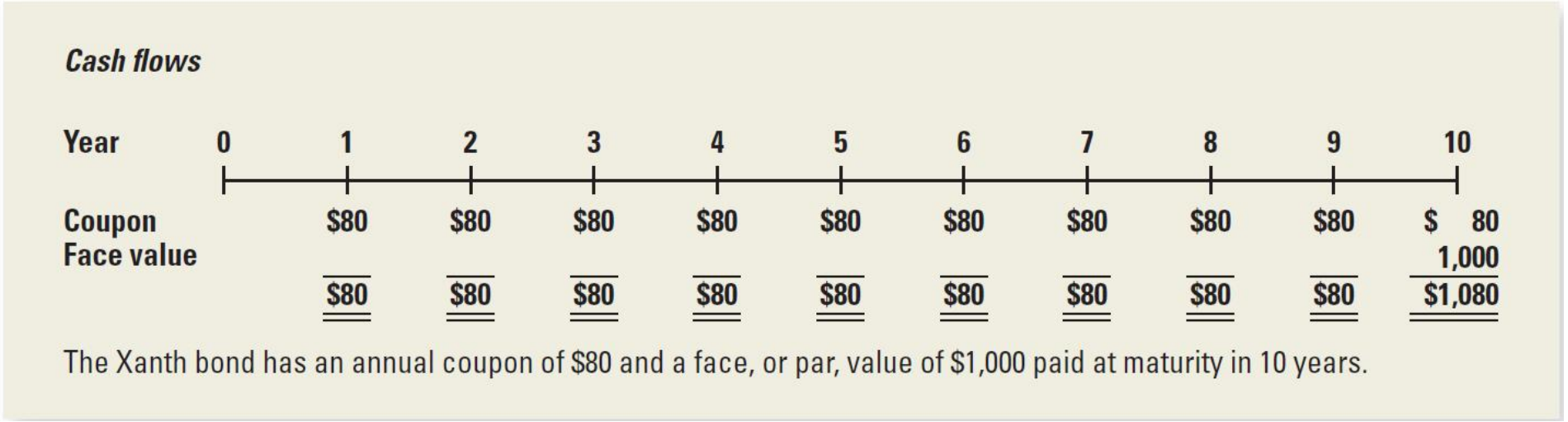
- Bond is a fixed-income (固定收益) security, much less risky than stock, and less liquid.
  - For example, on average, only three transactions happen in the life of a corporate bond.

- Bond is traded in the **over-the-counter (OTC) market** with **dealer** making the market. It is not traded in the electronic trading system.

Bond Valuation

Remember: Value of a financial security= PV of expected future cash flows

Figure 8.1 Cash Flows for Xanth Co. Bond



The Xanth bond has an annual coupon of $80 and a face, or par, value of $1,000 paid at maturity in 10 years.

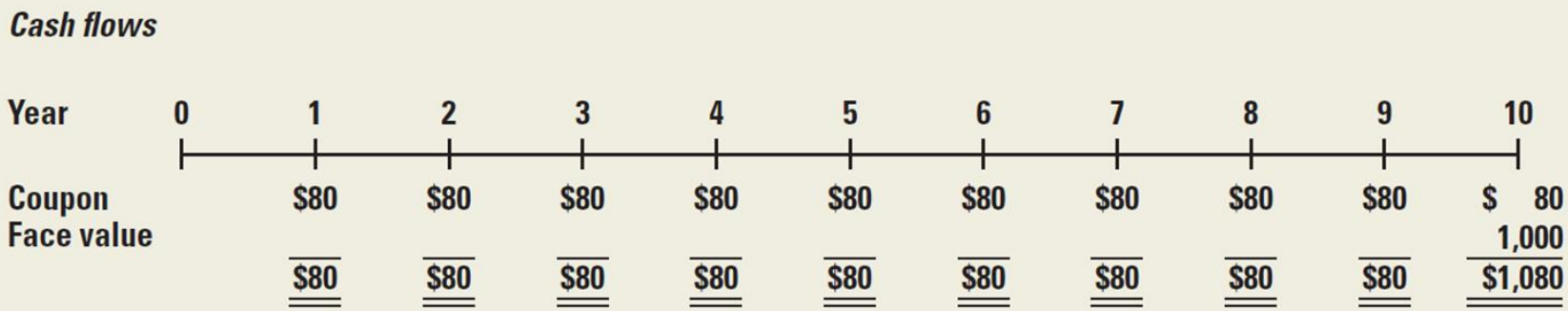
$$\text{Bond value} = C \times [1 - 1/(1 + r)^T]/r + F/(1 + r)^T$$

$$\text{Bond value} = \text{Present value of the coupons} + \text{Present value of the face amount}$$

The Discount rate r is YTM, not coupon rate.

Bond Valuation: Example 1

Figure 8.1 Cash Flows for Xanth Co. Bond



The Xanth bond has an annual coupon of $80 and a face, or par, value of $1,000 paid at maturity in 10 years.

Assume an 8% YTM (discount rate), calculate the value of the bond:

- The present value of **principle**=$1,000/$1.08^{10}$=463.19
- The present value of the **coupon**= 80× (1-1/1.08^{10})/0.08=536.81
- Total bond value = 436.19 + 536.81 = 1000 (the same as the par)

Bond Valuation: Example 2

Consider a bond with a 10% annual coupon rate, 15 years to maturity, and a par value of $1,000. The current price is $928.09.Will the yield be more or less than 10%?

$$928.09 = \frac{100}{1+YTM} + \frac{100}{(1+YTM)^2} + \ldots\ldots + \frac{100}{(1+YTM)^{15}} + \frac{1000}{(1+YTM)^{15}}$$

YTM=?

在线计算器

东方财富：https://data.eastmoney.com/money/calc/WinBond.html

Yield to Maturity

- After issuance, the coupon rate and par value do not change. But the price of a bond changes over time, due to changes in macro economic factors and supply and demand.

- YTM is the rate implied by the current bond price and is determined by the market. It is another price of a bond expressed in the form of a rate.

- YTM changes overtime. When the price goes up, YTM goes down. YTM is the return (IRR) on the bond **if you hold the bond until maturity**.

  - Consider you hold a government bond selling at YTM 3%. Many investors want to enter the bond market and want to buy the bond in your hand. In this situation, you then set the price higher, leading the YTM lower than 3%.

Why We Need the YTM?

YTM and bond price are both the "price" of a bond. Given the bond price is known at first, why we further need the YTM?

- **Valuation purpose**: When a firm issue new bond, what the price should be set? We can use the YTM of another firm with similar characteristics to compute the price.

- **Comparison purpose**: Different bonds have different coupon rate, payment frequencies, and face value. They are not directly comparable based on the prices. However, the YTM can be compared. Recall we compare projects according to the IRR.

Coupon Rate vs. YTM

- Do not mix them up, they are totally different concepts. The coupon rate is determined by the bond itself and does not change overtime. YTM is determined by the market interest rate.

- Three types of bond:
  - **Discount bond**: When coupon rate < YTM, the price of bond < par value. An extreme case is the zero-coupon bond, which is priced much lower than its face value.
  - **Premium bond**: When coupon rate > YTM, the price of bond > par value.
  - **Par bond**: When coupon rate =YTM, the price of bond = par value.
  - For discount or premium bond, the price will converge to the face value at the maturity date.

Interest Rate and Bond Price

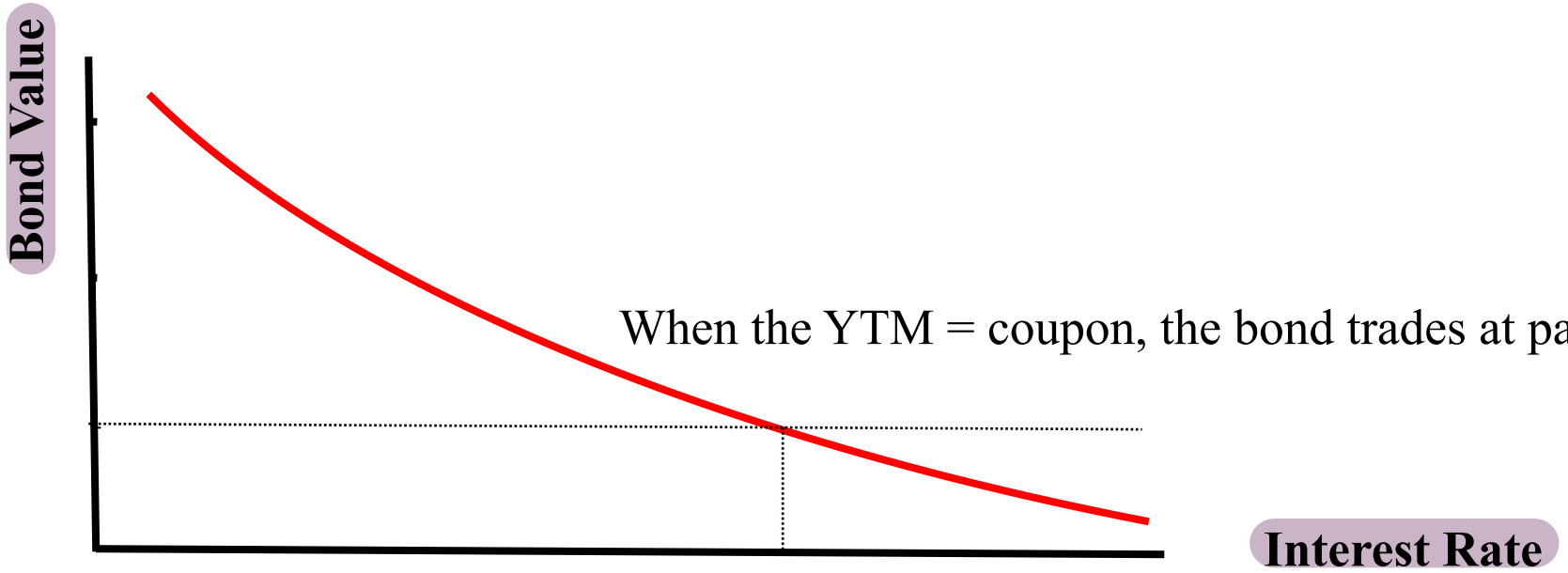
If one year later the interest rate goes up to 10%, what is the value of the bond?

- **After one year, the bond has nine years to maturity**. We repeat the PV calculations with **9 years** instead of 10, and a **10%** yield instead of 8%.
  - First, the PV of the principle=$\$1,000/1.10^9 = \$1,000/2.3579 = \$424.10$
  - Second, the PV of coupon payment=$\$80 \times (1 - 1/1.10^9) /.10 = \$460.72$
  - Total bond value=$\$424.10 + 460.72 = \$884.82 < 1000$

- Clearly, when interest rate goes up, bond price drops.

Interest Rate and Bond Price

If in one year the interest rate *r* stays at 8%, what is the value of the bond? Use your calculator, you will see the price remains at 1,000. If the interest rate *r* goes down to 6%, what is the value of the bond? Use your calculator, you simply get total bond value = 1136.03



Interest Rate Risk

$$\text{Bond value} = C \times [1 - 1/(1 + r)^T]/r + F/(1 + r)^T$$

- Interest rate risk: the sensitivity of the bond price to the interest rate. **Interest rate and bond price is negatively related**.
- The longer the time to maturity, the lower the coupon rate, the greater the interest risk.
- Interest rate is the most important risk factor for bond valuation. As a bond trader, the key skill is to predict the interest rate if you want to make money in the market.

Why Bond is Less Risky Than Stock

- Let's revisit the previous example. When interest rate is 8%, the price of the bond is 1,000. After one year, the interest rate goes up to 10%, the price becomes 884.82

- Suppose you sell the bond in one year, your investment return = (Coupon + Price change) / Investment=(884.82+80−1000)/1000= −3.5%.

- It is not common that the interest rate will go up by 2% in one year. Even if this happens, you only lose 3.5%. If you invest in the stock, it is easy to lose 3.5% within a single day!

Semiannual Coupons: Example 1

Find the present value (as of January 1, 2016), of a 6.375% coupon bond with **semi-annual** payments, and a maturity date of December 2020 if the YTM is 5%.

N	**10**
I/Y	**$2.5 = \frac{5}{2}$**
PMT	**$31.875 = \frac{1{,}000 \times 0.06375}{2}$**
FV	1,000
PV	– 1,060.17

Effective annual rate (EAR)
$= (1+0.05/2)^2-1$
$=5.0625\%$

Using Financial Calculator

Semiannual Coupons: Example 2

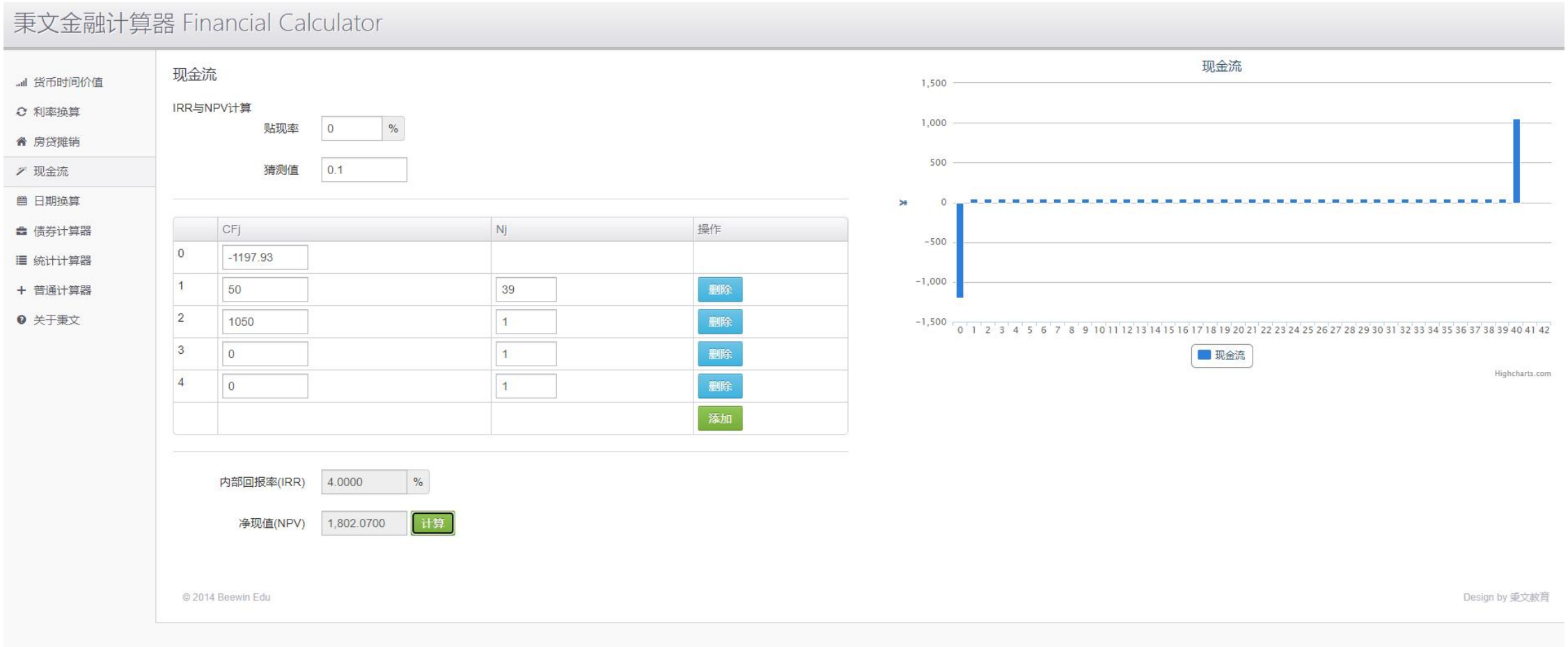
Suppose a bond with a 10% coupon rate and semiannual coupons has a face value of $1,000, 20 years to maturity, and is selling for $1,197.93.

- Is the YTM more or less than 10%?
- What is the semi-annual coupon payment?
- How many periods are there?

Answer:

- Less. Because 1197.93>1000, it is premium bond.
- 5%*1000=50
- N=40

Using Financial Calculator



4% is not the YTM. YTM should be 4%*2=8%

Government Bond

- Treasury Security 国库证券
  - Issued by the government, via the treasury department (财政部)
  - Treasury bill: **pure discount bonds** with maturity less than one year
  - Treasury note: coupon debt with maturity between one and 10 years
  - Treasury bond: coupon debt with maturity greater than 10 years
  - With no default risk. The YTM of treasury securities can be used as the **risk-free rate**.

- Municipal bond (城投债)
  - Issued by local governments, via 地方城市建设投资公司
  - Default risk is slightly higher than treasury bond.

Corporate Bond

- Issued by the companies, either public or private.
- Greater default risk relative to government bonds.
  - The promised yield (YTM) is higher than the expected return due to this added default risk.
  - With the same cash flow structure, corporate bond is traded at a lower price than government bond due to the default risk.
  - We can view the pricing mechanism as: The YTM of a corporate bond = YTM of a government bond + **Credit Spread**

Credit Rating

- Rating agencies assess a firm's **default risk**, and give a score to each firm or bond, such as AAA, AA, A, BBB,…..CCC, CC, C, and D. The capacity to repay the bond declines along the ratings from AAA to D.

- Fund manager style based on credit rating
  - **Investment grade bond**: rated above BBB, low default risk, low yield.
  - **Junk bond**: rated below BBB, high default risk, high yield.

- Three leading rating agencies:
  - Standard & Poor（标普）
  - Moody's（穆迪）
  - Fitch（惠誉）

Investment Grade vs. Junk Bond

Moody's	Standard & Poor's and Fitch
Investment-grade bonds	
Aaa	AAA
Aa	AA
A	A
Baa	BBB
Junk bonds	
Ba	BB
B	B
Caa	CCC
Ca	CC
C	C

Bond Market

- Bond market can also be divided into primary market and secondary market.
- In the secondary market, bonds are traded over-the-counter (OTC) with dealers connected electronically. The dealers (做市商) :
  - Are specialists who buy low and sell high in the bond market.
  - Quote **bid** and **ask** price on the same bond and earn the **spread**. Bid (ask) price is the offer (sell) price set by dealer. Investors buy at ask and sell at bid prices.
  - Assume the **inventory risk** since they themselves hold bond.
- Bond issuance is larger than equity issuance, in terms of the money raised, but generally low daily trading volume in single issues. Treasury securities are much more liquid than corporate bonds

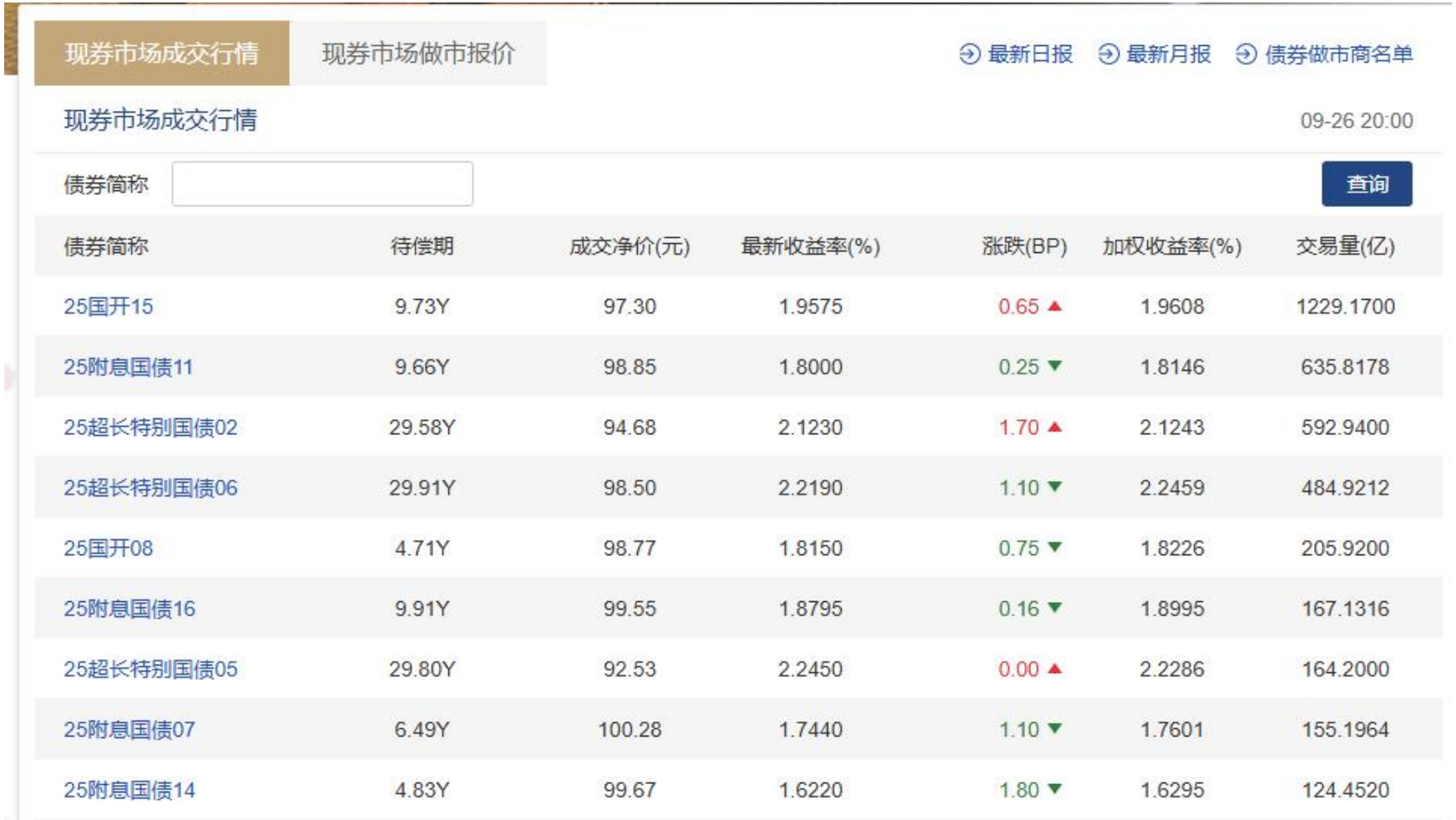
Dealer

主做市商名单

更新日期：2025-09-25|总共13条数据

主做市商名单	
东方证券股份有限公司	广发证券股份有限公司
国泰海通证券股份有限公司	国投证券股份有限公司
国信证券股份有限公司	华泰证券股份有限公司
申万宏源证券有限公司	招商证券股份有限公司
浙商证券股份有限公司	中国国际金融股份有限公司
中国银河证券股份有限公司	中信建投证券股份有限公司
中信证券股份有限公司	

Bid Ask Price



现券市场成交行情　现券市场做市报价　最新日报　最新月报　债券做市商名单

现券市场成交行情　09-26 20:00

债券简称　查询

债券简称	待偿期	成交净价(元)	最新收益率(%)	涨跌(BP)	加权收益率(%)	交易量(亿)
25国开15	9.73Y	97.30	1.9575	0.65 ▲	1.9608	1229.1700
25附息国债11	9.66Y	98.85	1.8000	0.25 ▼	1.8146	635.8178
25超长特别国债02	29.58Y	94.68	2.1230	1.70 ▲	2.1243	592.9400
25超长特别国债06	29.91Y	98.50	2.2190	1.10 ▼	2.2459	484.9212
25国开08	4.71Y	98.77	1.8150	0.75 ▼	1.8226	205.9200
25附息国债16	9.91Y	99.55	1.8795	0.16 ▼	1.8995	167.1316
25超长特别国债05	29.80Y	92.53	2.2450	0.00 ▲	2.2286	164.2000
25附息国债07	6.49Y	100.28	1.7440	1.10 ▼	1.7601	155.1964
25附息国债14	4.83Y	99.67	1.6220	1.80 ▼	1.6295	124.4520

中国货币网： https://www.chinamoney.org.cn/chinese/mkdatabond/

Flight to Quality

Question: during a financial crisis or war, the price of most financial assets will drop. Are there some assets whose prices will go up?

- The answer is government bond and gold.
- It is well documented that during extreme bad times (e.g., crisis, war, natural disaster), investors sell stocks, real estate, corporate bond, fund shares, and buy treasury bond and gold.
- This phenomenon is labeled as “Flight to Quality”.