LECTURE VI
CORPORATE BOND, RATING AND CREDIT RISK

International Finance- 2018

Some basic questions

- What is rating?

  It is a system to provide an easy to understand signal about the probability of **default** of a certain financial instrument and the **loss** caused by this default

  Bond ratings affect the rate of return that lenders require of the firm and the firm's cost of borrowing

- What is default?
  - tricky question, it depends on the contract
    - debt restructuring, failure to pay, bankruptcy
- What is loss given default?

Bond Rating

- In the **S&P** rating system AAA is the best rating. After that comes AA, A, BBB, BB, B, and CCC
- The corresponding **Moody's** ratings are Aaa, Aa, A, Baa, Ba, B, and Caa. Another provider of ratings is **Fitch**
  - Bonds with ratings of BBB (or Baa) and above are considered to be "investment grade"
  - Junk Bonds
    - Debt that is rated below BBB
    - Often, trusts and insurance companies are not permitted to invest in junk debt
    - Michael Milken developed this market in the mid-1980s, although he was convicted of insider trading

Standard and Poor's	Moody's	Average Interest Rate* (%)	Definition
AAA	Aaa	5.47	Best quality and highest rating. Capacity to pay interest and repay principal is extremely strong. Smallest degree of investment risk.
AA	Aa	5.81	High quality. Very strong capacity to pay interest and repay principal and differs from AAA/Aaa in a small degree.
A	A	5.99	Strong capacity to pay interest and repay principal. Possess many favorable investment attributes and are considered upper-medium-grade obligations. Somewhat more susceptible to the adverse effects of changes in circumstances and economic conditions.
BBB	Baa	6.39	Medium-grade obligations. Neither highly protected nor poorly secured. Adequate capacity to pay interest and repay principal. May lack long-term reliability and protective elements to secure interest and principal payments.
BB	Ba		Moderate ability to pay interest and repay principal. Have speculative elements and future cannot be considered well assured. Adverse business, economic, and financial conditions could lead to inability to meet financial obligations.
B	B		Lack characteristics of desirable investment. Assurance of interest and principal payments over long period of time may be small. Adverse conditions likely to impair ability to meet financial obligations.
CCC	Caa		Poor standing. Identifiable vulnerability to default and dependent on favorable business, economic, and financial conditions to meet timely payment of interest and repayment of principal.
CC	Ca		Represent obligations that are speculative to a high degree. Issues often default and have other marked shortcomings.
C	C		Lowest-rated class of bonds. Have extremely poor prospects of attaining any real investment standard. May be used to cover a situation where bankruptcy petition has been filed, but debt service payments are continued.
CI			Reserved for income bonds on which no interest is being paid.
D			Payment default.
NR			No public rating has been requested.
(+) or (−)			Ratings from AA to CCC may be modified by the addition of a plus or minus sign to show relative standing within the major rating categories.

From credit «risk» to credit «pricing»

The higher the rating the lower the interest rate paid

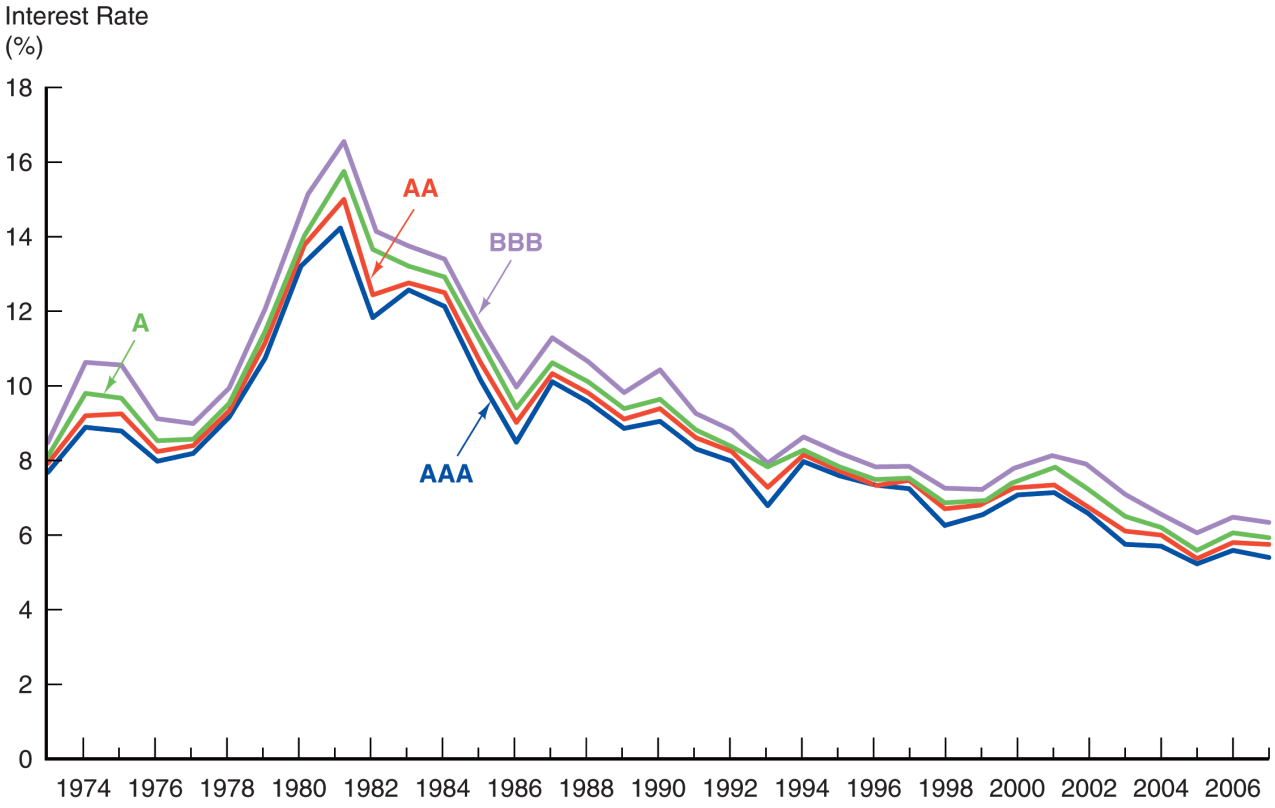


Figure 10.5 Corporate Bond Interest Rates, 1973–2006 (End of year)

Source: Federal Reserve Bulletin, Table 1.35, various issues.

Credit Spread

Credit Spread = difference between the Yield To Maturity on a risky bond and the Yield To Maturity of the risk-free asset

- Q1: what is a risk-free asset?

Credit Spread = Probability of Default * Loss given Default

- Q2: Default needs a time horizon
- Q3: Is the loss time-invariant?

What is risk-free?

In the US

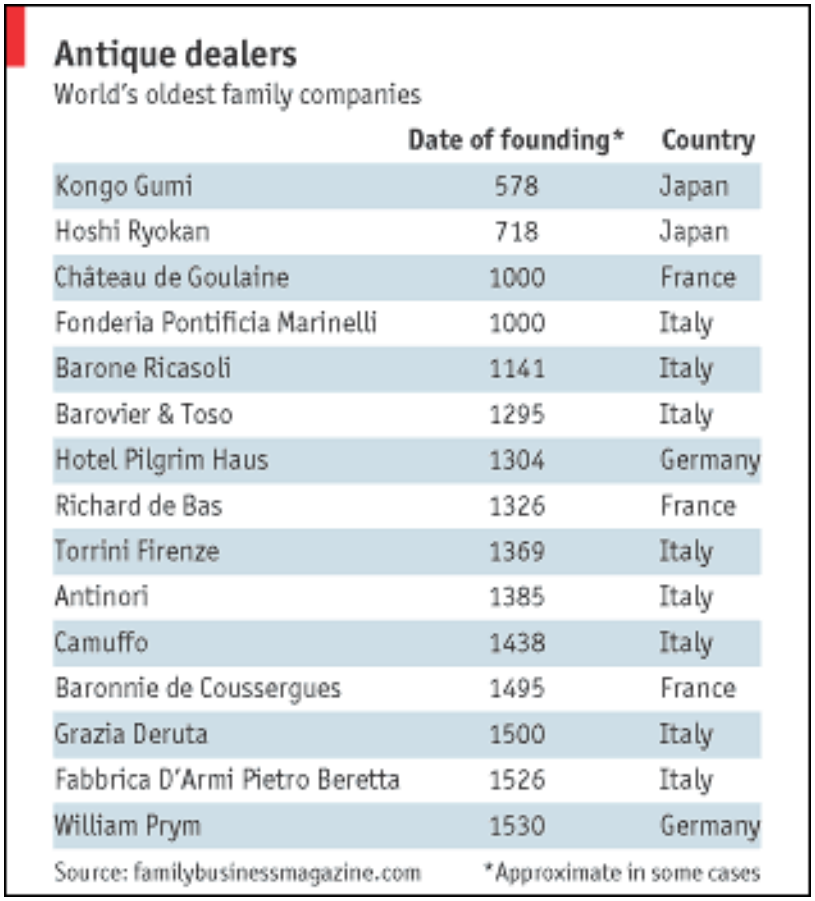
- Treasury bonds: no default risk since the Treasury can print money to payoff the debt

In Emerging markets ?

In Euro-area ?

Default and time

- Companies that survive 100 years or longer are "a special and rarefied group." Jim Collins, *Built to Last*
- The average life expectancy of a big multinational corporation (Fortune 500) is 50 years.
- Ellen de Rooij of the Stratix Group in Amsterdam indicates that the average life expectancy of all firms, regardless of size, measured in Japan and much of Europe, is only 12.5 years.



Antique dealers

World's oldest family companies

	Date of founding*	Country
Kongo Gumi	578	Japan
Hoshi Ryokan	718	Japan
Château de Goulaine	1000	France
Fonderia Pontificia Marinelli	1000	Italy
Barone Ricasoli	1141	Italy
Barovier & Toso	1295	Italy
Hotel Pilgrim Haus	1304	Germany
Richard de Bas	1326	France
Torrini Firenze	1369	Italy
Antinori	1385	Italy
Camuffo	1438	Italy
Baronnie de Coussergues	1495	France
Grazia Deruta	1500	Italy
Fabbrica D'Armi Pietro Beretta	1526	Italy
William Prym	1530	Germany

Source: familybusinessmagazine.com *Approximate in some cases

Average Cumulative Default Rates (%)

(S&P Credit Week, April 15, 1996, Table 23.2, page 627)

Yrs	1	2	3	4	5	7	10
AAA	0.00	0.00	0.07	0.15	0.24	0.66	1.40
AA	0.00	0.02	0.12	0.25	0.43	0.89	1.29
A	0.06	0.16	0.27	0.44	0.67	1.12	2.17
BBB	0.18	0.44	0.72	1.27	1.78	2.99	4.34
BB	1.06	3.48	6.12	8.68	10.97	14.46	17.73
B	5.20	11.00	15.95	19.40	21.88	25.14	29.02
CCC	19.79	26.92	31.63	35.97	40.15	42.64	45.10

Example:
let's start from these 2 ZCB curves

Maturity (years)	Risk-free yield	Corporate bond yield
1	5%	5.25%
2	5%	5.50%
3	5%	5.70%
4	5%	5.85%
5	5%	5.95%

implied losses from defaults

- One-year Treasury bond (principal=$1) sells for

$$e^{-0.05\times 1} = 0.951229$$

- One-year corporate bond (principal=$1) sells for

$$e^{-0.0525\times 1} = 0.948854$$

  or at a 0.2497% discount

- This indicates that the holder of a corporate bond expects to lose 0.2497% from defaults in the first year

Does Credit risk mean only default?

- Credit risk is not a one-dimensional problem of default
- It is also a problem of credit deterioration, i.e. the worsening of the rating (and then increased def.prob.)
- An example is constituted by mutual funds investing in Investment Grade bond. Their problem is downgrading to sub-investment grades

One-Year Transition Matrix

Init Rat	Year End Rating AAA	AA	A	BBB	BB	B	CCC	Def
AAA	90.81	8.33	0.68	0.06	0.12	0.00	0.00	0.00
AA	0.70	90.65	7.79	0.64	0.06	0.14	0.02	0.00
A	0.09	2.27	91.05	5.52	0.74	0.26	0.01	0.06
BBB	0.02	0.33	5.95	86.93	5.30	1.17	0.12	0.18
BB	0.03	0.14	0.67	7.73	80.53	8.84	1.00	1.06
B	0.00	0.11	0.24	0.43	6.48	83.46	4.07	5.20
CCC	0.22	0.00	0.22	1.30	2.38	11.24	64.86	19.79
Def	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100

from default statistics to bond pricing

- we need to know, what is the default definition:
    - changes according to the contract
        - ISDA effort has not yet produced a standard
    - changes according to the nature of the issuer (sovereign vs private, corporate vs bank, etc)
    - changes according to the legislations

- we need to know what is the loss caused by a default
    - changes according to financial instruments
    - changes according to covenants
    - changes according to legislations
    - changes according to sectors
    - changes according to economic cycles

Reducing Exposure to Credit Risk

- Set credit limits
- Ask counterparty to post collateral
- Design contract to reduce credit risk (eg margins)
- Include a downgrade trigger in contract
- use credit derivatives

Attraction of Credit Derivatives

- Allows credit risks to be exchanged without the underlying assets being exchanged
- Allows credit risks to be managed

Credit Default Swap

- Company A has the right to sell a reference bond for its face value to company B in the event there is a default on the bond
- In return, A makes periodic payments to B
- The reference bond is issued by a third party, C

Credit Derivatives

Examples:

- Credit default swap
- Total return swap
- Credit spread option
- CDO
- ABS