



Foundations of Finance



Financial Instruments



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Partial Review

- ▶ What are the three axioms about investor behaviour?
- ▶ What is the axiom about markets, and what does it rule out?
- ▶ What is the difference between price and value?

Overview

- ▶ Real and financial assets
- ▶ Uses of financial assets
- ▶ Important examples of financial assets

Real Versus Financial Assets

▶ Real Assets

- ▶ Assets used to produce goods and services
- ▶ Examples: Factories, land, human capital, etc.

▶ Financial Assets

- ▶ Claims to the returns generated by real assets. They allocate the proceeds from a real activity according to pre-determined rules.
- ▶ Two main types are stocks and bonds
- ▶ Derivatives (contingent claims) are claims on other financial assets
 - ▶ Options, futures, swaps, swaptions

Use of Financial Instruments

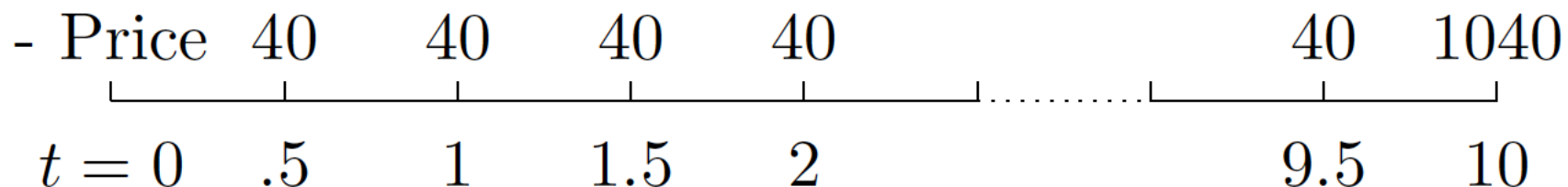
- ▶ Allocation of capital
 - ▶ Financing of projects
- ▶ Allocation of risk
 - ▶ Diversification
 - ▶ Hedging
- ▶ Consumption smoothing
 - ▶ Savings and borrowing
- ▶ Meeting place for investors with different needs

Major Classes of Financial Assets

- ▶ Fixed Income Securities
- ▶ Equity
- ▶ Derivatives
 - ▶ Options
 - ▶ Futures, Forwards and Swaps
- ▶ Securitized Products

Important Financial Assets-Fixed Income Securities

- ▶ **Fixed** promised cash-flows: coupon payments and principal payment (aka face value).
 - ▶ Examples: Treasuries, municipal and corporate bonds.
- ▶ Valuation: **Time value of money** (TVM) adjustment, credit risk adjustment.
- ▶ Cash flow diagram for buying and holding a 10-year, 8% semi-annual coupon bond with \$1,000 face value:



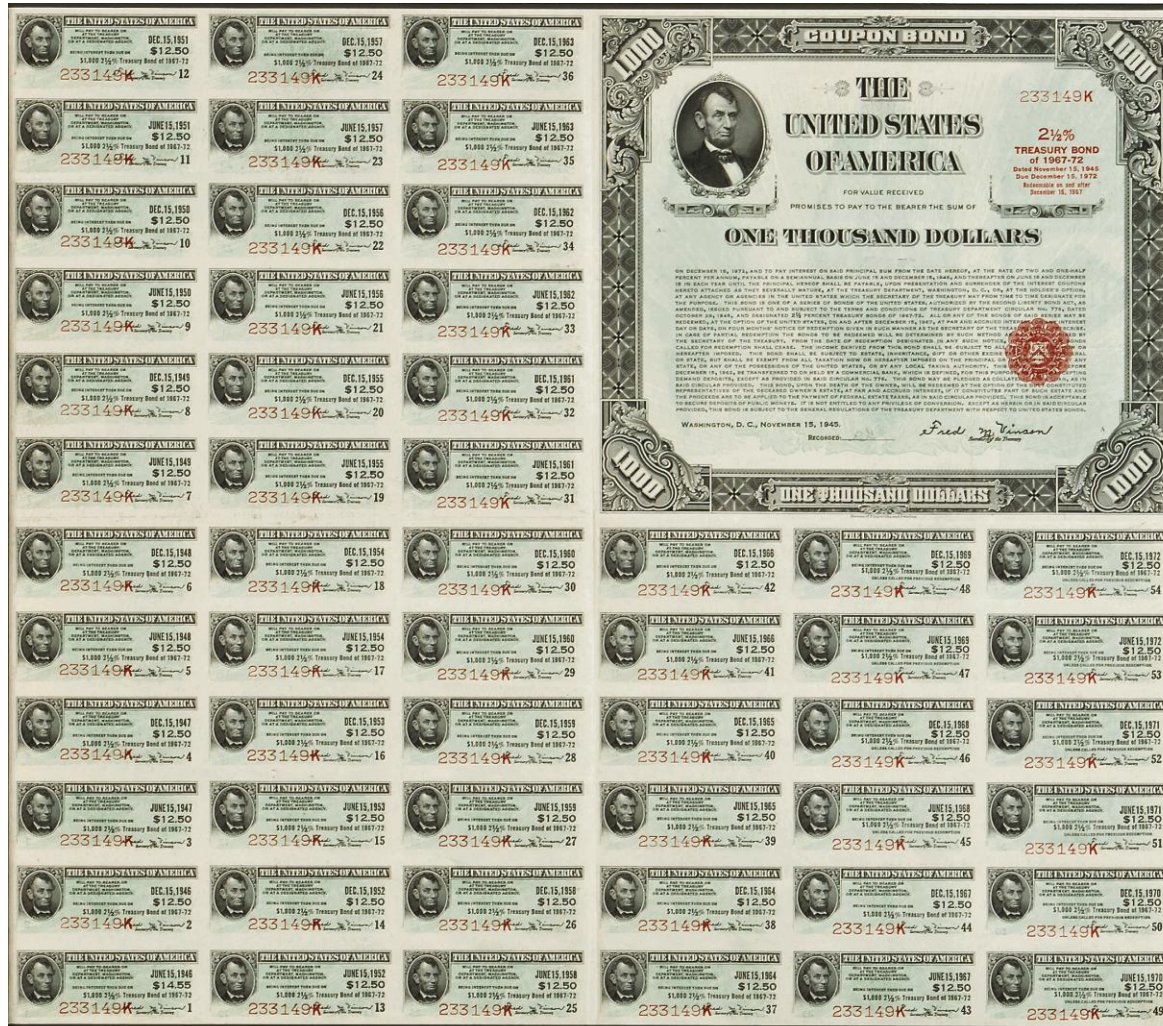
Fixed Income Securities

- ▶ An immense market of securities, instruments and products with a fixed-income cash flow stream:
 - ▶ Treasury bonds, notes, bills (~30 trillion)
 - ▶ Corporate bonds
 - ▶ Commercial paper
 - ▶ Municipal bonds
 - ▶ Private credit
 - ▶ Leases
 - ▶ Consumer credit such as mortgages, student loans
 - ▶ Asset backed securities
- ▶ The uses, terms, tax features, and risks of fixed income instruments differ but the valuation principles are the same

Treasury Bonds

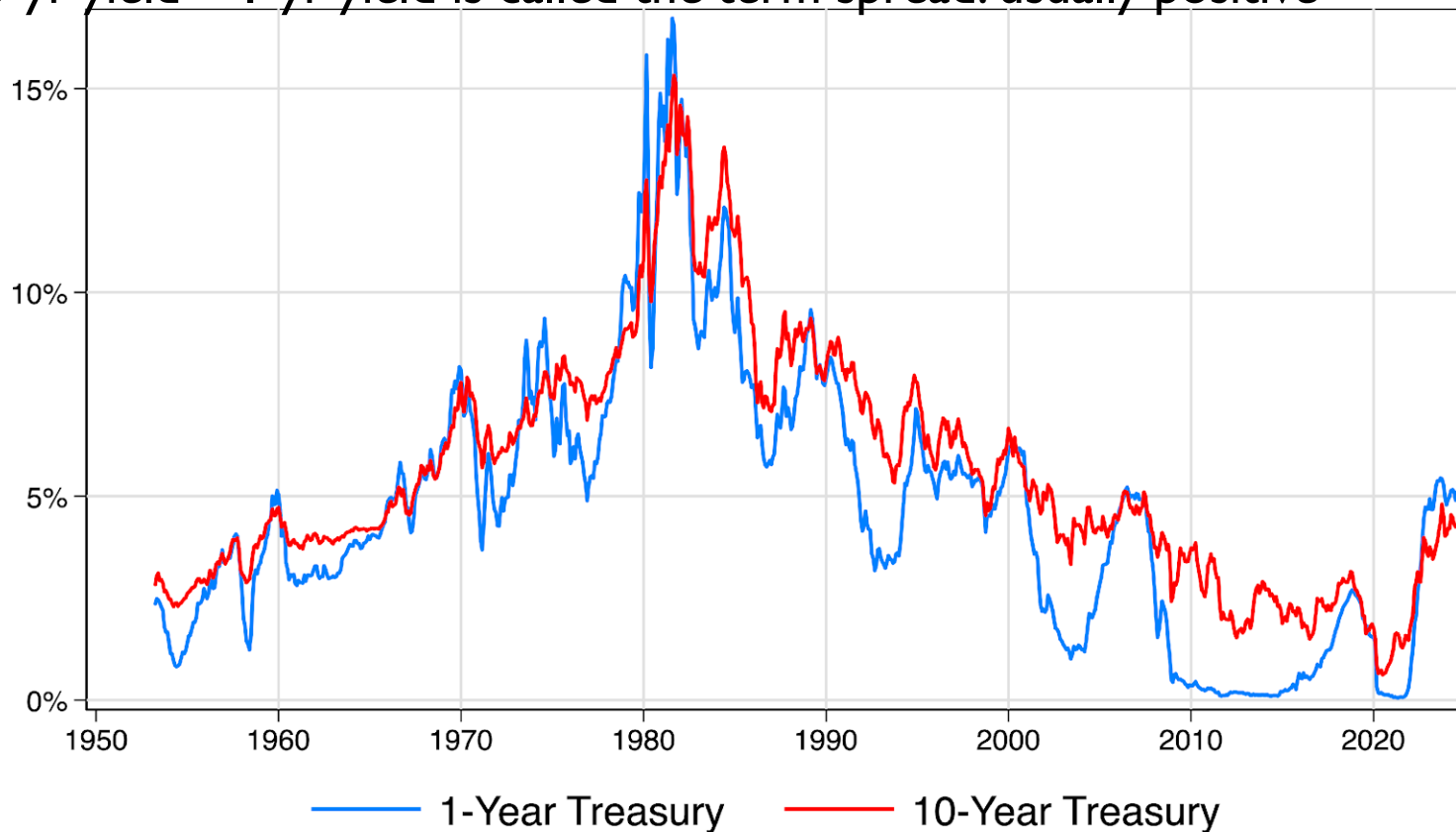
- ▶ Types of treasury bonds
 - ▶ Treasury bills (less than 1-year maturity)
 - ▶ Treasury notes (1-10 year maturity)
 - ▶ Treasury bonds (10-30 year maturity)
- ▶ Semi-annual coupon bond payments
- ▶ Why are government bond traditionally seen as a safe investment? How about sovereign bonds?
- ▶ Which bond pays the highest interest rate? A 10-year T-bond or 1-year T-note?

Fixed Income: Treasury Bond



Treasury Interest Rates

- ▶ Yields, interest rates are a common way to express the prices of fixed-income securities
- ▶ 10-yr yield – 1-yr yield is called the term spread: usually positive



Sovereign Debt in Europe

- ▶ The euro area has no single treasury — each state issues its own debt
- ▶ Spain: the Tesoro Público
 - ▶ Letras (≤ 1 yr) · Bonos (3–5 yr) · Obligaciones (10 yr +)
- ▶ Germany: the Bund is the euro-area benchmark
- ▶ The 10-year Spain–Germany spread is the *prima de riesgo*
 - ▶ Same currency, same maturity — almost pure credit risk

Municipal Bonds

- ▶ Issued by state and local governments
 - ▶ Exempt from Federal Income taxes
 - ▶ Exempt from issuing State local tax
- ▶ Types of Munis
 - ▶ General obligation bonds: backed by the “full faith of credit” of the issuer (taxing power)
 - ▶ Revenue bonds (riskier): Issued to finance specific projects (airports, hospitals, etc.)

Muni vs Treasury Bonds

- ▶ A (general obligation) muni bond pays 4% interest. A Treasury bond pays 5% interest. Which bond would you rather buy if your marginal tax rate on interest income is 20%
- ▶ A. Municipal bond
- ▶ B. Treasury bond
- ▶ C. Indifferent

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- ▶ B. Treasury bond
- ▶ C. Indifferent
- ▶ Answer: C — after tax, the Treasury also pays 4%

DIY: Muni vs Treasury Bond

- ▶ What if your marginal rate is higher than 20% and they are equally safe?
- ▶ A. Municipal bond
- ▶ B. Treasury bond
- ▶ C. Indifferent

DIY: Muni vs Treasury Bond

- ▶ What if your marginal rate is higher than 20% and they are equally safe?
- ▶ A. Municipal bond
- ▶ B. Treasury bond
- ▶ C. Indifferent
- ▶ Answer: A. The municipal bond
- ▶ Break-even rate: $4\% = 5\% \times (1 - t^*)$, so $t^* = 20\%$

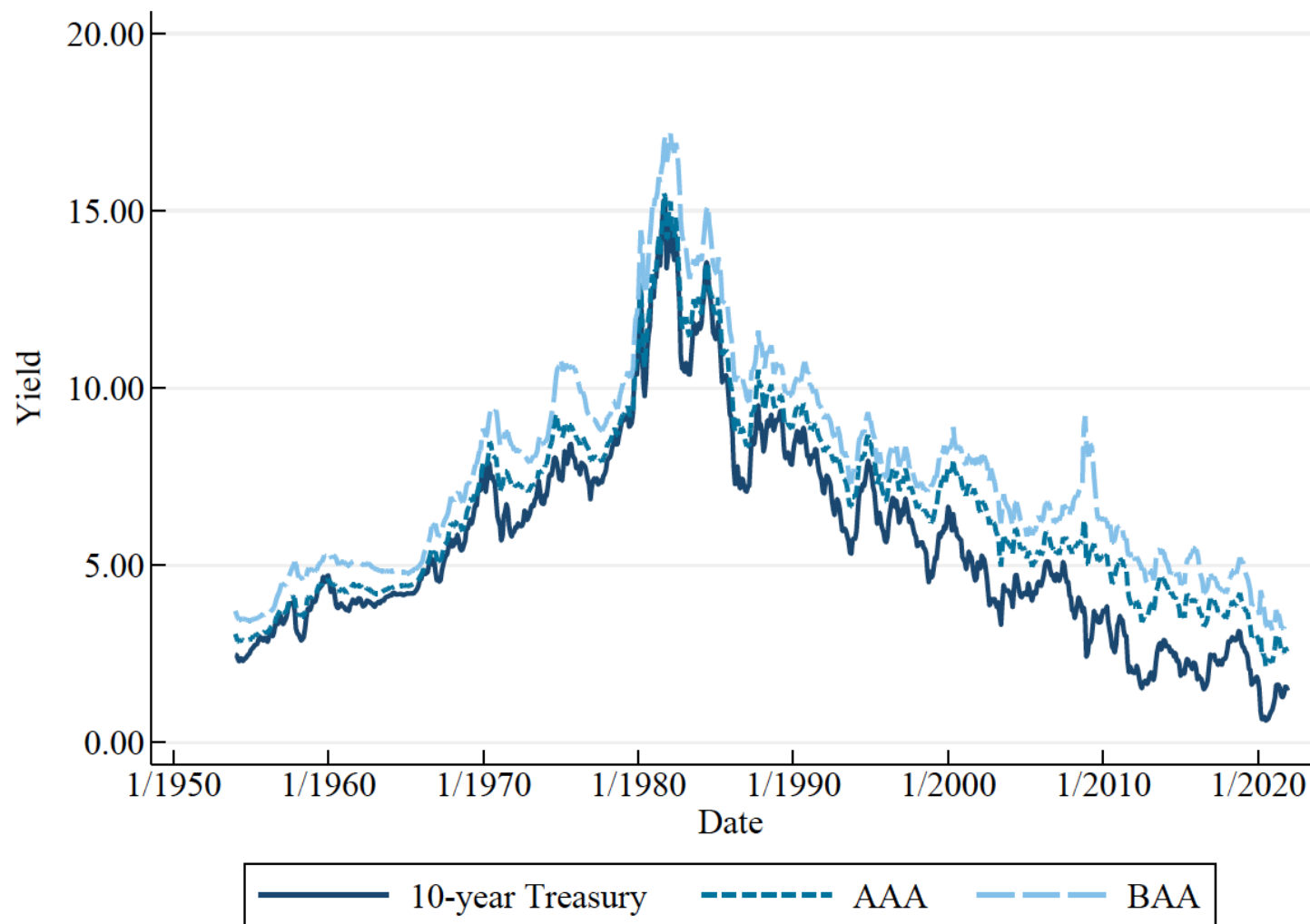
Corporate Bonds

- ▶ Fixed payments, but subject to default and prepayment risk.
- ▶ Short term (< 1 year): Commercial paper.
- ▶ Long term: Corporate bonds.
 - ▶ Typically pays semi-annual coupons
 - ▶ Different “seniority” classes:
 - ▶ Senior.
 - ▶ Junior or subordinated.
- ▶ Just over 10 trillion USD outstanding in the U.S.

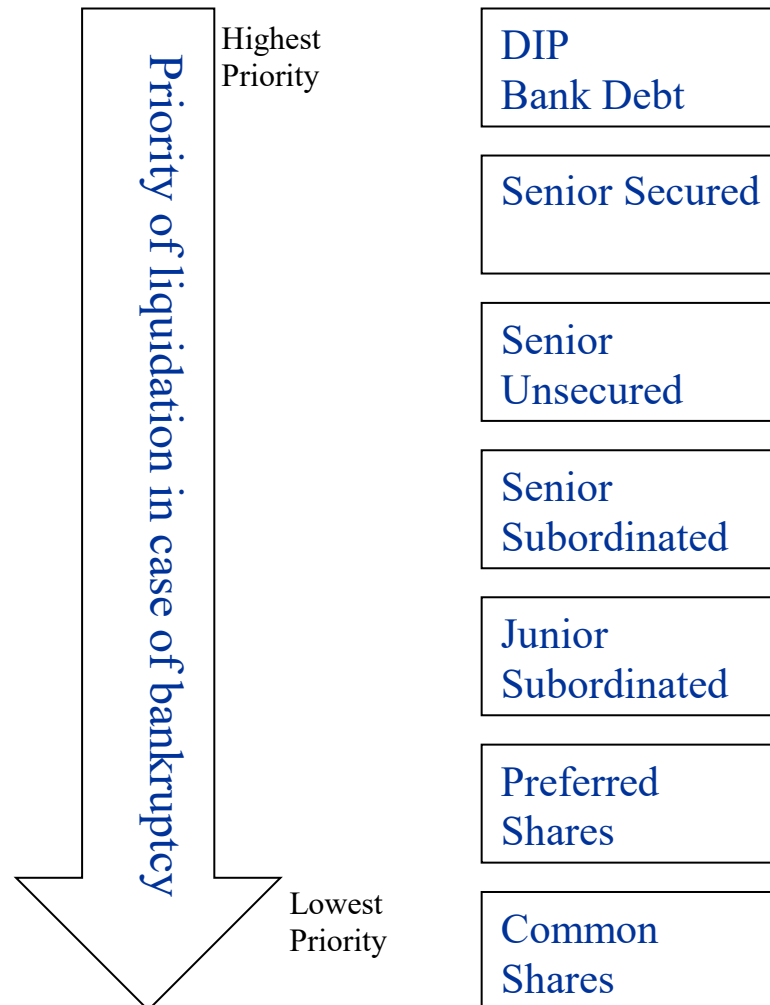
Bond Ratings

Moody's	S&P	Category
Aaa	AAA	Investment Grade
Aa	AA	
A	A	
Baa	BBB	
Ba	BB	Non-investment grade ("high yield", "junk")
B	B	
Caa	CCC	
Ca	CC	
C	C	

US Corporate Bond Yields



Bankruptcy-Order of Payments



Equity

- ▶ Equity is the **residual claim** on a corporation.
 - ▶ Maturity is indefinite, cash flows can occur far away.
 - ▶ Risky, variable liquidity
- ▶ Two main classes of equities:
 - ▶ Common Stock: voting rights (“junior”).
 - ▶ Preferred Stock: non-voting (“senior”).
- ▶ Valuation= $\text{TVM} + \text{Risk adjustment}$
- ▶ Common equity bears the most risk and therefore earns investors the highest expected return
 - ▶ For firms, this means it has the highest cost of capital

Derivatives

- ▶ Definition: Securities whose cash flows depend on other assets
- ▶ Examples: options, futures, Bonds with option future
- ▶ Valuation: $\text{TVM} + \text{risk adjustment} + \text{option adjustment}$
- ▶ Derivatives can be written on equity, credit default, interest rates, commodities, exchange rates, etc.

Derivatives: Options

- ▶ Call (**Put**) option: right, but not the obligation, to buy (**sell**) the underlying asset
 - ▶ At a specified price called strike price,
 - ▶ on a specified date called expiration date.
- ▶ Option value: The value of exercising only if it makes sense to do so (generates a positive payoff)

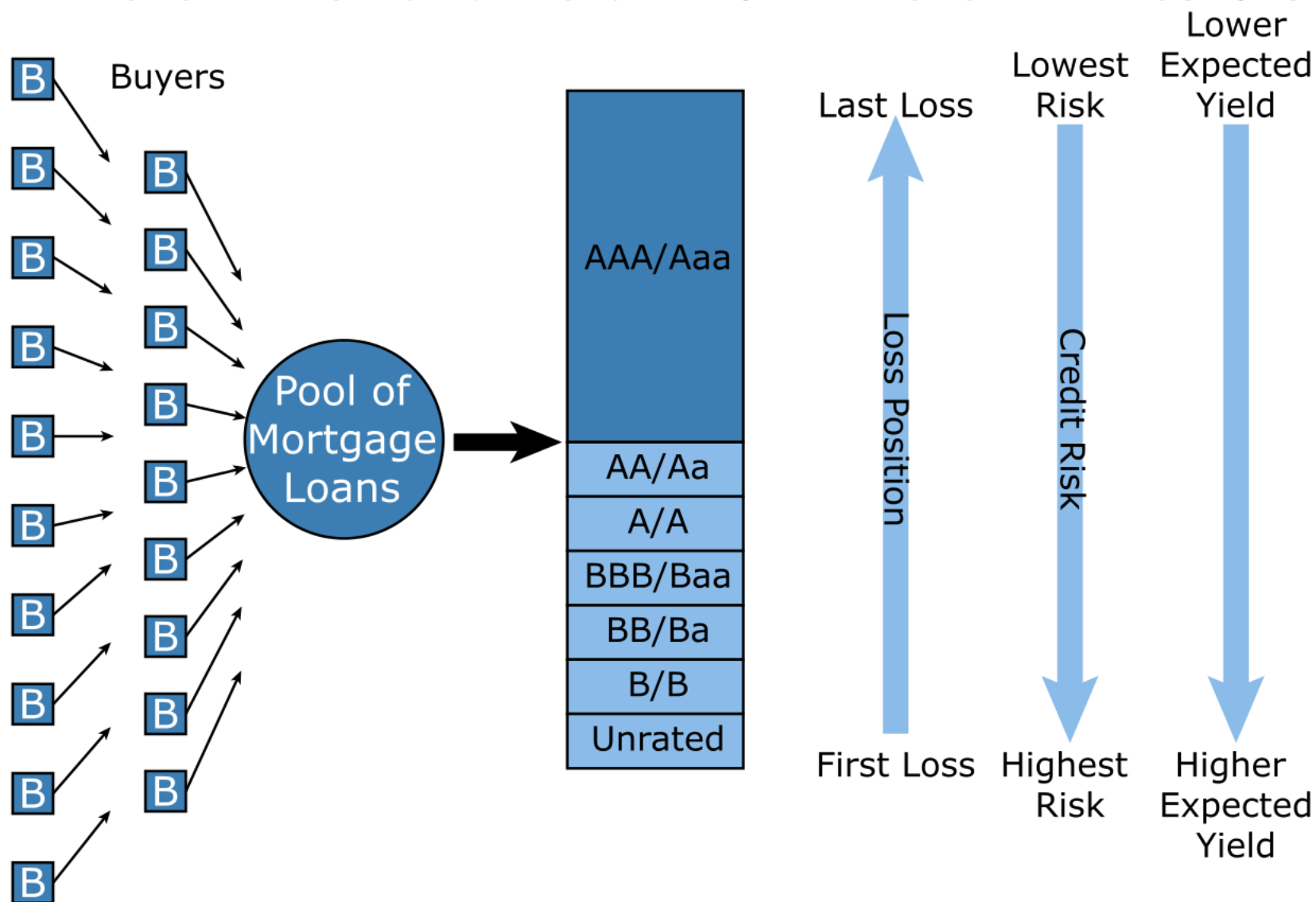
Derivatives: Futures

- ▶ Long Futures: an obligation to buy the underlying asset:
 - ▶ At a specified price,
 - ▶ on a specified date.
 - ▶ Two kinds: Commodities or financial
- ▶ No option value. Obligation not a right
- ▶ Also: swaps, swaptions.

Mortgage and Asset Backed Securities

- ▶ Bundling of existing securities such as:
 - ▶ Mortgages.
 - ▶ Auto loans.
 - ▶ Credit card receivables.
 - ▶ Corporate bonds.
- ▶ Securitization is an example of financial engineering.
- ▶ Pooling and tranching to diversify risk and cater to investor demand.

Different Risk and Return for Different Investors



Summary

- ▶ Financial assets are claims on the cash flows produced by real assets
- ▶ Four families: fixed income, equity, derivatives, securitised products
- ▶ All of them are valued the same way: time value of money, then adjust for risk
- ▶ Where you sit in the capital structure decides what you are paid, and when
- ▶ Next class: Financial Markets (BMAE 13.5, 14.2–14.3)