FIXED INCOME ANALYSIS
LECTURE 7

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CFA Institute

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1. INTRODUCTION

- This topic examines fixed-income instruments created through a process known as **securitization**. This process involves moving assets from the owner of the assets into a special legal entity.
- In addition to bonds issued by governments and companies, the fixed-income market includes securities that are backed, or collateralized, by a pool (collection) of assets, such as loans and receivables, and are referred to generically as **asset-backed securities** (ABS).

1. INTRODUCTION

- Assets that are typically used to create asset-backed bonds are called "**securitized assets**" and include the following, among others:

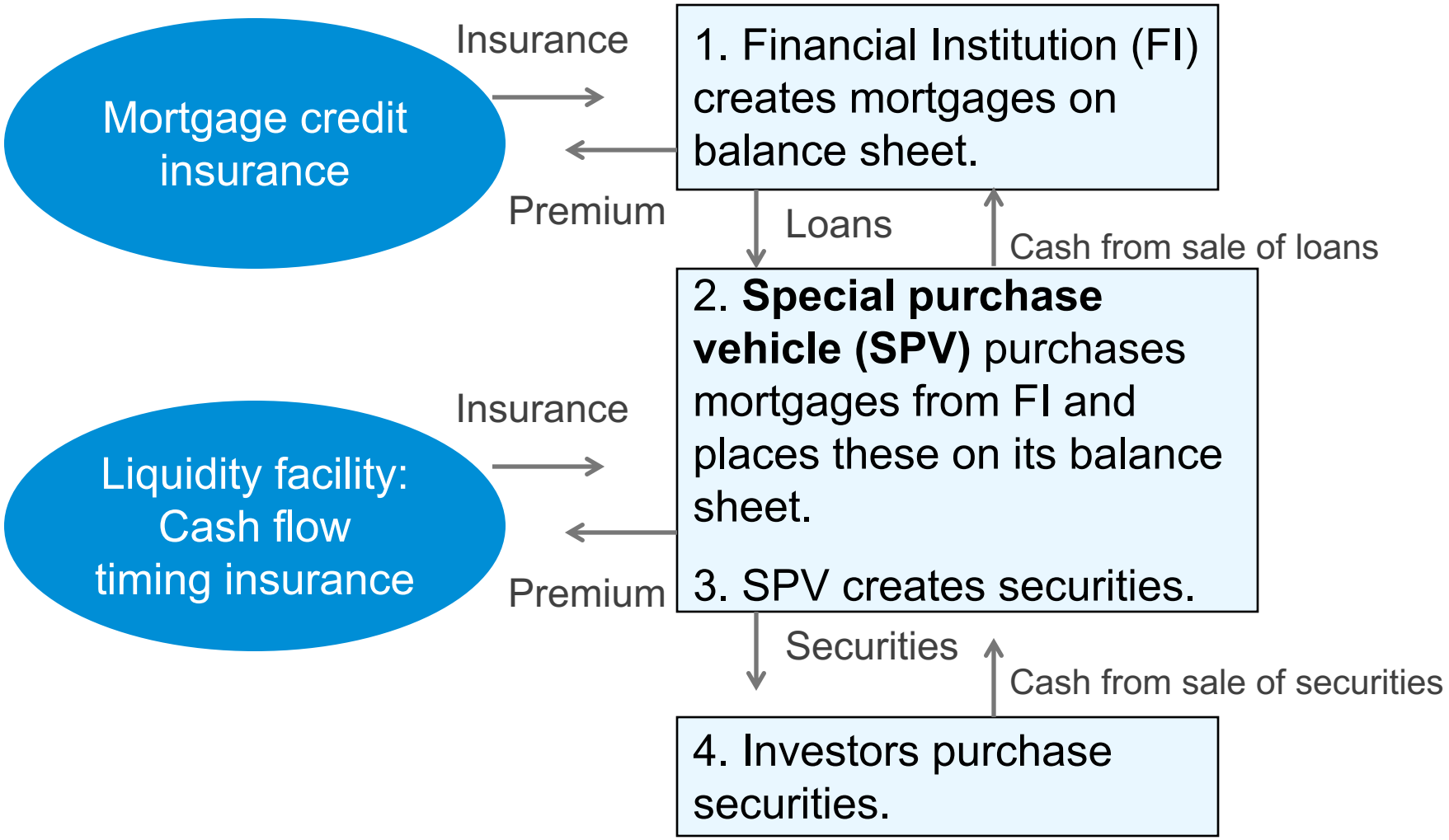
Residential mortgage loans	Commercial mortgage loans	Automobile loans
Student loans	Bank loans	Credit card debt

- A **mortgage-backed security** (MBS) is, by definition, an asset-backed security, but a distinction is often made between MBS and ABS backed by non-mortgage assets.

2. BENEFITS OF SECURITIZATION FOR ECONOMIES AND FINANCIAL MARKETS

- The securitization of pools of loans into multiple securities provides an economy with a number of benefits:
  - Allows investors to get a direct exposure to a portfolio of mortgages or other receivables without having a bank as an intermediary
  - Allows banks to increase the amount of funds available to lend and increase fee income
  - Allows the creation of tradable securities with better liquidity than the original loans on the bank's balance sheet
  - Enables innovations in investment products

3. THE SECURITIZATION PROCESS



MAIN PARTIES IN THE SECURITIZATION PROCESS

The main two parties in securitization

Originator (seller of the collateral)	• Originally owns the assets and sells them to the issuer (SPV)
Special purpose vehicle (SPV)	• Creates a security backed by the assets and sells them to investors

The third parties in securitization

Servicer (different from the seller)	• Independent accountants, lawyers/attorneys, trustees, underwriters, rating agencies, and guarantors

BONDS ISSUED IN THE SECURITIZATION PROCESS

- A simple transaction may involve the sale of only one bond class.
- More complicated, multiple class bond structures can be created:

In such a structure, rules will be established for the distribution of interest and principal to the bond classes. Some bond classes may receive payments earlier than others.

Time tranching

In a **subordination** (senior/subordinated) structure, the bond classes differ as to how they will share any losses resulting from defaults of the borrowers whose loans are in the pool of loans.

Credit tranching

4. RESIDENTIAL MORTGAGE LOANS

A **mortgage loan**, or simply mortgage, is a loan secured by the collateral of some specified real estate property that obliges the borrower to make a predetermined series of payments to the lender.

The mortgage gives the lender the right to **foreclose** on the loan if the borrower defaults (i.e., allows the lender to take possession of the mortgaged property and then sell it).

Typically, the amount of the loan advanced to purchase the property is less than the property's purchase price.

- The **loan-to-value ratio** is less than 100%.

FIVE SPECIFICATIONS OF MORTGAGE DESIGN

Mortgage designs vary around the world, in terms of the following:

1) The maturity of the loan

2) How the interest rate is determined

3) How the principal is to be repaid (i.e., the amortization schedule)

4) Whether the borrower has the option to prepay and, in this case, whether any prepayment penalties might be imposed

5) The rights of the lender in a foreclosure

MINI-QUIZ #1

Agnelli Industries, a manufacturer of industrial machine tools based in Bergamo, Italy, has €400 million of receivables on its balance sheet that it would like to securitize. The receivables represent payments Agnelli expects to receive for machine tools it has sold to various customers in Europe. Agnelli's corporate bonds have a credit rating below investment grade. Agnelli securitizes the receivables by selling them to the Agnelli Trust (the special purpose vehicle), which then issues the following bonds that all have a maturity of five years:

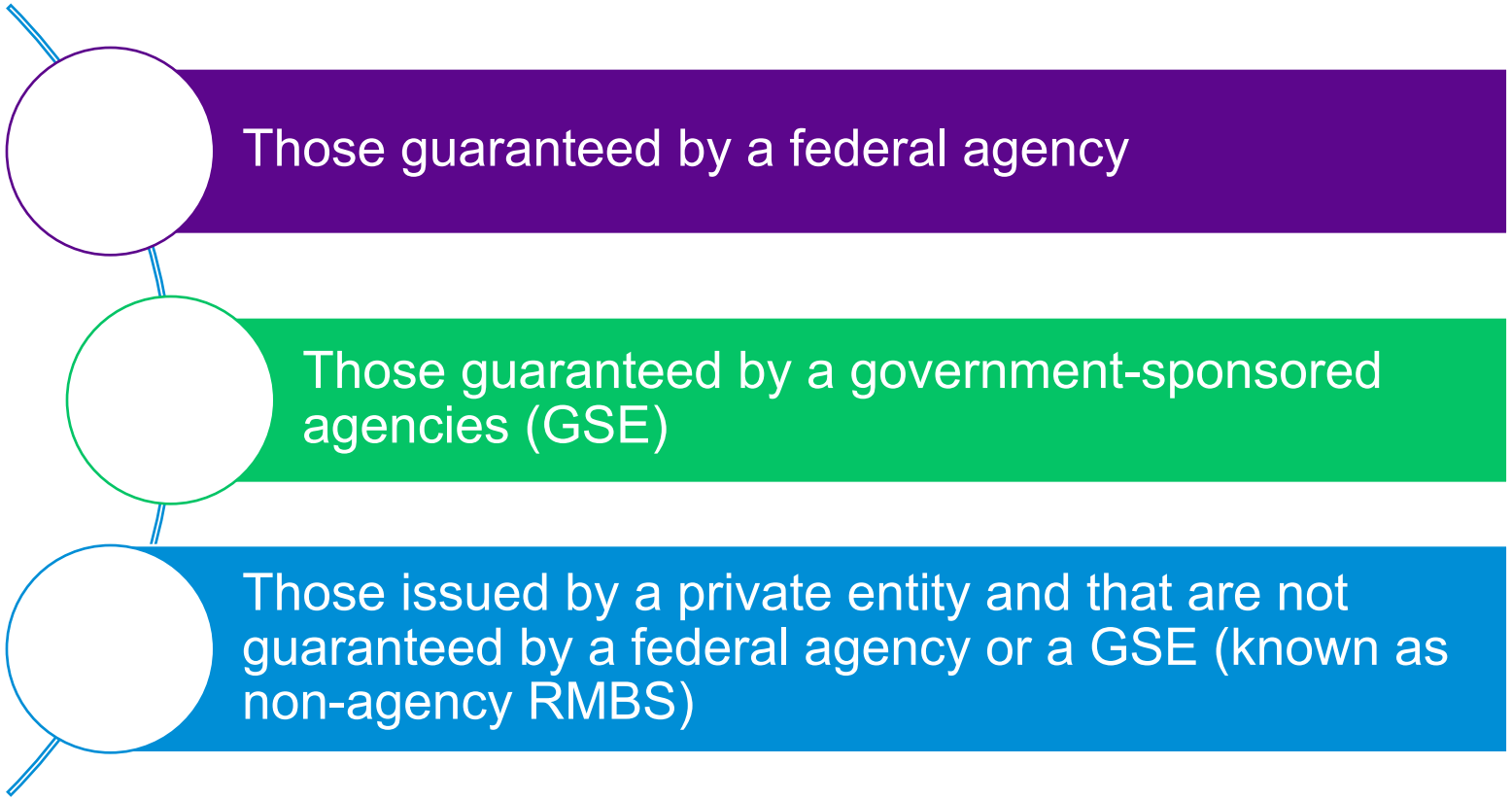
Bond Class	Par Value (€ millions)
A (senior)	280
B (subordinated)	60
C (subordinated)	60
Total	400

The Class A bonds in the securitization have an investment-grade credit rating.

1. How can a class of an asset-backed bond have an investment-grade rating when Agnelli's corporate bonds do not?
2. Assume that two years after the issuance of the asset-backed bonds, Agnelli Industries files for bankruptcy. What is the effect of the bankruptcy on the holders of the asset-backed bonds?

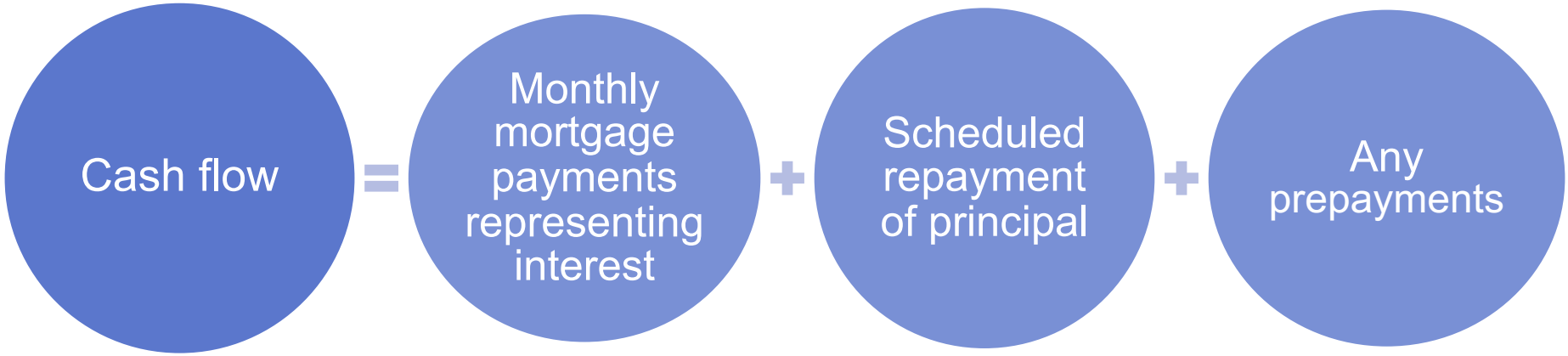
5. RESIDENTIAL MORTGAGE-BACKED SECURITIES

In the United States, residential mortgage-backed securities (RMBS) are divided into three sectors:



MORTGAGE PASS-THROUGH SECURITIES

- A **mortgage pass-through security** is a security created when one or more holders of mortgages form a pool of mortgages and sell shares or participation certificates in the pool.
- The cash flow of a mortgage pass-through security depends on the cash flow of the underlying pool of mortgages.



MORTGAGE PASS-THROUGH SECURITIES

- A mortgage pass-through security's coupon rate is called the "**pass-through rate**."

  - The pass-through rate is less than the mortgage rate on the underlying pool of mortgages by an amount equal to the servicing and other fees.

- Not all of the mortgages in a pool have the same mortgage rate and maturity.

  - For each mortgage pass-through security, a **weighted average coupon** (**WAC**) rate and **a weighted average maturity** (**WAM**) are determined.

MEASURES OF THE PREPAYMENT RATE

- The two key prepayment rate measures

Single monthly mortality (SMM) rate, a monthly measure

and

Its corresponding annualized rate, the conditional prepayment rate (CPR)

$$\text{SMM} = \frac{\text{Prepayment for month}}{\text{Beg. mortgage balance } (m) - \text{Principal repayment } (m)}$$

- Forecasting the future prepayment rate is key. The **Public Securities Association (PSA)** is a common benchmark. Prepayment rates are stated as a percentage of a PSA benchmark.

CONDITIONAL PREPAYMENT RATE

- In the standard PSA model, known as 100 PSA, the CPR starts at 0.2% for the first month and then increases at a constant rate of 0.2% per month to equal 6% at the 30th month.
  - After the 30th month, the CPR stays at a constant 6%.
  - Thus, for any month *t*, the **CPR** is

$$\text{CPR} = 0.06\left(\frac{t}{30}\right), \text{ if } t \leq 30$$

$$\text{CPR} = 0.06, \text{ if } t > 30$$

AVERAGE LIFE OF A MORTGAGE

- The **average life of a mortgage** in a pool is the average time for a single mortgage in the pool to be paid off, either by prepayment or by making scheduled payments until maturity.

Example. For a pool of 30-year mortgages:

Prepayment Schedule	Average Mortgage Life
100 PSA	11.2 years
165 PSA	8.6 years
250 PSA	6.4 years
400 PSA	4.5 years

COMPONENTS OF PREPAYMENT RISK

- The **prepayment risk** is the uncertainty of future cash flows because of prepayments. It has two components:

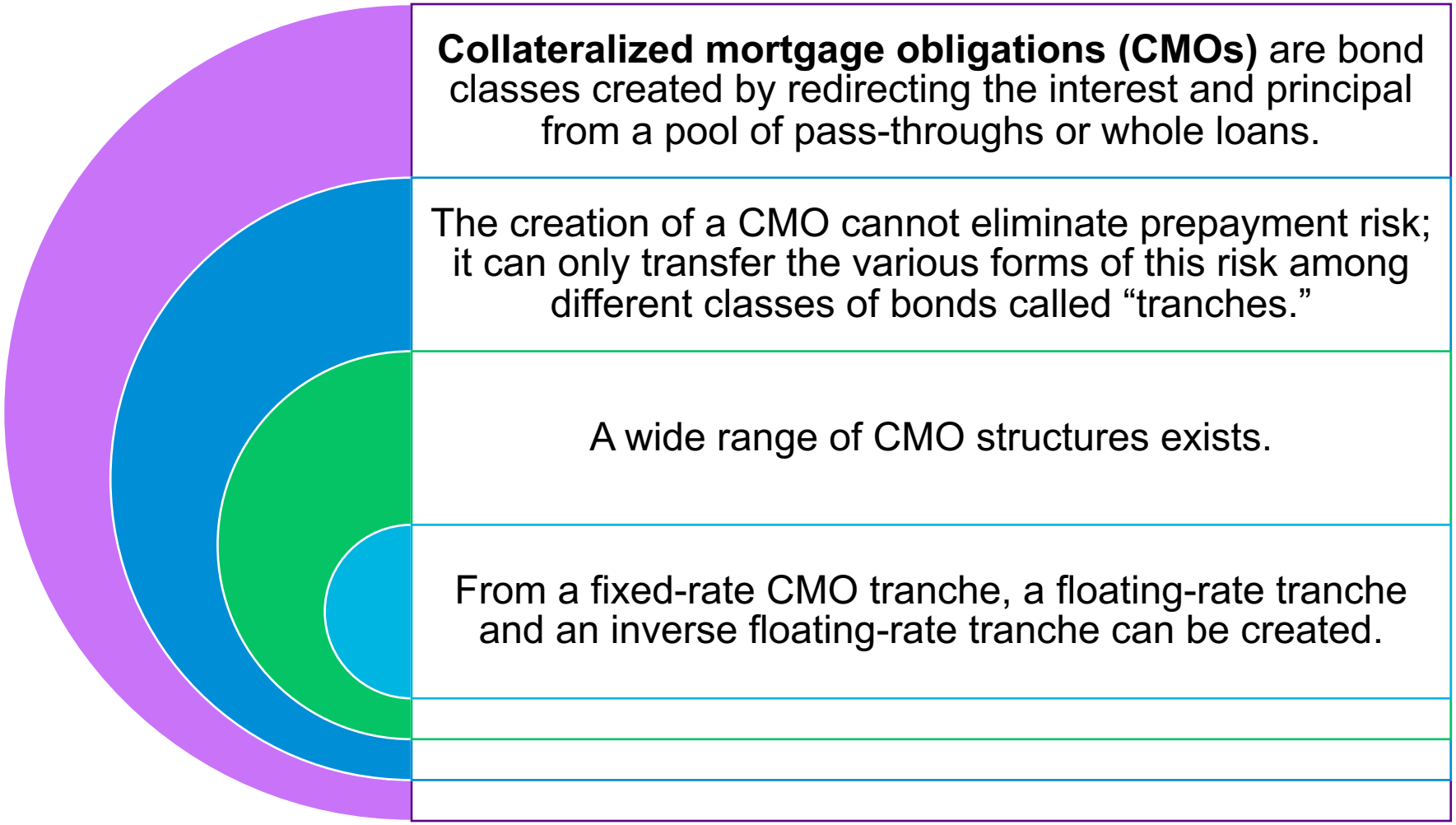
Contraction risk

- the risk that when interest rates decline, the security will have a shorter maturity than was anticipated at the time of purchase because homeowners refinance at now-available lower interest rates

Extension risk

- the risk that when interest rates rise, fewer prepayments will occur because homeowners are reluctant to give up the benefits of a contractual interest rate that now looks low

COLLATERALIZED MORTGAGE OBLIGATIONS



TRANCHES

- Sequential-pay CMOs are structures where each class of bond (the tranches) is retired sequentially.

First, distribute all principal payments to Tranche 1 until the principal balance for Tranche 1 is zero.

After Tranche 1 is paid off, do the same for Tranche 2, and so on.

- Planned amortization class (PAC) tranches offer greater predictability of cash flows as long as the prepayment rate is within a specified band over the collateral's life.
  - The key to the prepayment protection for the PAC tranches is the **support tranches**.

NON-AGENCY RESIDENTIAL MORTGAGE-BACKED SECURITIES

- **Non-agency RMBS** share many features and structuring techniques with agency CMOs. However, two complementary mechanisms are usually required in structuring non-agency RMBS.

1. The cash flows are distributed by rules, such as the waterfall, that dictate the allocation of interest payments and principal repayments to tranches with various degrees of priority/seniority.

2. There are rules for the allocation of realized losses, which specify that subordinated bond classes have lower payment priority than senior classes.

MINI-QUIZ #2

1. Which tranche in a CMO structure is *most* suitable for the following investors?
    1. An investor who is most concerned about contraction risk
    2. An investor who would like the investment to have a predictable and stable average life
    3. An investor who expects that interest rates will fall
    4. An investor who is willing to accept sign if cant prepayment risk if compensated with a relatively high expected return

2. Unlike an agency RMBS, a non-agency RMBS requires credit enhancement. True or False?

6. COMMERCIAL MORTGAGE-BACKED SECURITIES

- Commercial mortgage-backed securities (CMBS) are backed by a pool of commercial mortgage loans on income-producing property.
- Commercial mortgage loans are non-recourse loans, and as a result, the lender can only look to the income-producing property backing the loan for interest and principal repayment.

Two measures of credit performance of CMBS:	
Loan-to-value ratio	Debt-to-service coverage ratio, which is the property's net operating income (NOI) divided by the debt service

COMMERCIAL MORTGAGE-BACKED SECURITIES

CMBS typically offer investors significant call protection.

The degree of call protection available to a CMBS investor is a function of (1) call protection available at the loan level and (2) call protection afforded from the actual CMBS structure.

At the commercial loan level, call protection can be in the form of a prepayment lockout, a defeasance, prepayment penalty points, or yield maintenance charges.

- Many commercial loans backing CMBS transactions **are balloon loans** that require substantial principal payment at maturity of the loan.

7. NON-MORTGAGE ASSET-BACKED SECURITIES

- The collateral for an asset-backed security can be either:

Amortizing assets

(e.g., auto loans, personal and commercial loans)

In amortizing structures, the principal received from the scheduled repayment and any prepayments are distributed to the bond classes on the basis of the waterfall.

or

Non-amortizing assets

(e.g., credit card receivables)

For non-amortizing assets, prepayments by borrowers do not apply since there is no schedule of principal repayments.

In non-amortizing structures, typically there is a lockout period, a period where principal repayments are reinvested in new assets.

AUTO LOAN-BACKED SECURITIES

Auto loan-backed securities

The cash flows for auto loan-backed securities consist of regularly scheduled monthly loan payments (interest payment and scheduled principal repayments) and any prepayments.

All auto loan-backed securities have some form of credit enhancement—often a senior/subordinated so the senior tranches have credit enhancement because of the presence of subordinated tranches.

CREDIT CARD RECEIVABLE-BACKED SECURITIES

Credit card receivable-backed securities

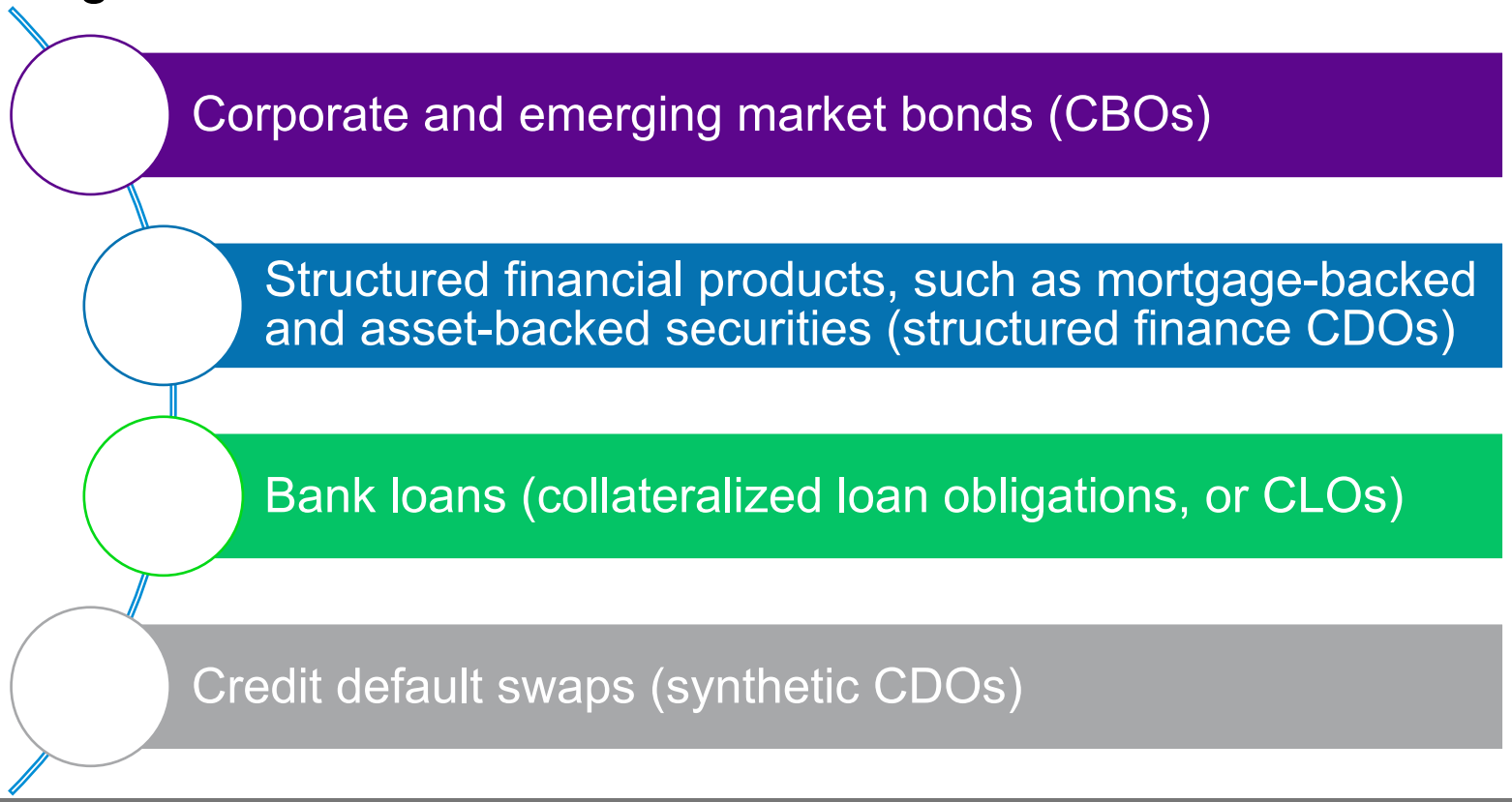
For a pool of credit card receivables, the cash flows consist of finance charges collected, fees, and principal repayments.

Interest—fixed or floating—is paid to security holders periodically.

Credit card receivable-backed securities have lockout periods during which the cash flow that is paid out to security holders is based only on finance charges collected and fees. When the lockout period is over, the principal is no longer reinvested but paid to investors.

8. COLLATERALIZED DEBT OBLIGATIONS

- A **collateralized debt obligation** (CDO) is a security backed by a diversified pool of one or more of the following types of debt obligations:



COLLATERALIZED DEBT OBLIGATIONS

- In a CDO, there is an asset manager responsible for managing the portfolio of assets.

The tranches in a CDO

- **Senior tranche** } rated
- **Mezzanine tranche** } rated
- **Subordinate/equity tranche** } unrated

The proceeds to meet the obligations to the CDO tranches (interest and principal repayment) can come from the following:

- Coupon interest payments of the underlying assets
- Maturing assets in the underlying pools
- Sale of assets in the underlying pool

CALCULATING A COLLATERALIZED DEBT OBLIGATION

Example. Consider the following US$100 million CDO:

Tranche	Par Value (US$)	Coupon Rate
Senior	80,000,000	LIBOR + 70 bps
Mezzanine	10,000,000	10-year US Treasury rate + 200 bps
Subordinated/equity	10,000,000	

- Assume the collateral consists of bonds that all mature in 10 years. The coupon rate is the 10-year US Treasury rate + 400 bps.
- The asset manager enters into an interest rate swap with a notional amount of US$80 million. The asset manager agrees to 1) pay a fixed rate each year equal to the 10-year Treasury rate + 100 bps and 2) receive LIBOR.

CALCULATING A COLLATERALIZED DEBT OBLIGATION

Example (continued).

- 10-year Treasury rate: 7%
- Interest from collateral: (7% + 4%) × $100 million = $11 million
- Interest to senior tranche: $80 million × (LIBOR + 70 bps)
- Interest to mezzanine tranche: $10 million × (7% + 2%) = $0.9 million
- Interest from swap counterparty: $80 million × LIBOR
- Interest to swap counterparty: 8% × $80 million = $6.4 million
- Net interest: $3.14 million

Now, suppose asset management fees are $640,000. Calculate cash flow to subordinate/equity tranche and annual return.

- Cash flow: $3.14 million – $0.64 million = $2.5 million
- Return: $2.5 million/$10 million = 25% (assumes no defaults, no call)

9. SUMMARY

Benefits of securitization

- It allows investors direct access to liquid investments and payment streams that would be unattainable if all the financing were performed through banks.
- It enables banks to increase loan origination, monitoring, and collections at economic scales greater than if they used only their own in-house loan portfolios.

Securitization process

- The parties to a securitization include the special purpose vehicle (SPV, also called the “trust”) that is the issuer of the securities and the seller of the pool of loans (also called the “depositor”).
- A common structure in a securitization is subordination, which leads to the creation of more than one bond class or tranche.

SUMMARY

Mortgage loans

- A mortgage loan is a loan secured by the collateral of some specified real estate property that obliges the borrower to make a predetermined series of payments to the lender.
- The cash flow of a mortgage includes (1) interest, (2) scheduled principal payments, and (3) prepayments.

Mortgage-backed securities

- There are two MBS sectors: (i) agency residential mortgage-backed securities (RMBS), including those guaranteed by the government or government-sponsored agencies, and (ii) non-agency RMBS.
- The payments that are received from the collateral are distributed to pay interest and repay principal to the security holders as well as to pay servicing and other fees.

SUMMARY

Motivation for creating securitized structures with multiple tranches (CMOs)

- The motivation for the creation of different types of structures is to redistribute prepayment risk and credit risk efficiently among different bond classes in the securitization.
- The cash flow of a mortgage pass-through security depends on the cash flow of the underlying pool of mortgages and consists of monthly mortgage payments representing interest, the scheduled repayment of principal, and any prepayments, net of servicing and other fees.
- The most common types of CMO tranches are sequential-pay tranches, planned amortization class (PAC) tranches, support tranches, and floating-rate tranches.

SUMMARY

Commercial mortgage-backed securities

- Commercial mortgage-backed securities (CMBS) are securities backed by a pool of commercial mortgage loans on income-producing property.
- Two key indicators of the potential credit performance of CMBS are the debt-to-service coverage ratio and the loan-to-value ratio.
- CMBS have considerable call protection, which allows CMBS to trade in the market more like corporate bonds than like RMBS.

SUMMARY

Non-mortgage asset-backed securities

- The most popular non-mortgage ABS are auto loan receivable-backed securities and credit card receivable-backed securities.
- The collateral is amortizing for auto loan-backed securities and non-amortizing for credit card receivable-backed securities.

Collateralized debt obligations

- A collateralized debt obligation (CDO) is a generic term used to describe a security backed by a diversified pool of one or more debt obligations.
- A CDO requires a collateral manager to buy and sell debt obligations for and from the CDO's portfolio of assets to generate sufficient cash flows to meet the obligations of the CDO bondholders and to generate a fair return for the equity holders.

HOMEWORK

- Read Chapter 7
- Chapter 7 problem 1,2,3,5,6,10,11,12,13,14,15