Fixed Income Investment

Session 8
April, 29th, 2013
(afternoon)

Dr. Cesario Mateus
www.cesariomateus.com

c.mateus@greenwich.ac.uk
cesariomateus@gmail.com

Lecture 8

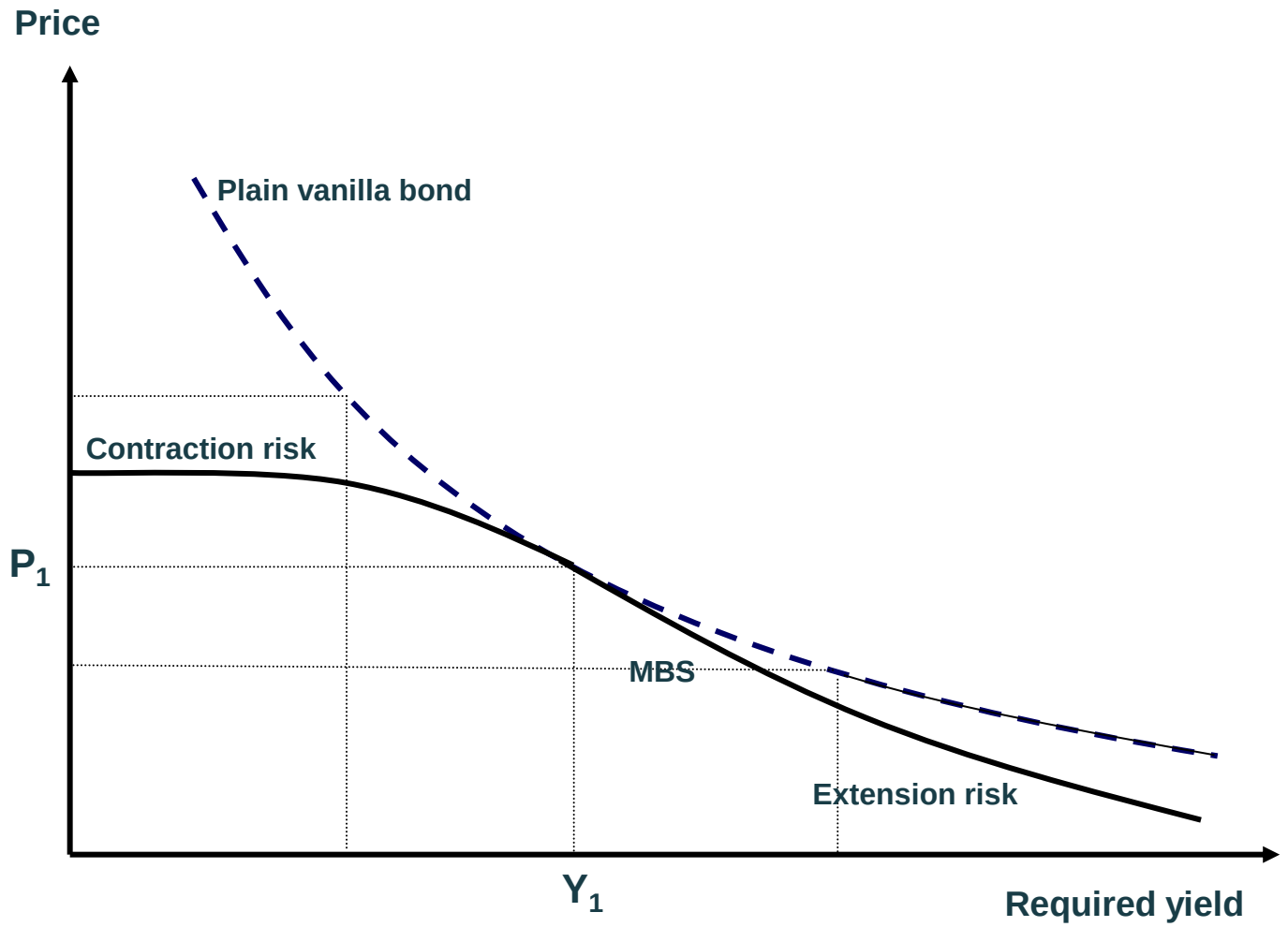
Collateralised mortgage obligations

Asset-backed securities

Collateralised debt obligations (CDOs)

The economics of CDO construction

Contraction/extension risk



Collateralised mortgage obligations

Some investors do not like the extension and/or the contraction risk

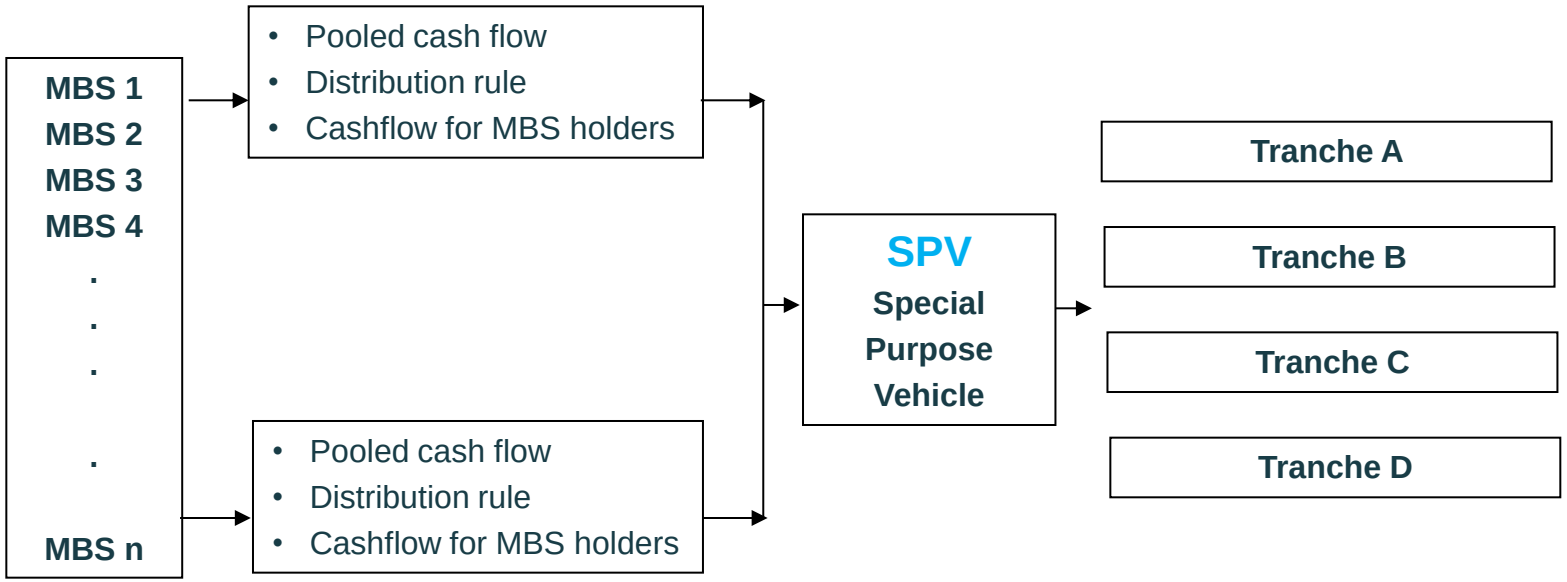
Answer is to create a structure such that at least some of the investors are protected from this risk, passing it on to those that don't mind

CMOs are structured to redistribute this prepayment risk

This is done via a "class" structure – creating tranches

Basically, principal payments are used to retire tranches on a priority basis

Cashflow characteristics



Tranch A is senior to tranche B, and tranche B is senior to tranche C, etc.

Tranche D is likely to be an "accrual tranche"
(no interests/receives amortized principal back in one lump sum)

CMO payment structures

Sequential pay structures:

Distribute coupon to each tranche based on principal. Disburse principal to tranche A until A is fully paid back; then disburse to tranche B etc etc. Tranches are retired sequentially.

Accrual tranches:

In sequential structure there is usually one tranche that receives no interest/regular coupon, a kind of zero coupon bond

Interest that would have gone to this tranche used to pay down other tranches more rapidly

This tranche usually receives its ammortised principal back in one lump sum

CMO payment structures

- Floating rate/inverse floating tranches:
  - lots of institutions prefer floating rate tranches, but this clearly exposes issuer to interest rate risk
  - answer is to split a tranche into two, creating a floating rate tranche, and an inverse floating rate tranche
  - as interest rates rise the interest to the FR tranche rises, but the interest payable to the IFR tranche falls by the same cash amount (by design) – and vice versa of course

$$Total\ Coupon = X\% \times [Libor + 0.50] + (1 + X\%) \times [Y - Z(Libor)]$$

CMO payment structures (Example)

Floating rate tranches pays: Libor+50bp (Principal value of $75m)

Inverse Floating tranche: 26.5% - 3×Libor (Principal value of $25m)

Principal combined tranches: $100m

Total coupon available to this tranche is $7.0 per year (coupon rate of 7%).

$$Total\ Coupon\ Rate = 75\% \times [Libor + 0.50] + (1 - 75\%) \times [26.5\% - 3 \times (Libor)]$$

Suppose LIBOR is 6% then the coupon rates for the 2 tranches will be:

$$Floating\ Tranche = \$4.875m = 6.5\% \times \$75m$$
$$Inverse\ Floating\ Tranche = \$2.125m = 8.5\% \times \$25m$$

$$and\ \$4.875m + \$2.125m = \$7.0\text{m}$$

CMO payment structures (Example)

Now suppose that LIBOR rises to 7%, then the coupon rates for the two tranches will be:

$$Floating\ Tranche = \$5.625m = 7.5\% \times \$75m$$
$$Inverse\ Floating\ Tranche = \$1.375m = 5.5\% \times \$25m$$

$$and\ \$5.625m + \$1.375m = \$7.0\text{m}$$

Finally suppose that LIBOR falls to 5%, then the coupon rates for the two tranches will be:

$$Floating\ Tranche = \$4.125m = 5.5\% \times \$75m$$
$$Inverse\ Floating\ Tranche = \$2.875m = 11.5\% \times \$25m$$

$$and\ \$4.125m + \$2.875m = \$7.0\text{m}$$

Regardless of the level of LIBOR the total amount of cash flow which is allocated to the 2 tranches is the same, although the relative amounts naturally change.

CMO payment structures

Planned ammortisation class tranches (PAC)

Even with *tranching* prepayment risk still exists, though it has shifted to lower tranche levels

With PAC bonds the principal and interest schedule is guaranteed for the highest tranches, shifting all prepayment risk to the lower tranches

Because of this PAC tranches have no extension/contraction risk at all

These tranches are therefore popular with those that wish to avoid these risks

Stripped CMOs

Principal is allocated to one tranche (PO) and interest (IO) to another

Both are exposed to prepayment risk

If prepayment rises return/yield on PO rises since income is received sooner

If prepayment rises return/yield on IO falls, because interest on principal sinks

So if you expect interest rates to rise (prepayment to fall) buy IO tranches, and if you expect interest rates to fall buy PO tranches

Asset-backed securities

MBS and MBOs are all backed by assets – mortgage loans (both residential and commercial (RMBS and CMBS)

But the term ABS is usually applied to bonds that are backed by assets other than these instruments

- David Bowie's publishing royalties
- municipal parking revenues/fines
- film royalties
- Chuckle Brothers back catalogue, etc etc

More common ABSs – car loans, credit card receivables, small business loans

Credit risk and ABSs

Collateral quality

What is the credit standing of the ultimate borrowers ?

How concentrated is the pool ? Are there a few large debtors in the pool (concentration risk) ?

Depending upon the credit quality the issuer will seek to enhance that quality again by using either external or internal enhancement methods

(just as with non-agency MBSs)

Credit risk and ABSs

Quality of originator/issuer/servicer

- How experienced is the issuer ?
- What sort of underwriting standards have been applied ?
- What competition does the originator in particular face ?

(Sub-prime lenders clearly used very lax standards that few seemed to worry about at the time)

Cashflow and stress testing

- Can the assets service the cashflow ?
- Must stress test various interest rate environments

Of course the usefulness of the stress testing is limited if the scenarios are relatively benign

Collateralised debt obligations (CDOs)

What is a CDO ?

A CDO is a security backed by pool of debt obligations:

- Investment or sub-investment grade bonds
- Asset backed securities
- Bank loans (secured and unsecured)
- Emerging market bonds
- CDSs (synthetic)
- CDOs ('CDO Squared', 'CDO cubed')

CBO = Collateralised bond obligation
CLO = Collateralised loan obligation

Most long-only fund managers invest in CDOs

Arbitrage cash CDO tranches

From the underlying pool of assets, CDO creates and issues other fixed income assets

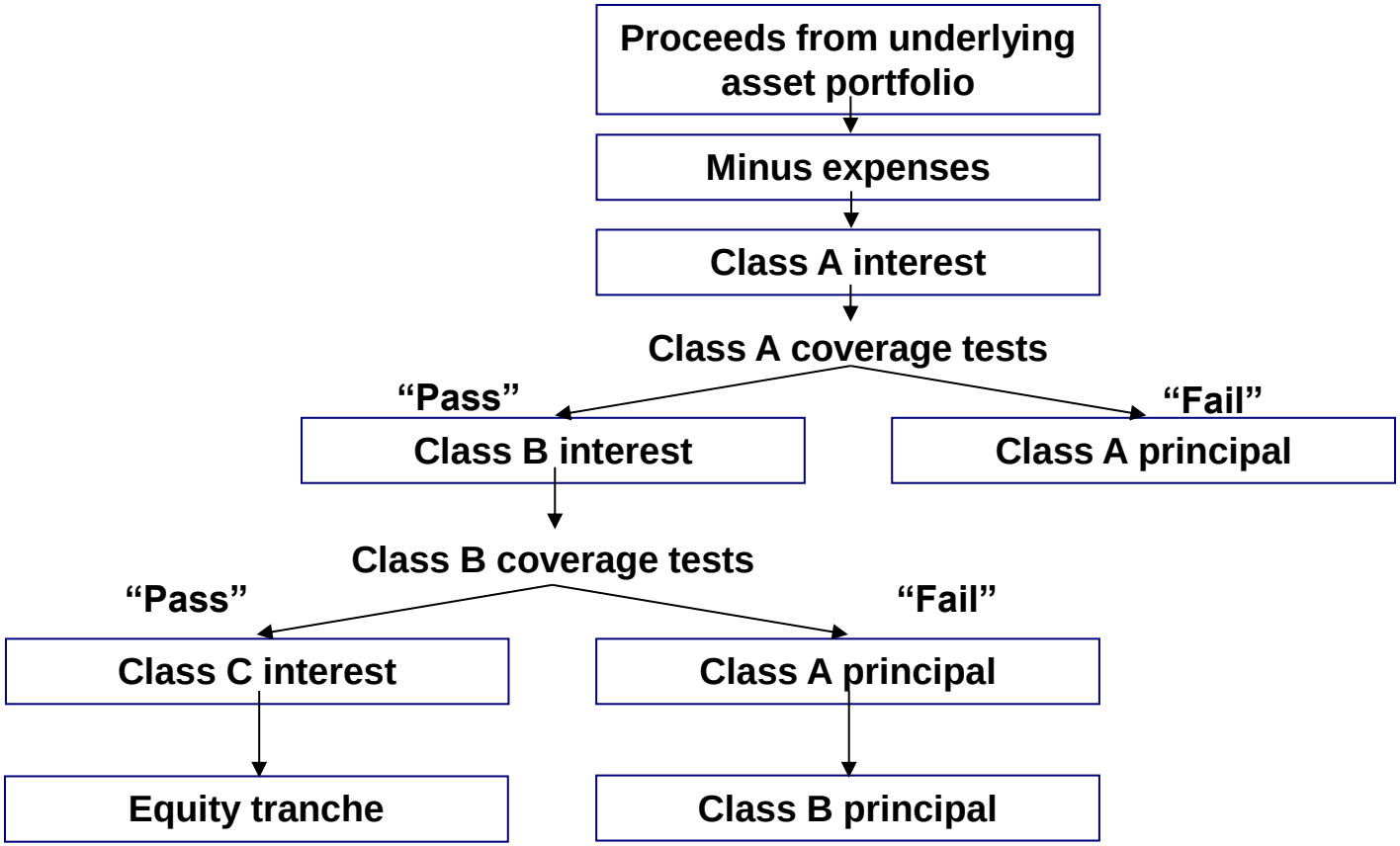
Typically three types of tranche:

- AAA (“Class A”)
- Mezzanine tranches (with lower ratings) (“Class B”)
- Equity tranche (“first loss”)

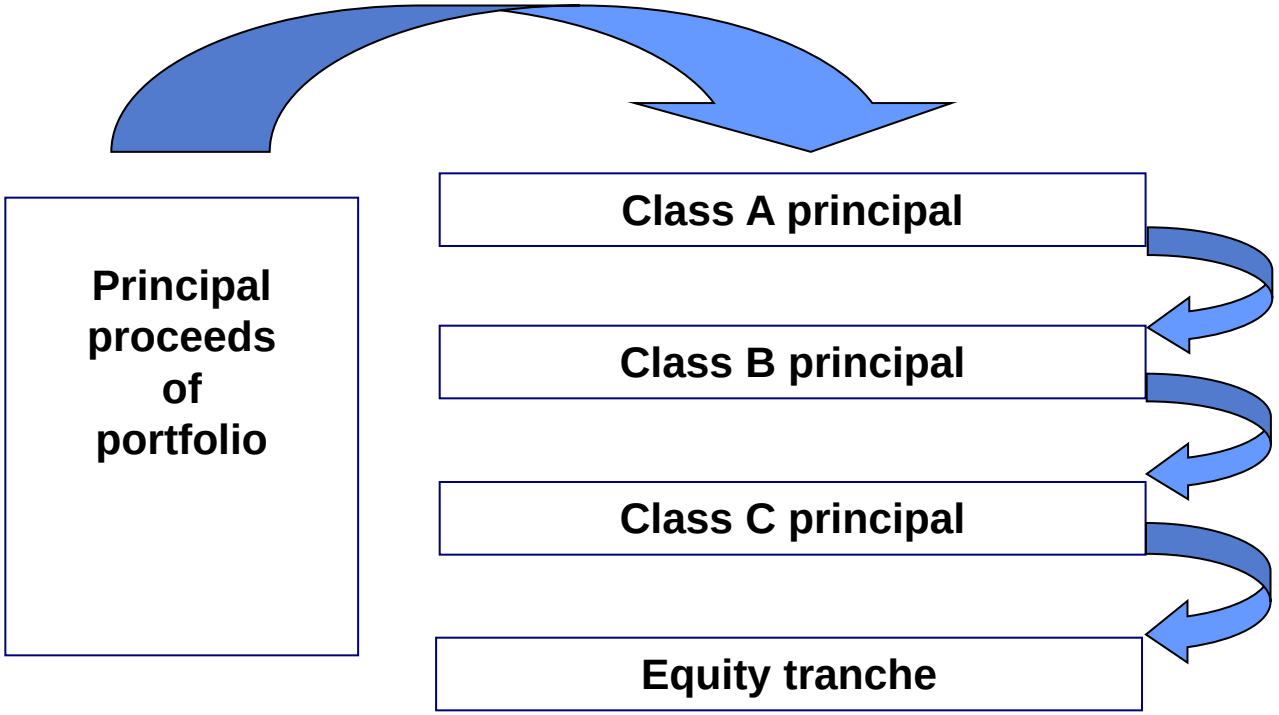
As name suggests the AAA tranche has least risk while the lower the rating the higher the risk

Highest risk tranche is the equity tranche – this tranche receives payments once all other classes have been paid and receives any residual value in the CDO

Interest rate cash flow “waterfall”



Principal cashflow “waterfall”



The economics of CDO construction

The main aim

Key to economic feasibility is the return that can be created for the equity or first loss tranche

Most CDO issuers aim to keep this bit of the CDO's structure for themselves

Traditional, long only bond fund managers see it as a way of generating additional income

Seen as a way for Life funds to increase returns on funds under management too

Technically pension funds could do it too – (though not sure if they are allowed)

CDO example: the collateral

Fund manager buys £100m of high yield bonds

Decides to use them as collateral for CDO

Bonds all:

- mature in ten year's time
- have a fixed coupon payment
- yield 4.0% over current ten-year gilt

These bonds generate income for the CDO tranches …

CDO example: the collateral

There will be three CDO tranches, with the following par values and coupon rates:

Tranche	Par value	Coupon type	Coupon rate
Senior	£80,000,000	Floating	LIBOR + 0.70%
Mezzanine	£10,000,000	Fixed	Gilt + 1.0%
First loss	£10,000,000	-	-

Floating rate exposure can be protected via an interest rate swap agreement

Protection from interest rate risk

The Senior tranche pays floating – which means the issuer is exposed to possible higher interest rates

The answer is to enter into an interest rate swap

Swap details:

- Notional: £80,000,000
- Ten year swap spread: 1.0%
- Receive: LIBOR

If ten-year gilt is 5% then:

- Pay 6.0% fixed on £80,000,000
- Receive LIBOR on £80,000,000

Interest received

Two sources of income received (if LIBOR = 4.5%):

Interest from collateral = £100,000,000 x (5% + 4%) = £9,000,000

Interest from swap = £80,000,000 x LIBOR

Interest from swap = £80,000,000 x 4.5% = £3,600,000

Interest paid

Three sources of income paid (if LIBOR = 4.5% and ten-year gilt = 5.0%):

Senior tranche = £80,000,000 x (LIBOR + 0.70%)
Senior tranche = £80,000,000 x 5.2% = £4,160,000

Mezzanine tranche = £10,000,000 x (gilt + 1.0%)
Mezzanine tranche = £10,000,000 x (6.0%) = £600,000

Swap = £80,000,000 x (gilt + 1.0%)
Swap = £80,000,000 x (6.0%) = £4,800,000

Total flows

Interest received	
Interest from collateral	£9,000,000
Interest from swap counterparty	£3,600,000
Total interest	£12,600,000

Interest paid out	
Interest to senior tranche	£4,160,000
Interest to mezzanine tranche	£600,000
Interest to swap counterparty	£4,800,000
Total interest	**£9,560,000**

Net	£3,040,000
Less fees	£634,000
Amount for equity	**£2,406,000**

Return to equity holder

With no defaults the return to the equity holder is:

$$\frac{£2{,}406{,}000}{£10{,}000{,}000} = 24.06\%!$$

This is the sort of “return” that CDO creators are looking for

Caveats

Main one of course: assumed no defaults

Admin fees etc

Assumed no repayment of principal

Systems required to issue CDO beyond some potential issuers

Summary

Credit derivatives, fastest growing derivatives market

CDSs allow:

- leveraged access to credit exposure
- short credit positions

CDOs can be used:

- by fund managers in portfolios
- to enhance returns on assets under management
- free capital for certain entities (banks, insurance companies)