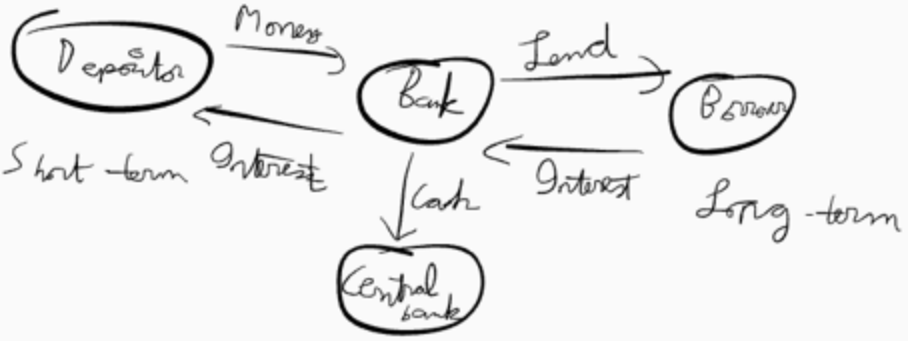
Credit risk

→ Someone who owes you something fails to pay it back

→ Borrowers → Derivatives



Basel

→ Capital needed to meet the level of risk being undertaken

→ Credit risk
→ Market "
→ Operational "
→ Liquidity "
→ Interest rate "

Eg: Cash 100 — Mortgage loan with AAA 100

0% risk wt — 100% risk wt

RWA = 0% × 100 = 0 — 100% × 100 = 100

On-balance sheet → Cash, Bonds, Loans

Off-balance sheet → Guarantees, derivatives → Convert to on-balance sheet by using credit conversion factors (CCF)

Eg: Basel I

⇒ Ratings did not matter

⇒ Credit risk computation based only on class of asset

100 avlbl to lend

Lend 100 to good customers

⇒ Search for bonds issued by poor customers

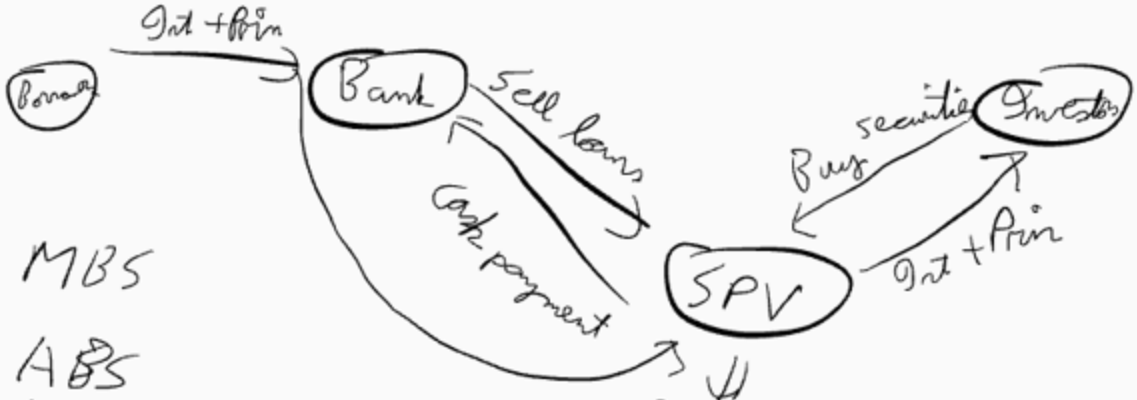
⇒ Invest in either g-sec or highly rated sop bonds

⇒ Sell a CDS on bonds issued by a poorly rated company

Yield on highly rated bonds invested in (7%) + CDS premium (~5%)

* Securitization

⇒ Increase lending books



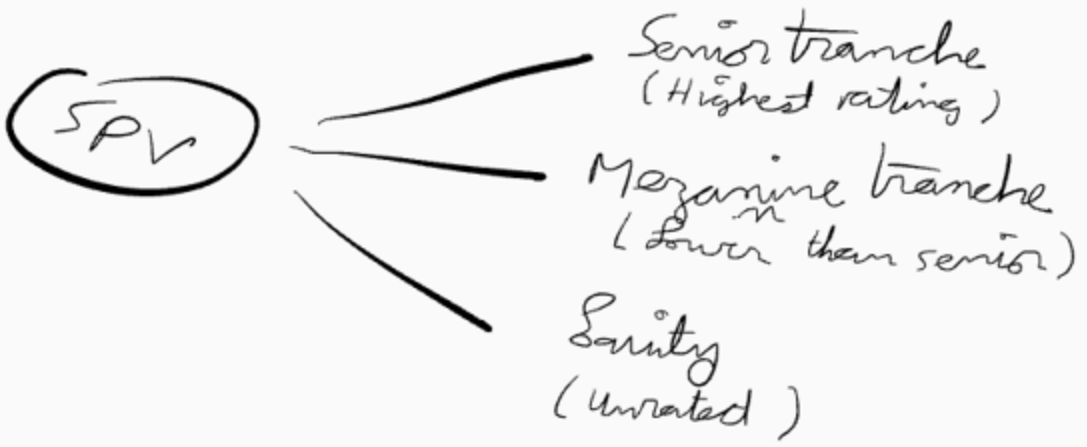
MBS

ABS

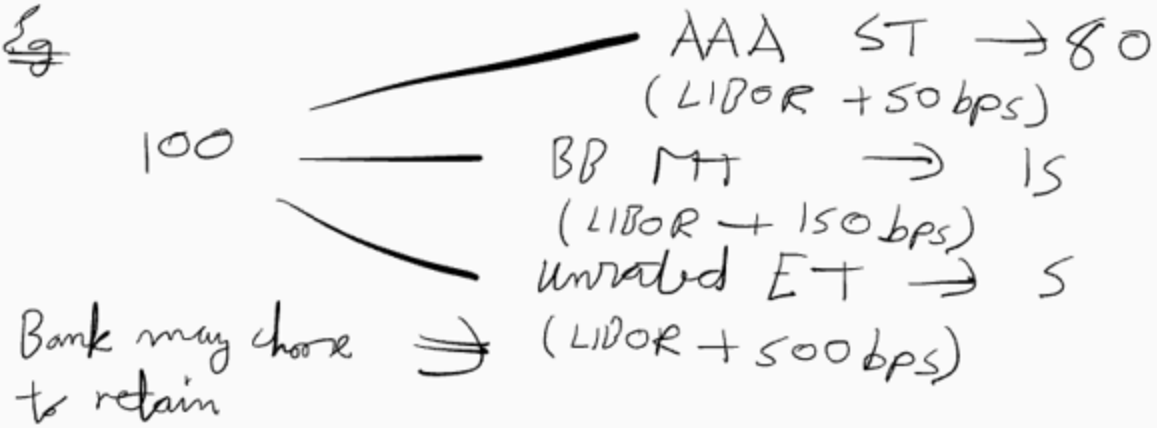
(Asset backed securities)

Bankruptcy remote

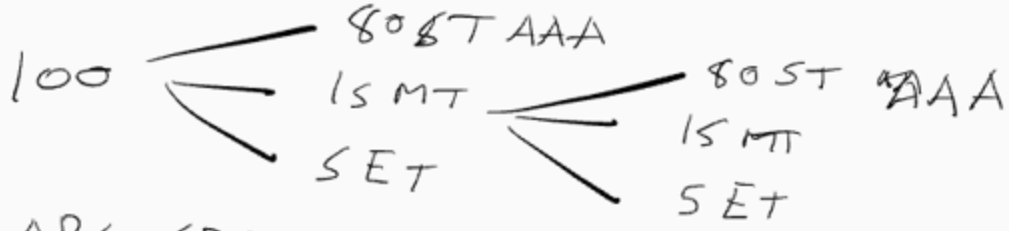
→ Generally issue bonds to investors



Eg



Bank may choose to retain



ABS CDO

Collateralized debt obligation

Major risks

→ Default risk

⇓

Default correlation

Keshav, Drishti, Akshay } Securitized loans by a bank

Joint default b/t customers to be low in good times

In bad times, generally default correlation increases

Eg: LTV ratio & FICO score

Inflate house values

⇓ Securitizations

Sub-prime < 700 FICO score

3 years ⇒ 5% teaser rate

27 years ⇒ LIBOR +7%.

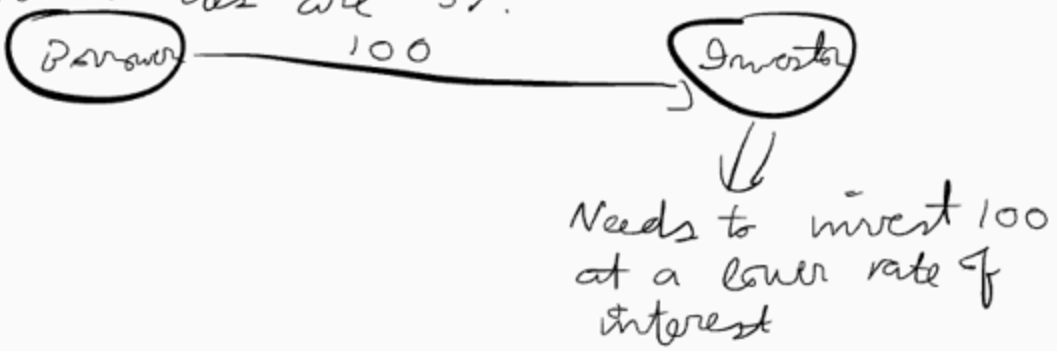
30

⇒ ~~Pre-payment risk~~

→ Borrowers repay their loans before maturity

→ Typically happens when interest rates are low

⇒ Loan int rate was 7%. current rates are 3%.



I] Broadly computed for loans

1) Delinquency Ratio

Days past due (DPD)

→ Affect your credit score
→ Difficult to obtain credit in the future
→ Will get credit at unfavorable terms
eg: high rates of interest

$$DR = \frac{\text{No. of delinquent loans}}{\text{No. of total loans}}$$

Practical aspects

Delinquent days > 60
∴ Basically if 2 EMI payments missed

Eg: On 31st Mar 2021,

	Total loans	Delinquent
Mortgage loans	1000	50
Credit card debt	3000	500

$$\text{Delinquency ratio} = \frac{50+500}{1000+3000} = \frac{550}{4000}$$

IFRS9 : Accounting standard for financial instruments

→ Give principles on computation of expected credit loss (provisions)

Stage 1	Stage 2	Stage 3
≤ 30 DPD	≤ 90 DPD	> 90 DPD

2.) **Default Ratio**

⇒ % of defaulted loans

$$\text{Default Ratio} = \frac{\text{No. of defaulted loans}}{\text{No. of total loans}}$$

→ Loans overdue > 90 days i.e. DPD > 90

Eg: Total loans = 2000

Loans with DPD ≤ 30 = 1500

" " DPD between 30 & 90 = 300

$$\text{Default rate} = \frac{200}{2000} = \boxed{10\%}$$

Impact

→ Impacts profitability

→ Impacts credit ratings

→ Impacts cost of debt & equity

3) Debt service coverage ratio

→ Indicate ability of borrower to meet debt obligations

→ Measure of current cash flow available

$$DSCR = \frac{\text{Net operating income}}{\text{Total service debt}}$$

Numerator = Revenue - Operating expenses

Denominator = Current debt obligations

→ Higher the DSCR, the better it is

→ Indicates a high operating income available to meet debt obligations

Eg: Operating income = 100,000

Annual debt payments = 30,000

$$DSCR = \frac{100,000}{30,000} = 3.33x$$

DSCR < 1 indicates insufficient cover available

Eg: ABC takes a loan from Bank XYZ. Bank XYZ adds a covenant to the loan stating that DSCR cannot fall below 3.5.

II.] Specific to mortgage backed securities

1.) Weighted average coupon

→ Measure of rate of return on the pool of assets currently held

Eg:

100,000	8%	5 years
200,000	7%	3 years
100,000	12%	10 years

$$WAC = 8\% \times \frac{100,000}{400,000} + 7\% \times \frac{200,000}{400,000} + 12\% \times \frac{100,000}{400,000}$$

$$= 2\% + 3.5\% + 3\% = \boxed{8.5\%}$$

After 2 years —

100,000	8%
50,000	7%
50,000	12%

$$WAC = \frac{1}{2} \times 8\% + \frac{1}{4} \times 7\% + \frac{1}{4} \times 12\%$$

$$= 8.75\%$$

Uses

→ Used in prepayment modelling

2.) Weighted Average Maturity (WAM)

⇒ Measures avg time to maturity of mortgage loans held

$$\frac{1}{C}\sum_{i} t_i \cdot C_i = WAM$$

$t_i \rightarrow$ Time to maturity for loan i

$C_i \rightarrow$ Principal o/s for loan i

$C \rightarrow$ Total principal o/s

Eg: $WAM = 5 \times \frac{1}{4} + 3 \times \frac{2}{4} + 10 \times \frac{1}{4}$

$= 5.25$ years

Uses

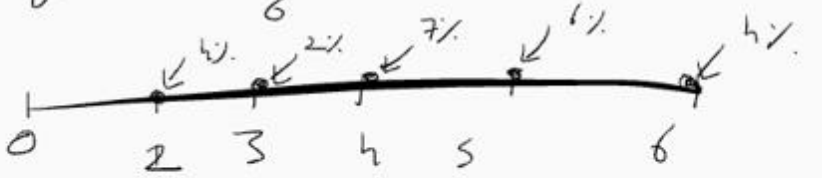
→ Can help an investor assess & match their future obligations

→ Bond laddering

→ Invest in bonds with different maturities

X	2
Y	3
Z	4
A	5
B	6

X	3
Y	3
Z	3
A	3
B	3



→ Allows to reinvest maturity proceeds at prevailing interest rates

→ Benefit is that reinvestment risk is reduced

3) Weighted Average Life (WAL)

→ Avg. time for loan to be repaid

Eg: Bond

t	C_t	$t \times C_t$
1	2,000	2000
2	3,000	6000
3	4,000	12000
	9,000	20,000

$$WAL = \frac{20000}{9000} = 2.22 \text{ years}$$

Uses

→ Used for analysing bond investments

→ Generally prefer loans with a lower WAL