

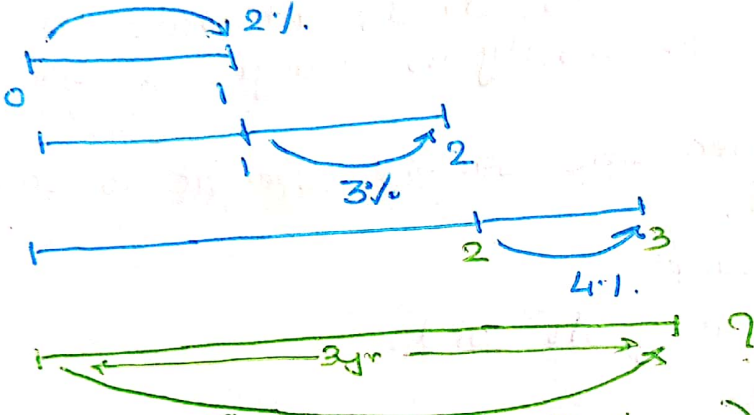
$$\therefore \text{IFR}_{6,2} = 0.02889 \times 2 = 0.05778$$

(3yly) implied forward yield is 5.778%, annualized for periodicity of two.

Q 1yr spot rate is 2%.

1yr forward rate 1yr from now (1yly) is 3%.

1yr forward rate 2yr from today (2yly) = 4%.



The idea is that borrowing for 3yrs at 3yr spot rate OR borrowing for 1yr period in 3 successive years, should have same cost.

$$(1 + S_3)^3 = [(1.02)^1 (1.03) (1.04)]$$

$$\therefore S_3 = [ \dots ]^{1/3} - 1 \Rightarrow 2.997\%$$

Refer to explanations of Schweizer!!!

[Discuss shortcut started in Schweizer]

### Yield Spreads:

→ It is difference in yield between different FI securities.

$$\text{YTM} = [\text{benchmark}] + [\text{spread}]$$

The benchmark yield for a fixed income security with a given time to maturity is base rate, often government bond yield.

Spread is the difference between the yield to maturity & the benchmark.

Benchmark captures macroeconomic factors:

- expected rate of inflation in currency in which bond is denominated
- general economic growth & business cycle
- foreign ex rates.
- impact of monetary & fiscal policy.

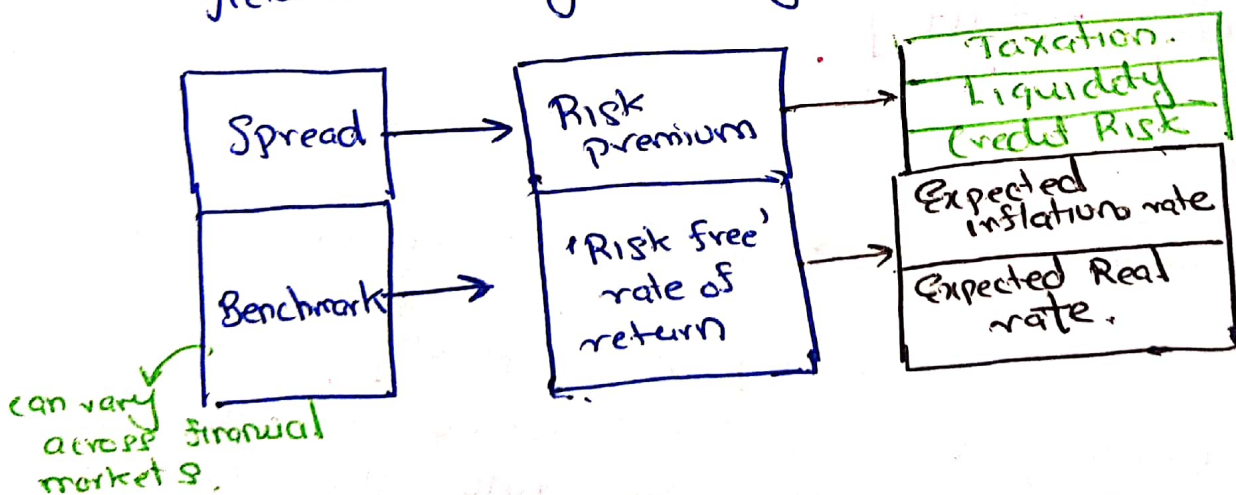
A change in any of above factors, affects all bonds in the market & effect is seen mostly in changes in benchmark yield.

Spread captures microeconomic factors specific to bond issuer & bond itself.

- credit risk of issuer
- changes in quality rating of bond.
- tax status of bond.

★ It should be noted, however that general yield spreads across issuers can widen & narrow with changes in macroeconomic factors.

Yield to Maturity Building Blocks.



Fixed rate bonds often use government benchmark security with 'same' or 'closest' time to maturity, to a specified bond.

Benchmark is usually most recently issued government bond & called 'on the run' security.

'On run government' bond is most actively traded security  
Seasoned government bonds are called 'off the run'.  
On run bonds typically trade at slightly lower YIMs than off run bonds, because of difference in demand for securities.

> frequently used benchmark, - LIBOR.

→ yield spread over specific benchmarks is referred to as 'benchmark spread' & usually measured in basis points.

→ yield spread in basis points over an actual or interpolated government bond is known as 'G spread'.

→ spread over government bond is return for bearing greater credit, liquidity & other risks, relative to sovereign bond.

Eg: A newly issued 5 year EUR bond priced at rate of 'mid swaps' + 150bps.

avg of 'bid' & 'offerred' swap rates.

→ yield spread is over 5yr EUR swaps, rather than government benchmark.

This yield spread of specific bond over standard swap rate in that currency of same tenor is known as 'I spread' or interpolated spread, to swap curve. (used for bonds denominated in Euros).

> Floating rate securities typically use 'LIBOR' as benchmark.

If yield increases, say from 6.25% to 6.50%,

we can introspect whether due to macroeconomic factors or microeconomic factors.

Yield Spreads over Benchmark yield curve:

Yield curve - relationship between YTM & time to maturity for securities with same risk profile.

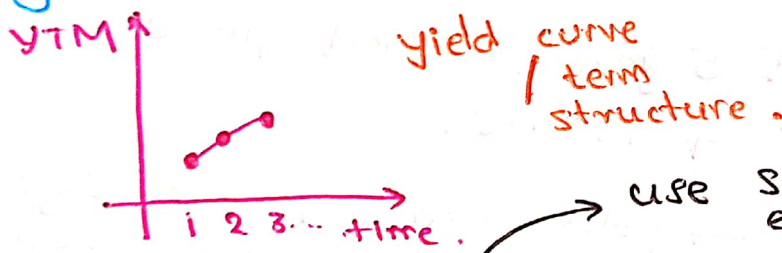
Eg: government bond yield curve is relationship between yields of on run government bonds and their times to maturity.

So, yield curves represent term structure of benchmark int rates, whether for

'risk free' government yields or

'risky' fixed swap rates.

> Benchmark yield curves tend to be upward sloping because investors typically demand premium for holding longer term securities.



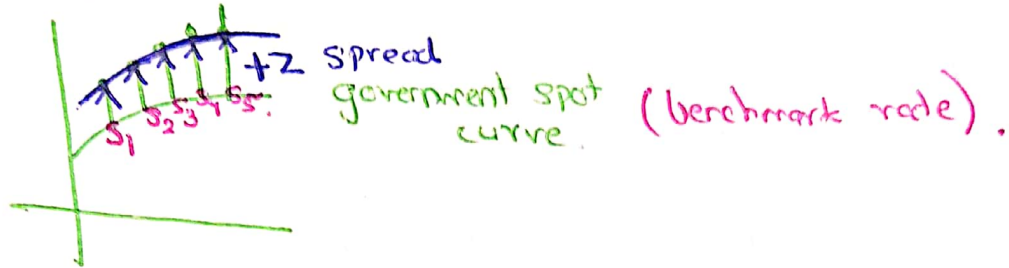
use same discount rate for each cash flow.

G spread & I spread measure difference b/w a static YTM of bond and Treasury yields or benchmark rates. (assuming yield curve is flat, so yields are approximately same across maturities)

But Z spread determines difference in yields with reference to whole term structure of int rates. ie Z spread can be calculated as:

$$P = \frac{CF_1}{(1+S_1+Z)} + \frac{CF_2}{(1+S_2+Z)^2} + \dots + \frac{CF_n}{(1+S_3+Z)^n}$$

>  $\geq$  spread calculates constant yield spread, over government (OR int rate swap) spot curve instead.



benchmark spot rates -  $S_1, S_2$  and  $S_3$  are derived from government yield curve (OR from fixed rates on IRS)

$\geq$  spread is same for all periods.

Also, called 'static spread', because constant.

Another perspective,

$\geq$  spread is an amount which when added to benchmark spot rates, produces value equal to market price of bond,

we have appropriate yield curve spread.

### Option Adjusted Spread :

$\geq$  spread is also used to calculate OAS on a callable bond. (embedded option)

>  $OAS = \geq \text{spread} - \text{option value (in bps)}$

Loosely speaking, OAS takes option yield component out of  $\geq$  spread measure.

i.e OAS is spread to government spot curve that bond would have if it were option free.