FI Active Management : Credit Strategies

12.1 : Credit Risk & Spread

Spread = excess return for the inherent risk

2 Crucial components of credit risk :

1. Probability of default (POD)
2. Loss given default (LGD)

total expected credit losses = $\sum$ POD × LGD

Spread ≈ POD × LGD

> **EXAMPLE: Credit spread, POD, and LGD**
>
> A credit analyst notes that an issuer has first lien bonds outstanding with a spread of 1.5%. The historical recovery rate for similar first lien bonds is 50%. The issuer is preparing to issue second lien bonds. The historical recovery rate of similar second lien bonds is 40%.
>
> **Calculate** the fair credit spread for the second lien bonds.

Spread = POD × LGD

POD = 1.5% ÷ (1 − 0.50) = 3%

(for first-lien)

spread (for second-lien) = 3% × (1 − 0.40) = **1.8%**

Credit Migration : risk of credit downgrade

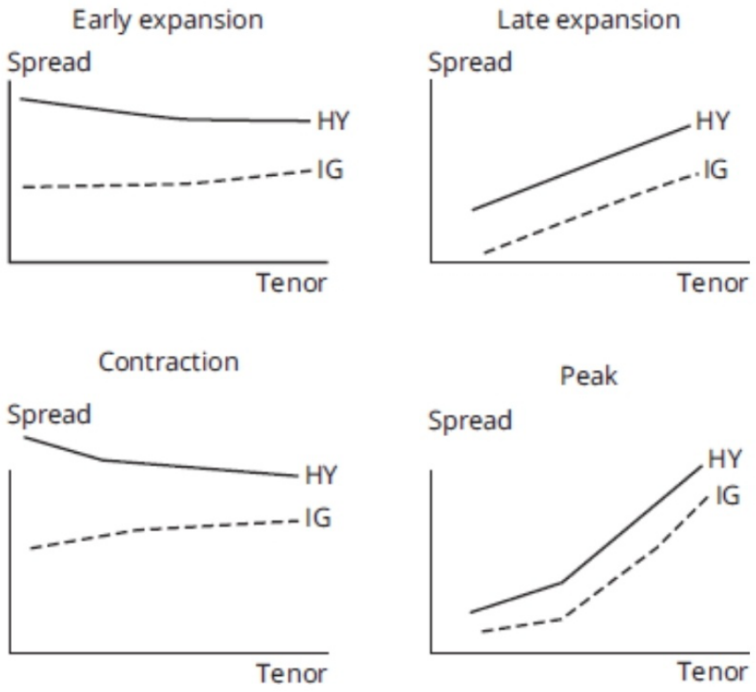
Credit Spread Curve : Credit spread vs. maturity.

	Early Expansion (Recovery)	Late expansion	Peak	Contraction (Recession)
Corp. Defaults	Peak	Falling	Stable	Rising
Credit Spread lvl	Stable	Falling	Rising	Peak
Credit Spread Slope	IG : stable HY : Inverted	Upward sloping	Upward Sloping	IG : flat HY : Inverted

IG : Investment Grade (BBB & Above)

HY : High-Yield / Speculative (BB & below)

Figure 12.1: Economic Cycle



Major difference : HY inversion in economic downturn
(near-term POG & downgrade risk is elevated)

risk-free rates & credit spread are NEG. CORRELATED.
(Strong econ condition => increasing r_f & lower spread b/c lower POD)

e.g. a 6% HY Bond, 4.4 Mod. Duration, BM Yield 2%
imagine a econ downturn, BM Yield becomes 1%,
BUT THE SPREAD IS NOW 5%
=> Observed sensitivity of bond is 0%, not 4.4%

↑ case of empirical duration vs. modified duration

MODULE QUIZ 12.1

1. At the peak of the economic cycle, the credit spread curve is *most likely*:
   A. rising and upward sloping.
   B. falling and downward sloping.
   C. rising and downward sloping.
2. Which of the following credit spread curves is *most likely* to invert during a recession?
   A. Both the IG curve and the HY curve.
   B. The IG curve only.
   C. The HY curve only.
3. Relative to its analytical duration, the empirical duration for a HY issuer is likely to be:
   A. lower.
   B. similar.
   C. higher.

1. A / lower defaults & increased profitability
=> short-term credit spread = low
long-term credit spread will likely increase.
due to higher leverage & increased inflation expectations over the longer run.

2. C / IG curve will usually flatten during downturn
HY will invert b/c of high level of HY defaults.

3. C (A) Analytical duration = theortical sensitivity of bond price (think: modified duration). As BM rates rise in good economic times, credit spread tends to fall. This inverse relationship will cause bond yields to move by less than BM rates. Hence, the bond price will empically less sensitive to changes in rates

Module 12.2 Credit Spread Measures

g-spread = bond YTM − interpolated YTM of two adj. maturity on gov. bond

EXAMPLE: Yield spread and *g*-spread

A credit analyst collates the following information regarding a corporate bond and two adjacent maturity on-the-run government benchmark securities:

	Maturity (Years)	Coupon	Yield	ModDur
Corporate bond	12	4.30%	4.5%	11.1
Government	10	2.75%	3.0%	9.2
Government	20	5.25%	5.0%	17.5

1. **Calculate** the yield spread and *g*-spread for the corporate bond.
2. **Calculate**, using both the yield spread and the *g*-spread, the estimated change in price of the corporate bond under the following scenario:
   – The corporate bond's spread and the 10-year government bond yield remain unchanged.
   – The 20-year government bond yield falls by 10 bps.

1. Yield Spread = 4.5 - 3.0% = 1.5%

↑ the closest-dated gov. bond yield

g-spread = $4.5 - \left(\frac{(5.0-3.0)}{10} \times 2 + 3.0\right)$

= 1.1%

↑ $12 = W \cdot 10 + (1-W) \cdot 20$

$W = 0.8$.

$0.8(3) + 0.2(5) = 3.4\%$

2. Corp. bond spread & 10-yr gov. bond yield remain unchanged:

Yield & price of bond are not expected to change.

20-year gov. bond yield falls by 10bp: 5% → 4.9%

new interpolated ytm = (4.9 - 3.0)/10 × 2 + 3

= 3.38%

using g-spread @ 1, corp. bond yield will move to 3.38 + 1.1% = 4.48% (change of 4.48% - 4.5% = -0.2%)

& chg. of price of -0.2% · 11.1 = -22.2%

i-Spread: Bond YTM - bond interpolated SFR.

advantage: based on a tradeable derivative.

asset swap spread: bond coupon - bond interpolated SFR.

EXAMPLE: *i*-spread and ASW

Recall the bonds from the previous example:

	Maturity (Years)	Coupon	Yield	ModDur
Corporate bond	12	4.30%	4.5%	11.1
Government	10	2.75%	3.0%	9.2
Government	20	5.25%	5.0%	17.5

Ten- and twenty-year swap spreads over similar maturity government bond YTMs are 20 bps and 30 bps, respectively.
Calculate the *i*-spread and the ASW for the corporate bond.

SFR(10y) = 3.0% + 0.20% = 3.20%
SFR(20y) = 5.0% + 0.30% = 5.30%
interpolated SFR = (5.30 - 3.20) ÷ 10 x 2 + 3.2%
= 3.62%
i-spread = 4.5% - 3.62% = 0.88%
ASW = 4.3% - 3.62% = 0.68%

z-Spread: bond's spread over risk-free spot rates

CDS Spread: fair value of the protection bought under a CDS contract, expressed as a periodic.

CDS basis = CDS Spread - z-spread

OAS Spread: bond's spread over an int. rate tree of potential future risk-free forward-rate paths.

Note: OAS is best, calculating OAS REMOVES impact of option (must use OAS to compare vanilla bonds w/ bonds w/ embedded options)

FRN Credit Spread Measures

FRN pays cpn = floating market reference rate (MRR) + fixed quoted margin (QM)

Since FRN cpn moves w/ MRR, FRN price is less sensitive to yield chg than fixed-rate cpn (i.e LOWER EffRateDur)

however, the QM is fixed so if the issuer credit quality declines, credit spread widens & price(FRN) declines.

EffRateDur > rates duration

Think: IRR

Required Return above MRR = Discounted Margin (DM)

if DM > QM => FRN will trade below Par

Important:

Expected future cpn are based on MRR + QM

discount rate is based on MRR + DM

$$EffRateDur_{FRN} = \frac{PV_- - PV_+}{2(\Delta MRR)(PV_0)}$$

$$EffSpreadDur_{FRN} = \frac{PV_- - PV_+}{2(\Delta DM)(PV_0)}$$

EXAMPLE: Discount margin

A 1-year FRN pays 3-month MRR + 1.25% on a quarterly basis. The current MRR is 0.55% and is assumed to stay constant over time, and the discount margin is 1.55%.

1. **State** whether the FRN will be trading below, equal to, or above par. **Justify** your response.
2. **Calculate** the value of $1 million of par of the FRN.

1. DM > QM ⇒ Below Par

2. MRR = 0.55%

Cpn = (0.55% + 1.25%) ÷ 4 = 0.46%

Cpn pmt = .45% · 1MM = 46% × 10,000 = 4,500

dis. rate = (0.65% + 1.55%) ÷ 4 = 0.525%

$$\text{price} = \frac{4{,}500}{1+0.525\%} + \frac{4{,}500}{(1+0.525\%)^2} + \frac{4{,}500}{(1+0.525\%)^3} + \frac{4{,}500+1MM}{(1+0.525\%)^4}$$

DM drawback: assume MRR is constant / term structure is flat.

zero-discount margin: incorporate term structure into the calculation (i.e.

Impact of Spreads on Port Return

EXAMPLE: Corporate vs. government bond rolldown

A manager collates the following information regarding a corporate bond and a benchmark government security with a similar maturity:

	Maturity	Coupon	YTM
Corporate bond	5	4.00%	2.25%
Government	4.5	2.00%	1.20%

Both bonds have a semiannual coupon. **Calculate** the annualized excess rolling yield earned by the manager if they hold the corporate bond versus if they hold the government bond over the next six months.

Price (Corp Bond)$_{now}$ = 10 N, I/Y 1.125, PMT 2, FV 100
= 108.232

Price (Corp Bond)$_{6m}$ = 9 N, I/Y 1.125, PMT 2, FV 100
= 107.450

Cpn Yield = 2 / 108.232 = 1.849%

Rolldown Yield = 107.450 / 108.232 − 1 = −0.723%

Total Annualized Return = (1.849% − 0.723%) × 2

= 2.25%

Price (Corp Bond)$_{now}$ = 9 N, I/Y 0.6, PMT 1, FV 100

= 103.494

Price (Corp Bond)$_{6m}$ = 8 N, I/Y 0.6, PMT 1, FV 100

= 103.115

Cpn Yield = 1 / 103.94 = 0.966%

Rolldown Yield = 103.115 ÷ 103.494 − 1 = −0.366%

Total Annualized Yield = (0.966% − 0.366%) × 2

= 1.20%

Excess rolling yield = 2.25% − 1.20% = 1.05%

When applying Step 4 of the return decomposition process, credit managers focus on the sensitivity of chg in yield spread via Effective spread duration & Effective spread convexity

$$\text{Effective spread duration} = \frac{PV_- - PV_+}{2(\Delta \text{spread})\,PV_0}$$

$$\text{Effective spread convexity} = \frac{PV_- + PV_+ - 2PV_0}{(\Delta \text{spread})^2\,PV_0}$$

$$\%\Delta \text{price} = (-\text{EffSpreadDur} \times \Delta\text{Spr}) + \left(\tfrac{1}{2} \cdot \text{EffSpreadConvexity} \times \Delta\text{Spr}^2\right).$$

Duration Time Spread (DTS) ≈ EffSpreadDur × spread

DTS × % change in index OAS = EffSpreadDur × spread × % change in index OAS

EXAMPLE: DTS

A portfolio manager collates the following information regarding their two-bond portfolio:

Issuer	OAS (bps)	EffSpreadDur	Weight
A-rated	180	9.0	70%
C-rated	400	9.5	30%

The current benchmark index OAS is 200 bps. **Calculate**:
1. The DTS of the portfolio.
2. The expected change in the value of the portfolio for a 20 bps increase in benchmark spread.

1. DTS of the portfolio
   = 30% (9.5 · 400) + 70% (9.0 · 180)
   = 2,274.
2. 20 bps / 200 = 10%
   227.4 · 0.1 = 22.7 bps.

Excess Spread

Expected excess spread = Spread − (EffSpreadDur × ΔSpread) − (POD × LGD)

EXAMPLE: Excess spread

A credit analyst collects the following information regarding a corporate bond:
- Effective spread duration: 4.5 years
- Current credit spread: 250 bps
- 1.5% annualized expected: POD
- Expected loss severity: 55%
- Expected credit spread in six-months' time: 270 bps

Evaluate the valuation of this corporate bond based on the estimates of the credit analyst and the bond's expected excess spread over a six-month holding period.

Expected excess spread = Spread − (Eff Spread Dur × Δspread) − (POD × LGD)

= (0.025 × 0.5) − (4.5 × (0.027 − 0.025)

− (0.015 × 0.6 × 0.55)

= −6.25 bps

MODULE QUIZ 12.2

1. A manager is calculating spread measures for a 12-year corporate bond using on-the-run Treasury bonds with 10 years and 15 years to maturity. In an upward-sloping yield curve environment, the manager will calculate a yield spread that is:
   A. lower than the *g*-spread.
   B. equal to the *g*-spread.
   C. higher than the *g*-spread.
2. For a corporate fixed-coupon bond trading below par, the *i*-spread will be:
   A. lower than the ASW.
   B. equal to the ASW.
   C. higher than the ASW.
3. A manager holds £1,000,000 face value in each of bonds X and Y. Bond X is priced at 102 with accrued interest of 1.0 per 100 par and an OAS of 120 basis points. Bond Y is priced at 94 with accrued interest of 1.5 per 100 par and an OAS of 140 basis points. The OAS of the portfolio is *most likely*:
   A. below 130 bps.
   B. equal to 130 bps.
   C. above 130 bps.
4. During an economic recovery, the Z-DM for an FRN is *most likely*:
   A. lower than the DM.
   B. equal to the DM.
   C. higher than the DM.

1. C / The g-spread compares corp bond yield to interpolated gov. YTM. Given YC is upward-sloping, g-spread will be lower than the yield spread.

2. B (C) i-spread : corp. YTM − interpolated swap rate. The ASW (asset swap spread) is bond cpn − interpolated swap rate. Since bond is trading below par, YTM of bond will be higher than its cpn ⇒ i-spread will be higher than ASW.

3. B (A) First, solve for MV of X & Y:

MV(X) : £1,000,000 × (1.02 + 0.01) = 1,030,000

MV(Y) : £1,000,000 × (0.94 + 0.015) = 955,000

£1,030,000 + £955,000 = £1,985,000

Weight of X : 1030000 / 1985000 = 0.51889

Weight of Y : 0.48111

given X has a higher weight than Y in portfolio, higher weight in the 120 bps than in 140 bps.
⇒ portfolio OAS will be less than 130 bps.

4. C (A) The DM assumes that the YC is flat b/c. it is the constant margin above the MRR required by investor. The Z-DM reflect the term structure of the MRR curve in that it reflects the constant return in excess of the MRR spot rates required by investor.
Upword sloping MRR curve
⇒ MRR spot rates will be higher than current MRR as maturity increases & Z-DM is lower than DM.

12.c. Bottom-up & Top-down Credit Strategies

Bottom-up: first identify the universe of bonds relevant to their mandate, then divide the universe by industry and/or geography

Factors to consider in assessing likelihood of issuer making scheduled principal & interest payment:
- Operating History & competitive position of issuer within the industry
- Relevant financial ratios relating to profitability, leverage & coverage ratio.

Credit Risk Models

2 types: structural models & reduced form models

Structural model : assume POD to be driven by the likelihood of the FV of borrower's assets falling below threshold & trigger default.

Reduced form : look for relationship b/w macro conditions & individual characteristics of the borrower (e.g. financial ratios).

e.g. Altman's z-score

$$z\text{-score} = (1.2 \times A) + (1.4 \times B) + (3.3 \times C) + (0.6 \times D) + (0.999 \cdot E)$$

where

A = working cap. / total assets.
B = retained earning / total assets.
C = EBIT / total assets.
D = MV(Equity) / total liabilities
E = sales / total assets.

z-score $> 3.0 \Leftrightarrow$ low chance of default
$1.8 \leq$ z-score $\leq 3.0 \Leftrightarrow$ some risk of default
z-score $\leq 1.8 \Leftrightarrow$ likely to default

Bottom-Up Relative Value Analysis.

Expected excess spread calculation introduced in the previous section can be used in a relative value analysis.

Bond w/ highest expected excess spread $\Leftrightarrow$ offers the best relative value.

EXAMPLE: Relative value analysis using spread curves

A corporate issuer has the option-free bonds outstanding displayed below:

Maturity (yr)	Coupon	YTM
2	0.5%	0.9%
5	2.0%	1.5%
15	3.5%	3.5%

On-the-run benchmark bonds have the following yields:

Maturity (yr)	YTM
2	0.2%
5	0.8%
10	2.0%
30	4.0%

The company plans on issuing a new bond with maturity of 10 years. Expectations are that the new bond will offer 5 bps more than the credit spread derived from interpolating the existing credit spread curve for the issuer.

Calculate the fair credit spread for the new 10-year bond issue.

Interpolate the credit spread w/ 5y & 15y bond

5y credit spread = 1.5% - 0.8% = 0.7%

15y credit spread = $3.5\% - [(4.0-2.0) \div (30-10) \times 5 + 2.0]$

$= 3.5\% - 2.5\%$

$= 1\%$

10y credit spread = $(1\% - 0.70\%) \div (15-5) \times 5 + 0.70$

$+ 0.05$

$= 0.90\%$

Top-Down Credit Strategies.

focus on macro factors likely to affect portfolio (e.g. strength of economic growth & corp. profit)

also used to identify sectors of market likely to improve / deteriorate.

focus on historical patterns (credit cycle, credit spread changes)

Factor-based Credit Strategies

4 factors in offering risk premium:

1. carry (expected return if conditions remain unchanged, measured by OAS).
2. Defensive (emprical evidence suggesting low risk assets offers higher risk-adjusted return than high-risk).
3. Momentum (bonds that have recently outperformed will continue to outperform).
4. Value (low MV vs. fundamental value or high excess return)

ESG factors

Techniques in ESG investing:

- Negative screening to exclude industries/companies/sovereigns w/ poor ESG records.
- Use of ESG ratings to target issuers with favorable ESG. characteristics.
- Investing to directly fund ESG-specific initiatives. (e.g. green bonds)

MODULE QUIZ 12.3

1. Altman's *z*-score model is specified as follows:

   z-score model = (1.2 × A) + (1.4 × B) + (3.3 × C) + (0.6 × D) + (0.999 × E)

   where:

   A = working capital / total assets

   B = retained earnings / total assets

   C = EBIT / total assets

   D = market value of equity / total liabilities

   E = sales / total assets

   A corporate issuer has sales of $2,000, total assets of $3,500, working capital of $2,100, retained earnings of $1,900, EBIT of $600, total liabilities of $1,200, and the market value of the company's equity is $3,000. The Altman's *z*-score for this company implies that the issuer has:

   A. low default risk.
   B. some risk of default.
   C. high default risk.

2. An analyst is using a structural model to assess the credit risk of a corporate issuer. Which of the following changes to the inputs of the model will *most likely* decrease the probability of default of the issuer?
   A. A decrease in the interest coverage ratio of the issuer.
   B. A decrease in the volatility of the issuer's share price.
   C. An increase in the leverage ratio of the issuer.

3. A credit analyst collates the following information regarding two corporate issuers:

Rating	EffSpreadDur	YTM	OAS (bps)	POD	Recovery Rate
A	6	3.5%	150	0.25%	40%
B	8	6.0%	300	3.00%	40%

   The manager expects spreads to widen by 15%. Based on excess spread, which of the following statements is accurate?

   A. The A-rated bond is more attractive than the B-rated bond.
   B. The A-rated bond and B-rated bond are both of similar attractiveness from a valuation perspective.
   C. The A-rated bond is less attractive than the B-rated bond.

4. Which of the following fixed-income risk factors suggests that low duration bonds should have higher risk-adjusted returns?
   A. Carry.
   B. Defensive.
   C. Value.

1. A / A = 2100 / 3500 = 0.60

   B = 1900 / 3500 = 0.54.

   C = 600 / 3500 = 0.17.

   E = 2000 / 3500 = 0.57.

   z-score model = (1.2 × 0.60) + (1.4 · 5.4) + (3.3 × 0.17) + (0.6 · 2.5) + (0.999 · 0.57)

   = 4.11

2. B / Under structured model, the prob. of default is measured by how far the asset of the issuer are away from a level that would trigger a default in terms of std. deviation.

3. C (A) Excess spread is calculated using the formula: expected excess spread = spread − (EffSpreadDur × Δ spread) − (POD × LGD)

Given a 15% increase in spreads:
excess spread for A-rated bond:
$0.015 - [6 \times (0.15 \times 0.015)] - [0.0025 \times (1-0.4)]$
$= 0\%$
excess spread for B-rated bond:
$0.03 - [8 \times (0.15 \times 0.03)] - [0.03 \times (1-0.4)]$
$= -0.024$
With a higher excess spread, A-rated bond offers a more attractive valuation than B-rated bond.

4. A (B) The carry factor represents returns earned from holding fixed-income securities over time. The value factor represents returns available from investing in bonds w/ low value relative to their fundamental value. The defensive factor suggests that risk-adjusted returns for less risky securities are superior to those of higher risk (longer duration) securities.

Module 12.4: Liquidity & Tail Risk

For illiquid bonds, matrix pricing (or evaluated pricing) is often used to estimate fair value via reference to the yields & prices of similar, actively traded bonds.

To measure transaction costs, use effective spread:

eff. spread for a buy order = trade size
× (trade price − midquote)

eff. spread for a sell order = trade size
× (midquote − trade price)

To manage liq. risk,
- use more on-the-run bonds
- use more FI alternatives (e.g. CDS, ETF).
- use asset swap to hedge exposure.

Tail Risk.

- the risk of losses due to infrequent but high negative impact events
- VaR & 3 common methods:
  1. Parametric Method
  2. Historical Simulations
  3. Monte Carlo Analysis

EXAMPLE: Fixed-rate bond VaR

A fixed-income manager invests $100 million into a 15-year bond with a coupon of 2%, yield of 3%, and a modified duration of 12. If daily yield volatility is assumed to be 1.5%, what is the VaR for the position at 99% confidence (1% in the tail) for one month (assuming 20 trading days in the month and normally distributed yields)?

20-day yield = $1.5\% \times \sqrt{20} = 6.708\%$

Single S.D. move = $6.708\% \times 3\% = 0.2012\%$

/ /

⇒ 1% VaR for a portfolio = 0.2012% × 2.33 = 46.9 bps.

Impact on portfolio of a 46.9 bps move

= -12 × 0.469%

= -5.63% (of 100 MM)

= 5.63 MM loss.

VaR drawback:

- tail events are more freq. & severe than VaR forecasts
- fails to capture correlation & liquidity
- fails to quantify expected loss

Extensions of VaR:

- Conditional VaR (CVaR).
- Incremental VaR (IVaR)
- Relative VaR

MODULE QUIZ 12.4

1. An active credit manager has a holding in a 5% coupon corporate bond, the size of which is 10 times the average daily trading volume according to historical TRACE data. In order to manage the interest rate risk of liquidating this position, the manager should enter:
   A. a pay-fixed swap and unwind the swap over time as the bond is sold.
   B. a pay-fixed swap and unwind the swap once the bond is fully sold.
   C. a receive-fixed swap and unwind the swap over time as the bond is sold.
2. An active credit manager can *best* assess the impact on the risk profile of a portfolio by increasing or decreasing an active position in the portfolio through using:
   A. relative VaR.
   B. incremental VaR.
   C. conditional VaR.

1. A ✓
2. B ✓

Module 12.5: CDS & Synthetic Strategies

CDS Mechanics

Fixed Cpn is standardized to be 1% for IG & 5% for HY.

Fixed Cpn is NOT always a fair premium paid by the protection buyer

CDS Spread	Upfront Prem.
= fixed cpn	None
> fixed cpn	(CDS Spread - fixed cpn) x EffSpreadDur paid to seller
< fixed cpn	(fixed cpn - CDS Spread) x EffSpreadDur paid to buyer

also conforms w/ the usual inverse price/yield relationship

$$\text{CDS price} \approx 1 + [(\text{fixed cpn} - \text{CDS spread}) \times \text{EffSpreadDur}]$$

EXAMPLE: CDS price and price changes

A manager purchases protection on a high-yield reference obligation using a 5-year CDS contract with a CDS spread of 5.5% and an effective spread duration of 4.5.

Calculate:

1. The up-front premium and the price of the CDS.
2. The mark-to-market gain or loss to the protection buyer if the CDS spread immediately falls to 5.4%.

CDS Spread = 5.5%, fixed cpn = 5%

upfront prem = (5.5% − 5%) × 4.5

= 2.25%.

price flipped b/c of inverse relationship.

CDS price = 1 + (5% − 5.5%) × 4.5

= 97.75%

think of CDS seller needing to sell below par to attract buyers

CDS price will have gone up, MTM LOSS

Think of protection buyer as synthetically shorting the bond

CDS can be single name or index-based

Active CDS Strategies : CDS Long-Short strategy & CDS curve trades

EXAMPLE: CDS long-short strategy

A manager wishes to increase exposure to XYZ Corp and decrease exposure to ABC Corp in their credit portfolio. Details of CDS contracts on the two companies are displayed here:

	Tenor (Years)	CDS Spread (bps)	EffSpreadDur
ABC Corp	5	220	4.59
XYZ Corp	5	240	4.62

Describe the appropriate long-short CDS trade to meet the manager's objectives. **Calculate** the manager's return if ABC Corp spreads widen by 15 bps and XYZ Corp spreads narrow by 20 bps, based on $15 million notional principal for each contract.

Want to short ABC, long XYZ.

⇒ Buy CDS on ABC, sell CDS on XYZ.

XYZ spread narrows by 20 bps ⇒ profit 0.20% · 4.62 = 0.924%

ABC spread widens by 15 bps ⇒ profit 0.15% · 4.59 = 0.68%

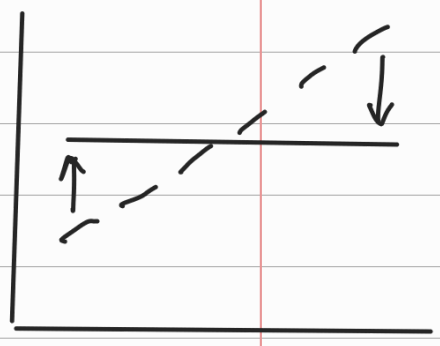
Curve Trade: profit on view on changes in the CDS curve (buying where spreads are expected to rise. & selling where spreads are expected to fall)

EXAMPLE: Duration-neutral CDS curve flattener

An active credit manager expects the upward-sloping CDS curve for high-yield U.S. issuers to flatten. Details of the 5-year and 10-year CDS index contracts are displayed here:

Issuer	Tenor (Years)	CDS Spread (bps)	EffSpreadDur
HY CDS index	5	410	4.78
HY CDS index	10	490	9.18

1. **Describe** the appropriate long-short CDS to profit from the manager's view, assuming they wish to remain duration neutral and hold a $5,000,000 notional position in the 5-year contract.
2. **Calculate** the investor's return if 5-year spreads fall by 5 bps and 10-year spreads fall by 20 bps.



want to long long mat. → sell CDS
short short mat → buy CDS

2. 5 yr fall by 5 bps. → −0.05 · 4.78
10yr fall by 20bps → +0.2 · 9.18

Static Credit Spread Curve Strategies

EXAMPLE: Credit spread curve buy-and-hold strategy for static credit curve

An active credit manager collates the following data regarding the bonds of a corporate issuer and comparable government benchmark bonds. All coupons are semiannual, and all government securities listed are trading at par.

	Corporate Bonds			
Maturity (Years)	Coupon	YTM	Price	Govt. Par Yields
5	2.00%	2.00%	100.0000	0.50%
10	2.40%	2.30%	100.8888	0.80%
15	3.10%	2.90%	102.4187	1.10%

The manager expects a stable credit spread curve over the next six months and consequently takes an overweight position of $10 million face value of the 15-year corporate bond versus the 10-year corporate bond in order to extend the credit duration of the portfolio.

1. **Calculate** the incremental coupon income and rolldown price appreciation earned by the manager from extending the credit duration of the portfolio.
2. **Determine** the attribution of this incremental return to benchmark yield versus credit spread. **Show** your calculations.

1. Incremental Cpn Income = [0.031 − 0.024] ÷ 2 × 10 MM
= 35,000

Price of 10y bond in 6month:

(interpolated) yield = (2.30% − 2%) ÷ (10 − 5) × 4.5 + 2%
= 2.27%

Price in 6m = PMT = 1.2, I/Y = 2.27% ÷ 2 = 1.135%.
FV = 100, N = 19. Price = 101.1053.

org = 100.8888

Rolldown Return = (101.1053 − 100.8888) /100 · 10MM = 21,650

Interpolated 14.5y yield = (2.90 − 2.30) ÷ (15 − 10) × 4.5 + 2.3%
= 2.84%

Price in 6m = PMT = 1.55, I/Y = 2.84% ÷ 2 = 1.42%.
FV = 100, N = 29 Price = 103.0726

org = 102.4187

Rolldown Return = (103.0726 − 102.4187) /100 · 10MM = 65,390

2. Return on BM Yield:

9.5y yield = (0.80 - 0.50) ÷ (10 - 5) × 4.5 + 0.50%
= 0.77%.

Price (9.5y)

9.5y yield = (1.10 - 0.80) ÷ (15 - 10) × 4.5 + 0.80%
= 1.07%.

Chg in g-spread: (Corp YTM - Gov YTM) over the 6m:

Bond	Corp YTM	Gov. YTM	g-spread.
10y @ init	2.30%	0.80%	1.50%
9.5y in 6M.	2.27%	0.77%	1.50%
Chg.	-0.03%	-0.03%	0%
15y @ Init	2.90%	1.10%	1.80%
14.5y in 6M.	2.84%	1.07%	1.77%
Chg	-0.06%	-0.03%	-0.03%

Recall the total rolldown return of 15y = 65,390
Since 50% of fall in corp. YTM falls into g-spread & govt. YTM evenly, 32,695 is attributable to changes in BM yield

Bond	Total Rolldown Ret.	BM Yield	Credit Spread
10yr	21,690	21,690	0
15yr	65,390.	32,695	32,695
Incremental	43, 740	11, 045	32,695

EXAMPLE: CDS strategy for a static credit spread curve

A manager expects a static credit spread curve over the next 12 months and plans to increase the spread duration of the portfolio in order to enhance returns. They collect the following information regarding CDS contracts on a domestic HY index:

Reference Obligation	Tenor (Years)	CDS Spread (bps)	EffSpreadDur
HY index	5	450	4.8
HY index	10	550	8.9

The manager takes the appropriate position in $50 million notional of the 10-year CDS. Assume annual coupon payments and a 9-year effective spread duration of 8.1.

1. **State** whether the manager should buy or sell protection in the 10-year CDS.
2. **Calculate** the total coupon income and rolldown return from the position in the 10-year CDS.

1. Sell CDS $\Leftrightarrow$ Increase Duration.

2. Spread = 550 bps

Prem = (550 bps − 500 bps) × 50MM.

= 250,000

CDS Price = 1 + − 50bps × 8.9

= 1 − 4.45%

= 0.9505.

Rolldown Return = 1+(600 − 530) × 8.9. ← needs to be interpolated

= 1 − 2.67% 8.1

= 0.9733 × 0.9757.

Dynamic Credit Spread Strategies

EXAMPLE: Dynamic credit curve cash strategy—economic slowdown

An active credit manager collects the following information on three corporate bonds in their investment universe:

Rating	Current OAS	Expected Loss (POD × LGD)	EffSpreadDur
A	1.30%	0.09%	6.00
BBB	1.72%	0.39%	6.60
BB	2.60%	0.79%	5.90

The manager's benchmark is equally weighted across the three zero-coupon bonds. The manager is expecting an economic slowdown causing divergence in the changes of HY spreads relative to IG spreads over the next 12 months. The manager intends to take a 100% long position in a single bond and a 100% short position in a single bond to profit from this view.

1. **Describe** the trades the manager should make to profit from their credit spread curve view.
2. **Calculate** the excess spread of the portfolio and the benchmark under an economic slowdown where both OAS and expected loss increase by 40% for IG bonds and 80% for HY bonds.

1. Divergence = HY Yield Overvalued, IG undervalued
   short BB x A long BBB
   Close enough

2. excess spread = Spread − (effSprDur × Δspr) − LGD × POD.
   A = 0.013 − (6 · 0.4 · 0.013) − 0.0009 · 1.4

EXAMPLE: Dynamic credit curve synthetic strategy—economic slowdown

A credit analyst collates the following information regarding CDS contracts on an IG index and a HY index:

Reference Obligation	Tenor (Years)	CDS Spread (bps)	EffSpreadDur
IG index	5	100	4.65
HY index	5	250	4.63

The manager is expecting an economic slowdown causing divergence in the changes of HY spreads relative to IG spreads over the next 12 months. The estimated spread durations of the IG index and HY index in 12 months' time are 3.85 and 3.82, respectively. The manager intends to invest in a long-short CDS trade with notional of $50 million in each of the contracts listed to profit from this view.

1. **Describe** the trades the manager should make to profit from their credit spread curve view.
2. **Calculate** the total return of the strategy under an economic slowdown where CDS spreads increase by 40% for the IG index and 80% for the HY index.

1. Short BB → Long BB CDS., Short IG CDS.

Long

MODULE QUIZ 12.5

1. A CDS contract on a HY issuer has a CDS spread of 4.7% and effective spread duration of 4.5. The up-front premium on $10 million notional of this contract is:
   A. $135,000 and paid to the protection seller.
   B. $135,000 and paid to the protection buyer.
   C. $1,665,000 and paid to the protection seller.
2. An active credit manager expecting a stable credit curve is *least likely* to:
   A. sell protection in longer-dated CDS contracts.
   B. buy protection in shorter-dated CDS contracts.
   C. lower the credit rating of the portfolio.
3. An active credit manager who is expecting an economic recovery should *most likely*:
   A. lower exposure to HY securities.
   B. use CDS contracts to sell short-dated protection and buy long-dated protection.
   C. use CDS contracts to buy protection on HY issuers and sell protection on IG issuers.
4. An active credit manager decides to overweight exposure to an investment-grade company using $10 million notional of CDS contracts with tenor of 5 years, a CDS spread of 150 basis points, and a spread duration of 4.5. One year later, the CDS spread is 120 basis points and the spread duration is 3.5. The profit from the CDS trade is *closest* to:
   A. $100,000.
   B. $155,000.
   C. $255,000.

1. A (B) Upfront premium
= (fixed cpn - CDS spread) × EffSpreadDur × notional
= (0.05 - 0.047) × 4.5 × 10,000,000
= $135,000
Since fixed cpn paid is higher than the CDS spread, up-front prem is paid from the seller to the buyer.

2. B. ✓
Managers expecting a static credit spread curve should enhance the return of the portfolio via lowering the credit rating of the portfolio (buy HY bonds, sell HY protection) or extending the spread duration of the portfolio (buy longer-dated bonds, sell longer-dated CDS contracts)

3. B ✓ An economic recovery is likely to see HY spreads fall more than IG spread & credit curves steepening. (i.e manager should therefore sell protection on HY issues vs. buy protection on IG). To profit from the steepening curve, they should sell short-term protection & buy long-term protection.

4. initial price of CDS = 1 + [(0.01 - 0.015) × 4.5]
= 0.9775.
price after 12 months = 1 + [(0.01 - 0.012) × 3.5]
= 0.993

Price from price chg = (0.993 - 0.9775) × 10,000,000
= $155,000

Total Profit = $155,000 + 100,000
= $255,000

Module 12.6: Global Credit Strategies, Structured Credit & FI Analytics

12.i: Considerations in constructing / managing portfolios across int'l credit markets.

Global Credit Strategies

Considerations when engaging in cross-border credit strategies:

- Attempts to diversify thru investing in diff sectors in an emerging market that's heavily reliant upon a dominant industry or commodity export
- Significant sector difference may exist (even b/w developed markets)
- Diff. in accounting std. may affect liquidity, profitability & solvency ratio.

- Diff in magnitude & timing of the credit cycle across countries. often present opportunities in yields, FX rate & credit spread curves.

EXAMPLE: Cross-border credit strategy

A U.S.-based active credit manager has the view that an economic recovery will see European credit outperform U.S. credit over the next 12 months. They identify the following CDS contract based on a European HY index:

Reference Obligation	Tenor (Years)	CDS Spread (bps)	EffSpreadDur
EUR HY index	5	450	4.55

Calculate the price return (ignoring coupon) of the appropriate position in the above CDS contract if the European credit spreads fall by 20% and the EUR strengthens against the USD by 2%.

Initial price = $1 + (0.05 - 0.045) \times 4.55 = 1.02275$.

After the fall in spreads,

new price = $1 + (0.05 - 0.045 \times 0.8) \times 4.55 = 1.0637$

$R_{FC} = 1.0637 \div 1.02275 - 1 = 4\%$

$R_{DC} = 1.04 \times 1.02 - 1 = 6.08\%$

Considerations when assessing the willingness & ability of EM gov't to meet their sovereign debt payments:

- Institutional consideration
- Economic profile
- Exchange rate regime

Structured Credit

12.j. use of structured financial instruments.

2 primary reasons to invest in Structured Credit:

1. Structured instrument issues different tranches of security, allowing investors to create risk exposures not available thru. investing directly in the collateral CDOs & CLOs offer tranches.

2. Structured instrument offers exposure to collateral that the investor cannot access directly (e.g. MBSs, ABSs, covered bonds)

FI Analysis

Comprises of 3 major parts: inputs, user-defined params, outputs

MODULE QUIZ 12.6

1. An active credit manager has exposure to two emerging markets, Market A and Market B, with the following economic profiles:

	Country A	Country B
Foreign debt/GDP	100%	60%
Budget deficit/GDP	4%	6%
Currency reserves/GDP	12%	21%

Based on these ratios, if the manager wishes to invest in the country with the greatest fiscal stability, they should increase exposure to:

A. Country A and reduce exposure to Country B due to the relative budget deficit/GDP ratios.
B. Country B and reduce exposure to Country A due to the relative foreign debt/GDP ratios.
C. Country B and reduce exposure to Country A due to the relative currency reserves/GDP ratios.

2. After recent central bank actions, an active credit manager expects an economic recovery and a strong rebound in residential housing prices. The portfolio position *most appropriate* to profit from this view is to sell:

A. the BB-rated tranche of a credit card ABS and buy the AA-rated tranche of the same structured product.
B. the AA-rated tranche of a CDO and buy the BB-rated tranche of the same structured product.
C. the AA tranche of an MBS and buy the BB tranche of the same structure product.

3. A manager performing risk analytics on their portfolio of MBS securities is *most likely* to increase the future value output of their portfolio relative to similar option-free bond holding through making which of the following input changes?

A. A downward parallel shift in the yield curve.
B. An increase in interest rate volatility.
C. A decrease in interest rate volatility.

1. C (A) If the manager wishes to invest in countries with the greatest fiscal stability, they should invest in countries w/ lowest budget deficit / GDP ratios.

2. B (C) In anticipation of an economic rebound, manager should lower the credit quality of investments since HY spreads will likely contract by more than IG spreads. The manager can incorporate their view on a housing market recovery by using MBS securities.

3. B (C) MBS contains a short prepayment option (think: call option) which becomes more valuable if int. rate volatility increases. Therefore, MBS security will be more valuable if vol. assumption falls & embedded short prepayment option value falls.

/ /

Quoted margin (QM), which is the yield spread over the MRR upon issuance of the floating rate note (FRN), compensates investors for the issuer's credit risk. Discount margin (DM) is the yield spread over the MRR that prices the FRN at par on each reset date. Zero-discount margin (Z-DM), which is the yield spread over the forward MRR curve, is the fixed periodic adjustment to the FRN pricing model that is required to solve for the observed market price.

Noting that the economy is in the beginning of the recovery phase, the creditworthiness of the Canadian issuer is expected to improve over time, resulting in a decrease in the DM. As a result, the QM is expected to be higher than the DM since the QM does not reflect credit risk changes over time.

Because the recovery is expected to continue for the coming years, Z-DM (a forward-looking spread) is expected to be lower than the DM. As a result, QM > DM > Z-DM.

DM, which represents the spread that prices the FRN at each settlement date at par, is expected to be lower than QM because the creditworthiness of the bond will improve.

Because the recovery is expected to last for the coming years, Z-DM, which is the yield spread over the forward MRR, is expected to be lower than DM.