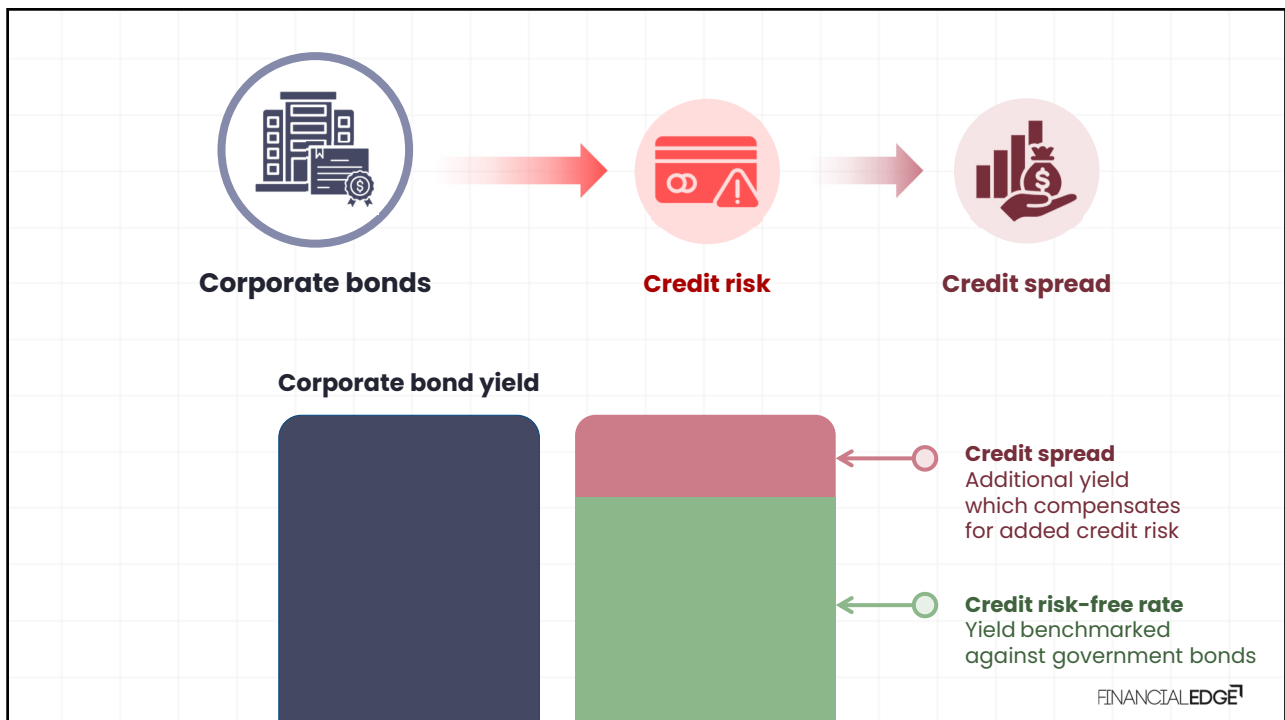
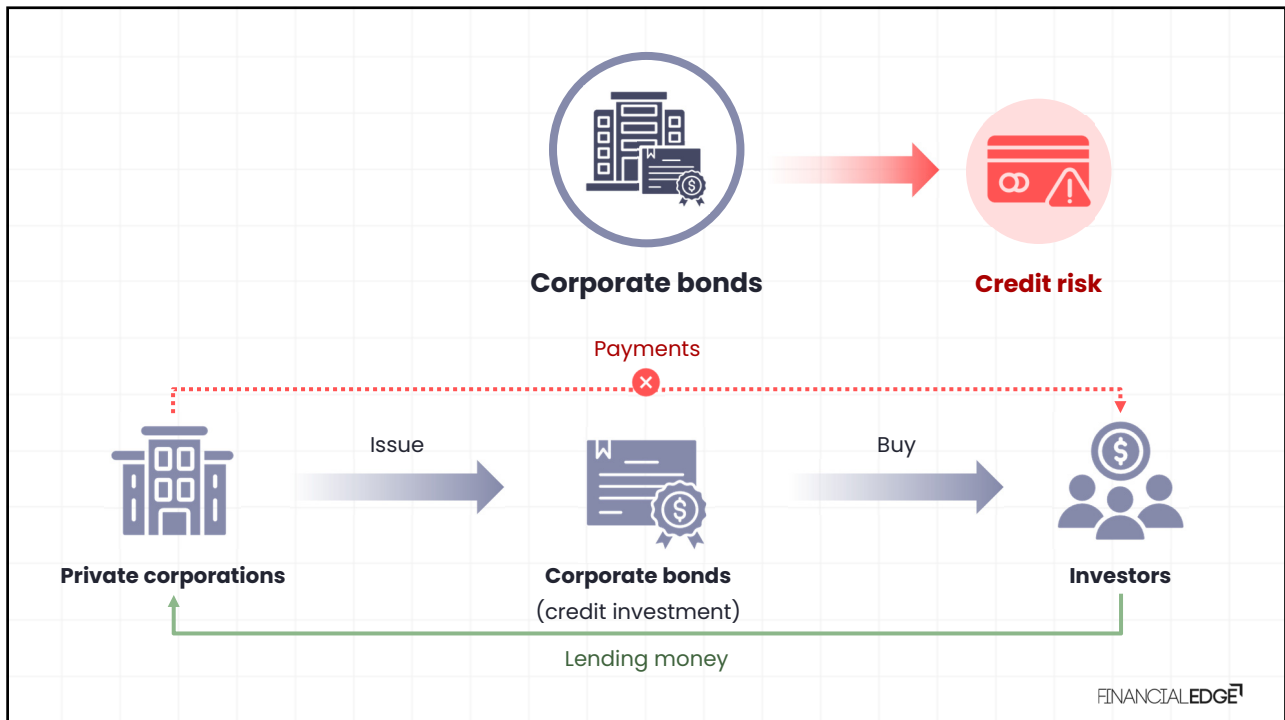


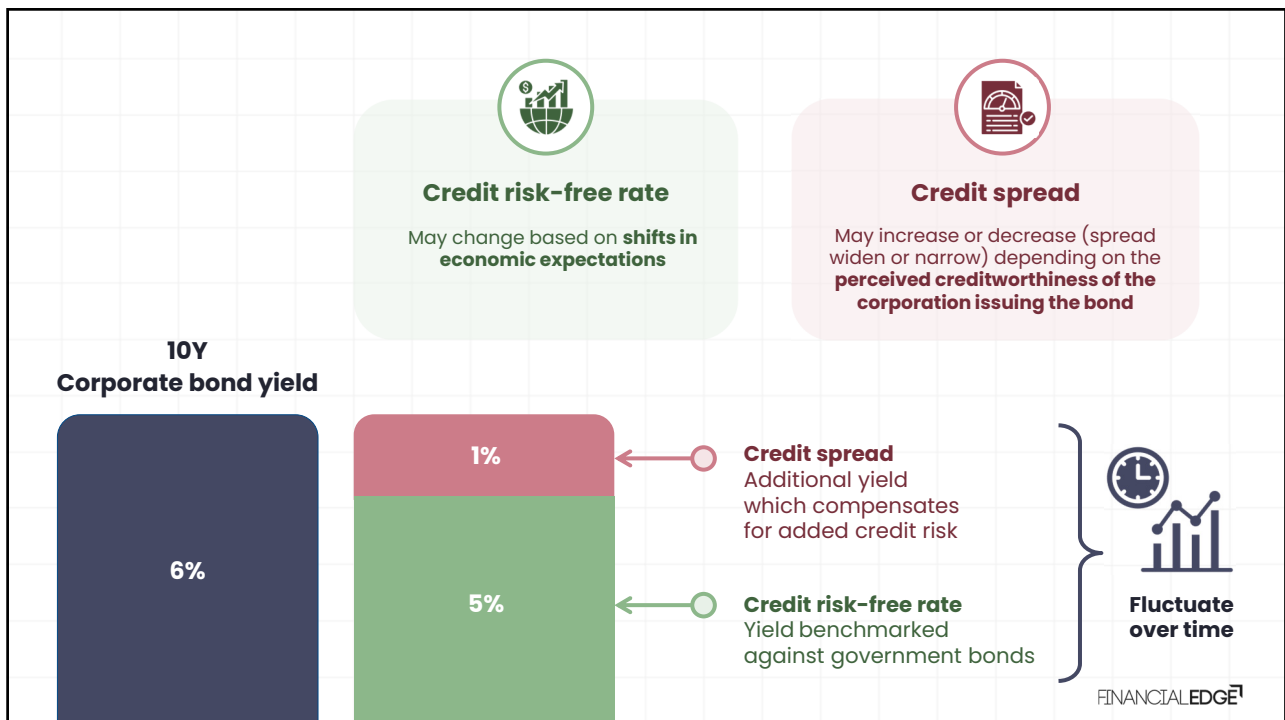
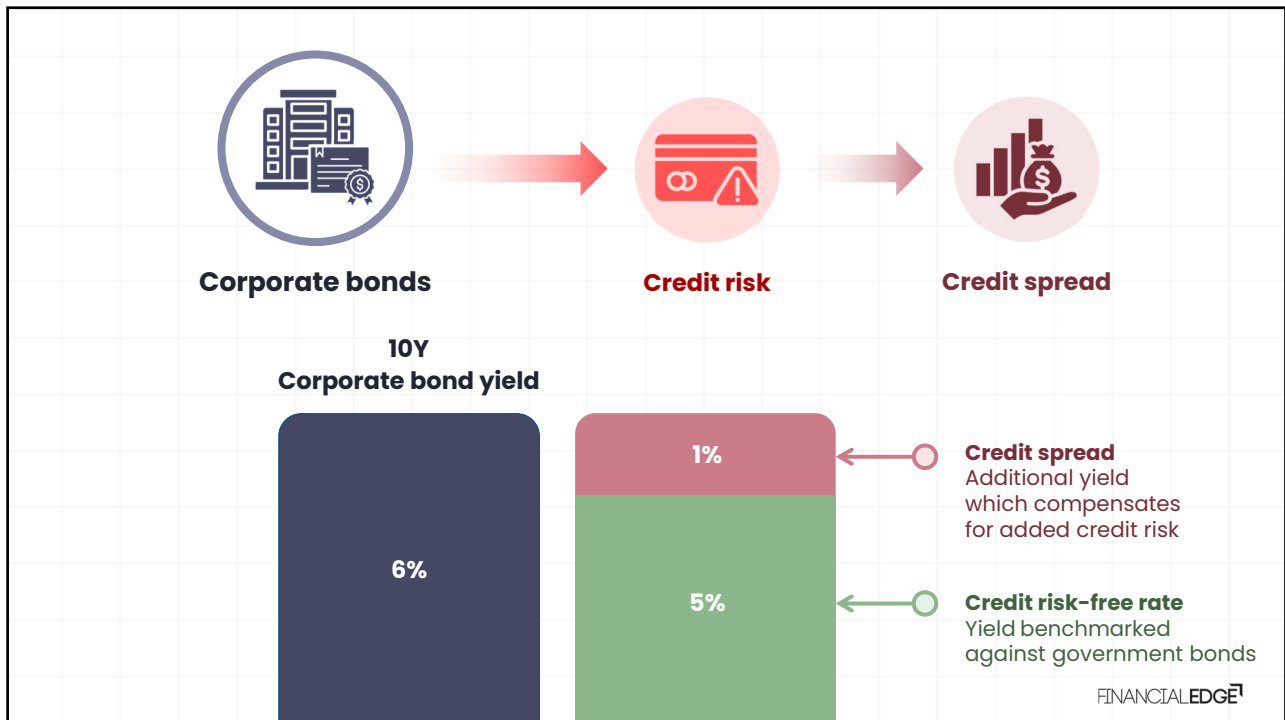


Corporate Bonds

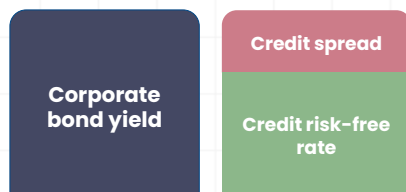
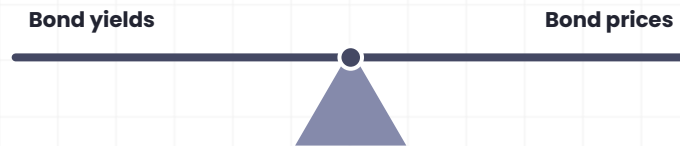


Corporate Bonds and Credit Spreads

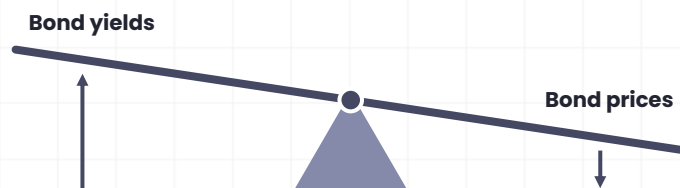




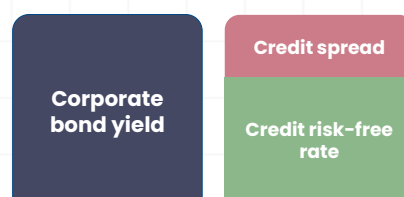
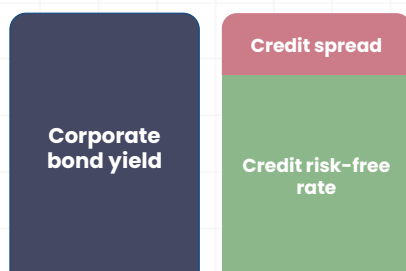
Yields and bonds prices move inversely

FINANCIALEDGE⁷

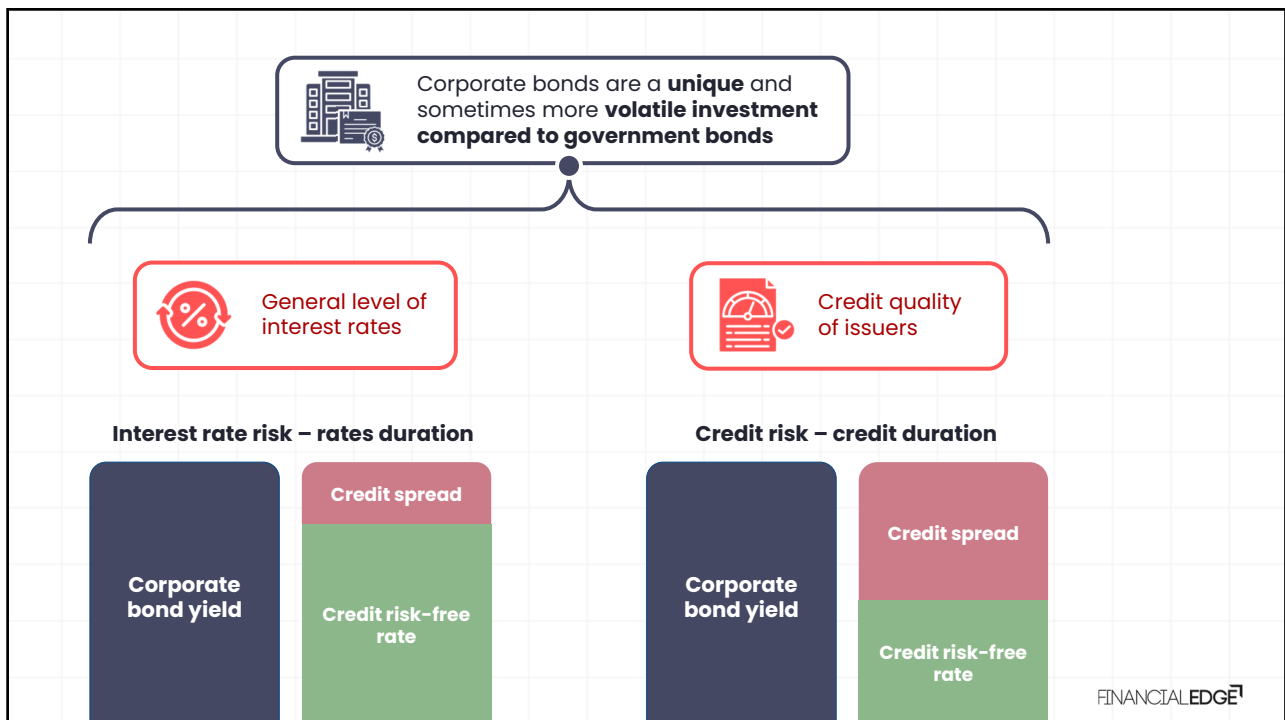
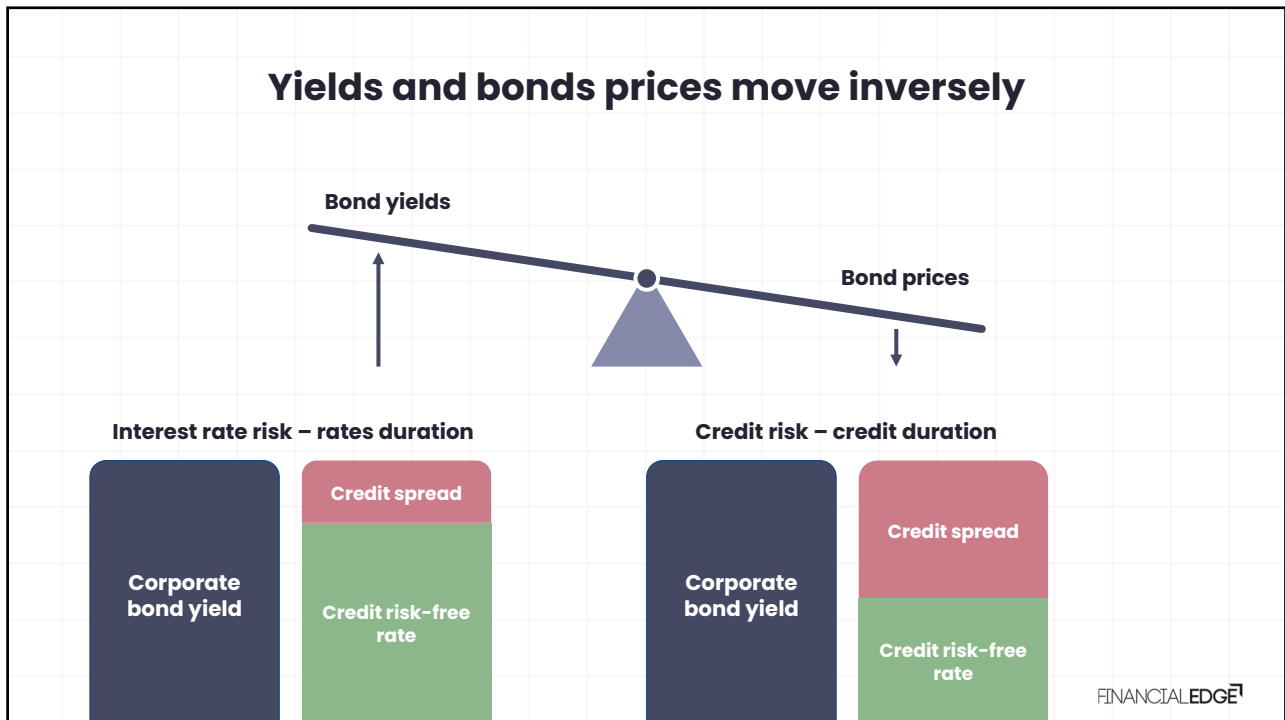
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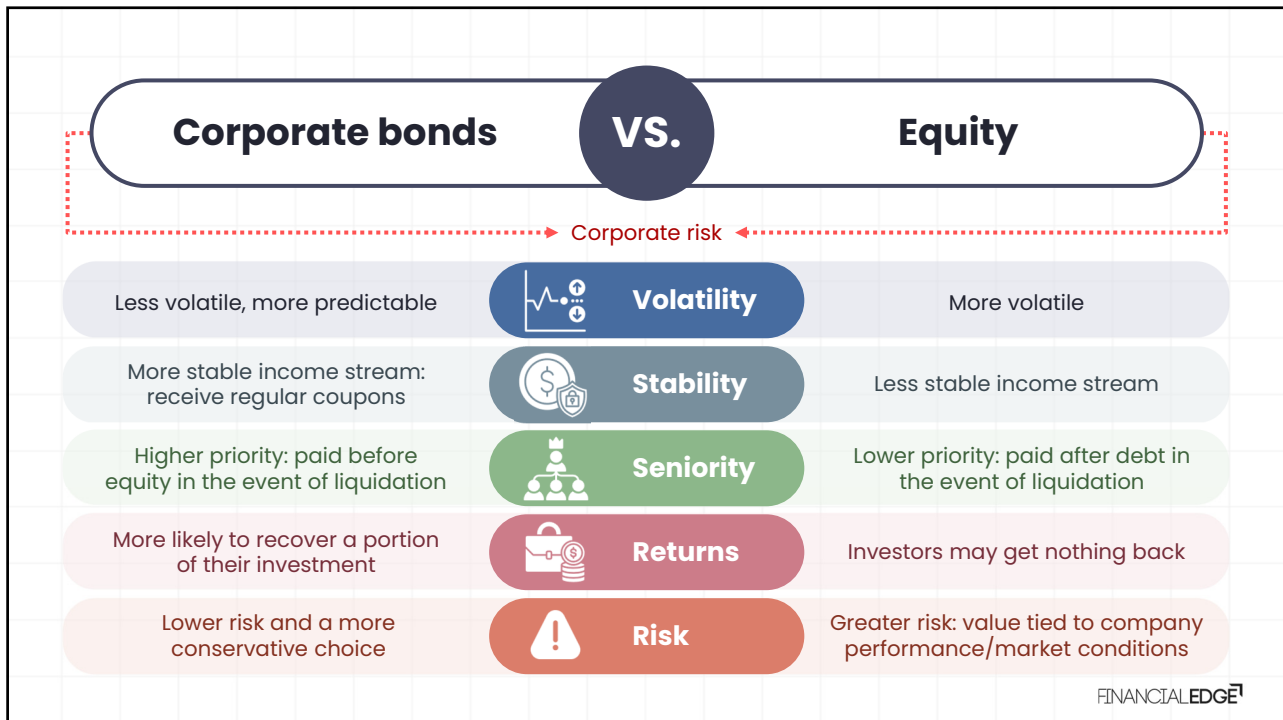


Interest rate risk – rates duration

FINANCIALEDGE⁷

Yields and bonds prices move inversely





How to Assess Credit Risk



Risk vs. Return

Investors expect to be compensated with **adequate returns** when they take on **additional risk**

How to assess credit risk



General issuer risk

Factors that affect the overall **financial health** of the company issuing the bond

Business risk

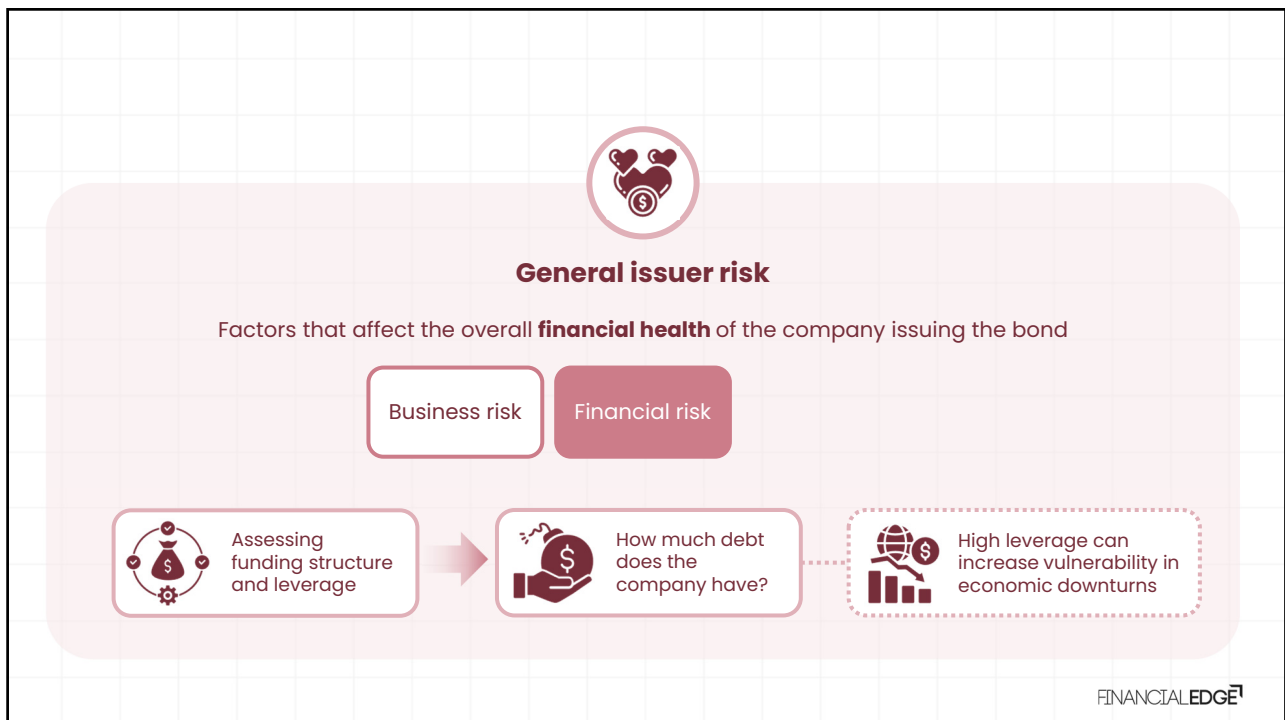
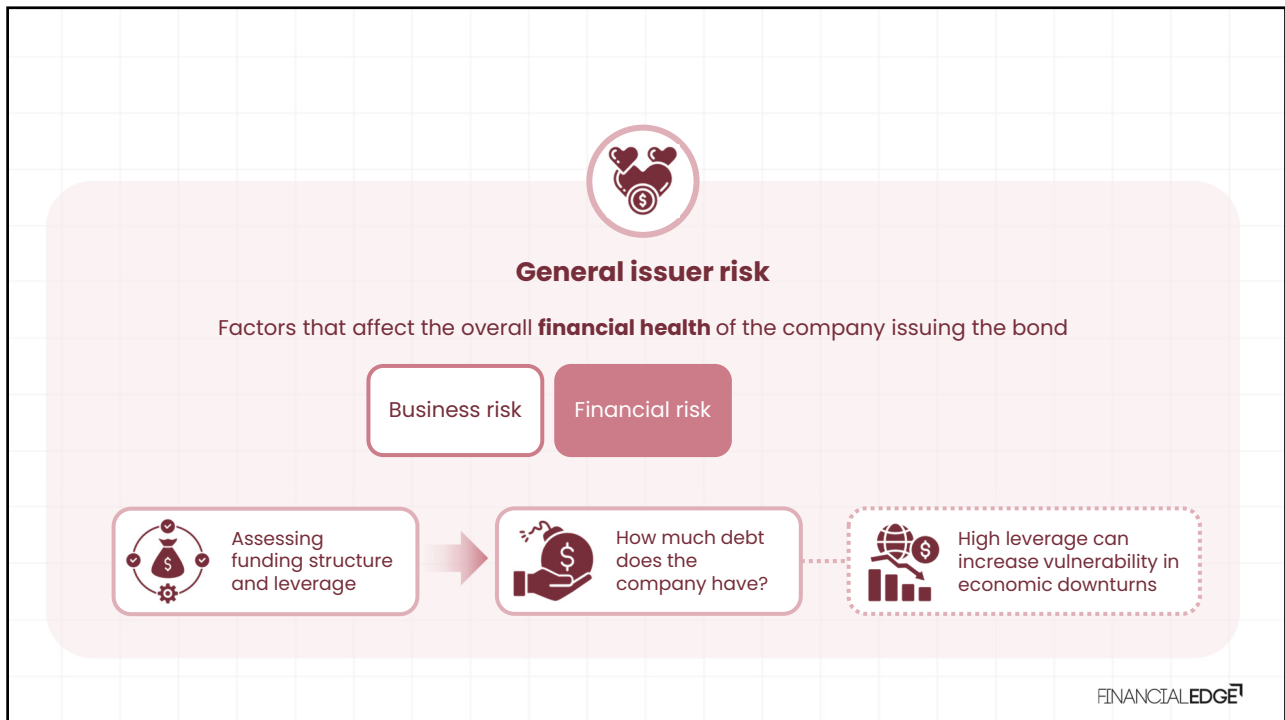


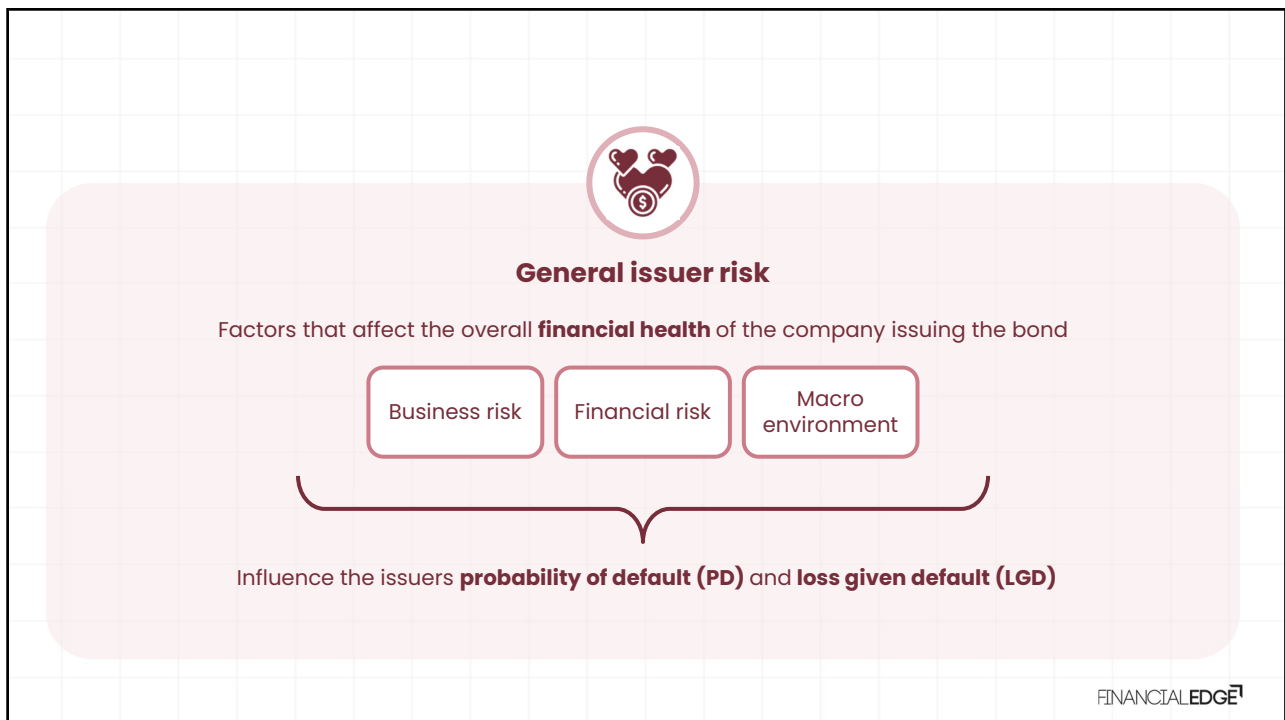
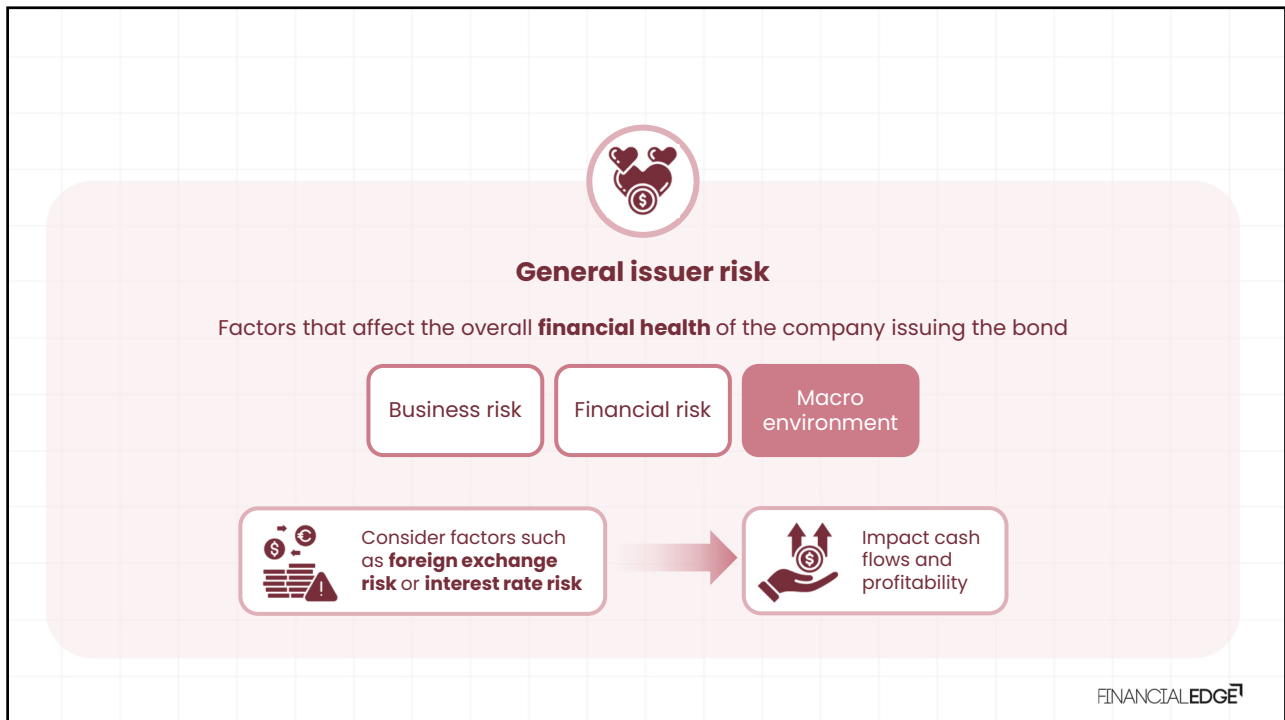
Analyzing
business strategy

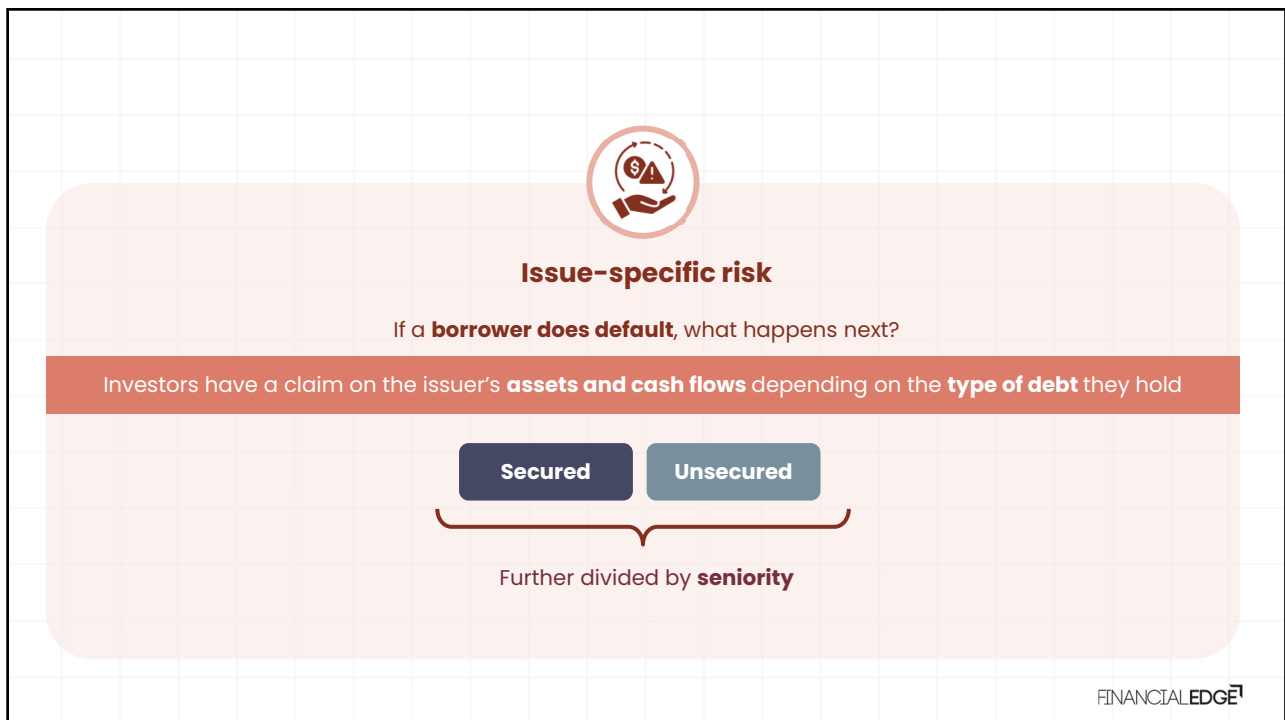
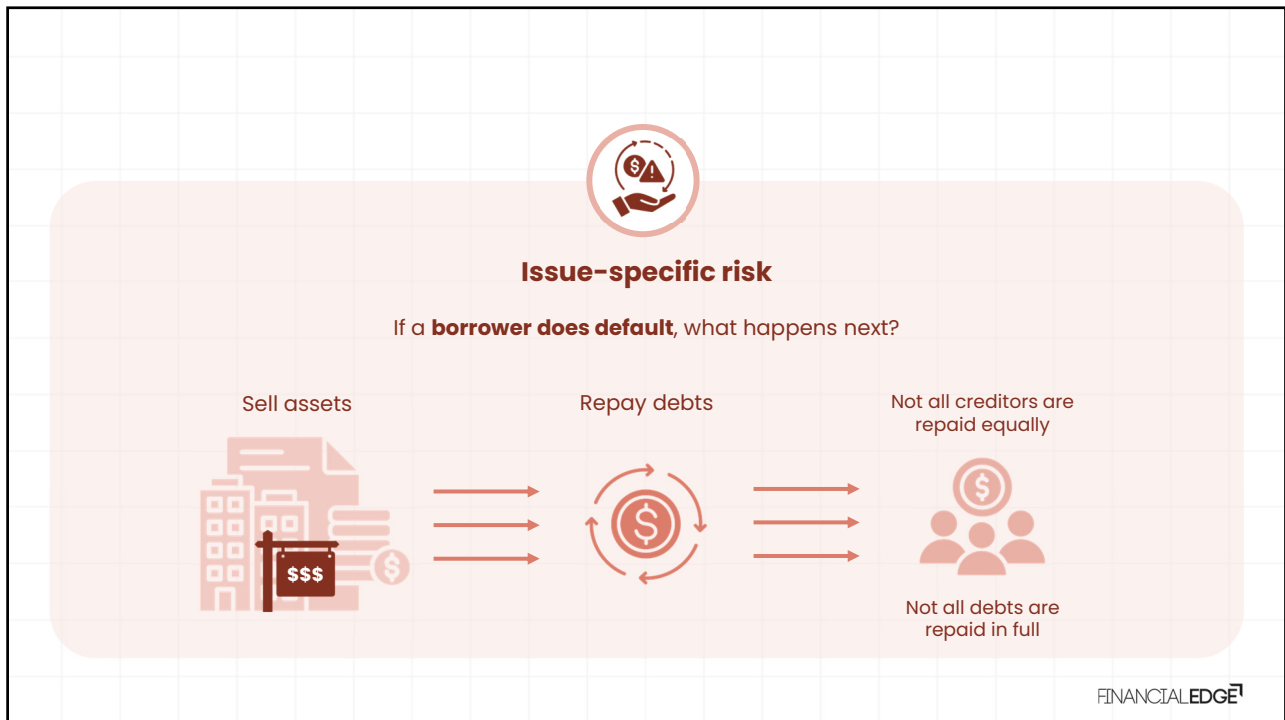


Stability of
cash flows

e.g. a company with a **high appetite** for mergers and acquisitions might **face more uncertainty** in **cash flow stability**









Issue-specific risk

If the value of outstanding **debt exceeds** the value of **assets and cash flows**, **waterfall payments** apply

Secured

Debt instruments are **backed with specific collateral** pledged by the issuer

In case of bankruptcy, lenders have the **right to foreclose** on the collateral

Unsecured

Debt instruments **only provide a general claim** on the issuer's assets

1

Senior unsecured

2

Subordinated

FINANCIALEDGE⁷

Loss Given Default (LGD)

The percentage of the original investment that **investors lose** if the issuer defaults

1 – recovery rate

e.g.

Company **defaults** on 1,000 par-value bond

Creditors **recover 400**

Recovery rate = **40%**

LGD = **60%**



Recovery Rate (RR)

The portion of the original investment that **creditors recover** if the issuer defaults

Typically higher for **secured debt**

Often **unknown** until long after default

Markets operate on **expected recovery rate**:



Issuer's assets



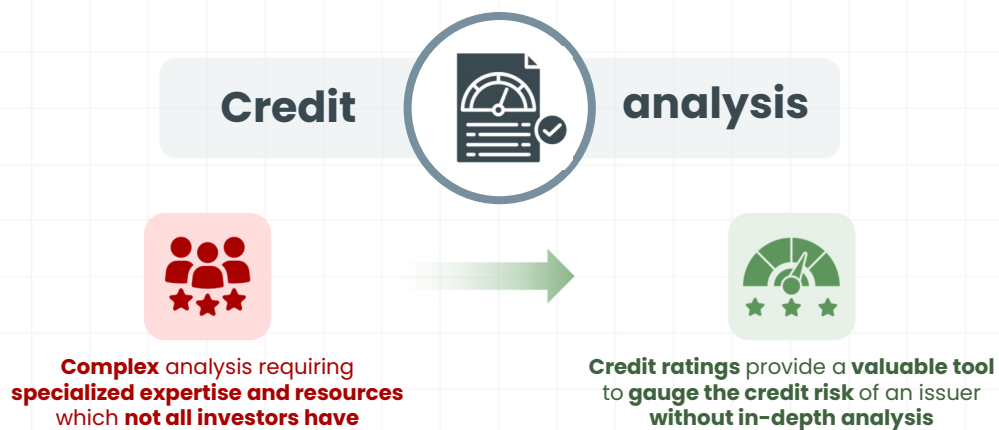
Collateral



Other risks

FINANCIALEDGE⁷

Credit Ratings



Credit



analysis

Assesses the issuer's **financial health, operating environment, and default risk** to assign a rating



Helps investors to **quickly understand** a **borrower's creditworthiness**

Measures a borrower's **creditworthiness**

S&P Global

MOODY'S

FitchRatings

These agencies are **compensated by the entity seeking a rating** for itself or one of its debt issues

FINANCIALEDGE¹

Credit Ratings

Moody's	S&P	Fitch	
Long-term	Long-term	Long-term	
Aaa	AAA	AAA	Extremely strong capacity to meet commitments
Aa1	AA+	AA+	Very strong capacity to meet financial commitments
Aa2	AA	AA	
Aa3	AA-	AA-	
A1	A+	A+	Strong capacity to meet financial commitments, somewhat susceptible to adverse economic conditions and changes in circumstances
A2	A	A	
A3	A-	A-	
Baa1	BBB+	BBB+	Adequate capacity to meet financial commitments, but more subject to adverse economic conditions
Baa2	BBB	BBB	
Baa3	BBB-	BBB-	
Ba1	BB+	BB+	Less vulnerable in the near-term but faces major ongoing uncertainties to adverse business, financial and economic conditions
Ba2	BB	BB	
Ba3	BB-	BB-	
B1	B+	B+	More vulnerable to adverse business, financial and economic conditions but currently has the capacity to meet financial commitments
B2	B	B	
B3	B-	B-	
Caa1	CCC+	CCC+	Currently vulnerable and dependent on favorable business, financial and economic conditions to meet financial commitments
Caa2	CCC	CCC	
Caa3	CCC-	CCC-	
Ca	CC	CC	Currently highly vulnerable
C	C	C	Bankruptcy petition is filed but payments continue
C	RD	DDD	Payment default on financial commitments

Investment Grade (IG)

High Yield (HY)

Practical implications



Professional investors **restricted to only invest in IG securities**



The **pool of eligible investors shrinks** if an issuer is **downgraded from IG to HY**



Reduction in demand leads to **widening credit spreads**

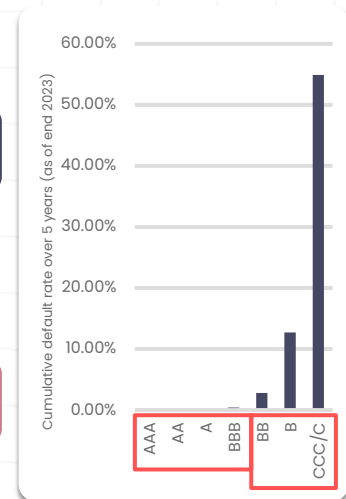
FINANCIALEDGE¹

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Investment Grade (IG)

High Yield (HY)

FINANCIALEDGE⁷

Credit Ratings

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Aa3	AA-	AA-	
A1	A+	A+	Strong capacity to meet financial commitments, somewhat susceptible to adverse economic conditions and changes in circumstances
A2	A	A	
A3	A-	A-	
Baa1	BBB+	BBB+	Adequate capacity to meet financial commitments, but more subject to adverse economic conditions
Baa2	BBB	BBB	
Baa3	BBB-	BBB-	
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Ba3	BB-	BB-	
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B3	B-	B-	
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Caa2	CCC	CCC	
Caa3	CCC-	CCC-	
Ca	CC	CC	Currently highly vulnerable
	C	C	Bankruptcy petition is filed but payments continue
C	RD	DDD	Payment default on financial commitments

Investment Grade (IG)

High Yield (HY)

Ratings can apply to both...

**Issuer**

Rating reflects **overall creditworthiness** of the borrower

**Specific issues**

Rating considers the **specific terms and conditions** of an individual bond

FINANCIALEDGE⁷

The Bond Indenture and Covenants

FINANCIALEDGE¹

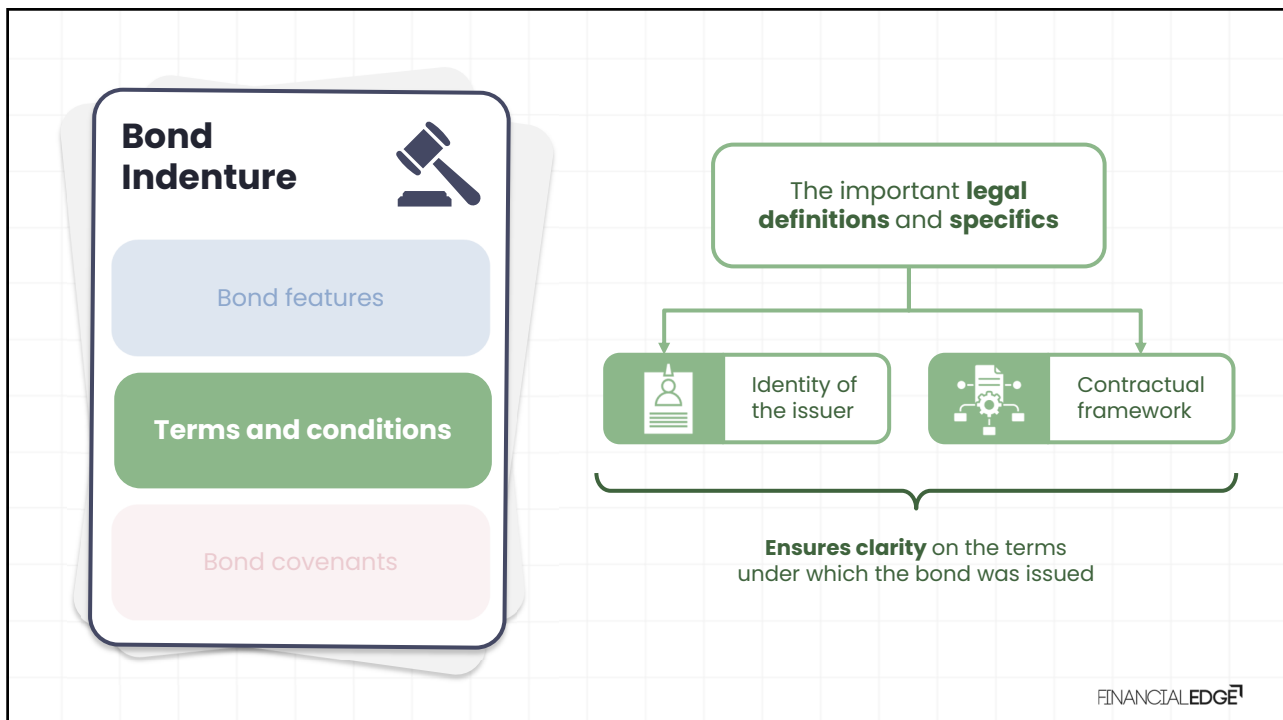
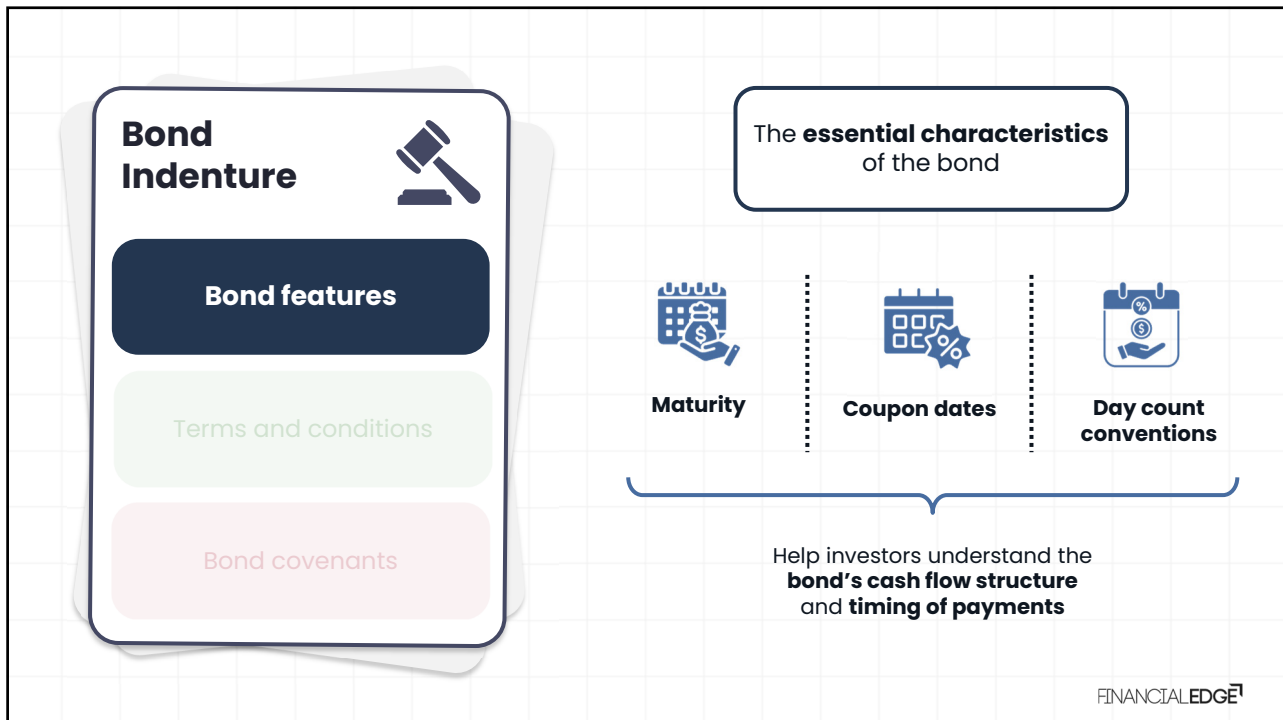
The Bond Indenture

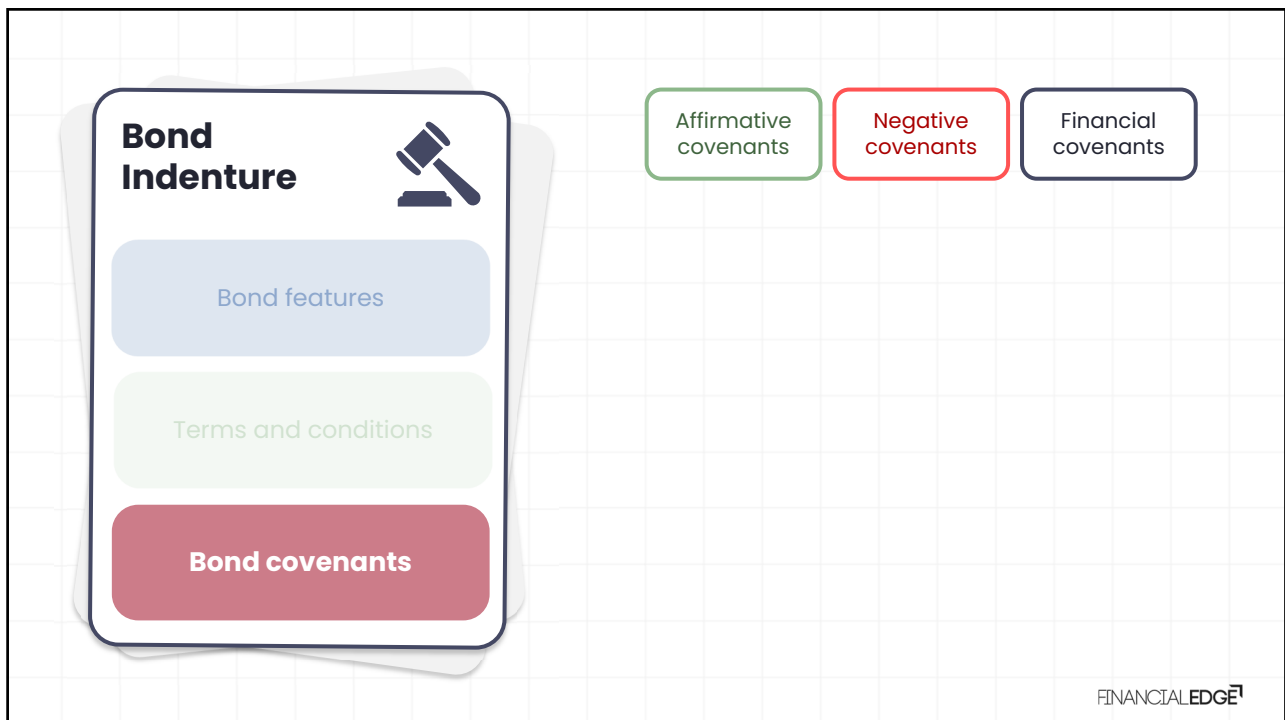
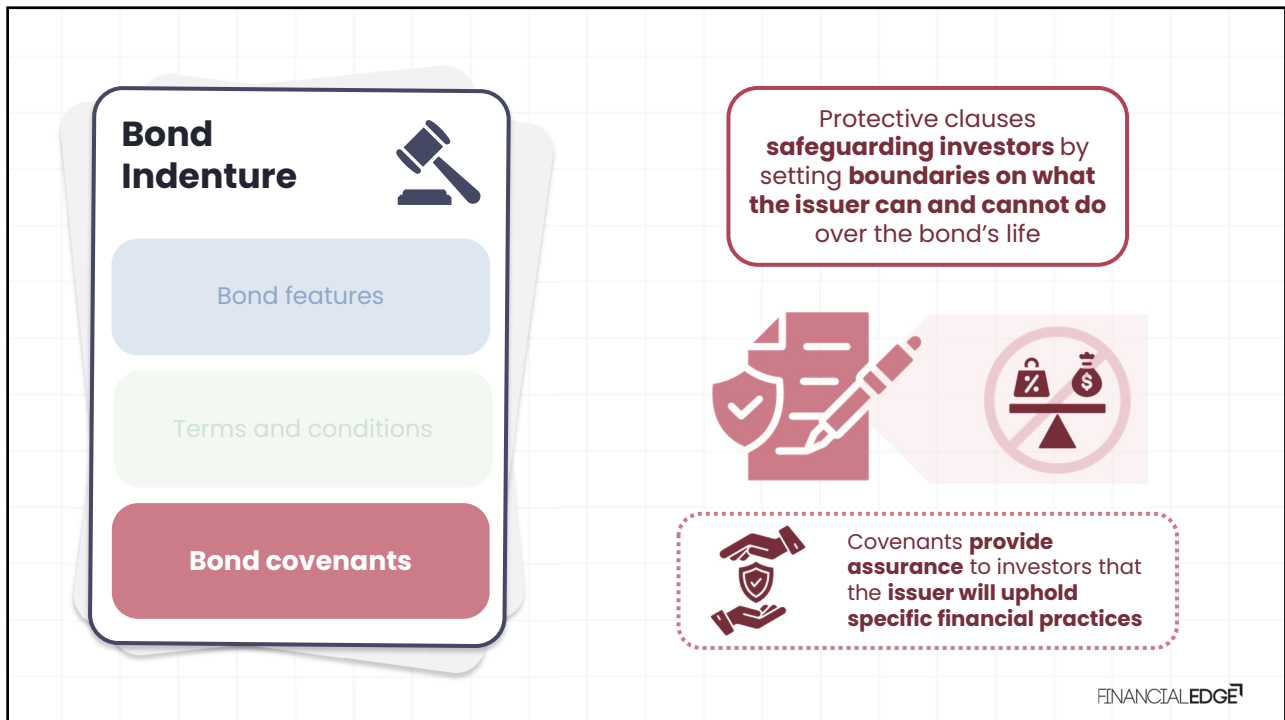
Legally binding contract
between the **issuer** and
bondholders

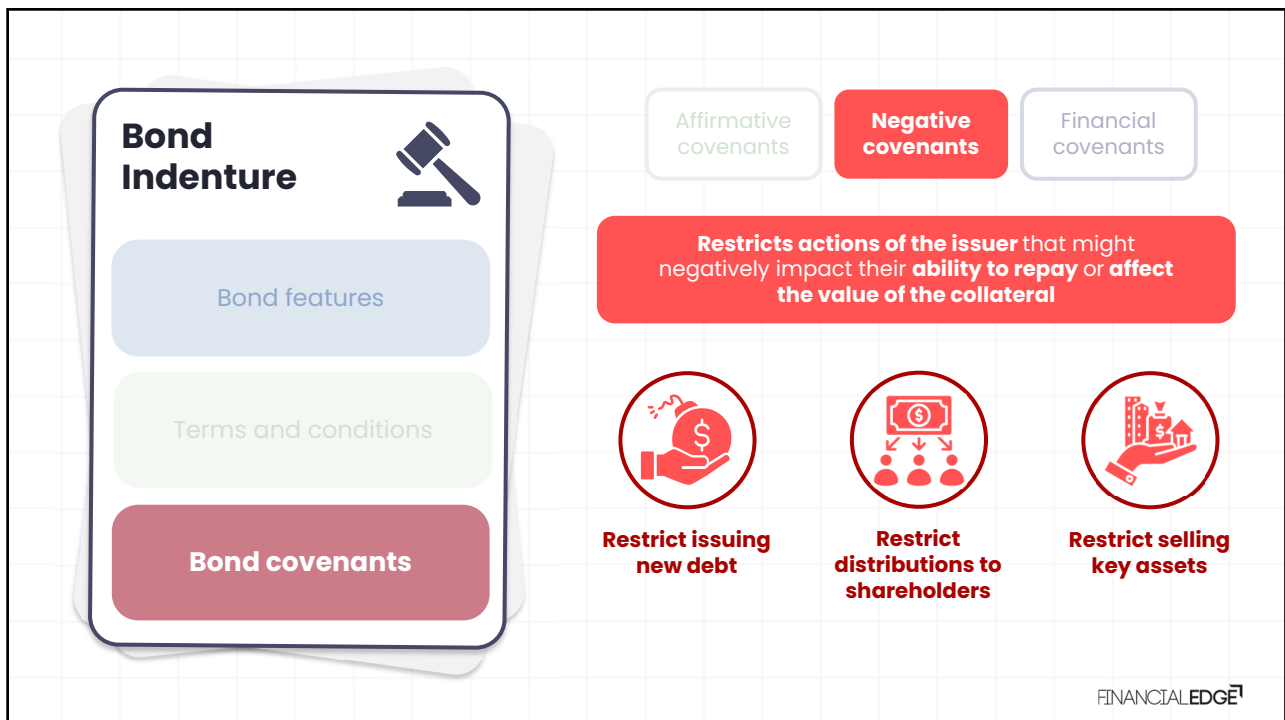
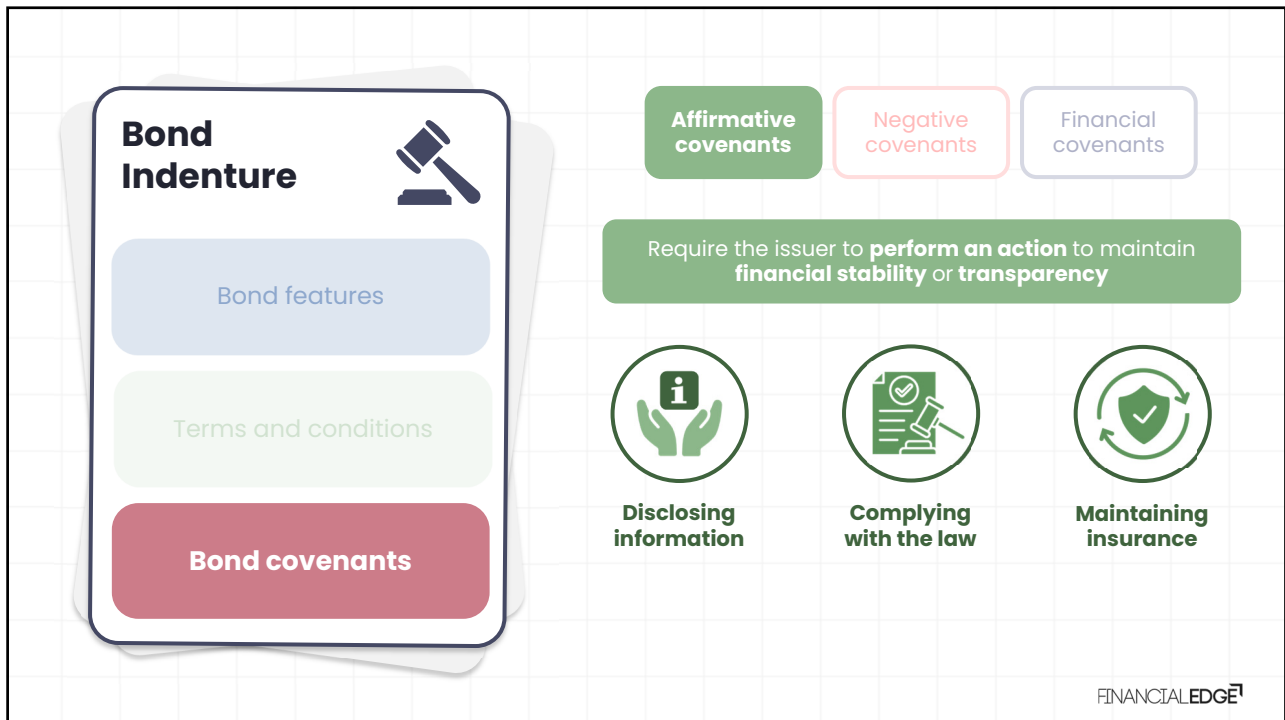
Outlines the **issuer's**
commitments and **investors'**
rights and protections

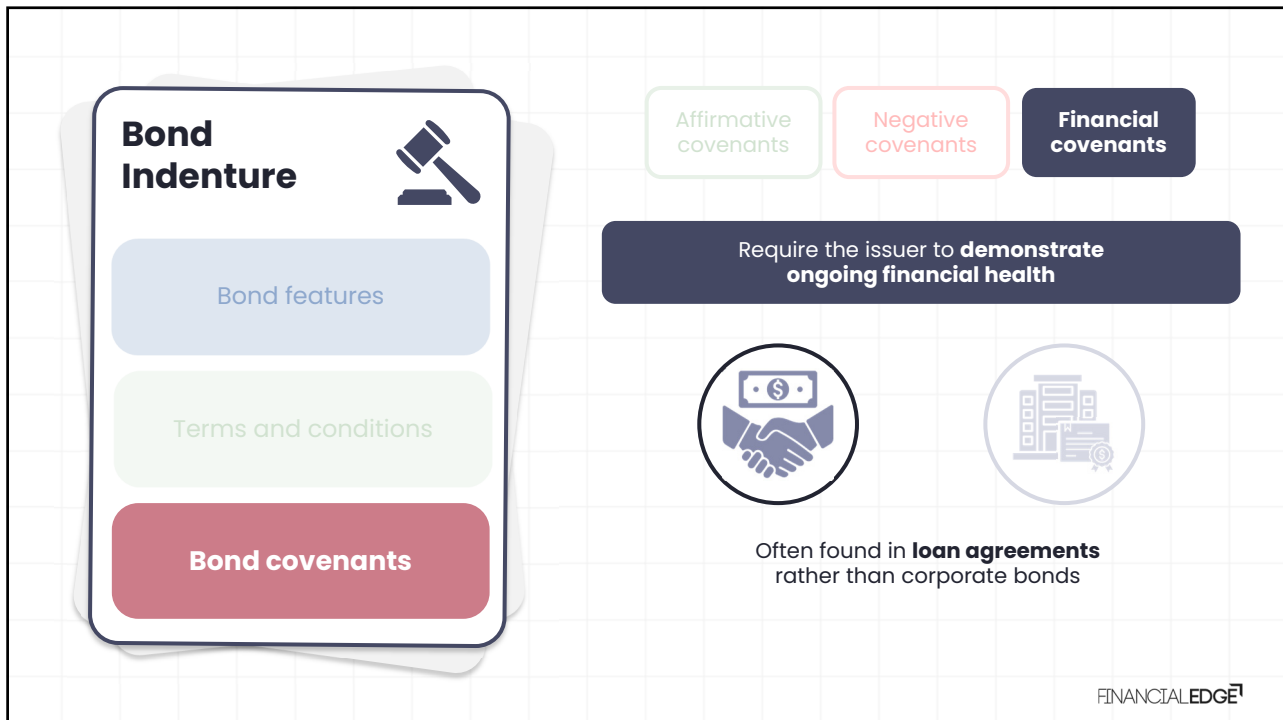
Comprehensive legal
document that the **issuer is**
obligated to follow

FINANCIALEDGE¹

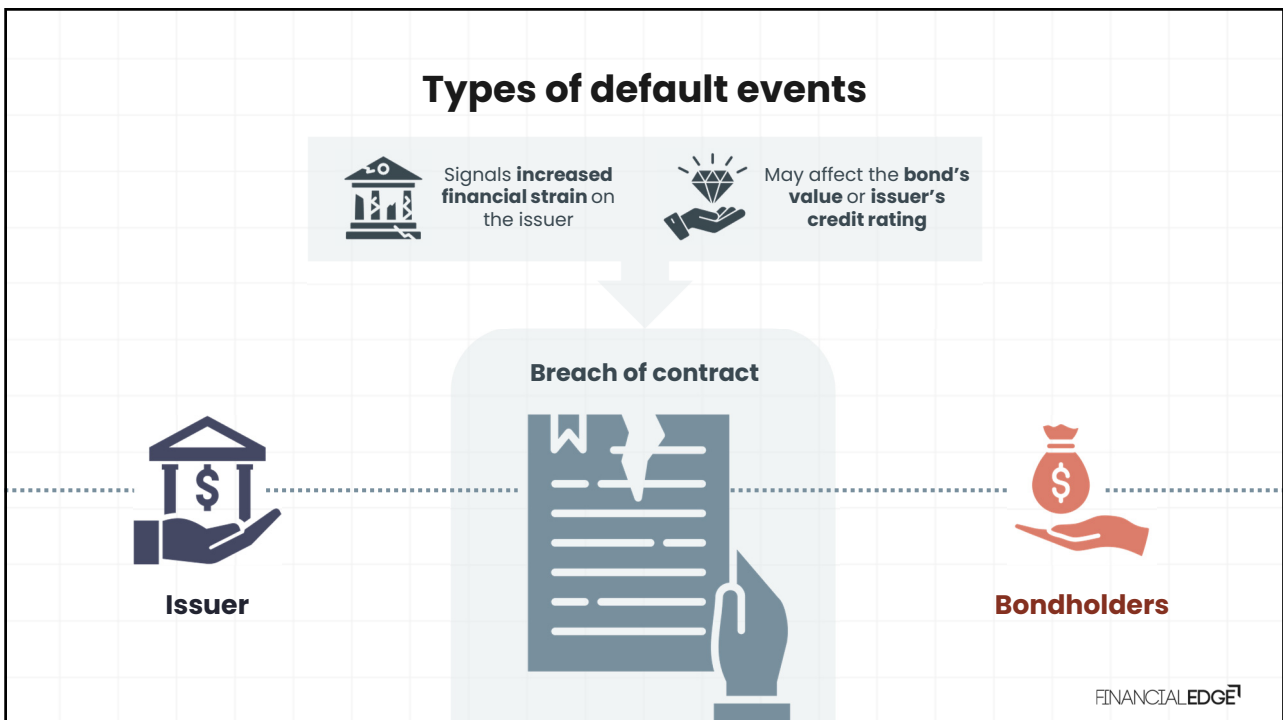
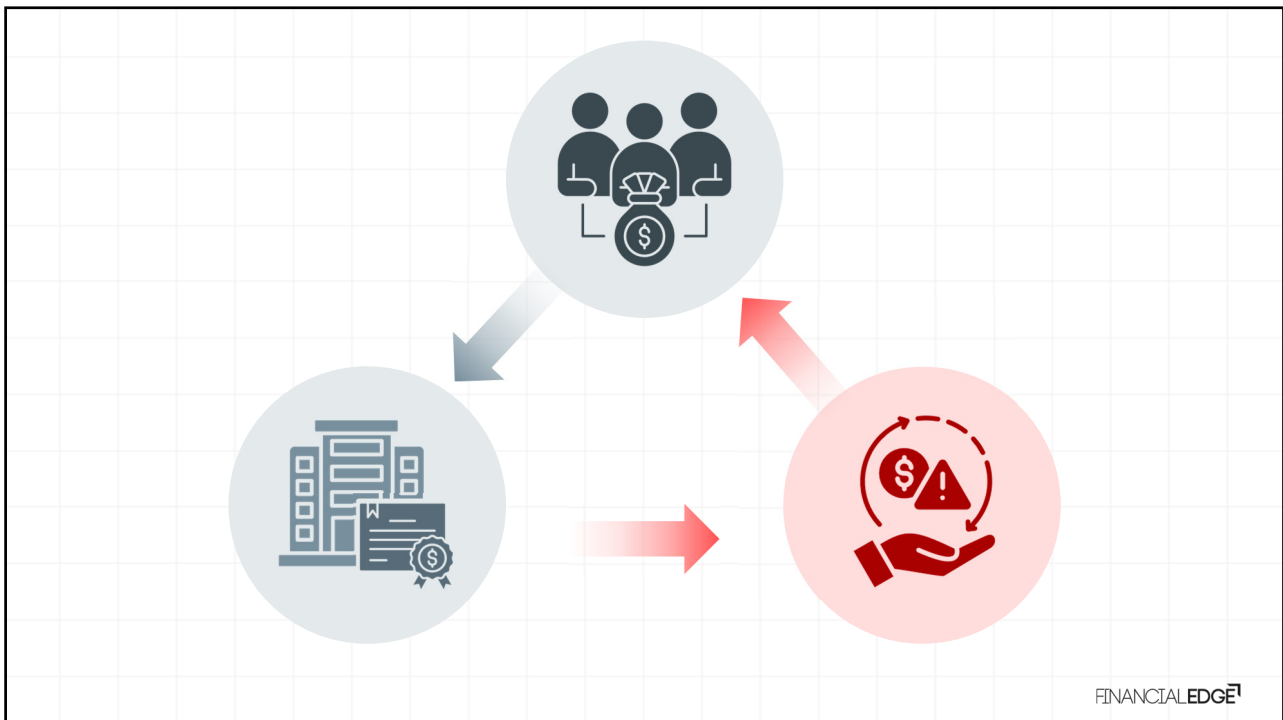


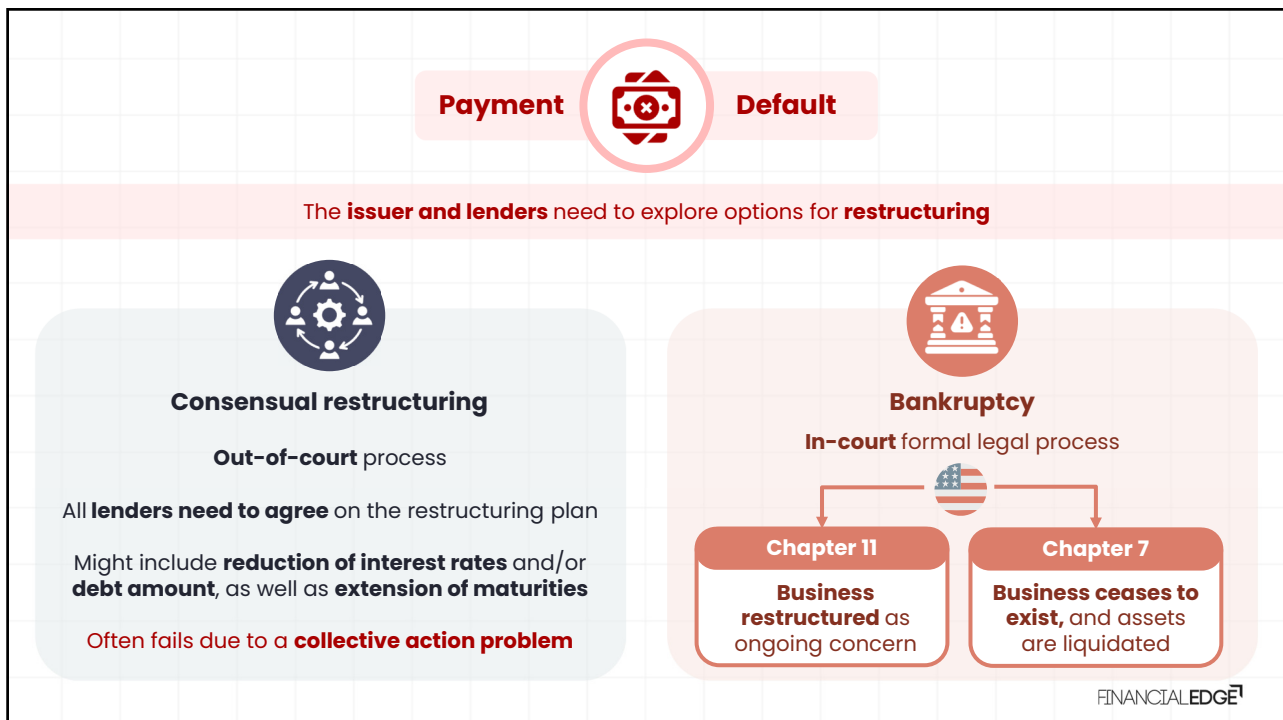
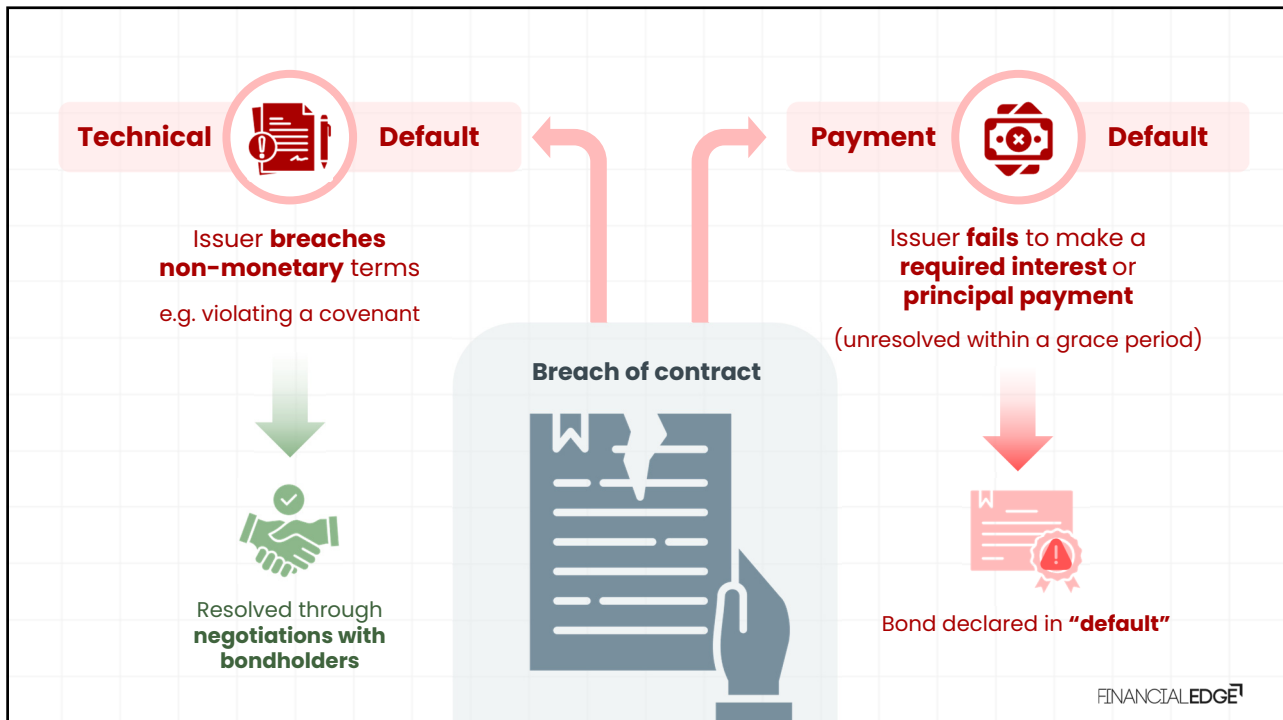






Default Risk – Types of Default

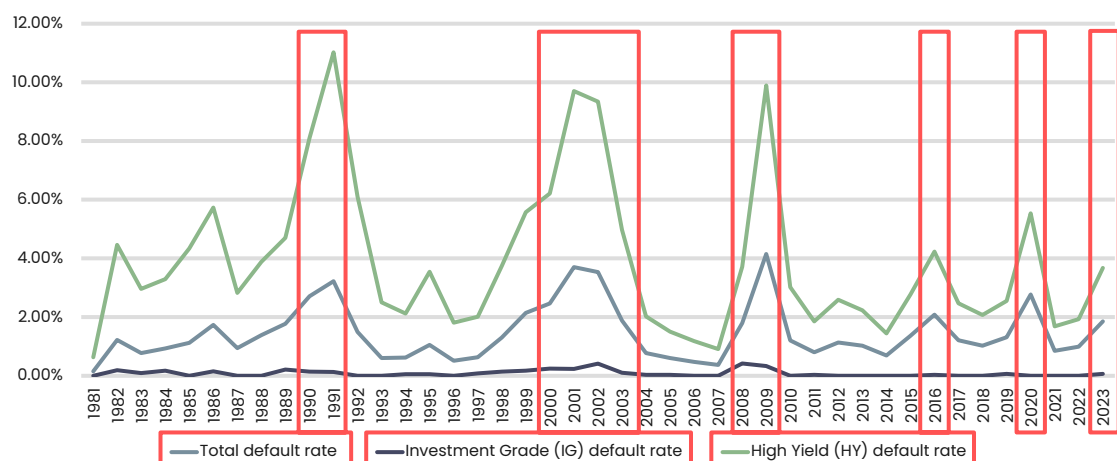




Historical Default Rates

FINANCIALEDGE¹

Historical default rates



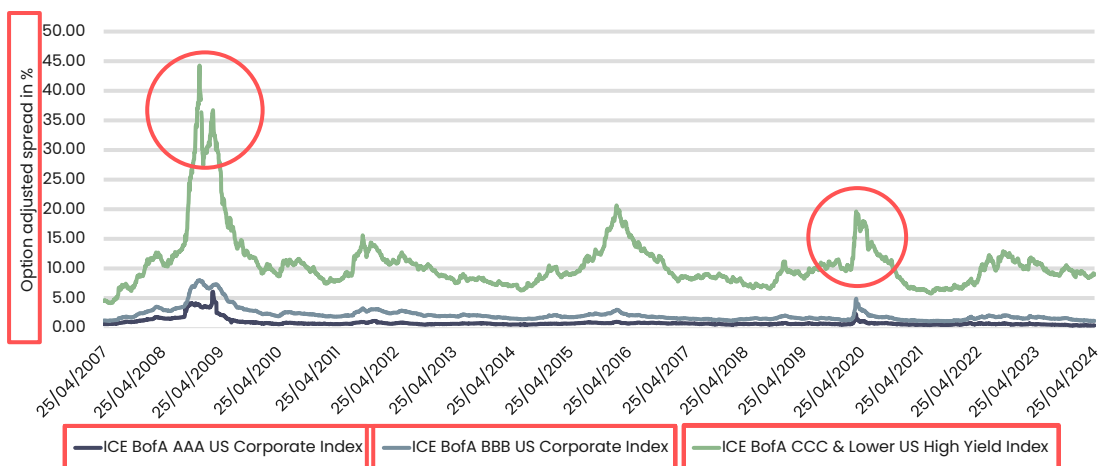
Source: S&P Global Ratings, 2023 Annual Global Corporate Default and Rating Transition Study

FINANCIALEDGE¹

Historical Credit Spreads

FINANCIALEDGE⁷

Historical credit spreads



Source: Federal Reserve Bank of St. Louis, FRED

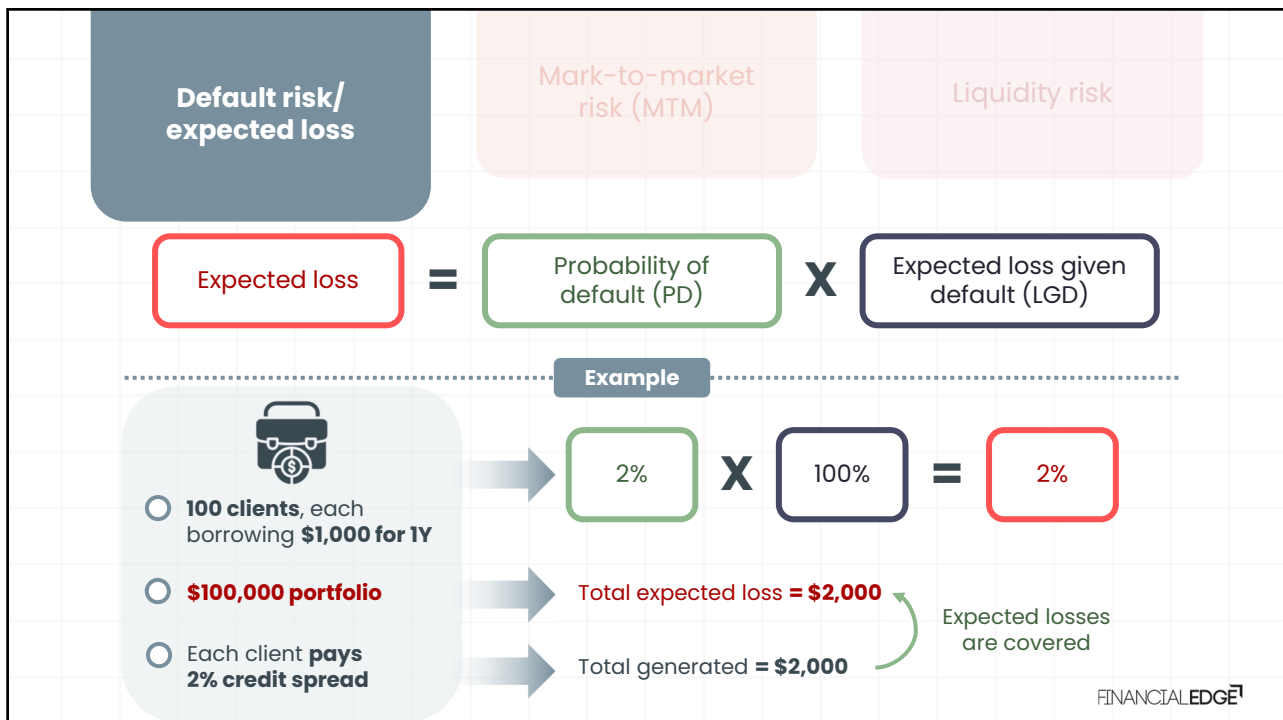
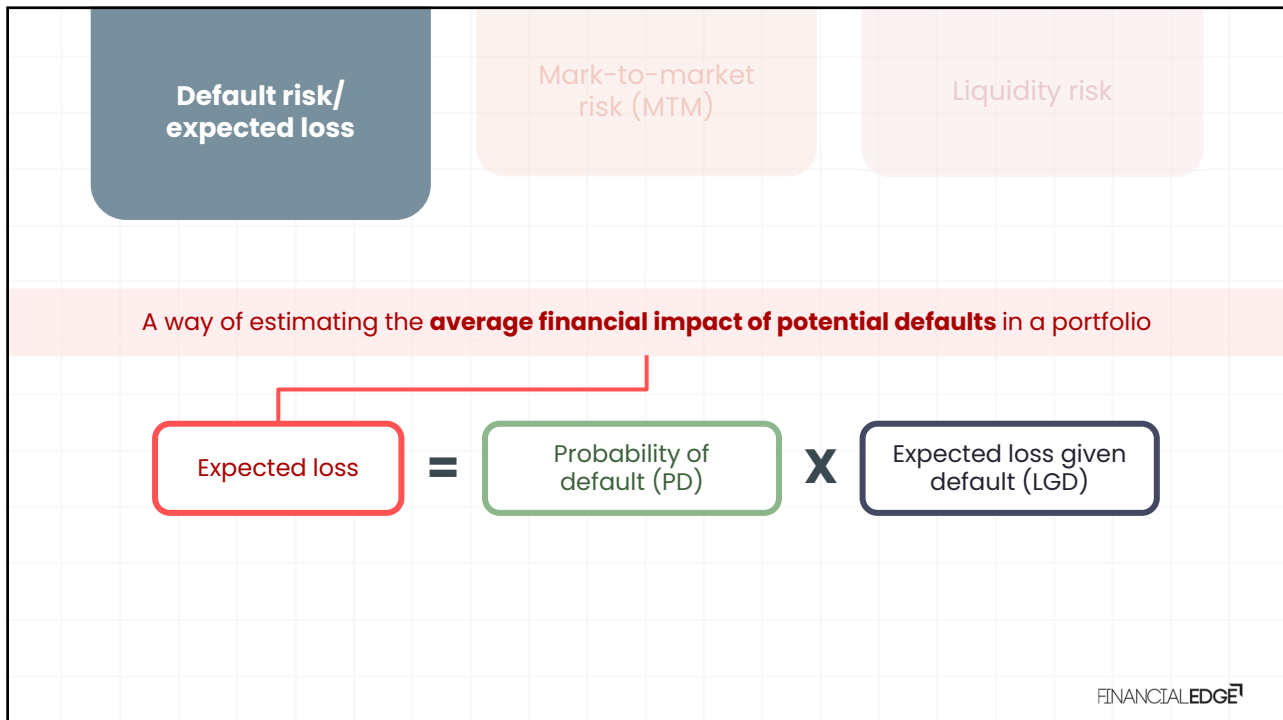
FINANCIALEDGE⁷

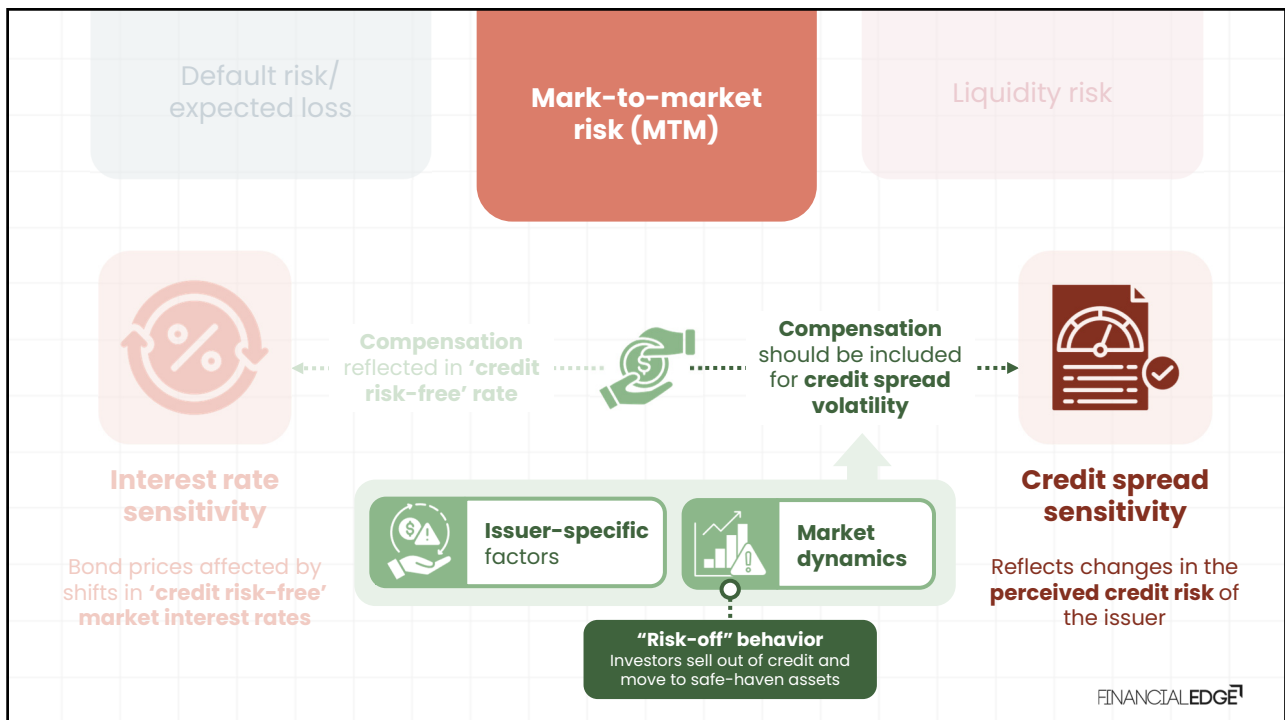
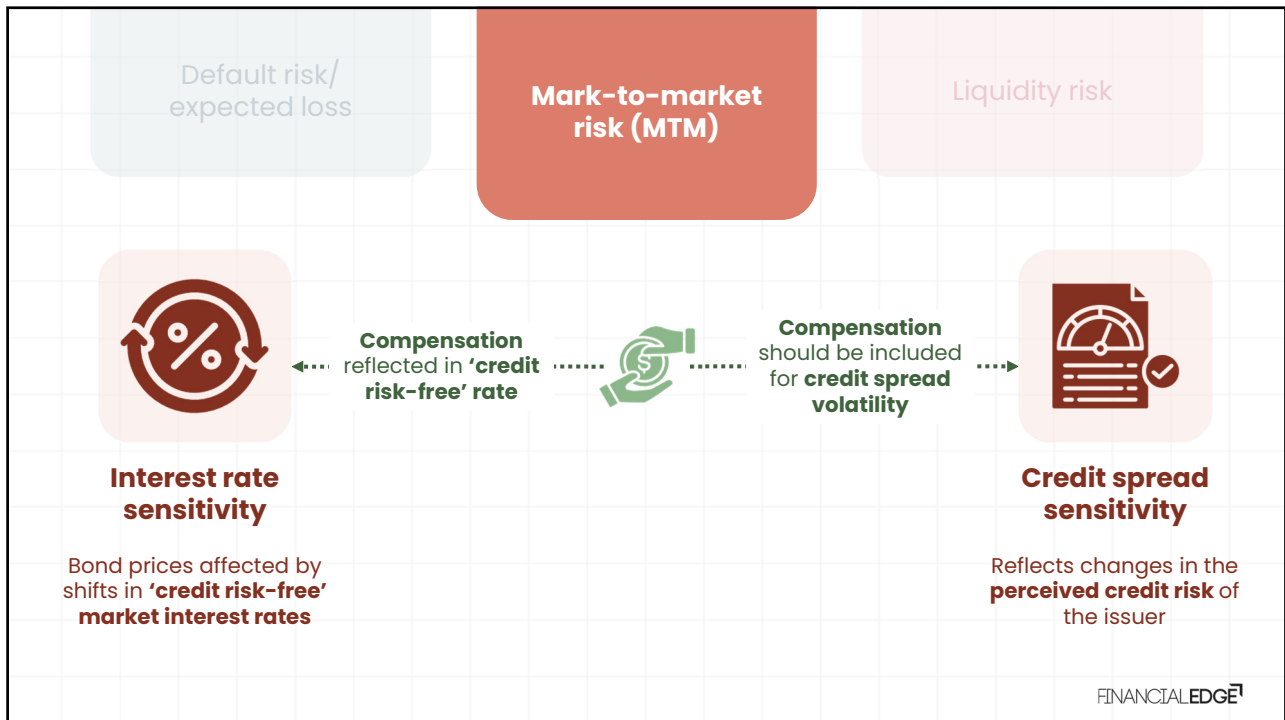
Risk in Corporate Bonds

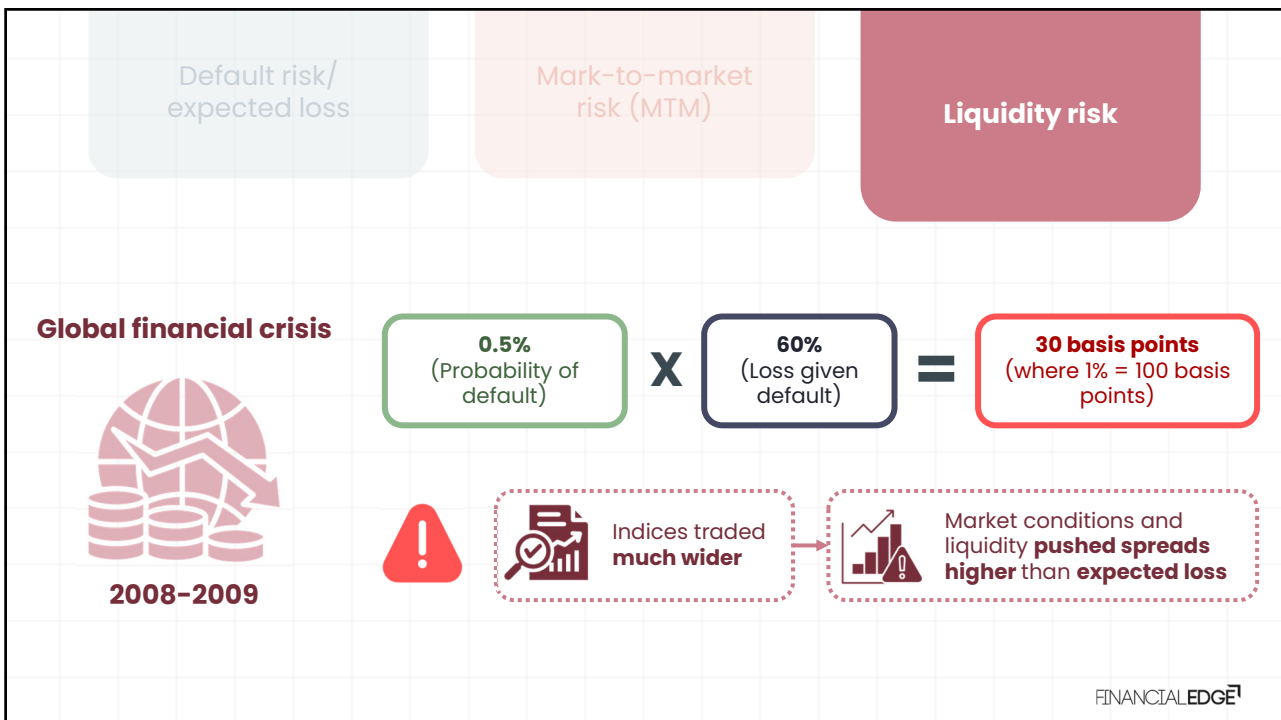
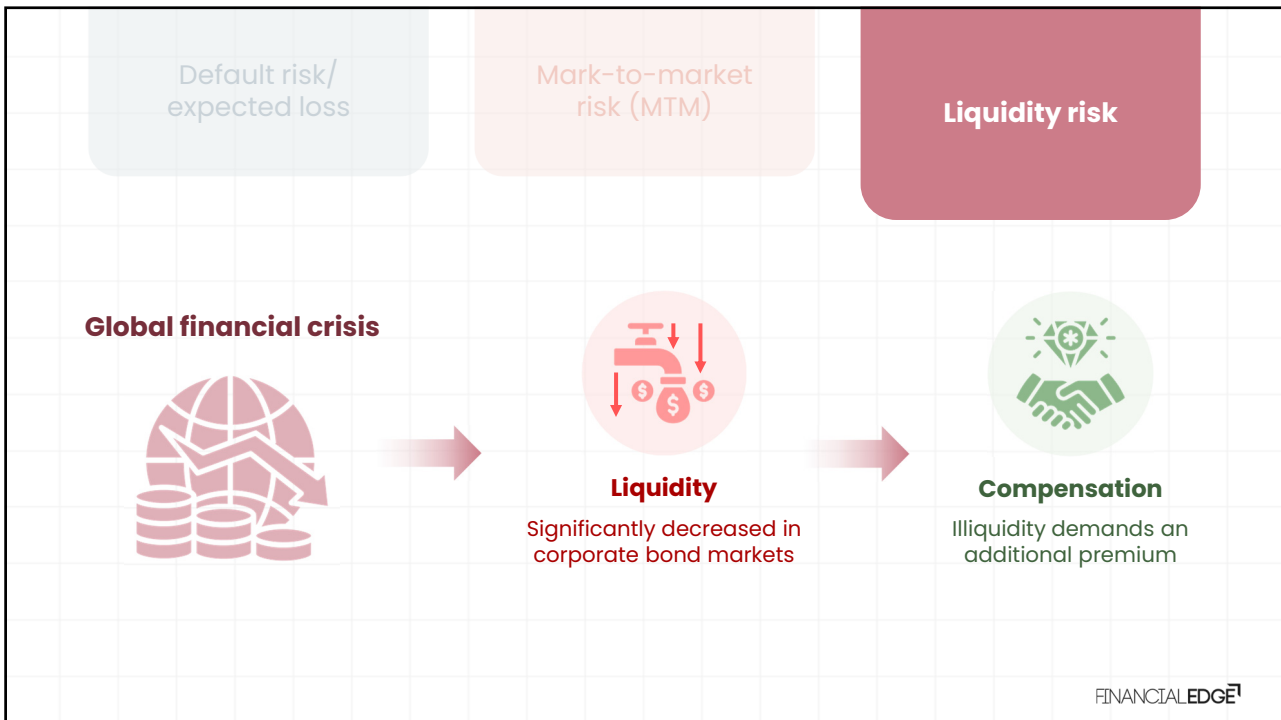
FINANCIALEDGE¹

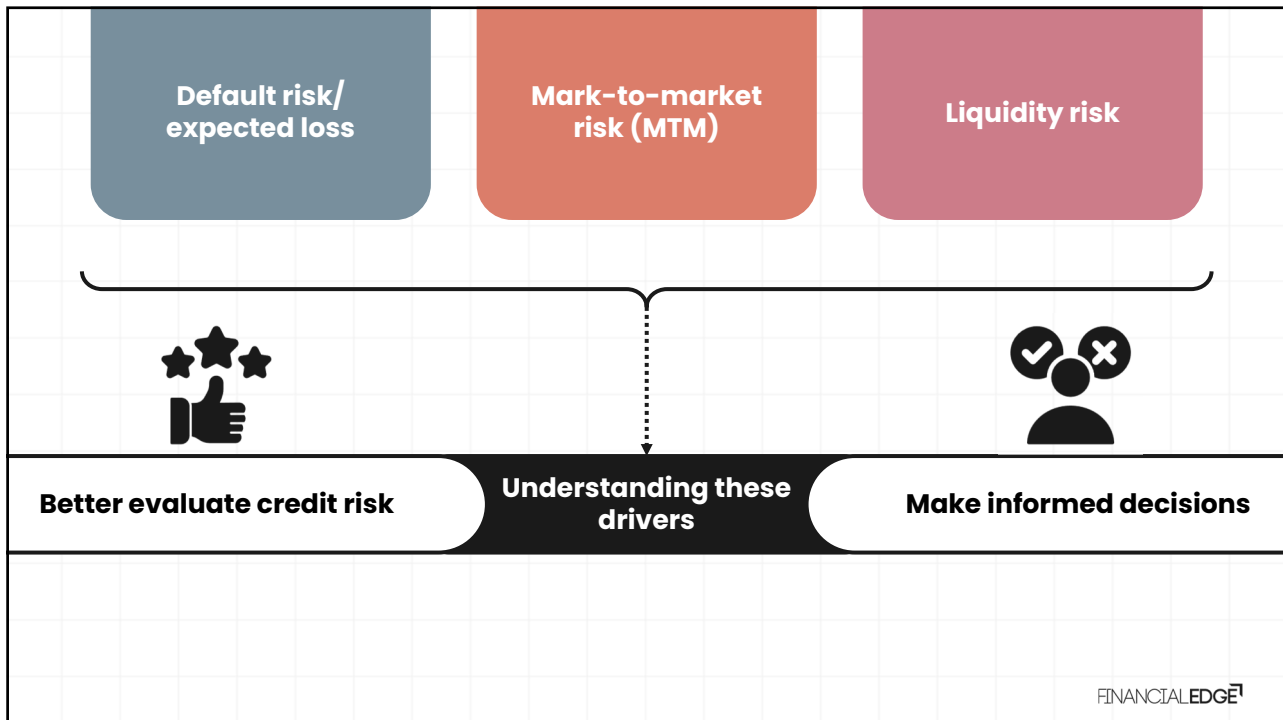
Credit spreads should
compensate investors for
the different **risks they face**

FINANCIALEDGE¹



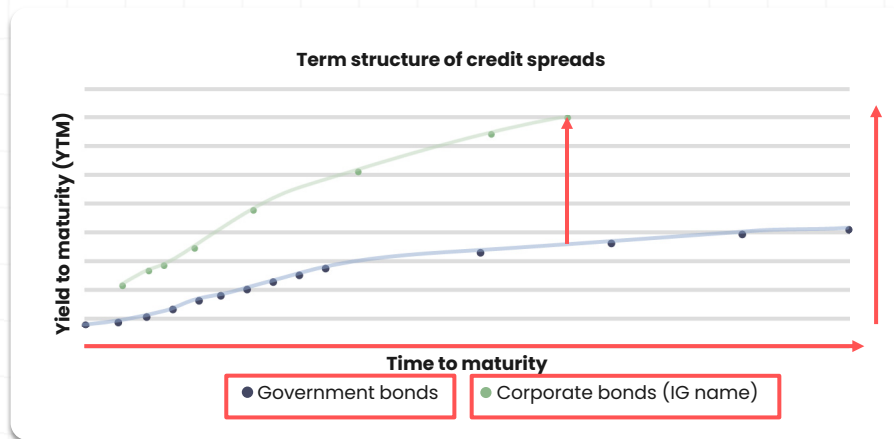






Term Structure of Credit Spreads

Relationship between credit spread and time to maturity

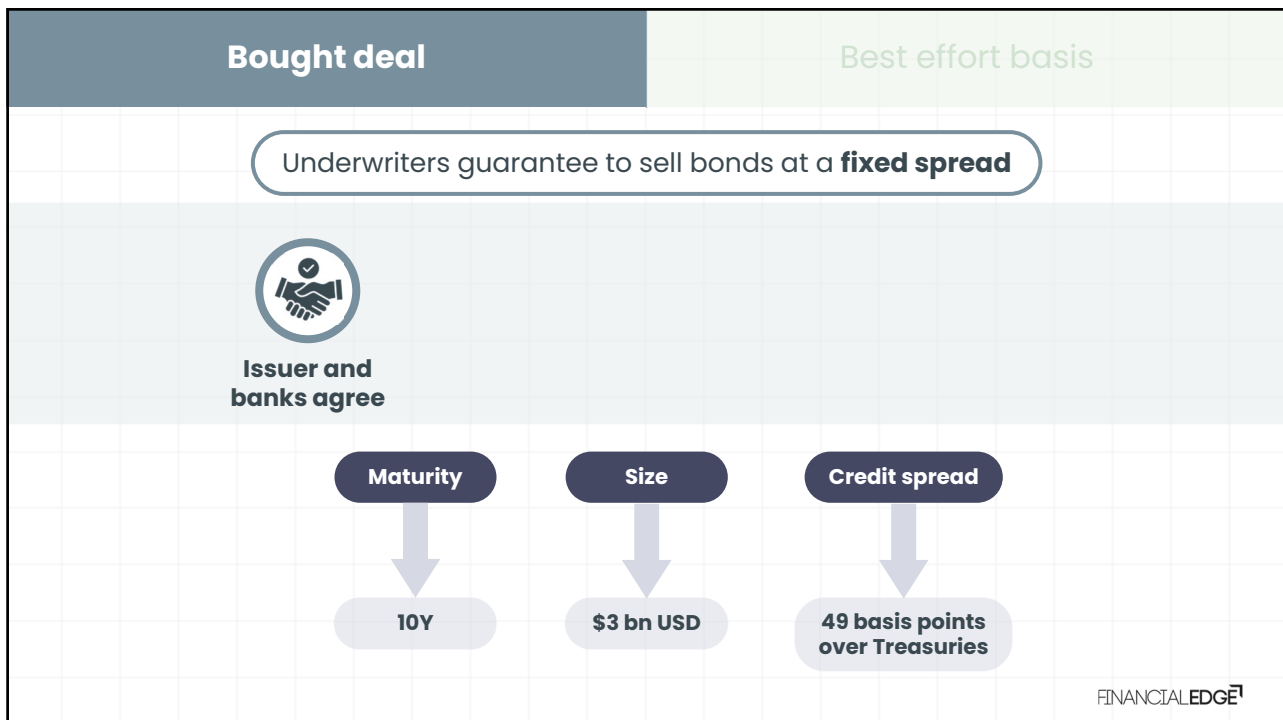
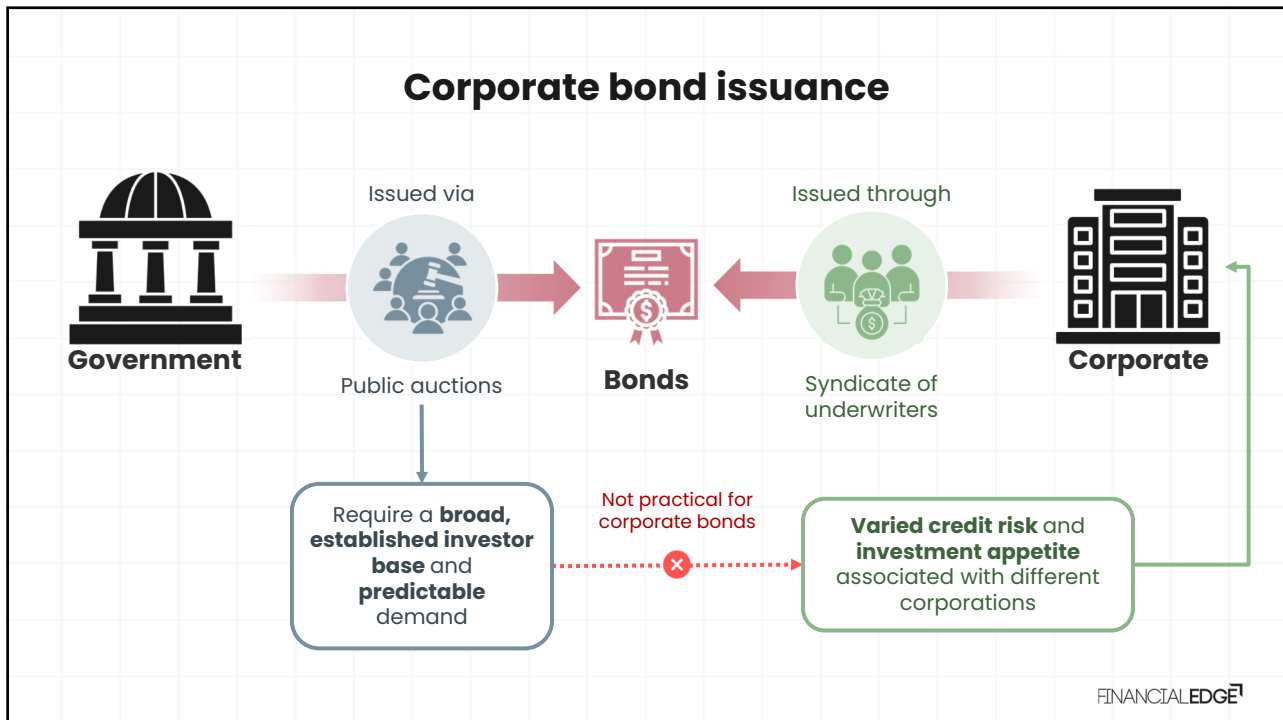


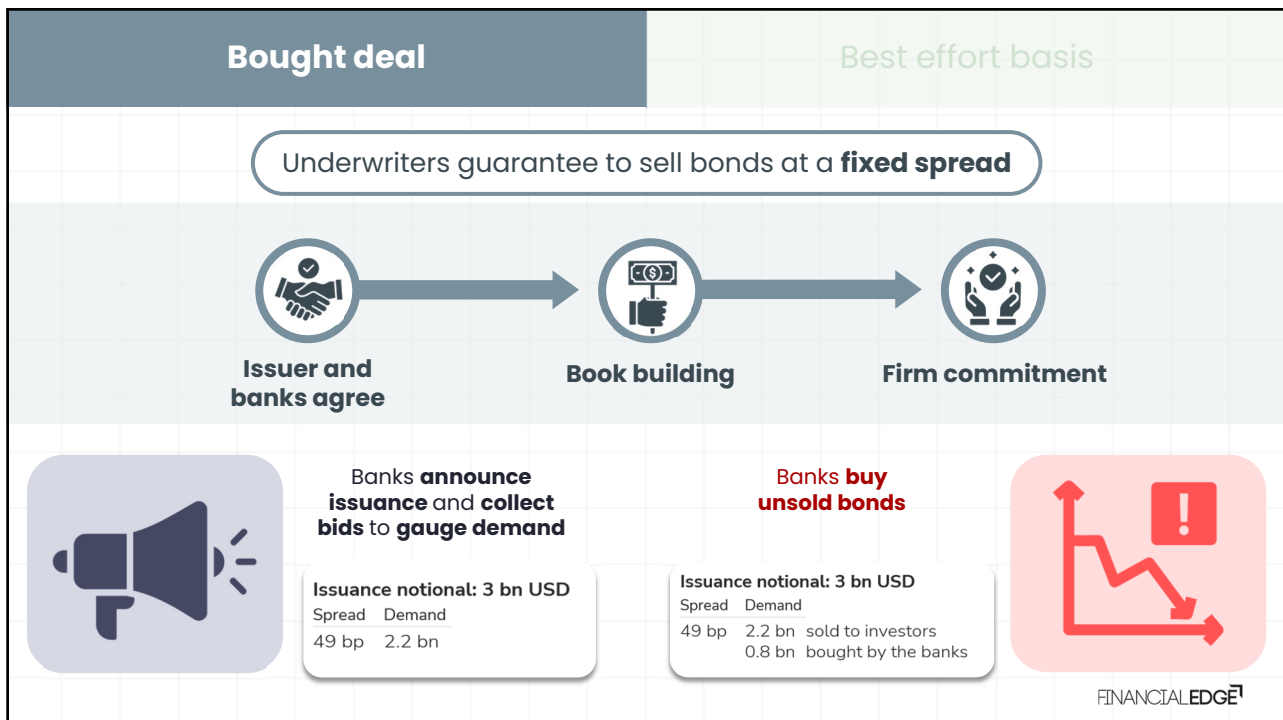
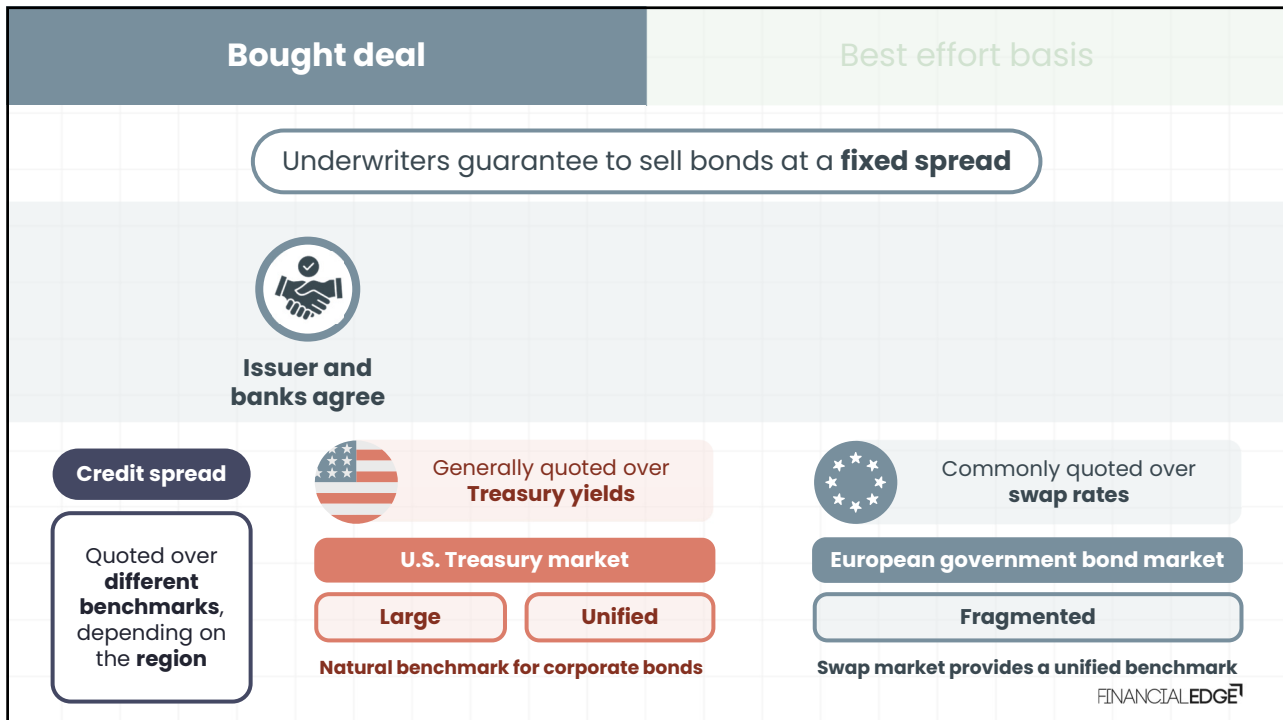
Typically, upward sloping:
higher spreads required
for risky **longer maturities**

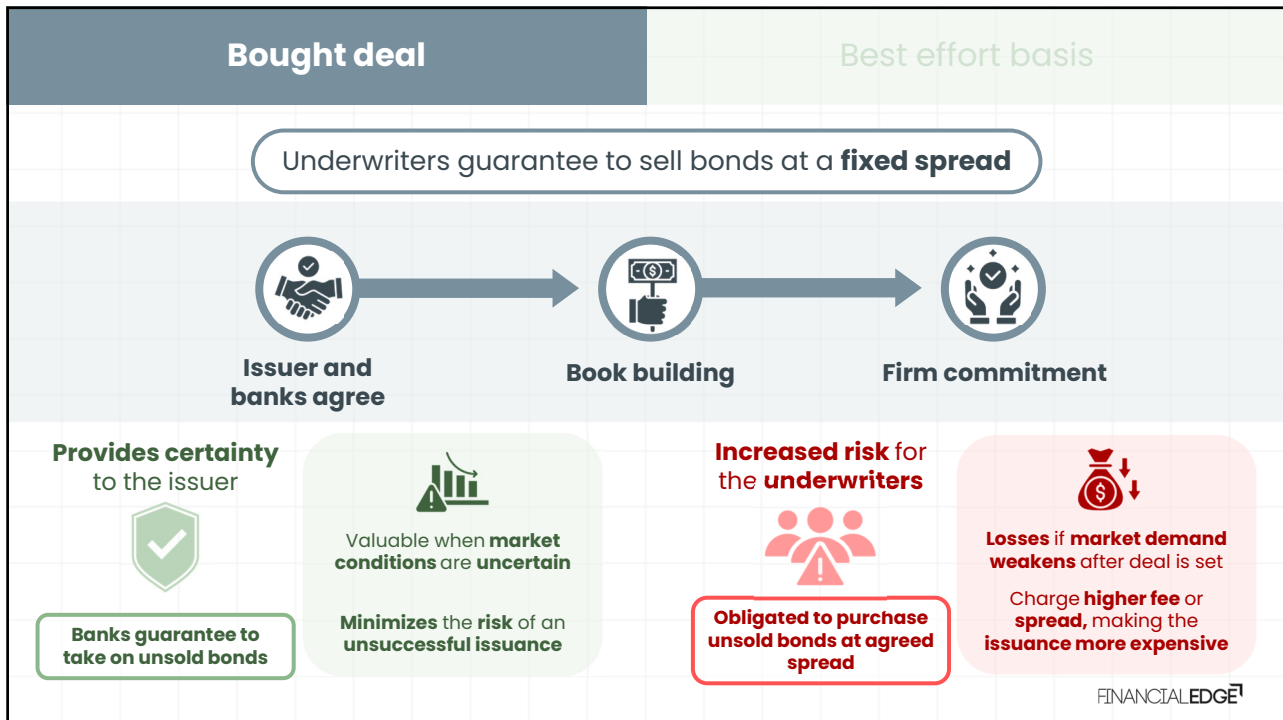


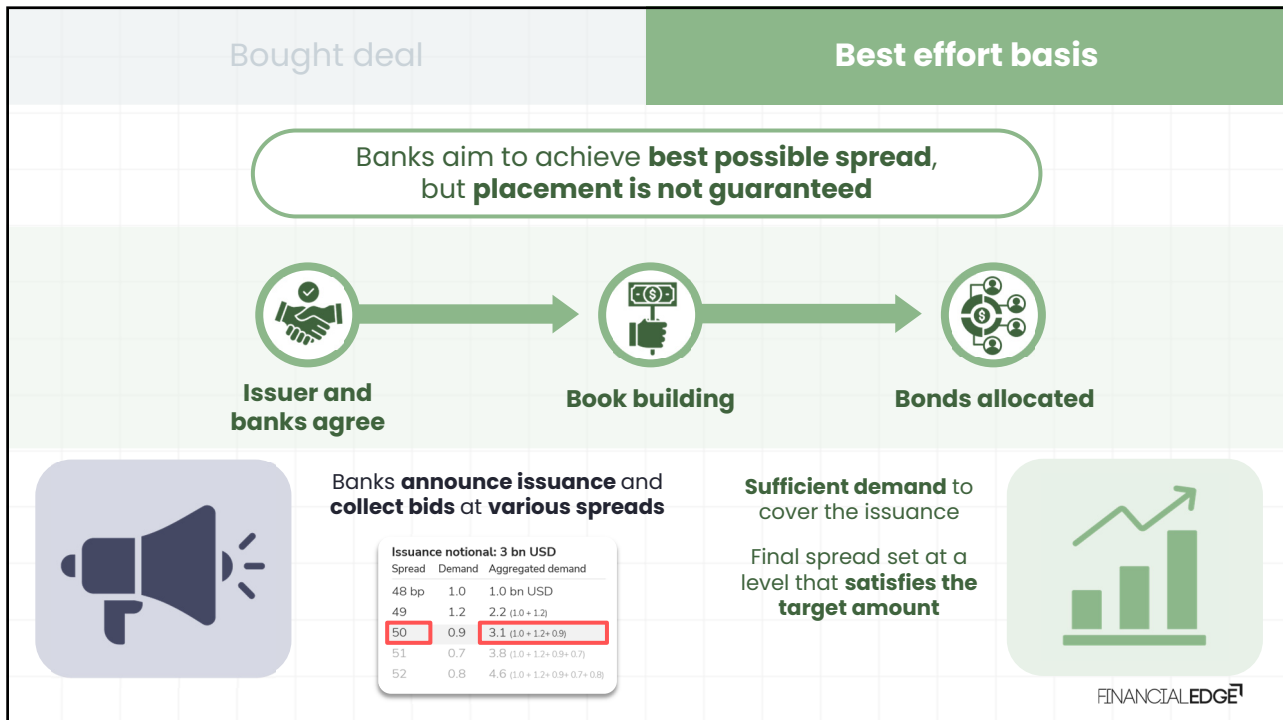
Term structure is subject
to **market conditions**
and **investor sentiment**

Corporate Bond Issuance









**Private placement**

Bonds **sold directly** to a small group of **institutional investors**

**Shelf registration**

Company registers **many bonds** with regulators and **issues them over time**

**Club deal**

Bonds **issued to a pre-arranged group** of **multiple investors**

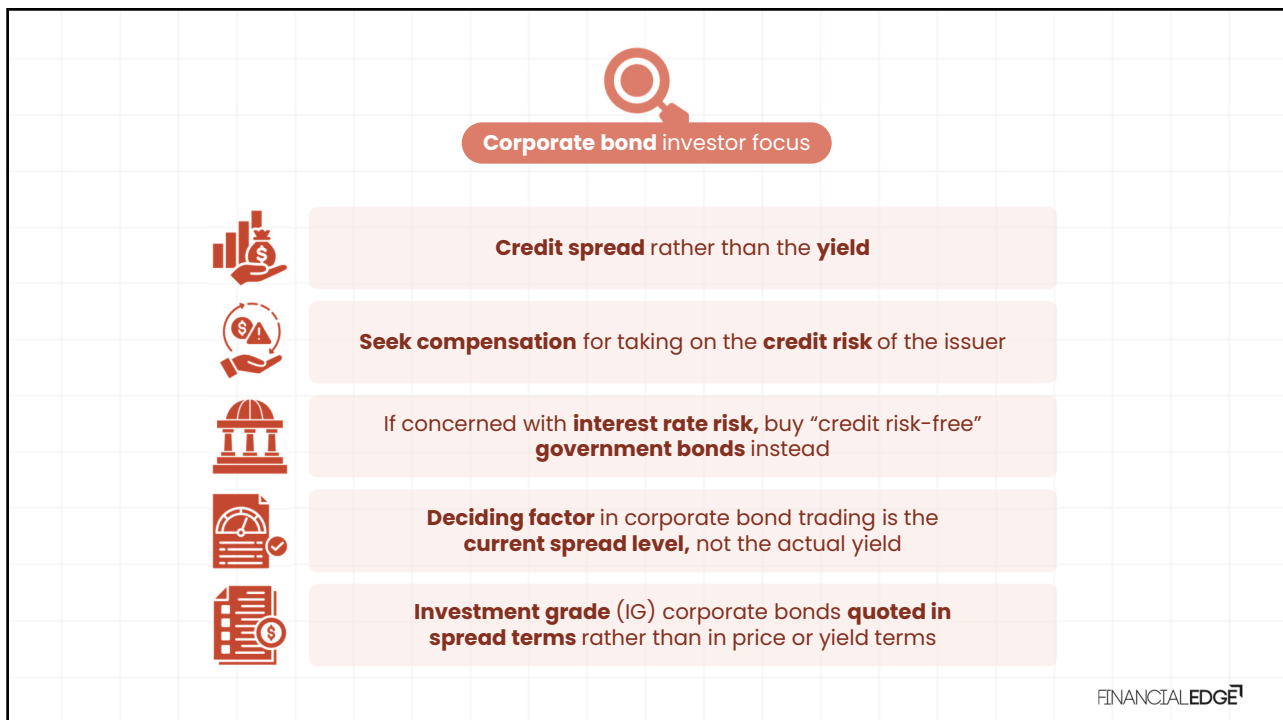
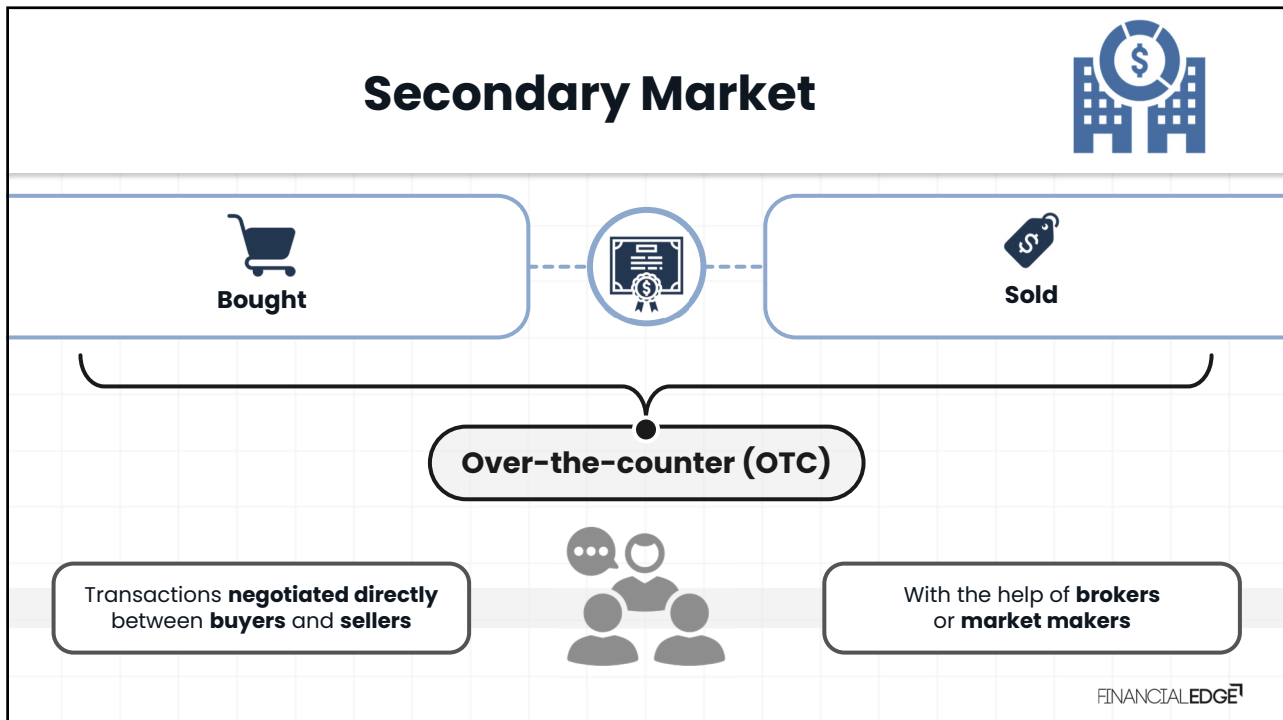
**Reverse inquiry**

Issuance is **initiated based on interest from investors**. The issuer may **tailor terms** to meet this demand

FINANCIALEDGE¹

Corporate Bond Secondary Market

FINANCIALEDGE¹





Investment grade (IG) corporate bonds **quoted in spread terms** rather than in price or yield terms

Varies depending on the region



Generally quoted over **Treasury yields**



Commonly quoted over **swap rates**

FINANCIALEDGE¹

Investment grade (IG) corporate bonds **quoted in spread terms** rather than in price or yield terms

Varies depending on the credit quality of the bond

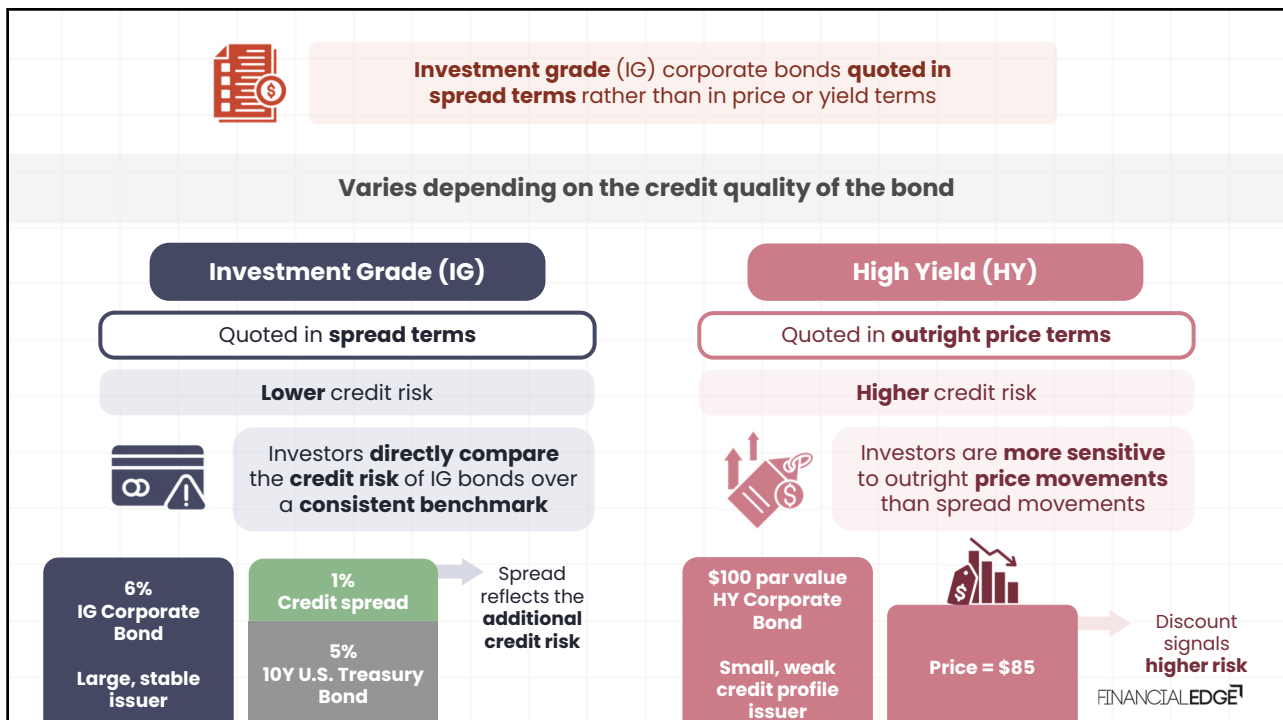
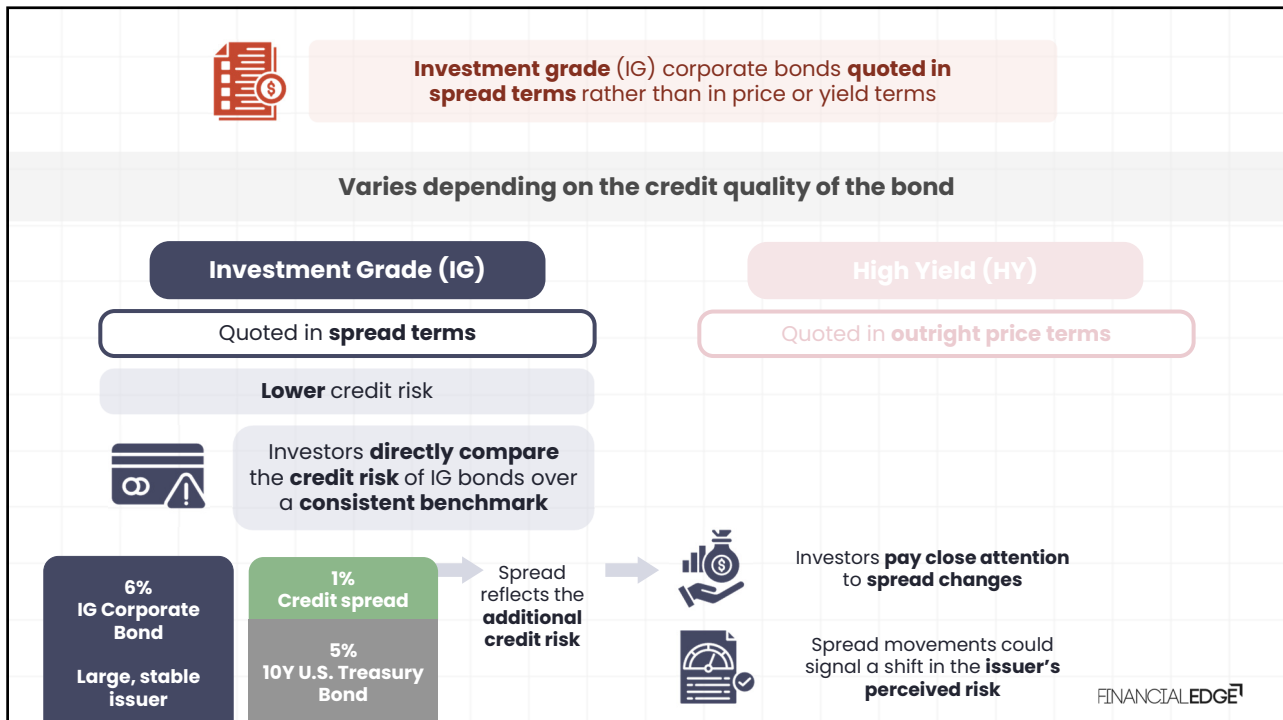
Investment Grade (IG)

Quoted in **spread terms**

High Yield (HY)

Quoted in **outright price terms**

FINANCIALEDGE¹



Different Types of Credit Spreads

FINANCIALEDGE⁷

Traditional credit spread

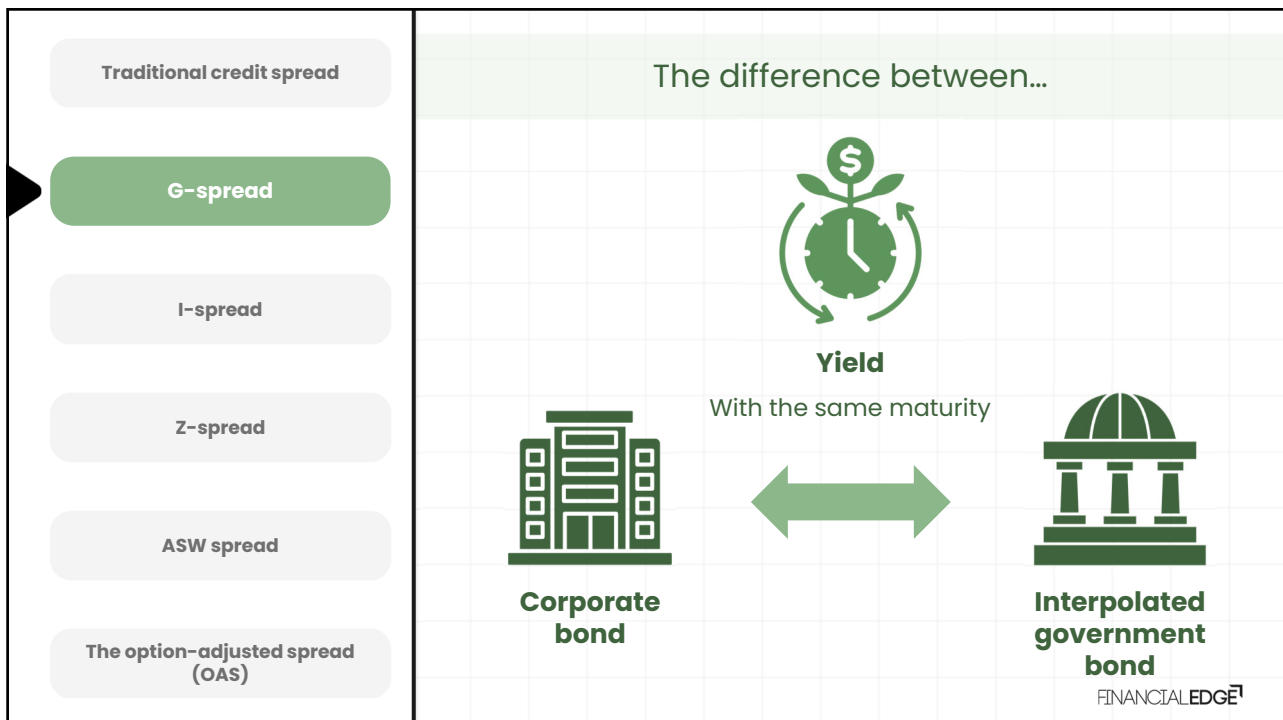
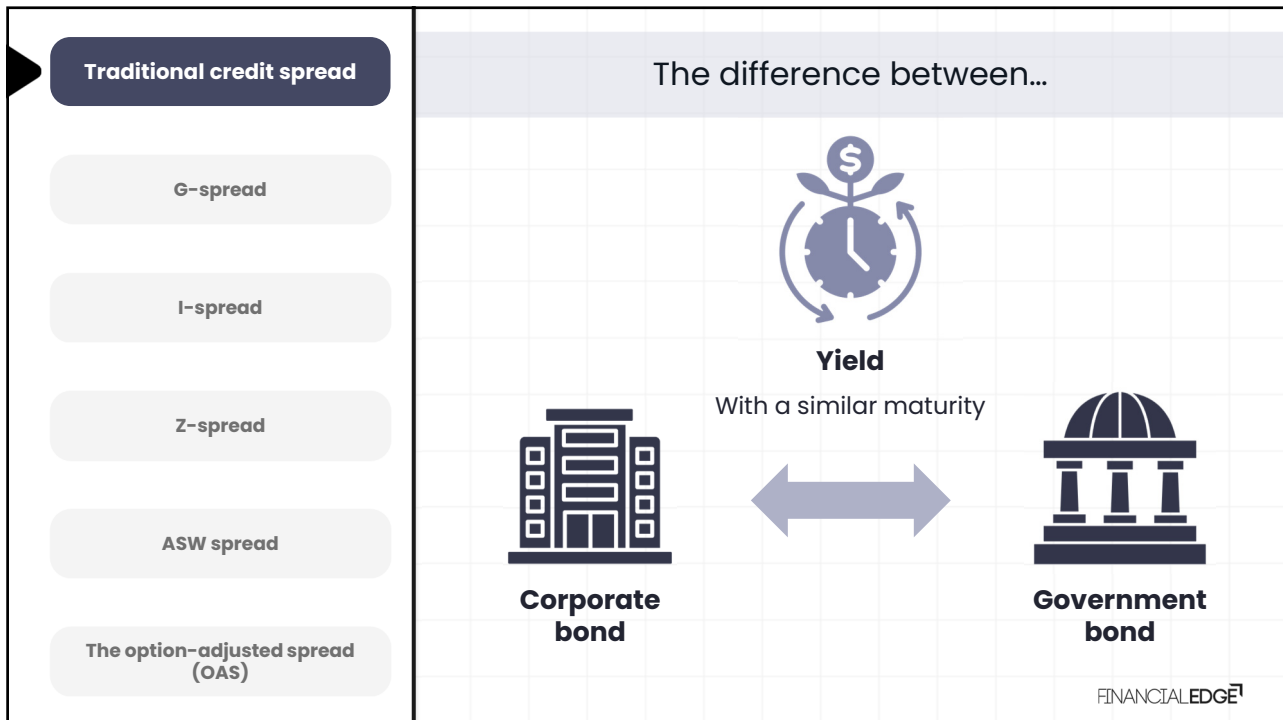
G-spread

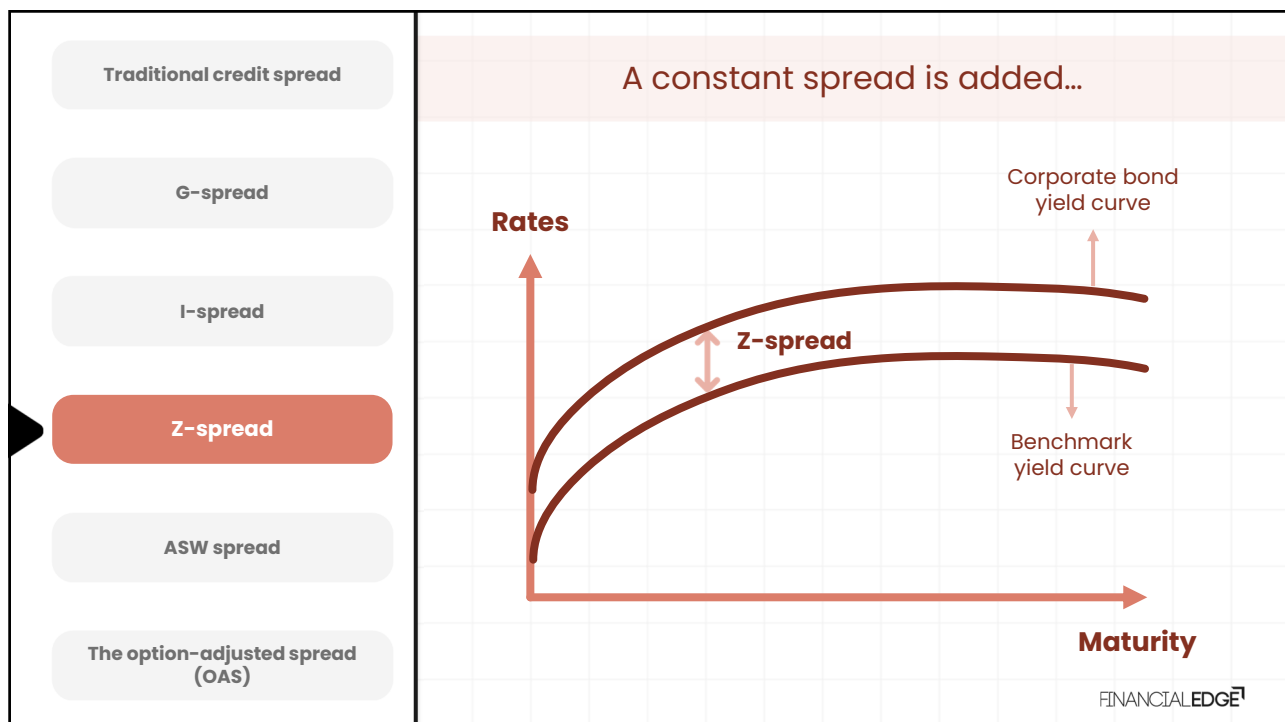
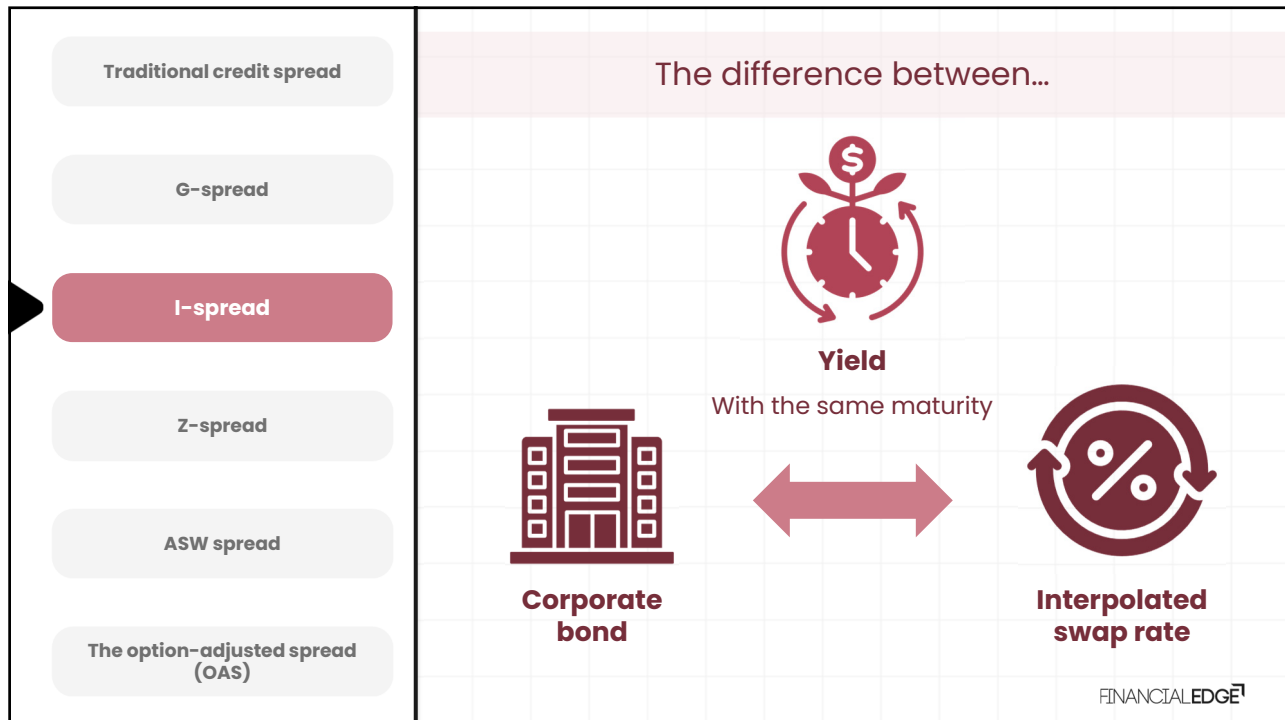
I-spread

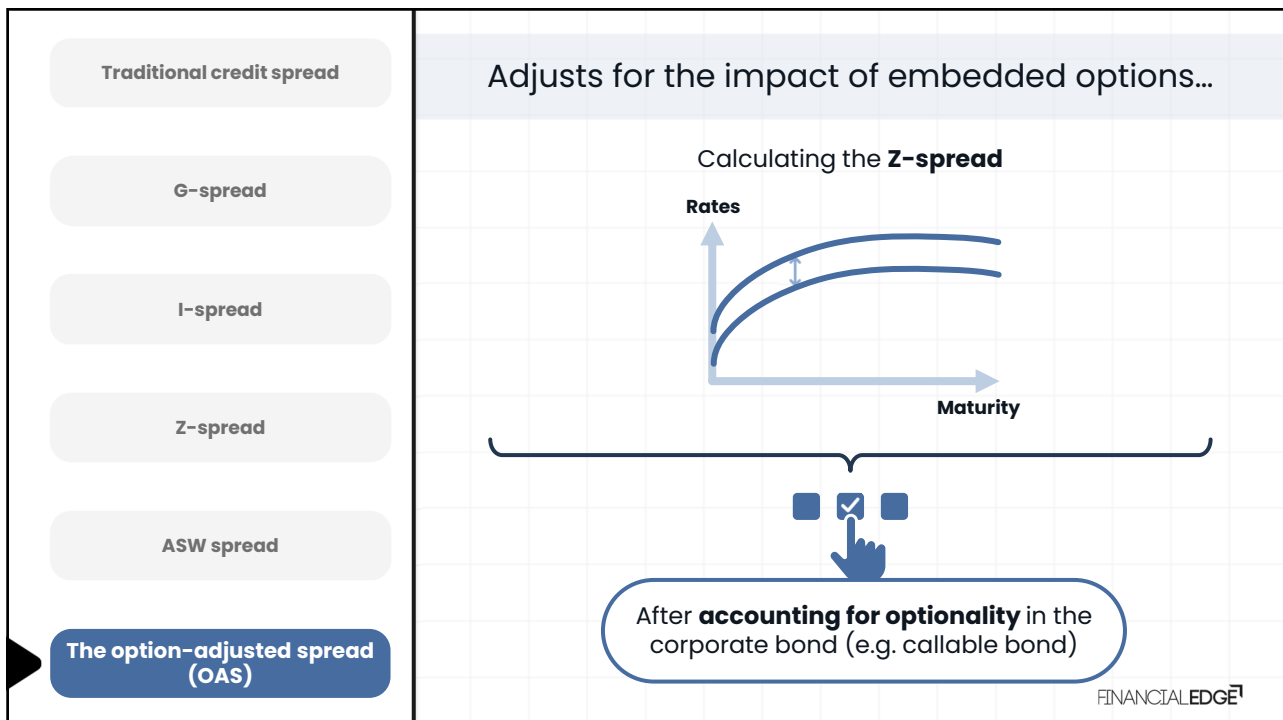
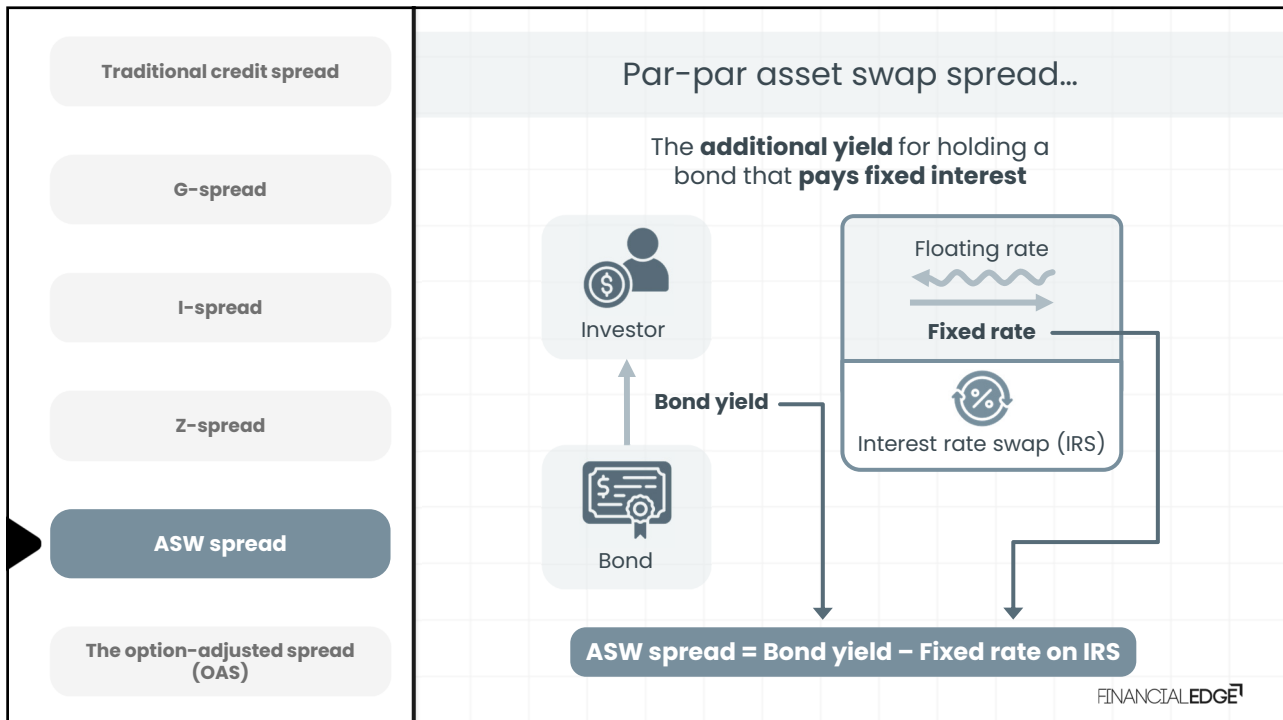
Z-spread

ASW spread

The option-adjusted spread
(OAS)FINANCIALEDGE⁷







Traditional Credit Spread

FINANCIALEDGE¹

Traditional credit spread

The difference between



Yield to maturity (YTM)



**Corporate
bond**



with a similar maturity

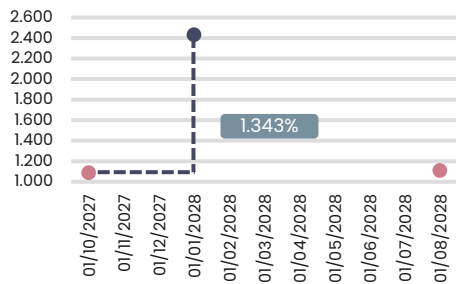


**Government
bond**

FINANCIALEDGE¹

Corporate Bond

Issuer: Deutsche Telekom International Finance			
Coupon:	3.25%	Clean price:	104.08%
Maturity:	17/01/2028	YTM:	2.432%



Market data and calculations as of July 2022

Benchmark Bond

Benchmark bond	Coupon	Maturity	Price	YTM
German Bund:	1.30%	15/10/2027	101.05%	1.089%
German Bund:	0.25%	15/08/2028	95.07%	1.108%

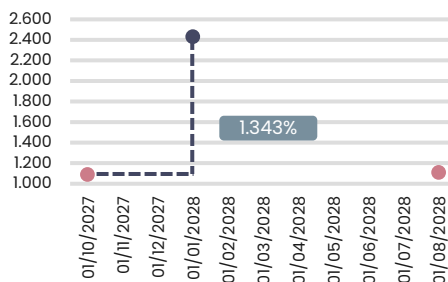
$$2.432\% - 1.089\% = 1.343\%$$

CORPORATE
BOND YIELD

GOVERNMENT
BOND YIELD

TRADITIONAL
SPREAD

FINANCIALEDGE¹



Market data and calculations as of July 2022

Advantages

Relatively simple to calculate

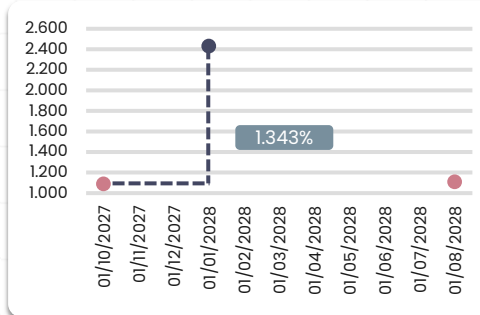
Can be **traded directly**

Limitations

Doesn't account for **maturity differences**

May not **accurately reflect** the **credit risk**

FINANCIALEDGE¹



Market data and calculations as of July 2022

Limitations

Doesn't account for **maturity differences**

May not **accurately reflect** the **credit risk**

Steep yield curve environment

Yields increase with each **additional year to maturity**

The spread is capturing some of the **yield curve effect** from the **longer maturity**

FINANCIALEDGE⁷

G-Spread

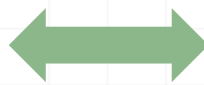
FINANCIALEDGE⁷

G-Spread

The difference between



Yield to maturity (YTM)



with the **exact same** maturity



Corporate bond



Interpolated government bond

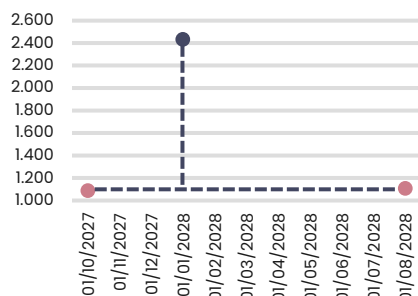
Using **two nearby government bonds** as reference points

FINANCIALEDGE⁷

Corporate Bond

Issuer: Deutsche Telekom International Finance

Coupon:	3.25%	Clean price:	104.08%
Maturity:	17/01/2028	YTM:	2.432%

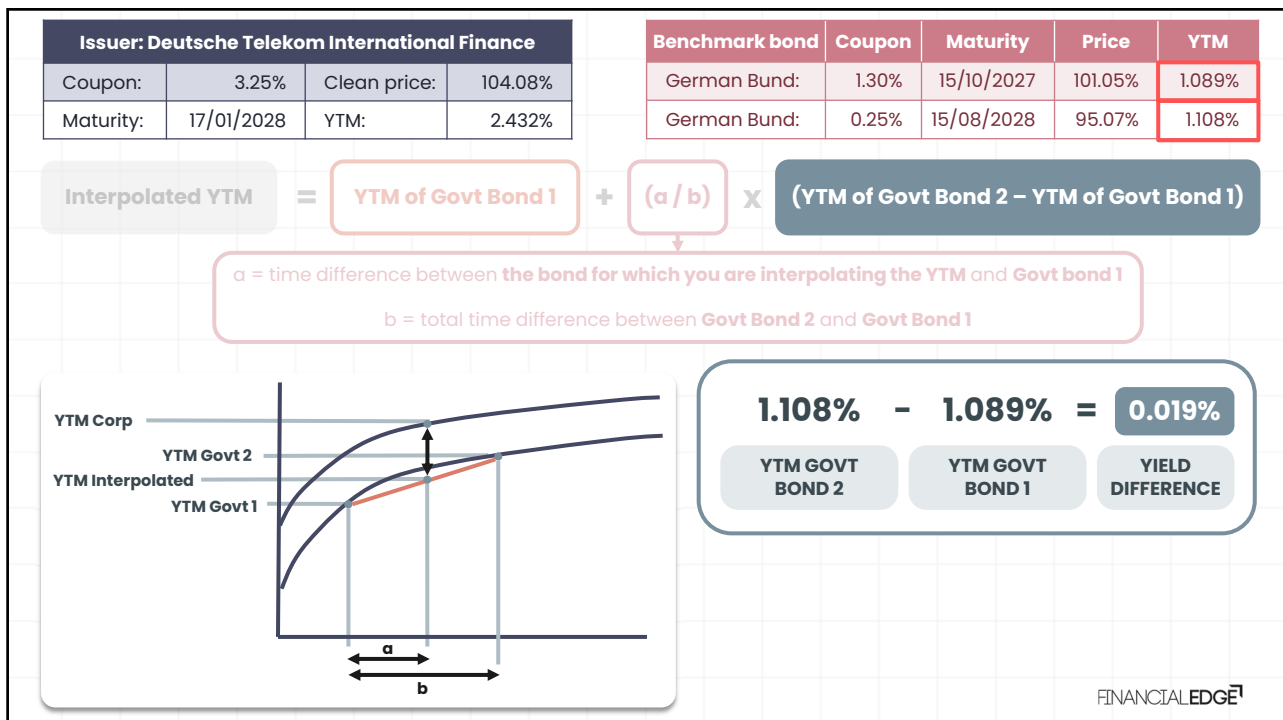
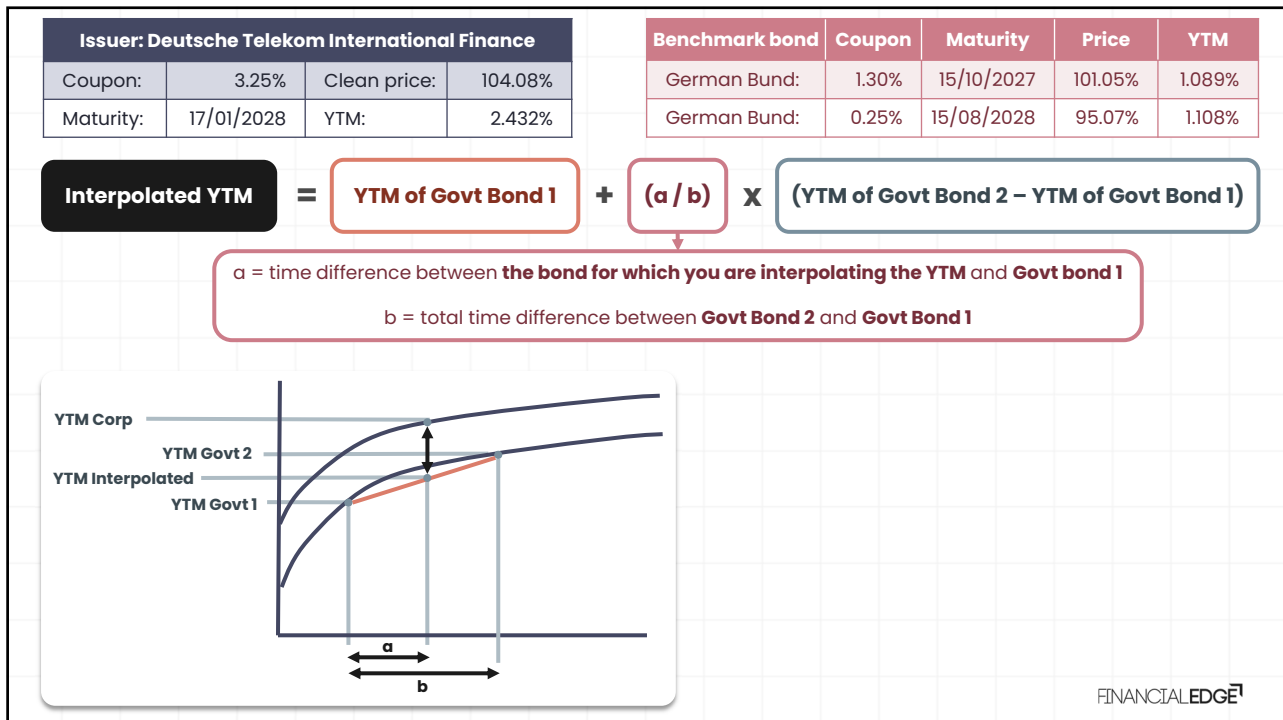


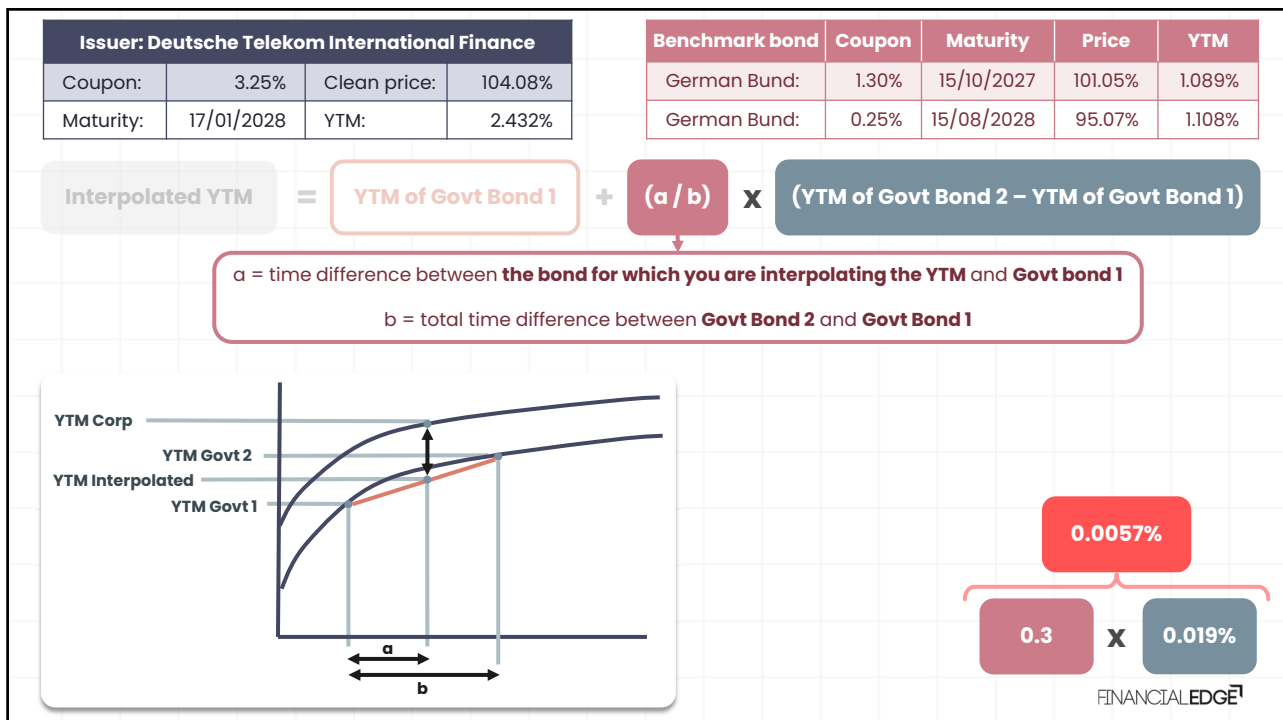
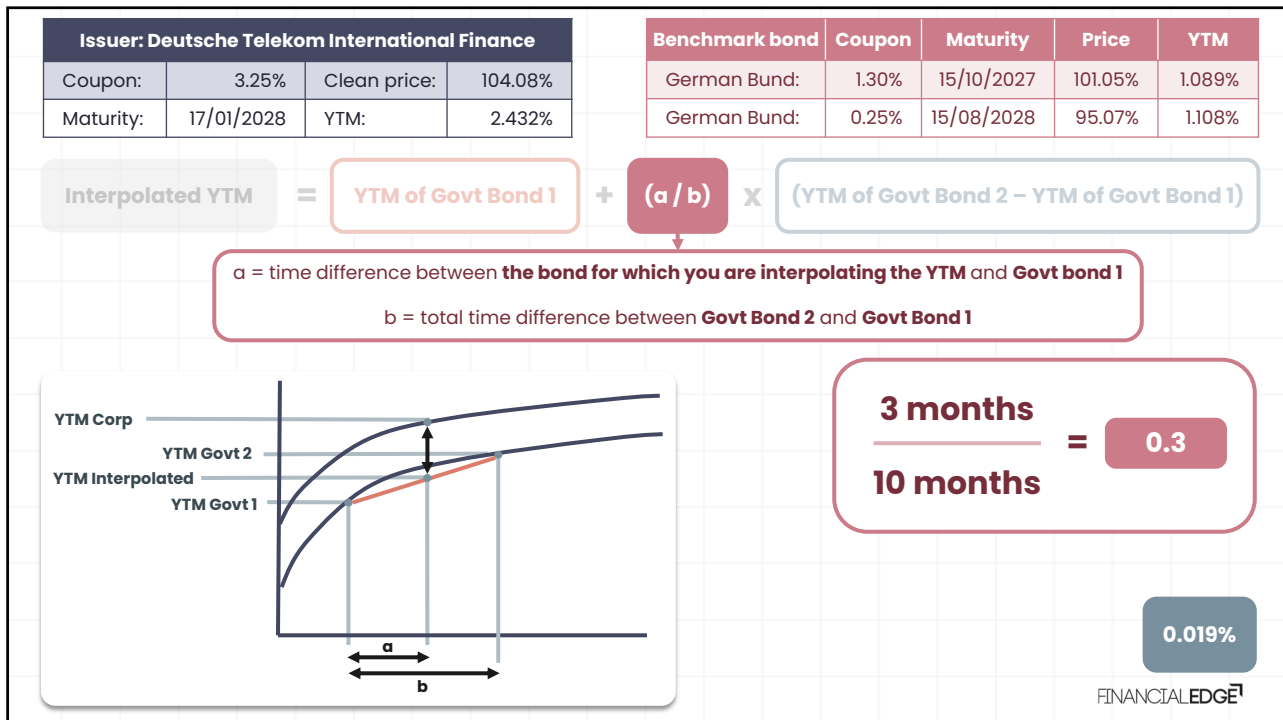
Market data and calculations as of July 2022

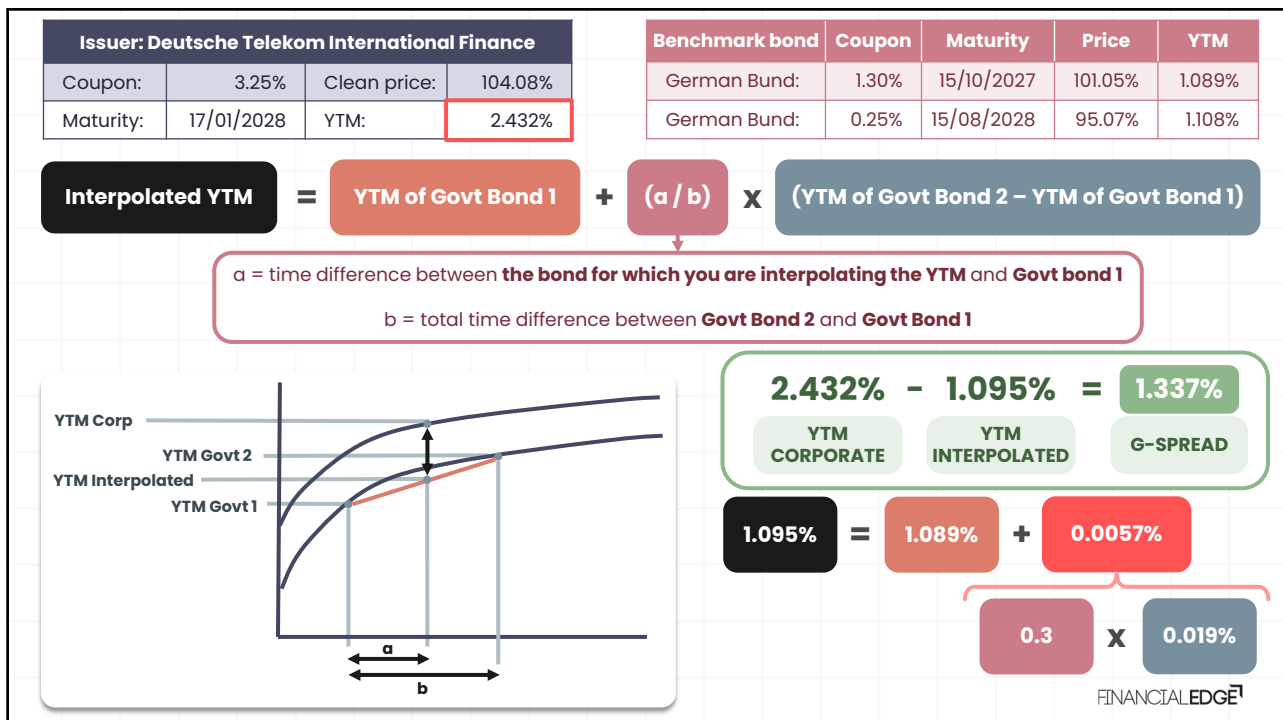
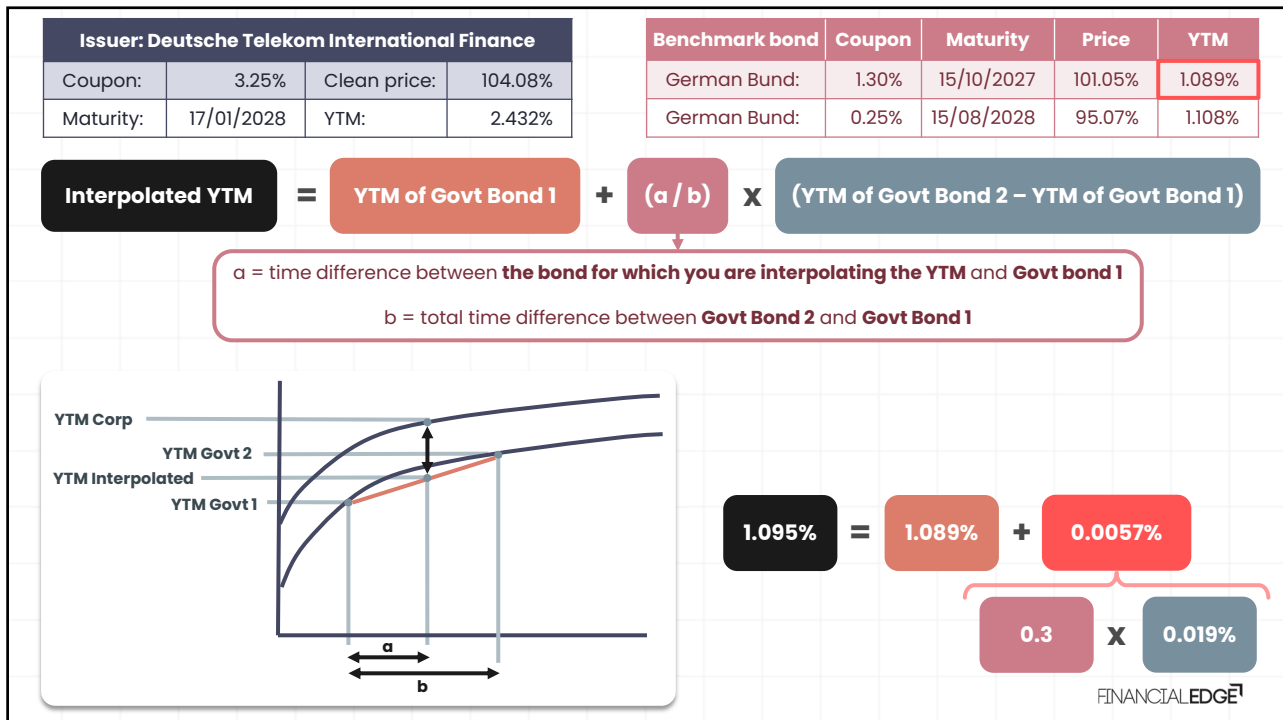
Benchmark Bond

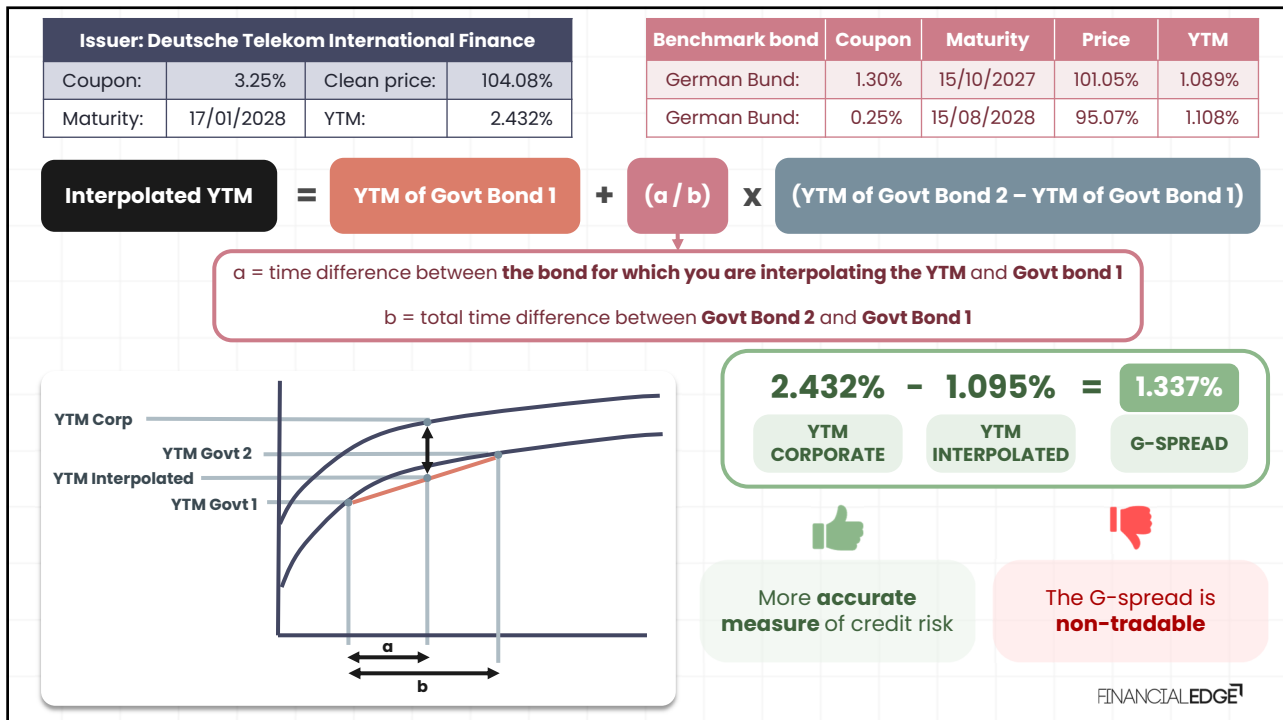
Benchmark bond	Coupon	Maturity	Price	YTM
German Bund:	1.30%	15/10/2027	101.05%	1.089%
German Bund:	0.25%	15/08/2028	95.07%	1.108%

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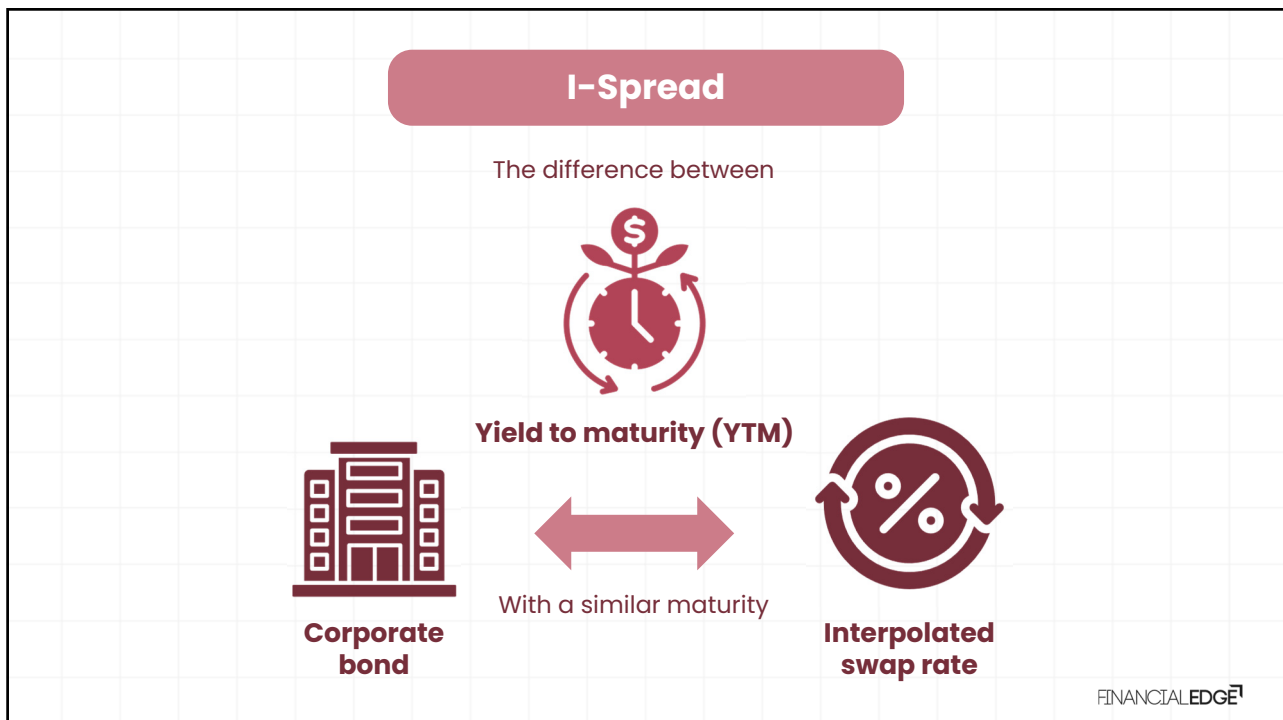
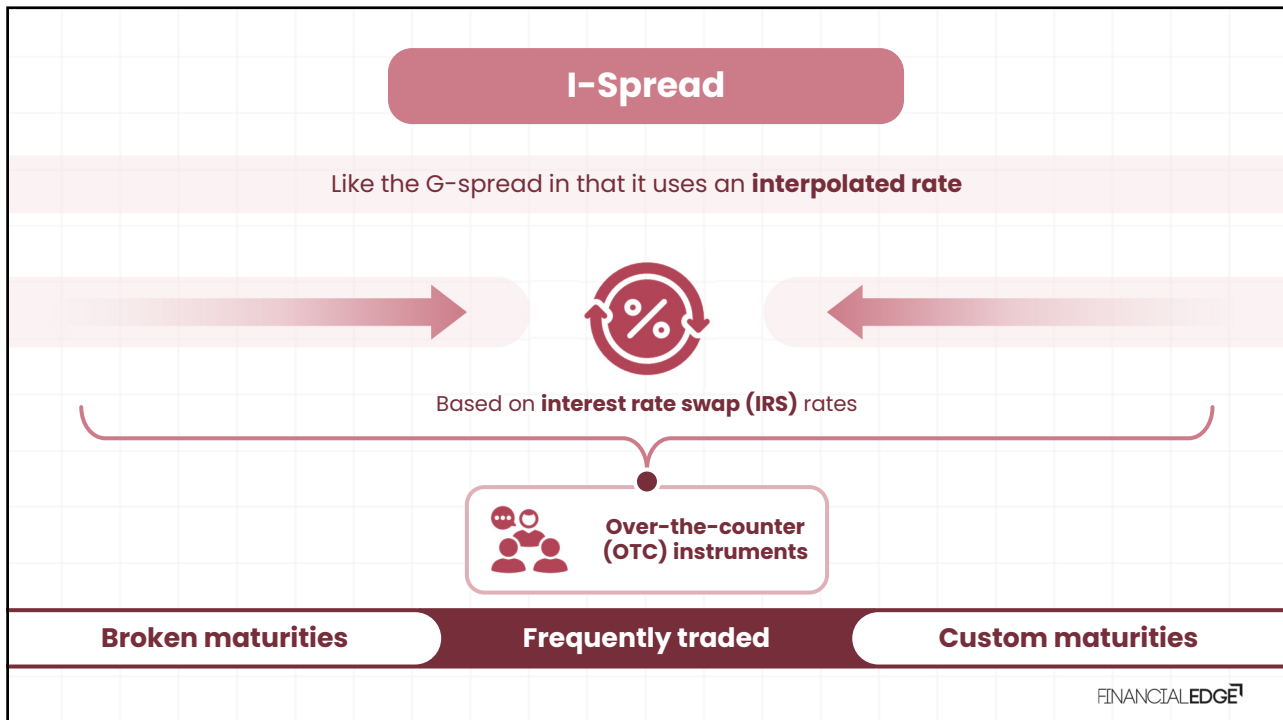






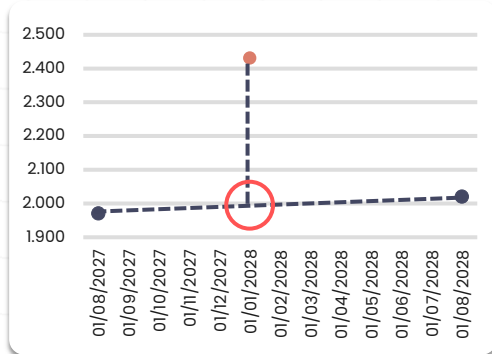


I-Spread



Corporate Bond

Issuer: Deutsche Telekom International Finance			
Coupon:	3.25%	Clean price:	104.08%
Maturity:	17/01/2028	YTM:	2.432%



Swap rates

EUR swaps	Swap rate
5Y	1.97%
6Y	2.02%

$$2.432\% - 1.989\% = 0.443\%$$

YTM CORPORATE
BOND

INTERPOLATED
SWAP RATE

I-SPREAD



Can be **directly traded**

Swaps may be a more
suitable benchmark in
some markets

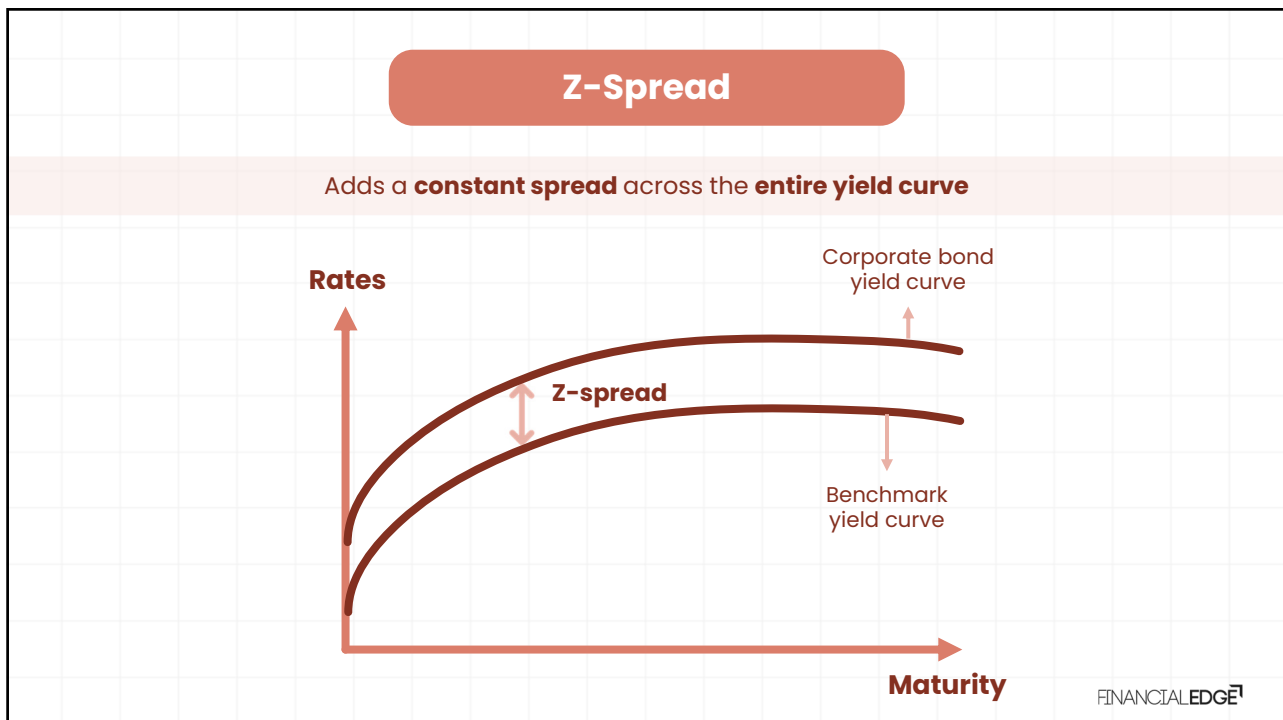
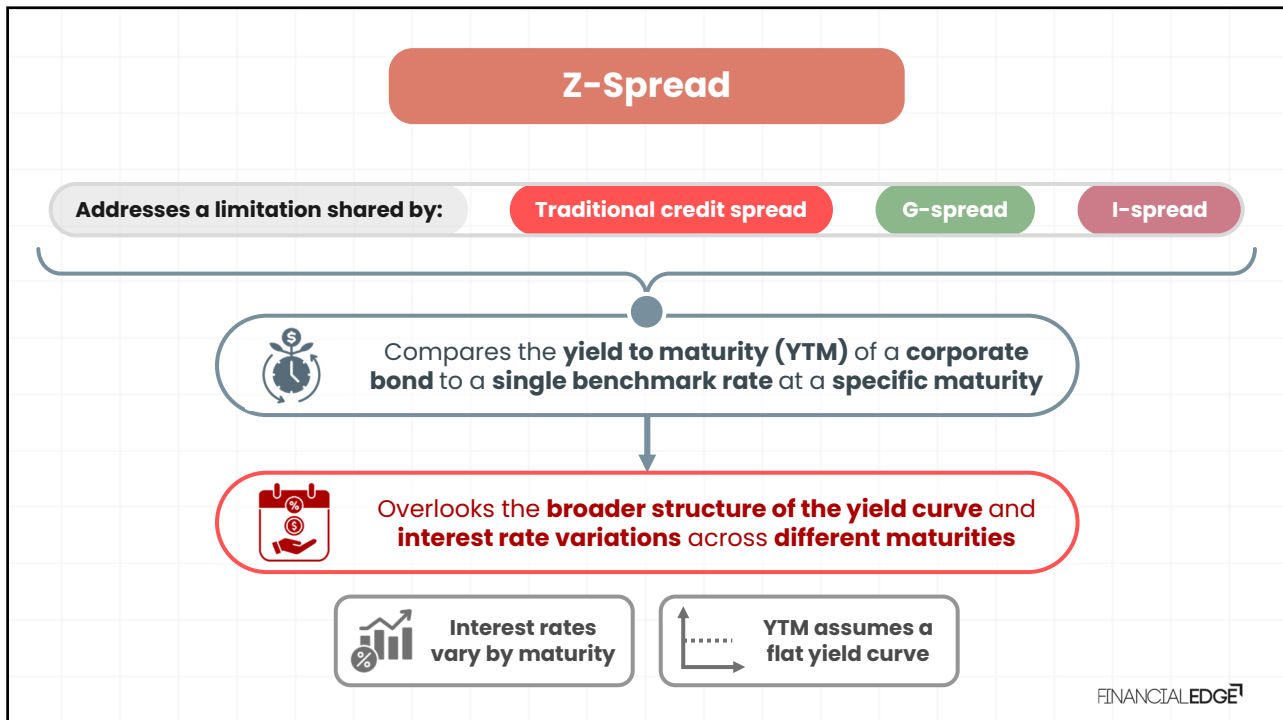


Swap rates (IBOR)
are **not purely credit
risk-free**

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Z-Spread

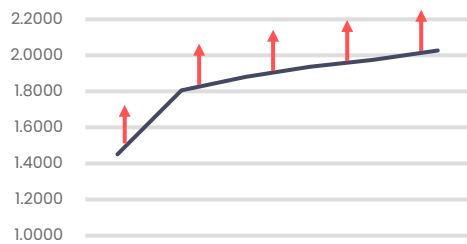
FINANCIALEDGE¹



Corporate Bond

Issuer: Deutsche Telekom International Finance

Coupon:	3.25%	Clean price:	104.08%
Maturity:	17/01/2028	YTM:	2.432%



Swap curves often preferred as they are **par curves**

Market data and calculations as of July 2022

Bond cash flows discounted with zero plus spread

Date	Cash flow	Zero rate	Z-Spread	PV	DF
17/01/2023	3.250	0.773	0.447	3.235	0.995
17/01/2024	3.250	1.626	0.447	3.159	0.972
17/01/2025	3.250	1.834	0.447	3.080	0.948
17/01/2026	3.250	1.901	0.447	3.004	0.924
17/01/2027	3.250	1.951	0.447	2.929	0.901
17/01/2028	103.250	1.995	0.447	90.668	0.878
				Price excluding z-spread:	106.075
				Price including z-spread:	104.080



Discrepancy indicates a **spread** needs to be applied



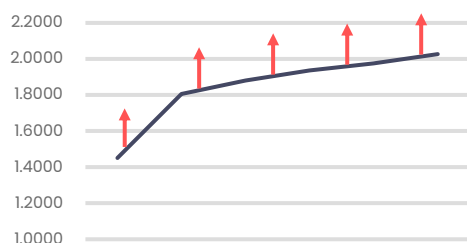
Determined through **trial and error**

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Corporate Bond

Issuer: Deutsche Telekom International Finance

Coupon:	3.25%	Clean price:	104.08%
Maturity:	17/01/2028	YTM:	2.432%



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Market data and calculations as of July 2022

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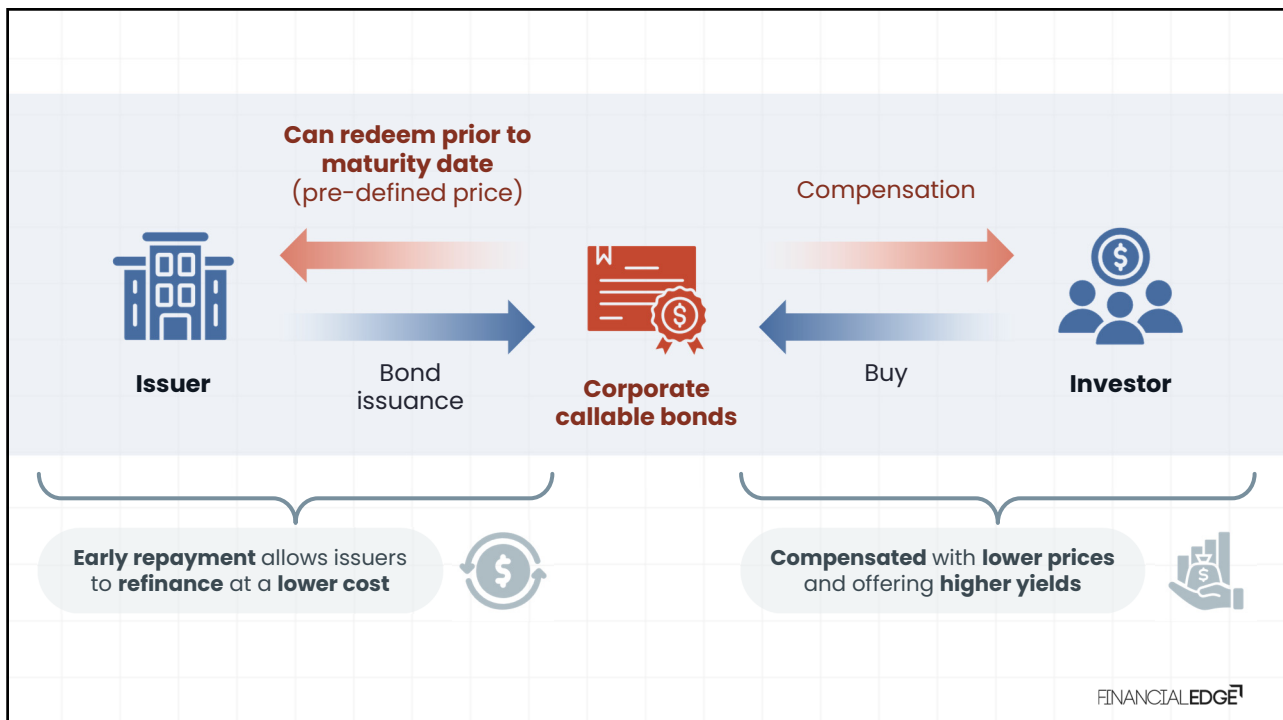
Incorporates both the bond's **cash flow structure** and **shape of the yield curve**



Precise measure of credit risk compared to a single-maturity benchmark

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Callable Bonds

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Callable bond investor risks

In addition to the **reinvestment risk** they face...



Limit on the price appreciation of the bond as interest rates fall

The price at which the **bond can be called** acts as an **upper limit**

No one will buy a bond for **more than it could be called at** in the future



Negative convexity

As **rates fall**, **prices rise less** than a **non-callable bond** would

As **rates rise**, **prices fall in line** with a **regular bond**

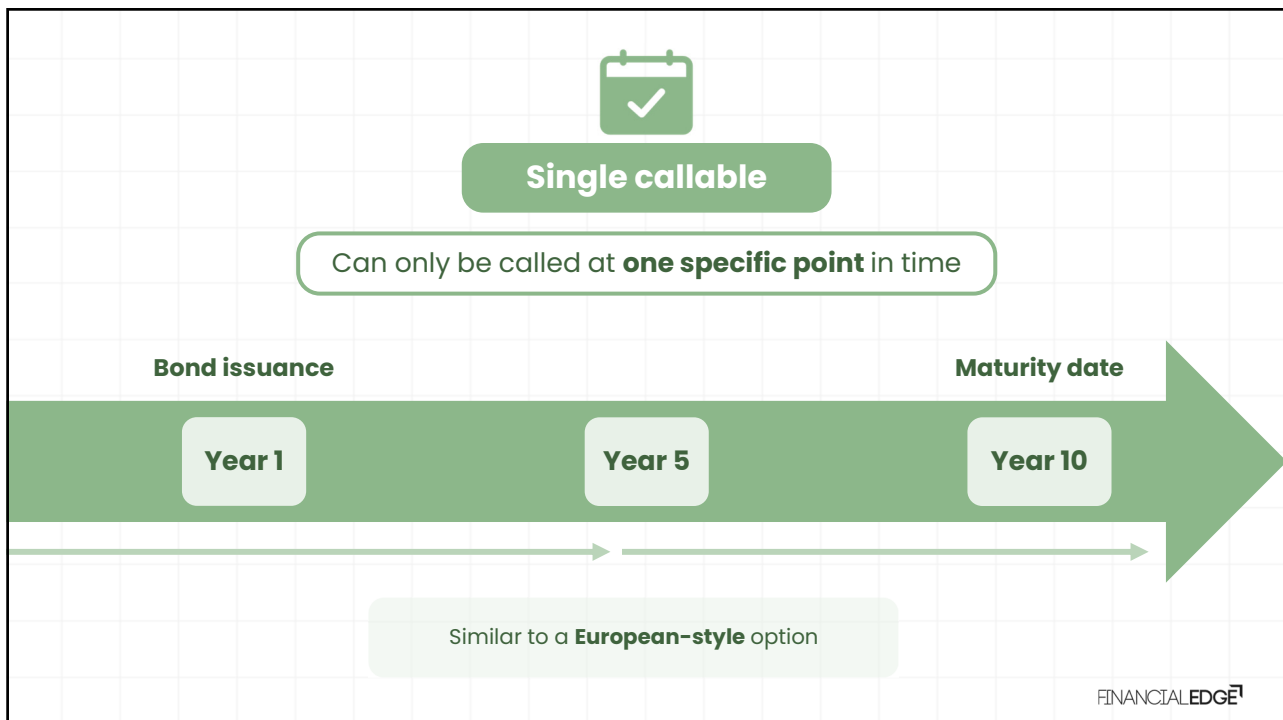
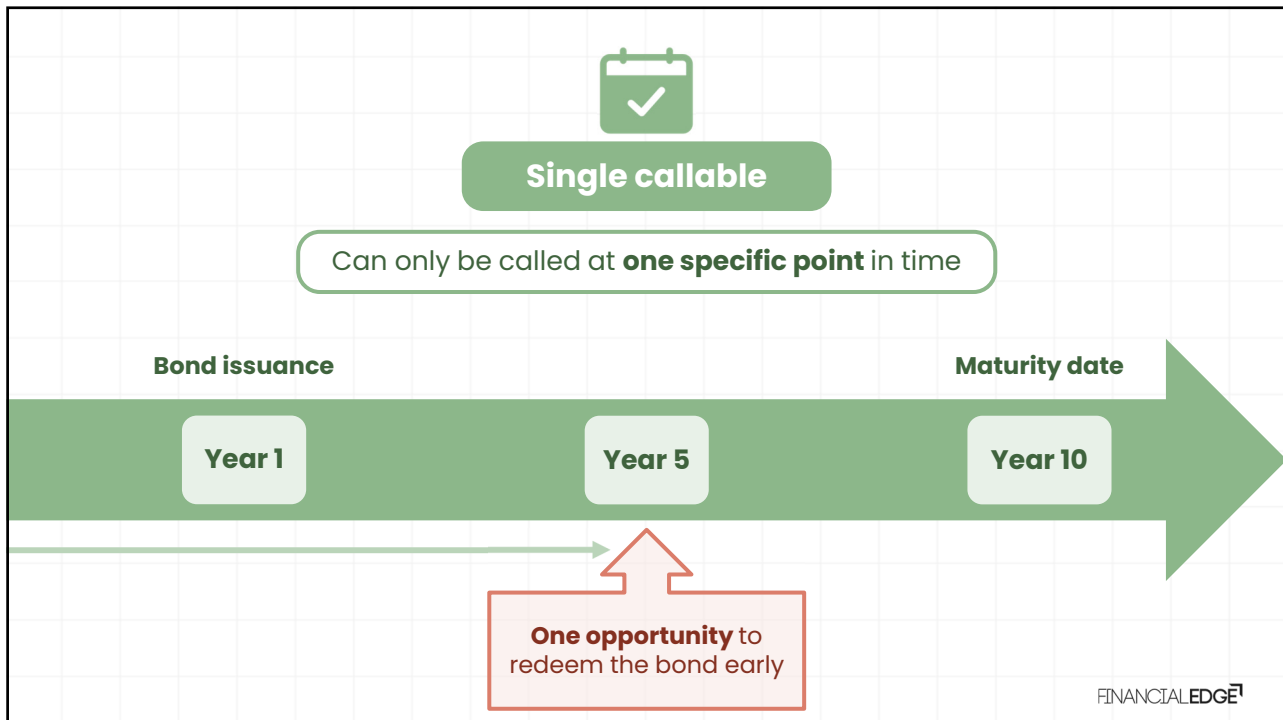
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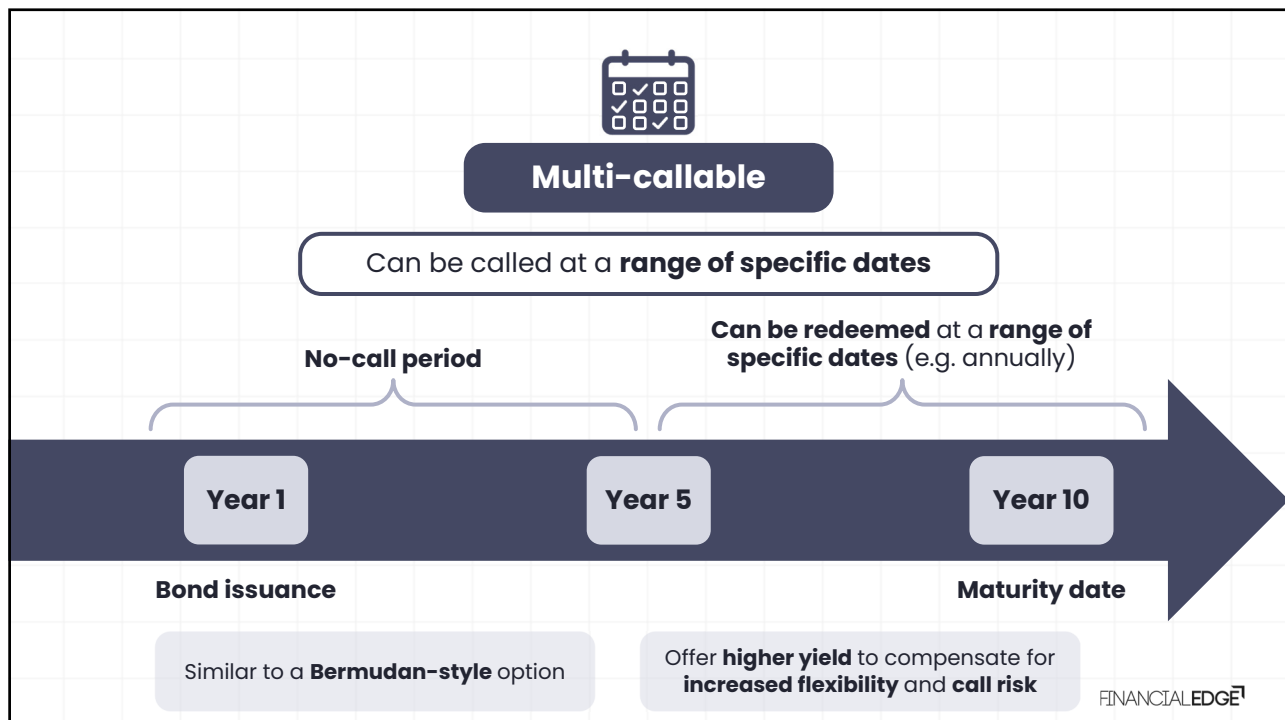
Single callable



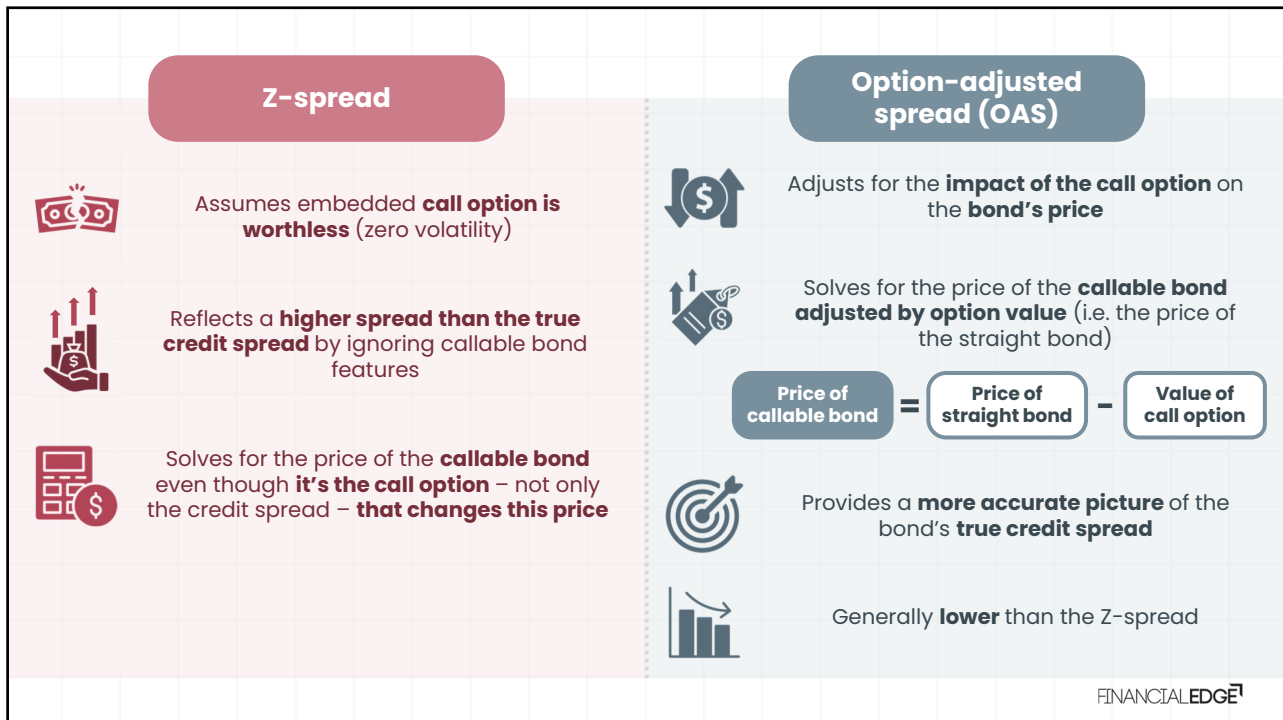
Multi-callable

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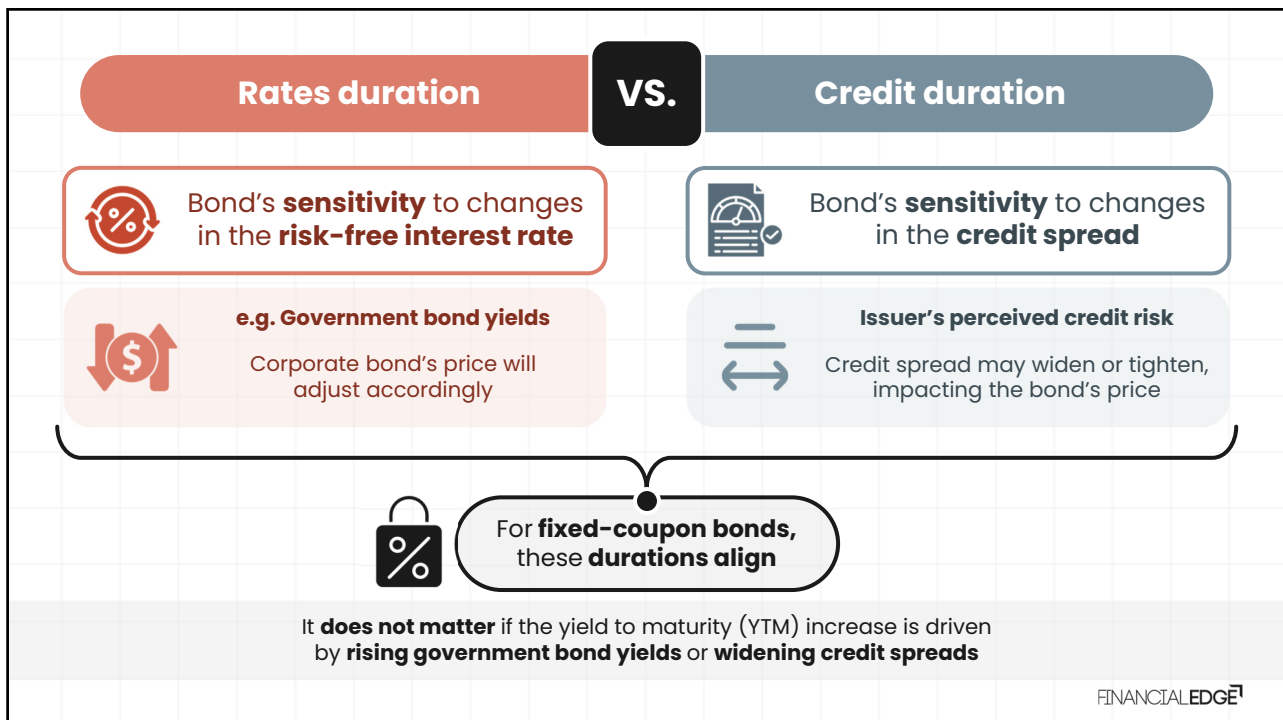
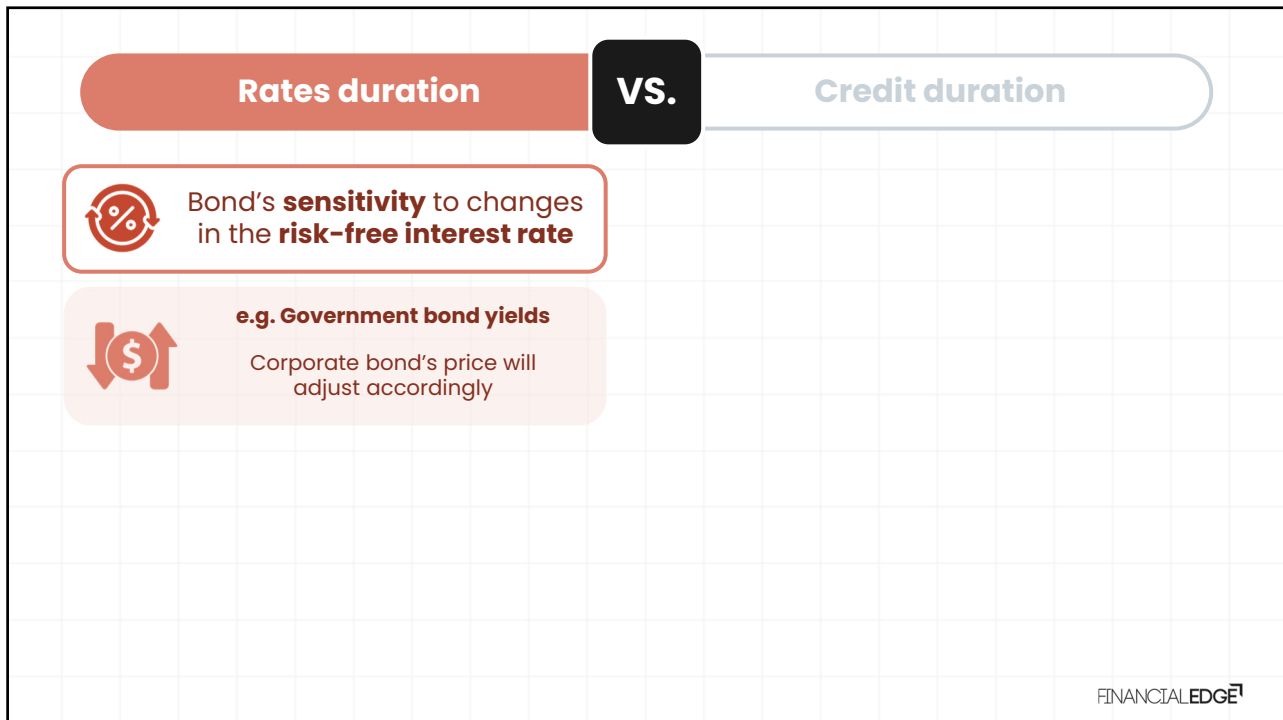


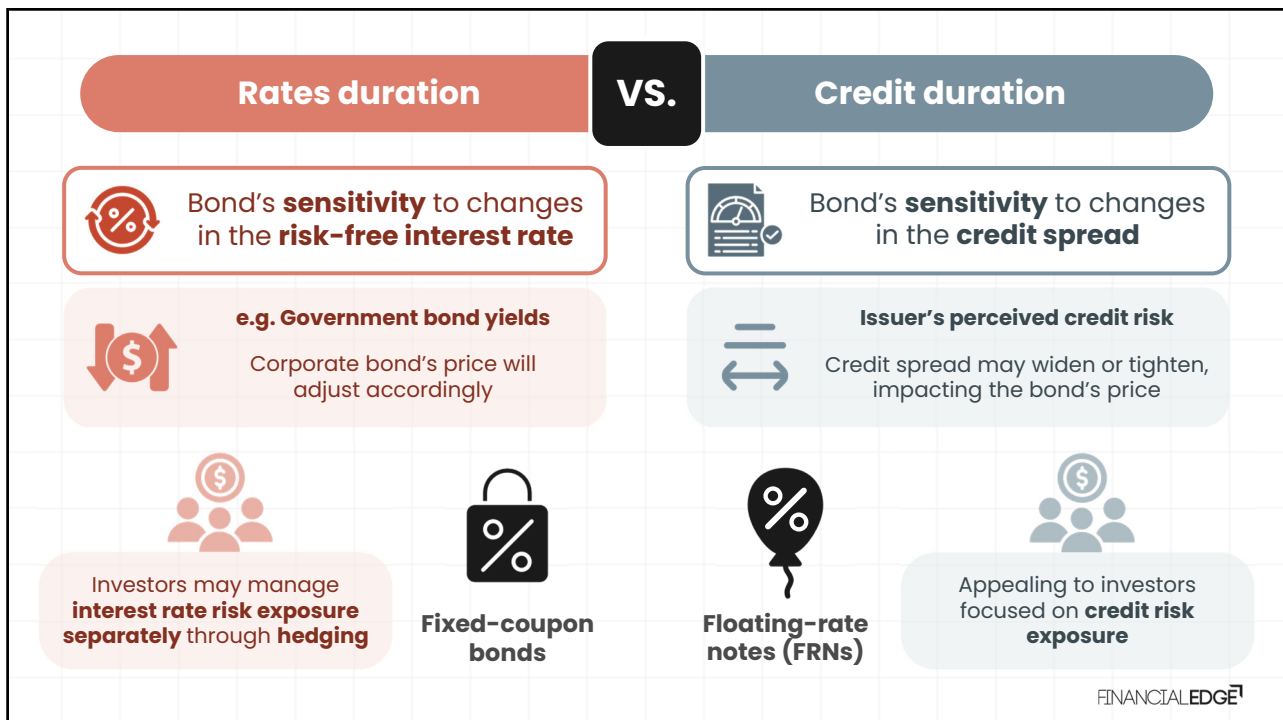
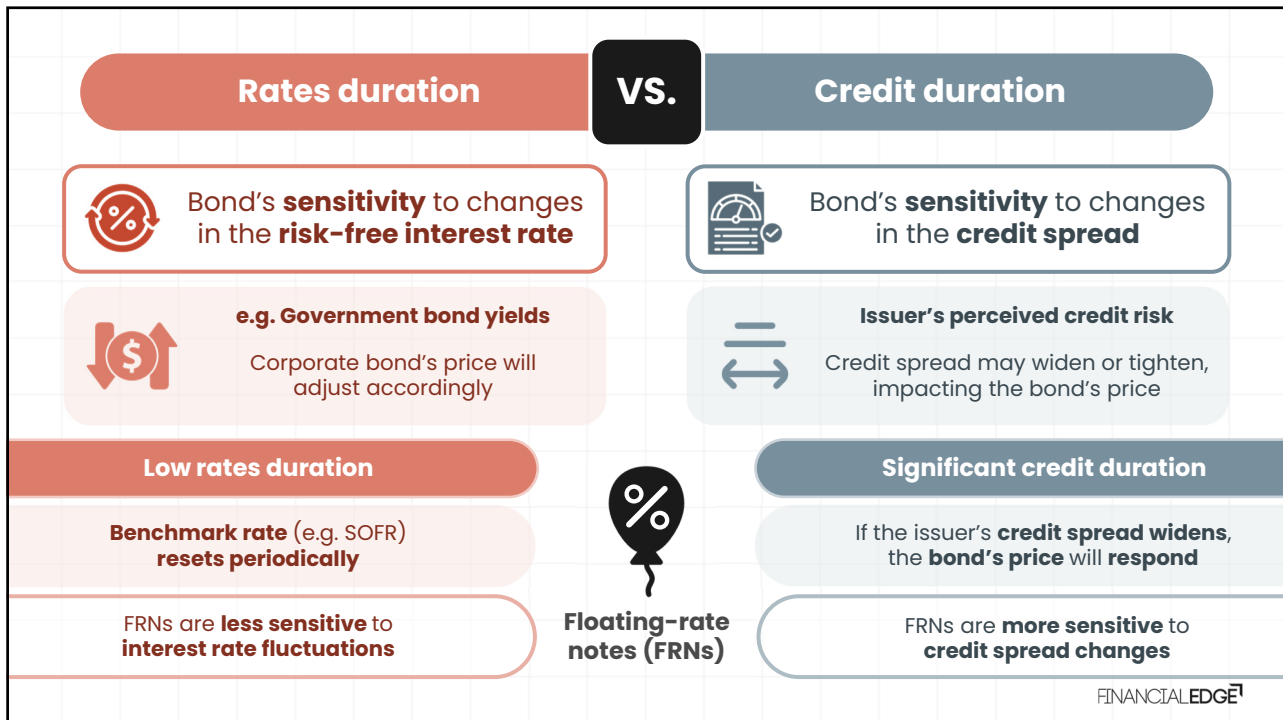
OAS

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Rates Duration vs. Credit Duration

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