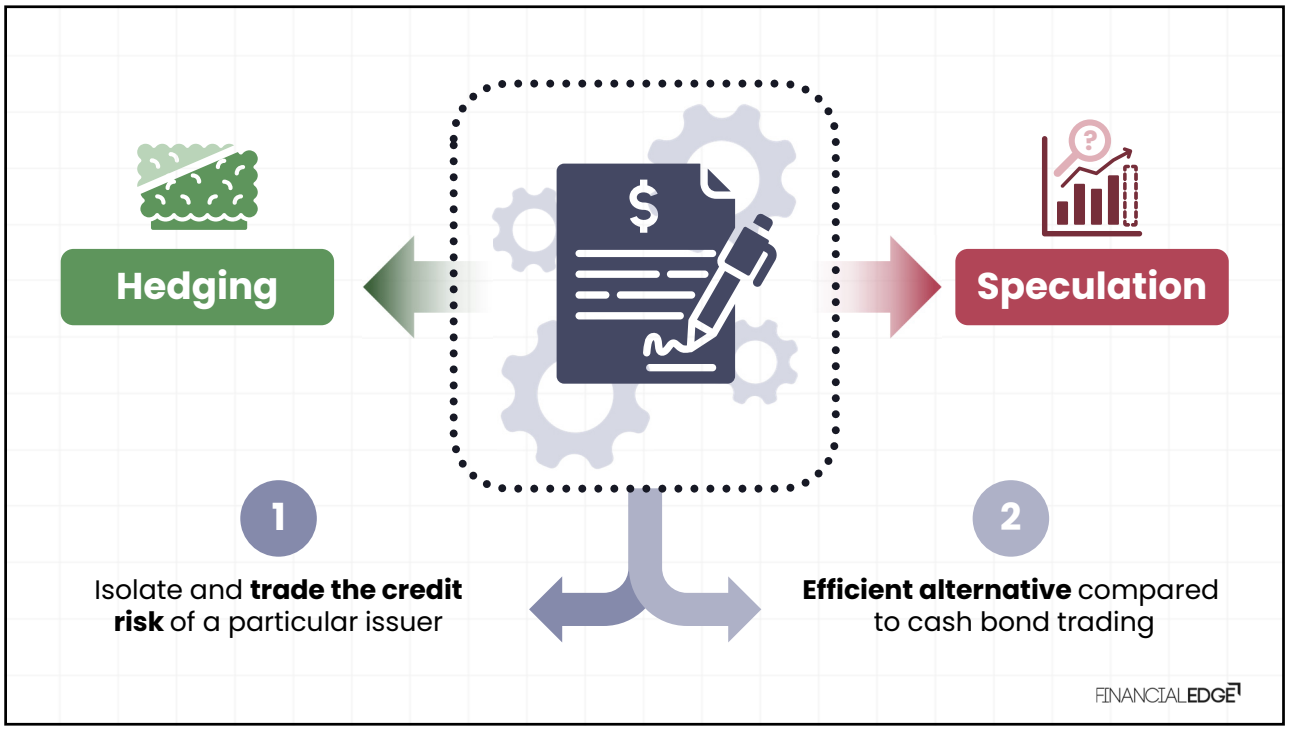
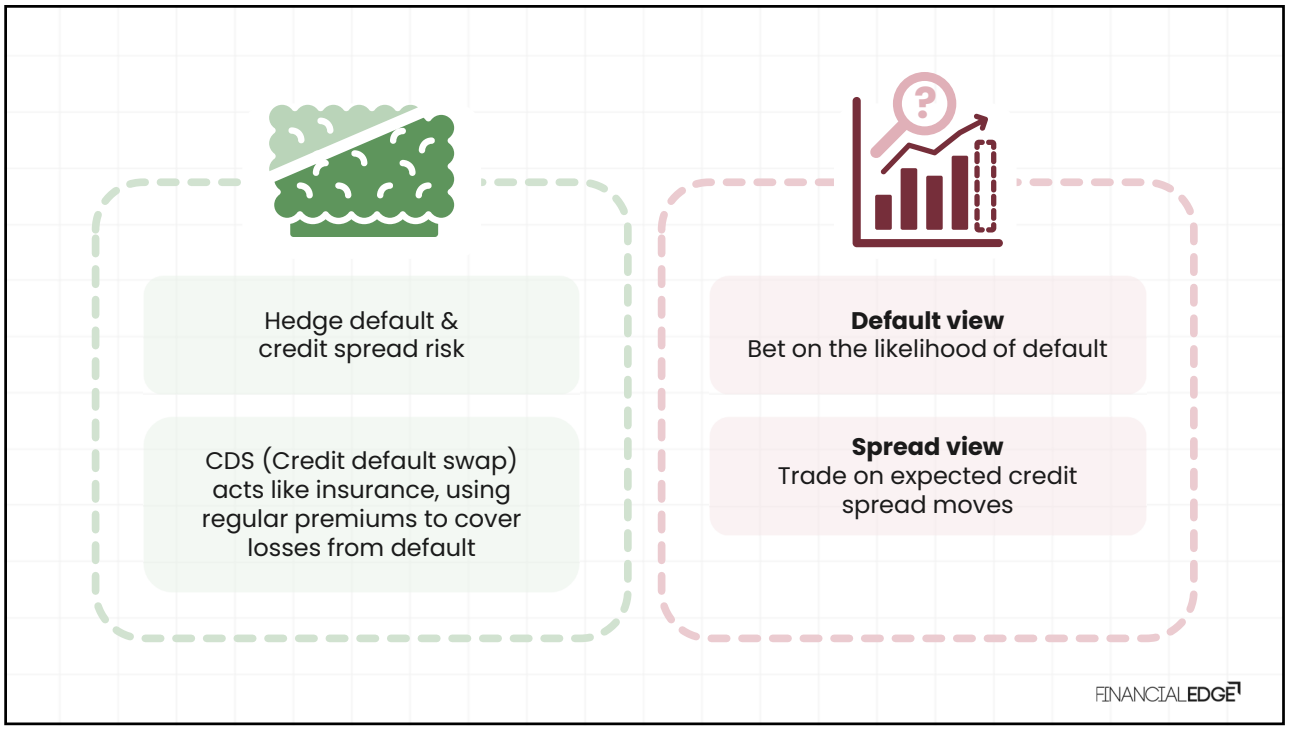
Credit Derivatives Overview





Single Name Credit Default Swap (CDS)

FINANCIALEDGE

CDS

Credit Default Swap

Pays CDS premium to **receive protection** in case of a credit event

Protection Buyer

CDS premium

(Premium leg)

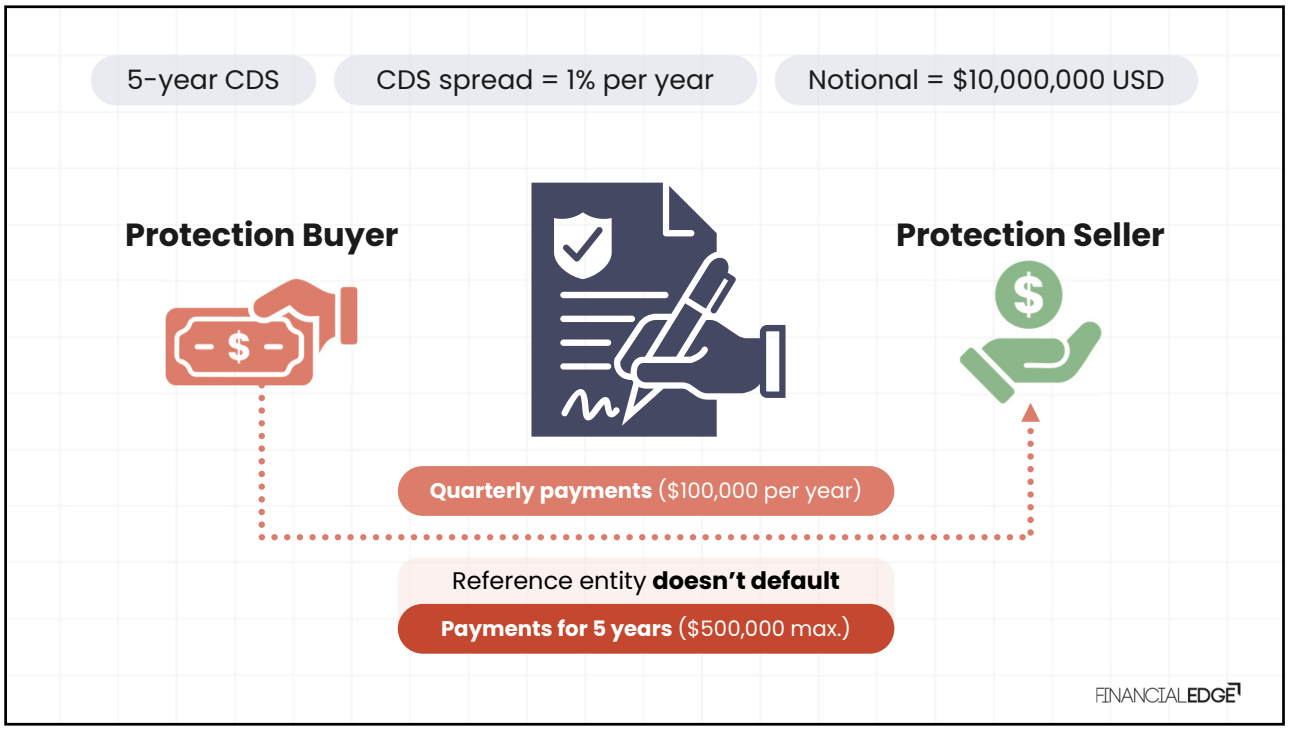
Protection Seller

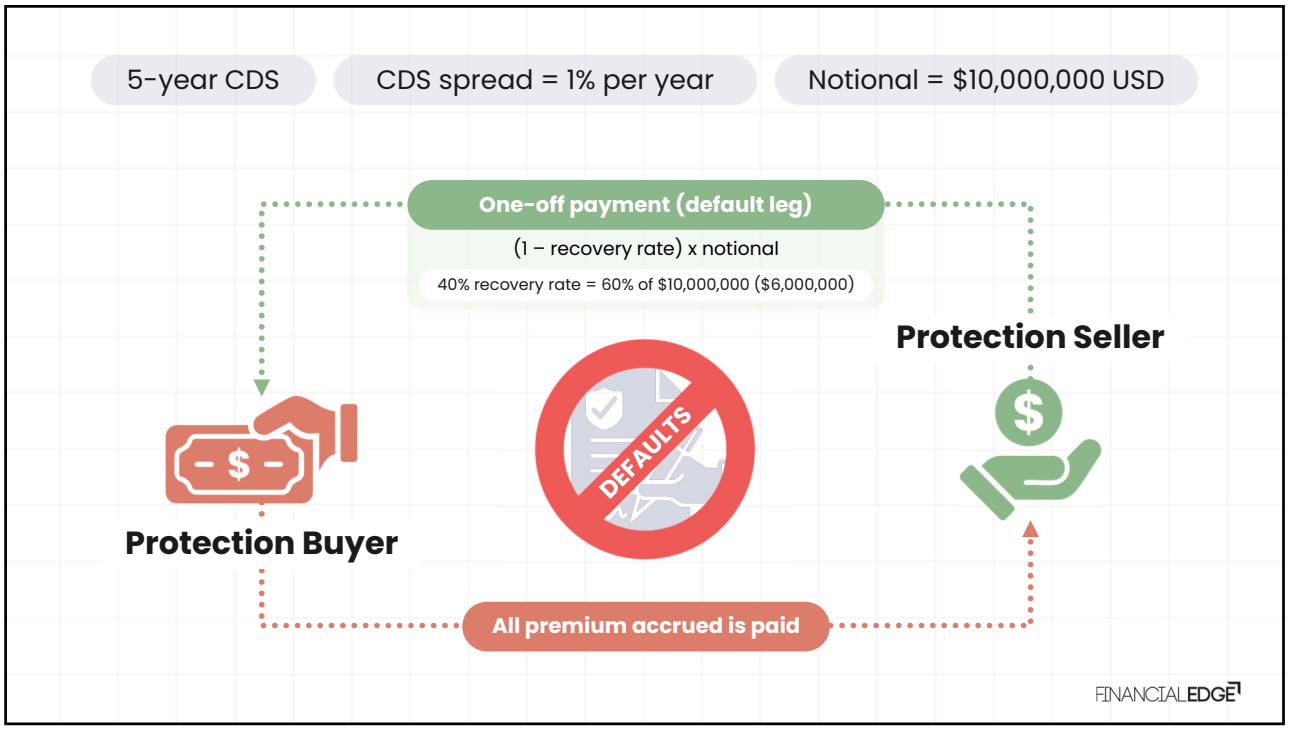
1 - recovery

(Default leg)

Receives CDS premium in exchange for **providing protection** in case of a credit event

FINANCIALEDGE





Insuring Against Default

FINANCIALEDGE

Hedge Credit Risk in a Bond Investment

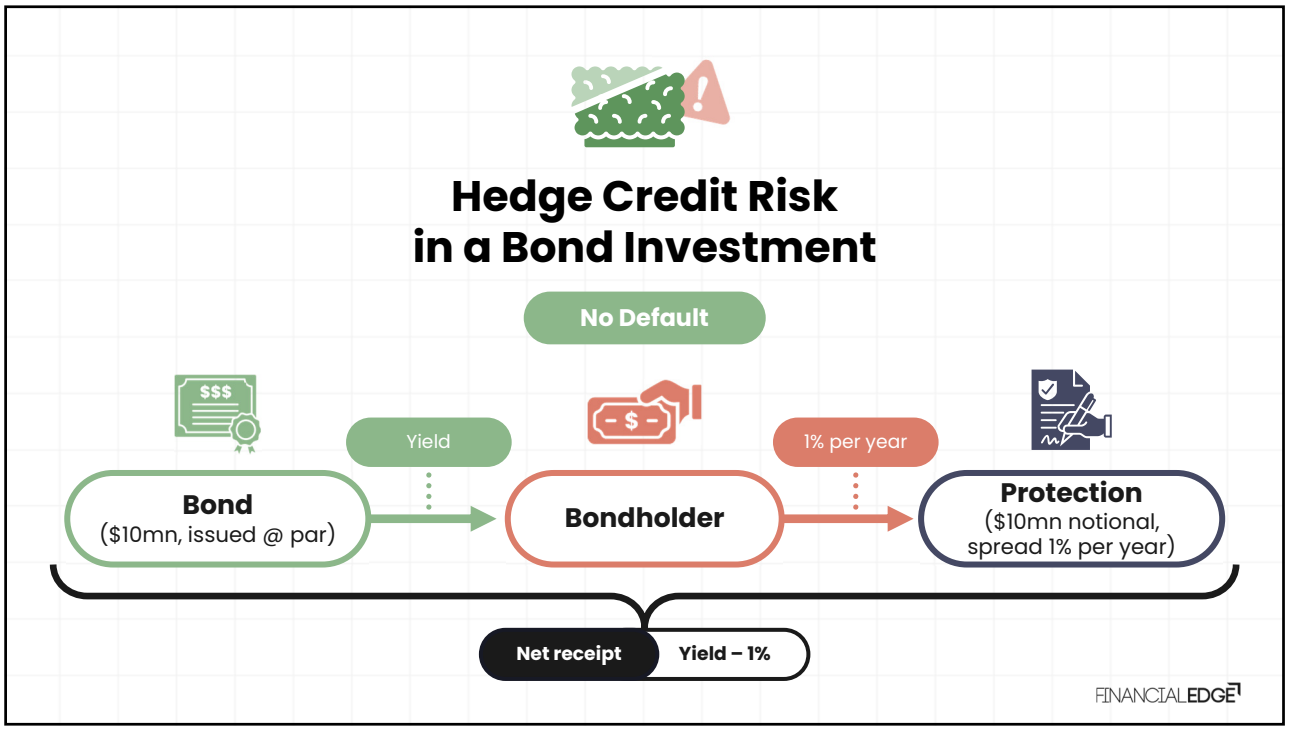
Default & **No Default**

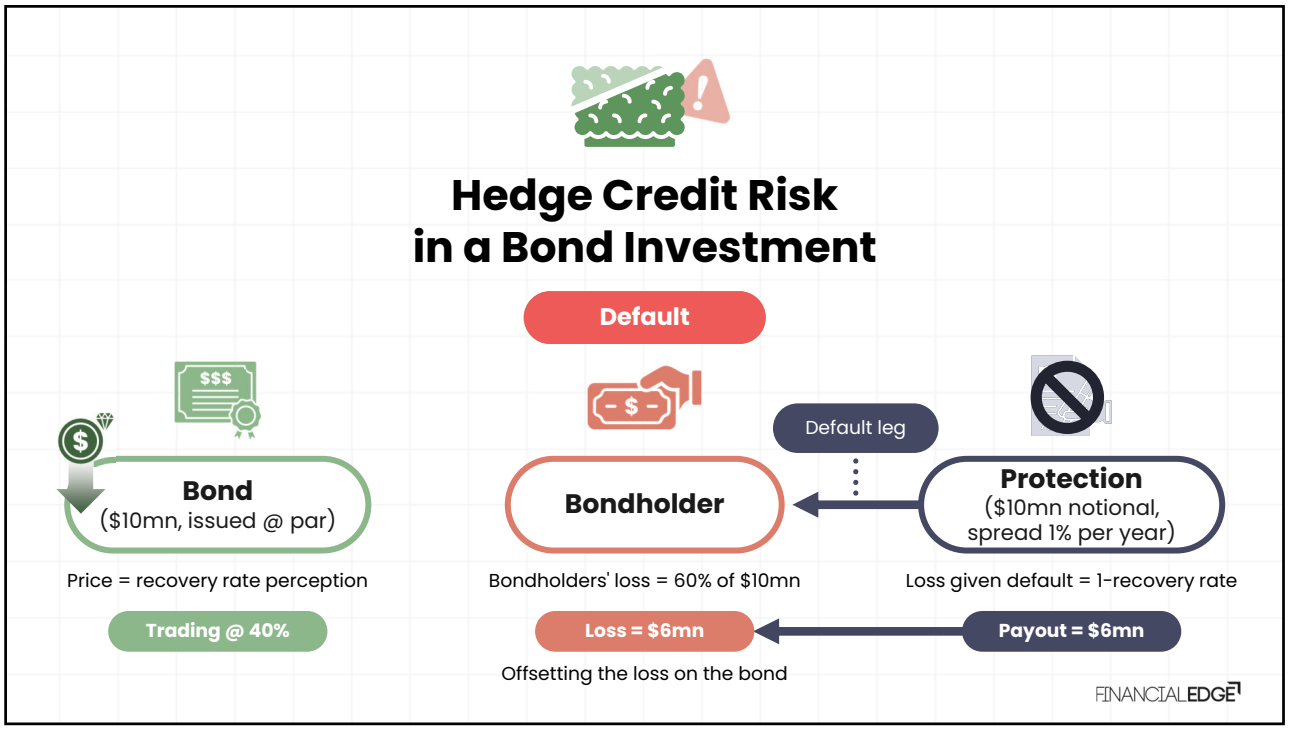
Bought bond
($10mn, issued @ par)

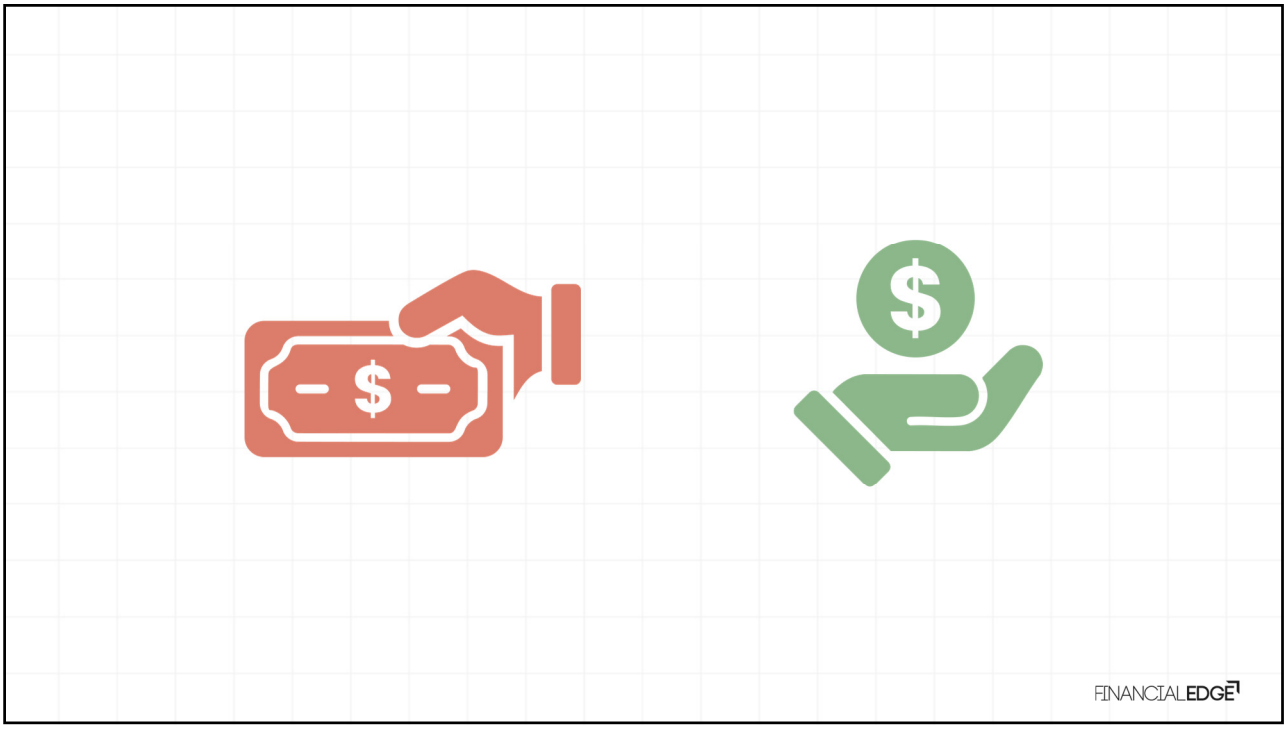
Bondholder

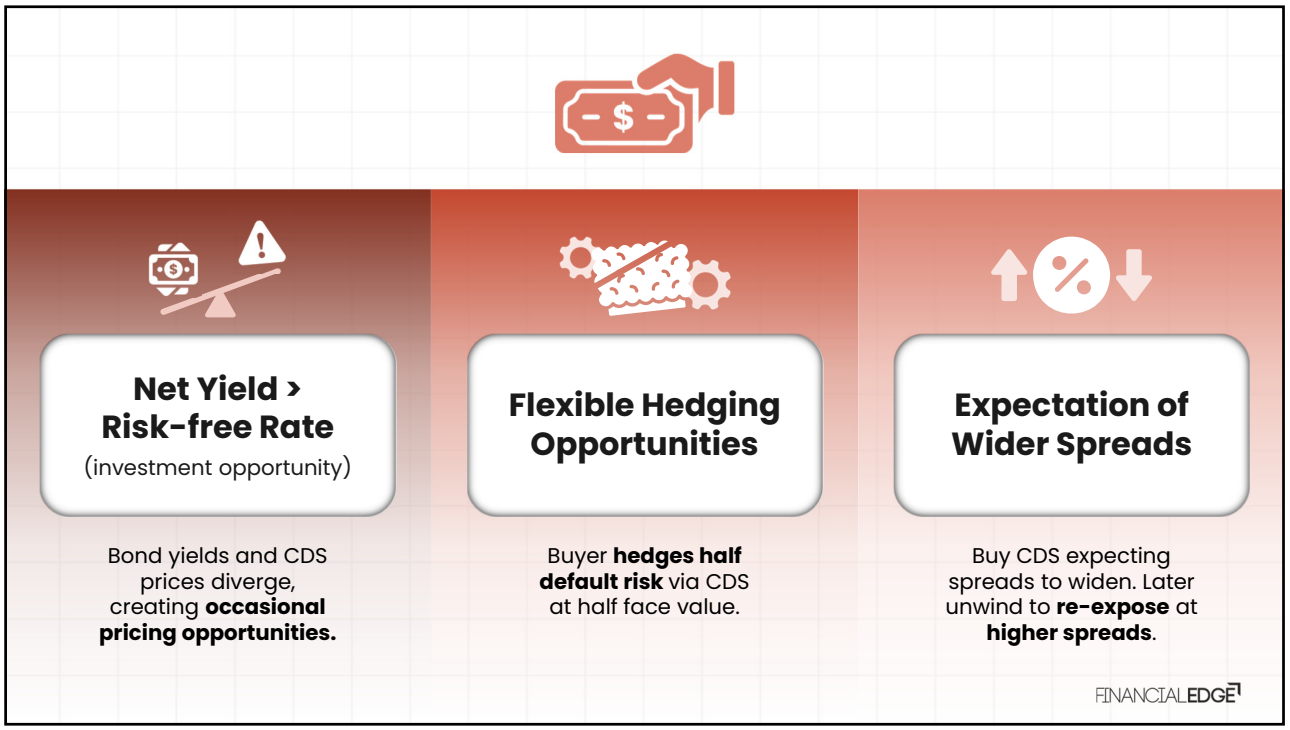
Buys protection
($10mn notional, spread 1% per year)

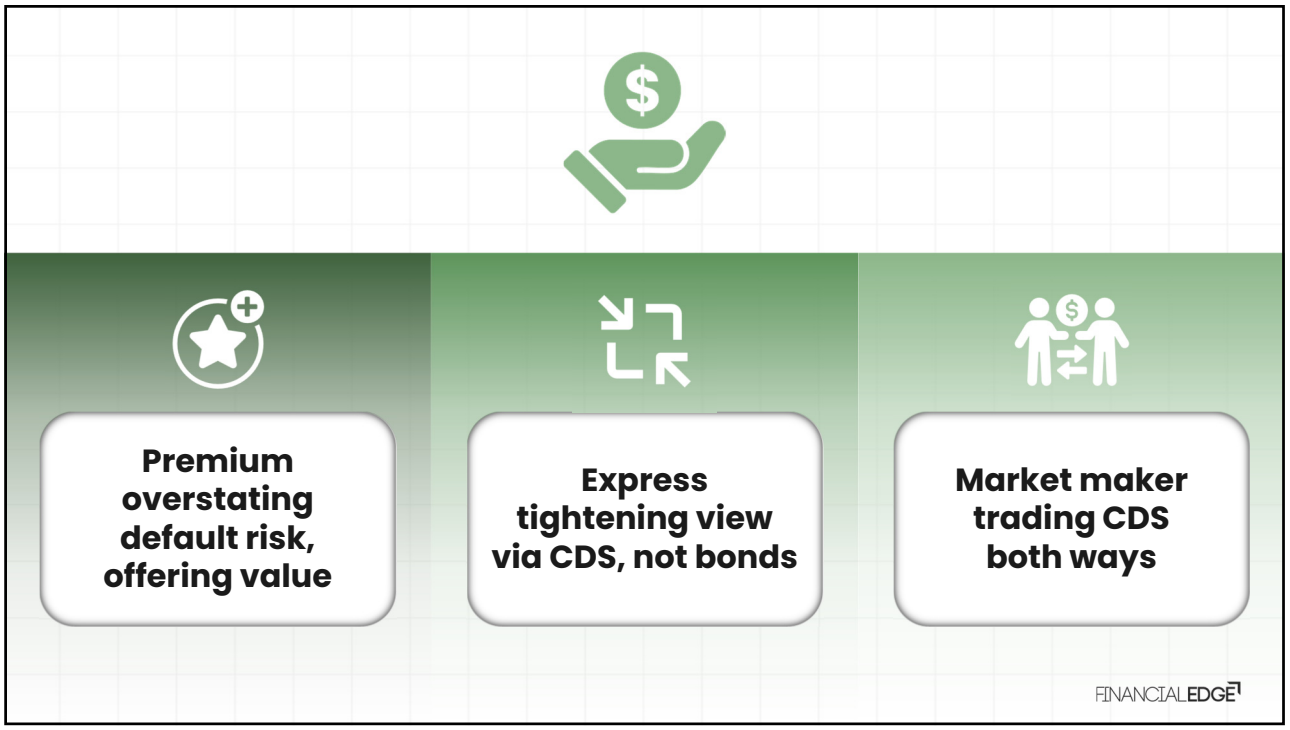
FINANCIALEDGE







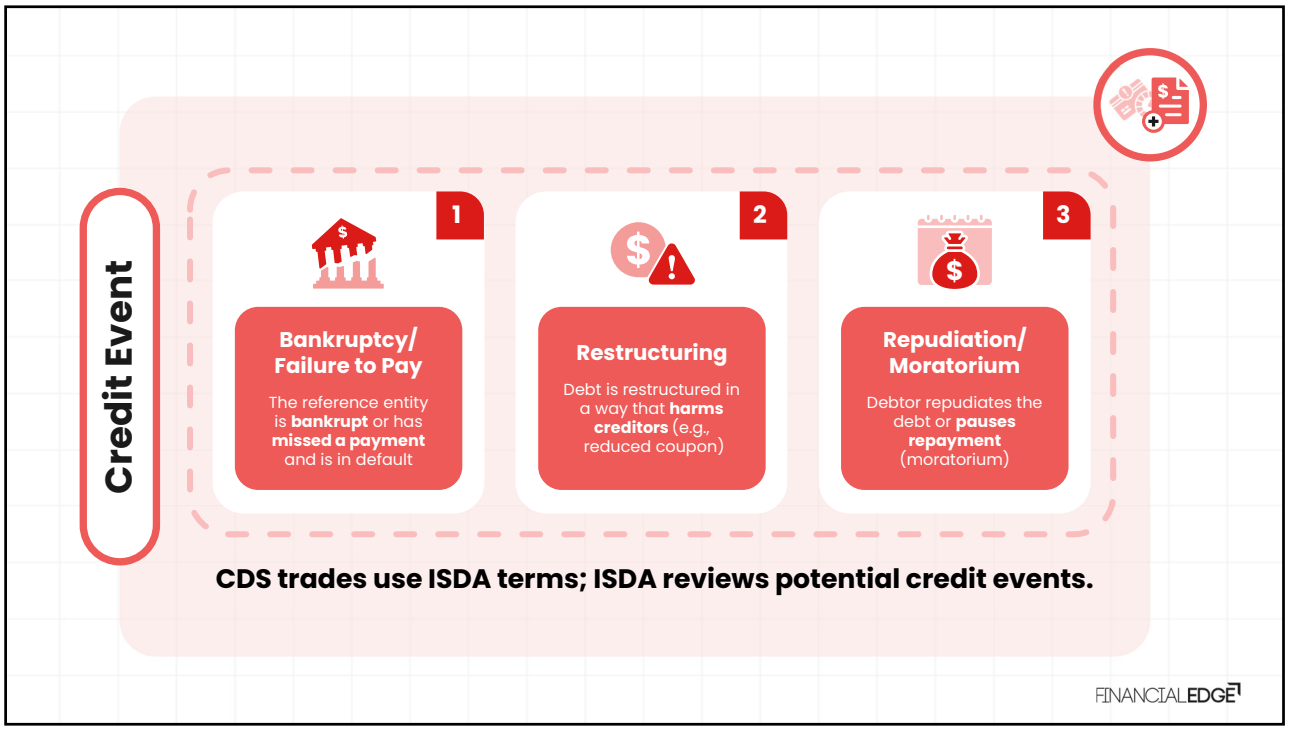




Determining If a Credit Event Has Occurred

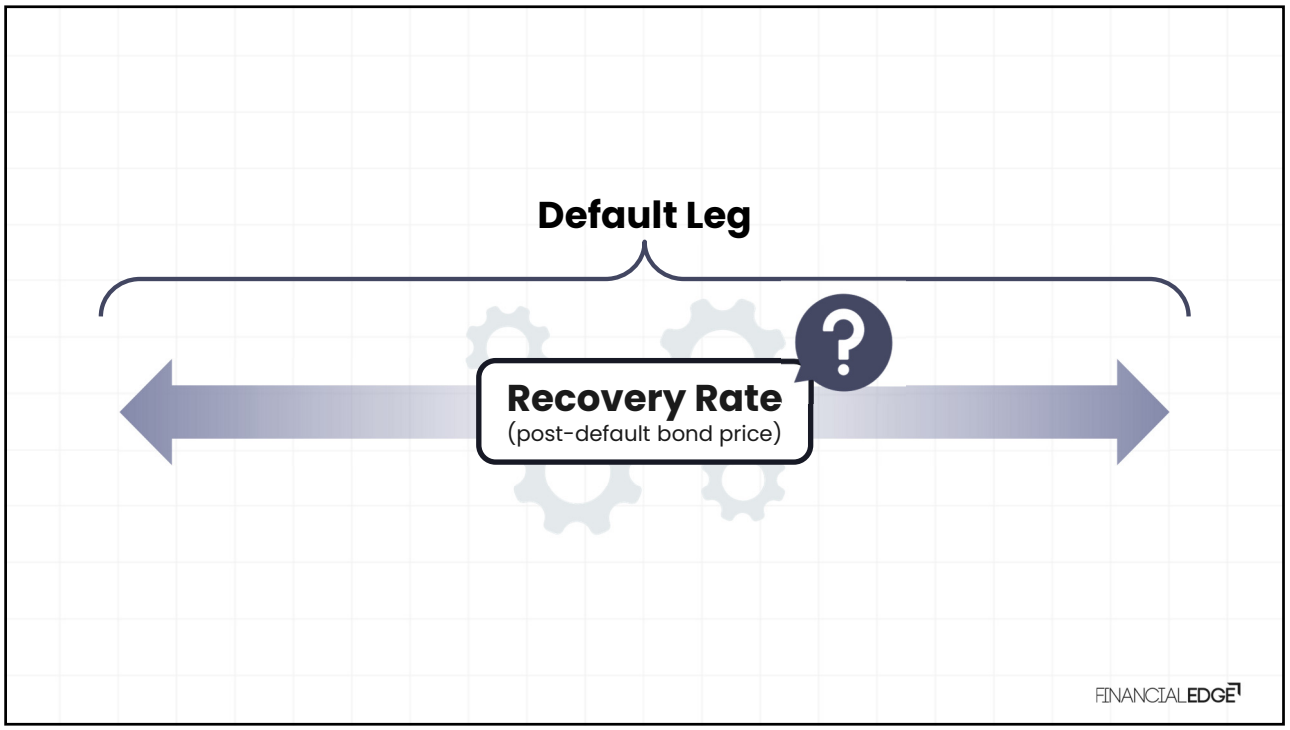
FINANCIALEDGE

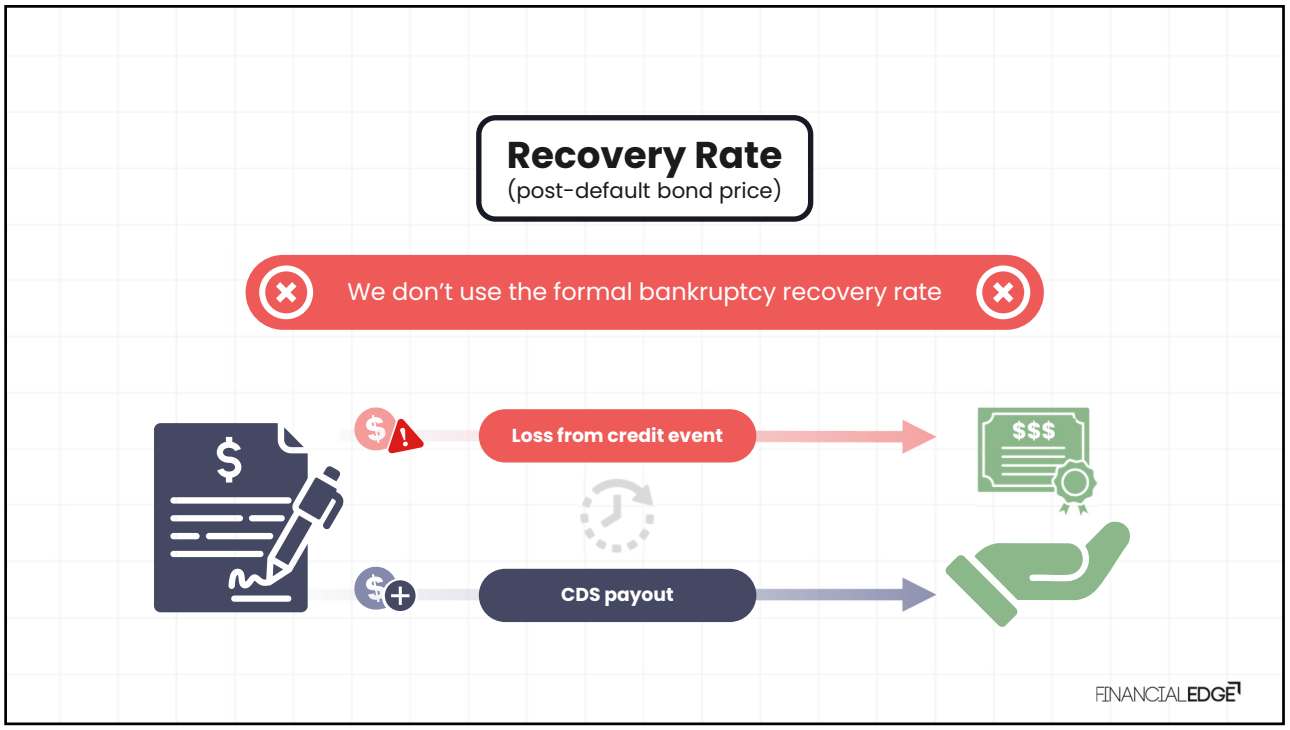
FINANCIALEDGE

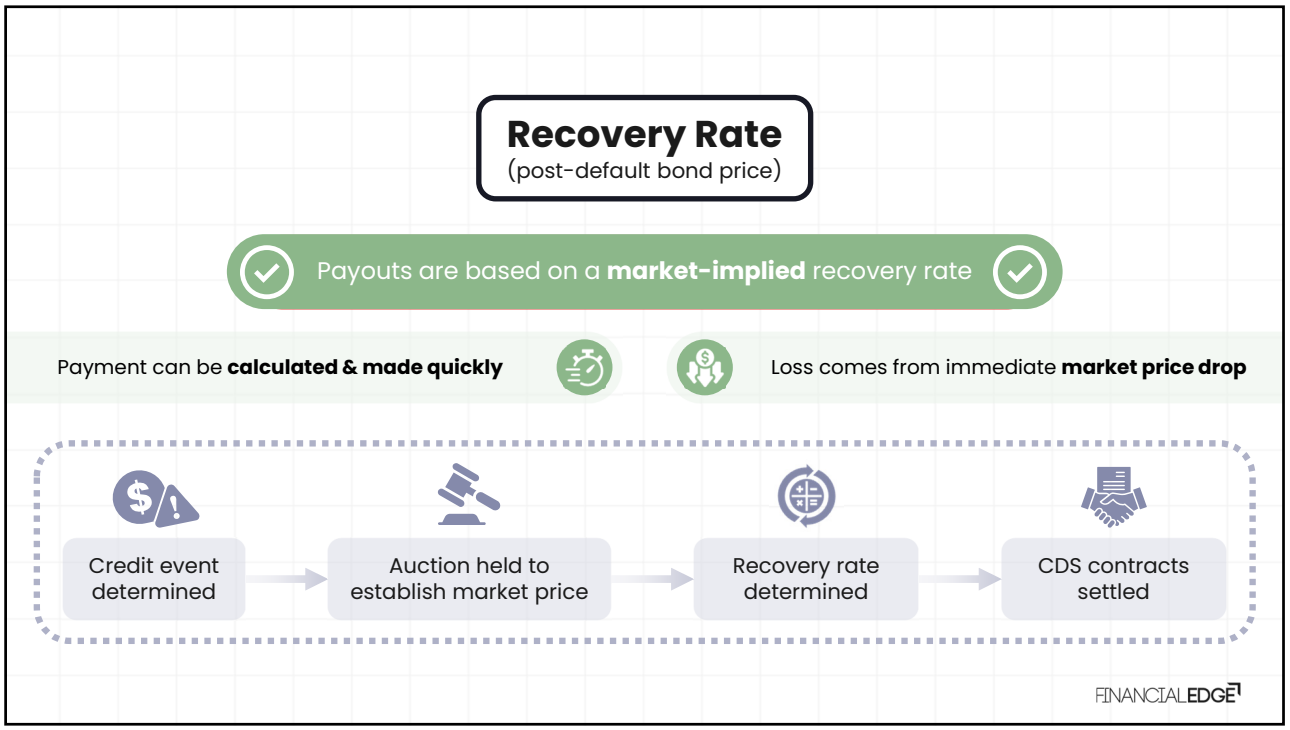


Calculating the Recovery Rate

FINANCIALEDGE

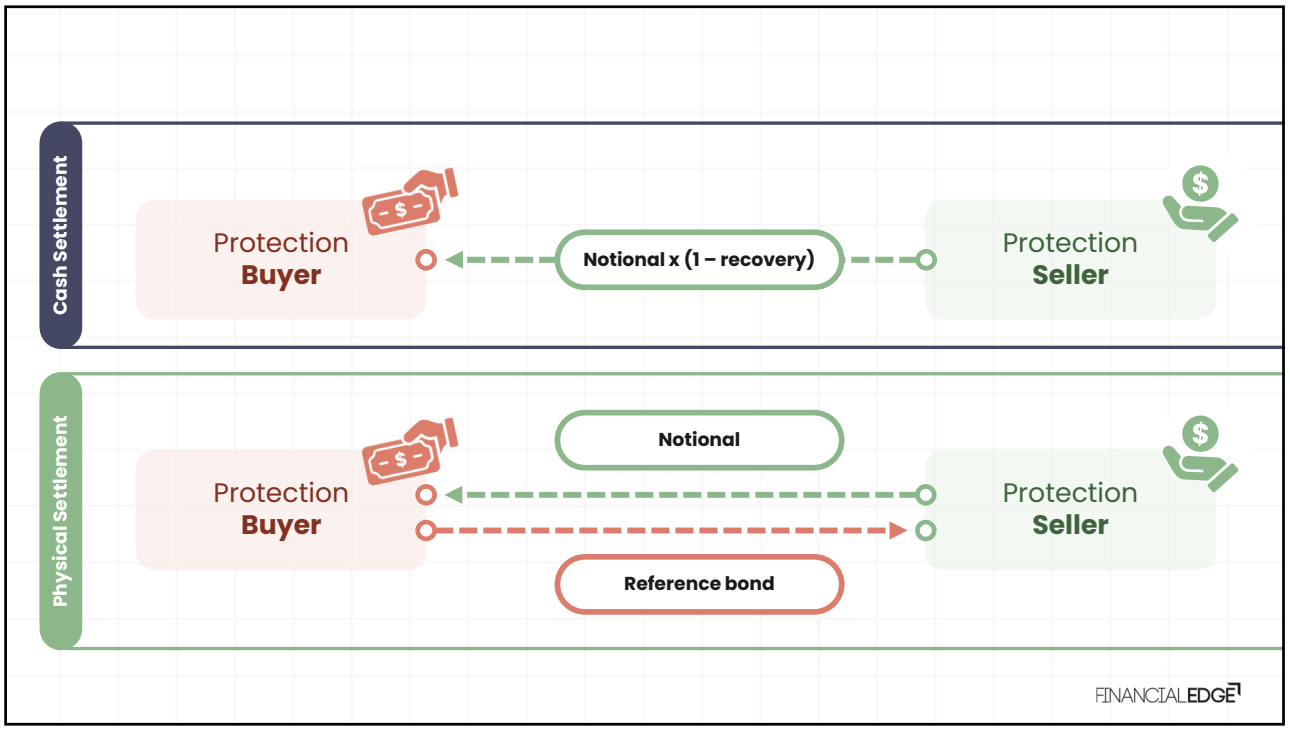


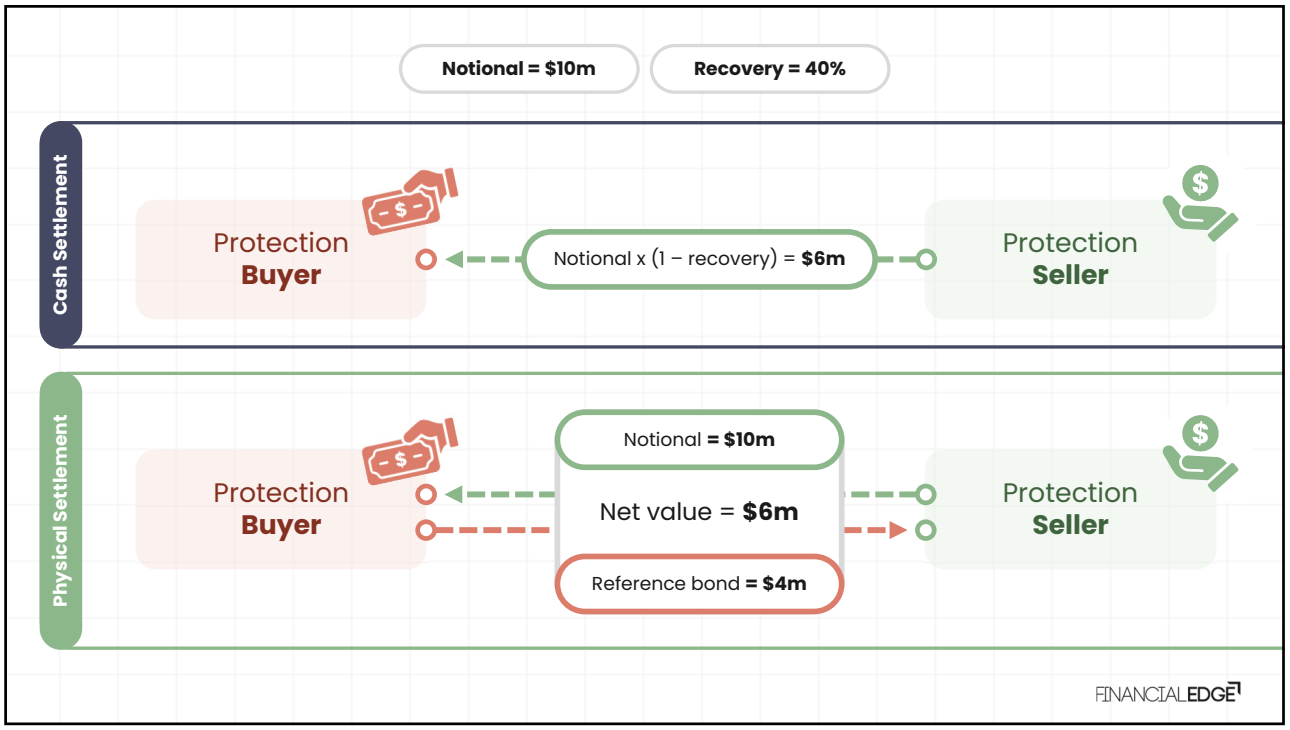




Settlement Style

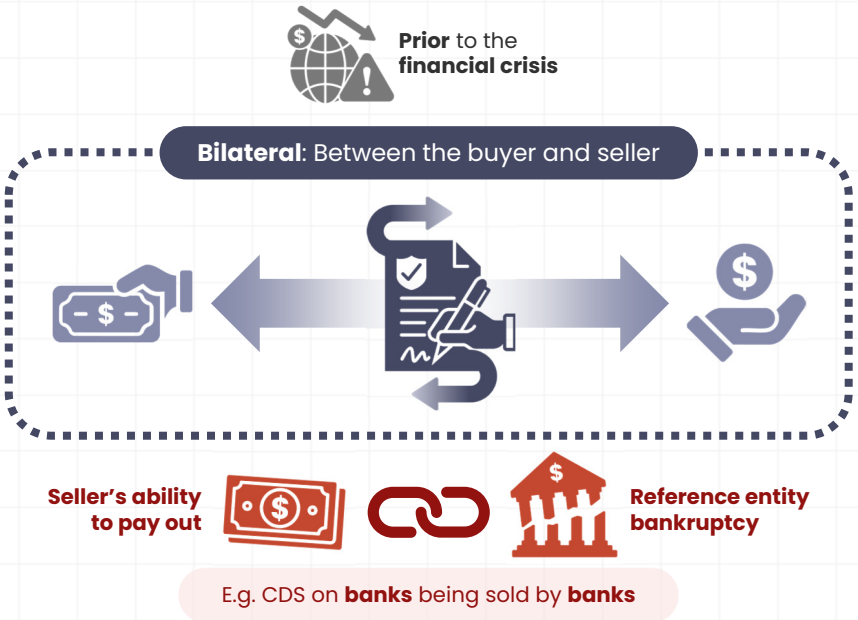
FINANCIALEDGE





Central Clearing for CDS

FINANCIALEDGE



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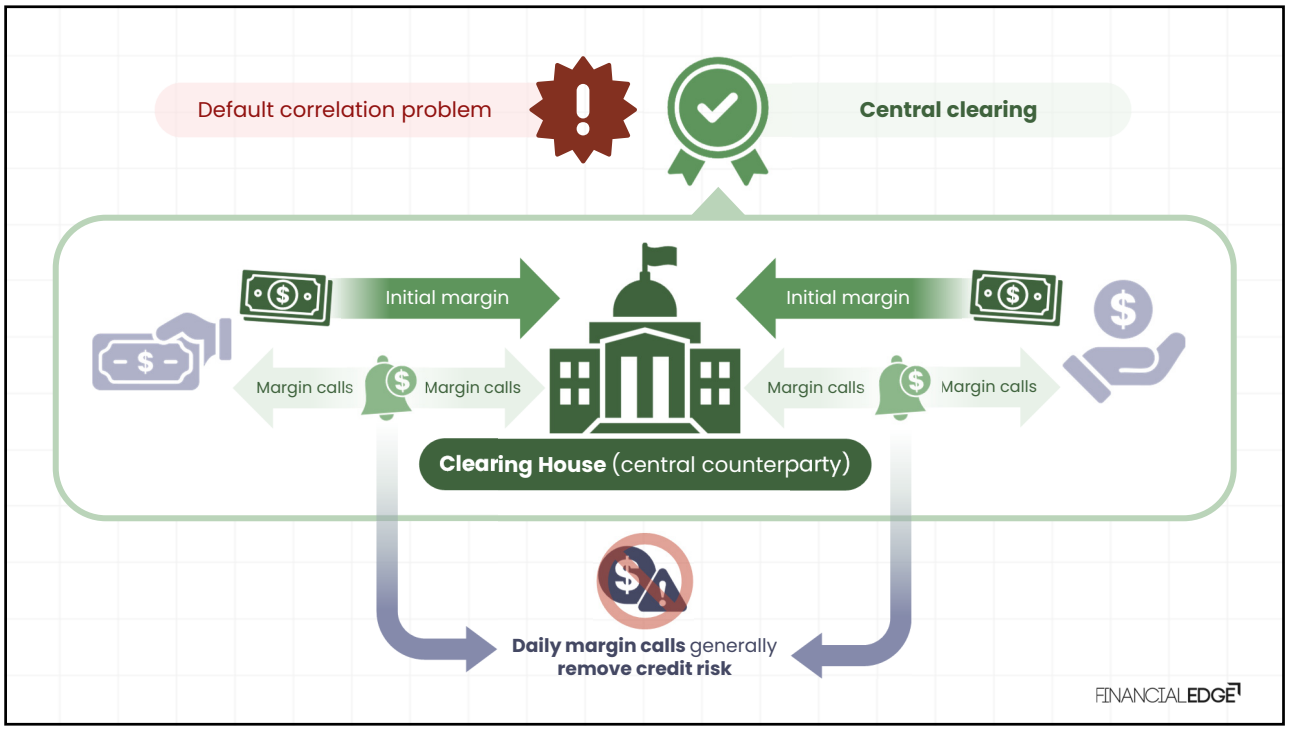


Credit Default Swaps (CDSs) are still an **over-the-counter (OTC)** market

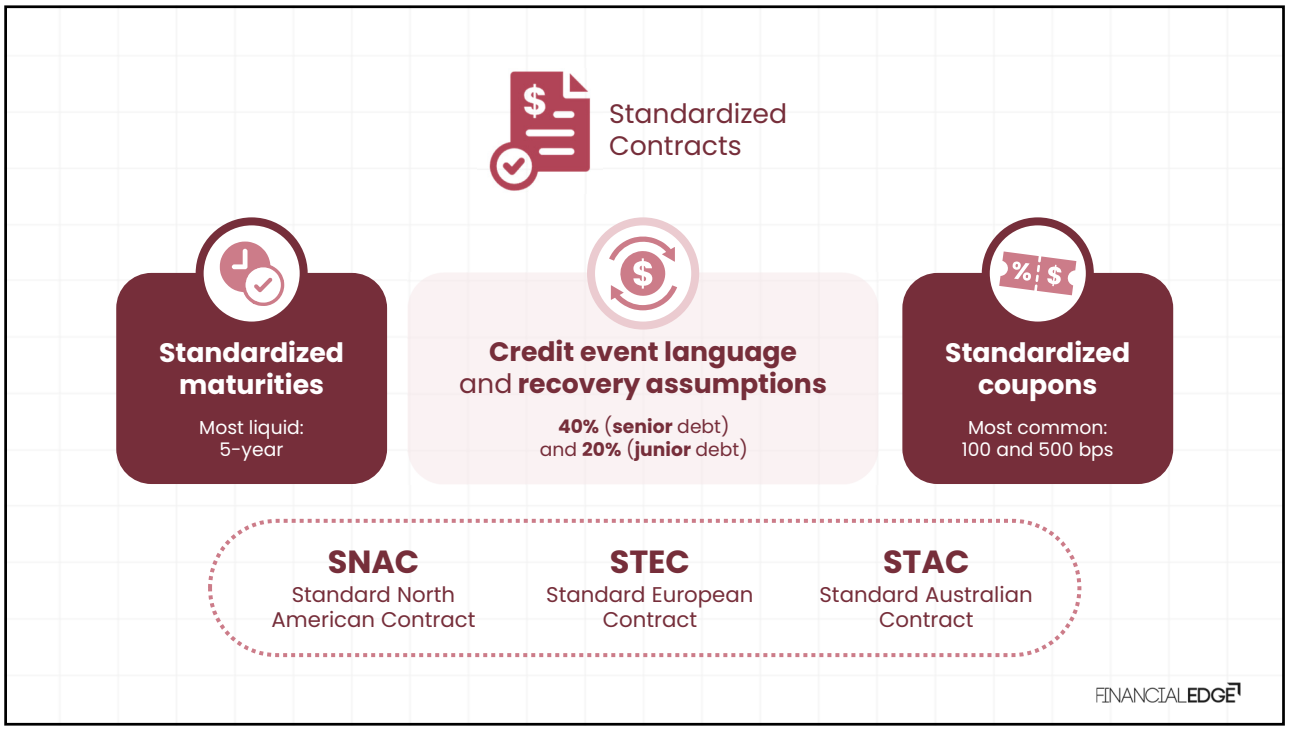
1. Trade **agreed bilaterally**
2. Trade **given up** to a mutually agreed **clearing house**

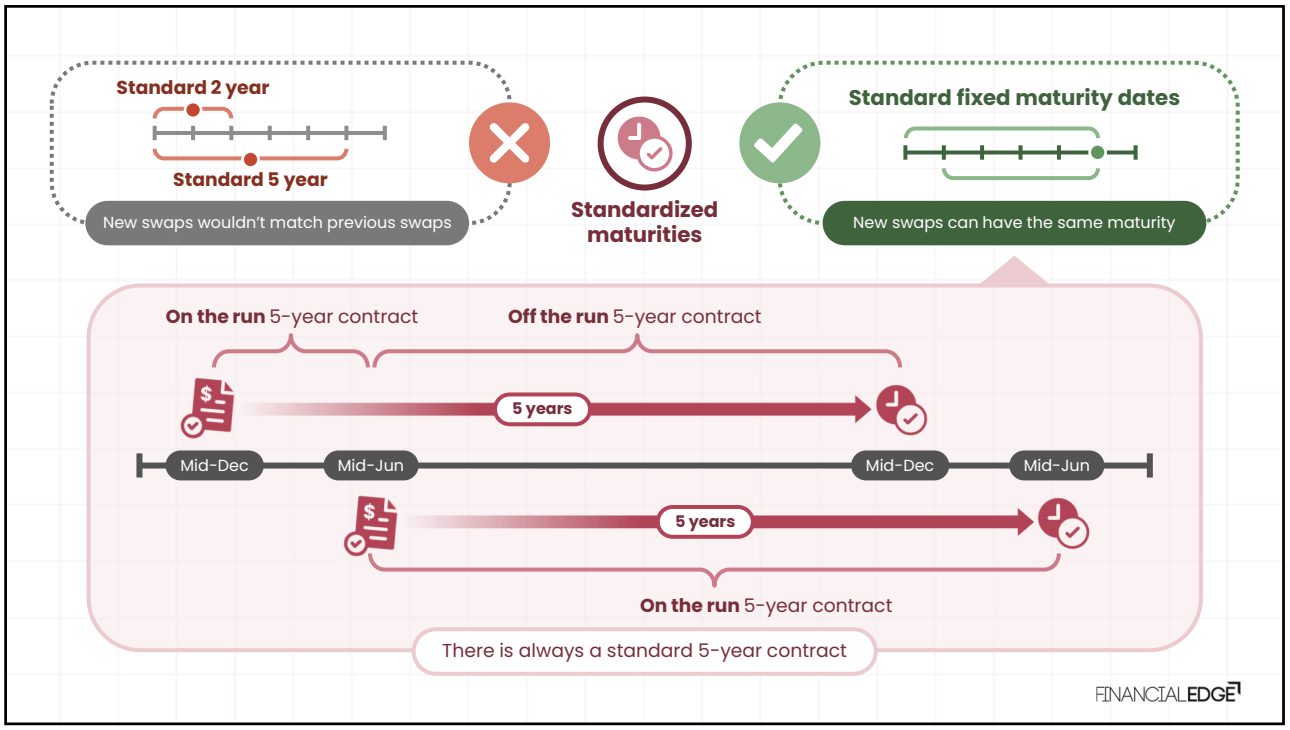
FINANCIALEDGE

Standardized Contracts

FINANCIALEDGE

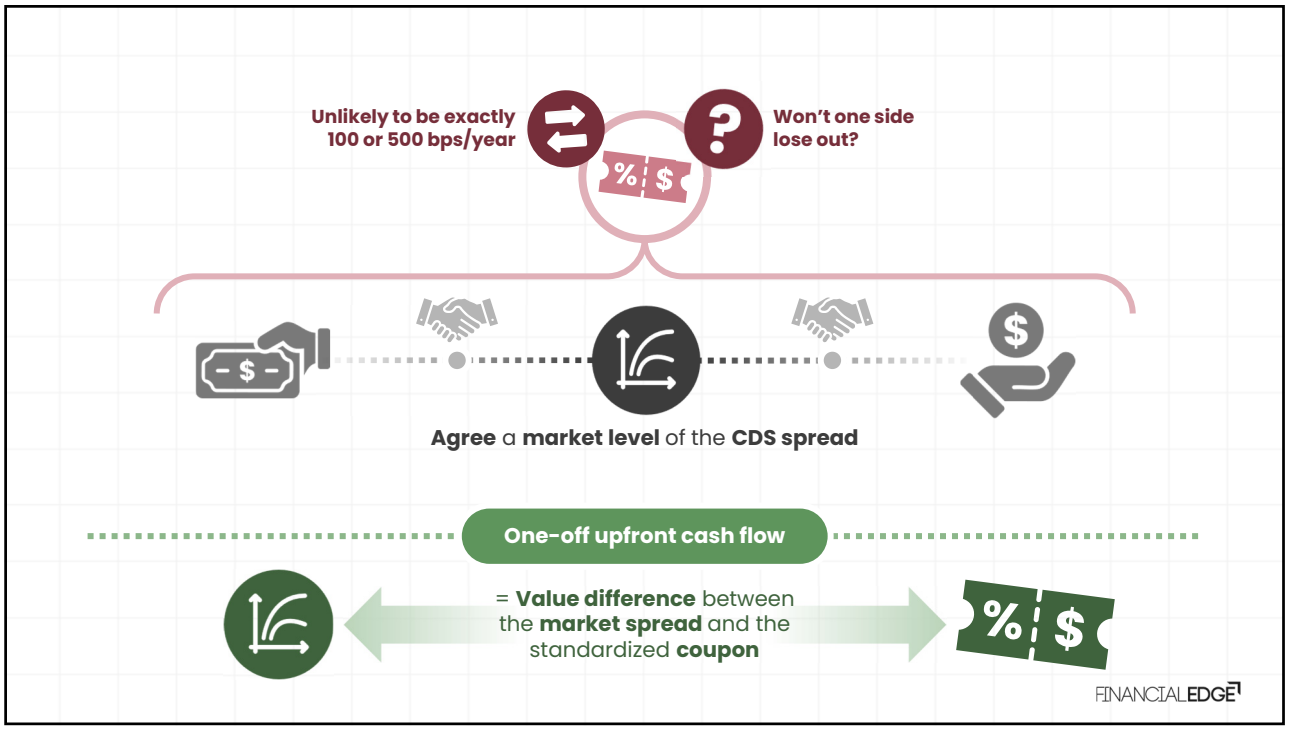
FINANCIALEDGE





CDS Upfront Amounts

FINANCIALEDGE



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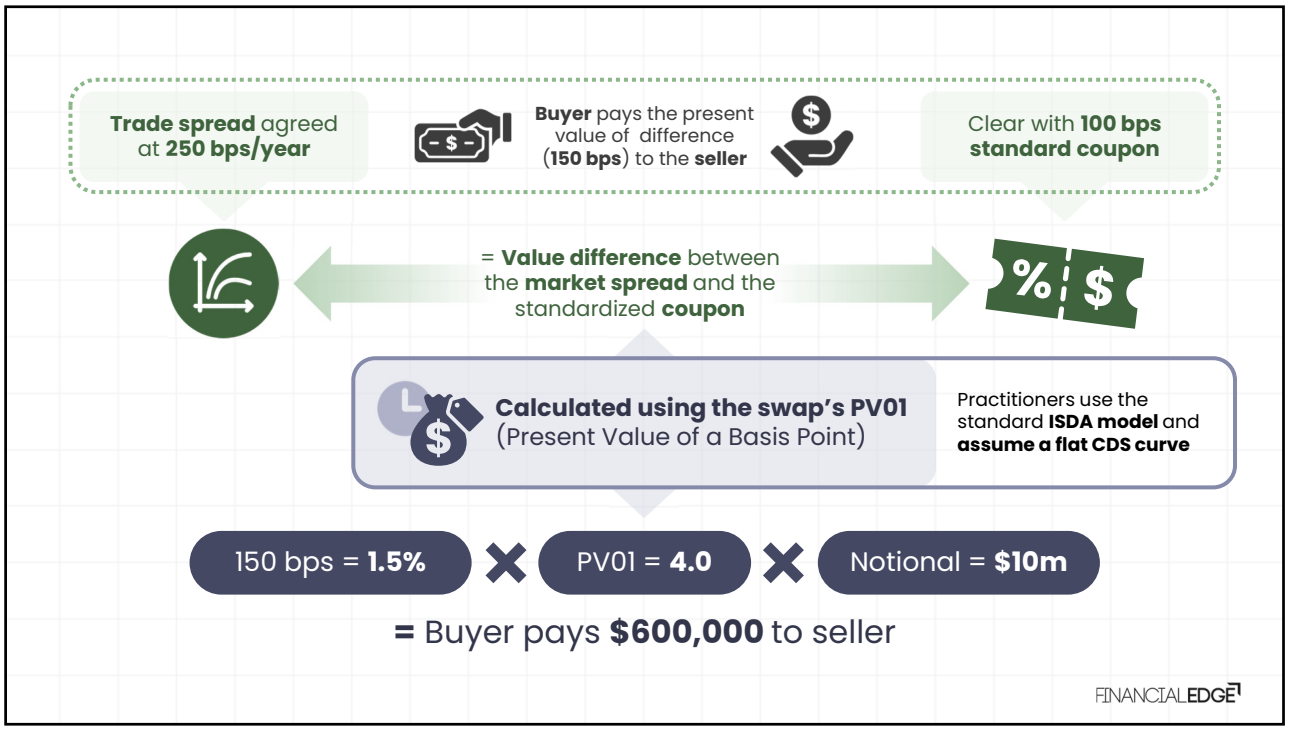
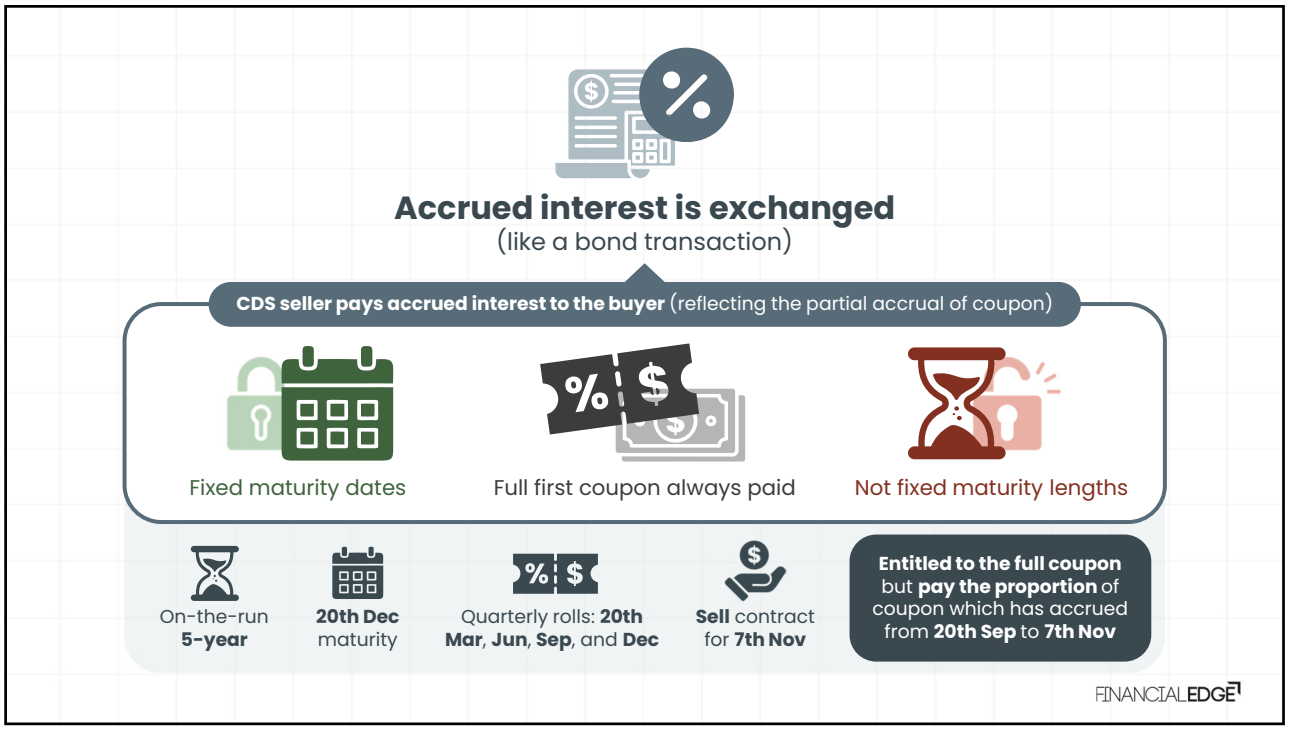
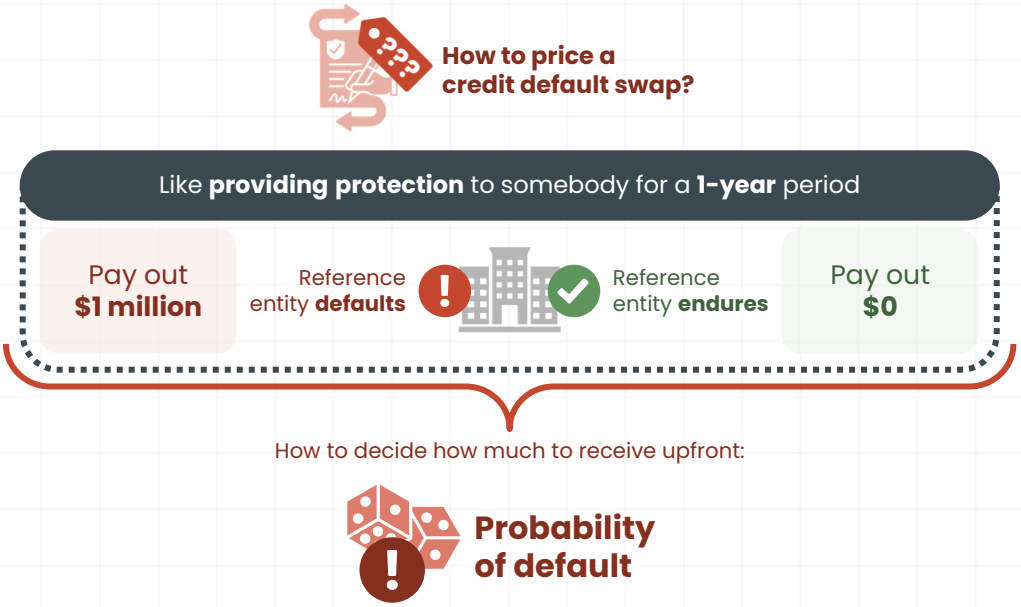




CDS Pricing – Part 1

FINANCIALEDGE



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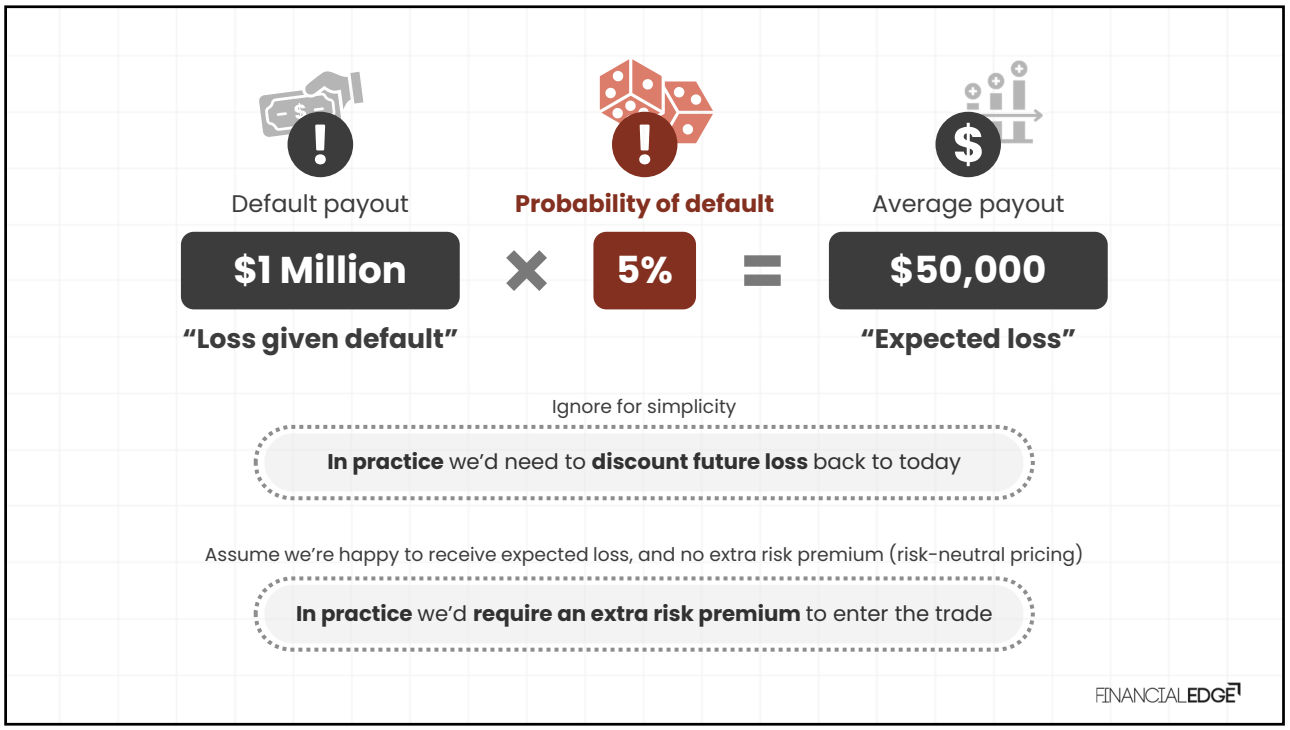

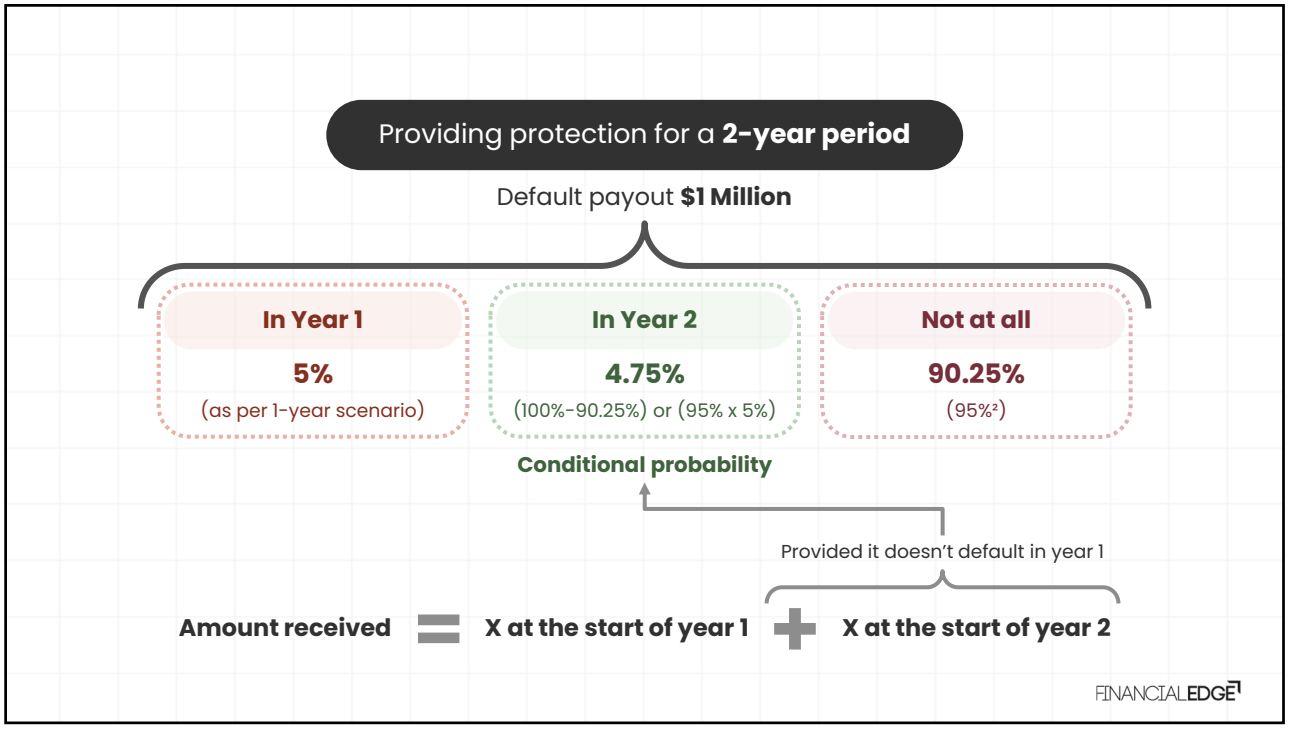

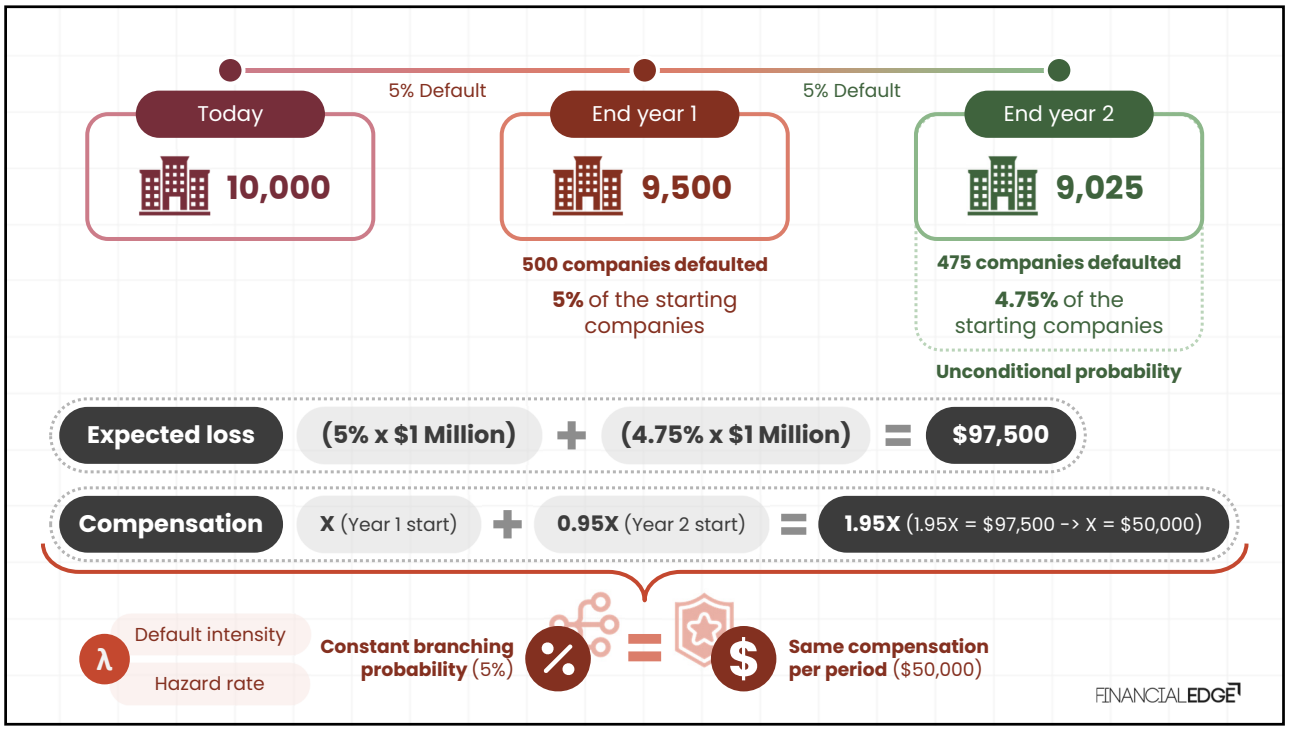

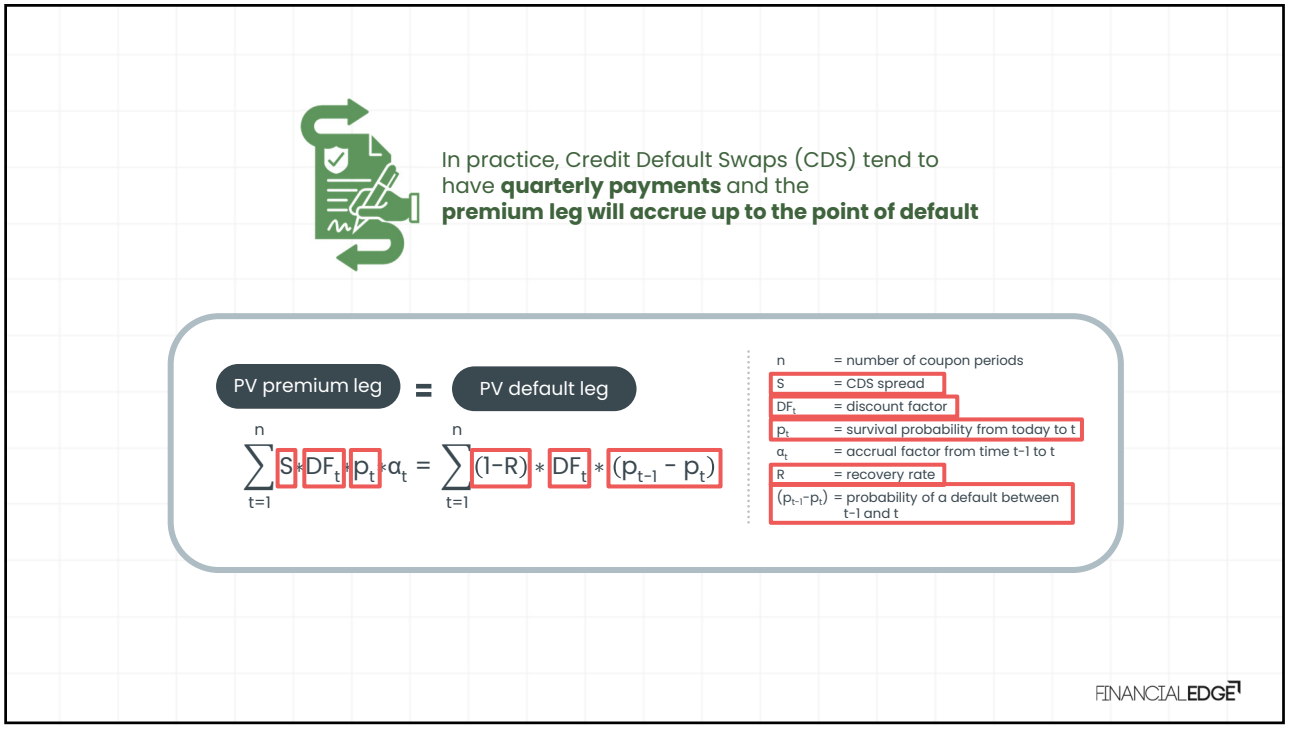

CDS Pricing – Part 2

FINANCIALEDGE

5-year Credit Default Swap (CDS)

Notional	Recovery	Coupon (bppa)
100	40%	300.0

Time	Rates	DF	Default intensity	P (survival)	P (default)	P premium	P default
0				100.00%			
1	5.00%	0.9524	5.00%	95.00%	5.00%	2.8571	2.8571
2	5.00%	0.9070	5.00%	90.25%	4.75%	2.5850	2.5850
3	5.00%	0.8638	5.00%	85.74%	4.51%	2.3388	2.3388
4	5.00%	0.8227	5.00%	81.45%	4.29%	2.1161	2.1161
5	5.00%	0.7835	5.00%	77.38%	4.07%	1.9146	1.9146

Cum P(default)	22.62%

		NPV
11.8117	11.8117	0

Cumulative default probability - 1 minus the probability of surviving all 5 years (with **5% default intensity**, there's **22.6% chance of default** over 5 years)

Default and survival probabilities (extended to 5 years)

FINANCIALEDGE

5-year Credit Default Swap (CDS)

Notional	Recovery	Coupon (bppa)
100	40%	300.0

Time	Rates	DF	Default intensity	P (survival)	P (default)	P premium	P default
0				100.00%			
1	5.00%	0.9524	5.00%	95.00%	5.00%	2.8571	2.8571
2	Simplified	0.9070	5.00%	90.25%	4.75%	Simplified	2.5850
3	5.00%	0.8638	5.00%	85.74%	4.51%	2.3388	2.3388
4	5.00%	0.8227	5.00%	81.45%	4.29%	2.1161	2.1161
5	5.00%	0.7835	5.00%	77.38%	4.07%	1.9146	1.9146

				NPV
Cum P(default)	22.62%	11.8117	11.8117	0

Annual steps are too crude for accurate pricing – should use a continuous probability distribution (measure the probability of default at any point in time)

Premium leg pays **based on the probability of surviving to start of year N**, rather than the **end of year N**

FINANCIALEDGE

5-year Credit Default Swap (CDS)

Notional	Recovery	Coupon (bppa)
100	40%	300.0

Time	Rates	DF	Default intensity	P (survival)	P (default)	P premium	P default
0				100.00%			
1	5.00%	0.9524	5.00%	95.00%	5.00%	2.8571	2.8571
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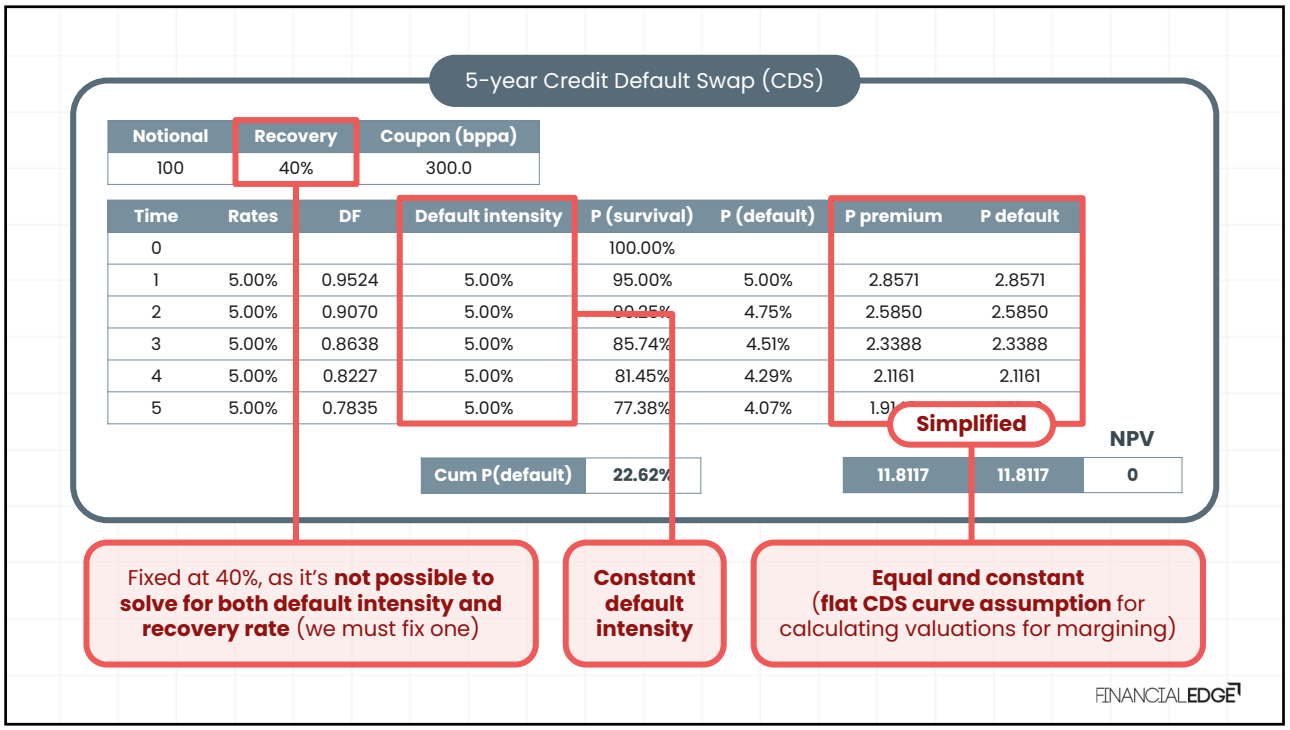
4	5.00%	0.8227	5.00%	81.45%	4.29%	2.1161	2.1161
5	5.00%	0.7835	5.00%	77.38%	4.07%	1.9146	1.9146

				NPV
Cum P(default)	22.62%	11.8117	11.8117	0

FINANCIALEDGE


5-year Credit Default Swap (CDS)
Notional
Recovery
Coupon (bppa)
100
40%
300.0
Time
Rates
DF
Default intensity
P (survival)
P (default)
P premium
P default
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95.00%
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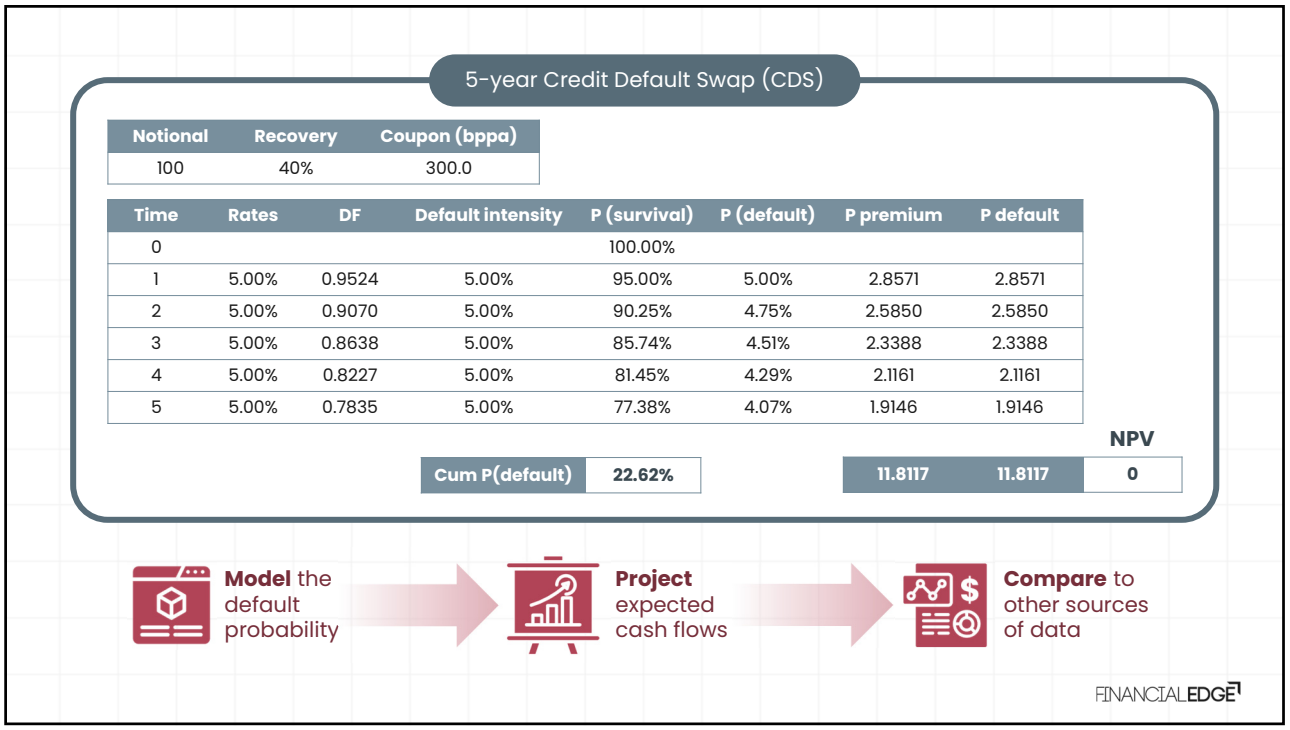
4.29%
2.1161
2.1161
5
5.00%
0.7835
5.00%
77.38%
4.07%
1.91
Simplified
NPV
Cum P(default)
22.62%
11.8117
11.8117
0
Fixed at 40%, as it's not possible to solve for both default intensity and recovery rate (we must fix one)
Constant default intensity
Equal and constant (flat CDS curve assumption for calculating valuations for margining)
FINANCIALEDGE


5-year Credit Default Swap (CDS)
Notional
Recovery
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100
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Time
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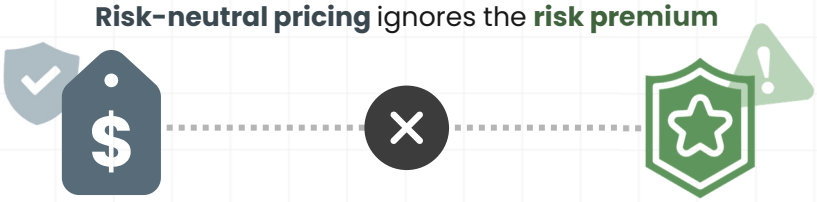
5.00%
77.38%
4.07%
1.9146
1.9146
NPV
Cum P(default)
22.62%
11.8117
11.8117
0
Model the default probability
Project expected cash flows
Compare to other sources of data
FINANCIALEDGE

Risk-neutral pricing ignores the **risk premium**



Risk-neutral pricing assumes people don't care about uncertainty (in practice they do)

Someone taking on an uncertain commitment normally asks for **more than the risk-neutral expected value**

CDS spreads will be higher than breakeven due to the risk premium (tempt the seller to take on the risk)

CDS pricing above overestimates the default probabilities but establishes upper bound

FINANCIALEDGE

Standardized coupons

100 bps contract

$$Upfront\ PV = (Coupon\ -par\ CDS\ spread) * PV01_{CDS}$$

Buyer **pays** ~ **7.87%** of notional

Notional	Recovery	Coupon (bppa)
100	40%	**100.0**

Time	Rates	DF	PV premium	PV default
0				
1	5.00%	0.9524	0.9524	2.8571
2	5.00%	0.9070	0.8617	2.5850
3	5.00%	0.8638	0.7796	2.3388
4	5.00%	0.8227	0.7054	2.1161
5	5.00%	0.7835	0.6382	1.9146

		NPV
3.9372	11.8117	**7.8745**

500 bps contract

$$PV01_{CDS} = \sum P(survival)_i * DF_i$$

Buyer **receives** ~ **7.87%** of notional

Notional	Recovery	Coupon (bppa)
100	40%	**500.0**

Time	Rates	DF	PV premium	PV default
0				
1	5.00%	0.9524	4.7619	2.8571
2	5.00%	0.9070	4.3084	2.5850
3	5.00%	0.8638	3.8981	2.3388
4	5.00%	0.8227	3.5268	2.1161
5	5.00%	0.7835	3.1909	1.9146

		NPV
19.6861	11.8117	**-7.8745**

Clearing house assigns a standard coupon and calculates the **upfront PV to be paid to compensate for the change in coupon**

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CDS Risk

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Sensitivity to changes in the par CDS spread is called **CS01** or **Spread DV01**

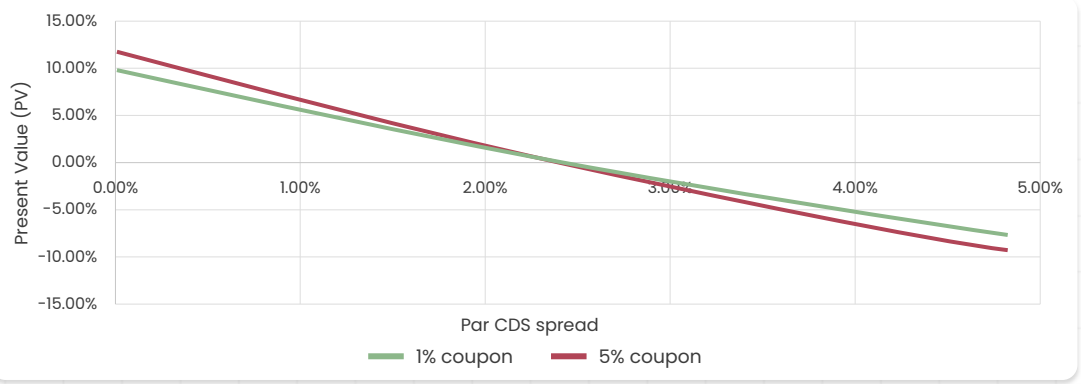
FINANCIALEDGE

Sensitivity to changes in the par CDS spread is called **CS01** or **Spread DV01**

Buyer of a CDS and had a **CS01** of **25,000**

Market spread **increased** by **10 bps**

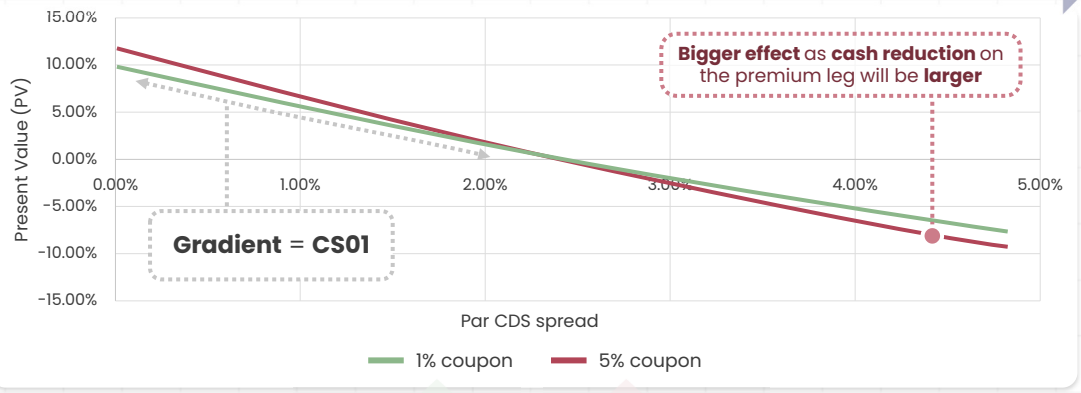
Make **$250,000 profit**



Risk is impacted by the choice of standard coupon

FINANCIALEDGE

Par CDS spread rises = **Default probabilities** rise = **Expected maturity** shortens



$100,000 per year

$500,000 per year

Risk is impacted by the choice of standard coupon

FINANCIALEDGE

Credit Default Swaps (CDS) are convex instruments

Driven by the **changing expected life** (short position benefits lower spread - longer expect life to make money in)

FINANCIALEDGE

Hedging Non-Par Bonds

FINANCIALEDGE

We have assumed that to **hedge a bond against default** we would match the **notional size of the CDS** with the **face value of the bond**

=

Only true if the **bond is trading at par**

How do we adjust our hedge if the **bond is trading away from par?**

FINANCIALEDGE

We have assumed that to **hedge a bond against default** we would match the **notional size of the CDS** with the **face value of the bond**

=

Payout on CDS

1 – recovery rate
(par – recovery)

CDS payout > loss on bond
= net gain, over hedged

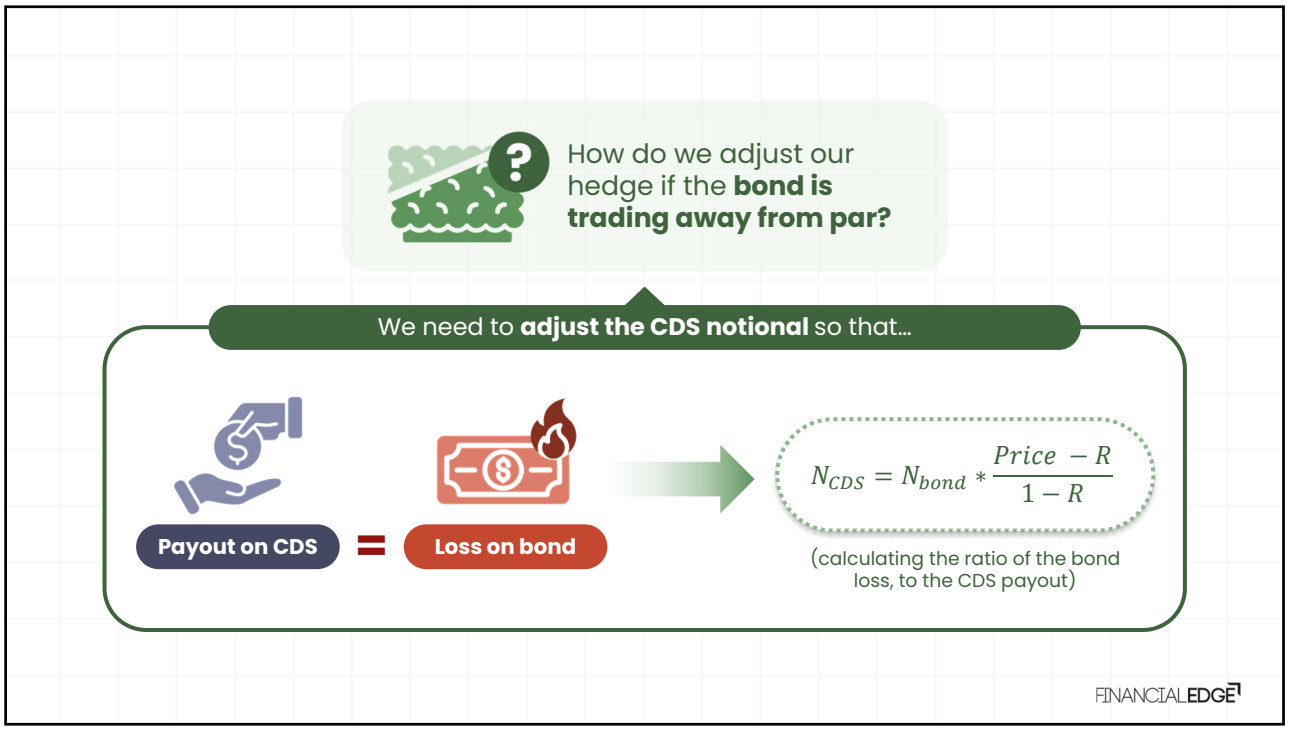
Loss on bond

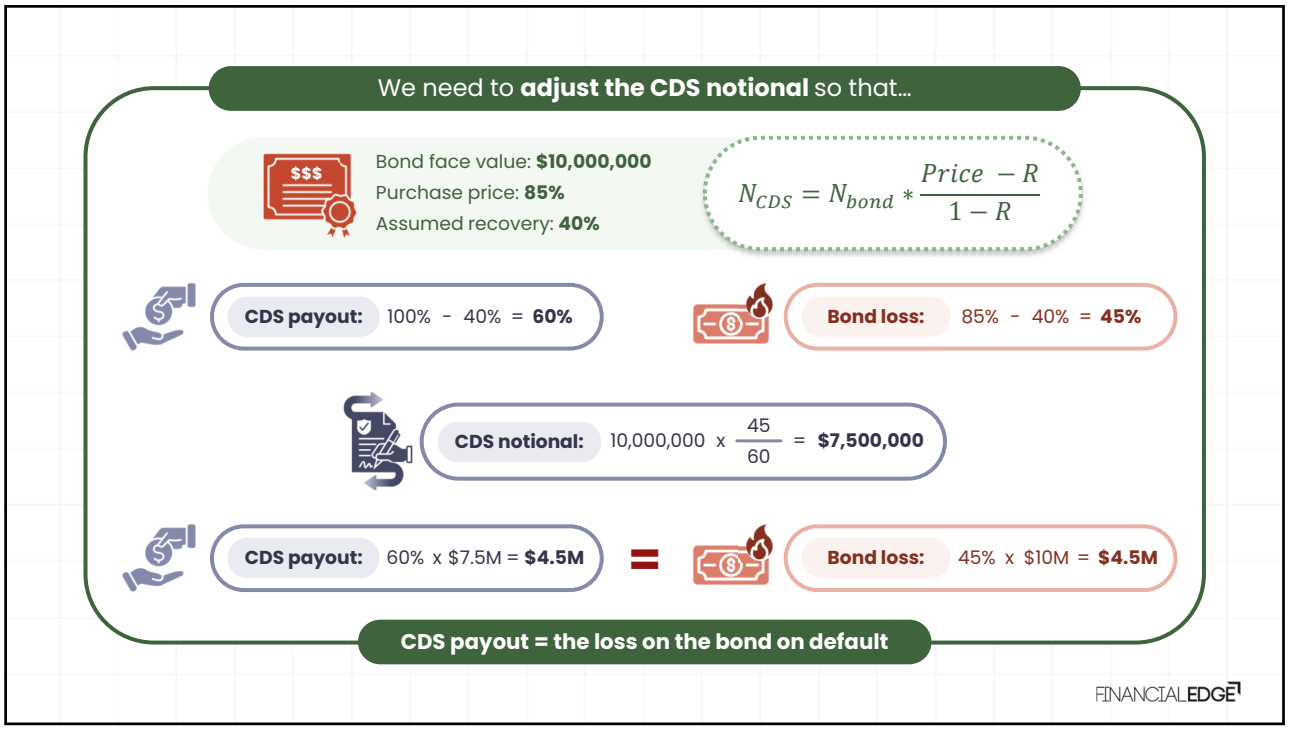
Depends on the price you paid

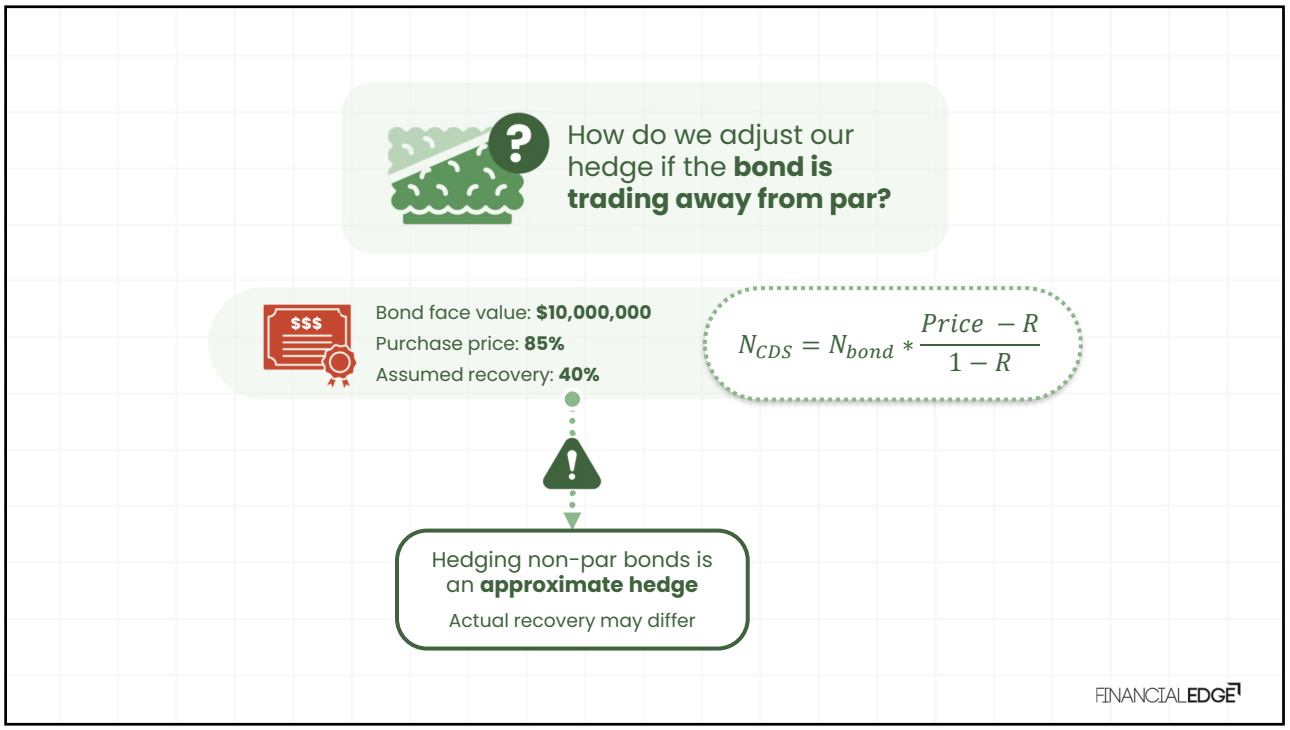
A bond bought at 85% has a loss on default of **85% - recovery**

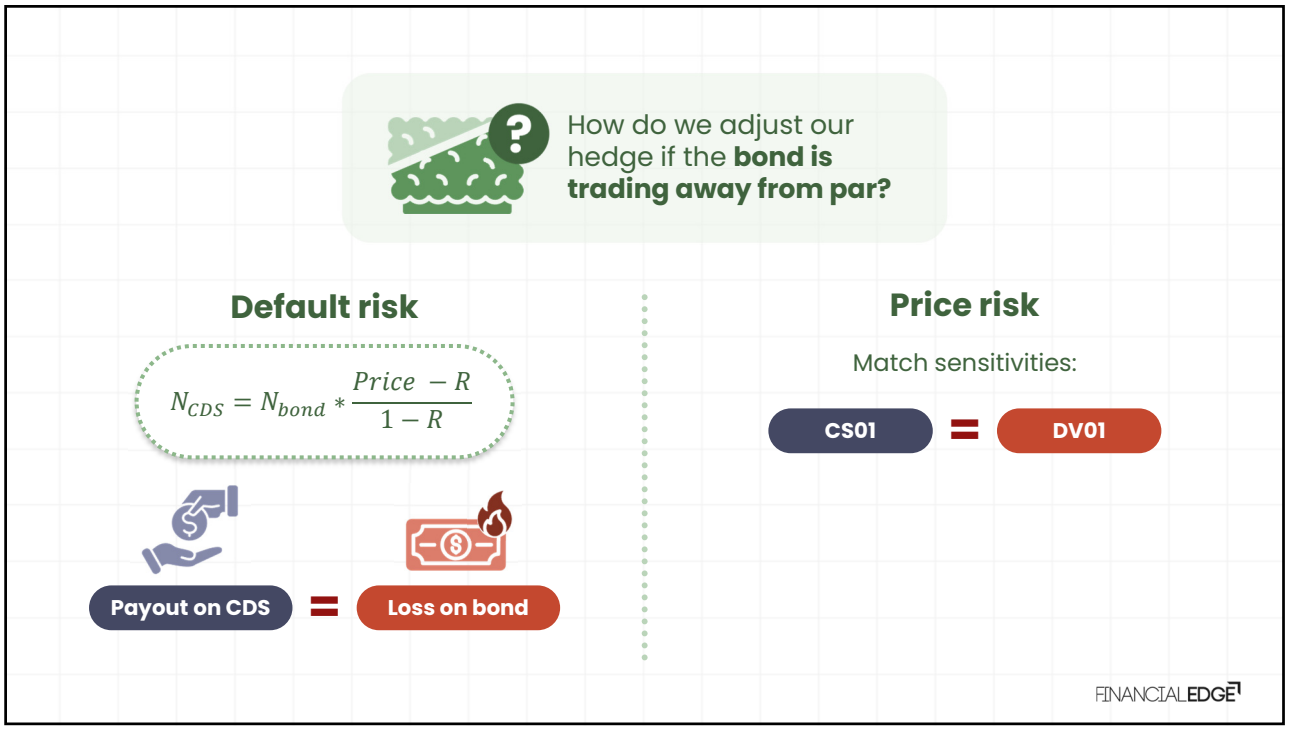
Only true if the **bond is trading at par**

FINANCIALEDGE









Managing risk

Viable way of managing the **credit risk on a bond**

Credit Default Swap

Speculation

Useful tool for speculators to use to **express a view on credit**

FINANCIALEDGE

CDS-Cash Basis

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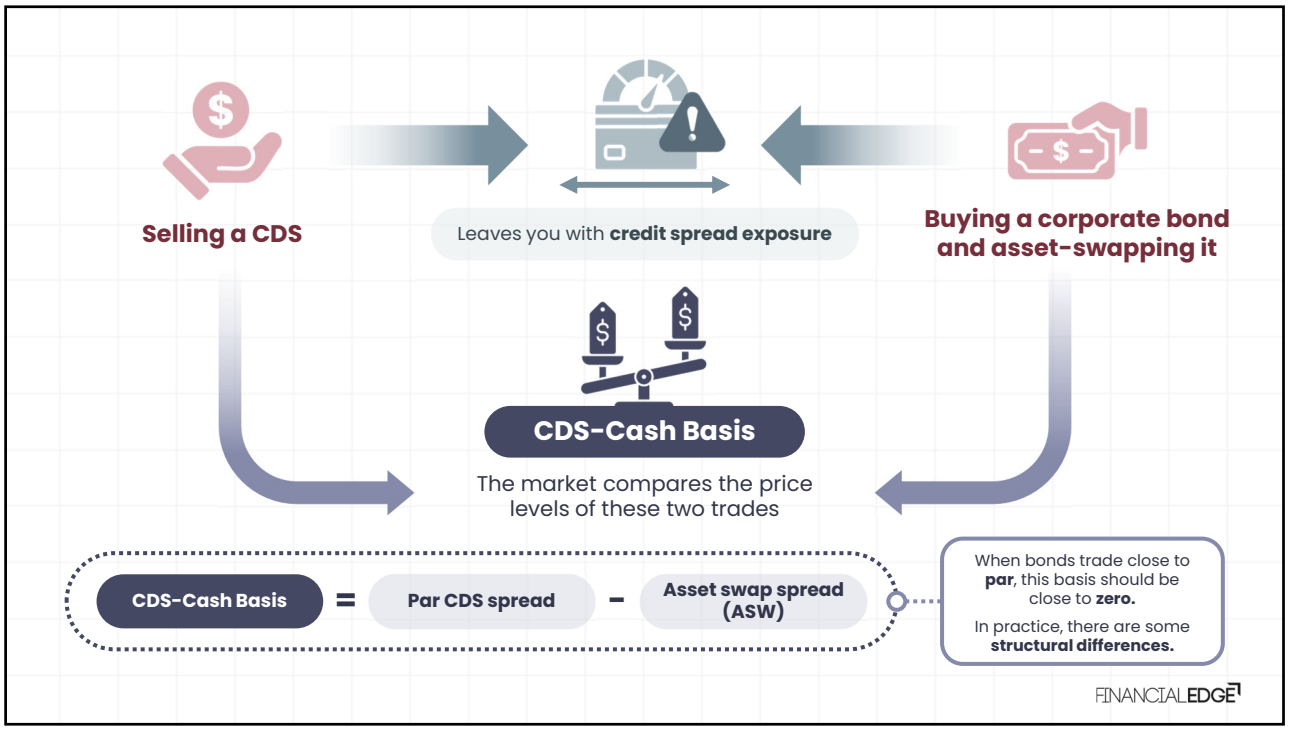

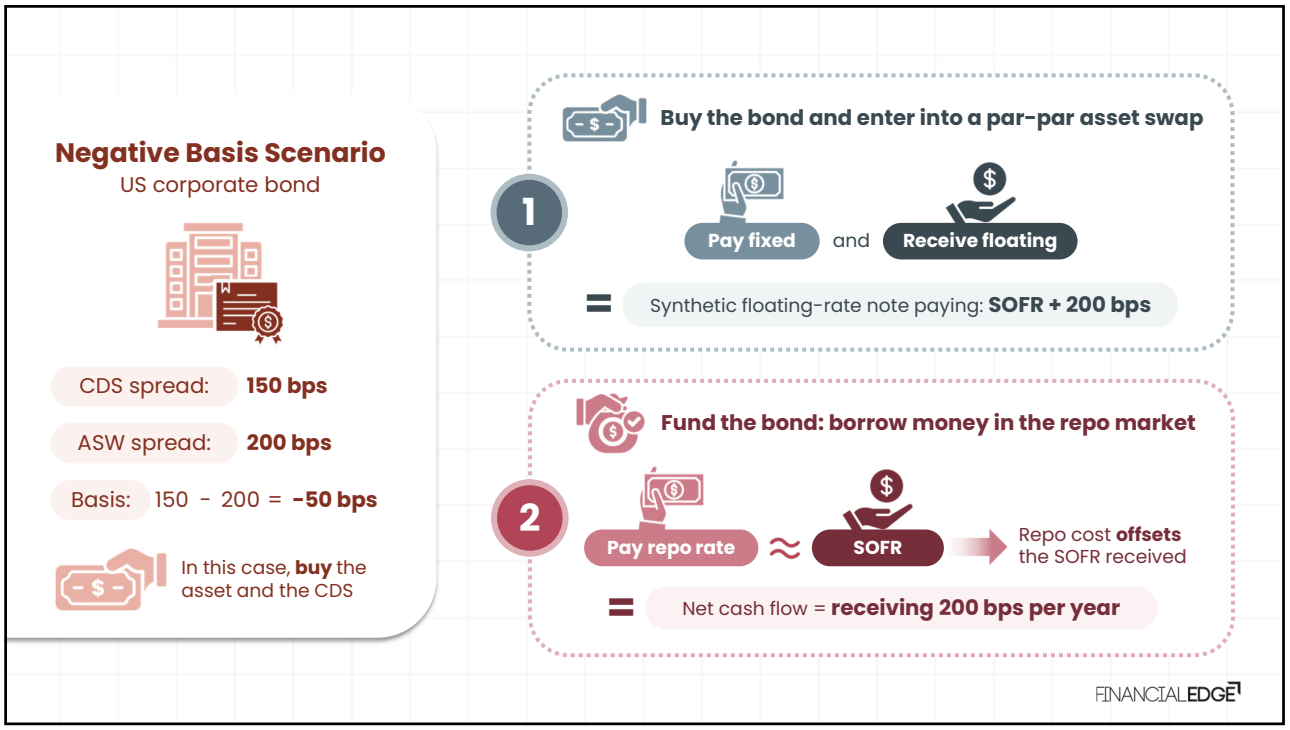

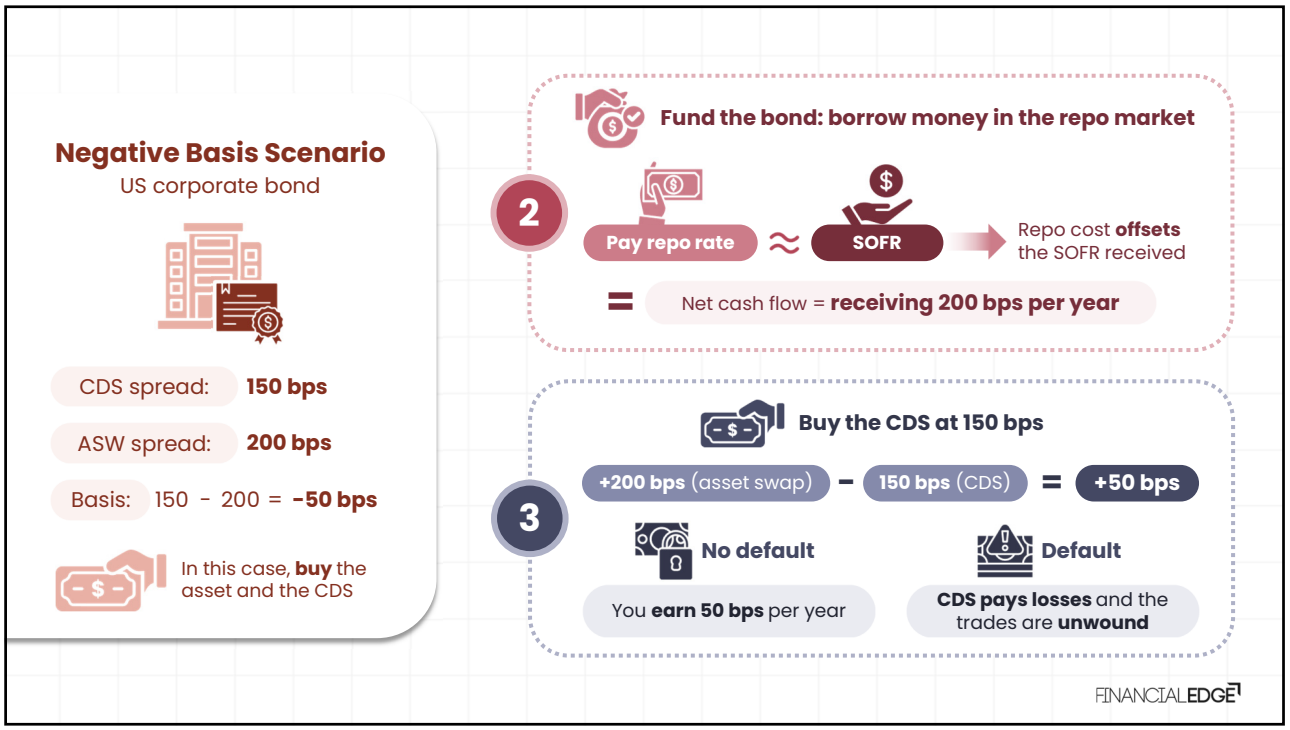

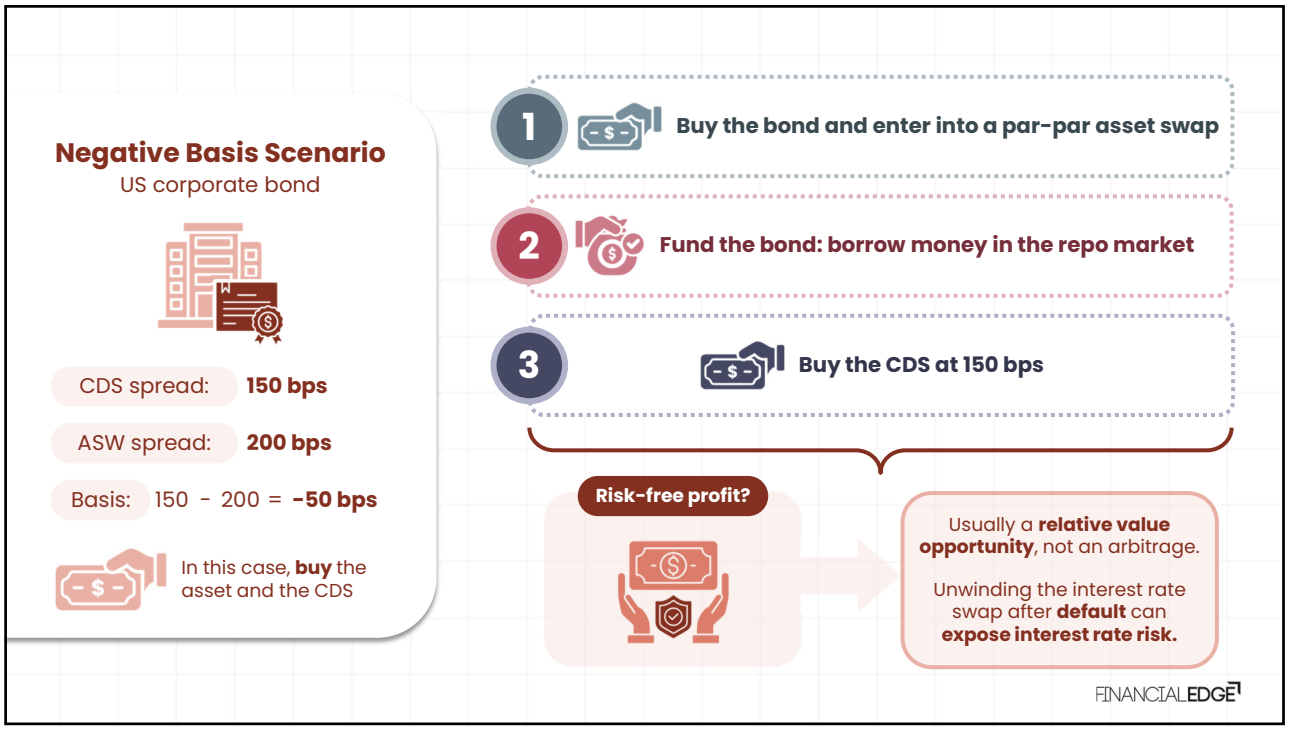

CDS-Cash Basis Drivers

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Why the CDS-Cash Basis does not trade at zero

Positive Basis
(CDS > ASW)

Negative Basis
(CDS < ASW)

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Why the CDS-Cash Basis does not trade at zero

Positive Basis (CDS > ASW)

The choice of asset swap benchmark.
EUR government bonds can asset swap to negative spreads vs. EURIBOR. A CDS spread cannot go negative.

CDS as an efficient shorting mechanism.
Buying a CDS is a much cleaner way to express the trade than shorting cash bonds.

Convertible bond hedging.
Relative value traders hedge convertible bonds by buying CDS, creating excess demand that pushes CDS prices up.

The price of the bond.
A bond trading below par can result in a positive basis.

Negative Basis (CDS < ASW)

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Why the CDS-Cash Basis does not trade at zero

Positive Basis (CDS > ASW)

The price of the bond.
A bond trading below par can result in a positive basis.

Basis = **zero**
Bond price = **below par**

Buy the CDS and asset swap

No default = **flat position**

Default = **over-hedged**

Over-hedged = windfall gain

Traders may **buy the basis above zero**, paying a small ongoing cost in return for a **possible windfall gain** on default

Negative Basis (CDS < ASW)

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Negative Basis (CDS < ASW)

Funding costs.
If you could not fund the bond at the benchmark rate, selling the CDS at a negative basis may be cheaper.

CLN and synthetic CDO issuance.
These structures require issuers to sell CDS protection, putting downward pressure on CDS prices.

The price of the bond.
A bond trading above par can result in a negative basis (windfall gain effect).

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CDS Indexes

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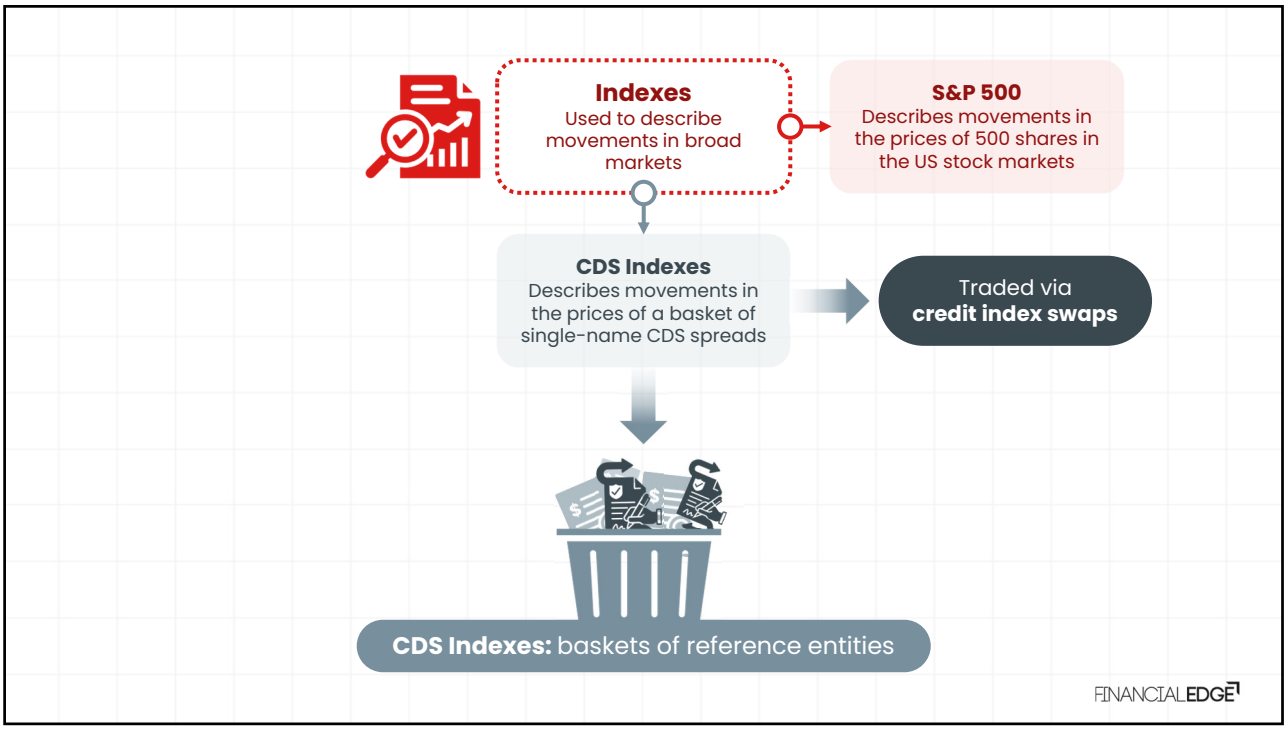

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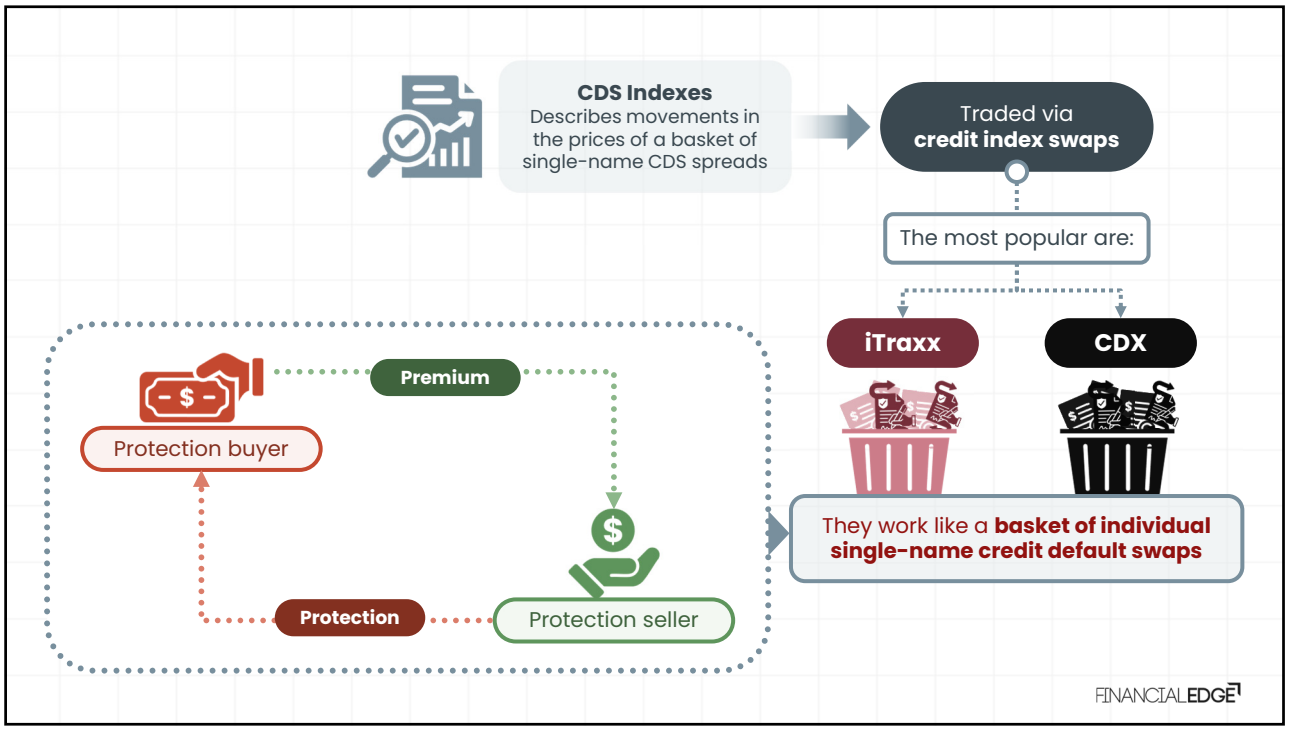

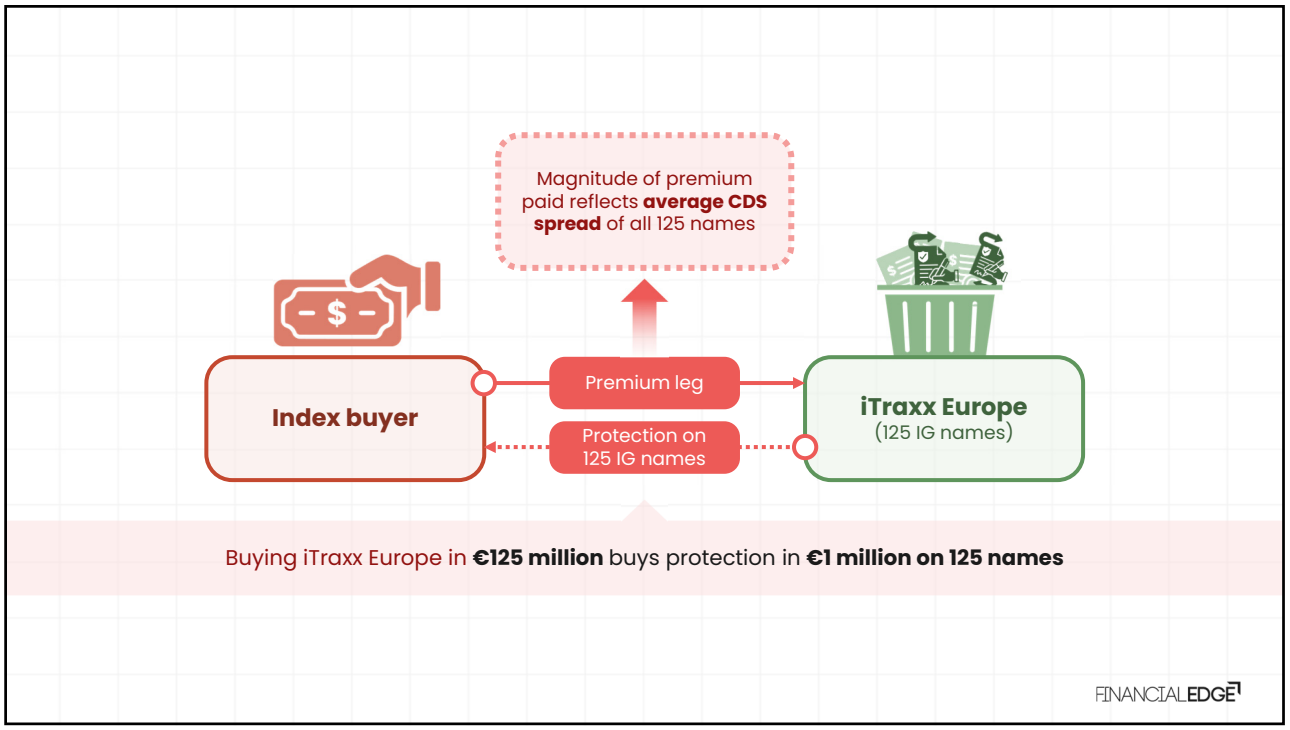

The difference is the **scope** of the **underlying reference names**

Credit Index Swaps

Exposure to **many companies**

Single-name CDS

Exposure to **one company**

Motivations

Protection Buyer
Looking to put a **macro hedge** on a loan portfolio exposed to **credit risk of a broad sector**

Protection Seller
Looking to **express a view** that credit spreads narrow across the market in a **single, convenient trade**

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Default

A credit event in an index CDS is processed at the constituent level, while the rest of the index remains unchanged.

Default is **processed on one name** → Trade carries on with **remaining surviving names** in a **reduced notional**

1 Before default

Index buyer ⟷ €125mn * coupon / Protection on 125 names ⟷ iTraxx Europe (125 names)

2 One name defaults

Index buyer ← €1mn * (1 – R) ← iTraxx Europe (125 names)

3 Continuation position

Index buyer ⟷ **€124mn** * coupon / Protection on **124** names ⟷ iTraxx Europe (125 names)

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