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# Financial Markets & Risk

Dr Cesario MATEUS

Senior Lecturer in Finance and Banking

Room QA259 – Department of Accounting and Finance

[c.mateus@greenwich.ac.uk](mailto:c.mateus@greenwich.ac.uk)

[www.cesariomateus.com](http://www.cesariomateus.com)

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# Session 4

Credit Risk I

Credit Default Swaps

Mortgage-backed Securities

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## What is a credit derivative ?

Traditionally derivatives protect from, or facilitate exposure to:

- interest rate, equity, commodity risk etc, etc.

Credit derivatives protect from, or facilitate exposure to credit risk, stemming from:

- corporate loans
- corporate bonds
- general exposure to credit worthiness of another organisation/entity

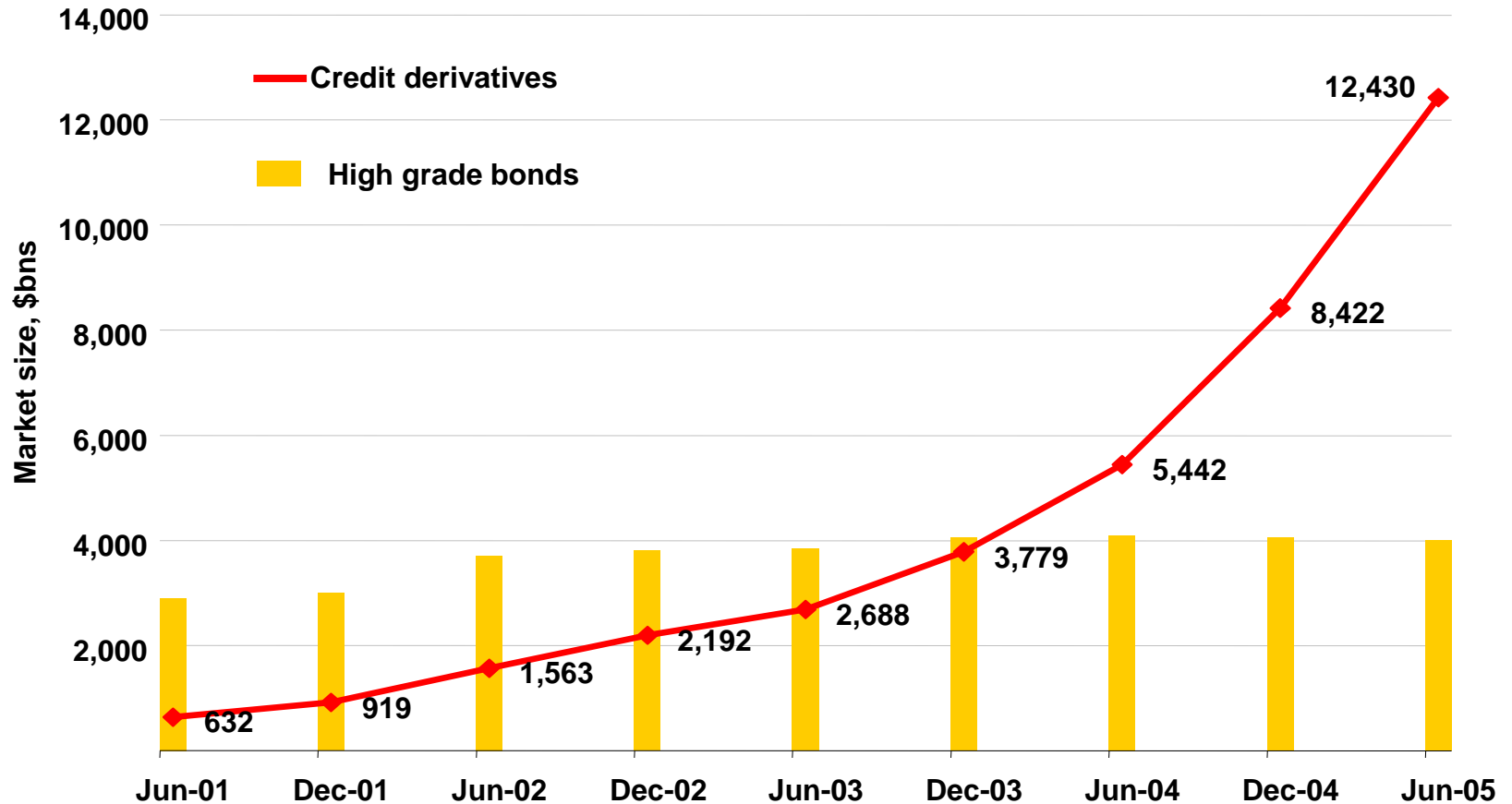
## Role of credit derivatives

Credit derivatives can be used to:

- facilitate access to, or to hedge credit exposure
- transfer credit risk
- enhance yield by generating leverage
- separate risks embedded in securities
- manage regulatory capital requirements

Separating credit risk from underlying cash market

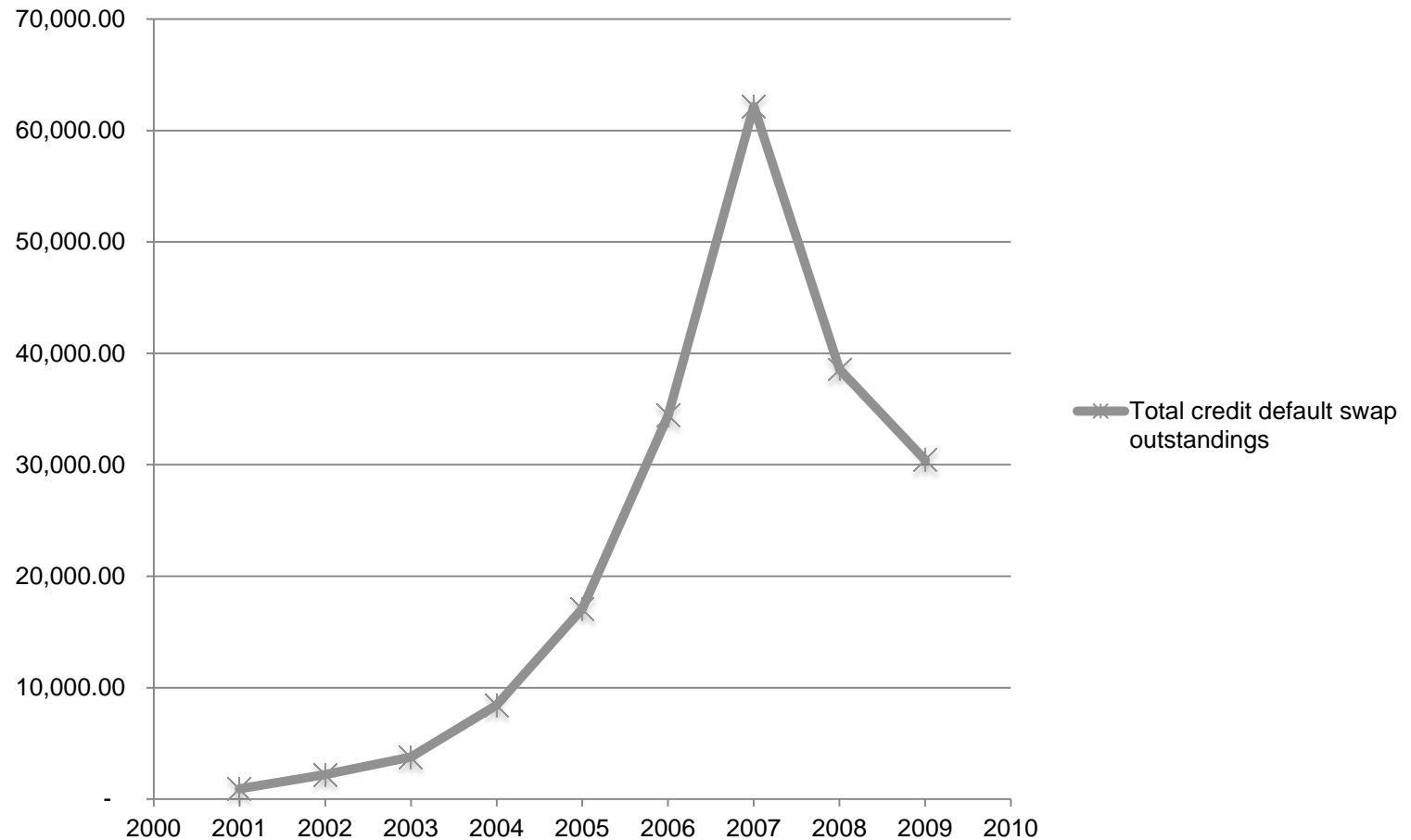
## Credit derivatives growth (ISDA)



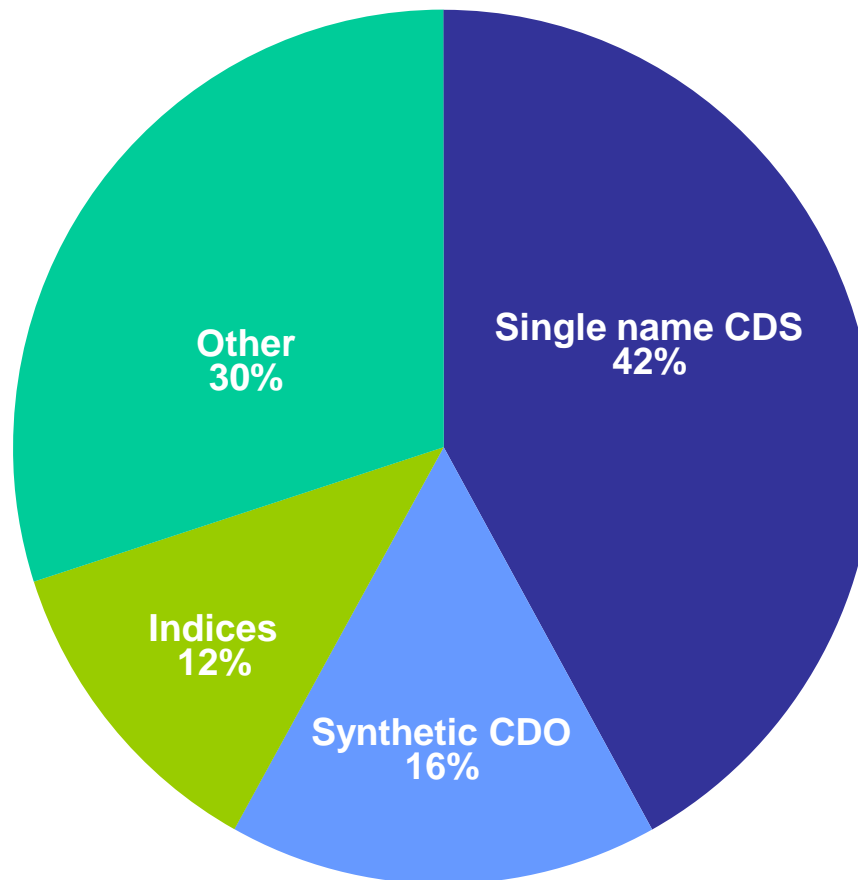
Source: ISDA (International Swaps and Derivatives Association)

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## Total credit default swap outstandings



## Composition of market



# Credit default swaps

What is a single name CDS ?

A **bilateral OTC agreement** that transfers a defined credit risk on a single credit risky entity from one party to another

Similar to an insurance contract – but with a subtle difference:

- One can insure one's car
- But one cannot insure someone else's car – this is illegal
- One cannot insure the same property for the full amount with two different insurers

With **CDSs** one can insure someone else's "property" with multiple 'insurers'



## CDS as insurance

Investors may buy the CDS (insurance) to protect against default by entity - **selling credit risk**

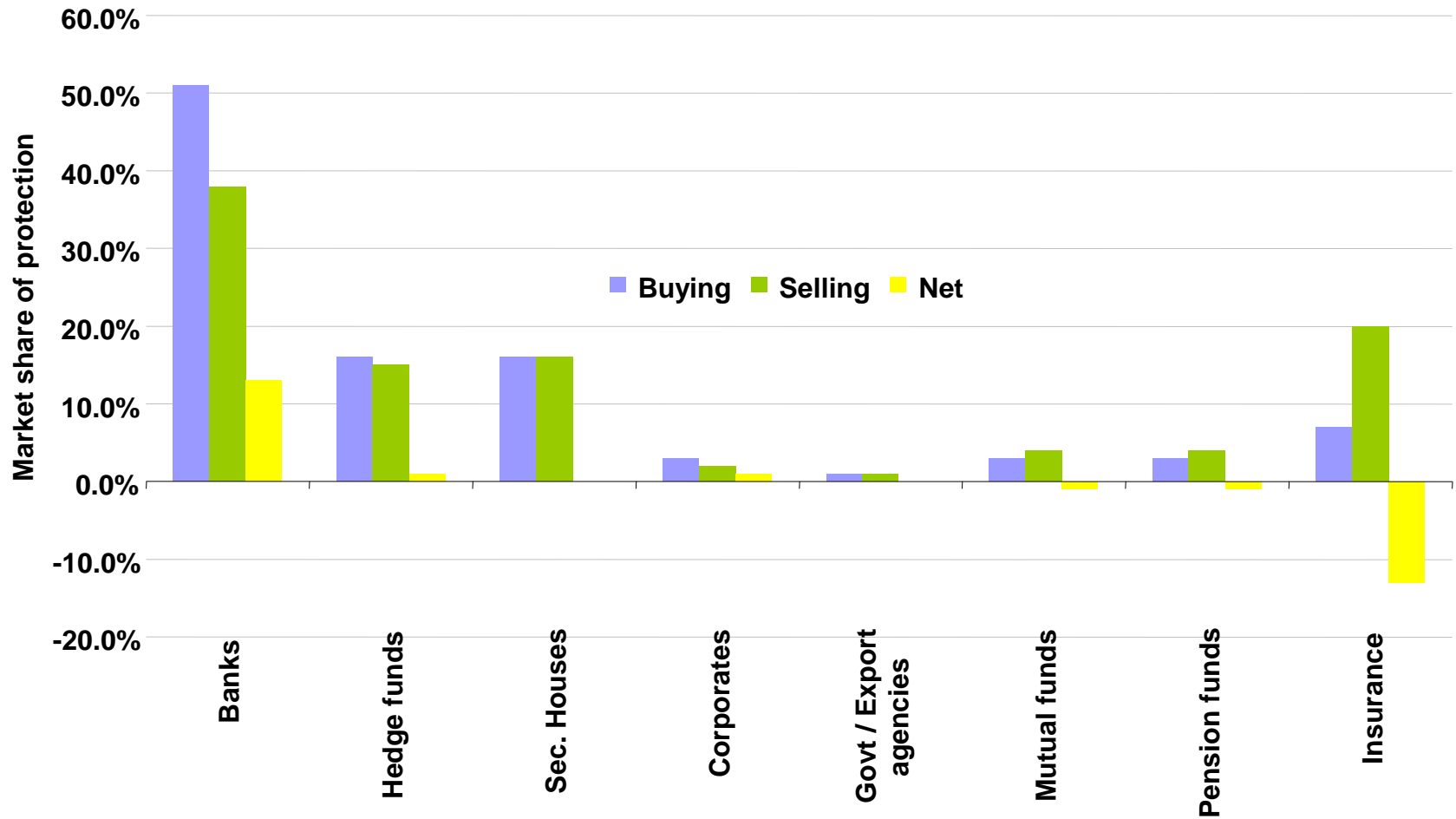
Can equally be used to gain access to credit exposure – by selling the CDS (insurance) - **buying credit risk**

Initially, credit risk is transferred via a CDS **without exchanging the underlying bond or loan**

Banks are the main **buyers of protection** (buyers of CDSs)

Insurance companies are the main **sellers of protection** (sellers of CDSs) ...

# Market participants



## What are the cash flows ?

Buyer of protection pays regular premium to seller of credit risk (similar to insurance premium) to protect against a **Credit Event on the Reference Entity**

**No exchange** of underlying asset

Premium is usually paid on a quarterly basis in the **absence of a Credit Event**

If Credit Event occurs protection seller **makes payment** to protection buyer; protection buyer **delivers a qualifying debt instrument**

Protection buyer then **stops paying premium**

# Credit events

Terms of contract specify range of credit events:

**Failure to pay** – reference entity does not pay commitment

**Bankruptcy** – reference entity becomes bankrupt

**Debt restructuring** – alteration of terms of obligation; this is the most controversial “credit event”

Any of these would activate payment **from protection seller to buyer**

Subtly different from default in ‘**cash market**’

## Reference entity

Which entity's credit risk is being transferred ?

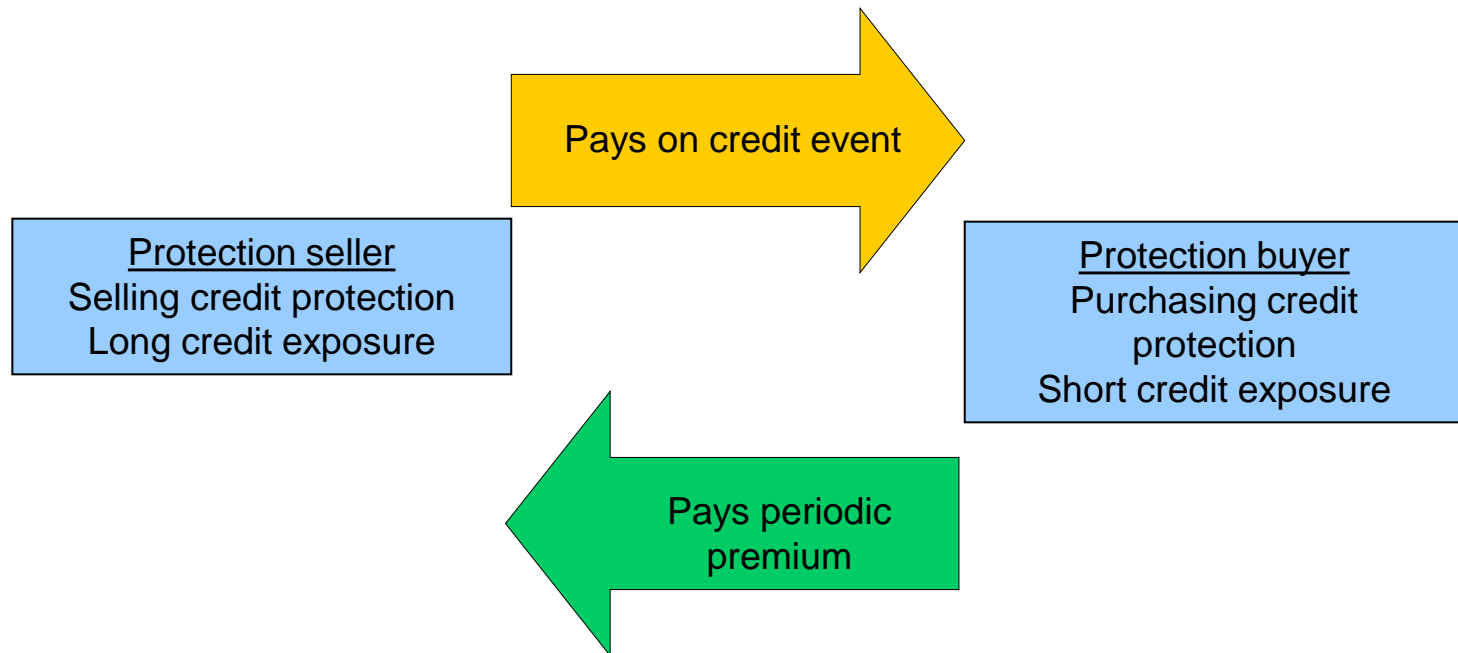
Large corporations have **complex debt and subsidiary structures**

Some subsidiaries benefit from a parental guarantee, others do not, while for others the guarantee is not worth the paper its written on!

Will the reference entity have deliverable debt for the duration of the CDS ? [France Telecom]

After corporate restructuring – mergers, acquisitions etc – **who is the successor reference entity ?**

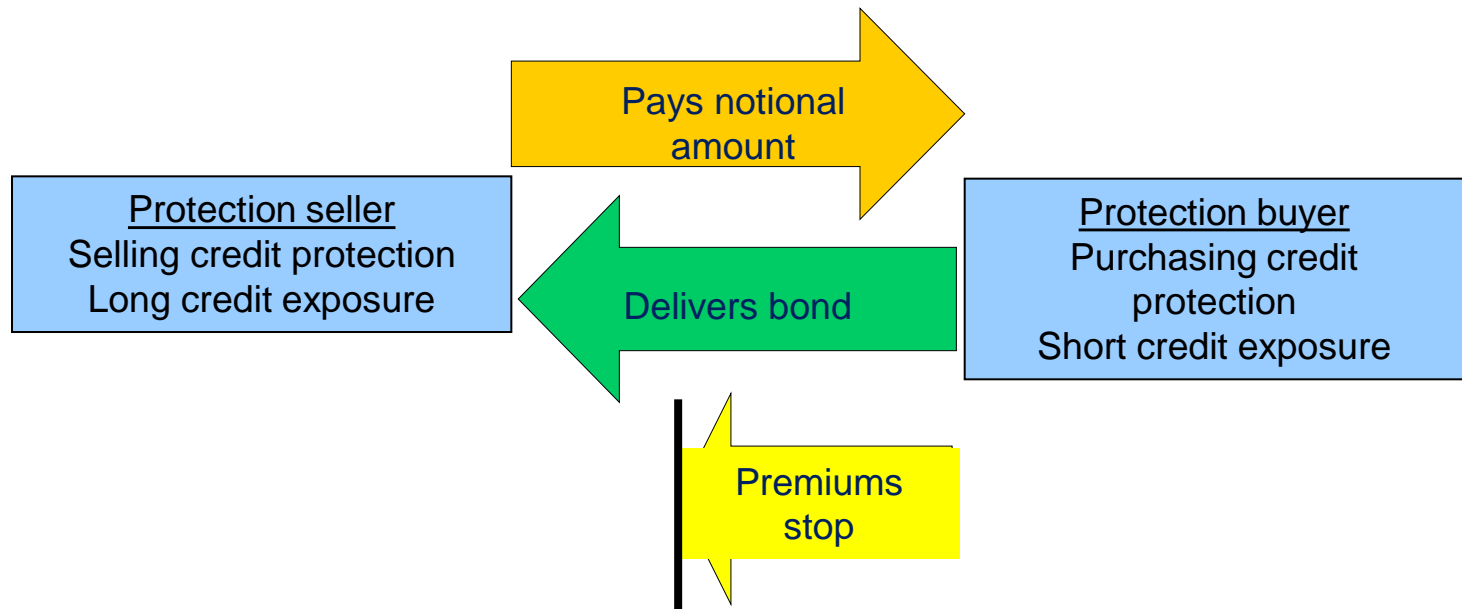
## Common CDS structure



Periodic premium can be thought of as **insurance premium**

In event of '**credit event**' protection seller pays protection buyer and buyer passes of reference obligation(s)

## Following credit event



At this point **protection seller experiences loss**; the difference between the cash compensation and the value of the delivered bond/obligation

Size of loss depends **upon recovery rate**

## Example

ABC pension fund sells protection on notional €10m France Telecom to Big Bank plc

Transaction term (length of insurance cover): 5 years

Bank agrees to pay ABC pension fund: fixed fee of 1.6%pa (payable quarterly)

Settlement is physical

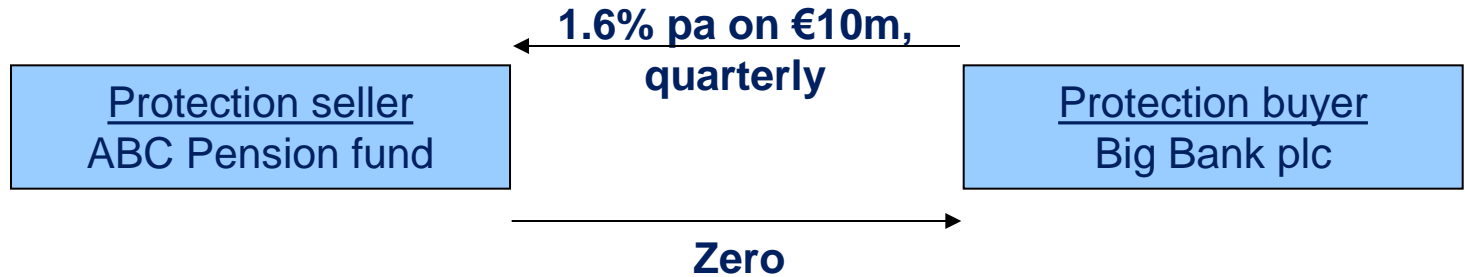
Should Credit Event occur ABC pension fund gives €10m to Big Bank; Big Bank delivers any qualifying senior unsecured France Telecom debt to pension fund

After this all payments terminate



# Example

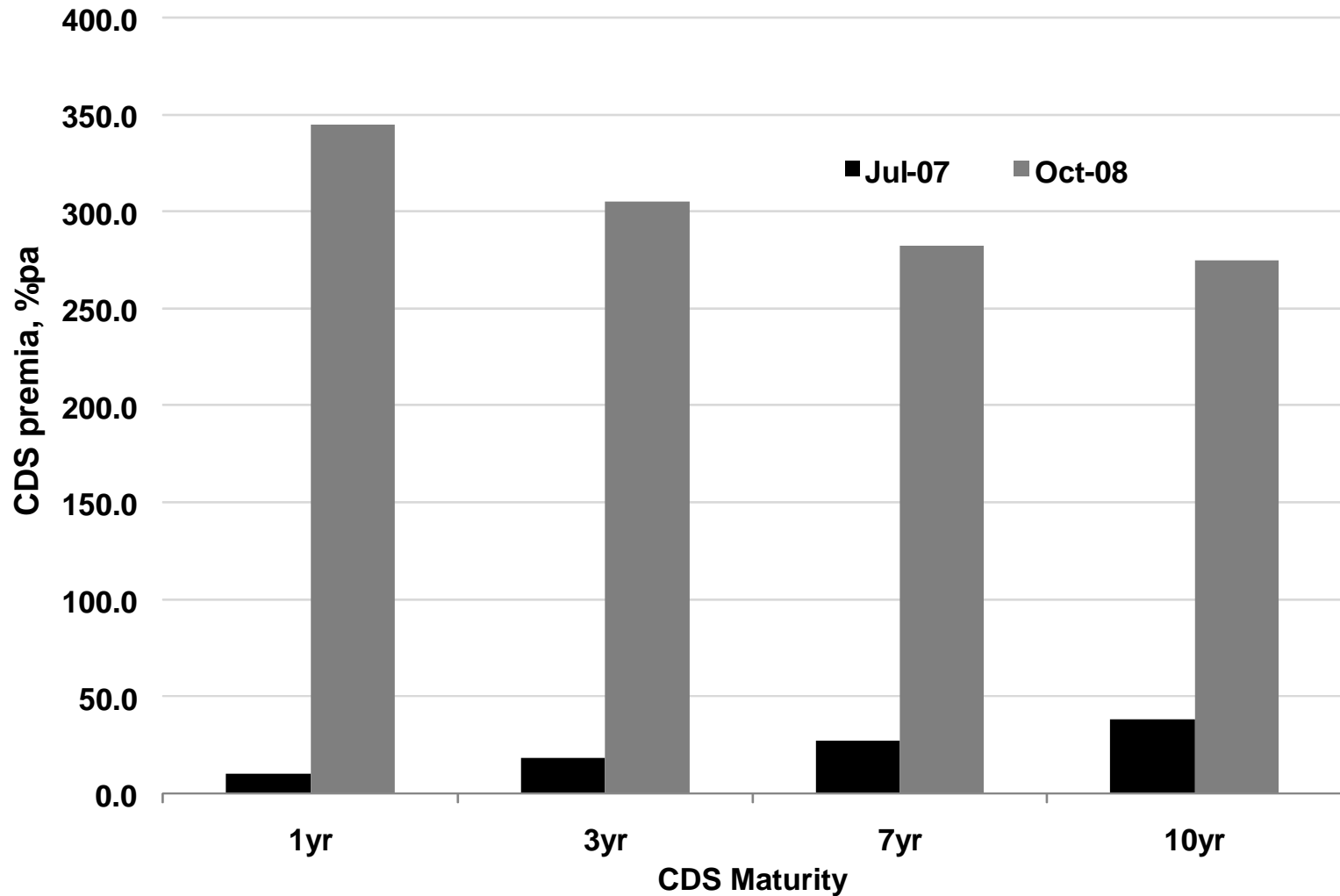
## Pre-event:



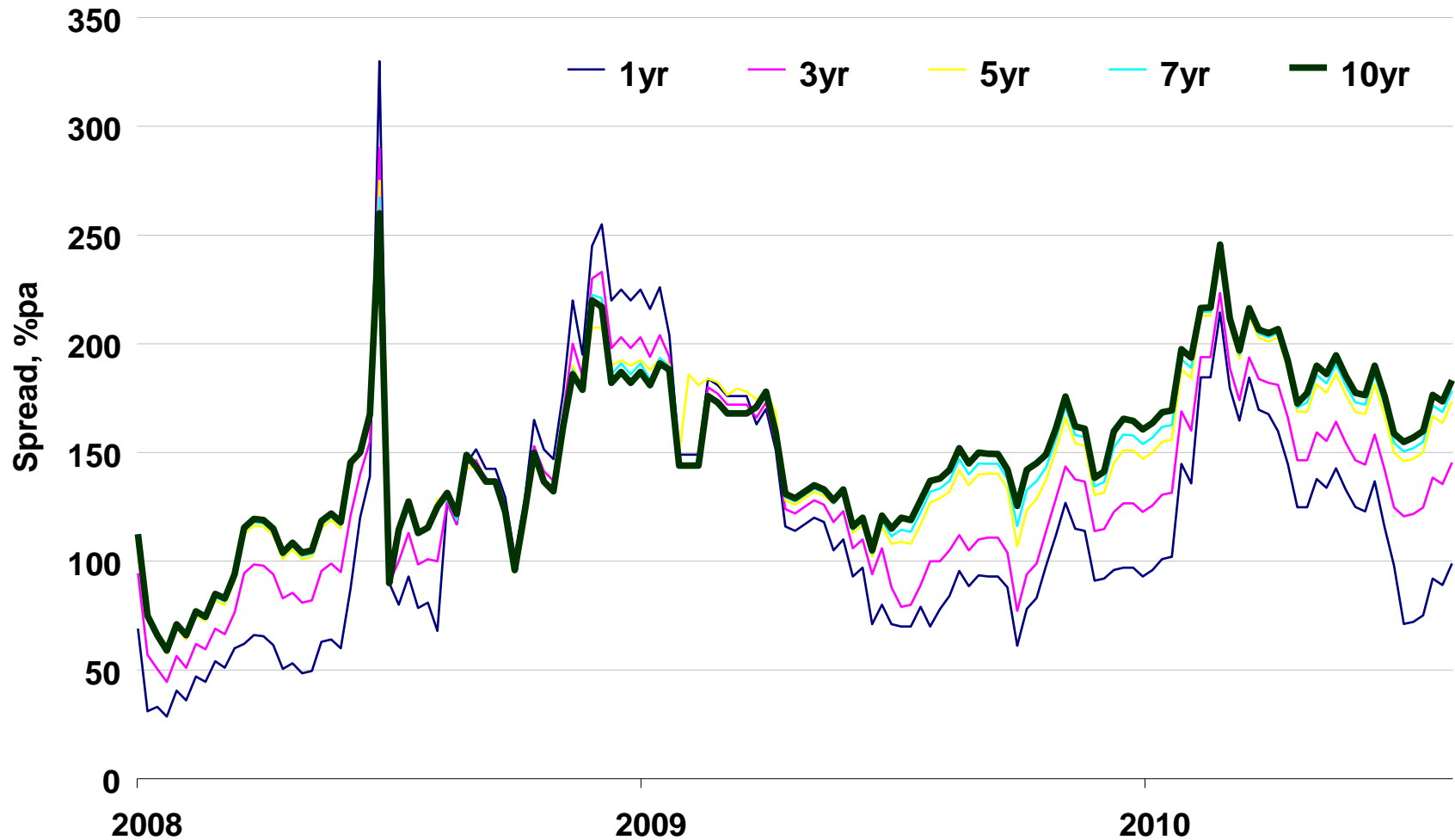
## Post-event:



## RBS's CDS spreads



## RBS's CDS spreads



# Terminating a CDS

## Three ways of terminating CDS:

- Reaching compensation **agreement with counterparty**
- One of counterparties finds **another counterparty** to take their place in the deal
- Entering **equal and opposite CDS position**

They are effectively equivalent

## Trading CDSs

CDSs used increasingly by traditional, long only fund managers

Seller of protection benefits if spreads contract – just like holder of a corporate bond

### Example:

- Sell at 50bps
- Buy back at 40bps
- For remaining life of contract:
- Net: Receive 50bp and pay 40bp = 10bp profit x (notional)

Opposite is true if spreads widen

# Advantages of CDSs

A way of 'risk sharing' – sharing credit risk

Increased liquidity – access to credit risk without having to deal in less liquid underlying bond market

Access to maturity exposures unavailable in the cash market

Can take short positions easily

## Exchange rate risk

Biggest and most liquid CDS market is in USD

Although sterling credits comprise the majority of European CDSs and the vast majority of credit derivative activity is in London, sterling CDS market is small

Most CDS contracts are traded/quoted in either USD or in €s

Sterling-based protection sellers may wish to hedge premiums

More difficult to hedge compensation payments, since their timing is unknown

## Counterparty risk

As with most **conventional swaps** there are two legs to a CDS and two counterparties

**Protection buyer** is committed to fixed, regular payments and **protection seller** to contingent payment

At beginning value of two sets of payments are equal, but changes in credit conditions change **relative value of legs**

**Collateral flows between** two counterparties to protect both sides against default of the other

Collateral management is additional complication compared with managing portfolio of corporate bonds



# CDS Indices

Credit derivative markets have developed and standardised to such an extent that CDS indices now available

Allow investors to obtain credit exposure, or to hedge credit exposure to wide pool of CDS names

CDS indices are moving towards cash settlement which should help to improve liquidity further in the future

Why use them ?

For much the same reasons that one might wish to use equity index futures

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Two providers:

CDX (North America, Emerging markets)

iTraxx (Europe and Asia)

Indices comprise sub-indices based on:

- geography
- industrial sectors
- Rating

Index members selected on 6 month rolling basis based upon CDS liquidity

## Example: iTraxx high grade index

125, equally weighted members

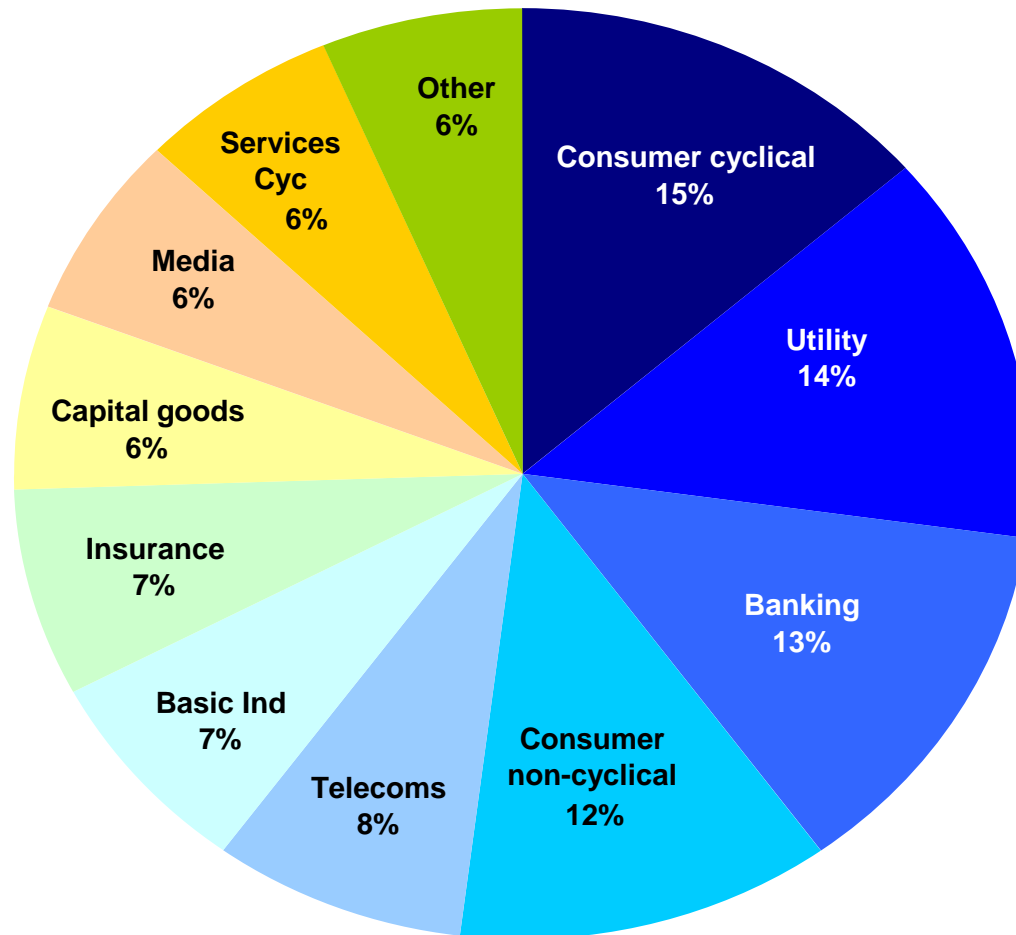
All reference entities are European investment grade

Traded in 4 benchmark maturities: 3, 5, 7 and 10 years

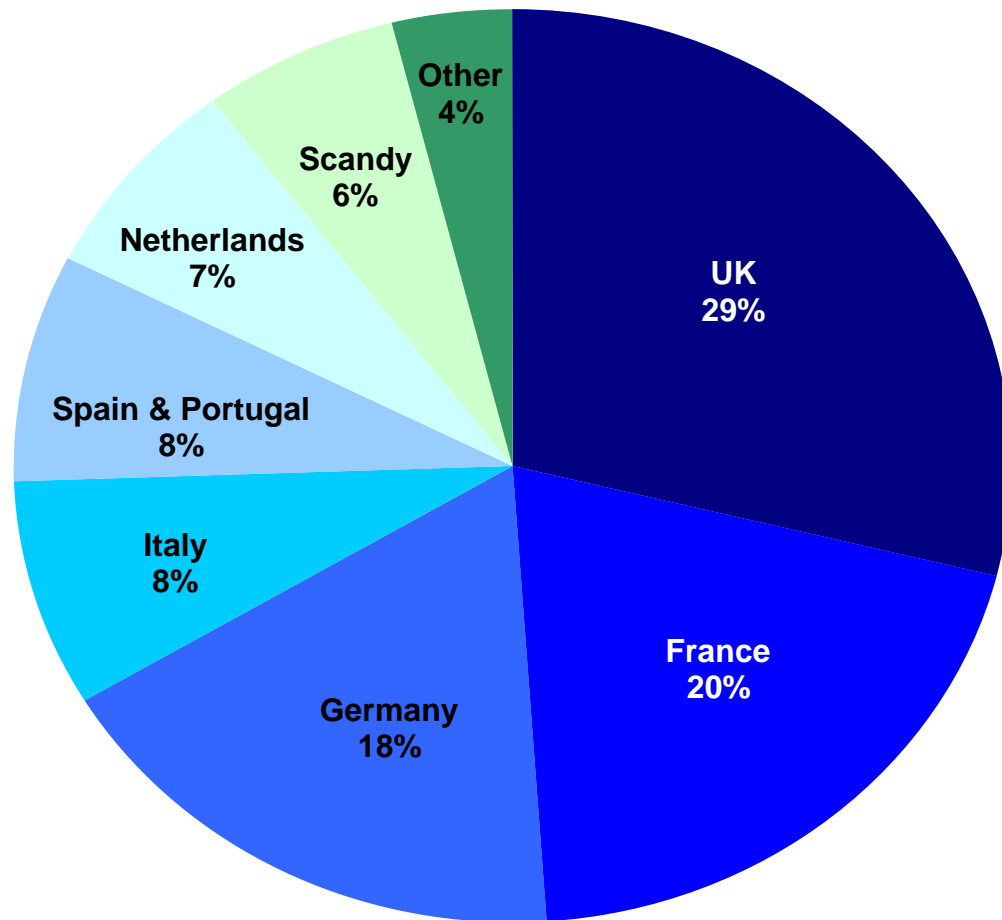
Members selected based on traded volume of CDS in previous 6 months

Pay out on three credit events: failure to pay, bankruptcy and “rescheduling”

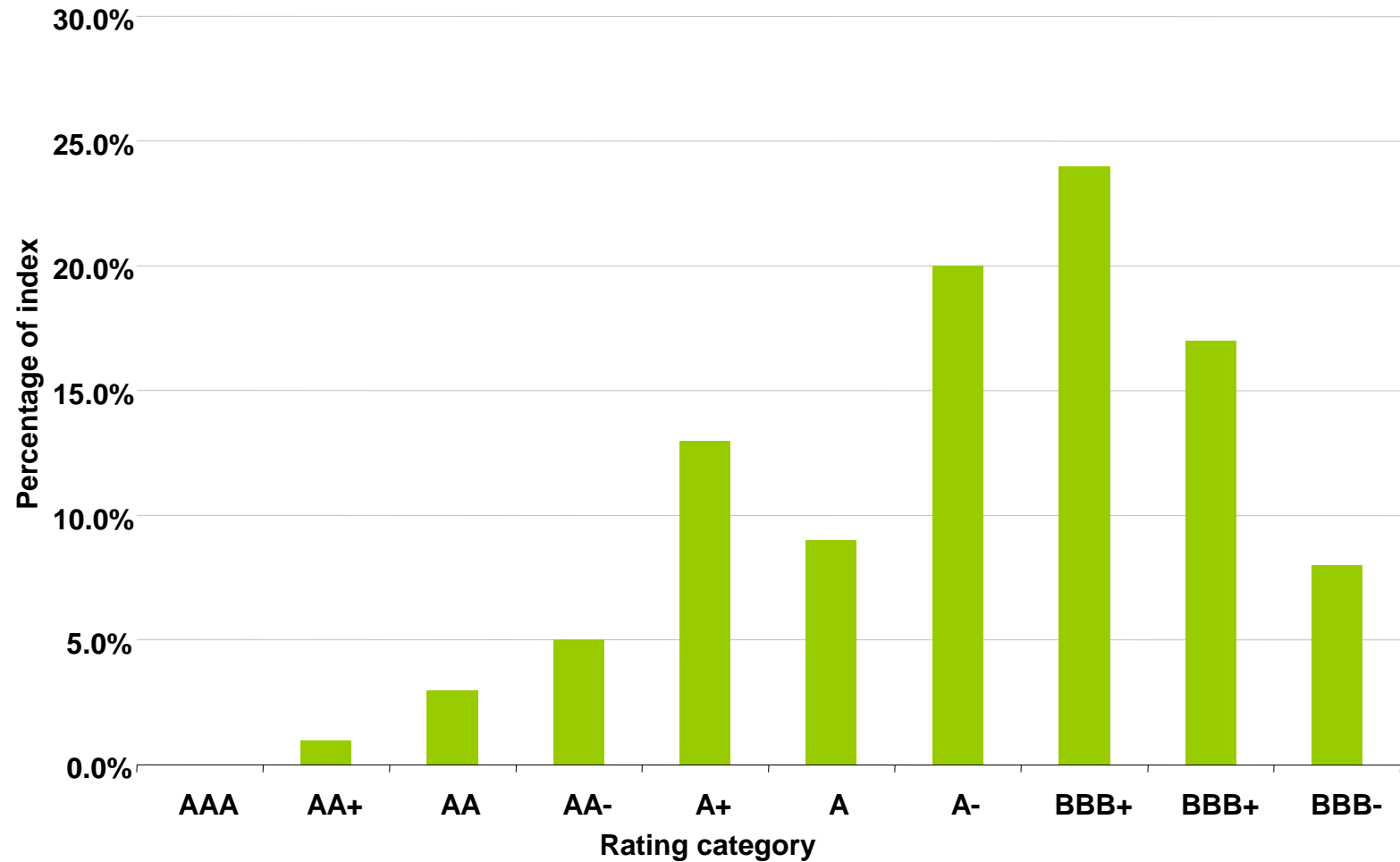
## Example: iTraxx high grade index



## Example: iTraxx high grade index



## Example: iTraxx high grade index



# Pros and cons of CDS indices

## Pros:

- Efficient access to diversified portfolio of credit
- Moving towards cash settlement
- Less complex to manage than a portfolio of bilateral single name CDSs

## Cons:

- Most liquid CDSs are not necessarily the most desirable credits
- Sectoral and rating profiles of indices may not coincide with desired risk/return characteristics

# Where do CDS spreads come from ?

## Creating a synthetic CDS

A CDS represents 'unfunded' access to credit risk, that is, access with no initial outlay

It is analogous to:

- borrowing cash
- purchasing corporate bond
- and being fixed payer and floating rate receiver in an interest rate swap

This is less complicated than it seems



## Borrowing cash:

Use none of your own funds and incur interest cost (say, LIBOR)

## Use borrowed cash to purchase bond:

Giving exposure to credit risk, but also gives rise to interest rate mismatch, that is (receiving fixed coupon, but paying floating (LIBOR)

## Enter into swap:

Paying away fixed and receiving say LIBOR

Taken together this only leaves the credit spread over LIBOR

## Cash flows for CDS replication

	Receive	Pay
Borrow cash	100	LIBOR
Purchase bond	GY + CS	100
Swap	LIBOR	GY+ SS
Total	100 + GY + CS + LIBOR	LIBOR + 100 + GY + SS

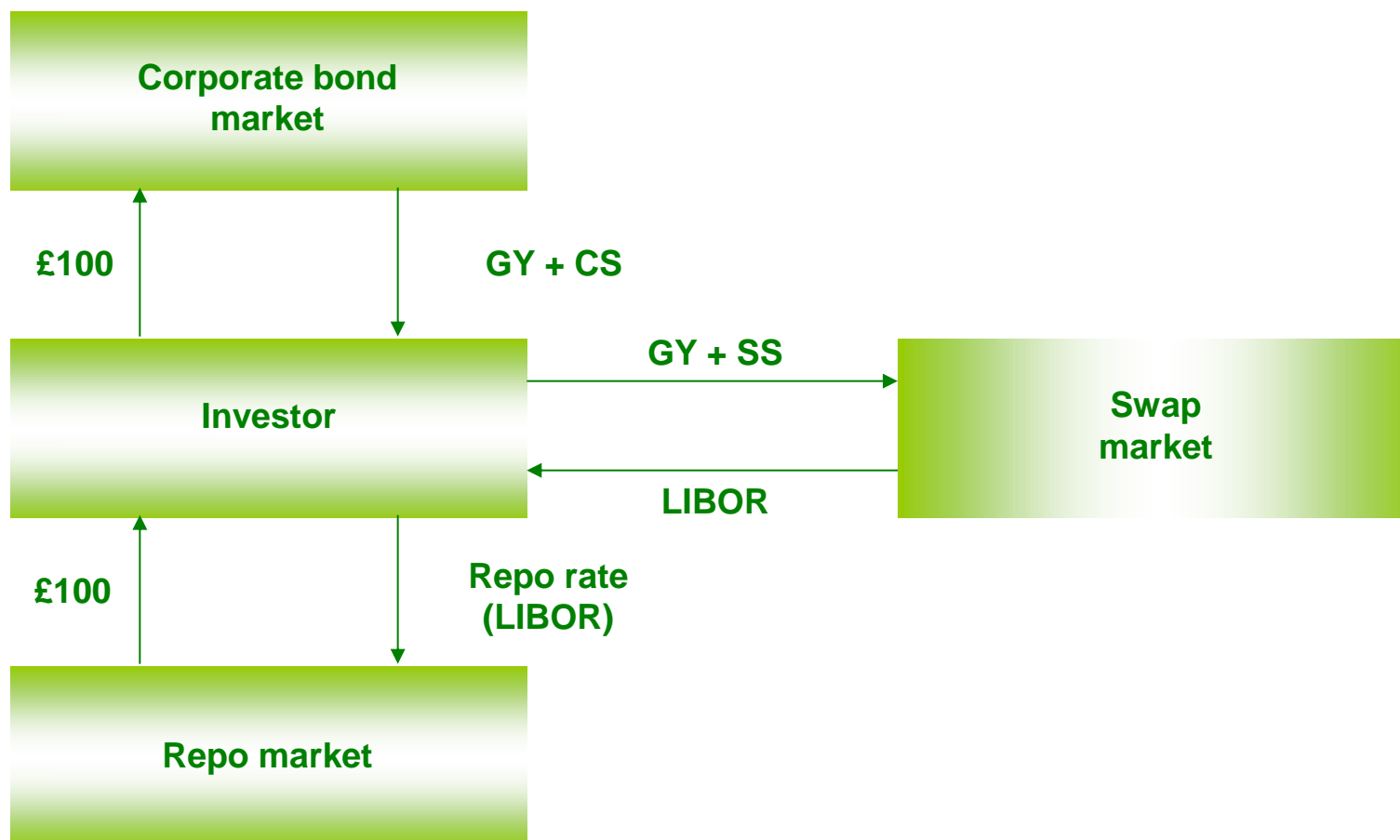
GY = gilt yield; SS = Swap Spread; CS = Bond spread

$$\text{Net} = 100 + \text{GY} + \text{CS} + \text{LIBOR} - (\text{LIBOR} + 100 + \text{GY} + \text{SS})$$

$$\text{Net} = \text{CS} - \text{SS} = \text{CDS Spread}$$

This means that the ten year CDS spread on a bond will be less than the conventional credit spread quoted for the same bond.

# Cash flows for CDS replication



## CDS replication summary

There are some minor adjustments that need to be made to this “arbitrage”, but the **principle is unchanged**

Example shows that CDS gives “**leveraged access**” to credit risk

A CDS quote is the corporate bond spread in excess of the relevant (in terms of maturity) swap spread

The **CDS spread** and the **corporate bond spread** should be determined by the same factors and should **therefore move together**

But corporate bond spread **will always be greater** than equivalent CDS spread