

TW3421x - An Introduction to Credit Risk Management

Credit Default Swaps

and CDS Spreads

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Week 7
Lesson 1

Credit Default Swaps

- ❖ A **Credit Default Swap** (CDS) is an instrument providing insurance against the risk of a default by a given company.

Terminology

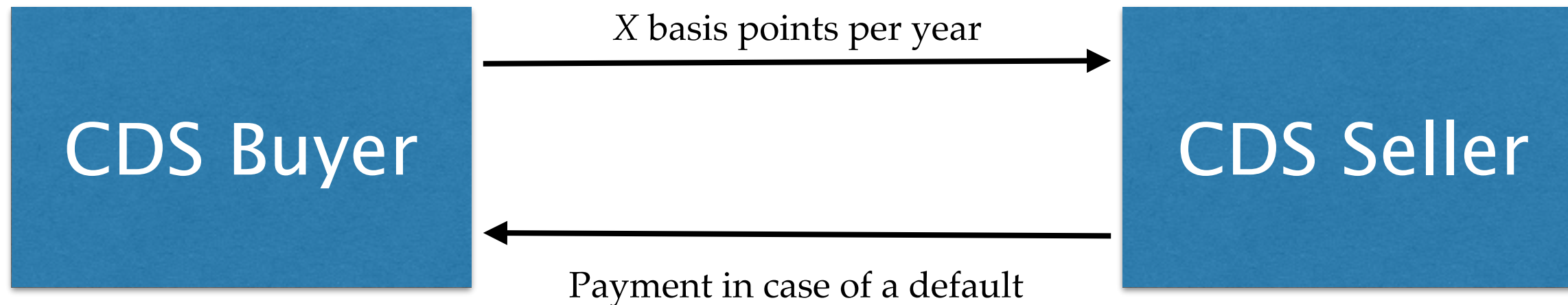
- ❖ The company subject to default is known as **reference entity**.
- ❖ The default is called **credit event**.

Mechanism

- ❖ The **buyer** of a CDS obtains the right to sell the bonds issued by the reference entity for their face value, when there is a credit event, that is a default.
- ❖ The **seller** of a CDS is obliged to buy the bonds for their face value when the credit event occurs.
- ❖ The total face value of all the bonds, which are part of the CDS, is known as the **notional principal**.

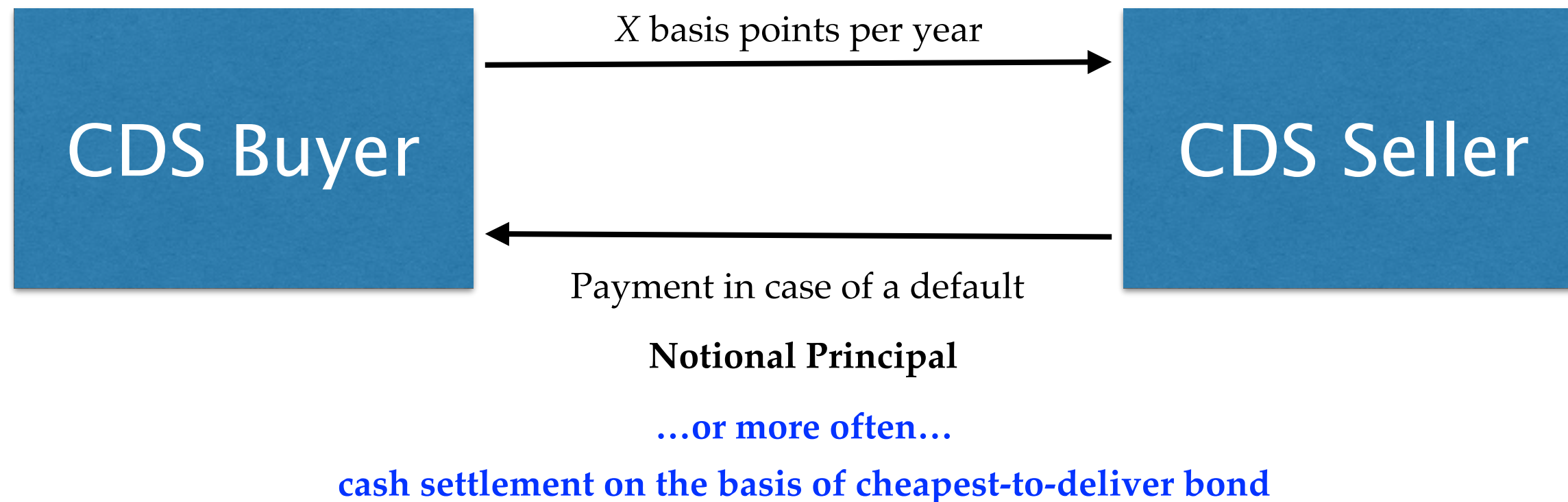
Mechanism

- ❖ The buyer of a CDS usually makes periodic payments to the seller, until the end of the life of the CDS, or until a credit event happens.



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Example

- ❖ Suppose that on June 20 2014, two parties agree to enter into a 5-year CDS with respect to a specific reference entity.
- ❖ The notional principal is €100 million.
- ❖ The buyer agrees to pay 90 basis points per year, in quarterly arrears, for protection against default by the reference entity.

Example: No Default

- ❖ In case of no default, that is no credit event, the buyer receives no payoff, while s/he pays the seller about €225k on September 20, December 20, March 20 and June 20 in 2014, 2015, 2016, 2017, 2018, 2019.

Example: No Default

90 bps of 100'000'000 is 900'000.
Then $900'000/4=225'000$.

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Example: Default

- ❖ Imagine now that we do have a credit event, i.e. a default.
- ❖ Let's say it happens in month 5 of year 3, that is around November 20 2017.
- ❖ In that case, the buyer stops paying the seller and claims the notional principal.
- ❖ The seller is obliged to pay the notional principal (or any other arrangement) to the buyer, by buying all the bonds involved in the CDS.

Notice

- ❖ Since the buyer's payments are in arrears, and the default event happens in November, a **final accrual payment** is required.
- ❖ In particular, the buyer must pay his/her insurance for October and November 2017, until the credit event. That is

$$900'000/12 \times 2 = 150'000$$

CDS Spread

- ❖ The **CDS spread** is nothing more than the total amount paid every year by the buyer as a percent of the nominal principal.
- ❖ In the previous example the spread is 90 bps, that is 0.9%.
- ❖ The CDS spread is the “price” (the extra rate) required by the seller of the CDS to bear the risk of default of the reference entity.

- ❖ CDS Spreads (but in general all credit spreads) can be used to quickly estimate the **probability of default** of a counterparty.
- ❖ This estimation is not extremely precise, and it is subject to rather strong assumptions from a probabilistic point of view, but it is surely quick and may be helpful to have **a first idea** about the creditworthiness of a counterparty.

Example

- ❖ Suppose that a 5-year CDS spread (CS) for a given company (the reference entity) is 240 bps per year, i.e. 2.4% per year.
- ❖ Assume that the recovery rate (R) in case of default is 40%.
- ❖ The average (yearly) PD, over the 5-year period, conditional on no earlier default is estimated as

$$\frac{0.024}{1 - 0.4} = 0.04 = 4\%$$

The General Formula

- ❖ In general, we can compute the **average PD of the reference entity**, conditional on no previous default, as

$$PD = \frac{CS}{1 - R}$$

Combining Spreads

- ❖ Suppose that, for the same reference entity, the 3-year CDS spread is 50 bps, while the 5-year CDS spread is 60 bps.
- ❖ The recovery rate is 60%.
- ❖ The average PD over 3 years is $0.005 / (1 - 0.6) = 0.0125$
- ❖ The average PD over 5 years is $0.006 / (1 - 0.6) = 0.015$

Combining Spreads

- ❖ **What is the average PD between year 3 and year 5?**
- ❖ The answer is

$$\frac{5 \times 0.015 - 3 \times 0.0125}{2} = 0.01875 = 1.875\%$$

In general

- ❖ The general formula for inferring the intermediate average PD between an y -year CDS and a x -year CDS, with $y > x$, is

$$\frac{y \times PD_y - x \times PD_x}{y - x}$$

where PD_x is the average PD for the x -year CDS.

Thank You