TW3421x - Week 7 - Credit Default Swaps

Hi there, welcome to Week 7, the last week of our Mooc. In this class, we introduce credit default swaps.

A credit default swap is a particular financial instrument that we can use as an insurance against the default of a given company. We will see that we can use CDS, that is the acronym for credit default swaps, for estimating the probability of default of a counterparty.

In particular we will use CDS spreads. Ok, so, let's start.

When we consider a CDS, the company subject to default is known as the reference entity, and its default is the so-called credit event.

The buyer of a CDS buys the right to sell the bonds issued by the reference entity for their face value, if the reference entity defaults.

The seller of a CDS is obliged to buy the bonds for their face value when the credit event occurs. With the term notional principal, we indicate the total face value of all the bonds, which are part of the CDS.

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

Typically the buyer pays a certain amount X of basis points of the notional principal per year in quarterly arrears. The seller only pays in case of a default.

In theory the seller has to pay the entire notional principal. In reality, most of the times, the amount is smaller, especially in case of cash settlements.

Usually a double auction procedure involving cheapest-to-deliver bonds is used, but we do not enter into the details. Let's consider an 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 euros and the buyer agrees to pay 90 basis points per year, in quarterly arrears.

If no default is observed, the buyer will pay approximately 225 thousand euros every 3 months, until the end of the contract.

Imagine, on the contrary, that a default happens around November 20, 2017. In that case, the buyer stops her payments and can claim the notional principal.

The seller is thus obliged to buy all buyers' bonds at their face value, that is the notional principal, unless some other arrangement has been done.

Since November 20 is two months after the last payment of the buyer, on September 20, the buyer is supposed to pay a last accrual payment. In our example something like 150 thousand euros.

By definition, the CDS spread is simply the total amount paid every year by the buyer as a percent of the nominal principal. In our example, the CDS spread is 0.9%.

This spread is the nothing more than the extra rate required by the seller of the CDS to bear the risk of default of the reference entity.

CDS spreads (as all spreads) can be used to rapidly estimate the probability of default of a counterparty.

This estimation is not the best one, because it relies on some strong probabilistic assumptions about risk-neutral measures, but it is surely quick and may be useful to have a first idea about the creditworthiness of a counterparty.

Suppose that a 5-year CDS spread for a given company (the reference entity) is 240 bps per year, i.e. 2.4% per year. Assume that the recovery rate in case of default is 40%.

The average PD, over the 5-year period, given that no other default has been observed so far for the reference entity, is 4%.

In general, to estimate the average PD of the reference entity, we can use the formula you can see on your screen, which is a very simple formula.

At the numerator we have the CDS spread, and at the denominator we have one minus the recovery rate.

Very simple and very very quick for a first estimate of the probability of default of a counterparty.

Credit spreads can also been combined to obtain the so-called intermediate PDs.

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 assumed to be 60%.

Using the previous formula we can easily compute the average probability of default over 3 and 5 years.

These probabilities can then be used to estimate the average probability of default between year 3 and year 5, which is more or less 1.88%.

The trick is to use the general formula you see on your screen.

Now that you also know how to use CDS spreads, it is time to finish.

Ciao. Alla prossima!