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Collaterised debt obligations
NEW YORK STOCK EXCHANGE
NYSE
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LIVERMORE

Tranching losses

- A number of fixed income assets can be combined and securities be sold based on this portfolio
- Fixed income assets can include mortgages, bonds, car loans, student loans, credit card receipts, ...
- Securities are designed such that they bear losses from defaults in order of priority
- The first tranche will bear the losses until it receives no more repayments
- Only once the first tranche has been eliminated, will the second tranche bear any losses, and so on from junior tranches to senior tranches
- The higher the tranche, the more losses are required before the tranche is not repaid in full

Pricing collaterised debt obligations

- Collaterised debt obligations are structured like ordinary bonds with a coupon payment and uncertain repayment
- The pricing of CDOs consists of finding an appropriate coupon payment
- The expected repayment, including coupon payment and the repayment of the principal, has to equal the repayment from a risk-free bond of the same maturity
- Solving this equality, will result in a spread over the risk-free rate

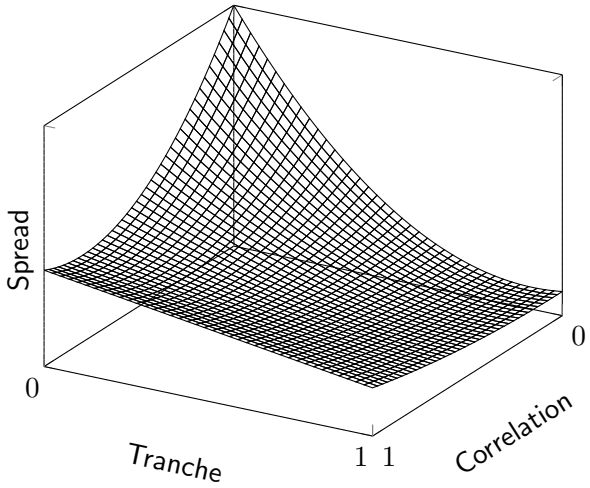
Additional considerations in pricing CDOs

- The pricing is conducted similarly to credit default swaps, but additional factors have to be taken into account
- The fixed income instruments have different default rates, but it is commonly assumed default rates are identical
- The defaults of the fixed income instruments will be correlated, it is commonly assumed correlations are identical
- A tranche may be not repaid at all, fully repaid, or partially repaid, depending on the number of defaults of the entities included
- Using Monte-Carlo simulations, the spread of CDOs can be determined

Key drivers of CDO spreads

- Higher default rates increase the spread due to the increased risk
- Higher correlations have an ambiguous effect on the spread
- For senior tranches the spread is increasing in the correlation
- For the equity tranche it is decreasing in the correlation
- Mezzanine tranches have an initial decrease and then increase in the correlation

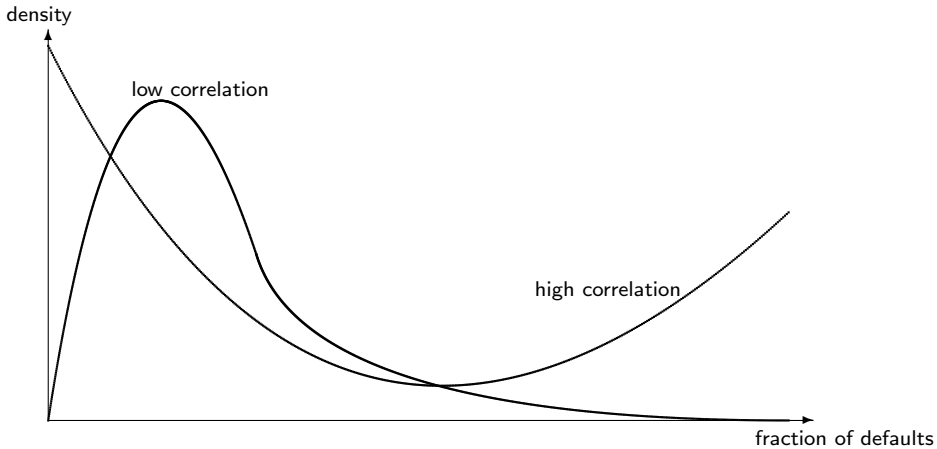
Spread of collaterised debt obligations



Defaults and correlation

- As the correlation increases, the likelihood of no losses at all increases, reducing the spread of the equity tranche
- At the same time the probability of high losses increases ("all-or-nothing"), causing the spread of senior tranches to increase
- For intermediate correlations, these two effects combine and as the correlation increases, the spread initially decreases and then increases again

Fraction of defaults



Higher correlations

- As correlations increase, it becomes more and more a situation where either no entity defaults or all entities default
- With low correlations a large number of defaults is unlikely and senior tranches are unlikely to face losses, while lower tranches are likely to face large losses
- High correlations reduce the risks of junior tranches as small number of defaults that only affect them become less likely
- Higher correlations make a large number of losses also more likely, increasing the risks to senior tranches

The importance of correlations

- A higher default rate will lead to a higher spread
- Correlations between the default of entities are an important determinant of the spread of CDOs
- The impact differs depending on the seniority of the tranche
- The risks when holding collaterised debt obligations are difficult to evaluate

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