Credit Risk

Projects

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Project 1

Do Rare Events Explain CDX Tranche Spread?

Project 1: Infectious defaults

Description of the project: This project aims at studying a CDO valuation model that uses a time-varying probability of default as suggested in [Seo and Wachter, 2016].

Target: Clear explanations of the valuation model suggested in the paper and comparison with the one exposed in the class. You also have to create a tool to price a CDO with this model coded in Python on Google Colab.

Project 2
Infectious defaults

Project 2: Infectious defaults

Description of the project: This project aims at building a CBO valuation model that is used in [Davis and Lo, 1999].

Target: Clear explanations of the valuation model suggested in the paper and comparison with the one exposed in the class. You also have to create a tool to price a CDO with this model coded in Python on Google Colab.

Project 1

Do Rare Events Explain CDX Tranche Spread?

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Project 3

Climate Risk: Transition and physical risk

Project 3: Climate Risk

Description of the project: This project aims at jointly modeling physical and transition risk within a Merton-like credit risk model, building up on [Bouchet and Le Guenedal, 2020].

Target: Introduce physical risk in the model as a Poisson component variable, whose jumps are proportional to the total asset value (any alternative may be proposed). You may consider a simpler model where physical risk occurs only once (with a exponential law time distribution).

- Assess the additional impact of physical risk on default probabilities

Project 4

Securitization and bank steering

Project 4: Securitization and bank steering

Description of the project: In this project, you are the Chief Financial Officer of a commercial bank.
Your bank delivers consumer credits, mortgages to individuals which require capital, which you are allowed to compute under the advanced approach (IRB-A).
So as to improve your Core Tier 1 ratio, you intend to proceed to a significant risk transfer. As a CFO, you would like to securitize your consumer or mortgages portfolio and find the right balance between:

- reducing the NBI (with the option of introducing excess spread within the securitization so as to enhance the quality of the structuration),
- free capital through the securitization so as to meet your Core Tier 1 Targets, or reduce the level of necessary equity, which you have to remunerate at a high cost of capital.

You will have to pay some fees for the structuration. The funding costs for the bank are quite close to 0.
As a method, you will need to convert the losses you are going to estimate on the pool and tranches. You may take an approach where the rating of the tranche is determined by the expected loss on the tranche (look for Moody's or Scope: https://www.scoperatings.com/ScopeRatingsApi/api/downloadmethodology?id=8f6dc4fe-71e6-4946-bc27-3e84585c0a38).

Project 4

Securitization and bank steering

Project 4: Securitization and bank steering (2/2)

Target: You will have to reply to the following questions within the project:

- what could be an appropriate cost of capital for a bank? Justify.
- On Kaggle, select some portfolio data. Propose some structuration for this portfolio:
  - No excess spread, securitize the whole pool. Propose relevant tranches (with prices) with corresponding rating and prices (take current market prices).
  - Same question, but you may desire to securitize only the "good part" of the portfolio.
  - Same question, but you know authorize yourself to introduce excess spread (this will improve your risk transfer capacity but reduce also more your net NBI).
- Compute your final RWA on the remaining exposure. What is the RWA saving you achieved through an efficient risk transfer.
- Find the optimum (and see how this optimum varies according to your assumptions).
- (Optional) apply your optimisation program on a real bank balance sheet (see results from EBA Stress tests: https://eba.europa.eu/risk-analysis-and-data/eu-wide-stress-testing/2018).

Bouchet and Le Guenedal (2020).
Credit Risk Sensitivity to Carbon Price.
SSRN/Amundi Working Paper.
Link.

Davis and Lo (1999).
Infectious defaults.
Link.

Seo and Wachter (2016).
Do Rare Events Explain CDX Tranche Spreads?
Journal of finance.
Link.