

MFE 409: Financial Risk Management

Problem set 6

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due 6/3 before midnight

You should work with your assigned group but should write up your answer individually. Give the name of your group members in your writeup and post it on CCLE before Monday June 3 at midnight.

1 Risk management and regulation after the 2008 Financial Crisis

Each study group is assigned to a bank as follows and responsible for summarizing their risk management policies. Your group number can be found in the attached list.

Group	Bank
1	Goldman Sachs
2	UBS
3	JP Morgan Chase
4	Citigroup
5	Barclays Capital
6	Morgan Stanley
7	Deutsche Bank
8	Bank of America
9	BNP Paribas
10	Credit Suisse

Download their 2009 and most recent annual reports (10-K for US firms and 20-F or 6-K for foreign firms) from SEC's website (<https://www.sec.gov/edgar/searchedgar/companysearch.htm>). Write an essay describing the approach of the bank is following for risk management. In particular, describe how it computes the various risk measures to respect the Basel regulations.

2 Bootstrapping a CDS curve

1. Recover the hazard rate curve from slide 15 of the notes.
2. Use this hazard rate curve to price a 6-year bond on the same company which pays 3% coupon every 6 month and has face value \$100.

3 Dynamic credit model

Consider 8 categories: AAA, AA, BBB, BB, B, CCC and default. We are interested in constructing a stochastic dynamic model of rating and default in continuous time. For this we will use the information in slide 7 of the notes.

1. Let us call $P(t)$ the 8×8 matrix of transition probability after time t . This means that $P_{ij}(t)$ is the probability of being in category j at date t if the firm is in category i at date 0.
 - (a) What is $P(0)$?
 - (b) What is $P(1)$?
2. Just like we defined the hazard rate has the instantaneous probability of default, we can consider instantaneous transition probability λ_{ij} such that $\lambda_{ij}dt$ is the probability of going from rating i to rating j during an interval dt if $i \neq j$. When $i = j$, we define λ_{ii} as the opposite of the intensity of leaving state i : $\lambda_{ii} = -\sum_{j \neq i} \lambda_{ij}$. We can put all these in a matrix Λ . Express Λ as a function of P and its first derivative.
3. Assuming that Λ is constant over time, derive an expression relating $P(1)$ and Λ .
4. Compute Λ for the values of slide 7.
5. Use this matrix Λ to compute the probabilities of default at horizon 1, 2, 3, 4, 5, 7, and 10 years given each initial rating.
6. Compare your results to slide 6 of the notes. What can explain the similarities and differences?
7. Use this model to price a 6-year bond on a BBB company which pays 3% coupon every 6 month and has face value \$100. Assume that the risk-free interest rate is 0% and recovery is 60%
8. Compute the 3, 5, and 10-year CDS spreads for the same company.

4 Short questions

1. “If you use the Delta approach for a positive Gamma option, you will overestimate the VaR”. Is it true or false? Explain.
2. Assume you are the CEO of a bank and feel that the risk regulations are too constraining. What are ways you could use to take more risk while still respecting the regulation:
 - (a) Under Basel I
 - (b) Under Basel II
3. Why is Basel II blamed for precipitating the financial crisis?