NUS Risk Management Institute
FE5101 – Part 1: Fixed Income and Rate Derivatives (Daniel)
Final Exam Preparation Note

Saturday 23rd November 2019. Check with RMI office to be sure of where and when to arrive there.

The final exam, including a section covering the fixed income and rates portion (first 6 sessions) It is for half of the credit for the first half of the course (i.e. 25% of your grade for the entire course), so please read this note to help prepare and revise.

Format

This half of the exam (Charlie's is separate) has 4 analytical questions consisting of several parts each for which partial credit is available. **Each question has both difficult and easy sub-questions, so it makes a lot of sense to read all of the questions through before attempting any of the harder-to-answer parts.**

The analytical questions involve a scenario giving you market prices for which you are to give calculated and logical explanations supporting your answers. If you're asked to calculate a number, here are the rounding rules for the exam:

Discount factors – to 6 decimal places e.g. 0.986743
Interest rates – to 3 decimal places. E.g. 3.556%
Par amounts – to the nearest 100,000. E.g. $12.4m

Formula and Calculations
The test is open-book. Be sure you know how to apply the formulas we've examined and applied in class.

Scoring

Analytical – The total marks value of each question is shown on the paper. Partial credit is possible. For questions telling you to show calculations or logic, these do not need to involve exhaustively long written explanations, but should explain how you got the answer. There are a couple of sample answers showing the detail in such an answer. If you're not asked to show calculations or explain, you do not have to.

The test scores will form a numerical part of your overall grade which is to be curved to university criteria.

Timing

As time pressure is an element of working in financial markets, the design of the test is to include some time pressure. No one will be allowed to take longer than the allotted time. *It is* *also recommended strongly that if you finish early, that you review your answers, especially to be sure you have understood the questions.*

Calculators

Most of the questions are mathematical and require a calculator. You can and should bring a hand-held calculator. *You cannot use a tablet or laptop.*

Because telephones have multi-functionality, some of which has been used improperly on the tests, we ***disallow the use of hand phone as calculators. No exceptions.***

You are not to share calculators. *If someone asks, the answer is "no." Bring your own calculator.*

Exam Content

Technically you are responsible for all topics we covered in the lectures. The stuff you definitely need to be sure about includes:

- Bonds, price-quoting and yield-to-maturity
- Day-count and frequency equivalents
- Interest accruals
- MacAuley Duration
- Modified Duration
- DV01
- Convexity
- Compounding and de-compounding
- Bills, discount pricing
- Bond Equivalent Yield
- Bootstrapping Zero-coupon Rates
- Inter-bank Deposits
- Money market deposit pricing
- Forward Implied Rates
- Interest Rate Futures
- Interest Rate Swaps applications and pricing and valuation
- Credit premiums / yield spreads
- Repo flows and accruals
- Short Selling bonds
- Carry cost and benefit

Difficulty:

The final is going to be **more difficult than the midterm.** To give you an idea, the midterm last year had similar results to this year, that is with mean score > 80%. But here's what the final results were ***last year*** on my half of the exam for which 75 total was possible:

Mean	45.11	60.1%
Median	49.00	65.3%
StdDev	13.96	18.6%
Mode	52.00	69.3%
High	71.00	94.7%
Low	6.00	8.0%

So, two things to keep in mind about the final:

1. **It's going to be harder**, so make sure you're not preparing for the midterm's level of difficulty, and
2. **You're graded on a curve**, so if you find it difficult in comparison to the midterm, so will others.

Books and Notes

This is an open-book test. But computers and tablets and telephones cannot be used. So make sure you have a hand-held calculator.

Side Paper

Do not bring any paper to the exam. Use the backs of the pages on the exam itself for this.

Exam Question Query or Dispute

Query: You can query a question during the exam for clarification only.

Dispute: If you think a question is unfair or otherwise disputable, indicate which question you wish to dispute by writing its number and the word dispute on the front page of the test, and send me an email identifying the question you have disputed with some explanation.

If we agree that a disputed question is unfair, we will deal with it fairly for the entire group.

We will not entertain disputes during the exam.

Stay in Touch during revision and beyond

Good luck and more importantly, study smart and hard. Make sure you show up at the right venue and on time. Let me know if I can be of any help between now and then.

I'll be teaching the first half of ***Equity Markets and Exotics***, **FE5103**. I hope to see you there in January 2020. Enjoy the holidays until then and good luck on finishing the semester.

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Practice Analytical Questions

1. A bond has a market price of $97.00. It pays a coupon of 6.75% annual actual/actual. It has 5 years remaining to maturity, and a modified duration of 4.1%

   A. If its yield goes up by 1%, what will be its new approximate price? Show your calculation

   Sample answer: $97 x (1-.041) ≈ $93.02

   B. If you buy $10m par of this bond, what will be the approximate dollar DV01? Show your calculation

   Sample answer: $10m x .97 x (.041/100) ≈ $3,977

2. A corporate entity borrows $10m in a 5yr loan from its bank at 3-month Libor + 45bp. They do an IRS to fix the rate on the entire $10m

   A. If they pay fixed in the IRS at 5.35% quarterly actual/360, what is their all-in cost of funds? Show your calculation

   Sample answer: Client pays Libor+45bp, receives Libor, pays 5.35%, so client's all-in cost of funds = 5.80% fixed

   B. If long-term interest rates go higher, does the IRS go into positive or negative mark-to-market value (from the perspective of the corporate borrower)?

3. It is mid-September and today's 3-month spot libor is 4% Act/360. The December Eurodollar (libor) futures contract is priced at 95.75.

   A. What three-month libor does the dec futures contract imply?
   B. If you invest at spot-3 month libor in September and roll over principal plus interest at the December-March implied rate, how much total cash will you have after 6 months?
   C. Based on the above pricing, what should spot 6-month libor be today?

4. If you go short of \$10m par amount of a 3% Act/365 coupon bond whose dirty price is \$10,645,300, at a repo rate of 1.3% daily act/360. What is your daily coupon accrual? What is your daily income on the cash in the repo transaction? Are you a net payer or receiver of "carry" in this short position?

   Try this question: There are numerical answers to this question, and the "carry" is the net cost or benefit of carrying a position. Remember: when you are short a bond you are paying the coupon accrual (as time elapses and interest accrues by the time you return it to the repo counter-party. And you are earning the repo rate on the cash. Assume the full dirty price of the bond is earning the repo rate since this is the cash you receive on delivering the bond to the buyer.