

# SIMON FRASER UNIVERSITY

## Midterm Exam

BUS 492  
Security Analysis

01-1

**Rules for Submitting Exam:** Answers to questions are to be typed, single spaced, of length 1 page **each** for all questions, with 1" margins and type point not to exceed 12. (This assignment is typed in 12 point.) For questions with a) and b) parts, answer both parts. Violations will be subject to deductions. Assignment is due on Mon., Feb. 26, 2001. (Those electing for the no paper option can submit the exam at the end of the term).

### Choose Any 3 of 4 Questions

1. a) Nicholas Bernoulli (1709) was quoted as saying: "I notice that the value of (life annuity) incomes is not correctly calculated by supposing that the return will last as many years as someone is supposed to live". Explain the rationale for Bernoulli's statement.

b) Contrast the solutions to the life annuity valuation problem developed by de Witt, Halley and de Moivre. Be sure to identify the limitations for each of the solutions.

2. "Classical immunization strategies, which explicitly assume parallel yield curve shifts, cannot in theory be expected to provide immunization when the yield curve shifts (are nonparallel)... However, these conditions readily generalize to conditions that insure immunization against any given yield curve shift assumption. Unfortunately, these conditions are not compatible in general. That is, immunization against a given type of shift will often create exposure to other types of shifts, causing immunization to fail as other shifts are realized."

Comment on the implications of this statement for asset and liability management. In your answer, be sure to identify what are "classical immunization strategies" and to explain how the generalized immunization conditions can be used to provide estimates of the degree of immunization risk.

3.a) "For a callable bond, it is inappropriate to use modified duration (and convexity) because the expected cash flow changes as the yield changes....A change in interest rates will affect the price volatility of the noncallable bond component depending on the duration of the noncallable bond. It will also affect the price of the embedded call option."

Explain how the option adjusted duration measure is derived and how this measure can be used in the analysis of callable bonds and mortgage backed securities.

b) An important drawback of "traditional yield spread analysis" is the "failure to take into account future interest rate volatility that would affect the expected cash flow" of a fixed income security. What is option adjusted spread analysis and how does this technique correct for this limitation of traditional yield spread

analysis in the analysis of bonds with embedded option features. What are some important pitfalls of option adjusted spread analysis?

4. a) "Whether the bond market moves up or down, high-convexity portfolios will always outperform low-convexity portfolios of equal duration and yield." Explain the argument supporting this statement. What factors would tend to undermine this position?

b) Explain this statement: "...the larger the convexity on a portfolio, the less the value of the portfolio rises over time if the interest rate remains unchanged." What are the implications of this result for the asset/liability managers seeking to control interest rate risk? Is it true that "the cost of a higher convexity is a lower yield"?