

**SIMON FRASER UNIVERSITY**  
*Faculty of Business Administration*

**Assignment #3**

BUS 417-D100  
Security Analysis

19-2

**Academic Honesty:** This assignment is individual work. Students are required to follow requirements of S10.01 (see class webpage).

**Rules for Submission:** Answer to question in Part I to be typed, single spaced, of maximum length 1 page, with 1" margins and type point not less than 12. (This assignment is typed in 12 point.) Both a) and b) parts have to be contained within one single sided page. There is no page constraint for questions in Part II. Violations will be subject to deductions. Assignments are due in class, at the start of the second lecture in week 8. Be sure to answer all parts of each question.

**PART I. ESSAY QUESTIONS. 20 pts. -- 10 pts. each for a) and b).**

1. 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 and the connection to the classical immunization strategy. What factors would tend to undermine the validity of the statement?

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. How does option adjusted spread analysis correct for the "failure" of traditional yield spread analysis in the valuation of bonds with embedded option features? Once the option adjusted spread has been determined, how can the cost of option be calculated? What are some important pitfalls of using option adjusted spread analysis to value mortgage backed securities and other collateralized debt obligations?

**PART II: NUMERICAL AND MATHEMATICAL QUESTIONS. 20 points – 10 pts. each.**

1. a) Derive the (annualized) Macaulay duration for: a semi-annual zero coupon bond; a semi-annual term annuity; a semi-annual par bond; and, an annual coupon non-par bond. (Hint: Do not use snapshots.)

b) Using the life annuity price formula with arithmetically declining survival rates and an interest rate of 4.9%, solve for the Macaulay duration of a life annuity for a 65 year old person that cannot live beyond 95 years using a 'discrete' derivative.

2. You have money to invest for 5 years in the UK and are trying to determine whether to buy and hold a 5 year par bond with yield of 1.23% or to purchase a **duration equal** portfolio of 2 year par bond with yield of 0.85% and a 10 year par bond with yield of 1.67%. i) Calculate the duration equal weights and the cost of convexity associated with the 2 + 10 year portfolio. ii) Provide an estimate of the market's expectation of the volatility (standard deviation) of interest rates.