Notation and terminology used for Exam FM

The following notation and terminology will apply to the examination questions.

Unless otherwise stated in the examination question, rates are expressed as annual rates. For example, the rate of interest, the rate of discount, the force of interest, the yield rate, and the coupon rate.

The <u>effective rate of interest</u> is denoted by i. The nominal rate of interest payable m times per period is denoted by $i^{(m)}$.

When more than one interest rate is referenced in a question, additional letters such as j may be used to denote the additional interest rates.

The <u>effective rate of discount</u> is denoted by d and is equal to $\dfrac{i}{1+i}$. The nominal rate of discount payable m times per period is denoted by $d^{(m)}$.

The discount factor is denoted by v and is equal to $\dfrac{1}{1+i}$.

<u>Force of interest</u>:

> A constant force of interest is denoted by δ

> A force of interest varying by time is denoted by δ_t

<u>Current Value</u>: The current value, as of a given date, of a set of cash flows is equal to the accumulated value of the cash flows occurring prior to the given date plus the discounted value of the cash flows occurring on or after the given date. The term "present value" is used when all cash flows are discounted and the term "future value" is used when all cash flows are accumulated.

An <u>annuity-immediate</u> is an annuity where the payments are made at the end of each period.

> The present value of an annuity-immediate with n payments of 1, at interest rate i, is denoted by

$$a_{\overline{n}|} \quad \text{or} \quad a_{\overline{n}|i}$$

> The accumulated value of an annuity-immediate with n payments of 1, at interest rate i, is denoted by

$$s_{\overline{n}|} \quad \text{or} \quad s_{\overline{n}|i}$$

An <u>annuity-due</u> is an annuity where the payments are made at the beginning of each period.

> The present value of an annuity-due with n payments of 1, at interest rate i, is denoted by

$$\ddot{a}_{\overline{n}|} \quad \text{or} \quad \ddot{a}_{\overline{n}|i}$$

> The accumulated value of an annuity-due with n payments of 1, at interest rate i, is denoted by

$$\ddot{s}_{\overline{n}|} \quad \text{or} \quad \ddot{s}_{\overline{n}|i}$$

"Dollar-weighted rate of return" means the simple interest approximation to the yield rate.

Unless otherwise stated in the examination question, the redemption value of a bond is equal to the face amount (par value) of the bond.

Unless otherwise stated in the examination question, "duration" means Macaulay duration and "convexity" means modified convexity.

Modified duration = $-\dfrac{P'(i)}{P(i)}$ and Modified convexity = $\dfrac{P''(i)}{P(i)}$, where

$P(i) = \sum_{t=1}^{N} R_t (1+i)^{-t}$, R_t is the cash flow at time t, and i is the effective rate of interest.

Macaulay duration = $\dfrac{\sum_{t=1}^{N} t \times \left[R_t (1+i)^{-t} \right]}{\sum_{t=1}^{N} R_t (1+i)^{-t}}$

Macaulay convexity = $\dfrac{\sum_{t=1}^{N} t^2 \times \left[R_t (1+i)^{-t} \right]}{\sum_{t=1}^{N} R_t (1+i)^{-t}}$.

Forward rate: An *m*-year spot rate that comes into effect *t* years in the future will be referred to as the "*m*-year forward rate, deferred *t* years" or as the "*m*-year forward rate, starting in *t* years".

Simple interest: If an examination question specifies simple interest, the accumulation function for each cash flow is given by $a(t) = 1 + ti$, with t measured from the moment that cash flow occurs.

The term T-Bill may be used to refer to a Treasury Bill.

Basis points: A unit of measure commonly used when referring to interest rates. 100 basis points equals 1.00%, or 0.01 in decimal form. The exam may refer to either "basis points" or "bps".

Refinanced loans: When a loan is refinanced, the outstanding balance of the existing loan is assumed to be calculated using the original loan's interest rate unless specified otherwise.