Ch1 and Ch2 Concepts and Definitions

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1 CH1

1.1 Effective Interest Rate and Discount Rate

Definitions

1. amount of interests from $X_1 = (X_2 - X_1)$
2. effective interest rate for time $[t_1, t_2] = i_{[t_1,t_2]} = \frac{X_2 - X_1}{X_1}$
3. amount of discount from $X_2 = (X_2 - X_1)$
4. effective discount rate for time $[t_1, t_2] = d_{[t_1,t_2]} = \frac{X_2 - X_1}{X_2}$

$(1 + i)(1 - d) = 1$ for compound interest

1.2 Accumulation Functions

Definitions

1. amount function: $A_K(t)$ for principal K dollars
2. accumulation function $a(t)$

note: $A_K(t) = Ka(t)$

1. simple interest accumulation function at rate s: $a(t) = (1 + st)$
2. compound interest accumulation function at rate i: $a(t) = (1 + i)^t$
3. simple discount accumulation function at rate d: $a(t) = \frac{1}{(1-dt)}$
4. compound discount accumulation function at rate d: $a(t) = \frac{1}{(1-d)^t}$

n-th time period: n-1,n

1.3 Discount Function, Discount Factor, PV, NPV

Definitions

1. discount function: $v(t) = \frac{1}{a(t)}$
2. discount factor: $v = \frac{1}{1+i}$
3. PV = present value = value at time 0
4. NPV = net present value

the accumulated value of X (given at t1) at t2 = Xv(t1)a(t2)

1.4 Nominal Interest, Nominal Discount

1. nominal interest rate convertible m times per year = $i^{(m)}$
2. effective m-th interest rate = $i^{(m)}/m$

1. nominal discount rate convertible m times per year = $d^{(m)}$
2. effective m-th discount rate = $d^{(m)}/m$

time rates

1. annually = m = 1
2. semiannually = m =2
3. quarterly = m = 4
4. monthly = m = 12

biannual = every two years; m = 1/2 "convertible, payable or compounded"
converting interest rate

$$(1 + i_{annual}) = (1 + i_m)^m$$

1.5 Constant force of interest and force of interest function

1. #% constant force of interest ($\delta = \#\%$) $= i = e^{\delta} - 1$
2. force of interest is constant, grows at a rate of δ compounded continuously
3. compounded continuously at a rate of δ; a(t) $= e^{\delta t}$

1. force of interest function: $\delta_t = \frac{a'(t)}{a(t)} = \frac{d}{dt}(ln * a(t))$

1.6 Inflation

1. inflation adjusted interest rate = j = purchase power percentage = real interest rate
2. non-inflation adjusted interest rate; stated interest rate = i
3. inflation rate = r

$$1 + j_{[t_1,t_2]} = \frac{1 + i_{[t_1,t_2]}}{1 + r_{[t_1,t_2]}}$$

2 CH2

2.1 Yield and Time-Weighted Yield

1. yield rate; internal rate of return; dollar-weighted yield rate
2. time-weighted yield