

Chapter 11 Formulas

$$P(i) = \sum_{t=1}^n V^t R_t = \sum_{t=1}^n \frac{R_t}{(1+i)^t}$$

$$\text{Duration} \quad \bar{d} = \frac{\sum_{t=1}^n t V^t R_t}{\sum_{t=1}^n V^t R_t}$$

$$\text{Volatility} \quad \bar{V} = \frac{-P'(i)}{P(i)} = V \bar{d}$$

$$\text{Convexity} \quad \bar{C} = \frac{P''(i)}{P(i)} = \frac{\sum_{t=1}^n t(t+1) V^{t+2} R_t}{\sum_{t=1}^n V^t R_t}$$

$$P(i+h) \doteq P(i) \left[1 - h \bar{V} + \frac{h^2}{2} \bar{C} \right]$$

Immunization (Redington) at $i = i_0$

$$P(i_0) = 0 \quad P'(i_0) = 0 \quad \text{and} \quad P''(i_0) > 0$$