



# 利息理论

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# 第一章 利息度量

## 1.1 贴现

$$v = \frac{1}{1+i}$$

## 第二章 等额年金

$$a_{\overline{n}|}, s_{\overline{n}|}$$

$$\ddot{a}_{\overline{n}|}, \ddot{s}_{\overline{n}|}$$

### 2.1 期初期末年金的现值

$$a_{\overline{n}|} = v + v^2 + v^3 + \cdots + v^n$$

$$\ddot{a} = \frac{1-v^n}{d}$$

### 第三章 变额年金

**定义 3.1. 期末付递增年金**

$$(Ia)_{\overline{n}|} = v + 2v^2 + 3v^3 + \cdots + (n-1)v^{n-1} + nv^n$$



注  $(Ia)_{\overline{n}|} = \frac{\ddot{a}_{\overline{n}|} - nv^n}{i}$

## 第四章 收益率

### 定义 4.1. Dollar-Weighted Return For a One-Year Period

Suppose the following information is known: (i) the balance in a fund at the start of the year is  $A$

(ii) for  $0 < t_1 < t_2 < \cdots < t_n < 1$ , the net deposit at time  $t_k$  is amount  $C_k$  (positive for a net deposit, negative for a net withdrawal), and

(iii) the balance in the fund at the end of the year is  $B$  Then the net amount of interest earned by the fund during the year is  $I = B - [A + \sum_{k=1}^n C_k]$ , and the dollar-weighted rate of return earned by the fund for the year is

$$\frac{I}{A + \sum_{k=1}^n C_k (1 - t_k)}$$



注  $(Ia)_{\bar{n}} = \frac{\ddot{a}_{\bar{n}} - nv^n}{i}$

### 定义 4.2. Time-Weighted Return For a One-Year Period

Suppose the following information is known:

(i) the balance in a fund at the start of the year is  $A$

(ii) for  $0 < t_1 < t_2 < \cdots < t_n < 1$ , the net deposit at time  $t_k$  is amount  $C_k$  (positive for a net deposit, negative for a net withdrawal)

(iii) the value of the fund just before the net deposit at time  $t_k$  is  $F_k$ , and

(iv) the balance in the fund at the end of the year is  $B$  The time-weighted return rate earned by the fund for the year is

$$\left[ \frac{F_1}{A} \times \frac{F_2}{F_1 + C_1} \times \frac{F_3}{F_2 + C_2} \times \cdots \times \frac{F_k}{F_{k-1} + C_{k-1}} \times \frac{B}{F_k + C_k} \right] - 1$$



### 4.1 再投资