Lectures 22/23: Expected Present Discounted Values

- EPDV
- Bond Prices
- Stock Prices
EPDV

• Figure 14-3
• $1/(1+i(t))$ : present discounted value of one dollar received next year
• An asset that expects to pay: $d(t)$, $d^e(t+1)$, …. has a EPDV of:

$$V = d(t) + \frac{d^e(t+1)}{(1+i(t))} + \frac{d^e(t+2)}{(1+i(t))(1+i^e(t+1))} + \ldots.$$
Using Present Values

• Two general principles:
  – $V$ rises with an increase in $d^e(t+s)$
  – $V$ falls with an increase in $i^e(t+s)$

$$V = d(t) + \frac{d^e(t+1)}{(1+i(t))} + \frac{d^e(t+2)}{(1+i(t))(1+i^e(t+1))} + \ldots.$$
Examples

\[ V = d(t) + \frac{d^e(t+1)}{(1+i(t))} + \frac{d^e(t+2)}{((1+i(t))(1+i^e(t+1)))} + \ldots \]

If \( i^e(t+s) = i \) and \( d^e(t+s) = d \)

\[ V = d \left[ 1 + \frac{1}{(1+i)} + \frac{1}{(1+i)^2} + \ldots + \frac{1}{(1+i)^{n-1}} \right] \]

\[ V = d \left[ 1 - \frac{1}{(1+i)^n} \right] / \left[ 1 - \frac{1}{(1+i)} \right] \]

Example: Lottery prize of $1m paid in 20 installments of $50k; if \( i=6\% \) =>

\[ V = 50,000 \times \frac{0.688}{0.067} = 608,000 \]

Note: If \( i=0 \) => \( V = \Sigma d = n \times d = 1m \)
Examples

\[ V = d \left[ 1 - \frac{1}{(1+i)^n} \right] / \left[ 1 - \frac{1}{(1+i)} \right] \]

Example: A consol \( n \rightarrow \infty \), payments start next year

\[ V = \frac{d}{(1+i)} \left[ \frac{1}{i/(1+i)} \right] = \frac{d}{i} \]
If \( d = $10 \) and \( i = 0.05 \) \( \Rightarrow \) \( C = $200 \)