9 Extra Problems

Wednesday, October 28, 2020 2:09 PM

$V_0 = V(1-\delta^T)(\delta/(1-\delta)) = V_1\delta + V_2\delta^2 + \dots V_T\delta^T$

$b_1 = V_1 + V_1(1+g) + V_1(1+g)^2 + \dots V_1(1+g)^{T-1}$

$V_0 = PV$

$a = (1-\delta^T)(\delta/(1-\delta))$

$T = 1,\dots,20 \quad V = 100 \quad i = .04 \rightarrow \delta = 1/1.04$

$Va = (1-(1/1.04)^{20})(1/.04)\cdot 100 = 1339$

$V = 1000 \quad r = 5\% \quad T = \text{very big}$

$P_0 = 200 \quad m = 1.5\% \quad P_{10} = 200\cdot 1.015^{10} = 232.10$

depr rate = 2%

$t = 1\dots 10 \quad i = 3\% \quad V_0 = 1000 \quad \delta = (1-.02)/(1+.03)$

PV =

PROBLEM

Megan has two investment options.

Option one involves an upfront cost of 100. At the end of one year it returns $12. Thereafter the annual payment increases by 10% per year, with the last payment in 10 years.

Option two involves an upfront cost of $200 to purchase an asset. At the end of each of the next four years, the asset returns $40. After year 4, she will have no further use for the asset and will sell it, taking payment for the asset at the end of year 5 at its market value of that time. The market value depreciates at 10% per year. Assume Megan's discount rate (safe interest rate) is 5%. Which, if either, should she choose?

$I = (12/1.05) + 12(1.1)/1.05^2 + \dots$

I thought I had it before but now I'm super lost

$1 \rightarrow \delta = 1.1/1.05 \quad V = (12/1.1)(1-(1.1/1.05)^{10})(\delta/(1-\delta)) - 100$

$2 \rightarrow 40(1-(1/1.05)^4)((1/1.05)/(1-1/1.05)) - 200 + \frac{200(.9)^5}{1.05^5}$

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m = inflation rate

$P_{today}\cdot(1+m_1)\cdot(1+m_2)\cdot(1+m_3) = P_3$ years

$r = 3\% \quad \delta = 1/1.03$

t	A	B
0	-10	-10
1	15	-5
2	NA	10
3	NA	15
NPV	4.56	8.30
EANB	2.38	2.23

$NPV_A = -10/1.03^0 + 15/1.03^1$

$NPV_B = -10/1.03^0 + -5/1.03^1 + 10/1.03^2 + 15/1.03^3$

$a_A = 1-(1/1.03)^2\cdot(1/1.03)/(1-1/1.03) \rightarrow EANB = 4.56/1.91 = 2.38$

$a_B = 3.717$

Cost in 2011 was $246,000

Cost in Jan 2020?

Problem for 11-16-2020

Suppose that the forecast period for a project is from year 0 thru year 15. You think there is a 10% chance each year from 15 on will be the last. The real net benefit in year 15 was 225 and grows at 2% per year. The discount rate is 3%.

a) What is the horizon value?

$NB_{15} = 225 \quad g = 2\% \quad r = 3\%$ 10% chance of ending each year

$\underbrace{225}_{15} + (\underbrace{[1.02\cdot .9]/1.03)(225)}_{16} + \underbrace{\left(\frac{1.02\cdot .9}{1.03}\right)^2(225)}_{17}$

$\delta = 1.02\cdot .9/1.03 \rightarrow 225\cdot\sum_0^\infty \delta^T\left(\frac{1}{1.03}\right)^{15} = \left(\frac{1}{1.03}\right)^{15}(225)(\delta/1-\delta)$

$a(\delta,T) = [1-\delta^T](\delta/1-\delta)$

b) Suppose that when the program ends, there will be a clean-up cost of $1000 that must be subtracted to calculate the horizon value. What is the horizon value now?

At end, C = 1000

$t \quad 15 \quad 16 \quad 17 \quad 18 \dots$

P_t

$\sum_{t=0}^{\infty} P_t \frac{1000}{1.03^t} \qquad \sum P_t = 1$

$.1 + .1\sum_1^\infty (.9/1.03)^t \qquad \delta = .9/1.03$

$\frac{1000}{1.03^{15}}\left[.1 + .1\left(\frac{\delta}{1-\delta}\right)\right] = \frac{100}{1.03^{15}}\left[1+\frac{\delta}{1-\delta}\right] = \frac{100}{1.03^{15}}\left[\frac{1}{1-\delta}\right] = 508.55$