EECE 450 Final (Extra) Review

Replacement Challenger-Defender

A new Komatsu haul truck 930 Model costs $200K to purchase and $22.5K to put into service. It will cost $50K to operate & maintain it in its first year. The O&M cost will grow at 8% per year. Use 14 percent as the required rate of return for analysis purposes.

For a lifetime of five years, calc. the Salvage value, EAC Capital, O&M cost for the fifth year, EAC O&M, & EAC Total if the value of the truck depreciates by 32 percent per year.

$$Salvage_5 = \$200K(1-0.32)^5 = \underline{\$29,078.67}$$

$$EAC\ Capital = \frac{\left(222500 - \frac{29078.67136}{1.14^5}\right)}{\left(\frac{1-1.14^{-5}}{0.14}\right)}$$

$$= \$60,411.46$$

$$O\&M\ Cost_5 = \$50K(1+0.08)^4 = \$68024.448$$

$$EAC\ O\&M = \frac{50K\left[\frac{1-\left(\frac{1.08}{1.14}\right)^5}{0.14-0.08}\right]}{\left(\frac{1-1.14^{-5}}{0.14}\right)} = \$57498.65339$$

$$EAC\ Total = 60411.46456 + 57498.65339$$

$$= \$117,910.12$$

Suppose the minimum EAC Total occurs at a lifetime of nine years and its value is $113,582.29

We have another haul truck that is old and is worth $8000 today and has an estimated two years of life until it will be worth $0. It costs $100,000 to operate in the year just ended and this amount is expected to increase by $9000 per year for the next two years.

Recommend whether to continue with (defender) old truck or replace it with the (challenger) Komatsu 930.

↓ Δ Mkt value	Forgone int.	O&M cost	Marg. Cost
$4000	8000(0.14) = $1120	$109,000	$114,120
$4000	$560	$118,000	$122,560

(Marg. cost ↑ ⇒ use Technique I)

Since $113582.29 < $114,120, we recommend replacing the old truck with the Komatsu 930 (best challenger) immediately.

Joint prob. dist^{n} example:

A company expect net annual operating cash flows of:

CF	Prob.
$20K	0.58
$30K	0.42

The investment lifetime is expected to be:

Lifetime (yrs)	Prob.
6	0.62
8	0.38

The required investment is $100K.
Make a recommendation for this project based on the EACF and include your comments about risk. MARR = 11½%.

CF \ Life	6 yrs	8 yrs	
20K	0.3596	0.2204	0.58
30K	0.2604	0.1596	0.42
	0.62	0.38	1

20K, 6yrs

this is assume @ not specified.

$$EACF = 20K + \frac{-100K + 0}{\left(\frac{1 - 1.115^{-6}}{0.115}\right)}$$

$$= -\$3979.12$$

CF \ Life	6yrs	8yrs
20K	$-\$3979.12$	$\$220.10$
30K	$\$6020.88$	$\$10220.10$

$$E(EACF) = 0.3596(-3979.12) + 0.2604(6020.88) + 0.2204(220.10) + 0.1596(10220.10)$$

$$= \$1816.580025$$

$$Var(EACF) = 0.3596(-3979.12)^2 + 0.2604(6020.88)^2 + 0.2204(220.10)^2 + 0.1596(10220.10)^2 - (1816.580025)^2 = *$$

S.D.(EACF) = $\sqrt{*}$ = $5339.89

∴ As a committee, we reject this opportunity. Although the expected EACF is positive, its standard deviation is too large, compared to its mean, and the probability of getting a negative EACF is too large (~36%) for our risk tolerance level.

- A co. has an investment opport. that req. an initial investment of $900K. The annual operating profits before tax will be $200K. After a life of seven years, the assets can salvaged for $90K. The assets will be put into an existing CCA class 43 pool (CCA rate = 30%). Tax rate = [redacted]%. All $ values above are in today's dollars

and there will be inflation of 1.853% annually. The nominal MARR = 9½%.

$$NPV = -900000 \quad \text{① Initial investment}$$

$$+ \frac{900000(0.3)(0.29)}{(0.095+0.3)} \cdot \frac{1+\frac{0.095}{2}}{1.095} \quad \text{② PV(perpet CCATS gained)}$$

$$+ \frac{90000(1.01853)^7}{1.095^7} \quad \text{③ PV(Salvage)}$$

$$- \frac{90000(1.01853)^7(0.3)(0.29)}{0.095+0.3} \cdot \frac{1}{1.095^7}$$

④ PV(perpet. CCATS lost)

$$+ 200000(1.01853)(1-0.29)\left[\frac{1-\left(\frac{1.01853}{1.095}\right)^7}{0.095-0.01853}\right]$$

⑤ PV(net operating CFs after tax)

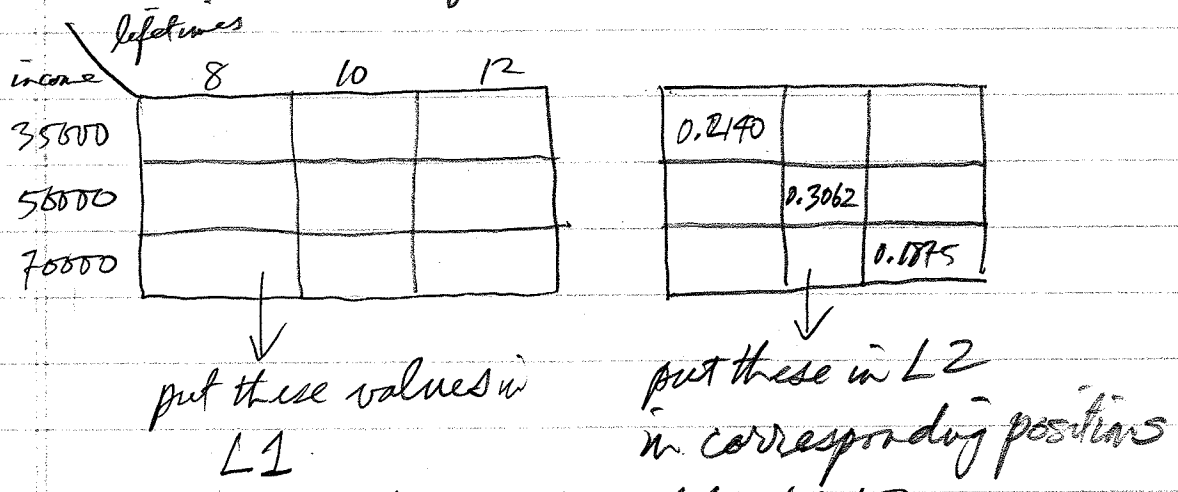
$$= ① -900000$$
$$② +189628.9232$$
$$③ +54220.11726$$
$$④ -11942.15241$$
$$⑤ +751912.0087 = \$83{,}819.6967$$

∴ We recommend accepting this investment because NPV > 0.

	14	15	16	17
10a	2	6	1	15
2p	X	(21)	18	X

EECE 450 Final Review

Chapter	Topics	% Weights
1	Intro.	
2	Costing models; forecasting	
3	TVM - discrete cash flows	10
4	TVM - annuities	
5	NPV	
6	EACF	
7	IRR/MIRR	
8	Incremental techniques	
9	BCR, PBP	
10	Risk assessment & prob. (sensitivity/scenarios, break-even, decision analysis, joint prob. dist.; simulation)	25
11	Depreciation models: SL, SOYD, DB, CCA	30
12	Investment anal. (acquiring/oper. assets) with taxes	
13	Replacement decisions	15
14	Inflation + investment anal.	15
15	Cost of Capital	5



STAT CALC 1-Var Stats L1,L2