Finance 476 Problem Set 2 Explained

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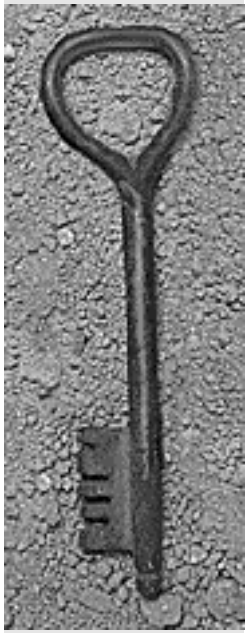
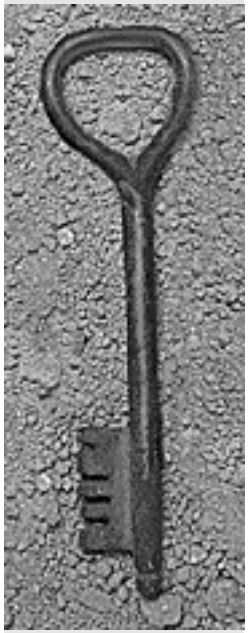


10-2 Cost of Preferred Stock

- Perpetual preferred
- $47.50 issue price
- $3.80 annual dividend
- What is k_p

$$k_p = \frac{D_p}{P_p} = \frac{3.80}{47.50} = .08$$

$$k_p = 8\% \text{ (2 points)}$$



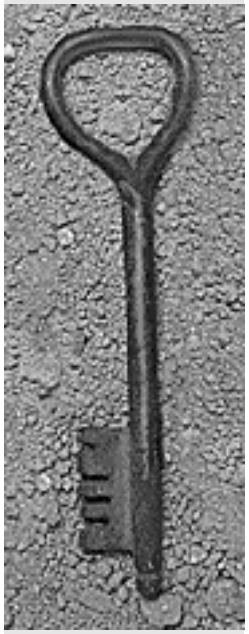
10-6 After-tax Cost of Debt

- 10% coupon
- 12% yield to maturity
- Tax rate is 35%
- What is after-tax cost of debt

$$k_d^{aftertax} = k_d(1-T)$$

$$k_d^{aftertax} = .12(1-.35) = .078$$

$$k_d^{aftertax} = 7.8\%\ (2\ \text{points})$$



10-15 Cost of Common Equity

- EPS for Y00 is $6.60
- EPS for Y95 was $4.42
- Pays 40% of EPS as dividends
- Stock sells for $36 per share

a. What is the growth rate in EPS?

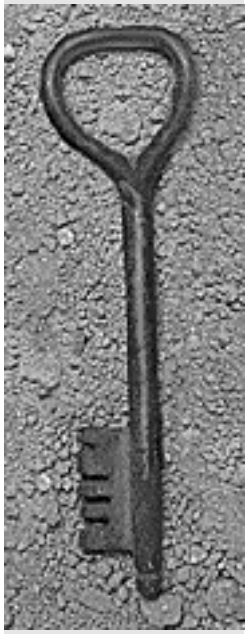
$$\frac{\text{EPS}_{2000}}{\text{EPS}_{1995}} = (1+g)^n$$

$$\frac{\text{EPS}_{2000}}{\text{EPS}_{1995}} = \frac{6.50}{4.42} = 1.4706$$

$$1.4706 = (1+g)^5$$

$$g = 1.4706^{1/5} - 1$$

$$g = .0802 = 8.02\% \text{ (2 points)}$$



10-15 Continued

b. Compute the next expected dividend per share assuming the growth rate continues.

$D_1 = EPS_0(g)(PayoutRate)$

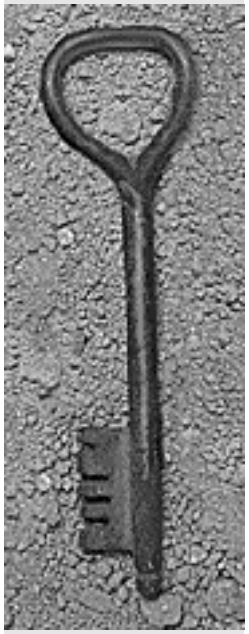
$D_1 = 6.50(1.0802)(.4) = \$2.81 \text{ (2 points)}$

c. What is the cost of retained earnings, k_s ?

$$k_s = \frac{D_1}{P_0} + g$$

$$k_s = \frac{2.81}{36} + .0802 = .1583$$

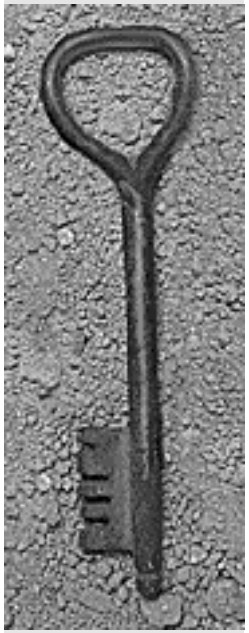
$k_s = 15.83\%$ (2 points)



10-17 Weighted Average Cost of Capital

- 7.8 MM shares common Oustanding
- Market price $65 per share
- Dividend 55% of 2000 EPS
- Constant growth, g a constant
- Nine years growth shown in data
- K_d is 9%
- Tax rate is 40%
- Debt is 104MM and equity is 156MM

Year	EPS
1991	$3.90
1992	$4.21
1993	$4.55
1994	$4.91
1995	$5.31
1996	$5.73
1997	$6.19
1998	$6.68
1999	$7.22
2000	$7.80



10-17 A. Finding K_s

- Use of constant growth model implied in statement "investors expect past trends to continue"
- Nine years of data on EPS given
- First find g (see lecture supplement) then find k_s using the constant growth model.

$$k_s = \frac{D_1}{P_0} + g$$

From the supplement al lecture, and as done in problem 10 - 15 earlier, we know :

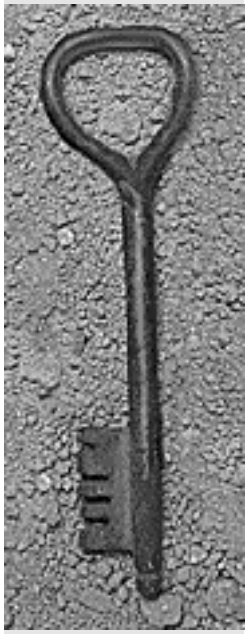
$$g = \left(\frac{EPS_{ending}}{EPS_{beginning}} \right)^{1/n} - 1$$

In this case, this yields :

$$g = \left(\frac{7.80}{3.90} \right)^{1/9} - 1 = .0801$$

Now we can find k_s using original equation above :

$$k_s = \frac{.55(7.80)}{65} + .0801 = .1461 = 14.61\% \text{ (2 points)}$$



10-17 B. Find the WACC

- First find w_d and w_s
- Use weighted average cost of capital equation to find WACC
- Remember to correct k_d for tax rate

Total Investment is 260MM as given.

$$w_d = \frac{\text{Debt}}{\text{Total Investment}} = \frac{104}{260} = 0.4$$

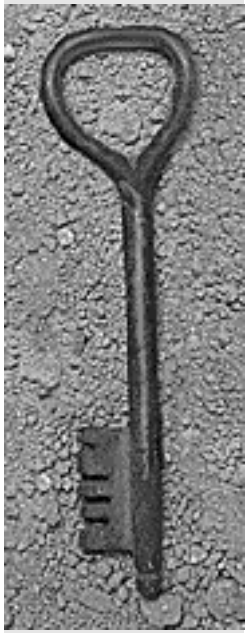
$$w_e = 1 - w_d = 1 - 0.4 = 0.6$$

$$WACC = w_d(1-T)k_d + w_e k_e$$

$$WACC = 0.4(1-0.40)(0.09) + 0.6(.146)$$

$$WACC = 0.0216 + 0.0876 = .1092$$

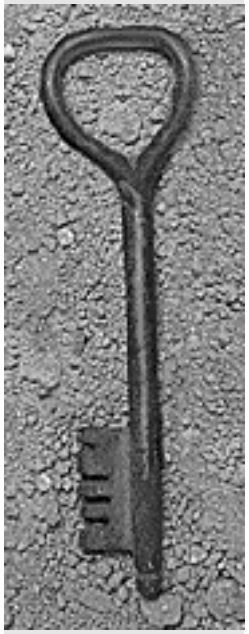
$$WACC = 10.92\%\ (1\,\text{point})$$



11-18 NPV (Parts a and B Only)

- Projects are mutually exclusive (only do one or the other, never both)
- Expected cash flows given:

Year	Expected Net Cash Flow		
	Project A		Project B
0	($300)		($405)
1	($387)		$134
2	($193)		$134
3	($100)		$134
4	$600		$134
5	$600		$134
6	$850		$134
7	($180)		$0



11-18a. NPV Project Selection

- If hurdle rate is 12%, which project is go?

k = 12%, use Table A-1 for PVIF

$$\text{NPV}_\text{A} = \sum_\text{i} \text{CF}_\text{i}(PVIF_{k,i})$$

$$NPV_A = -300 - 387(.8929) - 193(.7972) - 100(.7118) + 600(.6355) + 600(.5674) + 850(.5066) - 180(.4523)$$

$$NPV_A = \$200.34 \text{ (1 point)}$$

For the second case, use table A-2 for the PVIFA

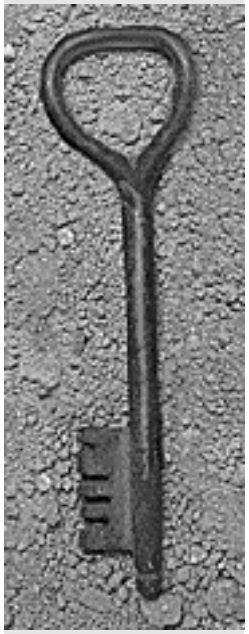
From Finance 475, you know PVIFA is present value factor for an annuity

$$\text{NPV}_\text{B} = INV + CF(PVIFA_{k,i})$$

$$NPV_B = -405 + 134(4.1114)$$

$$NPV_B = \$145.92 \text{ (1 point)}$$

Since $\text{NPV}_\text{A} \rangle \text{NPV}_\text{B}$, Project A is selected.



11-18 a Continued

- Redo if k=18%
- Use same procedure, but look up values for 18%

For $k = 18\%$, evaluate project A as before:

$$NPV_A = -300 - 387(.8475) - 193(.7182) - 100(.6086) + 600(.5158) + 600(.4371) + 850(.3704) - 180(.3139)$$

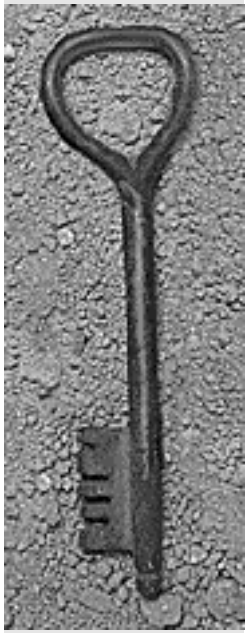
$$NPV_A = \$2.80$$

As with A, recompute the NPV of project B:

$$NPV_B = -405 + 134(3.4976)$$

$$NPV_B = \$63.67$$

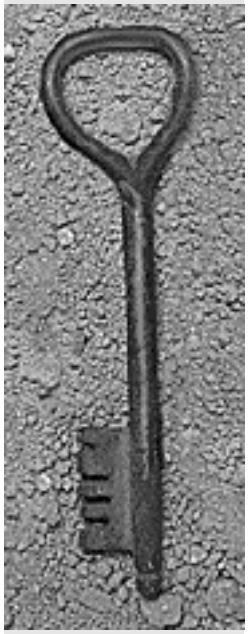
Now, since $NPV_B \rangle NPV_A$, Project B must be selected



11-18b NPV Profiles

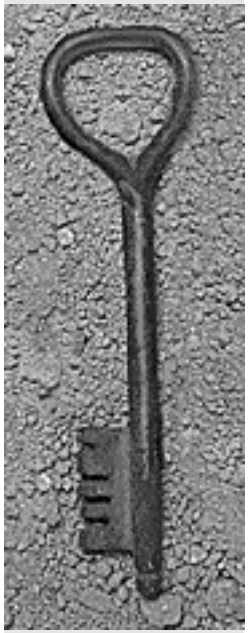
- Compute the NPV profile and find the crossover rate.

Project A NPV Values at varying k						
	Percent Hurdle Rate (k)					
Cash Flow	**0%**	**10%**	**12%**	**18%**	**25%**	**30%**
$ (300)	$ (300)	$ (300)	$ (300)	$ (300)	$ (300)	$ (300)
$ (387)	$ (387)	$ (352)	$ (346)	$ (328)	$ (310)	$ (298)
$ (193)	$ (193)	$ (160)	$ (154)	$ (139)	$ (124)	$ (114)
$ (100)	$ (100)	$ (75)	$ (71)	$ (61)	$ (51)	$ (46)
$ 600	$ 600	$ 410	$ 381	$ 309	$ 246	$ 210
$ 600	$ 600	$ 373	$ 340	$ 262	$ 197	$ 162
$ 850	$ 850	$ 480	$ 431	$ 315	$ 223	$ 176
$ (180)	$ (180)	$ (92)	$ (81)	$ (57)	$ (38)	$ (29)

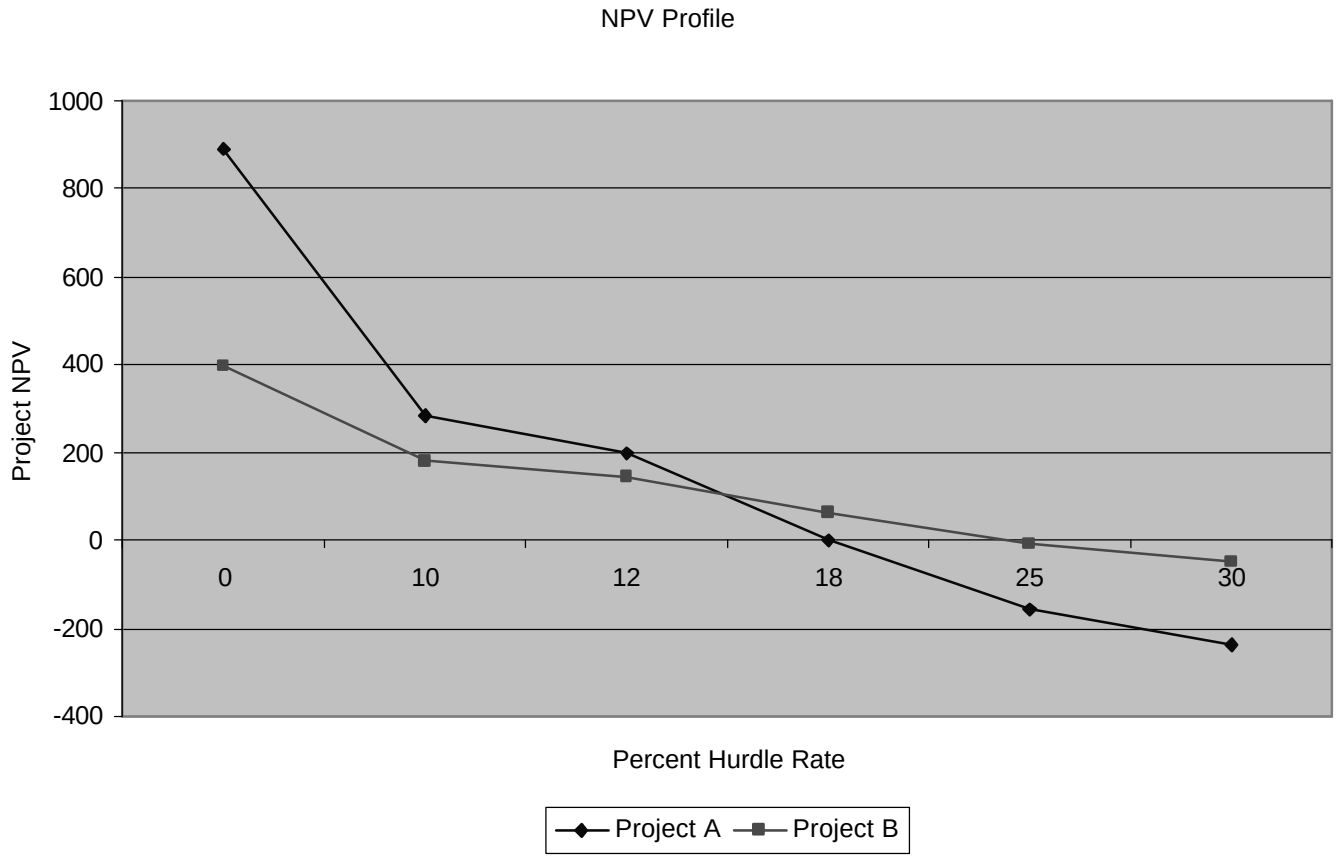


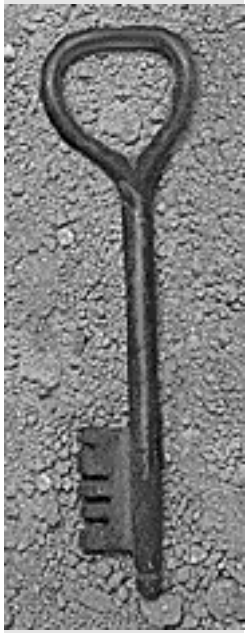
11-18b Continued

Project B						
Cash Flow	**Project Hurdle Rate**					
	0.00%	**10.00%**	**12.00%**	**18.00%**	**25.00%**	**30.00%**
$ (405)	-405	$ (405)	$ (405)	$ (405)	$ (405)	$ (405)
$ 134	134	$ 122	$ 120	$ 114	$ 107	$ 103
$ 134	134	$ 111	$ 107	$ 96	$ 86	$ 79
$ 134	134	$ 101	$ 95	$ 82	$ 69	$ 61
$ 134	134	$ 92	$ 85	$ 69	$ 55	$ 47
$ 134	134	$ 83	$ 76	$ 59	$ 44	$ 36
$ 134	134	$ 76	$ 68	$ 50	$ 35	$ 28
Project NPV	399	178.6049	145.9286	63.67874	-9.50918	-50.872



11-18b NPV Profile Graph





12-8 New Project Analysis

- Base price 108K, modifications 12.5k, salvage value 65K
- 3 year MARCS, change in net working capital of 5.5k
- Savings 44k/year, tax rate 35%

a. What is the cost of the machine in year 0?

C = Purchase Price + Modificati ons + Change in Working Capital

$C = 108 + 12.5 + 5.5 = 126\text{K}$ or \$126,000 (1 point)

b. What is the net operating cash flow in years 1, 2 and 3?

$\text{FCF}_i = EBIT(1-T) + Depn(T) - CapEx - \Delta CurrentAss\ ets$

$FCF_1 = 44000(1-.35) + .33(126000 - 5500)(.35)$

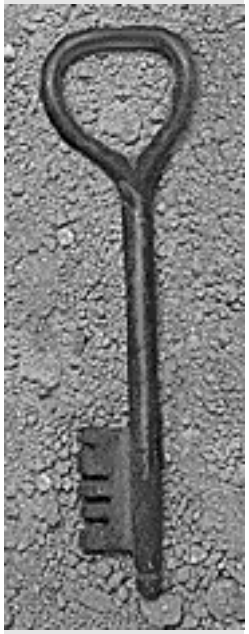
$FCF_1 = \$42{,}518$ (1 point)

$FCF_2 = 44000(1-.35) + .45(126000 - 5500)(.35)$

$FCF_2 = \$47{,}579$ (1 point)

$FCF_3 = 44000(1-.35) + .15(126000 - 5500)(.35)$

$FCF_3 = \$34{,}926$ (1 point)



12-8 Continued

c. What is the terminal cash flow for the project?

$$TCF = Salvage + \Delta WorkingCapital - T(Salvage - (C - \Delta WC)(1 - \sum D_i))$$

$$TCF = 65000 + 5500 - .35(65000 - (126000 - 5500)(1 - .93))$$

$$TCF = \$50,702 \,(1\,\text{point})$$

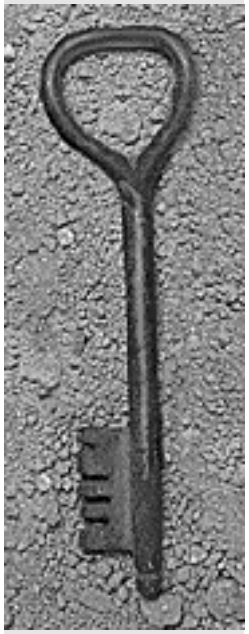
d. If $k_c = 12\%$, is the project a go or no-go?

Find NPV

$$\text{NPV} = \text{-C} + \sum_{n} \text{FCF}_n \,(PVIF\,(n, k_c))$$

$$NPV = -126000 + 42518(.8929) + 47579(.7972) + (34926 + 50702)(.7118)$$

$$NPV = 10,481 > 0 \Rightarrow "go" \,(1\,\text{point})$$



13-1 Projects with Unequal Lives

- Investment of 10K, hurdle rate is 10%
- Project A is 2 years, 6K first year, 8K second
- Project B is 4 years, 4K per year

a. If projects can't be repeated, which project should take, and what is its NPV?

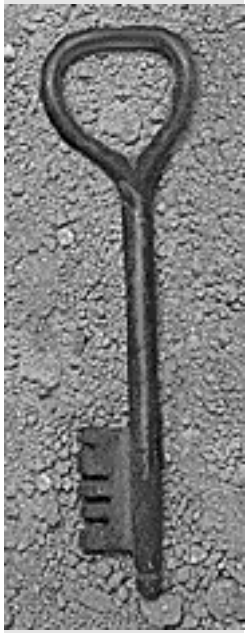
$$\text{NPV}_A = -10000 + 6000(.9091) + 8000(.8264)$$

$$NPV_A = 2065.80$$

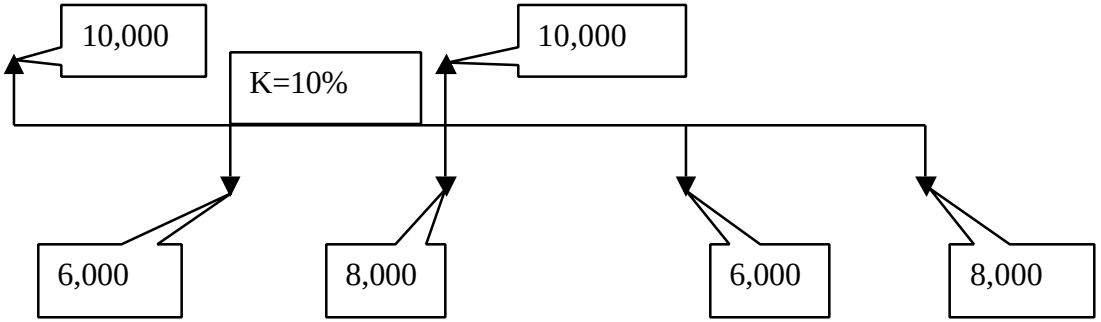
$$NPV_B = -10000 + 4000(3.1699)$$

$$NPV_B = 2679.60$$

$\Rightarrow$ B should be selected



13-1 Continued



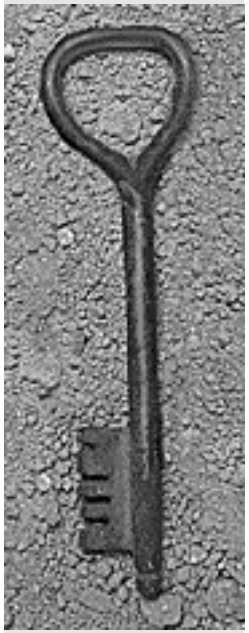
b. If projects can be repeated, what is NPV and which should be accepted?

Since you can repeat them, double the life of the two year project and compre to the 4.

$$NPV_A = -10000 + 6000(.9091) + (8000 - 10000)(.8264) + 6000(.7513) + 8000(.6830)$$

$$NPV_A = \$3{,}773$$

Since $NPV_A > NPV_B \Rightarrow$ *Select* A (1 point)



13-2 Optimal Capital Budget

- WACC is 12% if equity from RE
- If issue, WACC is 12.5%
- All same risk
- Which to pick?

Project	Size	IRR
A	$ 750	14%
B	$ 1,250	14%
C	$ 1,250	13%
D	$ 1,250	13%
E	$ 750	13%
F	$ 750	12%
G	$ 750	12%

Select all projects where IRR>WACC.
This means A through E, for
A total of $5,250,000.00 (1 point)