

162 - CURRENT

Stephen Spear

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Klusky ✓

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Guthrie

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8:45 Fri. Burke

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Globe-Weis  
14

Fri. May 6

1. IPF as a mean per year - a "mean adjusted for the time value of money."

2. IPF as related to  $i + d$

$$n = 10$$

$$d = .1 = \frac{1}{n}$$

$$i = .05$$

$$d + i = .15$$

$$IPF = .130 < d + i$$

Why? Bcs. base falls every year.

3. How much of pmts are int?

$$\cancel{10} \times IPF = 10 \times .130 = 1.30$$

Repay  $P + 30\%$

Int. is  $\frac{.30}{1.30}$  or 23% of all pmts.

4. ~~Quiz.~~  
~~Pay debt~~

4. Generalizing,

$$n \times IPF = \frac{ni}{1 - (1-i)^n} = \text{Total pmts}$$

$$a. 220,810 \div 335,810 = 65.8\%$$

$$c. \text{Int} = \$220,810$$

5. Quiz.  $n = 30$   
 $i = .09$   
 $P = \$115,000$

$$a. \text{What is } a? .097 \times \$115k = 11,194$$

$$b. \text{How much is int?}$$

$$11,194 \times 30 = 335,810$$

1 PF when  $i = .10$

| <u>n</u> | <u><math>\frac{1}{n}</math></u> | <u>i</u> | <u>1PF</u> |
|----------|---------------------------------|----------|------------|
| 1        | 1                               | .1       | 1.1        |
| 2        | .5                              | .1       | .576       |
| 8        | .125                            | .1       | .187       |
| 16       | .0625                           | .1       | .128       |
| 32       | .0313                           | .1       | .105       |
| 64       | .0156                           | .1       | .1002      |
| $\infty$ |                                 |          | .1000 ---  |

$$\frac{.1}{1 - \frac{1}{I}} = \frac{.1}{\frac{I-1}{I}} = \frac{i(I)}{i} = I$$

$$1PF > \frac{1}{n}$$

$$> i$$

$$1PF < \frac{1}{n} + i \quad (n > 1)$$

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$$\text{Pres. Value} = \$400 \frac{1 - 1.06^{-15}}{.06}$$

$$P = \$30,000 \times 1.06^{-15}$$

$$S =$$


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Wed. June 8

Assignment: p. 30 - 43

1. Max  $b = (S(n) - P I^n) \cdot SFF$

Then  $b \cdot FVF = (S(n) - P I^n)$

and  $P I^n + b \cdot FVF = S_n$ , so everything is accounted for.

2. Is consistent with max PVP

$$b = (S I^{-n} - P_0) \cdot I^n \cdot SFF$$

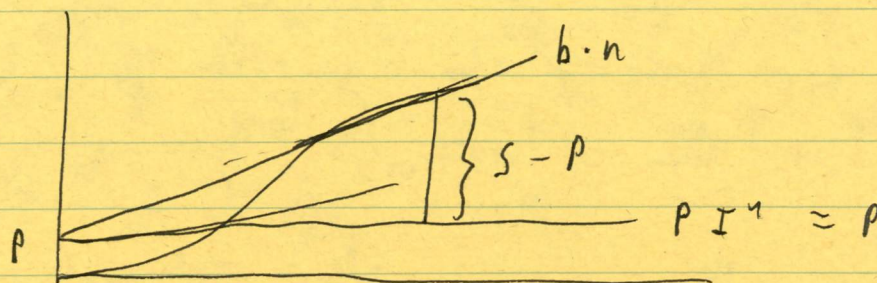
$$I^n \cdot \frac{i}{I^n - 1} = \frac{i}{1 - I^{-n}} = PVF$$

$$b = (S I^{-n} - P_0) \cdot PVF$$

$$PVP = \frac{b}{i} = (S I^{-n} - P_0) \frac{i}{1 - I^{-n}}$$

3. It works at low  $i$ , if  $i \rightarrow 0$ ,  $SFF \rightarrow \frac{1}{n}$

Check on calc., using  $n = 20$



$$\text{Max } \frac{S - P}{n} \text{ or } m.a.i$$

4. It is consistent with flow case, where  $K$  is depreciating.

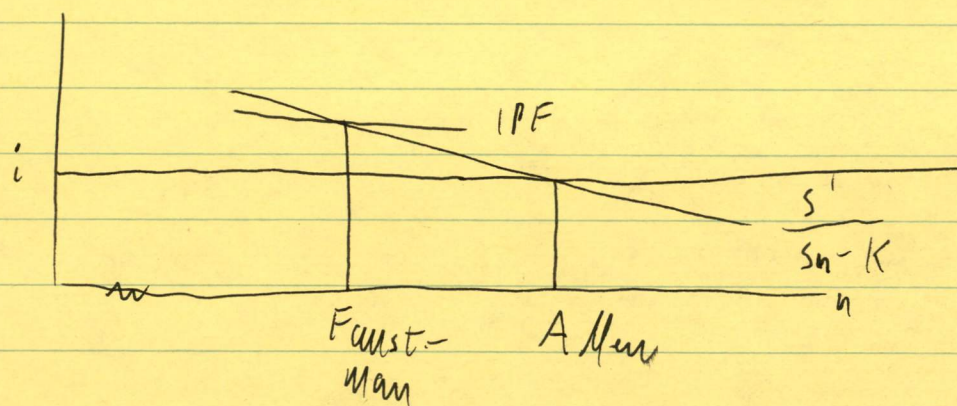
In flow case, salvage value = 0, so only ~~to tree case~~

MC of time is rent (or goodwill, or surplus) of  $G_2$

In tree case, there are two MCs of time.

If Timmer ruined tree, so  $S = 0$ , ~~Allen~~ Allen solution says walk away.

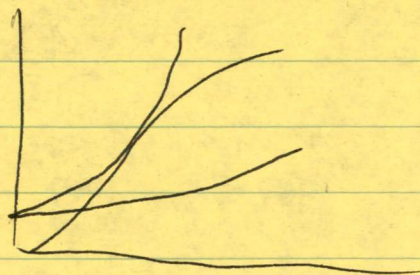
5. To make operational, use Mgrd approach.  
p. 37 \* Put under microscope.



p. 38 shows this solution is where ~~FA~~

$$S' = Si + b$$

b. Another wrong solution:  $\text{Max } i$



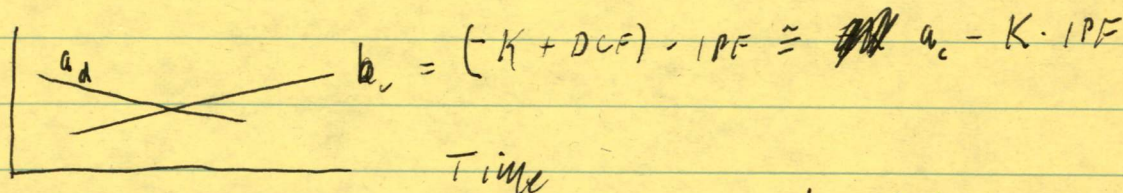
Mon June 5

1 PM

Soracco

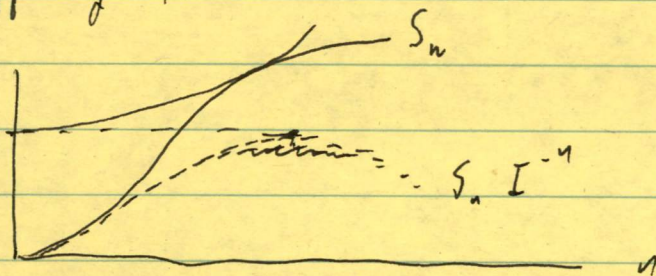
Finding opt. u

1. ~~Qualitative~~ Depreciating  $K$   
Cash flow - yielding, diminishing.  
No salvage value



$b = \text{Boiler value}$

2. Appreciating  $K$



Alt. solutions and their bugs, fallacies.

A. Max  $S_n$   
 $i = 0$

$b = 0$

$K$  has no effect on solution.

B. Max  $S_n I^{-\eta}$

$b = 0$

(There are 7 Site Classes)

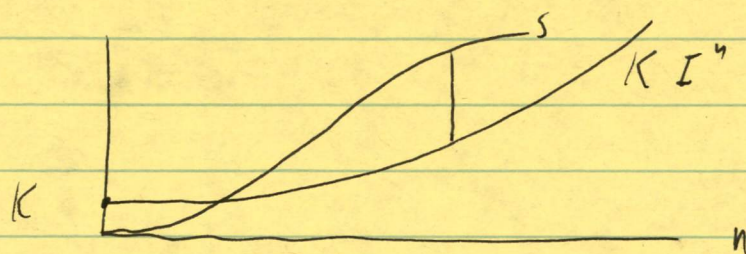
$K$  has no effect

$PV > K$ , unexplained

Is based on  $G_1$  only - neglects all later

Generations. Has bias toward longevity

c.  $\text{Max } S - KI^{\eta} \quad (\text{or } SI^{\eta} - K)$



$\frac{\Delta S}{S} < i$ , because  $\frac{\Delta(KI^{\eta})}{KI^{\eta}} = i$ ;  $\Delta KI^{\eta} = \Delta S$

So this is at higher  $n$  than  $\text{max } SI^{\eta}$ , which is too slow.

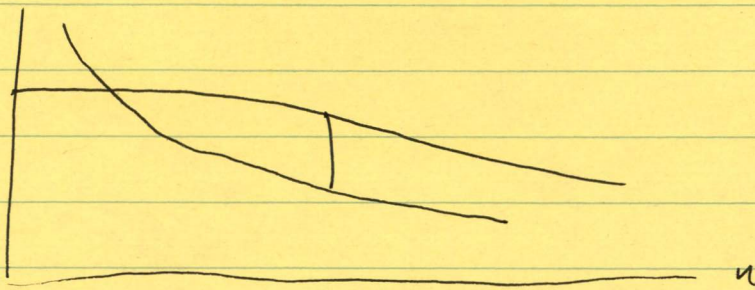
d. Max. annualized value of  $S - KI^{\eta}$

$$\text{Max } (S - KI^{\eta}) \frac{i}{I^{\eta} - 1} = (SI^{\eta} - K) \frac{i}{1 - I^{-\eta}}$$

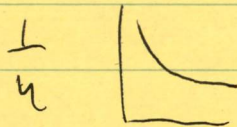
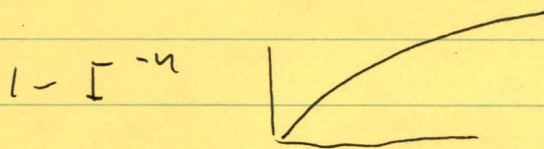
1. Is consistent with our basic principle

2.

1.



$$\frac{A}{n} \frac{1 - I^{-n}}{i} = \frac{A}{i} \frac{1 - I^{-n}}{n}$$

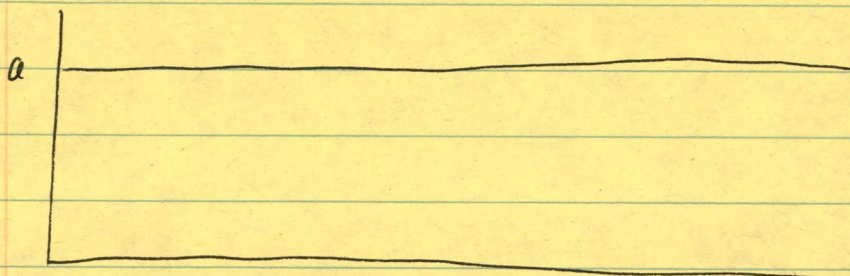


$$\text{Max} \quad \frac{1}{n} \left[ A \frac{1 - I^{-n}}{i} - K \right]$$

If  $i = 0$ :

$$\text{Max} \quad \frac{1}{n} [An - K] = A - \frac{K}{n} \quad \stackrel{?}{=} \text{"MER"}$$

$$PV = a \frac{1 - (I+d)^{-n}}{i+d}$$



What is deprec. in yr. 1? It ~~must~~ be greater when  $d$  is greater - but my simple method wd. make it smaller!

$$\text{Int. in yr. 1} = Pi$$

$$Pi = a(1 - (I+d)^{-n}) \times \frac{i}{i+d}$$

$$\begin{aligned} \frac{Pi}{a} &= \frac{Pi}{a \frac{1 - (I+d)^{-n}}{i+d}} = \frac{Pi}{a \frac{i+d}{1 - (I+d)^{-n}}} \\ &= \frac{i[1 - (I+d)^{-n}]}{i+d} \end{aligned}$$

$$\frac{R}{a} = 1 - \frac{i}{i+d} [1 - (I+d)^{-n}]$$

What is  $K$ ?

(E.g. a repertoire =  
stock of songs)

What is rent?

When c.f. varies over  $n$  yrs. Discount all to 0, mult. by IPF.

When c.f. varies over  $\infty$  yrs. do same. Then ground rent =  $V_i$

$$V_i = \frac{a_i}{i-q} > a$$

Problem:  $\infty$  is not bound by indivisible  $K$  outlay

New uniball

Ec. 182

"Capl. budgeting"  
~~= input~~ principle  
~~IRA~~

~~Dim. sets~~

~~a. To props~~  
~~b. To scale~~

Cap. Thr. as macro allegory

Some land buyers use hi  $i$  on  $G_1$ , and  
lower  $i$  on  $R_n$ .

Because they see  $R_n$  as a place to park slack  
money, for later.

$$PV = a_1 \frac{1 - 1.1^{-25}}{.1} + R_n 1.03^{-25}$$

$$\approx a_1 \times 9.09 + R_n \times .48$$

Credit card.

Nominal 18% means compounded daily.

$$\left(1 + \frac{.18}{365}\right)^{365} = 1.197$$

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$$\left(1 + \frac{x}{365}\right)^{365} = 1.18$$

$$1 + \frac{x}{365} = 1.18^{\frac{1}{365}} = \frac{1.00045}{\cancel{.99531}}$$

$$x = 365 \left( \cancel{.99531 - 1} \right) (.00045)$$

$$= .16555$$

$$\ln 1.18 = .16551$$

by Nabar, 162.

~~Week~~ Sequence (later, divide into weeks)

1. ~~P I P O. Logs~~

B. ~~Perps. - DCF + cost~~

1a. ~~Steady annual flow~~

2a. ~~Flow w. periodic replant.~~

3a. ~~Determining opt. pl.~~

3. ~~Rising annual flow, steadily~~

4. ~~" flow w. periodic replant.~~

~~Effect on opt. pl. (progressive obsolescence)~~

P: Fallacies

Fallacy: Fiber-optic cable is cheaper than copper,  $\therefore$  less K - invt.

a. It is more land - intensive. Uses less labor.

b. Consider whole system - requires new trans set-up (Gekker)

Fallacy: Learning a technique, & making problems fit it.

The weakness of grad. students - "have model, with toward."

In  $\$$  life, problems come first - you must select technique to fit the problem, not v.v.

Which is best way to budget K?

Quiz:

1)  $\left(\frac{10}{2}\right)^{\frac{1}{12}} - 1$  vs.  $\left(\frac{20}{4}\right)^{\frac{1}{13}} - 1$  ?  
". ".  
.145 .132

2) when <sup>high val is</sup> ~~land~~ worth 6

$\left(\frac{16}{8}\right)^{\frac{1}{12}} - 1 = .059$   $\left(\frac{26}{12}\right)^{\frac{1}{13}} = .076$

2. Thus, use of i standardizes for different u.  
No need to assume a value for D (or R).

Max i has problems, too.

- uses  $i > mkt$

- requires exog. value for fixed factor

3. Best - max a.

$$a = (-K_0 + F I^{-\eta}) \cdot IPF = F \cdot SFF - K_0 \cdot IPF$$

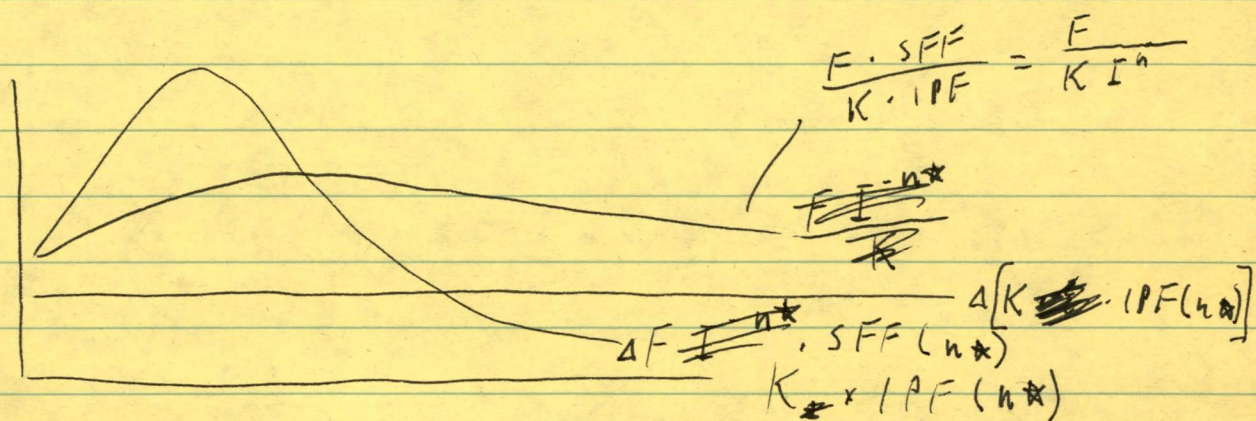
Only prob is finding <sup>opt.</sup> i, but can do that by

choosing u to max a it self.

4. Note complexity of optimizing. Go by steps

Step 1: For given  $K$  &  $F$ , find opt.  $n$   
 " 2. Change  $K$  &  $F$ , find new opt.  $n$

5.



$$\left( \frac{\frac{i}{I^n - 1}}{\frac{i}{1 - I^{-n}}} = \frac{1 - I^{-n}}{I^n - 1} = \frac{I^{-n} (I^n - 1)}{I^n - 1} = I^{-n} \right)$$

6. Avoid max  $\frac{F I^{-n}}{K}$ . Give simple examples.

4. Avoid fallacy of max B/C ratio - i.e.

$$\frac{F I^{-\eta}}{K}$$

a) Is not same as max  $F I^{-\eta} - K$

b) ~~Abstracts~~ Abstracts from cost of fixed factor -  
e.g. ~~a dam site~~, the wine vat