

Ad. 289-0 Current

Syllabus

- 9/27 1. Edel, Ch. 4. "Growth, Polln. & Social Costs"
10/2 Blank
- 10/4 2. Schultz. Ch. 2, Nat. Accts
- 10/9 3. Sch. Ch. 6, Ec. Growth.
- 10/11 4. Edel, Ch. 1, "E. Systems. Growth or Change" (Pressures for growth)
- 10/16 5. B & M Ch. 1, "Security & Growth"
Grunber ~~Burrows~~ report
- 10/18 5. B & M Ch. 2, "Contemp. Views on Social Aspects of Nat. Res."
Althaus ~~Grunber~~ Rpt.
- 10/23 7 B & M Ch. 3, "Mathematical models on Security"
Burrows, ~~Althaus~~ report.
Edel Ch. 3, "Instrs. of Food Supply"
Hatchett Rpt.
- 10/25 8 B & M Ch. 4 "Cons. Movement"
Grunber Burrows again.
- 10/30 9. B & M Ch. 5, "Basic Security Models"
Althaus Burrows

10. Ch. 6. "Mitigations of Scarcity in Complex Ecs."
~~Burrows~~ Altman

11. Mitigation of Capl. Scarcity
Wicksell, Lectures
" Value, K & Rent

12. Mitigation of Capl. Scarcity, II
~~AG, FELL~~
Newman, Eng. Ec. Analysis

13. Mitigation of Capl. Scarcity, III
M. G., FELL
Sheaf on turnover

14. Midterm, Nov. 15

15 Nov. 20 No assignment
Give out Taxes + Jobs

16 Nov. 22.

Newman, Eng. Ec. Anal.

Chap. 4 Cash Flow Equivalents

Chap. 10 Deprec

Chap. 11 Income Taxes

Chap. 12 Replacement Anal.

Chap. 17 Rationing Capl.

17 Nov. 27 Same + FELL + TISTOC
and sheets on turnover, and Cap. Thy. done again.

19 Nov. 29

Final

Bt M, Ch. 5, Basic Security Models.
Mon. Oct. 30, '78

~~For all security~~

Mr. Burrows will speak.

p. 101, suggest that Combs. press point that res. scarcity limits growth.

✓ Some do. But others see more clearly that scarcity shapes growth, growth must adapt to limits of earth, and policies that forestall adaptation are noxious.

They use method of abstraction of effects. The effects are:

- Social synergy
- Crowding
- Deple. or "extinction"

Method is laborious & pedantic, pompous & stigid.
Try to grasp essentials, regardless.

No safety-valve doctrine. Assume full empl. of labor.
Thus also abstract from much reality of settling new lands.
Quest for conceptual purity and isolation of effects leads away from reality -- a fault of many individual crsts. often attributed by Rad. - Inst. to regulators, and v.v.

However abused, the method of abstraction does

greatly increase power of understanding, when rightly used.

It may also be true that it is more often abused than not.

p. 102 Focus on output/labor. Treacherous.

Cycles ruled out. (Yet they are affected by resource prices.)

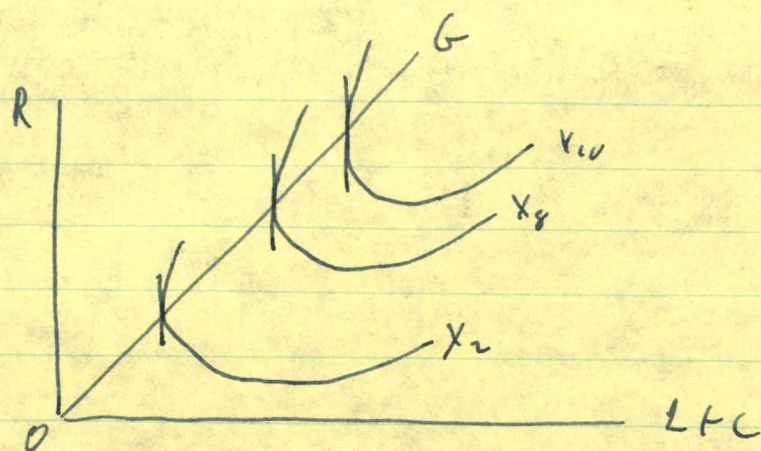
They begin, E-1, (Egn. 1) w. 2 factors, $R + (L + C)$
Vble. propns; but const. rets to scale. (Only the
vble. propns. shd. be relevant; but he does this to
abstract out a point, later.)

I. "Utopian" - Cornucopian - case.

(Device of taking imaginary condition + calling it a
"case" is common, but usually laborious + Treacherous.)
(Pedants call it "rigor"; it may rather be mannered,
stilted, make-believe.)

R is free; $MP = 0$. $AP(L+C) = \max$.
(Be sure all understand this.)

Max $AP(L+C)$ means min. $AC(L+C)$.



Exp. path linear, reflects const. rets to scale, they say. Actually, it only says i.g. $= k$ for all output. By rets. to scale here they mean to whole ec.; Δq costs due to using more land wd. be direct. of scale. $\neq$

$$\frac{MP_R}{MP_{(L+C)}} = 0 = k \text{ along } OG.$$

MP_R might be > 0 , (e.g., due to Hamiltonian policy) and still exp. path be linear, so long as $MP_R = k$

Main pt: since R is not only limit on growth - there are negative returns to $\Delta L R$. (but this excludes xptn. cost, lacking from B+M.)

$\neq$ But note, Isoquants are not scalar, so output can be doing anything, as far as they tell. But if R are homog., Iso.s are going to be scalar.

Cobb-Doug. fn. is const. rets, & it says a small L & C wd. still use all res.

This is only half true. Cobb-Doug. rets. do keep falling — but never to 0.

$$P = k A^{\alpha} B^{\beta}$$

Let A be const, then

$$P = K B^{\beta}$$



~~Note: C-D also screwy for small values.~~
~~E.g. if A , const. = 0,~~

$$\frac{dP}{dB} = K \beta B^{\beta-1} = \frac{K \beta}{B^{1-\beta}} > 0 \quad \dots \text{never tops out}$$

$$\frac{d^2P}{dB^2} = K \beta (\beta-1) B^{\beta-2} < 0 \quad (\beta < 1)$$

$$AP_A = \frac{k A^{\alpha} B^{\beta}}{A^{\alpha}} = k B^{\beta} A^{\alpha-1} \dots \text{always rising w. } B$$

~~$AP/AP = \dots$~~

$$P = k A^{\alpha} B^{\beta}$$

$$AP_A = \frac{P}{A} = k B^{\beta} A^{\alpha-1}$$

$$MP_A = \frac{dP}{dA} = k B^{\beta} \alpha A^{\alpha-1}$$

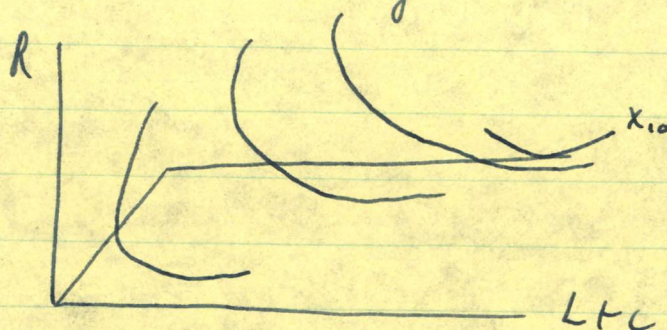
$$\frac{MP_A}{AP_A} = \alpha$$

But α is const. thru-out -- and < 1 .

Thus, Cobb-Doug. is always in Stage II.

However, as to scale, if $\alpha + \beta = 1$ there are const. rets. to scale.

2. Malthusian Scarcity



X_{10} is highest output reachable. $MP(L+C) = 0$.

3. Ricardian scarcity. i.e. no more make-believe.

$R \equiv$ res. in standard acres.

$R_u \equiv$ res. in physical acres, as they are.

E.g. 250 bad acres = 100 standard acres.

p. 109 Res. are ^{of lower quality} deteriorating when output ~~is lower~~ of fixed unit of $(L+C)$ is lower. So, they say, are $MP + AP$ of $L+C$.

(But this is ambiguous. They begin by saying $250 R_u = 100 R$, evidently converting physical acres to standard acres. But then it is $L+C$ they hold const., so poorer acres are those that yield less surplus. This is more correct.

E.g.

- E-n. Wn. wheat farmers. Less yield/acre, but hi yield/(LL+C).

- Citrus at top end of wt. line. Agrib. -- hi i.g. -- but hi yield.

- Hammer & Muntzell re Ozarks. Cheap land, higher labor, same yields.

- Ak. oil. Cheap at source, large xptn. cost. Note, also, large mkt. impact. Agrib. res. can be hi volume.

(Also note regulatory fallacy, treating hi vol. $\equiv$ low cost. The fallacy of identification ... "half truths were live by.")

- Ripening suburban land. Draw graph from Clawson book.

Draw moral from graphs: any land when used heavily yields less surplus/(LL+C). There are many margins; and perhaps no land that is 100% "unused". B+M say 90% of Ak unused, but natives don't think so.

- Bunce on land of hi capacity v. hi efficiency.

p. 109 Resource conversion fr. The standard acre idea again.

Take one inferior acre, beef it up w. $L + C$.

$$R = f_r(R_u, L_r + C_r)$$

so that it is "equivalent". They don't say w.r.t. what: gross yield; net rent (after $L_r + C_r$). Not clear which, here -- maybe clarify later. p. 111, they say the unit of R_u may be ignored.

(Note analogy to labor theory of value. Better land's superiority is measured by unit of $L + C$ it can subst. for, rather than in terms of products.)

p. 110

Divides $L + C$ in 2 parts.

a. $L_r + C_r$ required to bring unhomog. acres up to standard acres

b. $L_s + C_s$ reqd. to use the standard acres.

(Trouble is, you may never ~~be~~ bring some res. up to quality of standard acres.)

Wed., Nov. 8, '78.

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I. Review & Outline from last time

$$A. l.g. = \frac{L + C}{P}$$

1. Efficiency vs. Capacity of land.

It is not just the land but the use of land, that affects this. At the barley-cotton margin, barley has higher eff.; ctu. has higher capacity.

But at the upper margin of ctu. the cotton-grape margin, ctu. has higher eff. & lower capacity.

2. Intensification always means jumping from higher eff. to higher capacity -- & higher rent.
i.e. as you change land use at the margins.

3. The margins keep moving, too, due to:

- a. Δ pop. and migration
- b. Δ capability to use land.
 - i. Due to ΔK
 - ii. Due to new tech.

These effects can go either way, depend on relative prices.

- iii. Public works

iv. Spillovers from settlement, inc & dev. of nearby linked land. Regional synergism. Contr. & use of xptn. networks for trade.

c. ~~the~~ Land becomes more productive. It captures gains of synergy.

This is apart from redistr. effect. At a const. level of ~~the~~ real wages & int., rent & l.v. rise. Free lunch principle.

There are { Some e.g. are specific. E.g., learn to grow maize on land that before was only good for barley.
b, ii { E.g. learn to get machinery into fields previously too wet to use

Some are from regional multi. Policy benefits. Migration to a new resource base creates local multi.

B & M model makes social synergy pretty abstract. But it has a measure in Δ l.v.

B. Developing mgt. land is more K-req.,
in the mix of L + C.

Due to deteriorating track, box can now take longer turnaround time. Nat. ave. has risen to 22 days. (L.A. Times, Nov. 6, '78.) before returned to owner.

If cut this to 11 days, is same as having twice as many cars.

Loads delivered in year = No. of cars $\times$ turnarounds/yr.
 Turnarounds/yr. = $\frac{1}{\text{period of trip}}$, e.g. $\frac{1}{22/365} = \frac{365}{22} = 16.6$ deliveries/yr.

This is easier to visualize bec. a trip is handling a concrete thing, a boxcar.

~~Factors~~

To speed up trips, put a daily charge on boxcars.
 To discourage yard-sitting, charge rent for space.

Demunage.

To slow down trips, charge for loading, + unloading.

Factors lengthening trip time are:

- longer distances
 - inter city
 - intra-city

- bad track, slow speeds
- hi overtime ~~cost~~ switching crew costs

Starting, a Cross-sectional approach.

Begin w. retail or indl. inventory, $i = 0$

Period from purchase to sale is n mos.
Value-added is ignored.

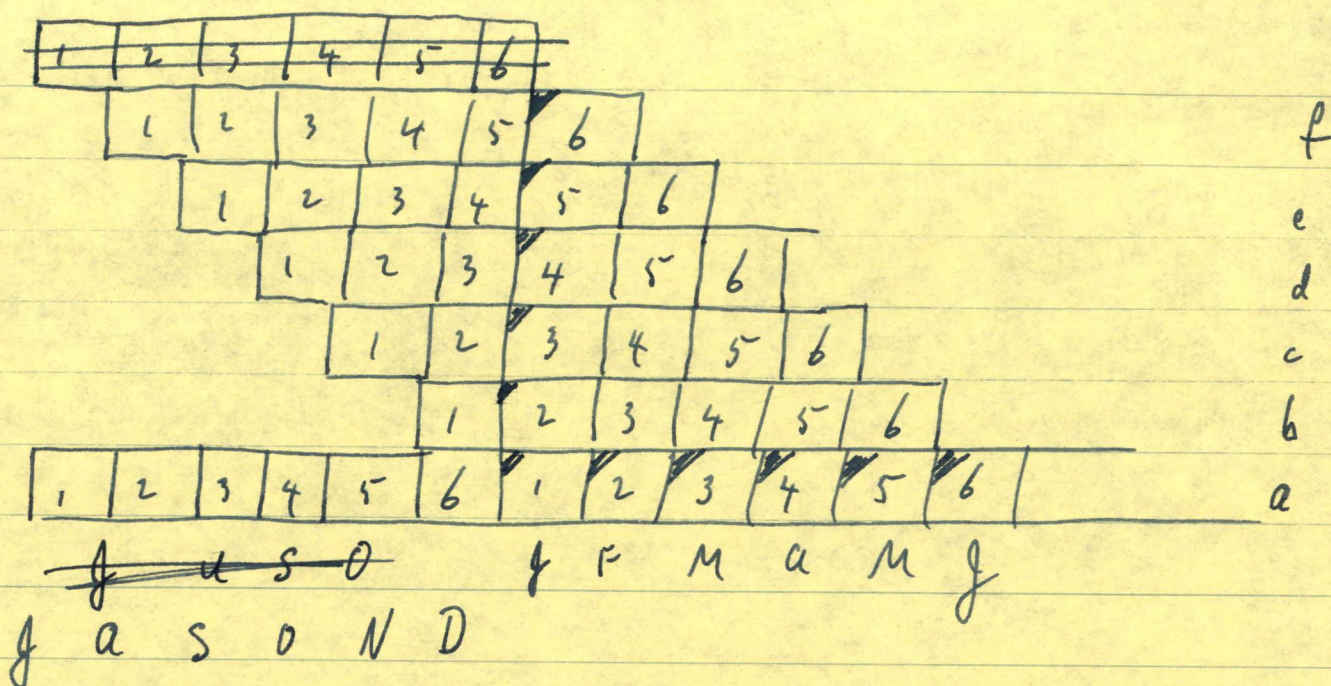
How many times does the K in inventory turn over in one mo? It turns over 1 time in n mos. $\therefore$ in 1 mo. it must turn over $1/n$ times

How much invy. fund is needed to have given flow of sales? Fund on hand must $= n \times \text{flow}$, or

$$\frac{\text{Stock}}{\text{Flow}} = n$$

$$\frac{\text{Flow}}{\text{Stock}} = \frac{1}{n} = \text{Turnover} = \frac{1}{6} \text{ per mo., } 2 \text{ per yr.}$$

The fund required at any one time for a steady flow is the fund required times the no. of mos. it is required, or $K_0 \times \text{pd.}$ The $K_0 \times \text{Pd.}$ product, visually a horizontal sequence, is stacked vertically. (This is something, like changing the order of integration.)



~~But~~

Here, cells are all same size; assuming, no value-added.

In fact, they grow as value is added - by accrued int. + rent, plus custodial labor, plus feed for livestock, water for crops, etc. So 6 is larger than 1-5, and flow/fund is i. larger than simple $1/n$.

Wicksell shows us how cells grow from adding comp. interest.

<u>Cell No</u>	<u>Value</u>
1	$(1+i)^{-6}$
2	$(1+i)^{-5}$
3	$(1+i)^{-4}$
4	$(1+i)^{-3}$
5	$(1+i)^{-2}$
6	$(1+i)^{-1}$

$$\text{Value} = \frac{1 - (1+i)^{-6}}{i}$$

$$(S = a \frac{1-r^n}{1-r})$$

$$r = (1+i)^{-1}$$

$$n = 6$$

$$a = (1+i)^{-1}$$

$$S = \frac{1 - (1+i)^{-6}}{(1+i)(1 - (1+i)^{-1})} = \frac{1 - (1+i)^{-6}}{1+i-1} = \frac{1 - (1+i)^{-6}}{i}$$

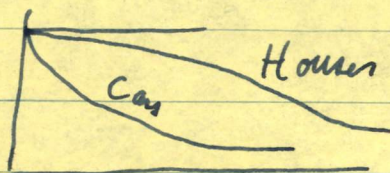
Mon. Nov. 21, '78

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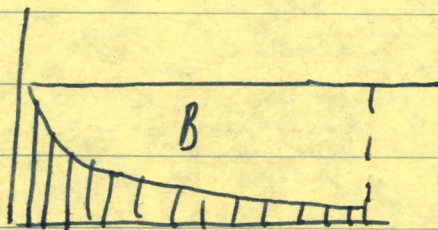
A. Deprec. + Cap. recovery.

1. Normally, these are the same, in eq.

2. Deprec. declines more than in prop. to $1/n$
Deprec. path changes, from concave up to
concave down.



3. In normalized eq., flow/fund ratio is
same as replacement/K.

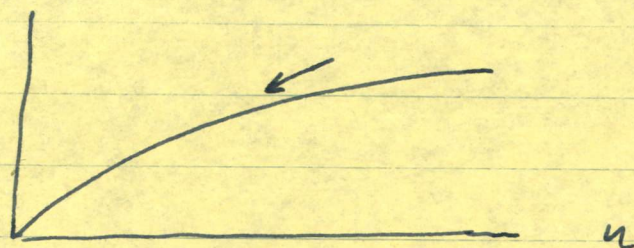


Area = Σ deprec.

Area = I required for one new house

Area + B = total service flow.

3. House deprec. follows PV curve backwards.



4. The amt of deprec. from n houses is enough to build one house each yr.

5. The value of n houses is:

$$K = \frac{1}{i} \left[n - \frac{1 - e^{-in}}{i} \right]$$

6. Turnover is deprec./K

$$= \frac{\frac{1 - e^{-in}}{i}}{\frac{1}{i} n - \frac{1 - e^{-in}}{i}} = \frac{1}{\frac{n}{(1 - e^{-in})} - \frac{1}{i}}$$

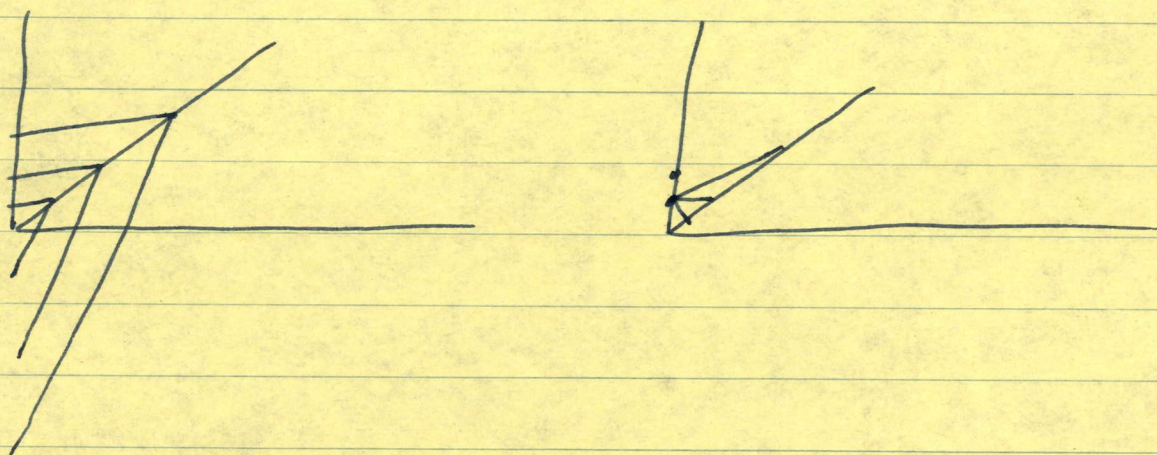
a decreasing fn. of n

B. So, substituting labor means replacing faster.

1. Garbage can e.g.
infrequent pickups, more cans.

2. Car. movement has resisted.

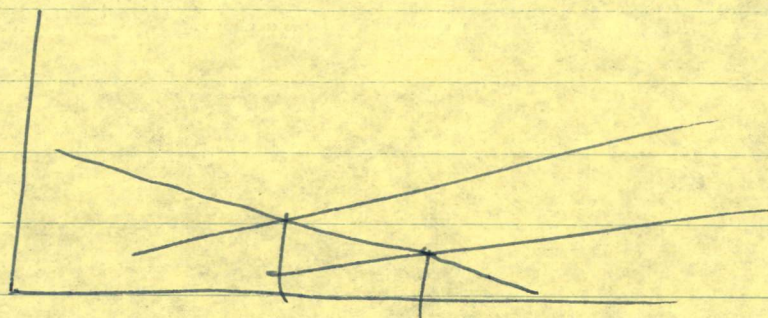
C. Hi int. + low w.r. mean faster replint.



D. Hi land rents mean faster replint.

E. Newnam on Replint. Pol. is weak.

But look at effect of prop. tax on Defenders & Challengers.



Need for neutral instrs. Remove instr. bias, and mt. can solve problems.

Use K intensively.

Neutral tax. Avoid intertemp. bias.

Avoid pref. treatment that causes substitu.

(Profits aren't falling, but reported taxable ones are - new IBM study, FTC data vs. D of Comm. data.)

Make jobs w/o use of more land. If don't, will be big count. demand for chewing up resources.

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Mon. Nov. 20, '78

Review Cap. Thy.

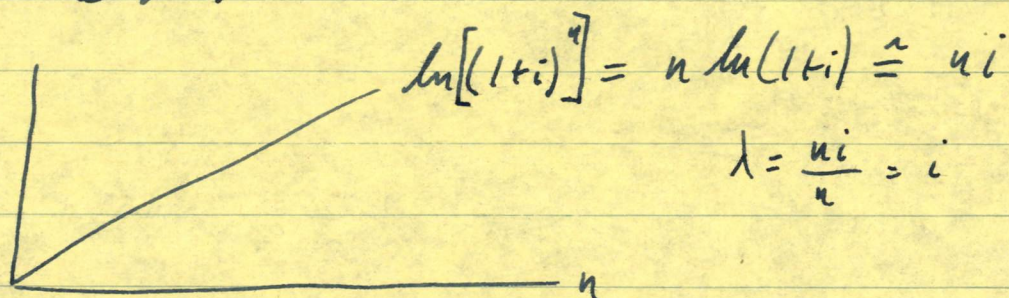
1. $(1+i) + i(1+i) = (1+i)^2$ etc.

2. Doubling time.

$$(1+i)^n = 2$$

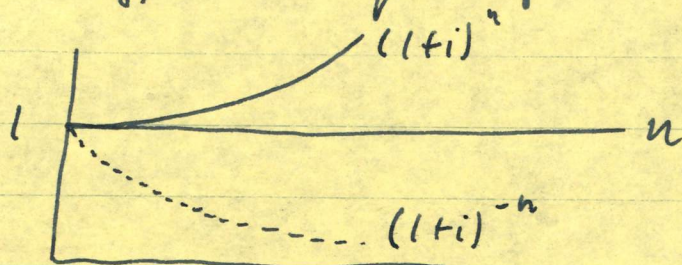
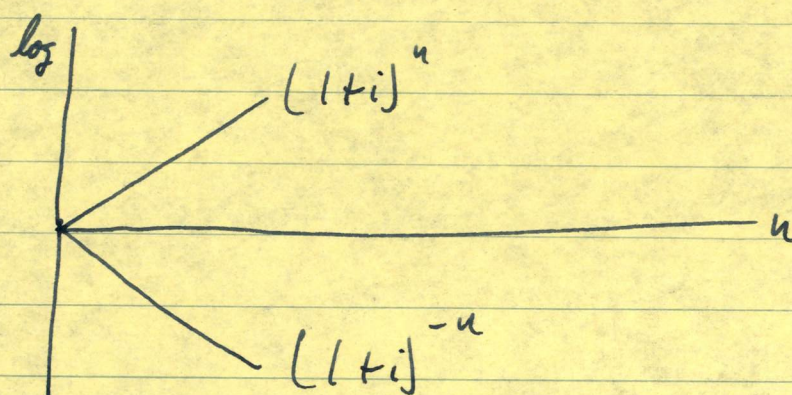
$$n = \frac{\ln 2}{\ln(1+i)} \approx \frac{.72}{i}$$

3. Graphing the $\ln$.



alt., use semi-log scale, graph f_n .

4. Discounting, reverse of compounding



5. Capitalization

$$a = P \cdot i$$

$$P = \frac{a}{i}$$

perpetual flows

6 PV, finite flows

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

b) Alternatively found as sum of series.

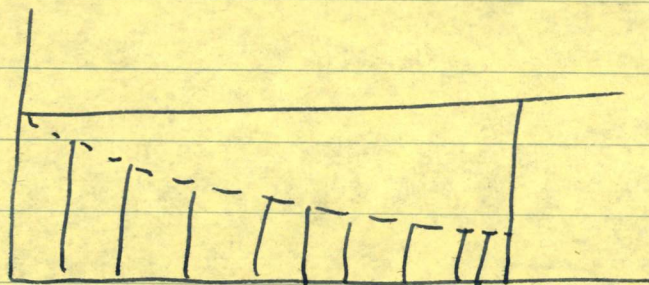
$$S = a \frac{1 - r^n}{1 - r}$$

$$a = (1+i)^{-1}$$

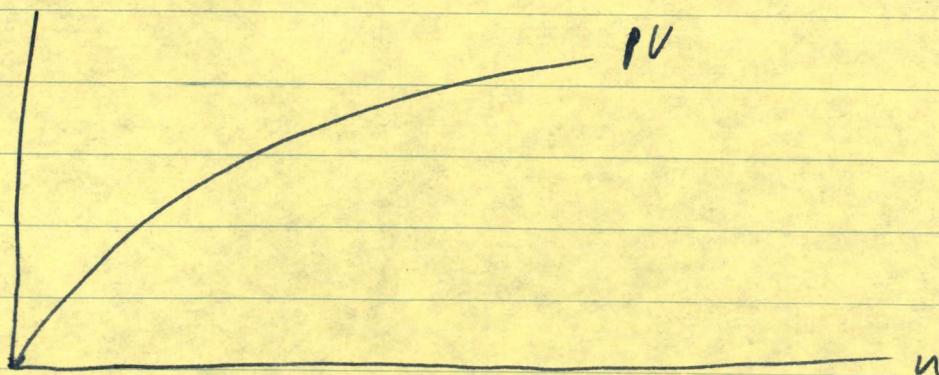
$$r = (1+i)^{-1}$$

$$S = \frac{1}{(1+i)} \frac{1 - (1+i)^{-n}}{1 - \frac{1}{1+i}} = \frac{1 - (1+i)^{-n}}{i}$$

c)



d)



1. 3 other formulae

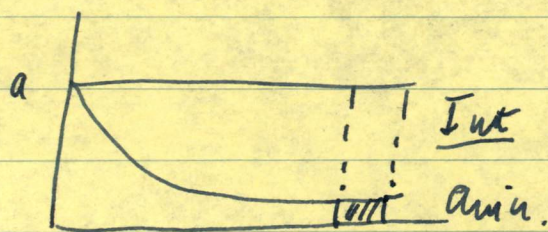
$$a. \quad PV(1+i)^n = \frac{(1+i)^n - 1}{i} = FV$$

$$b. \quad \frac{1}{PV} = \frac{i}{1 - (1+i)^{-n}} = \text{crf, installment factor, etc.}$$

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

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

Important in amortization + depreciation.
Helps us know how much is removed or
rolled over each yr.



$$a(n) = a(1+i)^{-n} = PV$$

$$Int = a[1 - (1+i)^{-n}] = PV \cdot i$$

$$e^{-in\pi i} = e^{-in\pi} e^i$$

-5-

8. Use of $e^{i\pi}$ for $(1+i)^n$

9. Factor proportions.

Wed, Nov. 29

Final, Admin. 289-0

1. How does an economy sub. labor for K ?
2. Many environmentalists ^{want} ~~argue~~ for laws against capital that wears out fast. Can you reconcile this with ~~the~~ the case for faster recovery of capital?
3. List some ~~business~~ instl. biases vs. ~~cost full comp~~ using labor. Does it matter, since labor produces K ?
4. How can we have growth w/o ~~resource~~ w/in limits of the earth?

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