C 386
Class notes

VIII. Problem of dynamic instability

A. Cobweb theorem

B. A gnrl problem of land devmt, w/o benefit of wtr law or instns.

1. Lag of supramgnl areas to Δd demand.

Inertia

Deliberate restrictive policies ... mktg orders etc.

New areas lead: no mapy to maintain; & utilities want to grab

2. Non-coordn. of complements; non-synchronizn.

Lag of ~~settlement~~ pvt. improvement behind public devmt. Land specn.

Elsewhere, lag of public improvement behind pvt.

or local behind Fed; or power behind wtr. Etc. ad inf.

Half-developed land all over, ∴

2½. Non-coordn. of different "voltage levels"; of trunks & twigs, mains & branches.

3. Scattered settlement

Bring service to a few, thereby to all

Result of 1-3: Long gestation

3½. Rising l.v., projected, generates careless optimism; hi l.v., realized, cause economizing ... use some intensively let rest go.

4. Process of growth feeds on itself ... for a while. Nationally; but esply regionally. Is a national multiplier; also a regional one, w. invmt. the "export indy." Bank expansion, too. Invmt in p.w., excessive. ... also creates false use of p.w.

5. Regional compn; & logrolling. Worsens problem of gestation.

Racing.

6. Center revives. Scared by compn.

7. Rénouement: Start more than we can finish. Lack capital, lack demand. Nation's capth. sprawled out, knocked out, unfinished projects.

Wtr devmt has been part of process, all along. Adds force to it, where wtr esply impt.

C. Contributions of wtr law.

1. Blocks best adjustments, forces ~~secondary devmt~~ obsolescence ~~in centers~~ in established producing areas.

~~Large investments~~

Law is sticky. Requires large force to overcome. Fine mgnl adjustments blocked.

Also, more valuable wtrs are, tighter people grab. ... & this cumulates.

2. Permits remote imports

Cannonsville; Owens, Colo., & Feather Rivers.

Principle of dfte. disadvantage. Fight at boundaries.

Analogies – utilities compete for fringe territory

U.S. & Russia do same

Water differs from other utilities, not purely sold for pvt. profit.

So w. wtr, cities & I.Ds. try capture wtr; w. power, utilities capture cities.

3. Remote imports are large

a. Ecs. of scale

b. Large service area necy for pol. support. Hence famous city limits of L.A., etc.

c. Scattered service area, but claim enough wtr for undeveloped lands

d. Exploit political conjuncture.

4. Large projects are slow

Ecs. of scale thus largely lost.

Competing regions stimulated

5. Racing ... approp. doctrine, & assoc. prescriptive mores.

6. Logrolling.

7. Result: too much public, not enough pvt. Vs. Galbraith

p. 47, Tucson paper (1st draft)

Return to lag of pvt. behind public.

Friday, May 5, 1961

VI. Interjurisdictional Relations.

A. Interstate lawsuits

Laramie R., Wyo. v. Colo., 1922. Common ~~system~~ policy; prior approp.
Wyo. won (enjoined a new Colo. diversion)
Ark. R., Ks. v. Colo., 1907 & 1943, "Equitable apportionment"

The gnrl. rule. Every case different. (Ks. tried stop established diversions)
No fixed allocation. Open for later review. Flexible.
Neither State completely right. Ks. can't impose ripn. idea on Colo; Colo. can't have all wtr.
Incentive to plaintiff States: retain some ripn. rts! (If Calif., had abandoned rip. system, cd. have gotten most of Colo. R.!)
Wis. v. Illinois, limited diversions from L. Mich.

B. Interstate barriers.

Colo. won't let you divert there for use outside, 1917. (But can't stop prior established diversions)
Other States mostly reciprocal.
Power export can be banned by State law.

C. Compacts

Treaties, requiring consent of Congress. Supreme Ct. encourages.
Colo. Compact first to allocate wtr, 1922. Now many do.
List in Widmer.
Freezes in perp., bad.

C. Compacts (cont.)

None on Mo., too many States. Several on tribs, tho:

Belle Fourche, Wyo - S.D., 1943

Yellowstone, Wyo - Mont - N.D., 1950

Cheyenne, Wyo - S.D. 1950 (unperfected as of '56) ~~but~~

S. Platte, Colo - Nebr. 1923

Supr. Ct. decrees on Laramie & N. Platte (Nebr. v. Wyo., 1935 & 1945) 1922-40

D. ~~Basin Commissions~~

Federal participation, direct.

Is almost necessary to develop interstate streams

Compact method limited --- can't set up interstate District w. tax power, etc. Pt. of N.Y. Authority, furthest extension of this.

Incodel flopped,

Bases: 1. Navigation, from commerce clause. Very potent. Legal basis for complete control.

2. Property. Fed. domain, never alienated

3. ~~St~~ Establish wks under State law, like anyone, only moreso, bcs comes bearing gifts, can set conditions.

E. Forms of Fed. partn.

1. ~~Single~~ agencies. Single function, conflicting, overlapping

So few streams are adequately developed by one agency

1, Agencies. (cont.)

A.E. Navign, flood.
B.R. Irrn
FPC Power
HEW Pollution
SCS Soil, small wtrsheds.

E.g. of single agency full devmt: coastal non-navigable fr irrn, Sta Ynez.

2. Inter-agency Basin Comm.
Pick-Sloan on Mo, 1944 Flood Control Act
a. BR determines irrn capacs of resrs, main & trib.
b. AE " flood control capac., & navign, main
c, Both dev. power

1944 also put AE much deeper into flood control, & this means we supply too, many areas.

Agency answer to Valley Authority. Also on AWR, Columbia, etc.

3. Valley Authority
Full use of navign power

7. Fed. - State relations

1. Between States, U.S. is necessary & all-powerful, whenever Congress chooses to exercise power. To dev. wtr involves condemning land, firming pwr, wheeling pwr ... U.S. can do. U.S. v. Twin City Pwr Co., 1956. Overriding navigation servitude.

2. Inside States

Can proceed on alternative bases. Western pressure is toward filing under State law, complying therewith. But Congress attaches conditions, much grief. Worse, U.S. sometimes proceeds on proprietary (Pelton etc.) or commerce basis (Gerlach). Justice Dept. pushes position 1877 act was not irrevocable but permissive, so U.S. can claim reserved wtrs.

3. Recent issues

a) Acreage limitation
320 acres + cousins etc.
Ivanhoe case. Years in litigation. 1958. "Trustee" theory down but not out.
Exceptions: Big Thompson, etc.

A.E. projects

Underground water
Engle formula

State projects

b.) Contracts or wtr rights?

Still to be resolved.

State courts still trying to apply Trustee theory "appurtenant" idea becomes very imptnt. Wtr cannot be removed by State or Fed. (& if they must continue to deliver it, are in poor position even to charge for it.)

c.) Reserved lands

Pelton Dam case. "Reserved" lands not part of public domain. Power site withdrawals; Indian reservations; military resns.

3, c, (cont.)

Effect was to remove Pelton site, & like ones, from State jurisdiction to Fed. And surly encourage Fed. agencies to try to est. rts. on bases stronger than State law, e.g. military, commerce, welfare. Ironically, Eisen. Ad. & PG&E were victors

d) Parallel efforts.

Sta. Mgts. Here, U.S. w. limitless funds simply was in position to pursue State law to logical conclusion.

Indian claims

Hawthorne Base, deep wells, U.S. mil. resn.

Gerlach & Krug cases

e) ~~M~~ Counter-effort:

W & Rts Settlement Act.

Congress to quitclaim wtr rts on reservations. To declare navigation subsidiary use, & foreswear nat. defense priorities.

Wd. keep U.S. out of wtr dcmts, too, ~~+~~ — at least pull its teeth on interstate streams.. Give ripns on navigable streams control of pwr.

Ebasco loves it. Never passed, but all western Republicans are for it. (Me. Republicans vs. it.)

G. Internat. Relations. Supremacy clause. treaties are supreme law of the land.

1. U.S.

Treaty basis. ~~No~~ Bargaining. Reconciling competing domestic interests often is larger part of job.

Canada's influence gen'ly good. Forced stop stalling on Columbia (by Kitimat) & St. Lawrence. Also in Gt. Lakes compact, Ontario & Quebec, as separate States

Joint construction on R. Grande; ~~Colorado~~ & St. Lawrence. coordn on Columbia.

R. Grande, costs shared pro rata with Mex. ... U.S. gets c. 59%

Treaty said to sacrifice Calif. to Texas, (one cause perhaps of later stringency on Colo.)

2. Elsewhere

Unlimited possibilities for internat reconciliation (or strife)

a. Moselle, Ger. - French coopn.

b. Central Eur.

Coastal plains vs. river basins. Plains have won, so rivers all internal. Pierce iron curtain — Elbe & Danube, one each way.

Navign. much more imptnt than here.

c. USSR - giant power & navign. & irrn. project, but all continent-bound

d. Jordan

d ¼. Evors
d ½. Nile
e. Indus

f. Zambesi

g. Many inside one country, but to be developed w. foreign funds by World Bank, etc.

Lever for ec. devmt.

TVA the model. Is an error. Too much public, inadequate incentives for pvt. complements. Tenn. Basin has not developed commensurately w. new opps. Tenn. States are not fastest-growing ones.

Western States are. It is their instns. most worth emulating (altho. ~~not slavishly, or. caution~~, bcs also are source of extreme instability in ec. devmt.)

Briefly. Fed. contribution to wtr devmt. Evaluation.

(+)

1. Full devmt
2. Demonstrated elast. demand for pwr
3. Wholesale - retail division
4. Multi-purpose
5. Power pools
6. Valley-wide integration
7. Retain flexibility.

(−)

1. Discourage local ent. & legal reform
2. Unearned windfalls to local landholders
3. Demands of distrib. equity (of a sort) lead to overdevmt
   agency rivalries help
4. Prefer starts to completions
   Interest free, time forgotten
5. ancient shibboleths: irrn, navign, flood control

Midterm Exam, Agricultural Economics, 386

April 12, 1961

1. State the positions of the Green and Blue Books on the use of secondary benefits in project justification, including the rationale of the respective positions.

   Explain the distinction of technological and pecuniary external economies.

2. What is the effect of exploiting virgin fertility on the intensive and extensive margins of land use?

3. The interest rates of lenders and borrowers are separated by the marketing costs charged by financial institutions. How does this affect the allocation of durable assets?

4. What considerations led us to postulate a scalloped long run average cost curve where small individual wells are an alternative to public water supply? In this case, show graphically how to determine the choice between the two methods of supply.

   a. Beginning from nothing

   b. Beginning with some private wells already sunk.

5. Explain the argument for marginal cost pricing in decreasing cost operations.

   Does the argument apply to water supply development?

Feel rushed? Frustrated? Overtaxed? Not enough time? Then try this for a comeback. Hand in your exam, then take 24 hours to write another one, using your notes and any sources you wish. You will get a grade on both efforts. The second is optional.

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3. ~~What is the obstacle is the effect of lenders~~

The interest rate of lenders and borrowers are separated by the marketing costs charged by financial institutions. How does this affect the allocation of durable assets? ~~What are alternatives to be~~

4. What considerations led us to postulate a scalloped long run average cost curve where small individual wells are ~~being~~ an alternative to ~~replaced by~~ public water supply? In this case, show graphically how to determine the choice between the two methods of supply.

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2dry hens

A. Green book

Δ net inc. in activities stemming from or induced by the project.
Assuming resources have alternative uses. Use "w & w/o project" approach.
alternative uses are mgnl., – uses of project ress, i.e. Loss of 2dry
benefits in non-project uses offsets gain in project uses.
Upshot – from national public viewpt., no weight to 2dry hen. p. 10

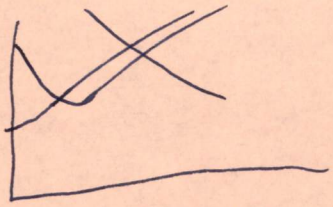
B. Blue book

p. 126 Consider technological spillovers, as legit. 2dry benefits. But pecuniary spillovers are purely distributional, due to price changes. (They miss the net pecuniary gain from ΔQ) (To see it clearest, assume no −ΔP)
(They cite 1950 edn. of Green Bk., which fact may confuse some students. They misquote it, too, p. 127.)

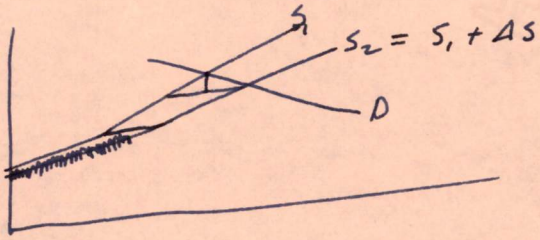
Competition in processing industries will compete away any gains there, unless is mnpy. (they do not recognize supply inelasticities unless caused by mnpy – a weakness.) Gain is passed on to consumer. (nor do they recognize undersused capacity, either built or buildable.) ~~[redacted]~~ Increment in production shd. be valued at $\frac{P_1 + P_2}{2}$. (They miss out on the left of the 2 golden triangles) (They also miss out on the new producer surplus, but in this case that happens to be ok bec producer surplus of 2d stage is already counted in c. s. of 1st stage.)

(They overlook the value added as wheat moves on. The Δd wheat supply creates new supramgnl opps. for adding value to wheat.)
(They use an e.g. that misses this, by keeping wheat price at

Stage 1



Stage 2



same level as they move on.)

(Perhaps the confusion harks back to welfare economics, with its distinction of techn. & "pecuniary" external ecs. The "pecuniary" suggests price changes are the crux, while in fact Δ output is.)

Δ r.e. values --- they treat as separate category. p. 128 Partly "pecuniary", which they equate with redistributive, due to higher demand w/o higher use (or use potentiality?). All Δ resid. r.e. value is pec. Some commercial is "real". But offset by losses elsewhere.

2dry ben. idea rests on middleman profit, above cost. But if there is such in project commod.y, maybe also in alternative comm.y. (But how about on project Δ of production?) (Also how about out mvmt where xptn is -Δ cost?)

Conclude 2dry bens in project output sales are very small: in hiring inputs maybe greater, esply. less elastic ones.

Fri., April 21, 1961

I. Review exam qus. (Cleveland?)

1. a. 2 Green Bks. 2d rejects 2dry hens even harder than 1st, but neither uses them. Paranoia. Misquote, p. 127

b. "Pecuniary" e.ecs. BB wrong, they are not just redistrib. Is a new resource created, the net Δ output. (Also may be a gain by relocating people where land is cheaper)

The new resource en route to consumer creates new supramgnl opps. for complements.

Putting it another way, retail value > farm value and excess does not rep. 100% real social costs. a, AC pricing of decr. cost services; b, Mopy profits; c, Inframgnl rents, where some complementary resources are in inelastic supply

c. "Tech feasibility" viewpt rejects more than 2dry hens.

2. Virgin fertility

a. "If" you count depletion as cost. No room for "if".

b. Exploits more intensive? Rubicons.

c. Effect back east, anti-conserv. Wide signif.

d. Extends mgn --- temporarily & tragically

3. Diff. i.r.

Imprecise answers. Review. $\frac{MR}{V} = i - \frac{\Delta V}{V} \quad (+t)$

4. Scalloped.

v. Thornton

5.

VII. Progress toward ~~integrated~~ economical allocation & devmt of wtr under State law.

A. Xfrability of approp. rts. Once helped some, now has ~~become obsolete~~ rigidified.

B. Instns. that hold wtr. rts
They serve as buffer between individ. & wtr law, effect ec. allocation inside their boundaries

1. Large landholder serving tenants
KCLC; Am. Crystal Sugar Co.
Preserve some flexibility, compensates for other defects. perhaps that's one reason they don't sell land titles

Concept of Desert Land Act.
Observe m.c. pricing – like elevators in skyscraper

2. P.U., pvtly owned.
Reg. by commish.
charge a price
Only form w/o some access to c.s.
Most failed, in ag.
Cities, did better, but most bought out by cities.

3. MWC
Utah, Colo. & S.C.
Coops.
Shares rented & sold inside cos., flexibility
" " among cos. S. Platte as new to a mkt. system as can find. High hopes. Seems to hold everything Blue Bk. cd. ask for.

3, MWC, (cont.)

But ~~follows~~ inadequacy of mkt. w/o channels shown.

Our concept of free mkt. grew up around maritime States of North, Baltic, & Medit. seas. Oceans were highways, ed. be assumed.

But here we must provide the channels via which wtr to be exported. As well as economizing w-in a framework, we have to build the framework.

MWC. share trading has scattered service areas, overlapping, criss-cross lines. Moral clear: conscious unified conception of a distribn. system most ecl. Distr. nets are nat. mopies.

4. ~~MWD~~ District

Provides the needed unified control

Tax pwr to tap c.s. & consolidate settlement

Flexibility of wtr allocn, by price if desired.
Lacks guid power, at least in practice, to charge for xptn. Portage stamp rates.
Reg. grnd wtr.

Multi-purpose - quite l distr. pwr.

In many States, exempt improvements.

An ~~ideal~~ excellent vehicle for ec. devmt. Can even be made State-wide: MWDSC covers more than most states' popn.

4, Distn. (cont.)

So instl pattern is adequate. We have the powers to behave eccly. Need only hammer out desirable ec. principles & plug them into instl. structure.

(Cd. even set up an interstate district, or possibly a Fed. Dist., altho ~~Expand~~ that means breaking new ground)

Might expand I.D. to big one.

" A flexible exchange among I.D.s. under wtr (& I.D.) laws.

" have super-Dist. like MWD to wholesale & tie together

" " State or Fed wholesaler

VIII. The problem of dynamic instability (Chaps X, XI)

IX. An ecl. wtr system.- (Chaps 3, 12) ~~(Chap. 7 on time aspects)~~

At a pt. (commencability ~~the~~ a keynote)

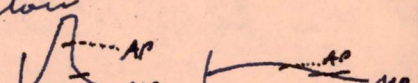
Conveyance

Timing (Chap. 7)

Aspects of ~~ideal~~ water system

2 parts: at a point; cost of xptn.

1. At a pt. F.O.B. pricing
   a. Select key pricing points. Points of control. Includes well-heads, thus control underground wtr too.
   b. Vest ~~con~~ ownership in central authority, as e.g. M.D. buys out clutter of MWC & pvt. rts.
      Probly have 2 or 3 levels of such authority --- e.g. Dist., Super-District, State. (Will avoid logrolling problem by changing for wtr & xpt.)
   c. Flexible price, vary w. balance of s & d
      Supply fluctuates quickly & unpredictably, so have buyers submit demand schedules, for each week or so, for enough ahead ~~so~~ so mgrs can plan.
      (These also serve as guides to planning new works, better than any mkt survey, --- altho s.r., so not perfect)
      (Do not use as means for p. discrim., wd. get no accurate info.)
      Compare this vs. a, Fixed priorities, fund & flow
      b, Fractional division



   d. Storage
      Flexible pricing reduces need. Cuts down peak storage need.
      " " " gives exact basis for computing value of storage: it is the added value. ~~in time of greatest need~~ Each increment to storage capac. lets you shift more wtr toward time of peak demand

e. Equity aspects

Pay mkt price for wtr,

Becomes source of revenue

Less pressure for uneconomic projects, ~~tax~~ (Is still c.s., but can handle that by land taxes)

Contrast to mkt in licenses: capital barrier allocates more than mp.

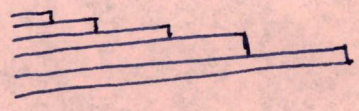
Bilateral monpy

f. Time aspects --- based on salvage value of site, figure quick obsolescence & depreen. Exhorts low dam. but is fuller devmt over time than hi dam that goes obsolete.

g. Extend to MC = MR, max B-C.

2. Transport aspects. More universal interest

a. Charges must Δ w. distance



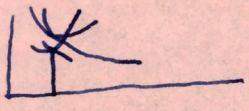
Failure to do this is largely problem of distrib. eg., where it conflicts w. effic.

~~b. Charges shd~~

Solution is tax on central locations. Which also improves allocn of land, reduces capital barrier

b. Charges = MC

LRMC = SRMC, is goal ~~—~~ abstracting from dynamics.



MC means cost of delivering more wtr at a pt. – not of extending line to that pt.

c. Make up deficits by flat charges per acre.

d. Extend system until MC × Q + Δ rent = full extension cost

Hirshleifer etc.

Chap V cont., §: overbuilding & underpricing.

p. 108 They postulate gen'l overbuilding — by implication bec of socialism. Approp. doctrine is sufficient cause I think.

(Due to premature excessive claims, all systems are in -Δq cost stage There is source of systematic bias that disturbs them.)

pp. 109-10 ff. Pvt. wtr systems are giving way to public bec:

a. P.u. commiss sets rates too low
b. Munic. bonds tax exempt
c. Munics. require premature devmt, & pvt. cos. can't fince it

(+ flexibility calls for excess capacity, too. E.g. for fire protection. Having it, mc will fall below ac habitually, even as approach need for expansion. Hence mc pricing need, ~~is~~ & subsidy need, are continuous. So?)

p. 112 Main practical suggestion = peak-load pricing, most practical being on seasonal basis, avoid special metering.

General arrogant & condescending manner. All but they are irrational. Yet other policies they deplore may have some rationale they haven't considered fully. "I beseech ye ... do consider that ye may be mistaken."

(But the excess capacity that enhances flexibility of wtr, reduces flexib. of sunk cap. 2 kinds of flexibility to consider)

Hirshleifer
etc.

Chap. VI. Invmt in Sk w/o supplies.

(Discounting future values does not necly mean neglecting future generations. That is rather a qu. of total cap. formtn. We may discount specific future values bcs we have ways of making money grow faster — to grow to a greater future value.)

p. 128 They identify S r.e. values & 2dry benefits.

c. pp. 128 on 2dry benefits. Devote Fri. to this. Prepare them by an exam qu. a. S rents

b. Sq returns? Desirable to spread out pops? Here is pregnant qu.

Prepare article on 2dry benefits.

File: Ag. Ec. 386 Classnotes.

Annuity, present value.

$$S = \frac{1 - r^{n+1}}{1 - r} - 1 = \frac{r - r^{n+1}}{1 - r}$$ ("n+1" bec we dropped first term)

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

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

As n grows, approach limit of $\frac{1}{i}$. Max. effect of i on value.

If value drops off at $(1-d)^n$,

$$V = \frac{1+i}{i+d}\left[1 - (1-d)^n(1+i)^{-n}\right]$$

If $n \to \infty$

$V \cong \frac{1}{i+d}$, but if $n \to \infty$, d must $\to 0$, so no effect.

2-3-61

1. Roll

2. Outline Course

3. Announce exams; days off.
4. Papers for grad. students
5. Immediate assignment. Bruner, Chaps 1-4. 3.
6. Def. of conservation.

2-3-61

Man. -- derive $\frac{1}{(1+i)^n} = P$

Meanings of "Conservation"

1. Leopold. Esthetic

2. Opposition to compound interest (or simple int.) (bring tables) (Have class derive formula)

3. Opposition to xfr to pvt. hands. "Justice in distribn."

4. .. .. human occupancy & enjoyment (Scotch Crofters)

5. .. .. consumer sovereignty. &/or values observed by majority.

[Note ideological extremes -- conservationist may be Eng. hard or socialist]

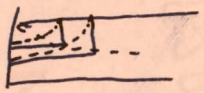
6. Need for professional mgmt. Hays, profnl. admn. vs. sloppiness.

7. Wantrup

2-6-61

$(1+i)^n \equiv$ rate of exch. between points of time.

Money makes money; & the money money makes ....



1. Class derive discount formula. 5 minute written

Present Value of annuity = [illegible]

2. More defs. of conservation

3. Recommended def. ..

4. Discuss Bunce

2-17-61. thru 2-24-61

1. Nature, depletion, renewal, & improvement .... improving on Nature.

Best is more than restoring, is creating new capital.

2. Class explain p.11, ec. rent can be "capd." only if no depletion.

Remember you have both at once ... + expectations of rising yields

3. Peril point idea.

When is society justified in interposing its judgement between individ. & his land? When society is remainderman. Separate costs & returns.

Hence interest in mgnt lands, of conservationists.

4. Firm vs. land.

Mgnt firm & mgnt land differ

Efficient firm & good land differ — obscured by undervaluing land, also ∴ undervaluing depletion.

eff. firm & large firm differ

5. "Eff." vs. capacity

"Eff." a poor word to apply to land. "Value" better.

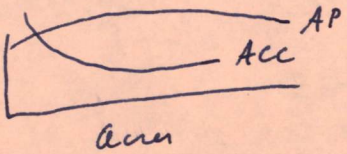
$$\text{Eff} \equiv \frac{\text{output}}{\text{input}} = \frac{\text{output}}{\text{max possible output}}$$

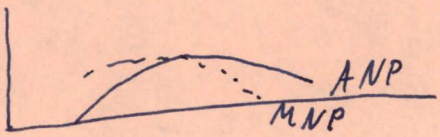
Capac: Ozarks vs. Putnams or Marshalls. Hamman

5. Elast. of production.

$= \frac{MP}{AP}$. Prove it.

6. Returns to one input, & to scale.





7. Interest diffs.

(Why begin here. Res is important qualification to "lower i → better conservation".)

8. Integrate interest diffs. and ecs. of scale

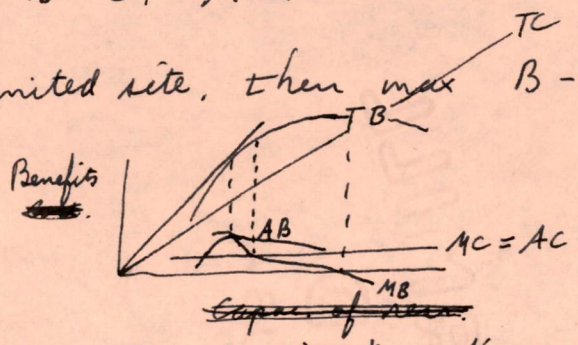
3-3-61

1. Outlines due, now. See me Monday.

2. Scale of farm vs. scale of public works

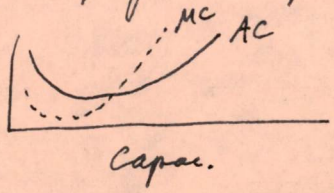
Farm is indefinitely expansible. Almost pure production ecs.
But dam is on fixed site. Site unique, residual evaluation necessary.
B/C vs. B - C. Max. aP vs. Max. ~~rent~~ site rent (= profit)

If limited site, then max B - C



Not counting site, whose cost can only be arrived at residually.

To add more info. to graph, choose some physical input, get curved cost curve. E.g. resr. capac.



Underdevmt only ecl. when govt. funds limited, $ > $.

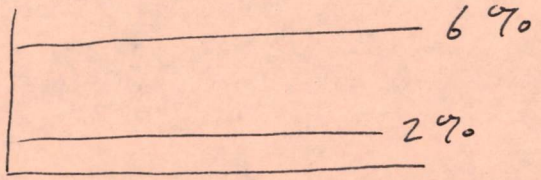
Galbraith. But dubious:

a. PW in excess of pvt. complements
b. Waste of building too slow
c. ~~D~~. Cycle danger of too many starts

For Wed, Chap IV,

3. i.r. effect on scale, again.

Farm. Land not fixed. But individual is. And his total command of assets.



Will affect all inputs. But
↑ Land particularly affected. bcs max. leverage of i.r.

% Δ P to land price, deduct from cost.

$$MR = Pi - \frac{\Delta P}{}$$

$$\frac{MR}{P} = i - \frac{\Delta P}{P}$$

Tenancy as time-divider.

Capital markets.

affects other inputs less. So financially strong have higher ratio of land to capital.

Another viewpoint on this, rate of turnover.

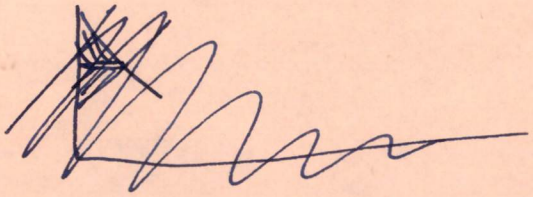
Investments of hi turnover least interest-elastic.

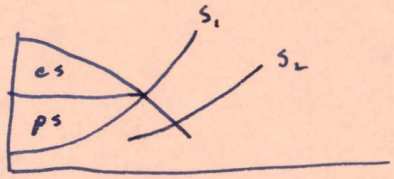
" " low " more " "

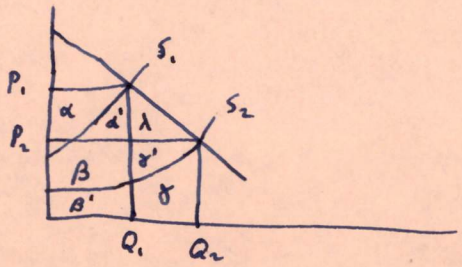
" " no " very " "

" " negative " most " "

Meso. supply area; pp. 1-2
Risk. pp. 3-







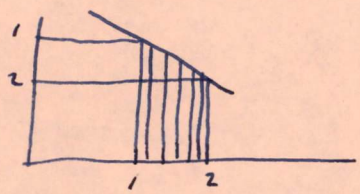
1. α & α' are a ~~loss~~ gain to consumers. α is a loss to producers, α' no loss, a net gain.

2. λ is a net gain

3. β & γ' are net gains of producer surplus

4. Summing up, gain is full area between supply curves.

Green book begins by discussing valuation of output, alone.

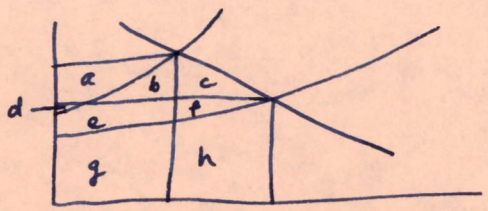


1. Make demand curve less mystical by calling it mp of output in some productive use.

2. Greenbook fails to consider decline of competing output. This meliorates price decline and enhances value of project. Incidentally is an important amendment to oligop. theory of implicit collusion thru fixed mkt. shares. Price cutter is faced w. curve more elastic than mkt. bcs mgnl producers drop out.

3. Use of a price midway is fuzzy solution. For mgnl. decision, use mgnl. price. For total benefits, find c.s. Usually found in l.r.

4. To what extent do losses to competing sellers offset project gains?



Net gain: b + c + e + f. (a.f. count a, also, inferiate r-r-s).
If unutilized excess capacity, net gain even greater.

5. Displacement of competitors occurs in 2 or 3 stages
   a. Competing w-t sources
   b. Competing raw commodities, e.g. baled ctn
   c. " semi-finished ", e.g. wool or synthetic fibers
   d. " finished ", e.g. clothing.

And as many intermediate steps as you care to make.

This adds to elasticity of demand. It shd be all summed up in initial demand curve for water. In many commodities, mkt. for commodity will not be nearly so limiting as cost of transporting water out --- distributing it, i.e.

Re ag. policy, they argue for ~~el~~ inelastic demand bec. cost of ctn. is small % of shirt. But cost of w-t is even smaller %, & demand is elastic. The more stages, the more chances for substn.

6. Lenders vs. equity risk.



7. Add risk to i.r? Depends on whether is fn. of time. And of current value of investment. ~~Check note from class last year.~~ Risk per annum is much less with remoter future values of given risk, even less if put on compound int. basis. So those with low risk preference may prefer futures. E.g. cut a value in half, 60 yrs hence vs. 10 yrs. (over)

8. Is risk all negative. Bias of book is that way. Like B&E

Assign Friedman & Savage on gambling vs. insurance.) on hi vs. low capac. uses.

Give name to net/gross

Lenders' risk is all negative, but some equity uncertainty works both ways, shouldn't be treated same. Need another word. [Assign & read F. Knight, risk uncertainty & profit, etc.] Valuation shows gnrly. some have high preference for future uncertainty. More money lost in mining & land speccn. than made from it. Cite A. Marshall

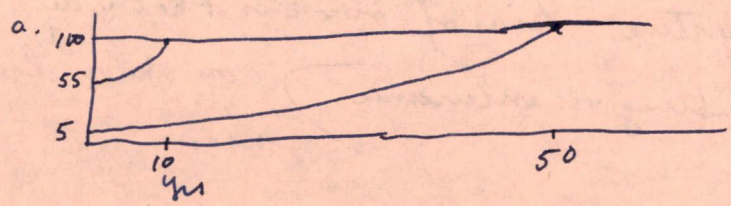
7. (resumed.)

Most risks probly Δ w. time. but no reason to assume they Δ exponentially. Probly less than that; [& certainly not so regularly.]

If you need something as an input in production, you want certainty, certainty commands a premium. Thus firm power or wh sells for more than dump. Bcs so many other things depend on it. ~~too~~ Extra can't be used. & shortage raises hell. But don't confuse this w. psych. prefs. But as an investor w. surplus cash, another matter. Some prefer chance, or gamble, & this shows up where odds are more even.

Insurance doesn't prove people don't like to gamble. Proves they prefer const. annual charge to occasional big one. But wd. be perfectly consistent for them to pay regularly for chance of big gain. And many do. Gambling highly profitable, forces some States.

Suppose I have two alternative ways to make 6%.



Suppose the expected $100 falls in half. The ten-yr invmt. return is negative. The 50-yr invmt. falls to 4½ - 5%

7 (cont.)

So Govt. shdn't nec. avoid investments of high chance. But don't confuse them with invnts whose chances of success are on balance poor.

Physical risk; obsolescence risk that site needed for higher use;
" " " output not demanded;
lenders' risk. All require different treatment.

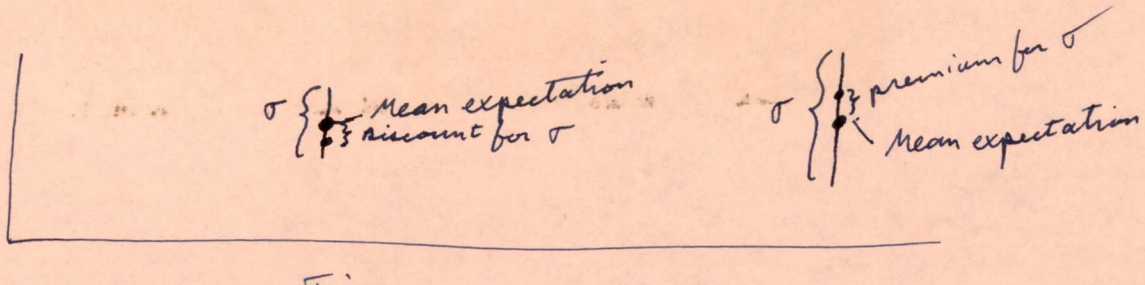
3 elements: Mean expected value; dispersion of expected values (measd by σ probly;); and valuation of the dispersion; (premium or discount).
And a fourth — ~~time lapse~~, mean date of expectation, with dispersion of these dates, & valuation of dispersion.

Generally, the nearer the date of expectation, the greater the discount for dispersion, both in value & in time, but the less these dispersions. Discounts are greater bes you need to make definite plans, commit complements, etc. But the farther the date of expectation, the less the discount, until it becomes a premium. Also, dispersion per year is less. So? Clearly not true of gamblers.

If we allow x% per yr. for risk, we are assuming that

a, Dispersion Δs w. time. (But not so, bes as improvement ages, the net/gross ratio rises, at least if we handle depreciation so, & dispersion falls)

b, ~~Dispersion preference~~ Certainty preference Δs w. time, or holds const. Opposite is probly true.



There is no evidence that most individuals, or the mkt gnrly, shuns wide spectrum of future expectations. Esp. when they are investing for supplemental income. If they are buying a service, they want it to be steady. Then there are in-between cases, like wtr rts, mixed, bec non-mktble. But if are pure investor, there are times when stocks yield less than bonds. (& there wd. be more were it not for inc. tax bias.)

If put risk discount in i.r., are assuming a great deal: that σ increases not just w. time (probly true) but that it ↑s precisely exponentially, &/or uncertainty preference ↑s w. time.

	10	40	60
$\frac{1}{1.03^n}$	.74	.31	.17
$\frac{1}{1.04^n}$	.68	.21	.09

At 60, deduct 50% for "risk"; cf. 8% at 10.

Risk

1. Lender's vs. equity risk.

Lender's risk is all negative. If borrower does well, lender doesn't share. But if does poorly, fails to pay.

But lenders' risk is not necessarily on top of equity risk. For equity interest has other sources of income. Lender's risk may be less than equity risk. When lend to big, rich, diversified borrower:

Corpn.
Bank (a few fncl. instns control $ ℰ etc.)
Govt. w. tax power

Sometimes lender's risk tied closely to equity — mortgage or rev. bond. Or Munic. Bond, once was a mortgage, now a virtual debenture, from MBA.

But sometimes no connection. U.S.

Issue: U.S. use its risk-free borrowing rate?

Answer: Distinguish negative risk from dispersion

Risk, allow for — but not nearly via i.r. specific allowances better. Will elaborate later

Dispersion, use the low rate. Only people who need discount for dispersion are those whose resources are small relative to the investment. (& not all of them).

One advantage of being large or diversified is pooling risks, so needn't shy from dispersion. Hence rich go into banking, insurance, serve as buffers, assume liability for large loss in return for small payment. Scarcity of rich makes this good invmt. outlet.

Govt. shd. not shy from dispersion. Creates more certainty for others, by decisive action. And thereby for itself, too.

Hirshleifer fallacy. risk is all negative, ~~#~~ taxpayers subsidize losses. Unbalanced. Are also gains.

Hi risk allowance leads to small projects, underdeveloped sites, just ~~#~~ as max B/c. Edison Electric ∴ pro hi risk.

There are plenty other good arguments that excessive funds flowing into p.w. But bad ones just keep us from emphasizing the strong ones.

2. Universal problem, diff borrowing rates, not just U.S.

Big corps
Big cities.
Is major factor tending to concen of ec. power.
If begin on U.S., ~~govt.~~, must hit whole system. Meantime, U.S. does a lot of good.

What kinds assets' allocation most affected?

3. Add risk to i.v.?

i	n → 1	10	25	50
.03	.91	.74	.48	.23
.04	.96	.68	.38	.14
.06	.94	.56	.23	.05

Only if fn. of time, exponential.

4. Is dispersion always discounted.

a. Smith, a. Marshall.

Mon. March 20, 1961

I. Risk (cont.)

A. Discounting for dispersion.

1. Pay more for firm or class I put out than dump. Reliability ~~Reliability of~~ of inputs in a virtuous. are needed in production, & in s.r., cannot easily adapt complements.

2. When buy for income, is ~~another function~~ more room for absorbing fluctuations.

3. Either case, the farther in future, the more time to adjust, the more willing to accept unreliability

So ~~stupp~~ power supply, $\frac{\sigma}{\bar{x}} = .15$, discount heavily, next year's supply, ~~[illegible]~~

Also whole future stream, bcs never becomes more certain.

But remote income, $\frac{\sigma}{\bar{x}} = .15$, no discount at all, or at least less. Is time to adjust. Adjustment per annum is less.

Add to that, uncertainty per yr is less.

E: We need certainty for immed. future, to make plans.

Farther future, settle for less.

4. Farther in future, is more certainty bcs s.r. fluctuations average out.

II. Ecs. of decreasing cost.

A. What are e.g. of decr. cost?

Dams.

One site

One service area ... may move to bigger site

Distr. network

Expansible area, no

Fixed area, yes. Except city streets

Wednesday, March 22, 1961

B. Argument for subsidy.

Mon., March 13, 1961

1. Conclude analysis of consumer surplus

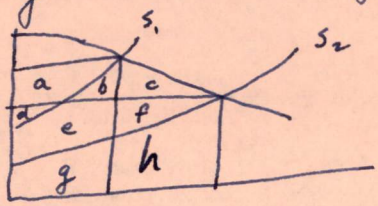
a. Demand curve is not mystic. Make it the mp of wtr in farming.

c.s. is then ground rent.

b. ~~Are we faced w.~~

Is project faced w. mkt demand curve? Depends on reaction of other sellers, & it is very important to forecast those.

They may behave classically & recede. Then demand is more elastic.



But they may increase output at lower price -- if previously had unutilized excess capacity. Cheap imported wtr may cause stiflers to relax grip. Is a matter of fact to explore in each case, but are some general propensities to watch for.

c. Use of a price midway is fuzzy & lazy.

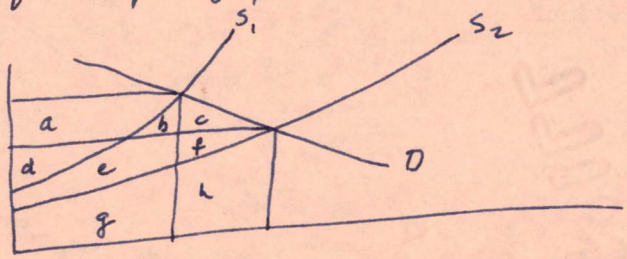
For mgnl decisions, use mgnl price

For total benefits, find c.s. — mostly in l.v. (but watch cycles.)

d. Subtract losses to competing sellers?

1, of project output

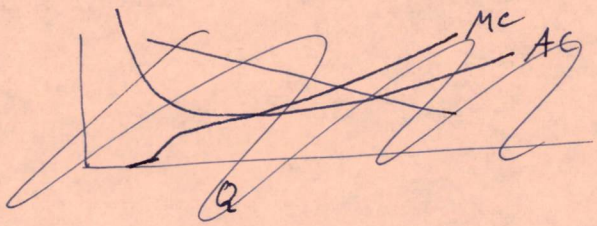
2, of competing products.

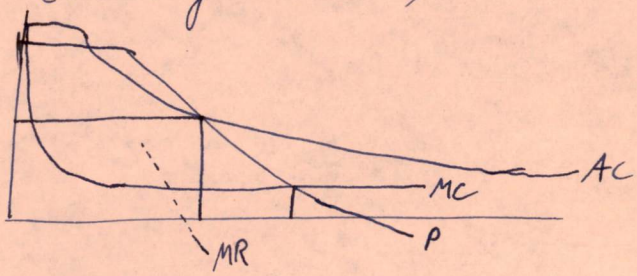


Net gain, ~~b~~ b, c, e, f. A.E. count a, anger r.r.s. Restrictive interests count a & b as dead net losses. Philosopher laughs & cries, & notes cycles of counter dominance.

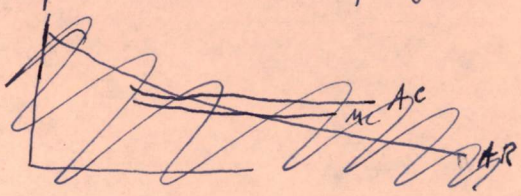
But watch that S_1 curve! Maybe decreasing cost will bend back down to s.e. Then project product sells for much less. Better to have fructified that underutilized local capacity some other way. (Note this is a stage in cobweb theorem.)

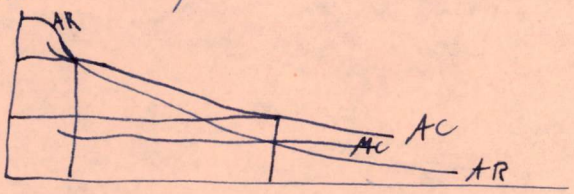
e. Suppose S_2 is decreasing costs? (Never got to this)





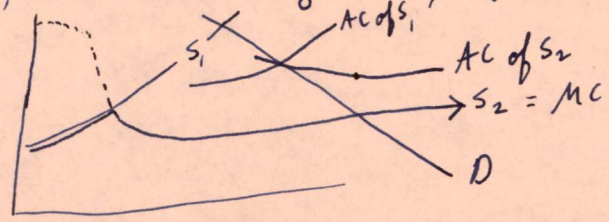
(Koplin in Land Eco is pretty ~~well argd.~~ good on this.)

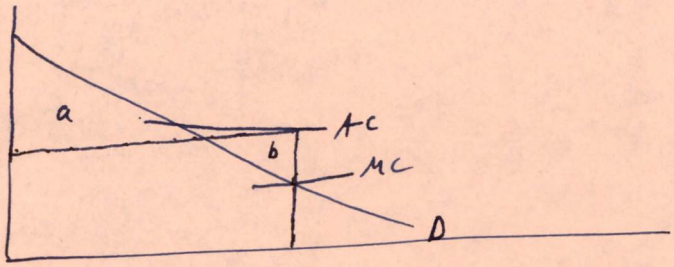


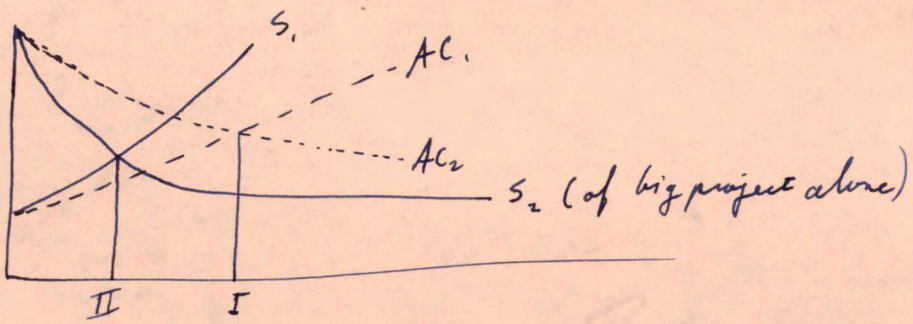


TC are rectangles; but T Rens. are trapezoids

Is it possible that by introducing the decreasing cost project you might reduce total benefits by driving out other producers & their ~~surplus~~ producer surplus, when decreasing cost project has little?





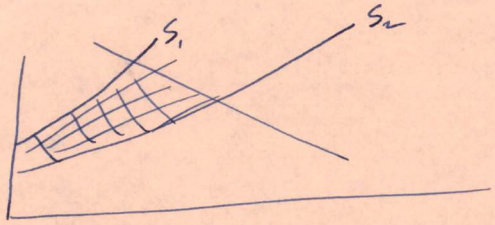


Not until Pt. I is the decreasing cost project justified. At P_I, producer surplus is net zero by either ~~project~~ S curve.

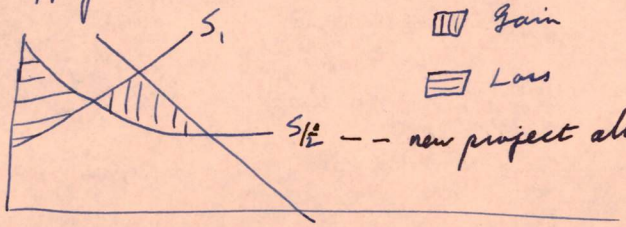
But w. MC pricing, S_2 can take over any place after II. If demand curve intersects between II & I, ~~we cd. justify~~, decreasing cost project not warranted, even tho we cd. justify subsidizing it in a vacuum.

This may be an important qualification to MC pricing.

In terms of benefits of adding supplies, also disrupts analysis.



Meso-supplymia is net gain, if Δg costs. But if decreasing, problems:



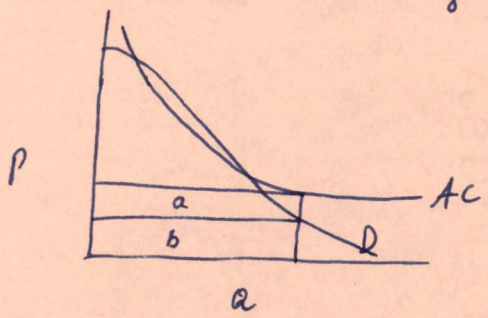
This is highly relevant to p.w., e.g. sewer system replacing septic tanks, so work it out. And thank Hugh Denney for bringing it out.

How do we add S_1 & $S_{1\frac{1}{2}}$? In practice, move n.e. on S_1 until as demand rises, new project becomes ecl (when is that?). Then move out $S_{1\frac{1}{2}}$ curve. But as price falls, move back on S_1, so ΣS is nearly vertical. A hard readjustment.

Note def. of demand, is at a pt., net of conveyance. Decr. cost project may itself Δ demand. ~~By state~~ subsidy to project from fixed charge on lands ~~now~~ will Δ demand, within service area. (or if we include conveyance in cost curve, will lower costs for a given demand)

I. Conventional thinking condemns mc pricing, bes. P·Q conceived as total benefit, & $PQ < AC \cdot Q = TC$

i.e. $b < [b+a]$

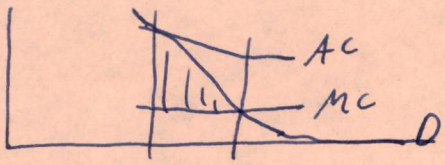


Pvt. seller goes back at least to $P = AC$.

and in effect even further, to max $P - AC$ (where $MR = MC$)

Applies to pvt. as well as public sellers, e.g. Columbia & "taxless" towns. Form of sales tax.

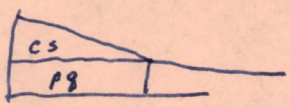
II. If lower P to $P = MC$, is net gain.



But is entire operation now economical? It was before; is better now; so it must be.

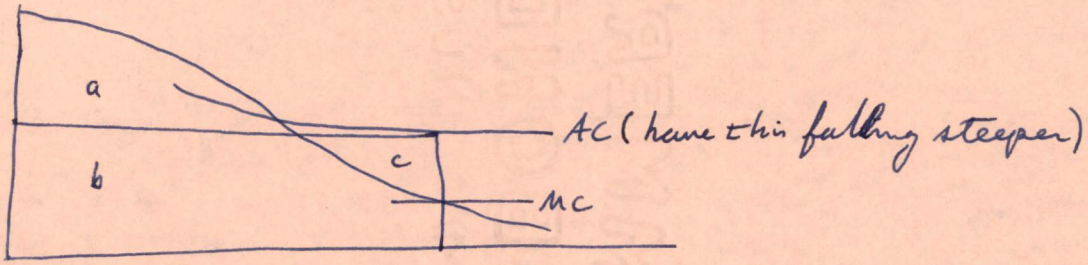
But $PQ < TC$. Violates a convention

But benefits $> PQ$:



C.S. trapped by land, where service area is limited.

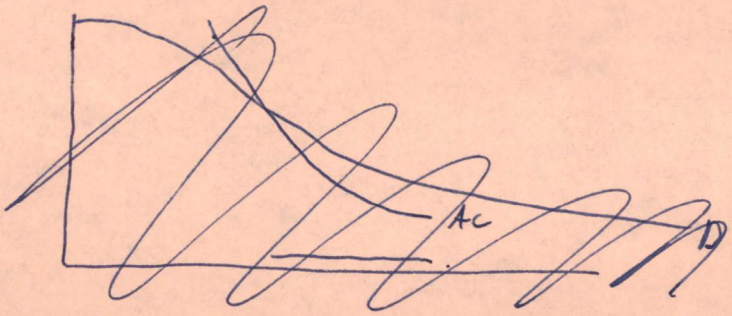
III. In terms of AC, show benefit so:

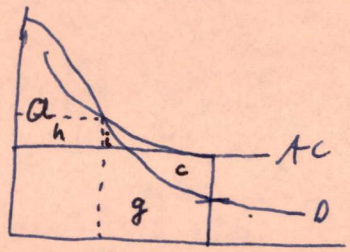


a − c is net benefit. a overbalances c, unless smaller.

So whole operation pays.

IV. Benefit of moving from P = AC to P = MC, in terms of AC



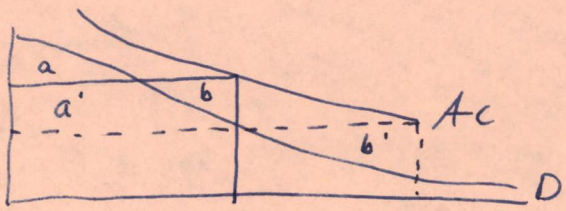


Area under new part of demand curve > ~~f~~ ΔC = ~~f~~ g + c − h

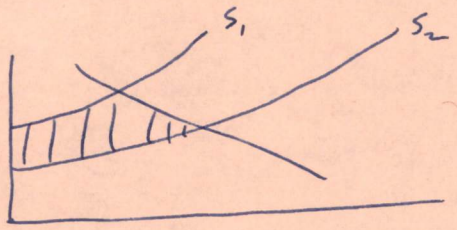
~~g~~ + i > ~~g~~ + c − h

i + h > c

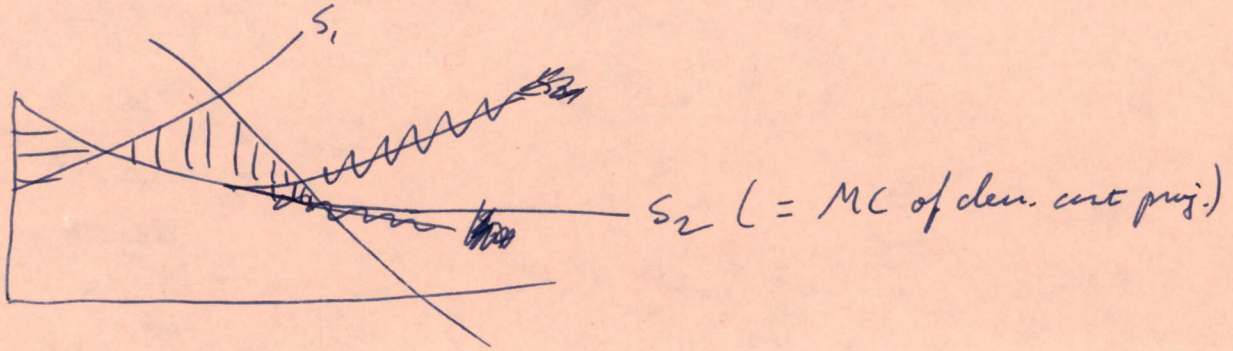
V. Ea MC pricing makes ecl where no project possible before.



VI. But we must consider alternative supplies.



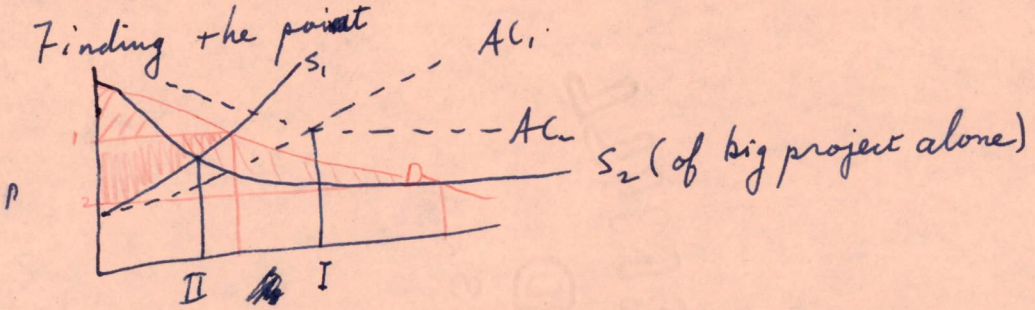
Area between curves is net gain from new supply, if increasing cost.



Now shd. we subsidize? Cuts into assumed c.s.

At some point we should. But not so soon as otherwise. Destroy producer surplus of S_1. Must deduct from Δ c.s. from lower prices.

VII. Finding the point



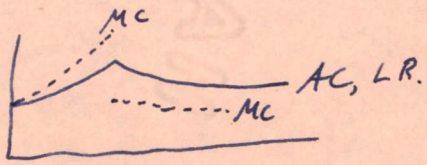
At point I, you are indifferent between the 2 methods. For greater outputs, choose big project.

Note that MC pricing lets you get past I, tho, when AC pricing wouldn't. But sometimes you wd. then have trouble justifying project as a whole, bcs as you lower price, much of the c.s you create wd. be offset by destroying producer surplus.

VIII.

2. ✓ Why don't we treat S_1 as a s.r. mc curve to a sr ac curve on the envelope l-r ac curve?

Res. S_1 is mgnl to a rising AC curve. If we combine the two, we get a scallop:



It is arbitrary whether we choose this means or the other. We cd. define the operation or the product broadly enough to include the increasing cost substitute; or treat it seperately. As convenient. Eventually we must break it down, for big decisions.

IX. Unresolved issues.

A. In defining areas, my S_2 used to mean a sum of 2 curves. shdn't it be same with decreasing costs?

B. With the scallop, is area under MC = TC?

C. In VII, redraw, defining areas explicitly & carefully, reconciling different methods.

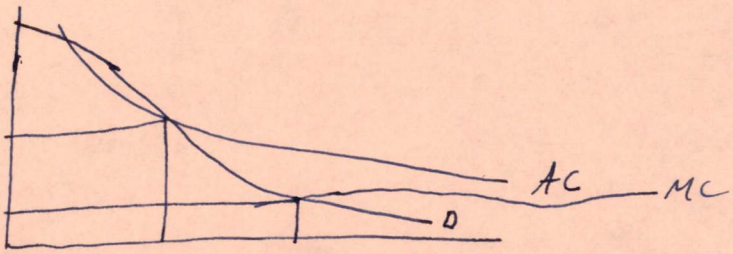
D. Can you handle S_1 by adjusting demand curve for S_2? Probably. but wd. it be any clearer?

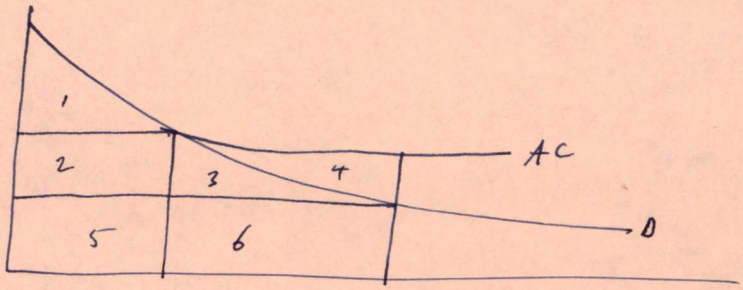
X. Demand lags due to imperfect mkts. Big project w. fixed charges Δs demand by accelerating land improvement. Thus reduces AC. Is big argument pro.

1. ✓ XI. Short run & l.r. curves.

I. Argument for subsidy to decr. cost opn.

(Stress area saturation as basic cause)

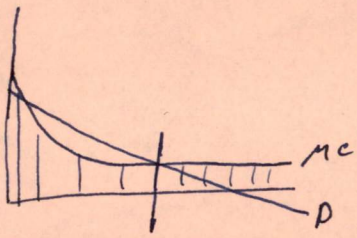


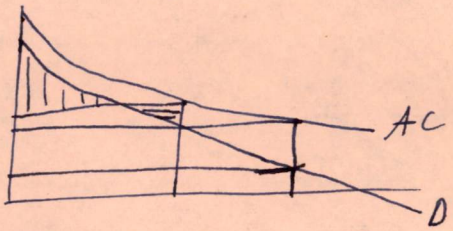


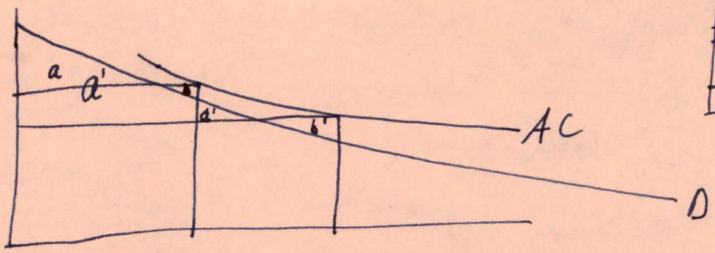
2 ways to measure TC (on graph)

a. area under MC curve

b. AC × Q







Show principle both ways.

Fri, March 24, 1961

I. Complete tag end of Wed.

II. Period of Analysis.

A. Green Book recommends. ask gus.

p. 25, unthinkable, p. 26.

Emphasize value of good demarcation.

B. Importance ... determines annual depreciation charge. G.B. much too low, misleading.

Importance ... best use of site.

~~As you lengthen life, depreciation lessens, this increases net residual rent, so why isn't best use of site the longest life physically possible?~~

Why demolish ~~the~~ usable bldgs? Why flood out usable dams, highways, etc. Higher use for site.

O.C. of site is best future use ... because historical costing.

C. Criteria for replacement

MC of time & MP of time, in an opn.

Defender & challenger. Mention Terbagh.

MC of time is rent imputable by challenger. ≡ interest on salvage value of defender.

MP of time is net income of defender, w/o figuring depreen. (NB, by deducting costs from MP we are including them w. MC of time, e.g. land taxes)

D. Importance of ec. rent

Is prime factor prompting demolition & replacement. Otherwise use old bldgs for hay, regardless of location. Slums due to low ec. rent, due to expanding highways ... we are still in migratory stage.

Likewise our reclamation program. Too much expansion of same old stuff, too little replacement & renewal on older lands. Pattern of our whole history.

E. How know future $\underline{a}$? Depends on life-span. But that in turn depends on the ff. $\underline{a}$. If the ff. $\underline{a}$ is much higher, proximate one will be lower, bcs. short life.

So, many wait for the next higher one, do nothing today. . . . seek to skip a step.

If we assume future conditions the same as present, plan present so as to max. $\underline{a}$, gives same life-span as breaking off life at net income = a_2. Take on faith.

F. Recommendation

Plan life to demolish when net inc. = a_2

Max. $\underline{a}$ by present knowledge -- but probly plan even shorter, allowing for obsolescence.

But note this is limited, bcs as get shorter, $\underline{a}$ falls, and pressure to replace declines.

Wed. March 29, 1961

1. p. 91, fail to distinguish levels of govt., external & internal subsidy.

L.A. cheap wtr & power, key to area's growth. Contrast S.F. Cite Ostrom.

MWDSC not typical. If it were, L.A. wd. have competitors for growth.

2. "MC pricing fails to distinguish projects that shd be abandoned."

Only partly true. Msre c.s. by effect on l.v.

AC pricing has us abandon services when still eco. --- muni. transit.

AC pricing, historical vs. replacement cost basis; 1958 No. S. Ct.
Worth a study. Also sinking fund, treatment of.

3. Gimmicks for collecting c.s.

Quantity discounts. But don't get it all, bcs. individuals who remain in hi rate brackets don't get down to mc. Class explain. Mkt demand is Σ of individ.

Two-part tariff. Connection charge, demand charge, etc.

Price discrimination. p. 92, call it most widely used, dubious.

4. The workable one they don't mention

They conceive of c.s. as related solely to individuals & their different tastes.

More realistic, relate it to locations. Providing the service gives the location a latent value, using the service. Those individuals who value the service then sort themselves out by bidding for locations. And c.s. imputes to locations rather than people.

Decreasing costs come from area saturation. Let charges Δ at outside

of system. Buyers squawk, but compensated by lower flat rates, i.e. ad valorem taxes.

Our system works opposite. High rates in town; low in country. Lowest tax rates in center.

5. Ag costs gurly in w/o supply?

Break into components.

Distrib. network, always l.r. decreasing costs.

Wed. April 5

Ag costs come where press on limits of nat. res.

✓

W/o itself, & storage space, become scarce. Problem of economizing on them becomes paramount many areas. How put a price on water?

6. LR & s.r. mc, in m.c. pricing. Need flexibility. We behave opposite, toll bridges.

Allocation of joint costs

1. Text is fuzzy. But m.c. obviates this problem, p. 94

2. Is a ritual, important in many practical situations a means of rationalizing what is done for other reasons.

Allocate much to power. Discuss.

3. One aspect they neglect. Distr. net, jt. costs are separable for extensions. Classify customers by distance from source.

Ecs. of distrib. networks -- an unworked field in ec. theory.

Will return later if time.

Costs as a fn of scale of output

They plead Δ_g costs bcs must range farther for wtr. p. 95

-Δ_g +rue a location rent attaches to wtr. But dubious if all projects hit rising costs. Often, get big enough to tap cheaper sources! Bcs. bigger.

True ... but does not ~~gainsay~~ gainsay decr. costs in distr.

Fri, Apr. 7, 1961

1. Increasing costs due to Δg xptn

a. Often offset by scale ecs., or much tempered. What appear to be Δg costs w. low demand may not be. Have scallop. instead of Fig. 11.

b. Often shouldered willingly, to claim wtr

c. Cities don't nec'ly use cheapest sources first; or best. Is room for breakthroughs as demand rises.

d. Many sites are still in stage of Δg returns — Bull 5. Bull 5 acreage may show decr. returns, but cost of reservoir falls.

e. Most imptnt — they don't distinguish local distr. from storage & wholesale xptn.

Conclusion: Δg costs in storing ~~& conveyg~~ wtr, & esp. in lengthening conveyance

- Δg costs in distribg wtr.

Calls for 2 seperate analyses. Wholesale & retail

E.g. of CVP & retailing I.D.s. Fed-local relations.

f. Ec. rent. Have it, either case. But if Δg cost, imputes to the scarce limit, in this case water. If - Δg cost, ~~—~~ wtr isn't scarce, then if follow MC pricing, imputes to land can serve.

2. Fig. 11 is haywire. Follow argument, but be able to criticize it.
a. Discontinuities overplayed; b. Blurs s.r. vs. l.r. distinction

3. p. 97. Wtr sales are often long term contracts

4. Peak load pricing?
5. Rates too low. Amen? Not nec'ly. Compensating error.

Friday, April 14, 1961

Secondary benefits

1. Primary benefits include more than salable: c.s.; flood control; etc.

2. Extended ben. are on lands not (nec'ly) served directly by project.
   They are pecuniary external economies. Technological are primary
   They are micro, not macro.

3. There are such things. Recognized by local devmt corps, etc.
   By r.rs & utilities. E.g. r.r.s selling townsites.

4. They are imptnt. in analysis of ec. devmt, big new field..
   Lead us into qns. that tax our analytical powers, but for that
   reason are most promising to pursue.

5. Regarding project output as supply, & fms. demand as demand, we found primary benefits.
   Now regard fm output as supply, processor demand as demand.
   E.g. oranges.

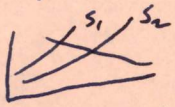
   Kinds of economies:

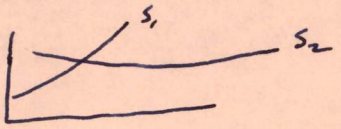
   A. Scale
      1. s.r., if under capac.
      2. l.r.

   B. Δ value of urban land in area by Δ supply of raw mtrls.
      (Remember, fruit has hitherto been valued in the field, so there are Δ l bens. between fm & consumer to account for)
      Ben. mcrd by land bes. it is in position to trap benefits.
      If something else is limited, it gets some too. E.g.
      a r.r.; or a truck line w. franchise.

~~S.A. (cont.)~~

6. As to Δ value of urban land, surely if there are primary there are 2dry benefits.

Does this imply something wrong w. pvt. mkts? Not if output can Δ by small increments: 

Rather, when either-or, large Δ: 

Need Δl justification now.

7. As to inter-regional compn for mobile resources, 2dry bens are real. ℓ resources move where instns allow localities to express them. Each locality shd. try to do so — but beware timing problem.

8. As to scale, l.v., get into toughest questions.

9. As to Fed. policy

Wednesday, April 19, 1961. Water law.

Dismiss class at 10:10

Water law.

1. The Problems - allocate water economically
   - distribute equitably. Blue B. (BB) overlooks

2. Govt alternative -
   Central adm. vs. free mkt.
   Lange & Taylor
   BB puts judicial allocation in box w. central adm.,
   but in fact it is associated institutionally w. pvt. propty.
   same time, ex. decisions may require State framework.
   Is qn. of how far framework should go .... physical channels,
   analogous to highways?

3. Fed - State - local relations .... will return. Surly, confusion is great. Rts. not clearly defined.

4. State laws.

What is expected of a graduate student: Competence + independence

1. Know what text says. & lecture says.
   But don't nec-ly believe it all. Evaluate critically.
   Some too much one way, some the other. Balance optimally.

2. E.g. most cited GB thru eyes of BB
   E.g. .. accepted Bunce on exploitation & intensity.
   ✓ E.g. shy away from precision of math, $MR = \frac{\Delta V}{\Delta V} + \frac{\Delta V}{\Delta V}$

Moral for teachers: drill them on math!

Midterm Exam, Agricultural Economics, 386

April 12, 1961

1. State the positions of the Green and Blue Books on the use of secondary benefits in project justification, including the rationale of the respective positions.

   Explain the distinction of technological and pecuniary external economies.

2. What is the effect of exploiting virgin fertility on the intensive and extensive margins of land use?

3. The interest rates of lenders and borrowers are separated by the marketing costs charged by financial institutions. How does this affect the allocation of durable assets?

4. What considerations led us to postulate a scalloped long run average cost curve where small individual wells are an alternative to public water supply? In this case, show graphically how to determine the choice between the two methods of supply.

   a. Beginning from nothing

   b. Beginning with some private wells already sunk.

5. Explain the argument for marginal cost pricing in decreasing cost operations.

   Does the argument apply to water supply development?

Feel rushed? Frustrated? Overtaxed? Not enough time? Then try this for a comeback. Hand in your exam, then take 24 hours to write another one, using your notes and any sources you wish. You will get a grade on both efforts. The second is optional.