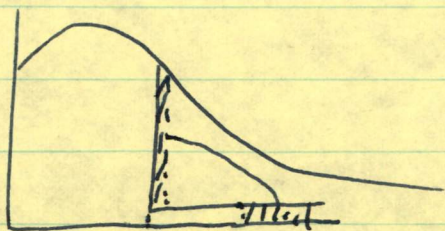


C': Risk, risk-sharing Summary

The best kind of goldplating for a lessee is advancing spending.



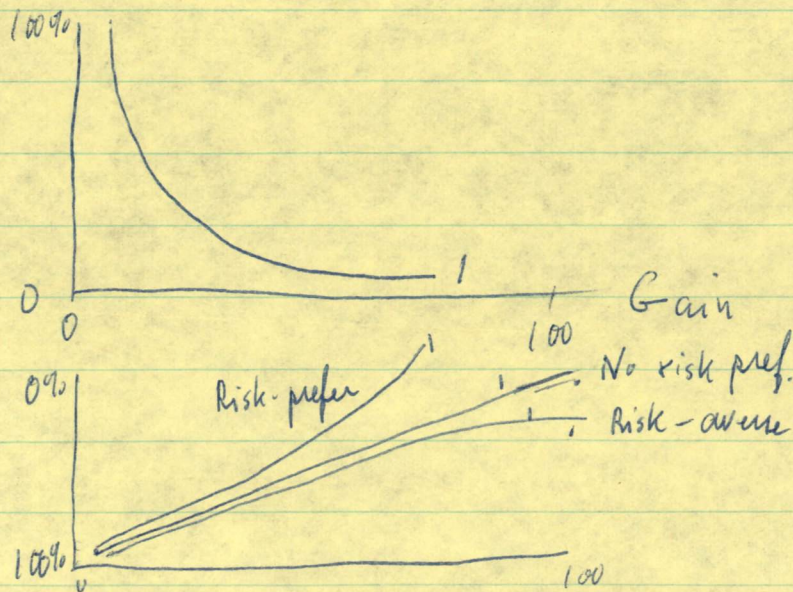
It is suboptimal today, but pays off later, & so passes audit.

Like Mary, ponder these things. Keep these things in yr. heart, & ponder them.

→ Firm that is small enough to pool its risks sequentially has time to learn from early mistakes — unlike firm that shoots 10 at once.

Anomaly of dual rates, double standard.
 20% return required by prvt. investor. But
 rate on reserve A at very low level is
 used

Project -	Chance	Gain	Product	Value
Take Matt's	1%	100	1	
letter, add	2%	50	1	
time-dim-	5%	20	1	
ension.	10%	10	1	
	20%	5	1	
	50%	2	1	



Probability of gambler's ruin tells us that you reduce ruin chances by 4% no of "chances".

But all these chances are assumed to have outcomes disclosed immediately. There is no time dim. (except a sequence, and not really, that is, you can do it all at once.)

A deferred outcome is the same as a loss, in s.t.

Deferral also reduces no of chances you can take over time.

Compare one-yr. outcomes vs. 10-yr. outcomes. Take $K/20$ for each one of 20 chances at t_0 . (t_1 is end of 1 yr; t_{10} is end of ten yrs.) 10 yr. lag means yr. out of action for 10 yrs. To avoid this, normalize. You ~~take~~ ^{recount} $1/10$ of yr. K each yr. This cuts to $1/10$ the no. of chances you can take.

But now, it also requires more favorable outcomes to survive, to face the lag.

✓ ∴ to help lean firms, reduce all lags. Let lessees recover their money early. Let oil be produced fast. Lease only immediately before time to produce. Give no advantage to sooner who explore early.

C Risk

Mgmt. shd. bear risks that are affected by quality of input.
Endogenous risks.

Exogenous risk is based on what nature put there.

Risk analysts say people's ~~attitudes~~ ^(or is it less?) are more inclined to favor risks where their own input affects the outcome. This depends on the person — but is the kind of risk preference whom we want to favor & attract. Active risk vs. passive risk.

Price risk is exog., passive. Rent, value, & resulting change, is factored up or down as price changes. ~~to~~ So are royalties, profit-shares, etc. Bonus bid, other hand, lessee assumes all the passive risk as well as active risk. We want lessor ~~to~~ to have the passive risk; lessee the active, since lessee is in charge.

To say that costs are yd "per bl." over life of well is misleading, bcs. they go up.

If you amortize K on a pb basis, they cd. be nearly const. But then the "cost pb" on dry leases = ∞ , which suggests flies in system.

If a cor.' survival depends on discoveries, then vert. intra. increases risk hugely. It Δ s what you can bore -- the whole firm -- w/o Δ g K used in expln.

To Δ survival chances, then, allocate all K to expln. Or else devote other K to a use not dependent on results of expln.

If p of "success" = .10. Then $1-p = .9$

To ~~lower~~ lower ~~prob.~~ prob. of failure, ~~then~~ diversify by taking more chances. Prob. of failure = $(1-p)^n$.

<u>Power, n</u>	$.9^n$	<u>Power, n</u>	$.9^n$	90 redn. of $.9^n$
5	.59	1	.9	.10
10	.34	2	.81	.10
15	.2 1 1	4	.66	.18
20	.12	8	.43	.35
30	.04	16	.18	.58
50	.005	32	.03	.83

Here are strikingly $\log$ returns to capital. As you double the no. of tries engaged - & i.e. the K needed - the prob. of ruin drops at an $\log$ rate.

When you are small, doubling yr. K doesn't halve yr. chances of ruin. But after a while you can halve yr. chances of failing by doubling yr. K , and then better and better.

You haven't changed the odds. You've just reduced the chance of wipe-out. You've also reduced chance of unusual hi gain, no doubt.

Above $n = 32$, you could get even higher redus. in $\log.9^n$
[$= n \log.9$] But the absolute redus wd. be less

And the % Δ in Φ survival chances becomes small

$$1 - (1-p)^n = \text{survival chance}$$

Ruin is too strong a term. Ruin is not ~~the~~ all bad. Survival of firms is not all good. Ruin allows regrouping, elim. deadwood.

Personnel w. highest confid. in their own abilities, ^{& highest willingness to work, endure privation etc.} will seek riskier pos., rewards geared to performance. And v.v.

But as to risk, multi-nationals have virtually elim. it by leav. of large nos. The ^{house} ~~bank~~ at Las Vegas doesn't take risks: the small gambler does.

<u>n</u>	<u>$(1-p)^n$</u>	<u>$1 - (1-p)^n$</u>
2	.81	.19
4	.66	.34
8	.43	.57
16	.18	.82
32	.034	.966
64	.0012	.9988
128	.0000013	.9999987

At $n = 32$, a 3.4% risk of wipeout is substantial,
relative to $i = 7.5\%$

at $n = 2$, risk is so hi that i hardly matters.

Dear Tish and Mase,

Thursday, Nov 25

For all I know today is Thanksgiving, but I have heard no mention of it over here. (Might as well use the typewriter., since it is just sitting here.) Does yours have a golfball? They are nice, because you can have several and switch to different symbols, styles of type, etc. But mostly the advantage of an electric is that with practice you can go faster, and since Mase types a lot that can be important. A minor advantage --but downgraded by the advent of xerox-- is the ability to make five carbons.

I don't really have much to say today, but I thought that I would dash off a reply to Mase's letter just to keep the flow of correspondence going.

The desk is really not important, but I did inquire again about it. It was a very inexpensive desk with a veneer top which has now come loose and has to be tacked on. On one side are 3 drawers and on the other 2, one being double size in order to serve as a file drawer. There is a shelf on each side which can be drawn out for extra space. I think that there is a middle drawer. Somewhere is either a stamp or a gummed label with Mason Gaffney on it, plus perhaps an address.

Sat. I expect to go for a hike in the Cotswolds (Sp?) with the Mathematics Club.

Glad to get a favourable report on the bibliography. My writing is sometimes influenced by Mason's, and the idea that a little liveliness in the writing helps make things interesting.

I Will be returning to The Eliot, ~~371~~ 370 Commonwealth Ave, Boston MA 02215 (?). Jan 22, However, I don't know what I would be able to do with a big box of avocados there.

I will have to send info on the estate income ~~for~~ for 1976. If I recall correctly it will be something like \$400 apiece for income tax purposes.

The one question Mase didn't answer, although it is only idle curiosity on my part, is whether the new tax law affects you. It apparently will have a big impact on some Americans in Europe.

Herewith a very, very brief summary of my lecture on the binomial distribution. If you repeat n times an experiment where each time the probability of success is p and therefore the probability of failure is $1 - p = q$, and the experiments do not interact on one another (are independent), then for each integer k between 0 and n , inclusive, the probability of exactly k successes is given by the formula

$$\text{Prob } k \text{ successes} = \binom{n}{k} p^k q^{n-k}, \text{ where } \binom{n}{k} = \frac{n!}{k!(n-k)!}$$

The prototype is flipping a biased coin, but here is another example.

The probability that a child will be

a girl is approximately $\frac{21}{43}$ (roughly $\frac{1}{2}$).

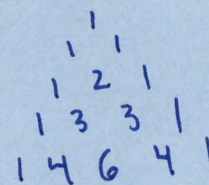
Define that to be a success. (The use of the word is somewhat

arbitrary in prob. theory, but this is clearly the right choice.) Then if $n=2$ the prob. of exactly two girls (twins excluded)

$$\text{is } \binom{2}{2} \left(\frac{21}{43}\right)^2 \cdot ()^0 = 1 \cdot \left(\frac{21}{43}\right)^2 \approx \frac{1}{4}.$$

Ann is probably an expert in prob. theory, having had a course from a good book. Maybe she could come out and elaborate on all this.

Brad is probably pretty fixed up with his studies. C.E. is a tough field.

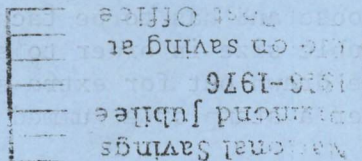


USA

Riverside, CA 92503

3040 Tyler Ave.

The Gaffneys



By air mail Air letter
Par avion Aerogramme

An air letter should not contain any enclosure

Sender's name and address (Please show your postcode)

I hope that for Stuart's peace of mind
Ann didn't buy a gar-guzzler. It's good for
my peace of mind if she stops riding bicycles on
highways. Ann saves money by her baby-sitting, so
perhaps that warrants spending it elsewhere. It won't
be worth as much next year.

Love to all,
Matt

1% chance of \$100

100% chance of \$1

Same value? Not if you have to wait.

i.e., shd. be lower than in 20% ballparks

a) Majors borrow at prime

b) " have surplus internal funds, are even divesting

c) End-users make upstream loans, $i=0$. a-f effect.

gas pipelines & utilities sustaining rate bases

d) Majors history of holding excess reserves shows they have much "patient money".

e) Is no gain to Aik. in subsidizing duplicate short lines.

f) Majors never go bankrupt. They even survived blow of OPEC!

Effect of low i is not to slow down prodn. from proven reserves anyway. It is not i -sensitive. Rather, effect is distrib. to Aik's share. So beware buying any hi risk stories.

C

Risk sharing

Atk. more diversified than most bidders, esp. lean interlopers we want to encourage. Shd. i. assume more risk.

Risk means participating, taking equity position, laying down some chips on the table & sharing in outcome.

Yet state doesn't want to share too much in outcome, wd. destroy incentive, encourage graft, padding.

So convert state's share into a fixed charge, as soon as feasible, based on more of its input. Its input is fixed, so its share can be a fixed amt. Off the bottom, rather than the top.

Its input is land. Trick is val. land. Van P. has done that. Paschall has shown how to use the info. of a Van P. rpt., & what else is needed.

(OKG says he knows as much about reem. as Paschall, but Paschall knows about capitalizing & appraisal techniques)