



Notes: Effects of Land and Taxes on Rates of Return on Investment

By Dr. Mason Gaffney

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Notes by M. Gaffney on the effects of land and taxes on rates of return on investment. Conclusion, 2-26-85.

C. The effect of income taxes on rates of return

1. PIPO case

a. When $L=0$

There is a tax benefit enjoyed simply by virtue of tax deferral. This benefit increases with the length of time of deferral, an effect not shown here; and with the rate of gain. Equation (5) and Table 5 show the second effect.

$$RRAT = \left[\frac{F(1-t) + Pt}{P} \right]^{1/n} - 1 \quad (5)$$

where $RRAT$ = rate of return after taxes
and t = tax rate imposed on $(F-P)$ at time n

Table 5: ROR on PIPO investment, before and after tax

Let $n=15$; $P=1$; $t=.5$; $L=0$

F	RRBT	RRAT	RRAT/RRBT
	%	%	(3)/(2)
(1)	(2)	(3)	(4)
0.0	-100.0	-4.52	.045
.5	-4.52	-1.90	.420
1.0	0.00	0.00	.500*
2.0	4.73	2.74	.579
4.0	9.68	6.30	.651
6.0	12.69	8.71	.686
8.0	14.87	10.55	.709

*The seemingly "indeterminate" ratio of 0/0 may in this case be determined by invoking l'Hopital's Rule. You may see this on your calculator by letting F be 1.001, and .999, and note how your answers approach .500.

The moral of Table 5 is that the income tax, based as it is on realization of gains through sale, contains a built-in bias in favor of PIPO gains (as opposed to income that flows in annually). The bias is manifest in RRAT's being higher than 50% of RRBT, even though the tax rate is a nominal 50%. This is the background against which we are to measure the further bias that results from adding land to the investment equation.

b. L greater than zero

As we saw before in §A, the effect of adding inert land to the top and bottom of the ratio F/P is to dilute the ratio and lower the ROR. "Inert" here refers to land that remains constant in value over the cycle of investment.

But if L rises in value faster than the capital that is on it, it raises the rate of gain. This advantage is enhanced where land gains are subject to a special low tax rate, "s". Equation (6) and Table 6 put this all together in one package.

$$RRAT = \left[\frac{F(1-t) + Pt + L_n(1-s) + L_0s}{P + L_0} \right]^{1/n} - 1 \quad (6)$$

Table 6: RRAT on PIPO investment, with land gain taxed at lower rate
 $n=15$; $P=1$; $L_0=1$; $t=.5$; $s=.2$

F	L_n	RRBT %	RRAT %	RRAT/RRBT
(1)	(2)	(3)	(4)	(5)
2	1	2.74	1.50	.547
4	1	6.30	3.80	.603
8	1	10.55	6.98	.661
8	2	11.33	7.95	.702
8	4	12.69	9.59	.756
8	6	13.85	10.95	.790
8	8	14.87	12.10	.814
6	8	13.85	11.40	.823
4	8	12.69	10.63	.838
2	8	11.33	9.77	.863
1	8	10.55	9.31	.883

There are two forces at work shown in Table 6. First, the advantage of tax deferral grows as RRBT grows. This effect is manifest in the top 7 rows, with col. (3) rising from 2.74 to 14.87, and col. (5) rising from .547 to .814. A nominal tax rate of 50% leaves the taxpayer with a RRAT equal to .814 of the RRBT, which amounts to an effective tax rate of less than 19%.

Second, there is the advantage of the lower tax rate on land. This is manifest in the bottom 5 rows where col. (5) continues to rise, even though col. (3) is falling. It is also manifest in the row where $F=8$ and $L_n=6$. Here $RRAT = 10.95\%$, which is higher than what we get in Table (5) when $F = 8$ and $RRAT = 10.55$. In this case the diluting effect of the slower-growing land value is more than offset by the effect of the lower tax rate on land gains.

The gain on some PIP0 investments in fact now also gets the lower "capital gains" rate. Timber is notable, having been awarded this favorable treatment since 1946. Here, however, our interest is in exploring the effects of the application of different rates, so we do not pursue the timber case, which would obviously be simpler and can be explored now by any reader.

2. Combined case

Here we build from our basic Equation (3), and modify it for taxes, and deductions from taxes. Cash flow is taxed at the "ordinary" rate, t ; and depreciation is deductible at the same rate. "Capital gains", which are really mostly land gains, are taxed at a lower rate, s ; and the "basis" of property, which is the part of the historical purchase price which is not depreciated, is deducted from the capital gain. Equation (7) puts that all together.

$$RRAT = \frac{[a(1-t) + (B/n)t](1-I^{-n})}{(L_0+B) - [L_n(1-s) + L_0s]I^{-n}} \quad (7)$$

a = cash flow

t = tax rate on "ordinary" income

B = Building cost, which is depreciable

L_0 = Land cost, not depreciable

n = economic life, here assumed equal to tax life

B/n = annual depreciation allowed as deduction, assuming simple straight line depreciation with no acceleration. This assumption is made for simplicity: actual treatment is often more complex, with faster write-off followed by some recapture.

$(B/n)t$ = annual reduction of tax liability due to deducting B/n
 s = tax rate on land gains.

L_n = Salvage value of land at time n . If it is resold at that time, there is a tax on the gain.

L_0s = reduction of tax liability due to deducting the "basis", L_0 , from the gain in L

(7) shows the logic of how this equation is constructed. Having this in hand, we now modify it to focus attention on the key ratios that determine the outcome, and which will vary in the tables that follow. Make these changes:

$$P = L_0 + B$$

$$lP = L_0 \quad (l \text{ is the fraction of } P \text{ which is land})$$

$$(1-l)P = B$$

$$F = L_n$$

Finally, divide both numerator and denominator by P , to put the equation in standardized form. We now have the very last equation we will need.

$$RRAT = \frac{[(a/P)(1-t) + t(1-l)/n](1-I^{-n})}{1 - [F(1-s)/P + ls]I^{-n}} \quad (7a)$$

Table 7 (next page) shows RRBT and RRAT as F/P rises from 0 to 8. Most of its assumptions are realistic. A few are bent a little in the cause of simplicity:

--- When F is less than L_0 Table 7 allows full deduction of the loss, at the gains rate, s . In practise such deductions cannot all be taken for granted. Some capital losses are never usable, and others require quite a struggle.

--- " l " refers to the share of P that is land for tax purposes, hence is not depreciable as an expense against ordinary income. It is here assumed constant at .4. Actually it is subject to the facts of each case, and to judgment and negotiation with IRS personnel. The relationship between the true value of l and the tax value of l may not be very close. It is believed by some experts that the IRS is more lenient in this matter than it is in most others, letting taxpayers depreciate land in effect. Taxpayers usually want to depreciate as much of P as possible so they can take it off against ordinary income, at an early date.

The undepreciated basis is deducted only from a capital gain, and not until the time of sale. There are many reasons (some of them noted under Table 7) why the time of sale may never come.

I have shortened these notes by sparing you a table showing how RRAT varies with the value assigned to l . It does make quite a difference.

--- taking $t=.5$ is a bit high. But when you combine Federal and California taxes it is closer. As in all these calculations it refers to the marginal rate, not the average.

--- taking $s=.2$ is shorthand for $t = .5 \times .4(P-L_0)$. Here it doesn't matter. Sometimes it does, and, apart from this example, you should think in terms of excluding 60% of gains from taxable income, rather than applying a tax rate 60% below the ordinary rate.

Table 7: ROR, combined case, as affected by income taxes

$n=15$; $a=.10$; $P=1$; $t=.5$; $s=.2$; $l=.4$

F/P	RRBT	RRAT				RRAT/RRBT
		$s=0$	$s=.2$	$s=.5$	$s=1.0$	$s=.2$
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1) 0.0	5.56	.61	1.47	2.56	4.00	.264
2) .5	8.18	4.62	4.50	4.33	4.00	.550
3) 1.0	10.00	7.00	6.50	5.68	4.00	.650
4) 2.0	12.56	10.12	9.27	7.76	4.00	.738
5) 4.0	15.87	13.90	12.76	10.60	4.00	.804
6) 8.0	19.84	18.25	16.87	14.19	4.00	.850
Row 6/1	3.57	29.92	11.48	5.54	1.00	3.22

Table 7 shows the combined effect of land value gains and their preferential tax treatment. The combined effect is at its strongest in Col. (3) where there is no tax at all on the land gain. The RRAT in row 6 is 29.92 times that in row 1, even though the ordinary income remains unchanged at .1P.

Morals:

a) RRAT/RRBT is highly variable: low where there are losses on the speculative land element, and high where there are gains.

b) This variation is a maximum when L' is untaxed, as in Col. (3) where $s=0$.

For most of us a tax rate of zero is a pipe dream. But landholders achieve it routinely, simply by not selling. The best

way in the world to avoid income tax is to buy land in advance of anticipated future needs -- your own needs, that is. This option is of dubious value to most firms and individuals because they lack the deep pockets of "patient money" that are required. It is of no value to those who buy the wrong land at the wrong time and see its value drop. It can be useful to ordinary people who can squeeze some cash flow from land while waiting for it to make them rich in later life.

c) The preferred treatment of land gains is only partly due to the use of a lower tax rate. It is also due to deferral of the tax until the end of the cycle, in year n . This is shown in Col. (5) where $s=t$. Even with a common tax rate there remains a large rise in RRAT as F/P rises.

d) A tax of 100% on gains (Col. (6)) eliminates their effect on RRAT, as you would expect. If there were such a tax it would be avoidable, however, by not selling, resulting in a tax rate of zero.

Do not conclude from Table 7 that the secret of financial success is to seek out those investments showing the highest RRAT in the table. The problem is that others have figured this out before, and gotten there first. That in turn has caused land prices to rise, and anticipated gains to fall, with a tendency to equalize after-tax rates of return. There is reason to believe, in fact, that many people have overemphasized tax matters in their financial strategies, such that "tax shelters" are oversubscribed. One cause of the current distress in agriculture, for example, is certainly excess supply resulting from all the urban capital poured into farm tax shelters in recent decades.

The secret of financial success is harder, with calculations like those in Table 7 being merely a tool to help you judge whether others have overreacted to tax bias before you came along. If it seems tough, cheer up, it is even tougher for others who have not been through this mental discipline, and who will leave loose opportunities lying around from which you may gain.