Land Prices, Forecasts, and Appreciation
By [Dr. Mason Gaffney]

Article citation:
[Gaffney, Mason]. "Land Prices, Forecasts, and Appreciation." N.d. Study guide.

Fair Use Disclaimer
The Robert Schalkenbach Foundation, a non profit private foundation, is publishing this article, at no cost, pursuant to the Fair Use provisions of Section 107 of the Copyright Act which states that under certain circumstances, the fair use of a copyrighted material for purposes of criticism, comment, teaching, scholarship and research is not an infringement of copyright. If you have any concerns about the publication of this article, please contact us at **info@schalkenbach.org.**

The Robert Schalkenbach Foundation's Digital Collections and Archives is an extension of the Robert Schalkenbach Foundation's Engel Georgist Library. It collects, organizes, preserves, and provides free online access to researchers and the general public of Georgist literature including books, newspapers, pamphlets, scholarly articles and archival materials.

RSF is particularly proud to offer free online access to the works of the late Georgist scholar Mason Gaffney, made possible through the generosity of the Danica Foundation and with the consent of the Mason and Letitia Gaffney Trust.

Robert Schalkenbach Foundation: https://schalkenbach.org/
Engel Georgist Library: https://www.librarycat.org/lib/EngelGeorgistLibrary
RSF Digital Collections and Archives: https://schalkenbach.starter1ua.preservica.com/

Land Prices, Forecasts, and Appreciation

1. The DCF of a rising cash flow, and how it appreciates

Here we deal with a perpetual asset, like land or common stock. We also assume tenure institutions that grant land to private owners in "fee simple," meaning the private tenure is to last as long as the land.[1]

Let cash flow begin with $1, and rise yearly by a fraction, g.

$$CF = 1 + (1+g) + (1+g)^2 + (1+g)^3 + \ldots + (1+g)^{\infty} \qquad (1)$$

Then,

$$DCF = I^{-1} + I^{-2}\cdot(1+g) + I^{-3}\cdot(1+g)^2 + \ldots + [(1+g)/I]^{\infty} \qquad (2)$$

Hereafter use T (*Terra*)[2] for a perpetual DCF. Land is about the only asset whose life expectancy is commonly perpetual. "Land" is short for all natural resources, including some you might not think of as land such as the surf, all water, the radio spectrum, the natural gene pool, fisheries, air space, and air itself (the gas).

Summing the series:

$$T = I^{-1}\ \frac{1}{1-[1+g]/I} = \frac{1}{I-(1+g)} = \frac{1}{i-g} \quad (g>i) \qquad (3)$$

---

[1]Why the legal detail? Many interests in land are terminable; fee simple is not universal, nor inevitable, nor a "natural order" of things. It is a human institution of fairly recent origin and an uncertain future.

[2]Most of you know that *Terra* is Latin for "land." "L" is generally used to denote Labor, so we need another letter for Land. "G" might be used, from Ground, but I use G to mean Generation. Foresters use "B", from the German *Bodenwerte*. I used to use that when I lived in Milwaukee, with its German population. *Terra* is easier for most English-speakers to remember today, especially in southern California. Think of it as *Tierra*, if that helps.

Note how the presence of -g in the denominator enhances the leverage of i on T. Otherwise put, in terms of Sensitivity, -g makes T highly sensitive to Δi. This sensitivity becomes extreme, even preposterous, as g--->i.

Solving (3) for Ti:

$$Ti = 1 + Tg \qquad (4)$$

Tg is ΔT by obvious inference from the equations (1) and (2), which define cash flow year by year. Work this out as an exercise.

Thus, Ti equals the sum of CF plus current appreciation. Note the symmetry and consistency of this with the paper on depreciation, where Pi equals CF less Depreciation.

(3) is a "factor" like the DCFF previously studied. It is true for each $1 of CF. For values of CF other than $1, multiply the factor by the applicable CF. This is a simple, general procedure that lets us figure out factors just once, then apply them to all cases.

This model, as summed up in Eqn. (3), is limited in application by its simplifying premise that the land being valued yields a steady yearly cash flow. A good deal of land does fit the model. In farming, cash grain farms, for example, yield their product regularly with only few or minor permanent improvements. In cities, parking lots are like that. Most land uses, however, call for periodic capital improvements. Their optimal use calls for periodic discrete cycles of investing capital followed by recovery. We need another model to value them.

2. Periodic Payments and Repeating Cycles

Go back to Equation (5,B), on p.11 of the paper on "Basic Math of Finance." Solve it for a/i:

$$a/i = \frac{P}{1-I^{-n}} \qquad (5)$$

"a" is the n-year-long annuity corresponding to P, i.e. having a DCF of P. Dividing a by i "capitalizes" it, i.e. gives the DCF of a perpetual annuity of a.

Thus the right side of (5) is the present value of a perpetual succession of payments of value P, received every n years. Note how this jibes with our earlier look at the Land Value Multiplier, which we previously derived in two different ways. This is restated in Section 3, following. See also the paper on "Present Value of Future Periodic Capital Costs."

How about appreciation? What if each succeeding cycle or "Generation" of investment and recovery will yield a higher gain than its predecessor? See Section 5, below.

3. Positive NPV and land values.

Net Present Value, NPV, means the present discounted value of future cash flows less the capital costs (K) at time zero that make these cash flows happen. What happens if investments yield positive NPVs regularly and routinely? That sounds too good to be true. If it were true, anyone could build new capital and sell it immediately for more than cost, quickly growing infinitely rich.

What prevents it is there is an invisible input that makes these favorable results possible. That input is land. Land is seen, but often unobserved. ("You see, my dear Watson, but you do not observe.")

What happens is this: the ability to get positive NPVs creates demand for the land on which such favorable results are possible. The Hawaii Hilton needs Waikiki; if would fare badly in Nome, or even Keokuk, IA. *Build it and They Will Come* was not written by a real estate person; **LOCATION** is everything. The selling price of land rises to soak up the surplus. Who says "there's no such thing as a free lunch"? Rather, as JFK said, "Life is not fair."[3]

---

[3]Economic life should be fair; that doesn't mean it is. Maybe your generation will make it so, as mine failed to do, but up to now it hasn't been fair, and it is getting less so. You'll never understand economic life if you feel you must believe in it, just because you're here and this is your life. You have to live with it, but you don't have to fall for its mythology. You'll cope better if you do not - keeps the head clearer.

Life is one long free lunch for the heirs of old settlers and other ancient owners, who make newcomers pay for a toehold on the Earth. Landownership is the original and greatest "welfare entitlement." Obvious as that is, it is one of the better kept

4. The Present Value of Succeeding Generations

Land lasts forever, so its value soaks up the surplus expected from all future cycles or Generations, not just the first. The NPV of the first Generation of investment and recovery is dated at time zero, the present. The NPV of the second Generation is dated at the end of the first one; of the third Generation at the end of the second, and so on. To find T, each succeeding G-value should be discounted back to time zero and added to the NPV of the first Generation.

Performing this summation we get Land Value (T).

$$T = G \frac{1}{1-I^{-n}} \qquad \text{(5, again)}$$

(5) consists of NPV of Generation #1 (G) times the rest of the right side. The latter is the reciprocal of the denominator. Call this reciprocal the "Land Value Multiplier" (LVM). To find land value, multiply NPV of Generation #1 by LVM. LVM is a coefficient greater than one which shows how much greater land value (T) is than the NPV of Generation #1.

$$LVM = \frac{1}{1-I^{-n}} \qquad (6)$$

For values of LVM, see Table 1.

---

secrets of economic theory, which has generally been developed and practiced with an eye to papering over this unfairness. Our objective in Managerial Economics is not to pass judgment, but to understand how the system works, the better to cope with it. In Managerial Economcs, just keep aware that people trying to rationalize the system have created reams of confusion in the process; don't let it bamboozle you.

Table 1: Land Value Multipliers

i --->	.02	.04	.08	.12
n				
1	51.00	26.00	13.50	9.33
5	10.61	5.62	3.13	2.31
10	5.57	3.08	1.86	1.47
20	3.06	1.84	1.27	1.12
40	1.83	1.26	1.05	1.01

To find Land Value, multiply NPV of Generation #1 by the applicable figure.

5. Effects of Foreseen Inflation

To adjust for foreseen inflation, the easy way is to use a real interest rate. That means (except for high inflation rates) just subtract the inflation rate from the nominal interest rate.[4] Thus, .05 is more realistic than .08, in the U.S.A., 1995.

Note, however, the inflation rate to apply here has to be a forecast. Individuals' forecasts in this world are highly subjective, speculative, and idiosyncratic. Many landowners and buyers today hold apocalyptic visions about future inflation. Once those with such views were a fringe, but their numbers are growing. They may base their subjective forecasts on radio-TV talk show hosts who tell them the U.N. is a conspiracy to seize the Federal Reserve Banks and repudiate the currency - things like that. If they believe the real i=0, it follows the LVM=∞.

There is a rustling of papers in the ivory towers with notions of "rational expectations" and "perfect markets," but a few minutes listening to certain radio-TV pitchmen, and watching the doting of their fans, should dispel such notions. Either they are unhinged, or their targeted condemnees are, as they say:

---

[4]If nominal interest rates and foreseen inflation rates get up over 15% or so, you need to sharpen your pencil, because simple subtraction will overstate your return after inflation. See the paper, "Sensitivity of Basic Financial Factors to n and i."

it must be one or the other, and may well be both. Take your choice, but general rationality is ruled out.

Quite apart from general inflation, caused by raising the money supply, there is often a real inflation of land rents, in constant dollars. To adjust for this, subtract the real inflation from the .04. Thus, .02 might be applicable. Note how this raises the LVM.

In the current (1995) militia-man, survivalist mindset, only land is safe to own because it never turns over and so is never turned into cash which the government controls, traces, and may seize or devalue. Land can be used for militia training maneuvers, and storing and concealing arms and munitions. These people in the land market, with their particular mix of the rational and irrational, may do astonishing things to land prices. Our sober-sided tables can only begin to show the influences.